no comments from planning

Please update to "Final Drainage Report". The report will be required to meet criteria for a final drainage report listed in the El Paso County's DCM Vol. 1 Section 1 Chapter 4.4

PRLIMINARY DRAINAGE REPORT

FIRST WING SUBDIVISION, FILING NO. 2

0 SPACE VILLAGE AVENUE

COLORADO SPRINGS, COLORADO

PREPARED FOR:

COMMERCIAL BUILDING SERVICES
7561 S. GRANT STREET, SUITE A-4
LITTLETON, COLORADO 80122
CONTACT: DAVID SPRATLEN
PHONE: 303.730.3001

PREPARED BY:

STERLING DESIGN ASSOCIATES, LLC
2009 W. LITTLETON BLVD. #300
LITTLETON, CO 80120
PH. 303.794.4727
CONTACT: JON SPENCER

Please add "PCD File No. MS-22-007".

MAY 5, 2022

Sterling Design Associates, llc
CIVIL ENGINEERS - LANDSCAPE ARCHITECTS

ENGINEER CERTIFICATION

This report for the preliminary design of First Wing Subdivision Filing No. 2 was prepared by me (or under my direct supervision) in accordance with the provisions of the El Paso County *Drainage Criteria Manual* and the Colorado Springs' *Drainage Design and Technical Criteria Manual* for the owners thereof. I understand that El Paso County and the City of Colorado Springs do not and will not assume liability for drainage facilities designed by others.

By: _____
Licensed Professional Engineer
State of Colorado
No. _____

Please revise drainage report certification page using the attached word document for the design engineer, owner/developer, and El Paso County signature blocks.

Sterling Design Associates, llc
CIVIL ENGINEERS - LANDSCAPE ARCHITECTS

TABLE OF CONTENTS

1) GENERAL LOCATION AND DESCRIPTION 1
   A) Location 1
   B) DESCRIPTION OF PROPERTY 2
2) DRAINAGE BASINS AND SUB-BASINS 2
   A) Major Basin Descriptions 2
   B) Sub-Basin Descriptions 3
3) DRAINAGE DESIGN CRITERIA 3
   A) Development Criteria Reference 3
   B) Hydrologic Criteria 4
4) DRAINAGE FACILITY DESIGN 4
   A) General Concept 4
   B) Specific Details 4
5) LIST OF REFERENCES 5

APPENDICES

A. FIRM Map, Web Soil Survey
B. Hydrology and Hydraulics Calculations and Analysis
C. Excerpts of Existing Drainage Reports
D. Drainage Basin Maps

1) GENERAL LOCATION AND DESCRIPTION

A) LOCATION

1. CITY AND COUNTY, AND LOCAL STREETS

The subject development is in unincorporated El Paso County; though it is addressed by the USPS to Colorado Springs. The Space Village Avenue right-of-way is immediate to the north property line. Intersection with Peterson Road is one-quarter mile to the west while the Marksheffel Road intersection is a half mile to the east.

2. TOWNSHIP, RANGE, SECTION, 1/4 SECTION

First Wing Subdivision Filing No. 2 is a parcel of land is situated in the Northwest 1/4 of Section 17, Township 14 South, Range 65 West of the 6th Principal Meridian, in El Paso County, Colorado.

VICINITY MAP

3. MAJOR DRAINAGEWAYS AND EXISTING FACILITIES

No major drainageways exist either on or immediately adjacent to the site.

4. SURROUNDING DEVELOPMENTS

The property to the west is, except for a partial access road, the undeveloped commercial Lot 1, Cowperwood SAIC. To the south is Peterson Air Force Base. To the east is open space belonging to the City of Colorado Springs. Several commercial developments, primarily storage facilities, exist north of the adjacent Space Village Avenue ROW including the Eastgate Business Park and Front Range Winwater Works.

B) DESCRIPTION OF PROPERTY

1. AREA AND EXISTING CONDITIONS

The terrain within the 22.80 acre site generally falls north to south at 2 to 4.5 percent grades. The east half of the site is covered with native grasses and a handful of widely spaced trees. The west half is being used as an impromptu storage yard and is largely denuded of significant vegetation.

2. GENERAL SOIL CONDITION

The Web Soil Survey referenced for this Lot indicate a Blakeland loamy sand subgrade with a hydrologic soil group A rating. Where native grasslands remain, the soil is suspected to be in good condition and remain highly porous. In areas being used for storage there is evidenced loss of infiltration due to compaction by vehicle loading.

