PRELIMINARY/FINAL DRAINAGE REPORT

SPACE VILLAGE FILING NO. 3

SOUTHWEST CORNER OF PETERSON BOULEVARD & SPACE VILLAGE AVENUE

EL PASO COUNTY, COLORADO

PREPARED FOR:

Space Village Retail, LLC
90 South Cascade Avenue, Suite 1500
Colorado Springs, CO 80903
(719) 448-4034
Contact: Danny Mientka

PREPARED BY:

Olsson Associates
1880 Fall River Drive, Suite 200
Loveland, CO 80538
(970) 461-7733
Contact: Josh Erramouspe

October 26, 2018

PCD Project No. SP-17-009 & SF-18-016

Olsson Project No. 017-1754

OLSSON ASSOCIATES

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 cause by any negligent acts, errors, or omissions on my part in preparing this report.

Josh Erramouspe
Colorado Licensed Professional Engineer No. 42141

DEVELOPER'S STATEMENT
I, the developer, have read and will comply with all the requirements specified in this drainage report and plan.

Space Village Retail, LLC hereby certifies that the drainage facilities for Space Village Filing No. 3 shall be constructed according to the design presented in this report. I understand that El Paso County does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that El Paso County reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of Space Village Filing No. 3 guarantee that final drainage design review will absolve Space Village Retail, LLC and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the ~~final plat~~ does not imply approval of my engineer's drainage design.

Space Village Retail, LLC

By: DANNY MIENTKA

Title: MANAGER

Address: 90 SOUTH CASCADE AVENUE, SUITE 1500
COLORADO SPRINGS, COLORADO 80903

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.

Jenifer Irvine, PE
County Engineer/ECM Administrator

Date

Table of Contents

1.0 GENERAL PROPERTY DESCRIPTION

The SITE is a 4.132-acre parcel situated in the northwest quarter of Section 17, Township 14 South, Range 65 West of the Sixth Principal Meridian, County of El Paso, State of Colorado. The SITE is bounded to the north by Space Village Avenue, to the east by Lot 1, Space Village Filing No. 2 and 6685 Space Village Avenue, to the west by Peterson Boulevard, and to the south by Lot 1 Cowperwood SAIC and Lot 1 Peterson Office Project. The property is located in Flood Zone "X", areas determined to be outside the 500-yr floodplain according to FEMA FIRM Map 08041C0754 F with an effective date of March 17, 1997.

Neither new development nor redevelopment of this property is proposed at this time. The purpose of this drainage report is to supplement a final plat submittal to further subdivide the existing property. Any future development or redevelopment within this property will require compliance with the County's current water quality and full spectrum detention design criteria.

2.0 GENERAL EXISTING DRAINAGE CHARACTERISTICS

2.1 Soils Condition

Existing soils within the SITE consist entirely of Truckton sandy loam. The NRCS hydrologic soil classification assigned to this type of soil is Type A. Refer to Appendix A for NRCS web soil survey mapping.

2.2 Existing Site Conditions

The SITE, which lies within the Sand Creek Drainage Basin, contains strip retail and undeveloped ground. Portions of the property are also being used as a parking lot for the surrounding developments. The existing strip retail, with its associated drives/parking, occupies 2.36 acres. The remaining 1.77 acres has been reserved for future commercial development. Asphalt paving covers approximately 50% of the SITE. The remaining area is covered by buildings, grass and landscape gravel.

2.3 Existing Drainage Conditions

The existing drainage on the site generally flows from northeast to southwest with slopes ranging from 1%-10%. Refer to the Existing Drainage Basin Map in Appendix C.

Basin B-1 encompasses approximately 3.07 acres. The basin is comprised of approximately 30% grassy landscape and 70% asphalt pavement. Runoff (Q_5=9.12 cfs, Q_{100}=18.07 cfs) flows into the existing 24" RCP culvert located on the west side of the SITE. The basin runoff is discharged from the 24" culvert on the west side of the site to the west side of Peterson Boulevard.

Basin B-2 encompasses approximately 1.12 acres south of the proposed Lot 1. The basin is comprised of mostly asphalt pavement, with small portions of roof & landscape. This basin was assumed to be 95% impervious per the El Paso County Drainage Criteria Manual. Runoff (Q_5=4.39 cfs, Q_{100}=7.98 cfs) flows into the existing 24" RCP culvert located on the west side of the SITE. The basin runoff is discharged from the 24" culvert on the west side of the site to the west side of Peterson Boulevard. The drainage patterns within the basin will not be altered after the development of Lot 1 and Lot 3; however, the basin has been analyzed here since the runoff from this basin will be routed through the 24" RCP culvert.

