

Forsgren Associates, LLC  
56 Inverness Drive East, Suite 112  
Englewood, CO 80128  
(720) 214-5884

August 20, 2019  
El Paso County Development Services  
Attn: Lindsay Darden  
2880 International Circle, Ste 110  
Colorado Springs, CO 80910

**SUBJECT: The Sod Guy  
Sales Lot  
Drainage Letter – Lot 1 in Appaloosa Highway 24 Subdivision Filing No 1A**

Dear Ms. Darden,

This letter is being presented to discuss existing and future drainage features of the proposed site at Lot 1 in Appaloosa Highway 24 Subdivision Filing No 1A and to provide a description of the proposed work. Justification will be provided showing there will be no negative impact to existing drainage features or downstream conditions.

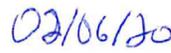
This project is located in the southwest 1/4 of Section 7, Township 14 South, and Range 65 West of the 6th Principal Meridian. The legal description of the property is Lot 1 in Appaloosa Highway 24 Subdivision. It has a tax ID number of 54073-17-012 and is zoned I-2. The streets that border the project area are US Highway-24 (Platte Avenue) to the South, Amelia St. to the West and Terminal Ave. to the North. Lot 1 in Appaloosa Highway 24 Subdivision is a vacant plot of land with no previous use. A 50-foot drainage easement borders the property to the east and contains a large concrete channel. An existing one-story building is located to the northwest at 5975 Terminal Avenue. A Final Drainage Report for Appaloosa Highway 24 Subdivision Filing No. 2, Lots 1, 2 & 3 has been previously approved on March 11, 2019. This site shall be in conformance with all applicable information provided in said Final Drainage Report.

**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.

  
\_\_\_\_\_  
Conner Burba, P.E. #51257



  
\_\_\_\_\_  
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.

 \_\_\_\_\_

Ed Apodaca

*The Sod Guy*

42600 Summit View Ct, Parker, CO 80138

02-06-2020

Date

**El Paso County:**

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

\_\_\_\_\_

Jennifer Irvine, P.E.

County Engineer / ECM Administrator

\_\_\_\_\_

Date

Conditions:

**Description of Property**

Lot 1 has an area of 1.003 acres and is currently vacant. Runoff from the site flows, generally, to the southwest to an existing swale which delivers the water to an existing storm inlet. The soil type for Lot 1 consists of Truckton sandy loam at slopes of 0-3%. Truckton sandy loams are of the hydrologic soil group A. See Appendix for the Custom Soils Resource Report for the site obtained from the National Cooperative Soil Survey (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>).

**Major Basin Description**

The site is located within the Sand Creek Drainage Basin. The site was previously studied as part of the previously approved drainage letter by HY-Power Company, approved December 1, 2000.

**Floodplain Statement**

The proposed improvements are not within a 100-year floodplain, FIRM #08041C0754G; revision date December 7, 2018. See Appendix for FEMA FIRM Floodplain maps.

### **Subbasin Description**

The entire site lies within the Sand Creek Drainage Basin. Stormwater runoff collected on site shall generally be detained in a proposed Extended Detention Basin (EDB) on the southwest corner of the site. In addition to the EDB being installed by others, a proposed Type C inlet shall be installed at the southwest corner of Lot 1 to convey flows to Lot 2. Flows will travel along the frontage of Amelia St. to the south along a grass lined swale to a second Type C inlet where the flows will be conveyed through a 18-inch HDPE storm sewer to the EDB. The EDB shall be owned and maintained by the Owner of Lot 3 in Appaloosa Highway 24 Subdivision.

### **Four Step Process to Minimize Adverse Impacts of Urbanization**

El Paso County requires the UDFCD Four Step Process be utilized for receiving waters protection. The goal of the Four Step Process is to reduce runoff volumes, treat the water quality capture volume of runoff, stabilize drainageways, and implement long-term source controls. With development projects with construction activities disturbing 1 acre or more, the Four Step Process must be implemented. Below is a description of all steps of the Four Step Process and how they were utilized in design.

#### ***Step 1: Employ Runoff Reduction Practices***

In order to reduce the runoff to Sand Creek Drainage Basin, LID strategies were implemented. LID techniques investigated and/or utilized include conserving existing features and minimizing impact to the overall site. As much as possible given the site constraints and grading, stormwater was directed to grass buffers and swales prior to being conveyed to the stormwater inlet at the southwest corner of the site. A grass lined swale extends from the northeast corner of the lot to the west and then to the south to the inlet in an effort to reduce runoff.

#### ***Step 2: Stabilize Drainageways***

Runoff flows directly offsite via underground storm piping to the southwest. The overall 100-year storm runoff of 4.5 cfs will not impact downstream drainageways. No streams or drainageways are present on, or adjacent to, the site.

#### ***Step 3: Provide Water Quality Capture Volume (WQCV)***

It has been determined that full-spectrum detention is required and will be provided to accommodate stormwater runoff from Lot 1. The full-spectrum EDB has been constructed and sized for runoff from lots 1, 2 and 3 and is located off-site. A full-spectrum, EDB will be installed downstream of the site with an outlet structure with three stages to release the water quality capture volume (WQCV) over 40-hours, excess urban runoff volume (EURV) over 72-hours, and the 100-year storm volume.

