

**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**

OCTOBER 2018

Prepared For:
HUNSINGER DEVELOPMENT CORPORATION
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719.955.1634

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Job No. 1609.00

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
10140 OTERO AVENUE
COLORADO SPRINGS, COLORADO**

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**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**

DESIGN ENGINEER’S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the 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.

L Ducett, P.E. 32339

Date

OWNER/DEVELOPER’S STATEMENT:

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

Authorized Signature

Date

Printed Name, Title

Business Name

Address

EL PASO COUNTY:

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

Jennifer Irvine, P.E.

County Engineer / ECM Administrator

Date

Conditions:

**FINAL DRAINAGE REPORT FOR
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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.

There are two offsite basins along the north side of the site where Old Ranch Road drains onto the site (as sheet flow). Offsite basin OS-1 is 0.37 acres and drains to Design Point Z. Offsite basin OS-1 has flows of $Q_5 = 1.2$ cfs and $Q_{100} = 2.7$ cfs. These flows are based on approximately 50% of the basin being impervious (half is paved and half is native grasses). See attached Existing Drainage Map (in appendix).

Offsite basin OS-2 is 0.17 acres and drains to Design Point Y. Offsite basin OS-2 has flows of $Q_5 = 0.4$ cfs and $Q_{100} = 1.2$ cfs. These flows are based on approximately 50% of the basin being impervious (half is paved and half is native grasses). See attached Existing Drainage Map (in appendix).

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 based 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 impervious area for the site has been set at 11% at the direction of El Paso County. Drainage will continue to flow into Kettle Creek on the southwest corner of the site.

There are two offsite basins along the north side of the site where Old Ranch Road drains onto the site (as sheet flow). Offsite basin OS-1 is 0.37 acres and drains to Design Point Z. Offsite basin OS-1 has flows of $Q_5 = 1.2$ cfs and $Q_{100} = 2.7$ cfs. These flows are based on approximately 50% of the basin being impervious (half is paved and half is native grasses). See attached Existing Drainage Map (in appendix).

Offsite basin OS-2 is 0.17 acres and drains to Design Point Y. Offsite basin OS-2 has flows of $Q_5 = 0.4$ cfs and $Q_{100} = 1.2$ cfs. These flows are based on approximately 50% of the basin being impervious (half is paved and half is native grasses). See attached Existing Drainage Map (in appendix).

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 9.4 cfs for the 5 year event and 41.5 cfs for the 100 year event. These flows are based on 11% 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.

The two existing pond areas onsite will be filled in or breached as part of this development.

Please see detailed calculations in the appendix.

In an effort to protect receiving water and as part of the “four-step process to minimize adverse impacts of urbanization” this site was analyzed in the following manner (note: this is not an urban site):

1. Reduce Runoff- The proposed lots will be rural residential on 2.5 acre lots. The percent impervious has been set at 11% and was previously estimated to be lower than that. The vast majority of the site is expected to remain in a primarily natural condition (lots of native grasses with some bushes and trees). Due to this the impervious areas of the site will be scatters around the site and will likely all be surrounded by natural/pervious areas.
2. Stabilize Drainageways- The only existing or proposed drainage channel onsite is the Sand Creek channel, which is on a portion of the site that has already been developed (existing residence). There are no drainage channels in the to be developed area of the site to be stabilized.
3. Provide Water Quality Capture Volume (WQCV)- Water quality is not required for this site due to the disturbed area being less than one acre.
4. Consider Need for Industrial and Commercial BMPs- ~~As this is a residential development industrial and commercial BMPs do not apply.~~

Update step 3 to also reference ECM Appendix I.7.1.B which notes for development areas of low density (rural) housing (2.5 acre or larger lots) WQCV is not required.

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.

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 percent impervious set for the subdivision is only 11%.

Kettle Creek DBPS was not adopted by the County.
1. Update to include the DBPS in the reference section
2. Provide the supporting sections of the DBPS in the appendix.

Flood control detention is not proposed as part of this development due the Drainage Basin Planning Study For Kettle Creek Basin not requiring flood control for this site, this development being for low density residential, and the disturbed area being less than one acre.

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.

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: 16 ac x 11% imp = 1.76 imp ac x \$9,287 per imp ac = \$ 16,345
TOTAL \$ 16,345

There are no associated bridge fees in the Kettle Creek Basin.

MAINTENANCE

Not applicable.