3. ENCUMBRANCES

A duel 30-inch CMP culvert under Space Village Avenue discharges onto the property approximately 260 feet from the east property line. It appears there is an off-site basin of approximately 53 acres contributing to this facility. There is a low area on site where, it is assumed, most runoff events have sat and infiltrated as there is no evidence of a low flow channel or rill that would be caused by frequent subjection to flowing water.

There are two 30-foot utility easements on the property adjacent to Space Village Avenue. The north most contains an 8-inch sanitary sewer main belonging to the Cherokee Metropolitan District. The southern one contains a 48-inch steel water line belonging to Colorado Springs Utilities. There are no irrigation facilities on-site that we are aware of. These utilities and their easements are not expected to be disturbed or displaced by the proposed development.

2) DRAINAGE BASINS AND SUB-BASINS

Please revise description. The property is located in the Peterson Field Drainage Basin.

A) MAJOR BASIN DESCRIPTIONS

The site is in the Sand Creek Basin and is a part of the Peterson Field DBS. In both these studies the area of this development is in the far upper reaches of the basin and there are no identifications of existing deficiency or proposed improvements within the property boundary or immediate thereto.

Likely due to the highly pervious soils there is no indication of continuous storm runoff flows either in low flow channels or rill on the site. Existing discharge of runoff from the site is either into the ground or as sheet flow onto Peterson AFB. The site is identified as Zone X, area of minimal flood hazard, by the El Paso County FIRM 08041C0754G with an effective date of 12/7/2018. No irrigation facilities are expected to be impacted by runoff from the proposed development.

It is intended that the 22.80 acre site be re-purposed as an outdoor storage yard. Ultimate tenants and internal circulation geometry is not known at this time.

B) Sub-Basin Descriptions

As part of the sub-basin description please include the total flow rates for each basin and the amount of runoff flowing through.

1. Historic Drainage Pattern

There are two distinct low points and a ridge that generally divide the site into an east (Basin A) and west (Basin B) half for drainage consideration. Grades within both direct any excess rainfall runoff to the south and onto Peterson AFB. Lack of evidence of past erosion or channel formation indicates this has been accomplished primarily as sheet flow up to now.

The drainage map showing existing conditions labels these basins as H1 and H2.

Please revise basin names to match basin IDs shown on the drainage maps.

2. Off-Site Drainage

The large open space on the property that the twin 30-inch CMP culverts under Space Village Avenue contribute will become a part of the proposed storage yard. As such, it will become necessary to pass this flow through, in a channel section, to Peterson AFB. There is a second area, approximately 6.8 acres, north of Space Village Avenue and west of the larger basin described above, that could contribute discharge over the road and onto the western property boundary in very large rain events. There is no evidence this has occurred, but there is no apparent means for water accumulating at that location to discharge other than into the ground or over the road and onto the site. A perimeter swale can easily provide for conveyance of flows, in this eventuality, south onto Peterson.

The existing conditions drainage map identifies off-site basins OS-W and OS-E. Please include these in the sub-basin breakdown. Include the total flow rate, five and 100 year flow rates and runoff pattern descriptions.

3) DRAINAGE DESIGN CRITERIA

A) Development Criteria Reference

1. Criteria, Master Plans, and Technical Info

This report references the El Paso County *Drainage Criteria Manual*, the City of Colorado Springs *Drainage Criteria Manual*, and Volumes I and II of the Mile High Flood District Drainage Criteria Manual for the needed technical information to make estimation of rate and volumetric stormwater considerations presented herein.

As mentioned previously, the area of proposed development is a part of the upper reaches of planning areas presented in the *Peterson Field Drainage Basin Master Plan* (August, 1984) and the *Sand Creek Drainage Basin Planning Study – Final Report* (January, 2021). Neither report particularly addresses the area in question or describes any problems or drainage improvements that may be associated with it. However, the Sand Creek study does graphically show the property as "open space / cemetery" in its future condition mapping; a designation not supported by the El Paso County Zoning Map or the Colorado Springs Comprehensive Plan.

2. Prior Studies

The area of the proposed development was, most recently, included in the Preliminary Drainage Report for First Wing Development (July, 2005). In that report the subject is referenced as being Filing No. 2 of the First Wing Development. It is described as existing Basin EX-3 and proposed Basin E and is summarized as having an allowed, detained 100-year release onto Peterson AFB of 36 cfs. Two minor basins, OS-3 and OS-4, are shown to contribute to the site from areas of Space Village Avenue south of the road center, only. However, the two aforementioned 30-inch culverts under Space Village Avenue route runoff from a considerably larger area onto the site. It is not known whether this was the case at the time that PDR was developed or occurred subsequent thereto.