#### ***Step 4: Consider Need for Industrial and Commercial BMPs***

Sites with specific needs, such as material storage or other site operations, require specific, source control BMPs be implemented on site, post-construction. For this site, contaminants from site activities are not anticipated. In addition, no hazardous materials will be stored on site. No site specific or other source control BMPs are proposed for this site.

### Drainage Basin and Bridge Fees

Per the El Paso County Land Development Code, Section 8.5.5.C.2, drainage basin and bridge fees shall be paid prior to approval based on total impervious area. At the time the Final Plat was approved, all drainage and bridge fees for Lots 1, 2 and 3 in Appaloosa Highway 24 Subdivision Filing No 1A were paid. As such, no additional fees shall be required for Lot 1 in Appaloosa Highway 24 Subdivision Filing No 1A shall be required.

### Proposed Conditions

The Sod Guy proposes the construction of a new sales lot and outdoor storage area. The majority of the surfacing will be gravel, with the entrance and parking being asphalt or concrete pavement. Currently, the site is covered in pervious, grass surface. A final drainage report shall be completed and submitted by others that takes into account all additional impervious surface added per this site work. An extended detention basin shall be installed to provide 100-year detention for Lots 1, 2 & 3 and shall release runoff at historic rates. The Owner of Lot 3 in Appaloosa Highway 24 Subdivision shall be responsible for maintaining this drainage facility. All drainage features shall be approved prior to construction in order to adequately convey and detain stormwater runoff.

The composite 5-year and 100-year runoff coefficients ( $C_5$  and  $C_{100}$ ) were calculated in order to verify conformance with the “**Final Drainage Report for Appaloosa Hwy 24 Subdivision Filing No. 1A, Lots 1,2 & 3**”. Values provided in this report are  $C_5=0.59$  and  $C_{100}=0.70$ . The values calculated are lower than or equal to the values presented in said report, therefore we are in compliance. Methods for calculating the runoff values for Lot 1 remained consistent between reports. The total runoff calculated in both reports for the 100-year storm event are equal (see Appendix). See below for the table of results showing the calculated composite  $C_5$  and  $C_{100}$  values.

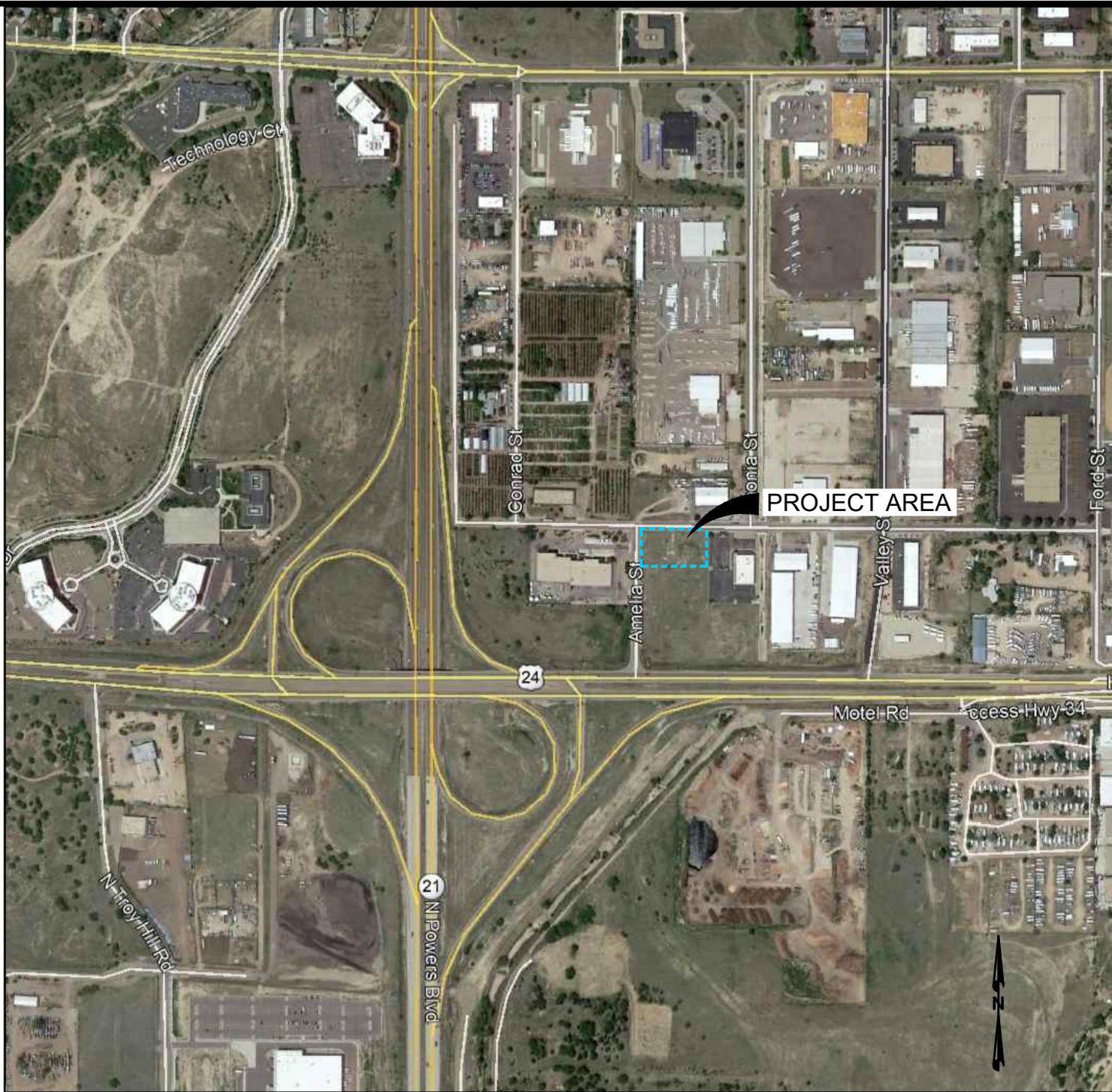
Composite "C" Values							
Surface Type	Area	Area	% Imper.	Impervious Area	Pervious Area	5 Comp.	100 Comp
	(SF)	(Acres)	%	(Acres)	(Acres)	"C"	"C"
Gravel	19,929	0.46	100%	0.458	0.00	0.59	0.70
Landscape	10,123	0.23	0%	0.000	0.23	0.08	0.35
Hardscape	13,679	0.31	100%	0.314	0.00	0.90	0.96
<b>All Onsite Basins</b>	<b>43,731</b>	<b>1.00</b>	<b>77%</b>	<b>0.77</b>	0.23	0.57	0.70