Include a comparative analysis b/w existing and developed flow rates. Based on your analysis state whether the increase is negligible and therefore not warrant flood control detention.

Update fee calculation per ECM 3.10.2a. Low density lots qualify for a 25% reduction in drainage fees.

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.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Luanne Ducett, P.E.
President

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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



GENERAL LOCATION MAP

Hunsinger Subdivision

Location Map

Old Ranch Rd

SITE

Otero Ave

Google Earth

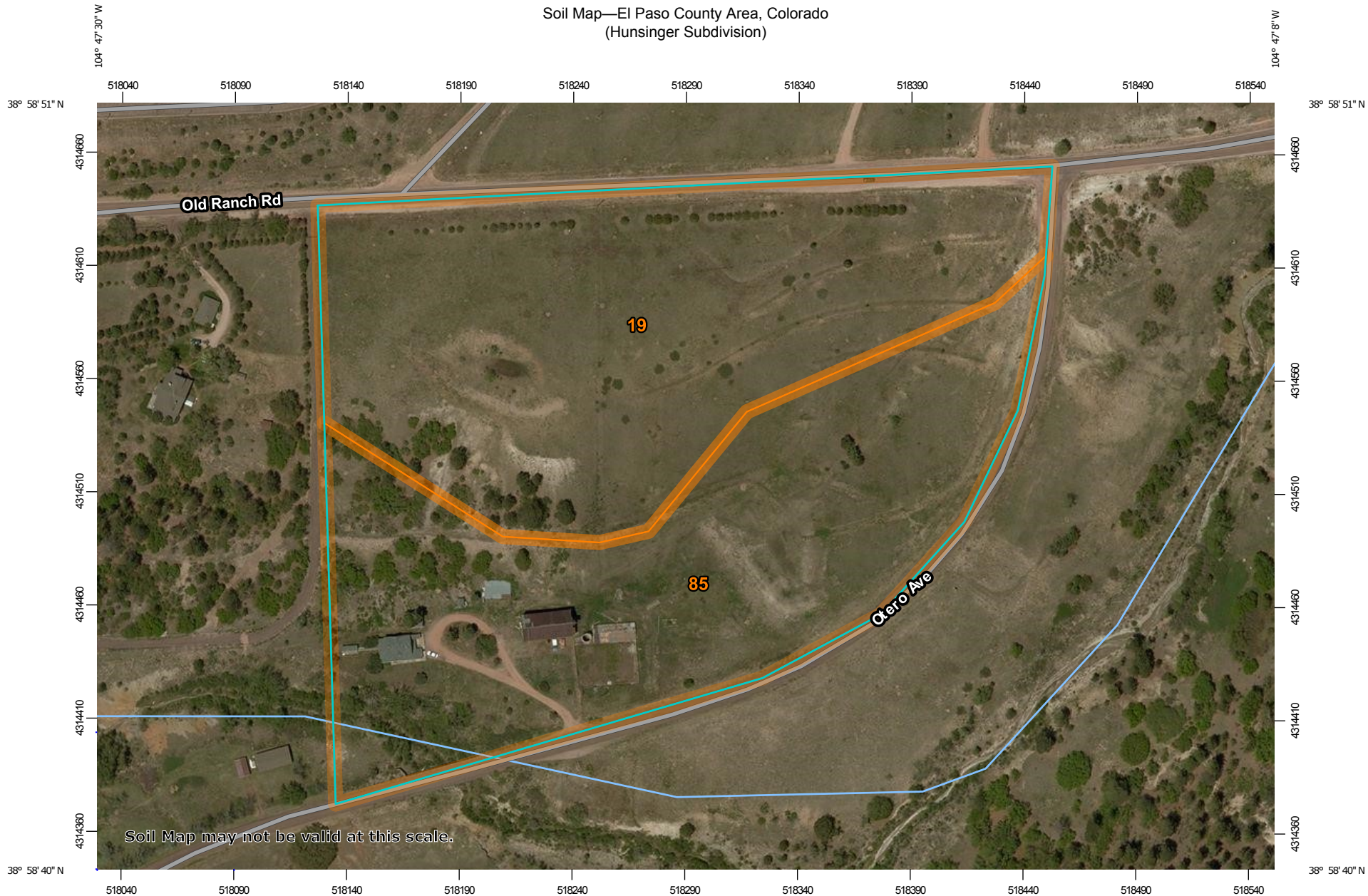
© 2018 Google



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.



