FINAL DRAINAGE REPORT FOR
HUNSINGER SUBDIVISION
LOT 10, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B CPRING CREST AMD FIL - LOT K, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL NO 2 – LOT L, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL 2
10140 OTERO AVENUE
COLORADO SPRINGS, COLORADO

May 24, 2018

Prepared For:
HUNSINGER DEVELOPMENT CORPORATION
Attn: Steve Hunsinger
10140 Otero Avenue
Colorado Springs, Colorado
719.955.1634

Prepared By:

TERRA NOVA ENGINEERING, INC.
721 S. 23RD STREET
Colorado Springs, CO 80904
(719) 635-6422

Job No. 1609.00

Add PCD File No. VR-18-014

FINAL DRAINAGE REPORT FOR
HUNSINGER SUBDIVISION
LOT 10, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B CPRING CREST AMD FIL - LOT K, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL NO 2 – LOT L, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL 2
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APPENDICIES

FINAL DRAINAGE REPORT FOR
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LOT 10, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B CPRING CREST AMD FIL - LOT K, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL NO 2 – LOT L, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL 2
10140 OTERO AVENUE
COLORADO SPRINGS, COLORADO

ENGINEER'S STATEMENT:

This report and plan for the drainage design of "HUNSINGER SUBDIVISION" 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.

Use El Paso County standard signature blocks for Engineers, Developers, and El Paso County statements

_____
L Ducett, P.E. 32339 Seal

DEVELOPER'S STATEMENT:

HUNSINGER DEVELOPMENT CORPORATION hereby certifies that the drainage facilities for HUNSINGER SUBDIVISION shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of HUNSINGER DEVELOPMENT CORPORATION guarantee that final drainage design review will absolve HUNSINGER DEVELOPMENT CORPORATION and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

HUNSINGER DEVELOPMENT CORPORATION

_____
Authorized Signature Date

_____
Printed Name

_____
Title

_____
Address

El Paso County Statement:

Filed in accordance with Section 51.1 of the El Paso Land Development Code, as amended.

_____ _____
Director of Public Works Date
Conditions:

FINAL DRAINAGE REPORT FOR
HUNSINGER SUBDIVISION
LOT 10, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B CPRING CREST AMD FIL - LOT K, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL NO 2 – LOT L, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL 2
10140 OTERO AVENUE
COLORADO SPRINGS, COLORADO

PURPOSE AND JUSTIFICATION

The purpose of this Final Drainage Report is to identify and analyze the existing drainage patterns, determine existing runoff quantities, and analyze the current development of this site as a residential subdivision. These lots have previously been platted and have not been part of previous drainage studies.

GENERAL DESCRIPTION

This Final Drainage Report for "HUNSINGER SUBDIVISION", located at 10140 Otero Road, is an analysis of an approximately 697,800 sf (16.02 ac) basin. The site is platted as LOT 10, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B CPRING CREST AMD FIL - LOT K, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL NO 2 – LOT L, VAC W 20.0 FT OF OTERO AVE ADJ, BLK B SPRING CREST FIL 2; with Lot 10 currently in use as a residence, and Lot K and Lot L currently being grazing/pasture land. The proposed development is a subdivision into five residential lots.

The site is in the northwest quarter of Section 28, Township 12 South, Range 66 West of the 6th Principal Meridian within El Paso County. The parcels are bounded to the north by Old Ranch Road, to the east and south by Otero Avenue, and to the west by Lot 9 & E 153.00 ft of Lot 8 Blk B Spring Crest AMD Fil and Lot M, Vac W 20.0 ft of Otero Ave, Blk B Spring Crest Fil 2. (See vicinity map, Appendix A).

The site lies within the Kettle Creek Basin, with storm runoff draining into Kettle Creek at the southwest corner of the subdivision.

The site consists of 52% Columbine gravelly sandy loam (hydrologic group "A") and 48% Stapleton-Bernal sandy loams (hydrologic group "B") per the USDA, NRCS web soil survey. The

hydrologic group "A" was used to represent the soil types and determine the onsite basin overland flow. (See map in appendix)

The study area consists of mostly undeveloped land, which currently includes a residence and grazing/pasture land, with mostly grass and dirt surfaces. The southwest corner of the study area is wooded, with a smaller number of trees scattered about the remainder of the study area. Approximately 1% of the study area is currently impervious (from roofs) and none of the study area is currently paved. The site currently drains toward the southwest, with an average slope of 12%.

EXISTING DRAINAGE CONDITIONS

There are seven existing structures, and Kettle Creek, in the southwest corner of the site. There is an existing drainage channel on the east and south sides of the site along Otero Avenue that drains into Kettle Creek on the site. There are two pond areas on the site, and two culverts along Otero Avenue for drive access' for the existing structures.