It is the professional opinion of the engineer that the proposed improvements will not have any negative impacts on the existing site conditions or the storm drainage system’s ability to convey flows from the site and will not adversely affect the downstream and surrounding developments. The owner of Lot 3 is responsible for the maintenance of the water quality pond located within Lot 3.

Please let me know if you have any questions.

Sincerely,  
Forsgren Associates, Inc

Conner Burba, P.E.  
Project Manager



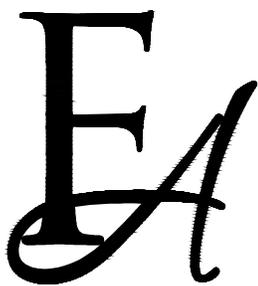
VICINITY MAP

SCALE: NTS

DATE:  
12/31/18

THE SOD GUY

PROJECT NO:  
04-18-XXXX



LOT 1 IN APPALOOSA  
HIGHWAY 24 SUBDIVISION  
SALES LOT  
VICINITY MAP

**PRELIMINARY  
DRAWING  
NOT FOR  
CONSTRUCTION**

**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 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  
NDA, NINGS12  
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, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

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.

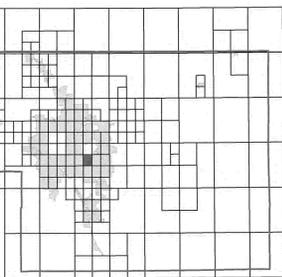
Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FIMX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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	