Basin B-3 encompasses an additional 1.51 acres of land to the north & west of the SITE. Currently stormwater surface runoff (Q_5=4.17 cfs, Q_{100}=8.40 cfs) discharges to the existing 24" RCP culvert located on the west side of the SITE. Again, the drainage patterns associated with this additional 1.51 acres will not be altered after Lot 1 and Lot 3 are developed. We have

included the runoff from this acreage in our sizing calculations for the proposed grated inlet that will replace the existing 24" RCP flared end section located on the west side of the SITE.

Design Point 4 is located at the inlet side of the existing 24" culvert that runs below Peterson Boulevard and outfalls on the west side of that road to property owned by Peterson AFB. Runoff generated within Basins B-1, B-2 and B-3 converges at this design point. In the existing condition the total flows at this design point are Q_5=17.25 cfs, Q_{100}=26.37 cfs. It should be noted that this culvert will experience inundation during the 100 YR event since the calculated runoff is greater than the full-flow capacity of the culvert.

3.0 PROPOSED DRAINAGE CONDITIONS

3.1 Proposed Basin Description

Upon future development of Lot 1 and Lot 3, developed runoff from Basin B-1 will drain through a private storm sewer system to a private on-site detention facility. The detention facility will discharge to the existing 24" RCP pipe at the west side of the SITE and will ultimately outfall to the land on the west side of Peterson Boulevard. Refer to the Drainage Basin Map for more detail on basin delineation. A detailed breakdown of the runoff generated on-site is described as follows:

Basin B-1 is the on-site portion of flow that will be routed to a detention facility. This basin encompasses approximately 3.07 acres and is assumed to be commercial development. The El Paso County Drainage Criteria Manual states that commercial development shall be assumed to be 95% impervious. Runoff generated in Basin B-1 in the proposed condition (Q_5=12.08 cfs, Q_{100}=22.04 cfs) was calculated using the rational method and will be routed to a detention facility via overland flow, curb and gutter, and private storm sewer if necessary.

See Section 2.3 for descriptions of Basin B-2 and B-3 as these basins will not change with the development of Lot 1 and Lot 3. Both basins will bypass the future detention facility and will discharge runoff directly to the existing 24" culvert under Peterson Boulevard.

Design Point 4 will see significantly less flow in the proposed condition compared to the existing condition because a detention facility will be designed to capture and attenuate the flows from Basin B-1 prior to discharging to the existing 24" culvert. The 24" RCP has a maximum capacity of 22.62 cfs (See appendix for Flowmaster calculation) without headwater, and the routed flow from basins B-2 and B-3 is Q_5=8.34 cfs, Q_{100}=15.97 cfs. To that end, the culvert has capacity for an additional 6.65 cfs in the 100 YR event before it becomes inundated. Therefore, Basin B-1 could feasibly contribute 6.65 cfs to the culvert in the 100 YR event, however, a full spectrum detention pond will capture runoff from Basin B-1 and the resultant pond release rate will be less than 6.65 cfs due to full spectrum design requirements. Assuming the detention pond will release less than 6.65 cfs in the 100 YR event, the ultimate discharge to the land owned by Peterson AFB (on the west side of Peterson Boulevard) will be less than what is currently being discharged to that same land today.

3.2 Detention Facility

Upon the development of either Lot 1 or Lot 3, a privately-owned detention facility will be constructed on Lot 1 to provide water quality, attenuation of the EURV, and also attenuation of the 100 YR runoff rate associated with Basin B-1. The pond should be designed and constructed a single time to handle developed flows from the entirety of basin B-1, rather than being designed/constructed in a phased approach. The water quality capture volume (WQCV), EURV release rate, and 100 YR release rate will be sized using the latest version of UD-Detention from Urban Drainage for full spectrum detention facilities. The detention facility and site design for development within Basin B-1 shall adhere to the four-step process as detailed in

Appendix I Section I.7.2 of the ECM. While the pond will be owned by the owner of Lot 1, the pond will be maintained by the Peterson Gateway Metropolitan District, and upon full design, an easement will be granted around the pond to allow the owner of Lot 3 to construct the pond improvements (in the case that Lot 3 develops before Lot 1).