The site has one existing drainage basin (EX-A) which is 16.02 acres and drains to Design Point A. Drainage basin EX-A has flows of Q_5 = 4.7 cfs and Q_{100} = 34.3 cfs. These flows are bases on approximately 1% of the basin being impervious. See attached Existing Drainage Map (in appendix). Some of the current drainage flows directly into Kettle Creek and some flows into a drainage channel along Otero Avenue before flowing into Kettle Creek. All of the drainage enters Kettle Creek onsite.

PROPOSED DRAINAGE CONDITIONS

In the proposed condition the drainage pattern for the site will remain essentially unchanged. No significant grading is proposed as part of this subdivision. The only increase in impervious area is from the addition of four building pads (for a total of 10,000 sf additional impervious area). Drainage will continue to flow into Kettle Creek on the southwest corner of the site.

Basin PR-1 (16.02 acres) covers the entire site and includes roof area, gravel surfaces, and dirt/grass surfaces that sheet and channel flows to the southwest corner of the basin and Design

Point 1, where Kettle Creek leaves the site. Basin PR-1 flow is 5.2 cfs for the 5 year event and 35.2 cfs for the 100 year event. These flows are bases on approximately 2.5% of the basin being impervious.

Flows within basin PR-1 will include only surface routing (no pipe routing). Surface routing includes sheet flow and channel flow directly into Kettle Creek and sheet flow into a channel along Otero Avenue before the channel flows into Kettle Creek on the southwest corner of the site.

Please see detailed calculations in the appendix.

Estimated percent impervious appears low. Per ECM appendix L table 3-1, typical values of percent impervious for single-family 2.5 acre lots is 11%. Revise accordingly.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the City of Colorado Springs Storm Drainage Design Criteria Manual Volumes 1 & 2 May 2014. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Not applicable.

Include a narrative explaining/justifying why flood control detention was not provided.

WATER QUALITY

As the disturbed area included in this subdivision (from proposed building pads and 20' wide drive access ways) is less than one acre, no water quality treatment is required. Additionally, the estimated percent impervious for the subdivision is only 2.5%.

FLOODPLAIN STATEMENT

Approximately 0.43 ac of the southwest corner of the site is within the designated F.E.M.A. 100 year flood plain of Kettle Creek per Flood Insurance Rate Map No. 08041C0506 F dated March 17, 1997 (see appendix and drainage maps). The 100 year flood elevation is shown as 6,631 feet on the site.

No changes to the lot lines in or adjacent to this flood plain are proposed as part of this subdivision. Additionally, no new structures are proposed in the proposed lot that includes this flood plain.

EROSION CONTROL

As no significant grading is proposed as part of this subdivision, no erosion control measures have been included.

CONSTRUCTION COST OPINION

Not applicable.

Show the calculations to get to 0.41 imp. ac.

DRAINAGE FEES

The existing site is in the Kettle Creek Basin (# FOMO3000). 2018 drainage fees due prior to final plat recordation for the Hunsinger Subdivision are as follows:

DRAINAGE FEES:	0.41 imp ac	x	$9,287	=	$ 3,808
				TOTAL $	**3,808**

MAINTENANCE

Not applicable.

Evaluate the 4-Step process addressing each step listed in section I.7.2 of ECM appendix I.

SUMMARY

Subdivision of this site will not adversely affect the surrounding development. In the proposed condition the drainage pattern for the site will remain essentially unchanged. No significant grading is proposed as part of this subdivision. Water quality is not required due to the disturbed area included in this subdivision being less than 1 acre.

Add a sentence stating There are no associated bridge fee in the Kettle Creek Basin.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

If the stock ponds remain then identify who owns/maintains the existing stock pond.