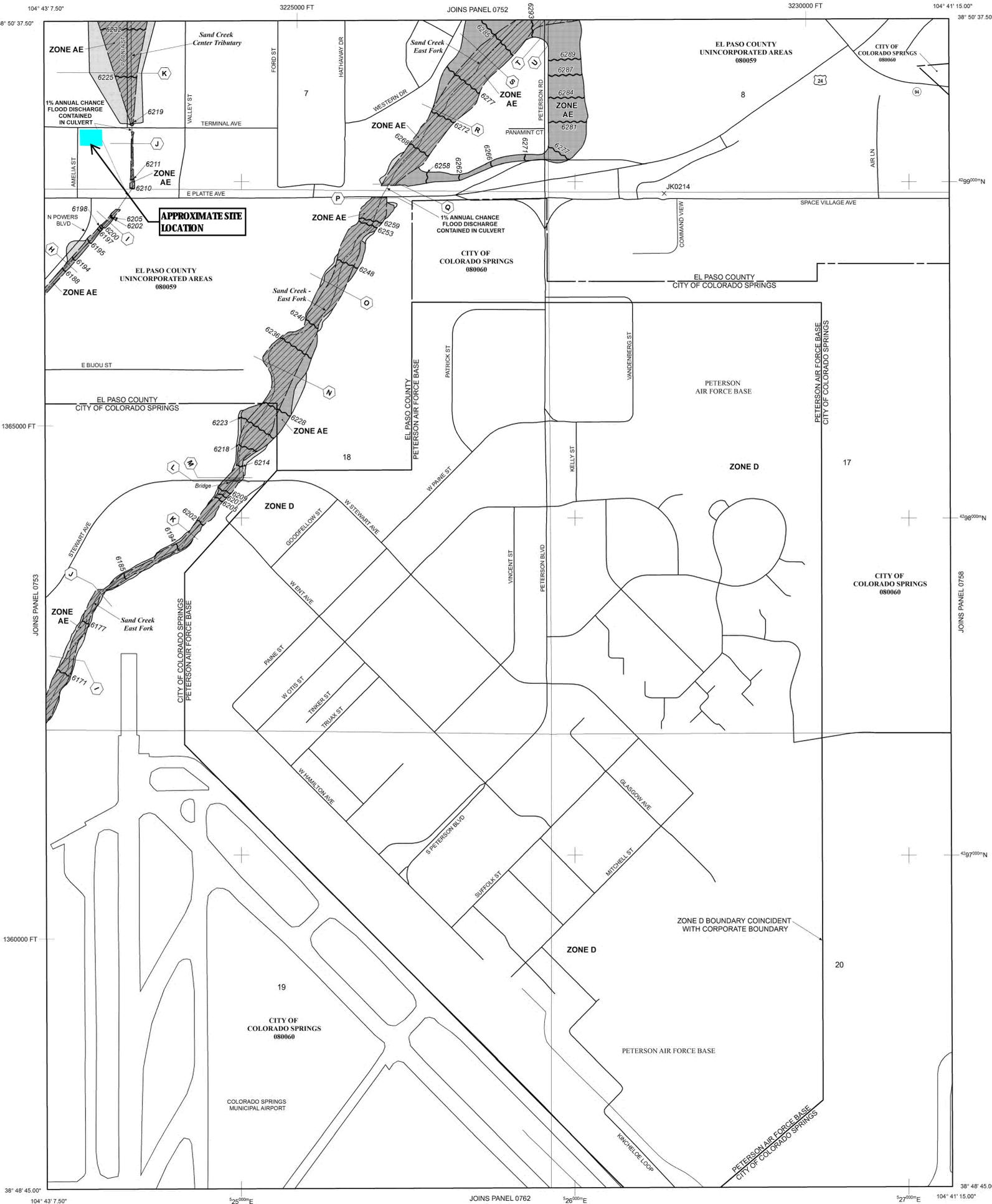
**Panel Location Map**



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 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. Base Flood Elevations determined.
- ZONE AE** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AH** 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 AO** Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decremented. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE AR** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE A99** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- ZONE VE** 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.

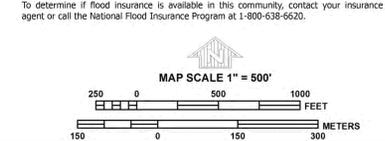
- Base Flood Elevation line and value; elevation in feet\* (EL 987)
- \* Referenced to the North American Vertical Datum of 1988 (NAVD 88)
- Cross section line
- Transsect line

- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 5000-foot grid ticks; Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- 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.



**NFP**

**PANEL 0754G**

**FIRM**  
FLOOD INSURANCE RATE MAP  
EL PASO COUNTY,  
COLORADO  
AND INCORPORATED AREAS

**PANEL 754 OF 1300**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0754	G
EL PASO COUNTY	080259	0754	G

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**  
08041C0754G

**MAP REVISED**  
DECEMBER 7, 2018

Federal Emergency Management Agency



Composite "C" Values							
Surface Type	Area	Area	% Imper.	Impervious Area	Pervious Area	5 Comp.	100 Comp
	(SF)	(Acres)	%	(Acres)	(Acres)	"C"	"C"
Gravel	19,929	0.46	100%	0.458	0.00	0.59	0.70
Landscape	10,123	0.23	0%	0.000	0.23	0.08	0.35
Hardscape	13,679	0.31	100%	0.314	0.00	0.90	0.96
<b>All Onsite Basins</b>	<b>43,731</b>	<b>1.00</b>	<b>77%</b>	<b>0.77</b>	0.23	0.57	0.70

5 Impervious "C"                    0.90  
 5 Pervious "C"                    0.08  
 5 Gravel "C"                    0.59  
  
 100 Impervious "C"                0.96  
 100 Pervious "C"                0.35  
 100 Gravel "C"                0.70

#N/A

By: Conner Burba

Project: Aerotech RV Park and Mini Storage

Printed:



Time of Concentration (Existing)																		
Sub-Basin Data			Initial/Overland Time (Ti)			Pavement Travel Time (Tt)				Pipe Travel Time (Tt)				Tc Check (Urbanized Basins)		Tc=Ti+Tt	Final Tc	
Basin		Area (ac)	Length (ft)	Slope (%)	*Ti (min)	Length (ft)	Slope (%)	Vel. (fps)	Tt (min)	Length (ft)	Slope (%)	Vel. (fps)	Tt (min)	Total Tt (min)	Total Length (ft)	Tc=(L/180)+10 (min)	(min)	(min)
Lot 1		1.00	375	2.00	8.25	30	1.00	2.00	5.00					5.00	405	12.25	13.25	12.25

C100= 0.70  
 C5 = 0.57  
 $*Ti=(0.395*(1.1-C5)*(L)^.5)/(s)^.33$   
 Conveyance Coefficient, Cv  
 Paved Areas 20  
 Tillage/Field 10  
 n (PVC) 0.012

Tc min. of 5 min.