A second reference study, presented in letter format as made available, addresses the Highway 24 Eastgate Business Park (December, 2011) north of Space Village Avenue. This is pertinent only in that it demonstrates the twin 30-inch culverts under the avenue and the business parks' discharge (Q_{100}=20.9 cfs, post detention) thereto. There is no further quantification of upstream flows to the culverts or addressing of the discharge condition downstream of Space Village Avenue.

B) HYDROLOGIC CRITERIA

On- and off-site basin runoff was determined through the use of the rational formula for the 5- and 100-year recurrence interval storms. Intensities for which were taken from Figure 6-5 of the Colorado Springs DCM. Intensities for detention sizing were excerpted from NOAA Atlas 14 as available through their website. Detention sizing was estimated using the design tool MHFD-Detention_v4.03.xlsm, an Excel worksheet published by the Mile High Flood District.

4) DRAINAGE FACILITY DESIGN

Please include a narrative on the proposed detention facilities in the proposed sub-basin description.

A) GENERAL CONCEPT

Site drainage patterns are not anticipated to change with development as a storage yard. Runoff will be routed overland to perimeter berms and swales which will direct excess rainfall to one of two proposed detention and water quality facilities. Treated and mitigated runoff will then be directed onto Peterson Air Force Base at the low points along the south property line.

Off-site drainage coming into the site from the north will be intercepted in a grass lined channel (east) or swales (west) which will route those flows to the south property line. The larger, channel, will confluence with other off-site flows from further east at the southeast property corner. Water in the swale will combine with discharge from the east pond facility before exiting onto the AFB.

2022 Drainage Basin fee is $15,243 per impervious acre and $1,156 per impervious acre for the bridge fee

https://assets-planningdevelopment.elpasoco.com/wp-content/uploads/2022-DFees-with-resolution-number-1.pdf

Also refer to ECM Appendix L table 3-1. As site development is not known at this time use 85% impervious for fee calc.

The channel is directing concentrated flow to the southerly lot which will negatively impact the southerly lot. How will this impact be mitigated? Additionally, this channelized flow does not match historic conditions. please address.

B) SPECIFIC DETAILS

On- and off-site basins are delineated on the general maps and calculations are included in the attached appendices. At the time of preparation of this report there are no detailed plans for the proposed improvements as those will be predicated on end users which have not been established. Water quality and detention pond placement is expected within the indicated envelopes which will dimensionally vary from the preliminary sizing provided by the MHFG-Detention worksheet.

It is estimated that it will require a 10' flat bottom channel flowing at approximately 2' depth to convey off-site flows from Basin OS-E at the average basin grade on the east side of the site. Similarly, a much smaller 'V' bottom swale flowing at just over a foot of depth will suffice on the west side for flows that may originate is OS-W. Flow velocities in both are coming in at 3.25 cfs for the channel and 2.85 fps for the swale. It is expected that these grades will be reduced to produce non-erosive velocities on average either through armored intermittent sections at steeper grades or with drop structures.

Please identify what is required/proposed for the swale/channel.

The existing and proposed discharge from the site onto Peterson Air Force Base are anticipated to coincide. However, there will necessarily be some change to the characteristics of discharge, namely in concentration, duration, and, for larger events, total volume. We have reached out to the Bases' Engineering Staff for coordination and determination of what can be accommodated by the existing infrastructure on Peterson and what, if anything, will need to be improved. Results of those discussions and any subsequent design will be included in updates.

- Please include a cost breakdown for drainage basin fees owed by the developer at the time of plat.
- Please include the engineer's estimate for the total cost of detention and water quality facilities and provide a breakdown of the cost.

Address with this report. Suitable outfalls (ECM3.2.4) for the sites developed flows must be provided.

Please compare the historic flows to the proposed developed condition flows. Are the developed flows at or below historic as required? Do the proposed full spectrum detention/water quality ponds meet the drainage time requirements (senate bill 15-212)? etc.
Provide a conclusions section. Confirm whether or not the developed flows will adversely affect the downstream or surrounding properties.

evaluate the 4 step process per ECM appendix I.7.2

5) LIST O

1. El Pas gh MuniCode and created (e-published) on Ju
2. City c 2014, as Revised January 2021.
3. Volume III Drainage Criteria Manual (DCM) Urban Drainage & Flood Control District, November 2010 with some sections updated April 2018.
4. Peterson Field Drainage Master Plan, prepared by URS/NES and dated September 28, 1984.
5. Sand Creek Drainage Basin Planning Study – Final Report, prepared by Stantec and HDR Dewberry and dated January, 2021.
6. Preliminary Drainage Report for First Wing Development by JR Engineering, Revised July 2005.
7. Addendum to Drainage Letter – Highway 24 Eastgate Business Park by Oliver E. Watts, Consulting Engineer, Inc. and revised December 5, 2011.
8. Soil Map-El Paso County Area, Colorado, as available on the Web Soil Survey National Cooperative Soil Survey mapping tool.
9. Flood Insurance Rat Map 08041C0754G with an effective date of December 7, 2018.
10. NOAA Atlas 14, Volume 8, Version 2 as available at https://hdsc.nws.noaa.gov

Due to the amount and type of comments provided, additional comments should be expected with the re-submittal.