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




Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/23/2018
Page 1 of 3

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:

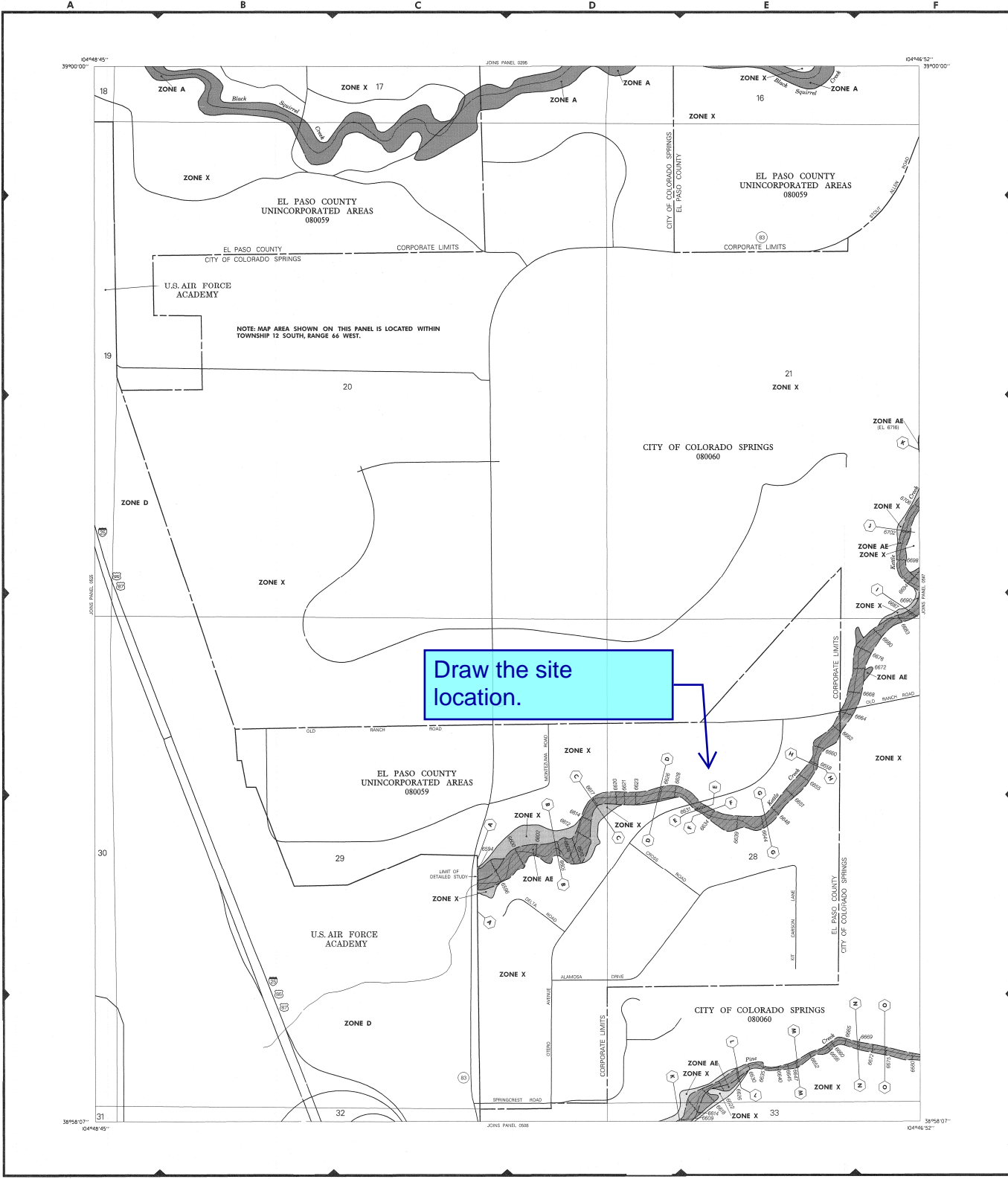
Hydric soil rating: No

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 elevation determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponds); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually about flow in drainage channels); average depths determined; 100-year areas of special flood concern are determined.
- ZONE APF** 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); 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 100-year flood areas of 100-year flood with average depths of less than 1 foot or with change areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE B** Areas in which flood hazard is undetermined.
- ZONE D** Areas in which flood hazard is undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1001
- Observed 1002
- Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Identified 1001
- Observed 1002
- Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