Luanne Ducett, P.E.
President

Jobs//1609.00/Drainage/160900 Final Drainage Report.docx

BIBLIOGRAPHY

"City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2, May 2014

"NRCS Soil Map for El Paso County Area, Colorado

"F.E.M.A. Flood Insurance Rate Map No. 08041C0506 F dated March 17, 1997

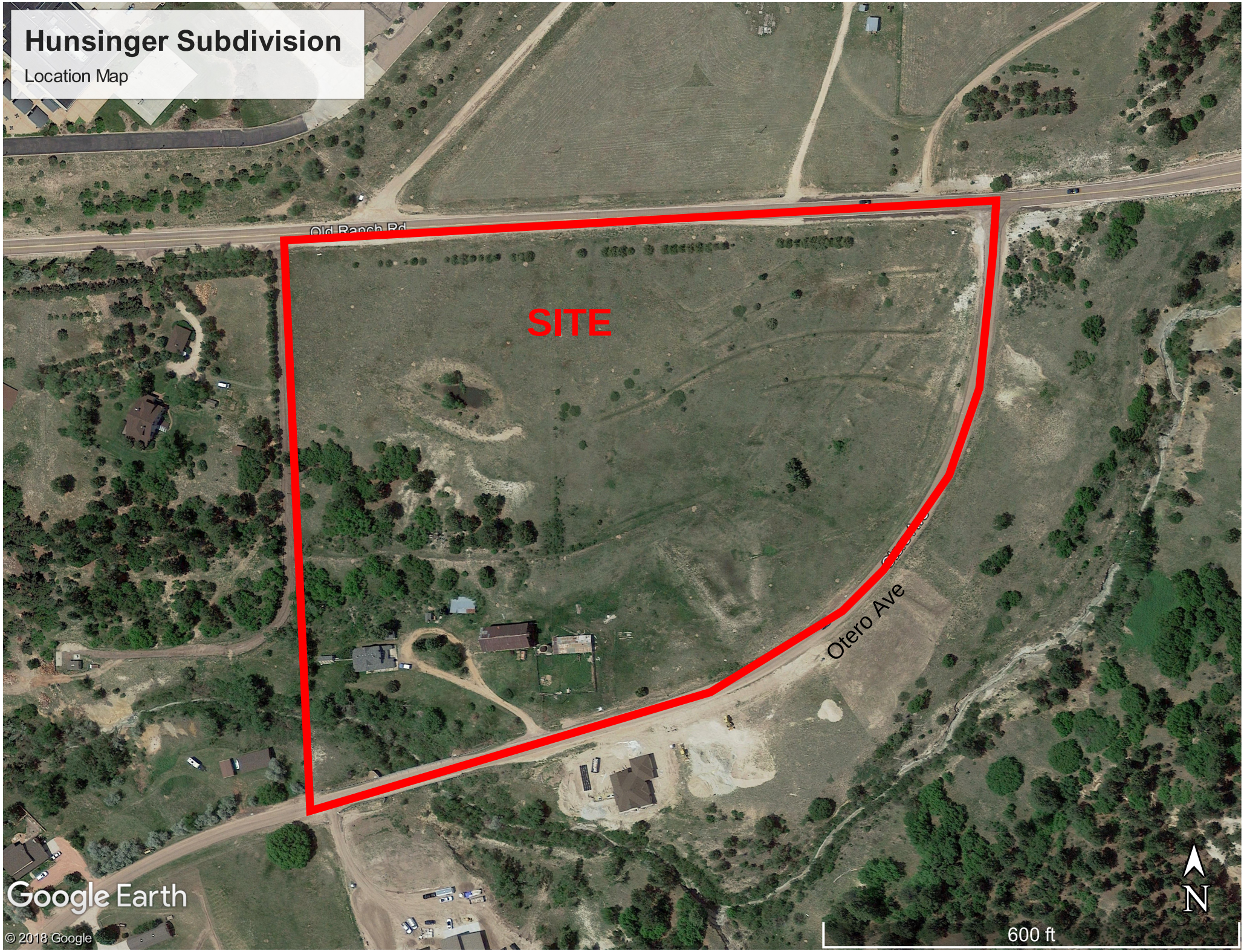
VICINITY MAP

Hunsinger Subdivision
Vicinity Map

Map data ©2018 Google 500 ft

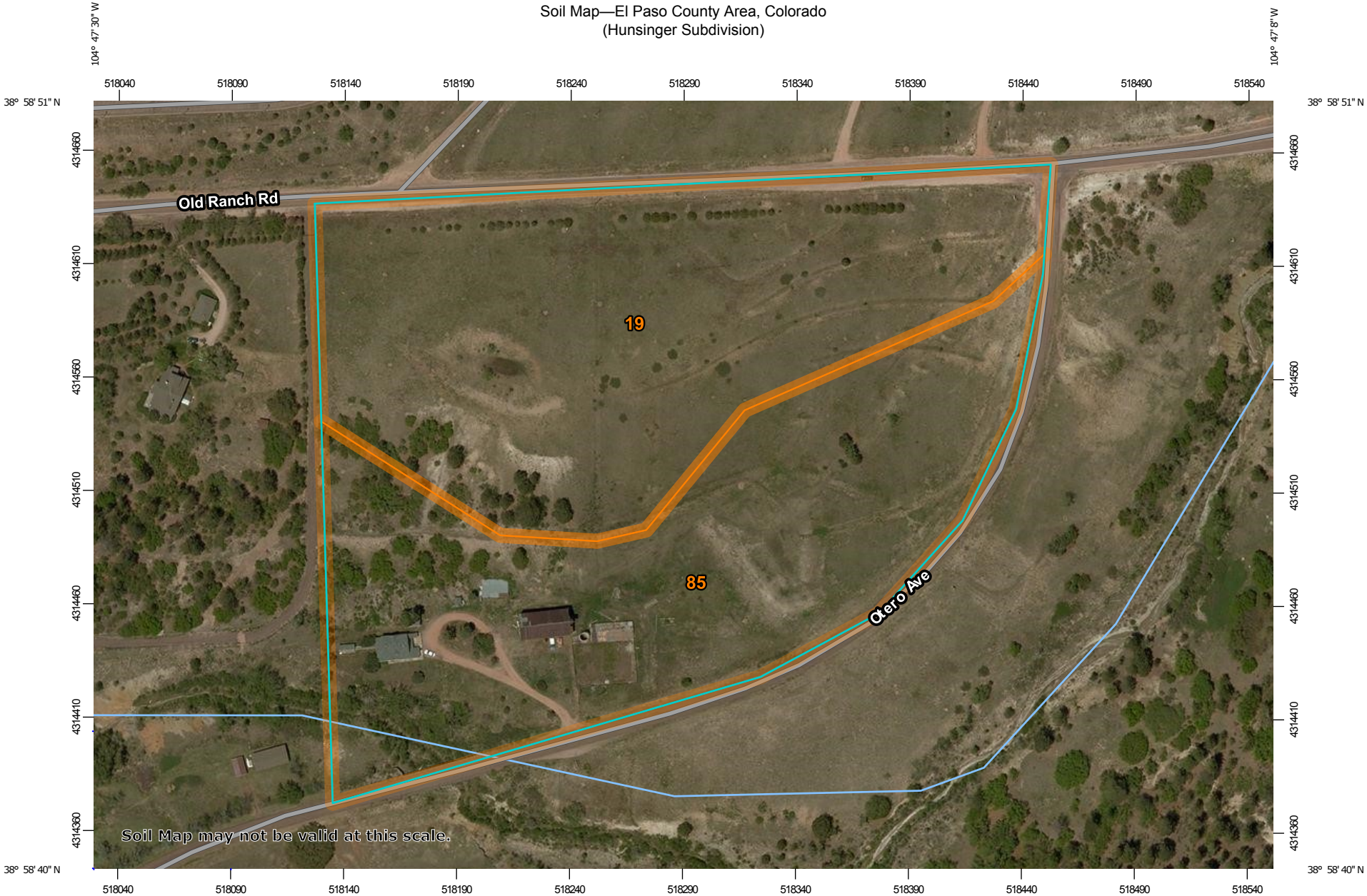
N

GENERAL LOCATION MAP


Hunsinger Subdivision
Location Map
Old Ranch Rd
SITE
Otero Ave
Google Earth
© 2018 Google
N
600 ft

NRCS SOIL MAP

Soil Map—El Paso County Area, Colorado
(Hunsinger Subdivision)



Map Scale: 1:2,390 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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 15, Oct 10, 2017

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

Date(s) aerial images were photographed: Jun 3, 2014—Jun 17, 2014

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
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	8.8	51.7%
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	8.2	48.3%
Totals for Area of Interest		**16.9**	**100.0%**

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: Fan terraces, fans, flood plains
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