APPENDIX A

FIRM Map
Web Soil Survey

National Flood Hazard Layer FIRMette

FEMA

104°41'53"W 38°50'34"N

104°41'16"W 38°50'6"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

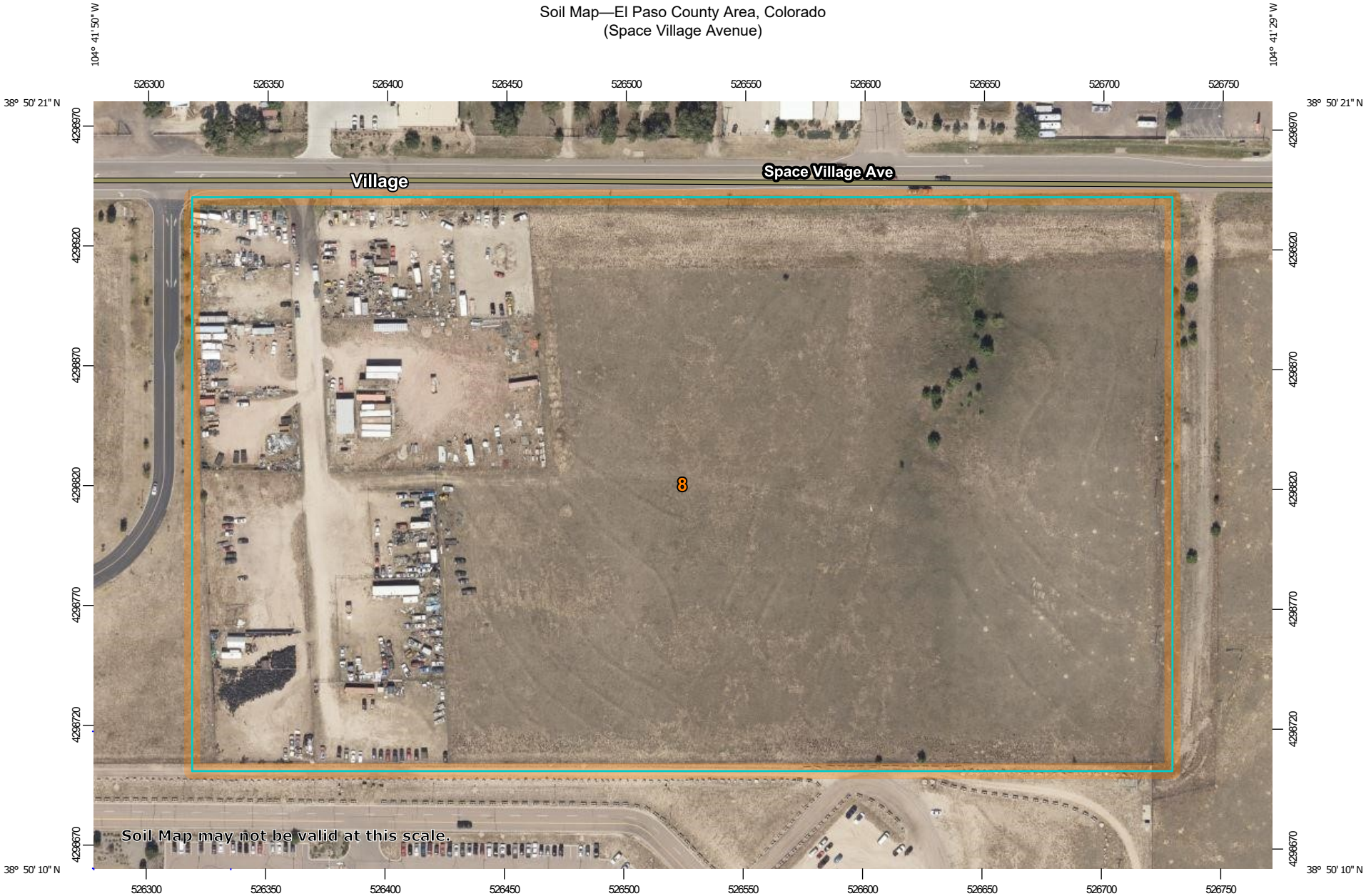
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/4/2022 at 6:52 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Soil Map—El Paso County Area, Colorado
(Space Village Avenue)