BOUNDARIES

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary of Special Flood Hazard Areas and Boundary of Different Special Flood Hazard Zones
- Boundary of Special Flood Hazard Zones

BASE FLOOD ELEVATION

- Line: Elevation in Feet. See Map Index for Elevation Datum.
- Area Section Line
- Base Flood Elevation in Feet Above Uniform Water Zone. See Map Index for Elevation Datum. Elevation Reference Mark.
- RM7
- River Mile
- Horizontal Coordinates Based on North American Datum of 1983 (NAD 83)

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 to features of 500 feet or more in length and include the effects of wave action. These elevations may also apply to structures from those developed in the National Weather Service for hurricane resistance planning.

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

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

Boundaries of the Floodways were compiled at cross sections and extrapolated between cross sections. The Floodways were based on historical, contemporary, and other data in accordance with the Federal Emergency Management Agency.

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

This map may incorporate approximate boundaries of Coastal Barrier Reserve System, Urban and/or Other Areas, and/or other areas established under the Coastal Barrier Improvement Act of 1982 (P.L. 97-353).

Coastal barrier areas are shown on all of the maps of this map. The user should contact appropriate community officials to determine if coastal barrier flood damage is applicable to the location of this map.

For community map history history prior to acquisition mapping, see Section 6.5 of the Flood Insurance Study Report.

For advisory 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 DATES OF REVISIONS TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actual rates apply to structures in areas where revisions or changes have been implemented.

To determine if Flood Insurance is available, contact an insurance agent or call the National Flood Insurance Program at 800-638-6666.

APPROXIMATE SCALE IN FEET

0 100 200 300 400 500

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:

COUNTY	SHEET NUMBER	PANEL	DATE
COLORADO SPRINGS CITY OF	08000	0006	1
EL PASO COUNTY	08000	0006	1
INCORPORATED AREAS	08000	0006	1

MAP NUMBER 080410C0506 F

EFFECTIVE DATE: MARCH 17, 1997

Federal Emergency Management Agency

HYDROLOGIC CALCULATIONS

HUNSINGER SUBDIVISION
AREA RUNOFF COEFFICIENT (C) SUMMARY

EXISTING

BASIN	TOTAL AREA (Acres)	DEVELOPED			UNDEVELOPED			WEIGHTED		WEIGHTED CA	
		AREA (Acres)	C5	C100	AREA (Acres)	C5	C100	C5	C100	CA5	CA100
OS-1	0.37	0.37	0.55	0.65	0.00	0.08	0.35	0.55	0.65	0.20	0.24
OS-2	0.17	0.17	0.55	0.65	0.00	0.08	0.35	0.55	0.65	0.09	0.11
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

BASIN	TOTAL AREA (Acres)	DEVELOPED			UNDEVELOPED			WEIGHTED		WEIGHTED CA	
		AREA (Acres)	C5	C100	AREA (Acres)	C5	C100	C5	C100	CA5	CA100
OS-1	0.37	0.37	0.55	0.65	0.00	0.08	0.35	0.55	0.65	0.20	0.24
OS-2	0.17	0.17	0.55	0.65	0.00	0.08	0.35	0.55	0.65	0.09	0.11
PR-1	16.02	16.02	0.16	0.41	0.00	0.08	0.35	0.16	0.41	2.56	6.57

Calculated by: DLF
Date: 10/18/2018
Checked by: _____

HUNSINGER SUBDIVISION RUNOFF SUMMARY

EXISTING

BASIN	AREA TOTAL (Acres)	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T _C	INTENSITY		TOTAL FLOWS	
		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.)
		<small>* For Calcs See Runoff Summary</small>														
<i>OS-1</i>	0.37	0.55	0.65	0.55	25	0.12	2.2	0	12.0%	0.7	0.0	2.2	5.9	11.0	1.2	2.7
<i>OS-2</i>	0.17	0.55	0.65	0.55	75	0.03	5.9	0	12.0%	0.7	0.0	5.9	4.8	8.6	0.4	1.0
<i>EX-A</i>	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