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

El Paso County Area, Colorado

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

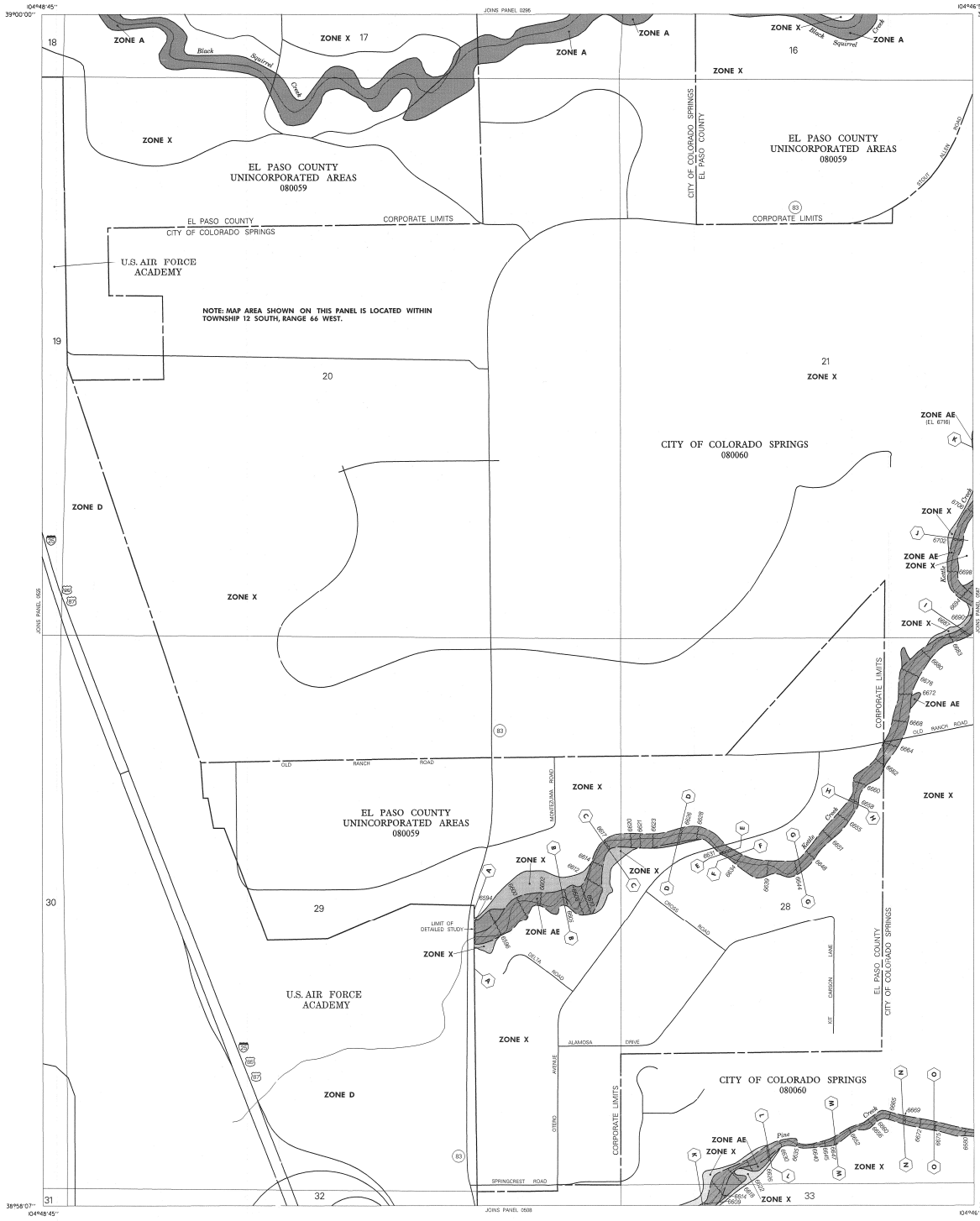
Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

FEMA FIRM MAP



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year floodplain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

D Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 Elevation Reference Mark

M2 River Mile

97°07'30", 32°22'30" Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those designated by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY,
COLORADO AND
INCORPORATED AREAS

PANEL 506 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0506	F
EL PASO COUNTY UNINCORPORATED AREAS	080059	0506	F

MAP NUMBER
08041C0506 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

HYDROLOGIC CALCULATIONS

HUNSINGER SUBDIVISION
AREA RUNOFF COEFFICIENT (C) SUMMARY

EXISTING

		DEVELOPED			*UNDEVELOPED*			*WEIGHTED*		*WEIGHTED CA*	
BASIN	**TOTAL AREA**	**AREA**	**C5**	**C100**	**AREA**	**C5**	**C100**	**C5**	**C100**	**CA5**	**CA100**
	(Acres)	*(Acres)*			*(Acres)*						
EX-A	16.02	3.00	0.09	0.36	13.02	0.08	0.35	0.08	0.35	1.31	5.64

DEVELOPED

		DEVELOPED			*UNDEVELOPED*			*WEIGHTED*		*WEIGHTED CA*	
BASIN	**TOTAL AREA**	**AREA**	**C5**	**C100**	**AREA**	**C5**	**C100**	**C5**	**C100**	**CA5**	**CA100**
	(Acres)	*(Acres)*			*(Acres)*						
PR-1	16.02	16.02	0.09	0.36	0.00	0.08	0.35	0.09	0.36	1.44	5.77

Calculated by: DLF
Date: 5/23/2018
Checked by: _____

HUNSINGER SUBDIVISION
RUNOFF SUMMARY

EXISTING

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_C	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(ft/ft)*	T_t *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		* For Calcs See Runoff Summary														
EX-A	16.02	0.08	0.35	0.08	300	0.12	14.0	0	12.0%	0.7	0.0	14.0	3.6	6.1	4.7	34.3

DEVELOPED

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_C	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(ft/ft)*	T_t *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		* For Calcs See Runoff Summary														
PR-1	16.02	0.09	0.36	0.09	300	0.12	13.9	0	12.0%	0.7	0.0	13.9	3.6	6.1	5.2	35.2

Calculated by: DLF

Date: 5/23/2018

Checked by: _____

HUNSINGER SUBDIVISION
SURFACE ROUTING SUMMARY

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
1	**PR-1**	1.44	5.77	13.9	3.6	6.1	5.2	35.2