#N/A

By: Conner Burba  
 Project: Aerotech RV Park and Mini Storage  
 Printed: 12/5/2019 10:55



5-Year & 100-Year Storm Runoff (Existing)									
Basin		Area	Tc	5 Intensity	100 Intensity	5 Comp. C	100 Comp. C	5 Q	100 Q
		(Acres)	(Min.)	(In./hr.)	(In./hr.)			(cfs)	(cfs)
Gravel		1.00	12.25	3.66	6.40	0.57	0.70	2.1	4.5

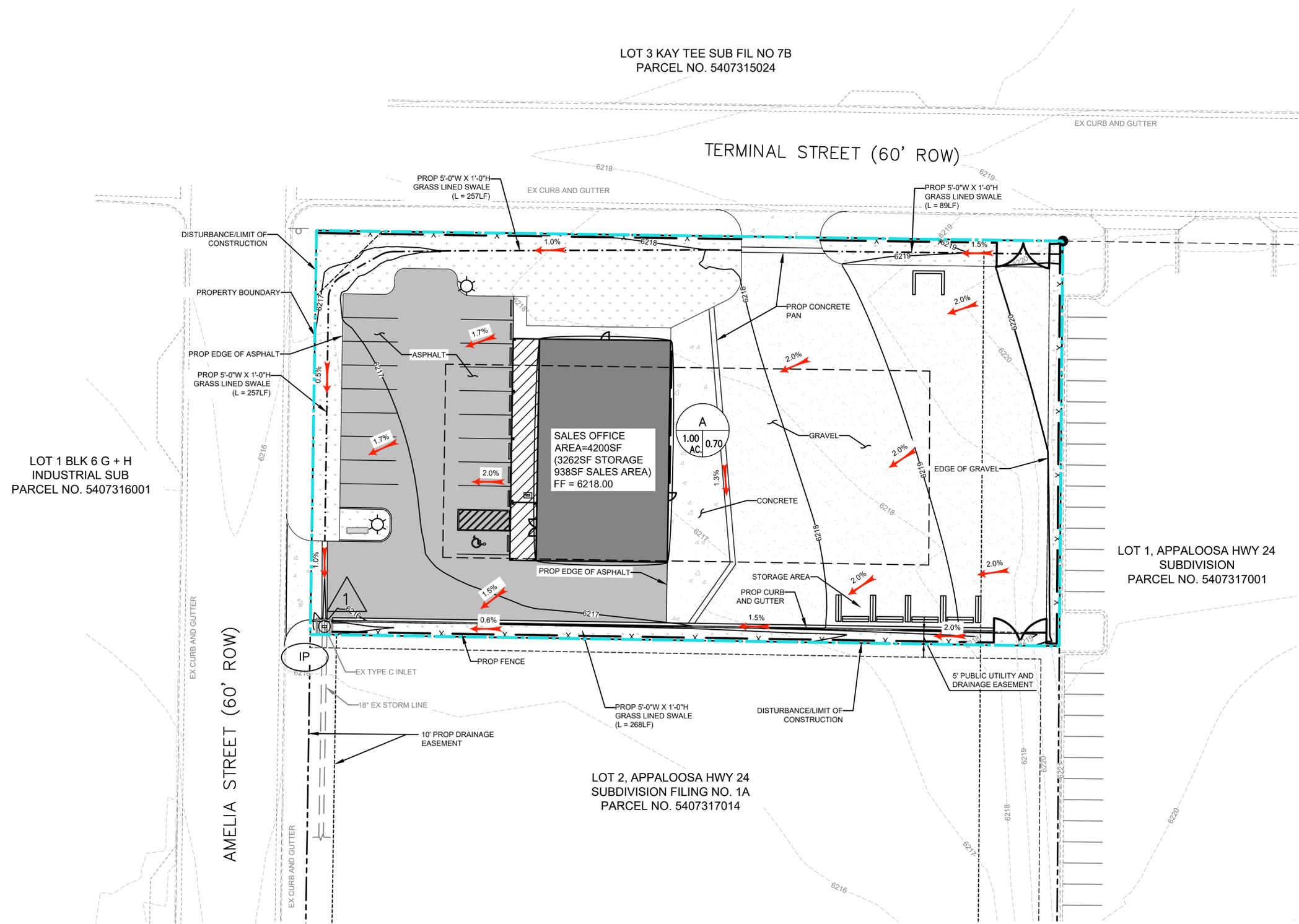
Routed	Design Points								

#N/A  
 By: Conner Burba  
 Project: Aerotech RV Park and Mini Storage  
 Printed: 12/5/2019 10:55