BASIN	AREA TOTAL (Acres)	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T _C	INTENSITY		TOTAL FLOWS	
		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.)
		<small>* For Calcs See Runoff Summary</small>														
<i>OS-1</i>	0.37	0.55	0.65	0.55	25	0.12	2.2	0	12.0%	0.7	0.0	2.2	5.9	11.0	1.2	2.7
<i>OS-2</i>	0.17	0.55	0.65	0.55	75	0.03	5.9	0	12.0%	0.7	0.0	5.9	4.8	8.6	0.4	1.0
<i>PR-1</i>	16.02	0.16	0.41	0.16	300	0.12	13.0	0	12.0%	0.7	0.0	13.0	3.7	6.3	9.4	41.5

Calculated by: DLF

Date: 10/18/2018

Checked by:

HUNSINGER SUBDIVISION SURFACE ROUTING SUMMARY

<i>Design Point(s)</i>	<i>Contributing Basins</i>	<i>Flow</i>	
		<i>Q₅</i>	<i>Q₁₀₀</i>
<i>Z</i>	OS-1	1.2	2.7
<i>Y</i>	OS-2	0.4	1.0
<i>A</i>	OS-1, OS-2, EX-A	6.3	38.0
<i>I</i>	OS-1, OS-2, PR-1	11.0	45.2

Calculated by: _____ DLF

Date: _____ 10/18/2018

Checked by: _____

DRAINAGE MAPS

HUNSINGER SUBDIVISION

EL PASO COUNTY

EXISTING DRAINAGE MAP

OCTOBER 2018

BASIN SUMMARY

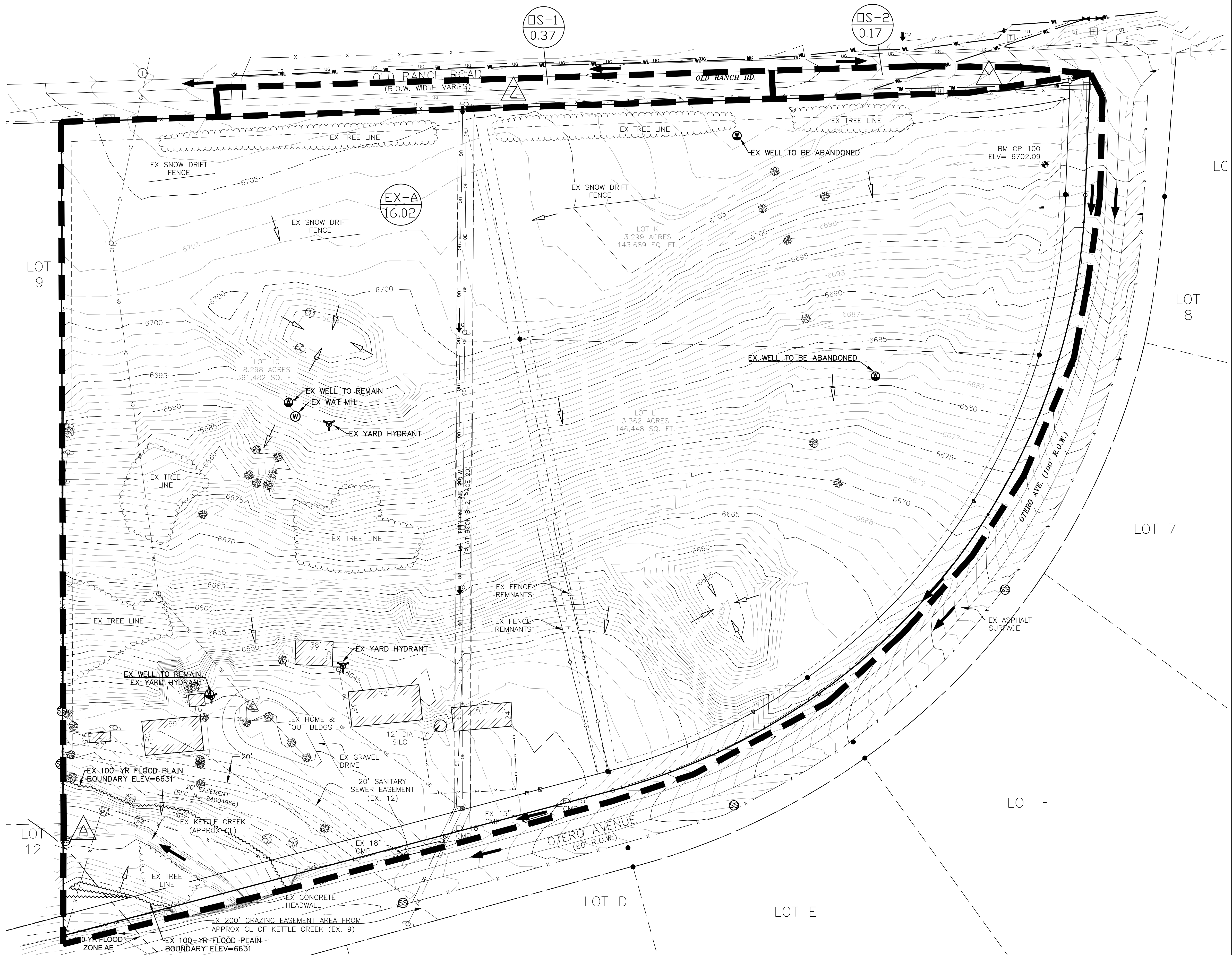
DESIGN POINT	BASIN	AREA (ACRES)	FLOW	
			5 YR (cfs)	100 YR (cfs)
Z	OS-1	0.37	1.2	2.7
Y	OS-2	0.17	0.4	1.0
A	EX-A	16.02	4.7	34.3