Map Scale: 1:2,260 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

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

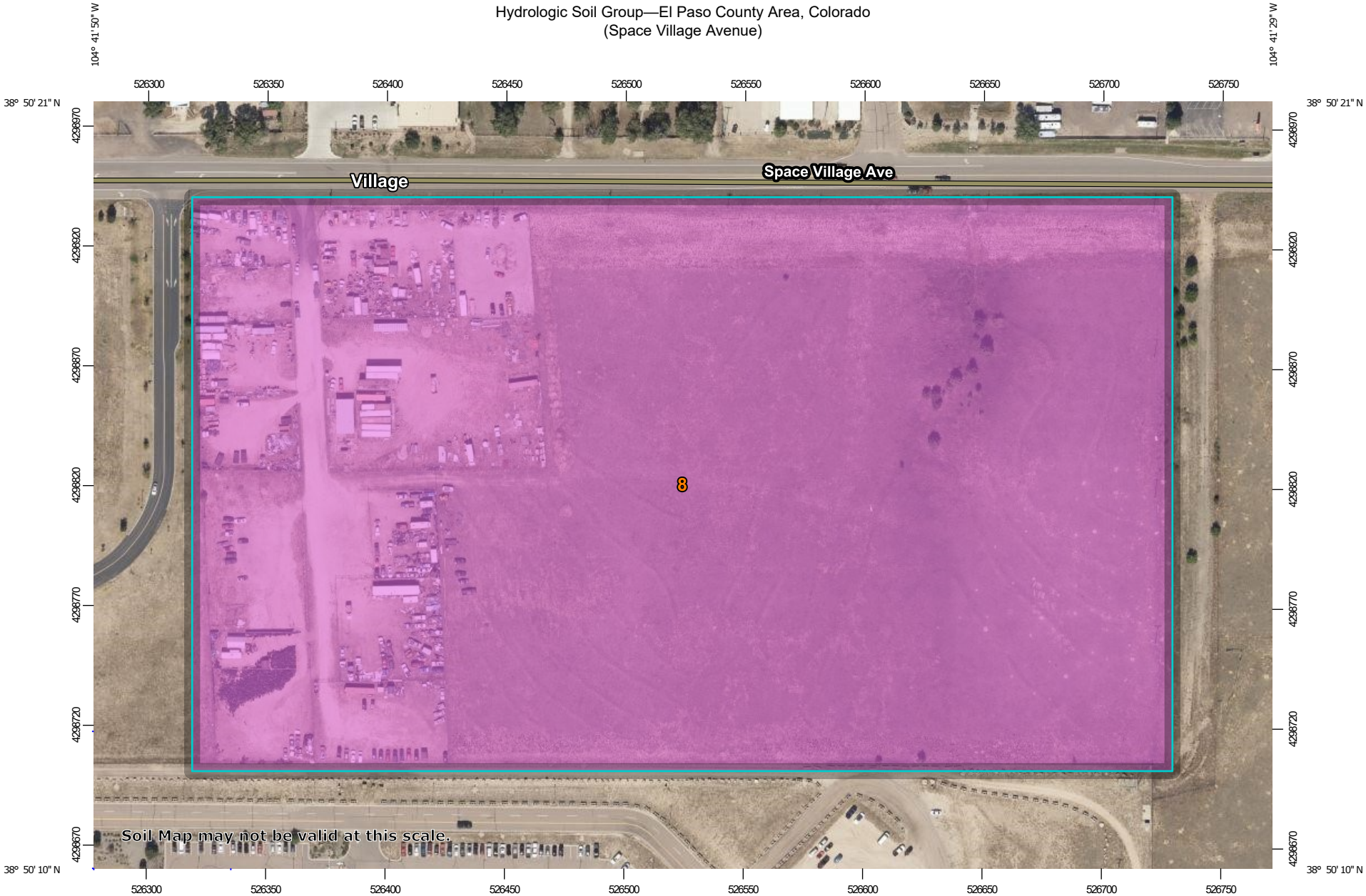
Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	24.4	100.0%
Totals for Area of Interest		**24.4**	**100.0%**

Hydrologic Soil Group—El Paso County Area, Colorado
(Space Village Avenue)



Map Scale: 1:2,260 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 19, Aug 31, 2021

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	24.4	100.0%
Totals for Area of Interest			**24.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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.