# THE SOD GUY - SALES LOT

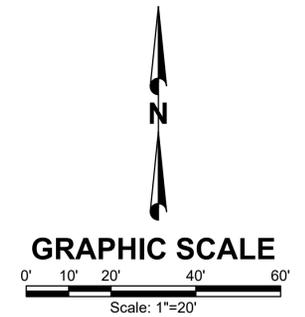
## PROPOSED BASIN PLAN

### LOT 1, APPALOOSA HIGHWAY 24 SUBDIVISION FILING NO 1A



**LEGEND:**

- A BASIN DESIGNATION
- 4.80  
AC .80 "C" COEFFICIENT (100 YR)
- 4 BASIN AREA (ACRES)
- 4 DESIGN POINT
- BASIN LINE
- PROPERTY LINE
- ↔ FLOW DIRECTION



Composite "C" Values							
Surface Type	Area	Area	% Imper.	Impervious Area	Pervious Area	5 Comp.	100 Comp
	(SF)	(Acres)	%	(Acres)	(Acres)	"C"	"C"
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Landscape	10,123	0.23	0%	0.000	0.23	0.08	0.35
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All Onsite Basins	43,731	1.00	77%	0.77	0.23	0.57	0.70

NO.	REVISIONS	BY	DATE

FORSGREN

Associates, Inc.

56 Inverness Drive East, Suite 112, Englewood, CO 80112  
PH: 720.214.5884 FAX: 720.000.0000

PROJECT NO. 04-018-00XX	DRAWN C. BURBA	DESIGNED C. BURBA	APPROVED C. BURBA	DATE J. MOORE
-------------------------	----------------	-------------------	-------------------	---------------

OWNER

THE SOD GUY

COLORADO SPRINGS, CO

SALES OFFICE

PROPOSED BASIN PLAN

SHEET NO:  
GP-01

DATE:  
11/06/19

PAGE NO:



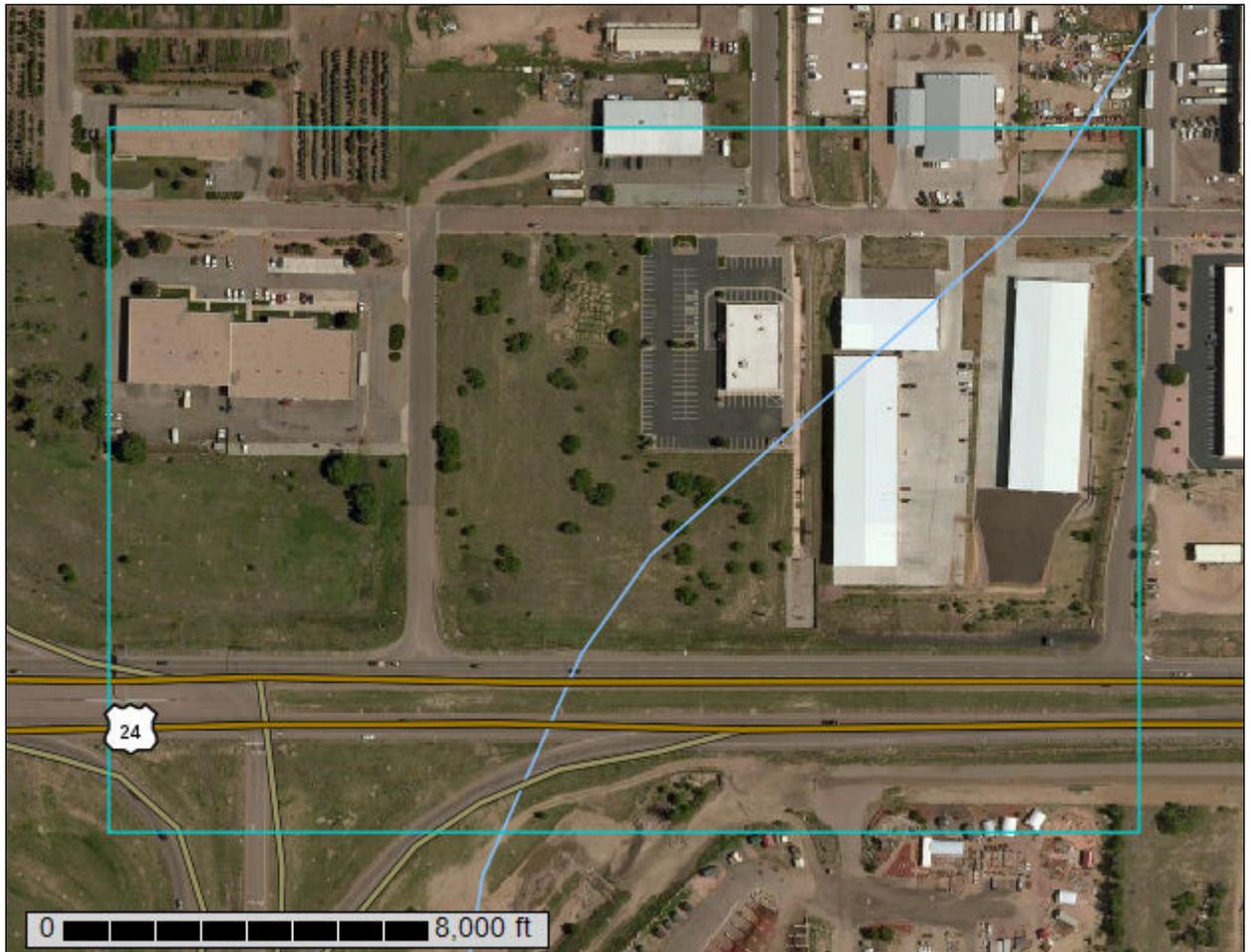
United States  
Department of  
Agriculture