4.0 DRAINAGE FEES/DRAINAGE BASIN PLANNING STUDY

This project is located within the Sand Creek Drainage Basin and is in general conformance with the Sand Creek DPBS. Future development of Lot 1 and Lot 3 will need to comply with the DBPS as well. There do not appear to be any drainage improvements identified in the DBPS associated with this land. The development's drainage fees are as follows and will be paid at the time of platting:

Drainage Fee: $17,751 per impervious acre x (0.95 x 4.13ac) = $69,646.05

Bridge Fee: $5,210 per impervious acre x (0.95 x 4.13ac) = $20,441.44

* These fees are based on the 2018 fee schedule and are due prior to recordation of the plat.

5.0 SUMMARY

In summary, assuming vacant portions of the SITE will be developed with commercial uses, the developed drainage patterns within the SITE will not be altered compared to existing drainage patterns. The ultimate discharge point will remain the same for this site (the 24" RCP culvert crossing Peterson Boulevard). As a part of any future development within Basin B-1, runoff generated within this basin will be detained in a full-spectrum detention facility and released at a controlled rate to the aforementioned existing 24" RCP culvert. If future development within Basin B-1 adheres to the recommendations presented in this drainage report, the runoff discharged to the existing 24" culvert under Peterson Boulevard will be less that what is discharged to the same culvert in the existing condition. A full, site-specific drainage report will need to be submitted to El Paso County for review and approval in conjunction with a Site Development Plan for either Lot 1 or Lot 3.

6.0 REFERENCES

"Drainage Criteria Manual Volume 1." Colorado Springs, CO (1994)

"Urban Storm Drainage." Criteria Manual Volume 1 (2017)

"Urban Storm Drainage." Criteria Manual Volume 2 (2017)

"Urban Storm Drainage." Criteria Manual Volume 3 (2010)

Sand Creek Drainage Basin Planning Study

Basin Name	Basin Description	Paved 100% (acres)	Building 90% (acres)	Gravel 40% (acres)	Landscape 2% (acres)	Total Area (ac)	C5	C100	Percent Imperviousness
B-1	Flows to Detention Pond	2.20	-	-	0.87	3.07	0.67	0.79	72.1%
B-2	Flows Around Detention Pond	1.06	-	-	0.05	1.12	0.86	0.93	95.2%
B-3	Within ROW	1.02	-	-	0.48	1.50	0.64	0.76	67.9%
					TOTAL	5.69	0.70	0.81	76%

BASIN	OVERLAND FLOW				GUTTER FLOW 1			GUTTER FLOW 2			Total T_c (min)	Check T_c Eq 6-5	Final T_c (min)
	L1 (ft)	S1 (%)	C5	Ti (min)	L2 (ft)	V (ft/s)	T2 (min)	L3 (ft)	V (ft/s)	T3 (min)			
B-1	100.0	2.30%	0.67	6.01	357.0	2.9	2.1				8.06	12.54	8.06
B-2	100.0	1.00%	0.86	4.40	399.0	2.2	3.0				7.40	12.77	7.40
B-3	64.0	2.81%	0.64	4.81	579.0	2.5	3.8				8.63	13.57	8.63

Basin Characteristics						Intensities		Sub-basin	
BASIN NAME	Description	AREA (acres)	C5	C100	Tc* (min)	I5 (in/hr)	I 100 (in/hr)	Q 5-yr (cfs)	Q 100-yr (cfs)
B-1	Flows to Detention Pond	3.07	0.67	0.79	8.1	4.45	7.47	9.12	18.07
B-2	Flows Around Detention Pond	1.12	0.86	0.93	7.4	4.58	7.69	4.39	7.98
B-3	Within ROW	1.50	0.64	0.76	8.6	4.35	7.30	4.17	8.40

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Basin Name	Basin Description	Paved 100% (acres)	Building 90% (acres)	Gravel 40% (acres)	Landscape 2% (acres)	Total Area (ac)	C5	C100	Percent Imperviousness
B-1	Flows to Detention Pond					3.07	0.81	0.88	95.0%
B-2	Flows Around Detention Pond	1.06	-	-	0.05	1.12	0.86	0.93	95.2%
B-3	Within ROW	1.02	-	-	0.48	1.50	0.64	0.76	67.9%
					TOTAL	5.69	0.77	0.86	88%