Calculated by: DLF

Date: 5/23/2018

Checked by: _____

DRAINAGE MAPS

HUNSINGER SUBDIVISION

EL PASO COUNTY

EXISTING DRAINAGE MAP

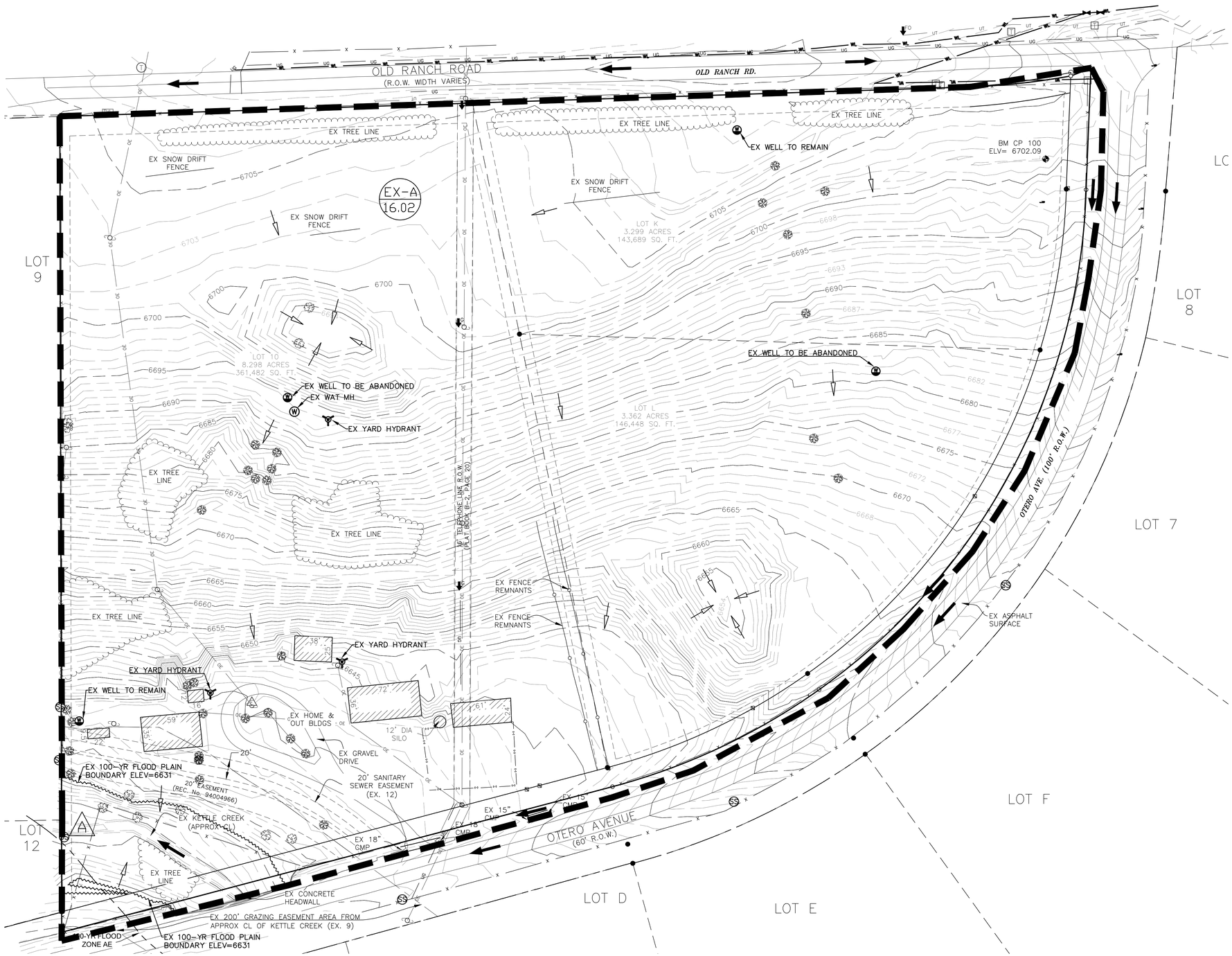
MAY 2018

DRAINAGE SUMMARY

DESIGN POINT	BASIN TRIBUTARY	AREA (ACRES)	FLOW 5 YR (cfs)	FLOW 100 YR (cfs)
A	EX-A	16.02	4.7	34.3

LEGEND

- P-7 / 12.22 — BASIN DESIGNATION / AREA IN BASIN (AC)
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- YARD HYDRANT
- ELECTRIC METER
- OVERHEAD ELECTRIC LINE
- UNDERGROUND FIBER-OPTIC MARKER
- TELEPHON PEDESTAL
- UNDERGROUND TELEPHONE MARKER
- UTILITY POLE
- GUY WIRE
- STREET SIGN
- MAILBOX
- CHAIN-LINK FENCE
- BARBED-WIRE FENCE
- CL EX SWALE
- EX TREE
- EX SANITARY SEWER MANHOLE



N

50' 0 50' 100'

SCALE: 1"=50'

REVISIONS

NO.	DESCRIPTION	DATE
1.	REV'D PER 6/2/16 CITY COMMENTS	8/22/16

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
HUNSINGER DEVELOPMENT CORP
ATTN: STEVE HUNSINGER
4406 COLLEGE PARK COURT
COLORADO SPRINGS, CO 80918