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



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

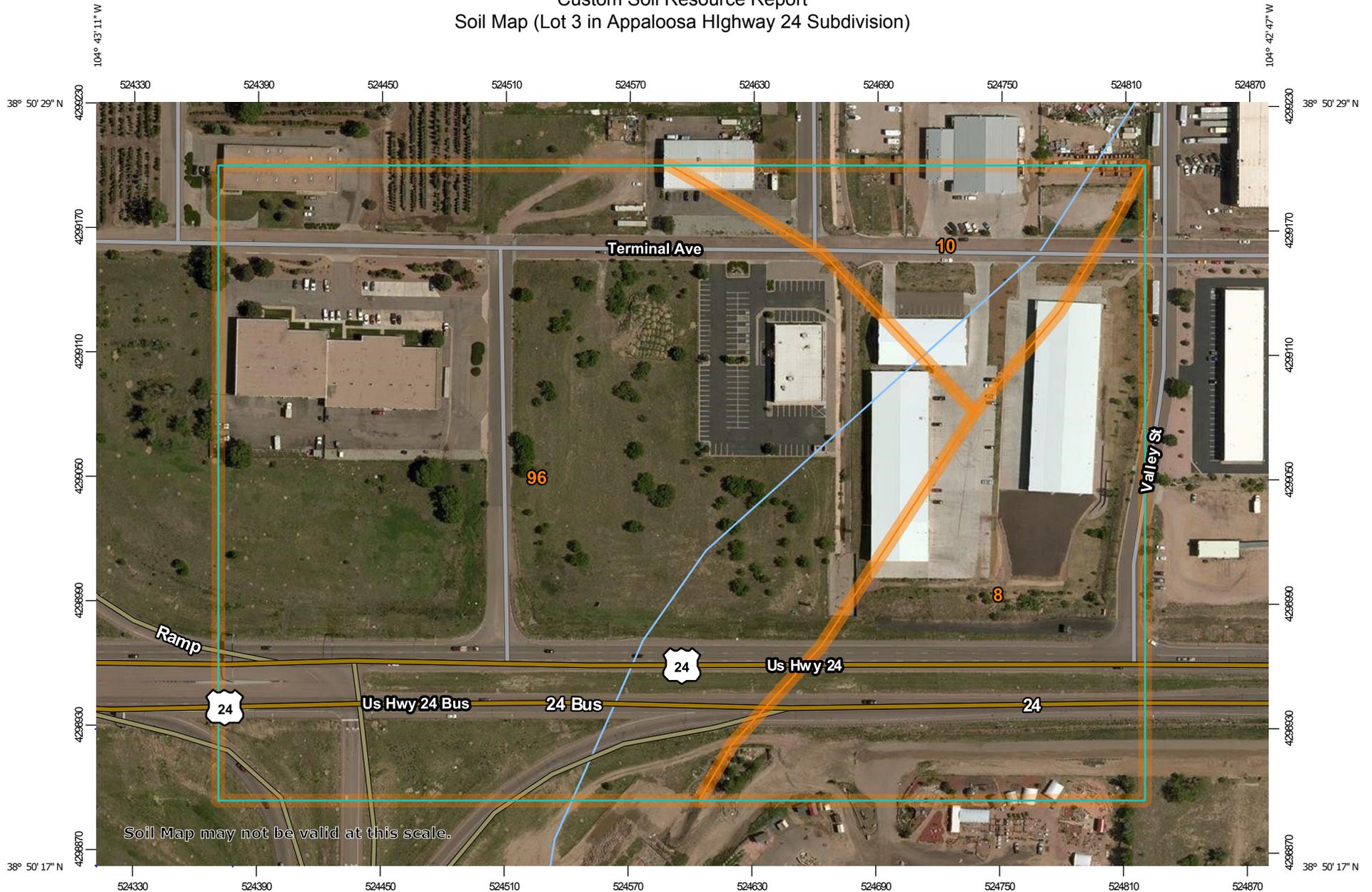
# Soil Map

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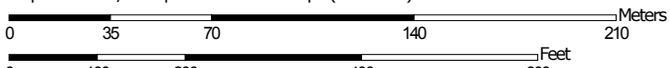
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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## Soil Map (Lot 3 in Appaloosa Highway 24 Subdivision)



Map Scale: 1:2,600 if printed on A landscape (11" x 8.5") sheet.