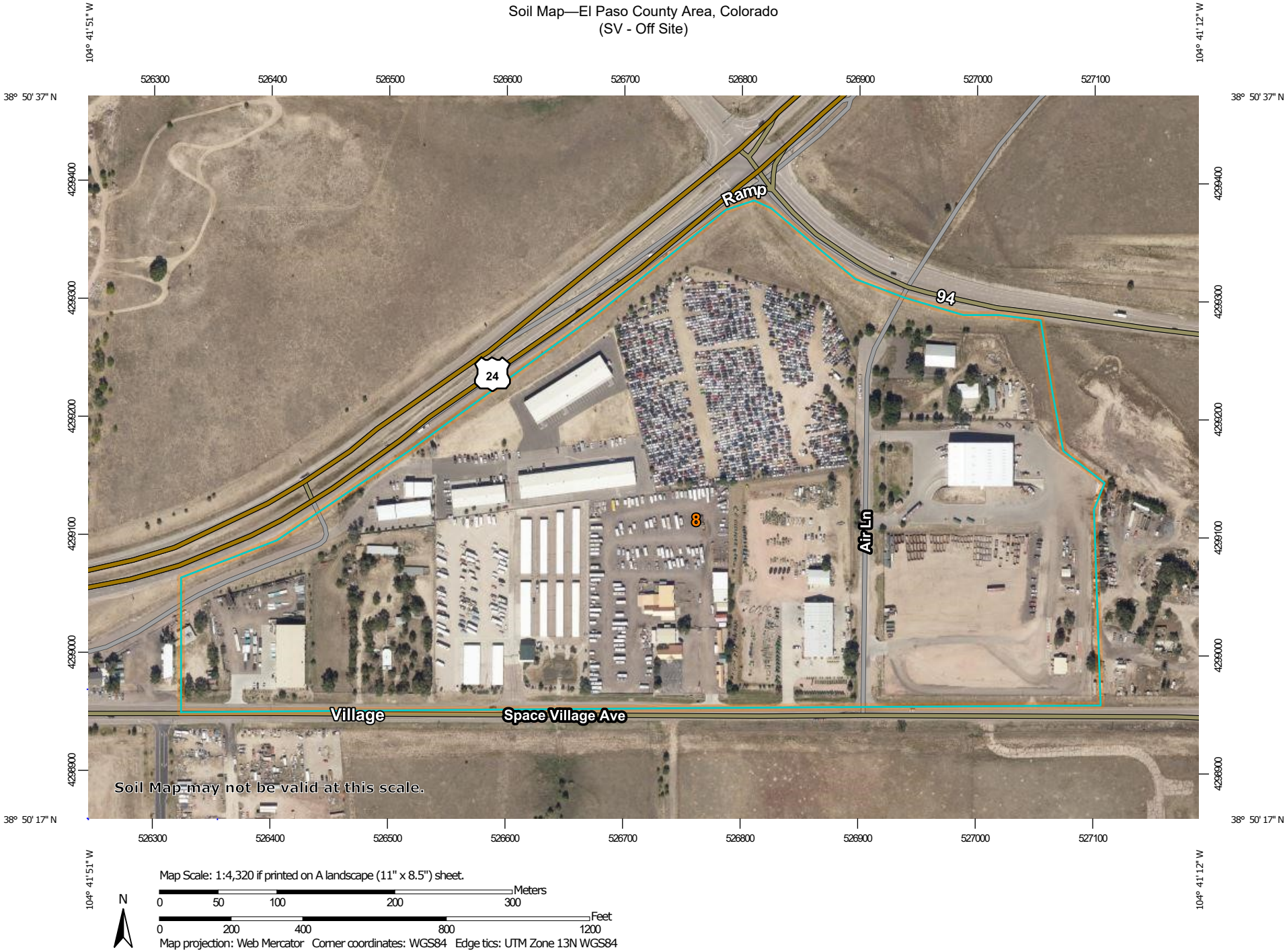
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Soil Map—El Paso County Area, Colorado
(SV - Off Site)



Map Scale: 1:4,320 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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 19, Aug 31, 2021