DRAINAGE SUMMARY

DESIGN POINT	BASIN TRIBUTARY	AREA (ACRES)	FLOW	
			5 YR (cfs)	100 YR (cfs)
Z	OS-1	0.37	1.2	2.7
Y	OS-2	0.17	0.4	1.0
A	OS-1, OS-2, EX-A	16.56	6.3	38.0

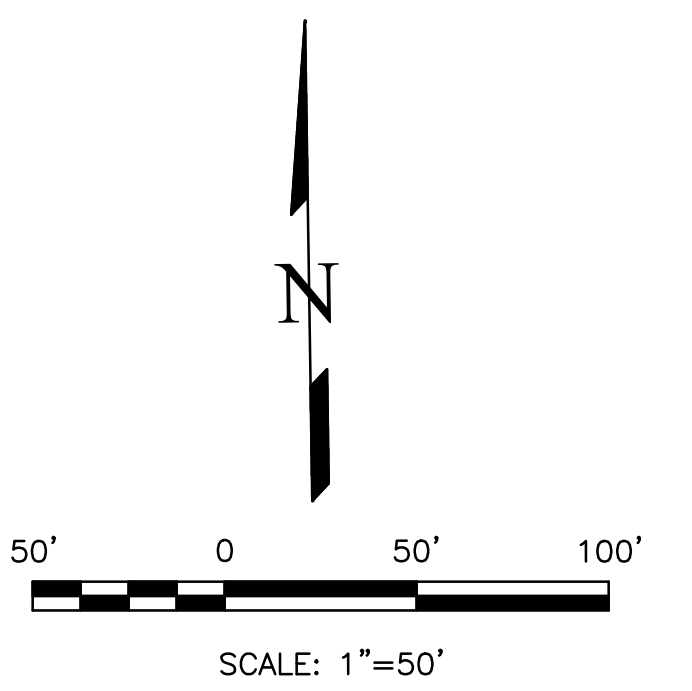
LEGEND

- P-7
12.22 BASIN DESIGNATION
- 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 GAS 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



<p>REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>REV'D PER 6/2/16 CTY COMMENTS 8/22/16</td> <td></td> </tr> </tbody> </table>	NO.	DESCRIPTION	DATE	1	REV'D PER 6/2/16 CTY COMMENTS 8/22/16		<p>UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE ENGINEERING BOARD OF THE STATE OF COLORADO, THESE DRAWINGS ARE NOT TO BE USED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT AND DATE STATED BY WRITTEN AUTHORIZATION.</p> <p>PREPARED FOR: HUNSINGER DEVELOPMENT CORP ATTN: STEVE HUNSINGER 4406 COLLEGE PARK COURT COLORADO SPRINGS, CO 80918</p> <div style="text-align: center;"> <p>Terra Nova Engineering, Inc. Civil/Environmental</p> </div> <p>721 S. ZARO STREET COLORADO SPRINGS, CO 80904 OFFICE: 719-635-6422 FAX: 719-635-6426 www.tnainc.com</p>
NO.	DESCRIPTION	DATE					
1	REV'D PER 6/2/16 CTY COMMENTS 8/22/16						
<p>HUNSINGER SUBDIVISION</p> <p>EXISTING DRAINAGE PLAN</p>	<p>DESIGNED BY JF DRAWN BY JF CHECKED BY LD</p> <p>H-SCALE AS SHOWN V-SCALE N/A</p> <p>JOB NO. 1609.00 DATE ISSUED 10/18/18 SHEET NO. 1 OF 2</p>						