Terra Nova Engineering, Inc. "Creative Civil Engineering Solutions"
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tneginc.com

HUNSINGER SUBDIVISION

EXISTING DRAINAGE PLAN

DESIGNED BY JF
DRAWN BY JF
CHECKED BY LD
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 1609.00
DATE ISSUED 05/29/18
SHEET NO. 1 OF 2

N:\jobs\1609.00\Drawings\SDP\160900 SDP.dwg, EX-DR, 5/29/2018 10:00:08 AM

HUNSINGER SUBDIVISION
EL PASO COUNTY
PROPOSED DRAINAGE MAP
MAY 2018

Include the off-site subbasin draining into the property. Update the narrative accordingly.

DRAINAGE SUMMARY

DESIGN POINT	BASIN TRIBUTARY	AREA (ACRES)	FLOW 5 YR (cfs)	FLOW 100 YR (cfs)
1	PR–1	16.02	5.2	35.2

LEGEND

- P-7 / 12.22 — BASIN DESIGNATION / AREA IN BASIN (AC)
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- YARD HYDRANT
- ELECTRIC METER
- OVERHEAD ELECTRIC LINE
- UNDERGROUND FIBER–OPTIC MARKER
- TELEPHON PEDESTAL
- UNDERGROUND TELEPHONE MARKER
- UTILITY POLE
- GUY WIRE
- STREET SIGN
- MAILBOX
- CHAIN–LINK FENCE
- BARBED–WIRE FENCE
- CL EX SWALE
- EX TREE
- EX SANITARY SEWER MANHOLE

NOTES

1. PR BUILDING PAD AND DRIVE ACCESS LOCATIONS ARE SUGGESTIONS
2. NO SIGNIFICANT GRADING CHANGES ARE INCLUDED IN THIS PLAN

OLD RANCH ROAD (R.O.W. WIDTH VARIES) — OLD RANCH RD.

LOT 1 — 3.06 ACRES — 133,360 SQ. FT.
LOT 2 — 2.67 ACRES — 116,529 SQ. FT.
LOT 3 — 2.53 ACRES — 110,329 SQ. FT.
LOT 4 — 2.57 ACRES — 112,097 SQ. FT.
LOT 5 — 2.89 ACRES — 126,069 SQ. FT.
LOT 7
LOT 8
LOT 9
LOT 12
LOT F

PR–1 — 16.02

EX WELL TO REMAIN
EX WELL TO BE ABANDONED
EX WAT MH
EX YARD HYDRANT
PR WELL TO BE INSTALLED WITHIN 100' OF POINT
50' X 50' BUILDING PAD
EX SNOW DRIFT FENCE
EX TREE LINE
EX HOME & OUT BLDGS
12' DIA SILO
EX GRAVEL DRIVE
EX LOT 1 DRIVEWAY
PR LOT LINES
EX FENCE REMNANTS
EX ASPHALT SURFACE
BM CP 100 ELV= 6702.09
Plat shows a single 30' wide access easement. Revise drainage plan to match the plat
PR 40' ACCESS ESMT
20' ACCESS DRIVE
20' FLAT ACCESS DRIVE
PR 20' WIDE DRIVE ACCESS WITH 18" RCP STORM CULVERT AT 7.3%
PR 20' WIDE DRIVE ACCESS WITH 18" RCP STORM CULVERT AT 7.5%
PR 20' WIDE DRIVE ACCESS WITH 18" RCP STORM CULVERT AT 5.5%
OTERO AVE. (100' R.O.W.)
20' SANITARY SEWER EASEMENT (EX. 12)
20' EASEMENT (REC. No. 94004966)
EX 100–YR FLOOD PLAIN BOUNDARY ELEV=6631
EX KETTLE CREEK (APPROX CL)
EX 200' GRAZING EASEMENT AREA FROM APPROX CL OF KETTLE CREEK (EX. 9)
EX CONCRETE HEADWALL
EX 18" CMP
EX 15" CMP
100–YR FLOOD ZONE AE
US TELEPHONE LINE R.O.W. (PLAT BOOK B–2, PAGE 20)

1. Verify the water rights (state engineer's office) and embankment stability (to be addressed specifically in the geotech report) if these are to remain.