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

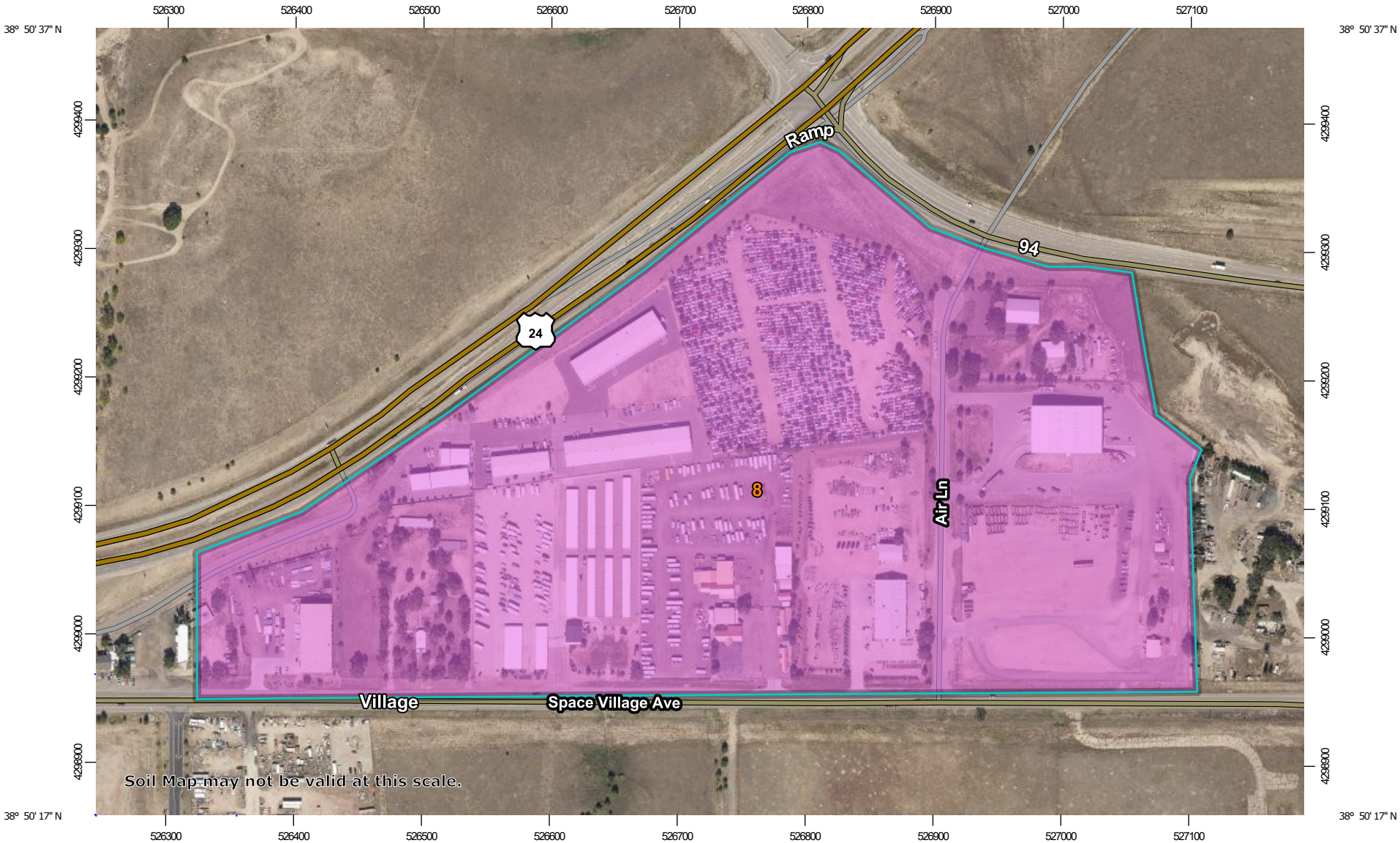
Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	56.1	100.0%
Totals for Area of Interest		**56.1**	**100.0%**

Hydrologic Soil Group—El Paso County Area, Colorado
(SV - Off Site)



Map Scale: 1:4,320 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 19, Aug 31, 2021

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	56.1	100.0%
Totals for Area of Interest			**56.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

APPENDIX B

Hydrology & Hydraulics Calculations and Analysis

STERLING
DESIGN ASSOCIATES
Civil Engineers | Landscape Architects

as the site development of each of the lots is not yet known, an imperviousness consistent with industrial areas should be utilized (+80%). Using a 50% impervious value will highly limit the development of the two lots.

Weighted Imperviousness

Job Name: 0 Space Village Ave.