BASIN	OVERLAND FLOW				GUTTER FLOW 1			GUTTER FLOW 2			Total T_c (min)	Check T_c Eq 6-5	Final T_c (min)
	L1 (ft)	S1 (%)	C5	Ti (min)	L2 (ft)	V (ft/s)	T2 (min)	L3 (ft)	V (ft/s)	T3 (min)			
B-1	100.0	1.93%	0.81	4.26	354.0	3.1	1.9				6.17	12.52	6.17
B-2	100.0	1.00%	0.86	4.40	399.0	2.2	3.0				7.40	12.77	7.40
B-3	64.0	2.81%	0.64	4.81	579.0	2.5	3.8				8.63	13.57	8.63

Basin Characteristics						Intensities		Sub-basin	
Basin Name	Description	Area (acres)	C5	C100	Tc* (min)	I5 (in/hr)	I 100 (in/hr)	Q 5-yr (cfs)	Q 100-yr (cfs)
B-1	Flows to Detention Pond	3.07	0.81	0.88	6.17	4.85	8.15	12.08	22.04
B-2	Flows Around Detention Pond	1.12	0.86	0.93	7.40	4.58	7.69	4.39	7.98
B-3	Within ROW	1.50	0.64	0.76	8.63	4.35	7.30	4.17	8.40

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

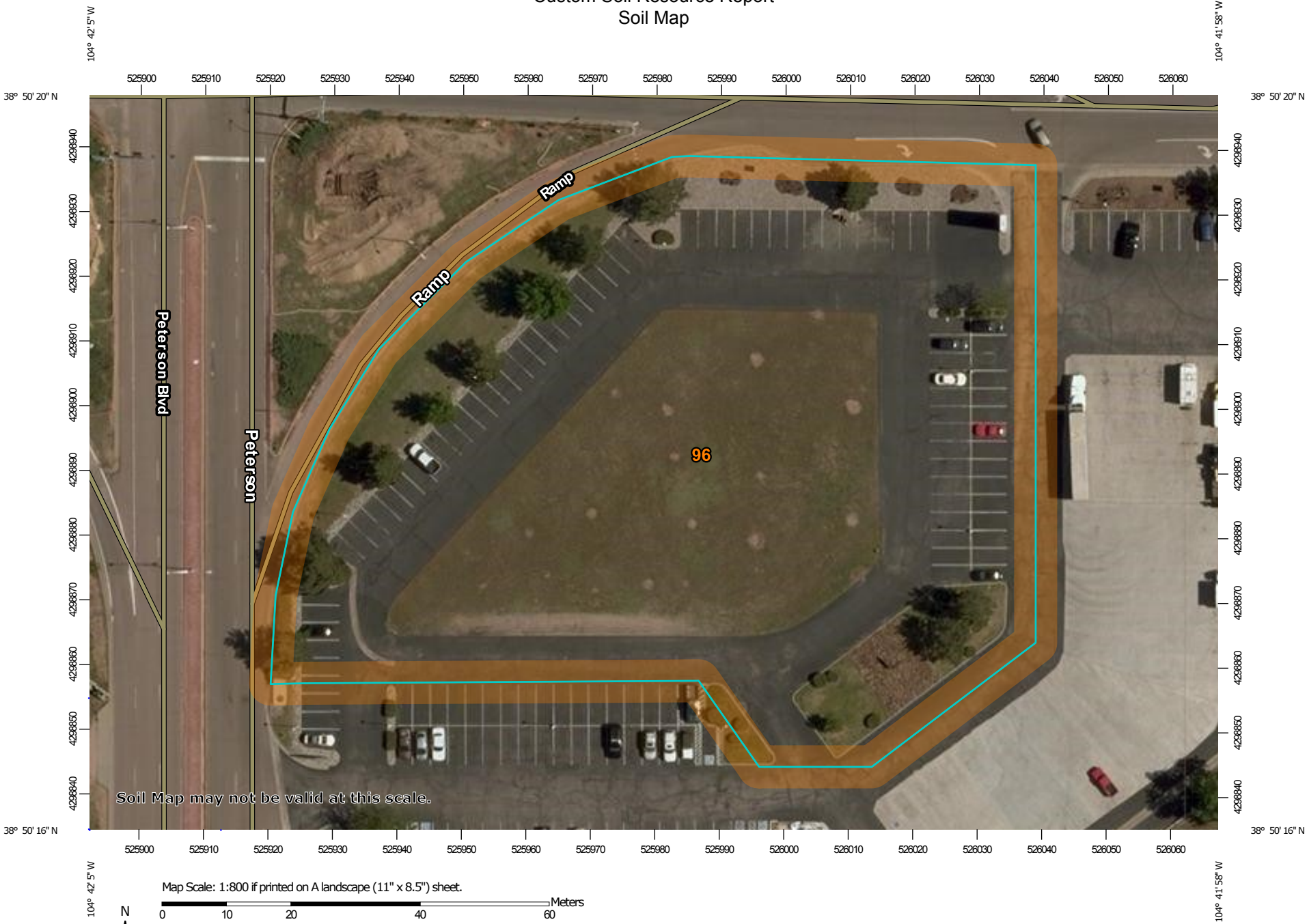
Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82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