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HUNSINGER SUBDIVISION

EL PASO COUNTY

PROPOSED DRAINAGE MAP

OCTOBER 2018

BASIN SUMMARY				
DESIGN POINT	BASIN	AREA (ACRES)	FLOW	
			5 YR (cfs)	100 YR (cfs)
Z	OS-1	0.37	1.2	2.7
Y	OS-2	0.17	0.4	1.0
1	PR-1	16.02	9.4	41.5

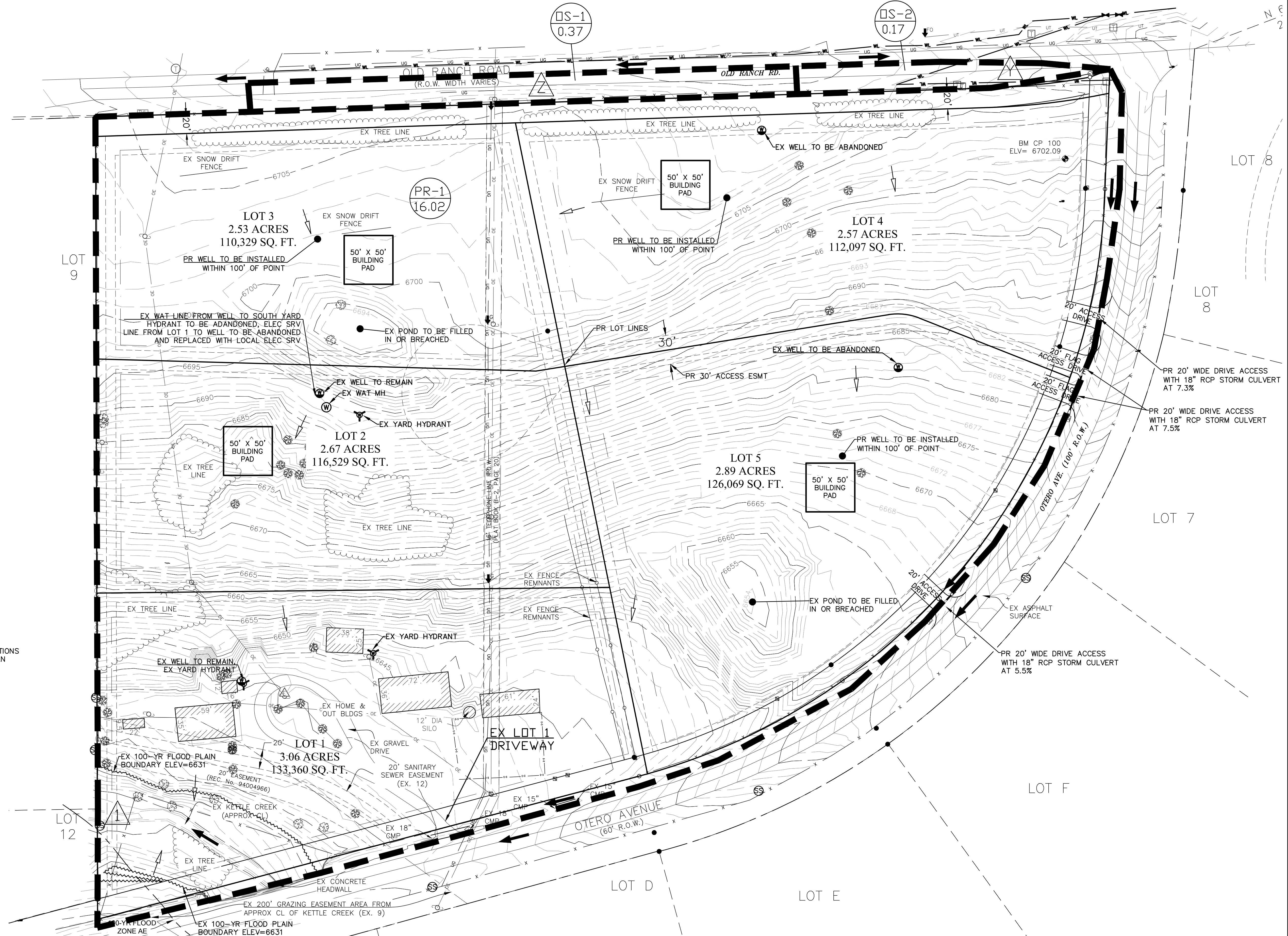
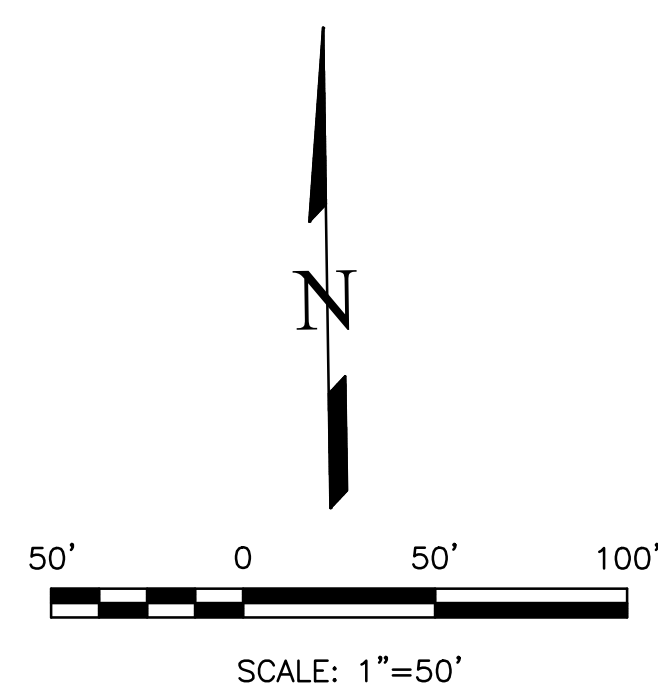
DRAINAGE SUMMARY				
DESIGN POINT	BASIN TRIBUTARY	AREA (ACRES)	FLOW	
			5 YR (cfs)	100 YR (cfs)
Z	OS-1	0.37	1.2	2.7
Y	OS-2	0.17	0.4	1.0
1	OS-1, OS-2, PR-1	16.56	11.0	45.2