2. If ponds remain then update the plat to enclose the pond and embankment within a no build drainage easement.

3. If ponds remain then add the following plat notes:
a. Notice: Future property owners are advised that El Paso County's approval of this plat does does not include certification of water rights or the structural stablility of the existing stock pond located on the subject property. The State of Colorado has jurisdiction regarding modification or elimination of the pond.
b. Notice: The buyer/owner of Lots 1, 2, 3, and 5 is advised that the property may be adversely impacted by stormwater impounded by the existing pond and dam embankment and may be responsible for obtaining water rights associated with such water retention/storage structure. The developer, HOA and/or property owner, but not El Paso County, is responsible for the hazards and responsibilities related to potential water storage, seepage and over-topping. The buyer should refer any questions about maintenance or water storage rights related to these ponds and dam embankments to the state engineer. No improvements shall be placed within the high water line of the stock pond reservoir or in the spillway or downstream spillway channel. If development activities associated with this subdivision results in required modifications, repairs, enlargements to, or replacement of, and dam, spillway, spillway channel, or other water detention or retention facility located within, or associated with this development, developer, the homeowner's association, and/or the dam owner shall be responsible or liable for such modifications, repairs, enlargements, or replacement and the cost thereof. El Paso County shall not be responsible or liable for such modifications, repairs, enlargements, or replacement and the cost thereof by virtue of this subdivision approval.

N

50' 0 50' 100'

SCALE: 1"=50'

REVISIONS

NO.	DESCRIPTION	DATE
1.	REVD PER 6/2/16 CITY COMMENTS	8/22/16

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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OFFICE: 719-635-6422
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HUNSINGER SUBDIVISION

PROPOSED DRAINAGE PLAN

DESIGNED BY LD
DRAWN BY DLF
CHECKED BY LD
H–SCALE AS SHOWN
V–SCALE N/A
JOB NO. 1609.00
DATE ISSUED 05/29/18
SHEET NO. 2 OF 2

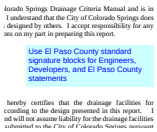
N:\jobs\1609.00\Drawings\SDP\160900 SDP.dwg, PR-DR, 5/29/2018 10:00:18 AM

Markup Summary

Daniel Torres (5)

Subject: Text Box
Page Label: 1
Lock: Locked
Author: Daniel Torres
Date: 10/5/2018 10:31:00 AM
Color:

Add PCD File No. VR-18-014



Subject: Text Box
Page Label: 3
Lock: Locked
Author: Daniel Torres
Date: 10/5/2018 10:31:01 AM
Color:

Use El Paso County standard signature blocks for Engineers, Developers, and El Paso County statements

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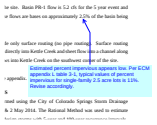
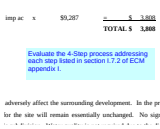


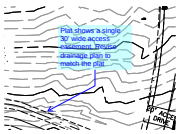
Subject: Callout
Page Label: 6
Lock: Locked
Author: Daniel Torres
Date: 10/5/2018 10:31:02 AM
Color:

Estimated percent impervious appears low. Per ECM appendix L table 3-1, typical values of percent impervious for single-family 2.5 acre lots is 11%. Revise accordingly.



Subject: Text Box
Page Label: 7
Lock: Locked
Author: Daniel Torres
Date: 10/5/2018 10:31:03 AM
Color:

Evaluate the 4-Step process addressing each step listed in section I.7.2 of ECM appendix I.



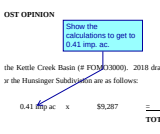
Subject: Callout
Page Label: [1] 160900 SDP-PR-DR
Lock: Locked
Author: Daniel Torres
Date: 10/5/2018 10:31:04 AM
Color:

Plat shows a single 30' wide access easement. Revise drainage plan to match the plat

dsdlaforce (6)

Subject: Callout
Page Label: 6
Lock: Locked
Author: dsdlaforce
Date: 10/5/2018 10:30:51 AM
Color:

Include a narrative explaining/justifying why flood control detention was not provided.



Subject: Callout
Page Label: 7
Lock: Locked
Author: dsdlaforce
Date: 10/5/2018 10:30:52 AM
Color:

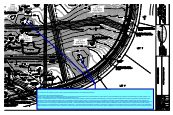
Show the calculations to get to 0.41 imp. ac.

Subject: Callout
Page Label: 7
Lock: Locked
Author: dsdlaforce
Date: 10/5/2018 10:30:53 AM
Color:

Add a sentence stating There are no associated bridge fee in the Kettle Creek Basin.

Subject: Callout
Page Label: 7
Lock: Locked
Author: dsdlaforce
Date: 10/5/2018 10:30:54 AM
Color:

If the stock ponds remain then identify who owns/maintains the existing stock pond.



Subject: Callout
Page Label: [1] 160900 SDP-PR-DR
Lock: Locked
Author: dsdlaforce
Date: 10/5/2018 10:30:56 AM
Color:

1. Verify the water rights (state engineer's office) and embankment stability (to be addressed specifically in the geotech report) if these are to remain.

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Subject: Cloud+
Page Label: [1] 160900 SDP-PR-DR
Lock: Locked
Author: dsdlaforce
Date: 10/5/2018 10:30:56 AM
Color:

Include the off-site subbasin draining into the property. Update the narrative accordingly.