3.2 Time of Concentration

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

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:800 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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 14, Sep 23, 2016

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

El Paso County Area, Colorado (CO625)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
96	Truckton sandy loam, 0 to 3 percent slopes	2.2	100.0%
Totals for Area of Interest		**2.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

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

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
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

Worksheet for 24" RCP Culvert

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	1.00000	%
Normal Depth	24	in
Diameter	24	in
Discharge	22.62	ft³/s

Results

Discharge	22.62	ft³/s
Normal Depth	24	in
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	6	in
Top Width	0.00	ft
Critical Depth	1.69	ft
Percent Full	100.0	%
Critical Slope	0.00946	ft/ft
Velocity	7.20	ft/s
Velocity Head	0.81	ft
Specific Energy	2.81	ft
Froude Number	0.00	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 24" RCP Culvert

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	24	in
Critical Depth	1.69	ft
Channel Slope	1.00000	%
Critical Slope	0.00946	ft/ft

B-3
1.50 | 0.64 / 0.76

B-1
3.07 | 0.67 / 0.79

B-2
1.12 | 0.86 / 0.93

EXISTING 24" RCP CULVERT
W INV. OUT=6263.60' @ 1.00%

17.25
26.37
4

Q6267.0

Q6269.1

6274
6273
6272
6271
6270
6269
6268

SPACE VILLAGE FILING NO. 2
LOT 1
PETERSON GROUP LLC
PARCEL# 5417001001
PLAT BOOK: B4 PAGE: 177
19,992 SQUARE FEET OR 0.458 ACRES

MIENTKA SUBDIVISION
RAI MANAGEMENT INC.
PARCEL# 5417001003
PLAT BOOK: E4 PAGE: 122

UNPLATTED
KCOM INC.
PARCEL# 5417000020
REC.# 204188107

12"RCP INV=6269.50

COWPERWOOD SAIC
THOMAS PROFESSIONAL & REG GRP
PARCEL# 5417001004
REC.# 205122346

PETERSON OFFICE PROJECT
COLORADO SPRINGS EQUITIES LLC.
PARCEL# 5417001002
PLAT BOOK: D4 PAGE: 129

N
W E
S
0' 15' 30' 60'
SCALE IN FEET

NOTE:
ALL PROPOSED STORM PIPE SHALL BE PRIVATELY OWNED AND MAINTAINED, AND SHALL BE HDPE UNLESS OTHERWISE NOTED.

LEGEND

EXISTING PROPERTY LINE	
PROPOSED PROPERTY LINE	
PROPOSED MAJOR CONTOUR	5280
PROPOSED MINOR CONTOUR	5279
EXISTING MAJOR CONTOUR	5280
EXISTING MINOR CONTOUR	5279
PROPOSED STORM SEWER	12"SD
BASIN DELINEATION	
TIME OF CONCENTRATION FLOWPATH	
DRAINAGE ARROW	

A = BASIN DESCRIPTION
B = BASIN AREA
C = MINOR EVENT COMPOSITE C-VALUE
D = MAJOR EVENT COMPOSITE C-VALUE
E = DESIGN POINT
F = MINOR EVENT PEAK RUNOFF (CFS)
G = MAJOR EVENT PEAK RUNOFF (CFS)

SUMMARY RUNOFF TABLE

BASIN NAME	AREA (ACRES)	C5	C100	Q5 (CFS)	Q100 (CFS)
B-1	3.07	0.67	0.79	9.12	18.07
B-2	1.12	0.86	0.93	4.39	7.98
B-3	1.50	0.64	0.76	4.17	8.40