LEGEND

- BASIN DESIGNATION
- AREA IN BASIN (AC)
- 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 GAS LINE
- UNDERGROUND FIBER-OPTIC MARKER
- TELEPHONE 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

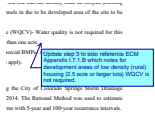


REVISIONS NO. 1 DATE 8/22/16 DESCRIPTION REV'D PER 6/2/16 CMT COMMENTS 8/22/16	UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE ENGINEERING BOARD OF THE STATE OF COLORADO, THESE DRAWINGS ARE NOT TO BE USED FOR ANY PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED BY WRITTEN AUTHORIZATION. PREPARED FOR: HUNSINGER DEVELOPMENT CORP ATTN: STEVE HUNSINGER 4406 COLLEGE PARK COURT COLORADO SPRINGS, CO 80918 Terra Nova Engineering, Inc. Civil Engineering 721 S. ZABO STREET COLORADO SPRINGS, CO 80904 OFFICE: 719-635-6422 FAX: 719-635-6426 www.tninc.com
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 10/18/18 SHEET NO. 2 OF 2

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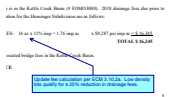
Markup Summary

dsdlaforce (5)



Subject: Callout
Page Label: 7
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Author: dsdlaforce
Date: 12/20/2018 11:31:51 AM
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Update step 3 to also reference ECM Appendix I.7.1.B which notes for development areas of low density (rural) housing (2.5 acre or larger lots) WQCV is not required.



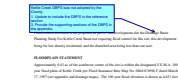
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Update fee calculation per ECM 3.10.2a. Low density lots qualify for a 25% reduction in drainage fees.



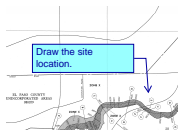
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Include a comparative analysis b/w existing and developed flow rates. Based on your analysis state whether the increase is negligible and therefore not warrant flood control detention.



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Kettle Creek DBPS was not adopted by the County.
1. Update to include the DBPS in the reference section
2. Provide the supporting sections of the DBPS in the appendix.



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Page Label: 24
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Author: dsdlaforce
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Draw the site location.