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

### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

**Special Point Features**

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

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

**Water Features**

 Streams and Canals

**Transportation**

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

**Background**

 Aerial Photography

### MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado  
 Survey Area Data: Version 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 (Lot 3 in Appaloosa Highway 24 Subdivision)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	8.0	23.3%
10	Blendon sandy loam, 0 to 3 percent slopes	3.2	9.4%
96	Truckton sandy loam, 0 to 3 percent slopes	23.0	67.3%
<b>Totals for Area of Interest</b>		<b>34.1</b>	<b>100.0%</b>

## Map Unit Descriptions (Lot 3 in Appaloosa Highway 24 Subdivision)

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.

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

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

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

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

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

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

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

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

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

## El Paso County Area, Colorado

### 8—Blakeland loamy sand, 1 to 9 percent slopes

#### Map Unit Setting

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

#### Map Unit Composition

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

#### Description of Blakeland

##### Setting

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

##### Typical profile

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

##### Properties and qualities

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

##### Interpretive groups

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

#### Minor Components

##### Other soils

*Percent of map unit:*  
*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

**10—Blendon sandy loam, 0 to 3 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 3671

*Elevation:* 6,000 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**

*Blendon and similar soils:* 85 percent

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

**Description of Blendon**

**Setting**

*Landform:* Alluvial fans, terraces

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Sandy alluvium derived from arkose

**Typical profile**

*A - 0 to 10 inches:* sandy loam

*Bw - 10 to 36 inches:* sandy loam

*C - 36 to 60 inches:* gravelly sandy loam

**Properties and qualities**

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 2 percent

*Available water storage in profile:* Moderate (about 6.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* B

*Ecological site:* Sandy Foothill (R049BY210CO)

*Hydric soil rating:* No

**Minor Components**

**Other soils**

*Percent of map unit:*  
*Hydric soil rating:* No

**Pleasant**

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

**96—Truckton sandy loam, 0 to 3 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 36bf  
*Elevation:* 6,000 to 7,000 feet  
*Mean annual precipitation:* 14 to 15 inches  
*Mean annual air temperature:* 46 to 50 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

**Map Unit Composition**

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

**Description of Truckton**

**Setting**

*Landform:* Flats  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

**Typical profile**

*A - 0 to 8 inches:* sandy loam  
*Bt - 8 to 24 inches:* sandy loam  
*C - 24 to 60 inches:* coarse sandy loam

**Properties and qualities**

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Very low  
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 6.00 in/hr)  
*Depth to water table:* More than 80 inches

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*Frequency of flooding:* None

*Frequency of ponding:* None

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

### **Interpretive groups**

*Land capability classification (irrigated):* 2e

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* A

*Ecological site:* Sandy Foothill (R049BY210CO)

*Hydric soil rating:* No

### **Minor Components**

#### **Other soils**

*Percent of map unit:*

*Hydric soil rating:* No

#### **Pleasant**

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

# Soil Information for All Uses

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## Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

## Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

## Engineering Properties (Lot 3 in Appaloosa Highway 24 Subdivision)

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

*Hydrologic soil group* is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These

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properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

*Depth* to the upper and lower boundaries of each layer is indicated.

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

*Classification* of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Percentage of rock fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

*Liquid limit and plasticity index (Atterberg limits)* indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

### References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

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Absence of an entry indicates that the data were not estimated. The asterisk '\*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—El Paso County Area, Colorado														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
8—Blakeland loamy sand, 1 to 9 percent slopes														
Blakeland	85	A	0-11	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-50-60	15-23-30	—	NP
			11-27	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-50-60	15-23-30	—	NP
			27-60	Loamy sand, loamy coarse sand, sand	SM, SP-SM, SW-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	95-98-100	80-90-100	35-48-60	5-15- 25	—	NP
10—Blendon sandy loam, 0 to 3 percent slopes														
Blendon	85	B	0-10	Sandy loam	SC, SC-SM	A-2-4, A-4	0- 0- 0	0- 0- 0	100-100-100	90-95-100	60-65-70	30-35-40	25-28-30	5-8 -10
			10-36	Sandy loam, fine sandy loam	CL, CL-ML, SC, SC-SM	A-2-4, A-4	0- 0- 0	0- 0- 0	85-93-100	80-90-100	50-68-85	25-40-55	25-28-30	5-8 -10
			36-60	Gravelly sandy loam	GM, SC-SM, SM	A-1-b, A-2	0- 0- 0	0- 0- 0	60-70-80	55-65-75	35-43-50	20-25-30	20-23-25	NP-3 -5

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Engineering Properties—El Paso County Area, Colorado														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
96—Truckton sandy loam, 0 to 3 percent slopes														
Truckton	85	A	0-8	Sandy loam	SC-SM, SM	A-2-4, A-4	0- 0- 0	0- 0- 0	95-98-100	95-98-100	60-65-70	30-35-40	20-23-25	NP-3 -5
			8-24	Sandy loam	SC-SM, SM	A-2-4, A-4	0- 0- 0	0- 0- 0	95-98-100	95-98-100	60-65-70	30-35-40	20-23-25	NP-3 -5
			24-60	Coarse sandy loam, loamy coarse sand	SM, SP-SM, SC-SM	A-2-4, A-1	0- 0- 0	0- 0- 0	85-93-100	80-90-100	35-53-70	10-20-30	20-23-25	NP-3 -5

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