DESIGN POINT SUMMARY

DESIGN POINT	CONTRIBUTING BASINS	Q5 (CFS)	Q100 (CFS)
4	B-1, B-2, B-3	17.25	26.37

OLSSON ASSOCIATES
1880 Fall River Dr Suite 200
Loveland, CO 80538
TEL 970.461.7733
www.olssonassociates.com

SPACE VILLAGE FILING NO. 3
SPACE VILLAGE AVENUE AND PETERSON BOULEVARD

EXISTING DRAINAGE BASIN MAP

REVISIONS
DATE
REVISION DESCRIPTION

DATE: 08/22/2018

SHEET NUMBER: 1 OF 1

DWG: F:\2017\1501-2000\017-1754\40-Design\Reports\GNCV\Drainage Memo\AutoCAD\C_XBSN_71754.dwg USER: jerramouspe
DATE: Aug 29, 2018 6:21pm XREFS: C_XBASE_71754 C_PCONT_71754

NOTE:
ALL PROPOSED STORM PIPE SHALL BE PRIVATELY OWNED AND MAINTAINED, AND SHALL BE HDPE UNLESS OTHERWISE NOTED.

N
W E
S
0' 10' 20' 40'
SCALE IN FEET

LEGEND

EXISTING PROPERTY LINE	
PROPOSED PROPERTY LINE	
PROPOSED MAJOR CONTOUR	5280
PROPOSED MINOR CONTOUR	5279
EXISTING MAJOR CONTOUR	5280
EXISTING MINOR CONTOUR	5279
PROPOSED STORM SEWER	12"SD 12"SD
BASIN DELINEATION	
TIME OF CONCENTRATION FLOWPATH	
DRAINAGE ARROW	

A = BASIN DESCRIPTION
B = BASIN AREA
C = MINOR EVENT COMPOSITE C-VALUE
D = MAJOR EVENT COMPOSITE C-VALUE
E = DESIGN POINT
F = MINOR EVENT PEAK RUNOFF (CFS)
G = MAJOR EVENT PEAK RUNOFF (CFS)

WITHIN CDOT R.O.W.

B-3
1.50 | 0.64 | 0.76

EXISTING 24" RCP CULVERT W INV. OUT=6263.60' @ 1.00%

MAX FLOW INTO EX. CULVERT IN PROPOSED CONDITION IS 22.62 CFS

POSSIBLE FUTURE DETENTION AREA

B-1
3.07 | 0.81 | 0.88

B-2
1.12 | 0.86 | 0.93

SPACE VILLAGE FILING NO. 2
LOT 1
PETERSON GROUP LLC
PARCEL# 5417001001
PLAT BOOK: B4 PAGE: 177
19,992 SQUARE FEET OR 0.458 ACRES

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PETERSON OFFICE PROJECT
COLORADO SPRINGS EQUITIES LLC.
PARCEL# 5417001002
PLAT BOOK: D4 PAGE: 129

24" RCP INV=6269.50

6274 6272 6270 6271 6268 6266 6269 6270

SUMMARY RUNOFF TABLE

BASIN NAME	AREA (ACRES)	C5	C100	Q5 (CFS)	Q100 (CFS)
B-1	3.07	0.81	0.88	12.08	22.04
B-2	1.12	0.86	0.93	4.39	7.98
B-3	1.50	0.64	0.76	4.17	8.40

DESIGN POINT SUMMARY

DESIGN POINT	CONTRIBUTING BASINS	Q5 (CFS)	Q100 (CFS)
4	B-1, B-2, B-3	8.34 + 5 YR RELEASE RATE FROM FUTURE DETENTION POND	15.97 + 100 YR RELEASE RATE FROM FUTURE DETENTION POND

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SPACE VILLAGE FILING NO. 3
SPACE VILLAGE AVENUE AND PETERSON BOULEVARD

PROPOSED DRAINAGE BASIN MAP

REVISIONS

△	DATE	REVISION DESCRIPTION

DATE: 11-07-2017

SHEET NUMBER:
1 OF 1

DWG: F:\2017\1501-2000\017-1754\40-Design\Reports\GNCV\Drainage Memo\AutoCAD\C_PBSN_71754.dwg USER: jerramouspe
DATE: Aug 29, 2018 6:20pm XREFS: C_PBASE_71754 C_XBASE_71754