Date: 5/3/22

By: JDT

	[1]I	C_5	C_{100}
Open Space	2	0.01	0.13
Single Family (Large)	15	0.08	0.23
Space Village ROW	40	0.27	0.42
Yards	50	0.36	0.50
Drives, Walks, Buildings	90	0.75	0.81

[1]% Impervious from UDFCD, *USDCM Vol. I* , Table 6-3

EXISTING SITE

Basin	Open Space	Single Fam. Large	Space Village ROW	Yards	Drives, Walks, & Buildings	Total	I	Weighted Runoff Coeff C_5	C_{100}
OS-E	4.299	1.147	0.000	34.328	13.201	52.976	55	0.42	0.54
OS-W	0.000	2.531	0.000	4.294	0.000	6.825	37	0.26	0.40
H1	11.414	0.000	0.855	0.000	0.000	12.269	5	0.03	0.15
H2	11.804	0.000	0.956	0.000	0.000	12.760	5	0.03	0.15
Site Totals	23.218	0.000	1.810	0.000	0.000	25.029	5	0.03	0.15

PROPOSED SITE

Basin	Open Space	Single Fam. Large	Space Village ROW	Yards	Drives, Walks, & Buildings	Total	I	Weighted Runoff Coeff C_5	C_{100}
A	0.000	0.000	0.855	11.414	0.000	12.269	49	0.35	0.49
B	0.000	0.000	0.956	11.804	0.000	12.760	49	0.35	0.49
Site Totals	0.000	0.000	1.810	23.218	0.000	25.029	49	0.35	0.49

Hydrologic Soil Group = A

STERLING
DESIGN ASSOCIATES
Civil Engineers | Landscape Architects

Time of Concentration

Job Name: 0 Space Village Ave.

Date: 5/3/22

By: JDT

Sub-Basin Data			**Initial/Overland Time (Ti)			Travel Time Tt				***Tc Check Urbanized Basin		Final Tc	Remarks
Desig	C5	Area	Length	Slope	Ti	Length	Slope	*Vel	Tt	Tot Len	Tc		
		Ac	Ft	Ft/Ft	Min	Ft	%	FPS	Min	Ft	Min	Min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
HISTORIC													
OS-E	0.42	52.98	730	3.3	22.3	630	1.3	0.8	13.2				Undeveloped (K=7)
						320	1.0	1.5	3.6			39.0	Undeveloped (K=15)
OS-W	0.26	6.82	600	2.5	27.6	400	1.0	1.5	4.4			32.0	Undeveloped (K=15)
H1	0.03	12.27	890	2.5	42.7							42.7	Undeveloped
H2	0.03	12.76	890	2.6	42.1							42.1	Undeveloped
PROPOSED													
A	0.35	0.00	300	2.5	17.2	590	2.5	2.4	4.1	890	21.5	21.4	(K=15)
B	0.35	0.00	300	2.6	17.0	590	2.6	2.4	4.1	890	21.5	21.1	(K=15)

*Velocity from UDFCD - DCM, Vol. I, Equation 6-4 and Table 6-2

**Ti caclualted from UDFCD - DCM, Vol. I, Equation 6-3

100 foot max for urban land uses

STERLING
DESIGN ASSOCIATES
Civil Engineers | Landscape Architects

Stormwater Runoff

Job Name: 0 Space Village Ave.

Date: 5/3/22

By: JDT

Return Period: 5-yr

Intensity[1]: -1.50 ln(Tc) + 7.583

Design Point	Direct Runoff							Total Runoff				Remarks
	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
	OS-E	52.98	0.42	39.0	22.39	2.09	46.76					To the two (2) 30" CMP under SV
	OS-W	6.82	0.26	32.0	1.75	2.38	4.17					Overtopping of SV (only)
	H1	12.27	0.03	42.7	0.34	1.95	0.67					
	H2	12.76	0.03	42.1	0.38	1.97	0.74					
	A	12.27	0.35	21.4	4.34	2.99	12.97					
	B	12.76	0.35	21.1	4.51	3.01	13.56					

[1]Intensity from Colorado Springs Drainage Criteria Manual, Volume 1, Figure 6-5

STERLING
DESIGN ASSOCIATES
Civil Engineers | Landscape Architects

Stormwater Runoff

Job Name: 0 Space Village Ave.

Date: 5/3/22

By: JDT

Return Period: 100-yr

Intensity[1]: -2.52 ln(Tc) + 12.735

Design Point	Direct Runoff							Total Runoff				Remarks
	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
	OS-E	52.98	0.54	39.0	28.68	3.50	100.48					To the two (2) 30" CMP under SV
	OS-W	6.82	0.40	32.0	2.73	4.00	10.91					Overtopping of SV (only)
	H1	12.27	0.15	42.7	1.84	3.28	6.04					
	H2	12.76	0.15	42.1	1.94	3.31	6.41					
	A	12.27	0.49	21.4	6.07	5.02	30.43					
	B	12.76	0.49	21.1	6.30	5.05	31.84					

[1]Intensity from Colorado Springs Drainage Criteria Manual, Volume 1, Figure 6-5

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 3 2022

OS-E Diversion Channel

Trapezoidal

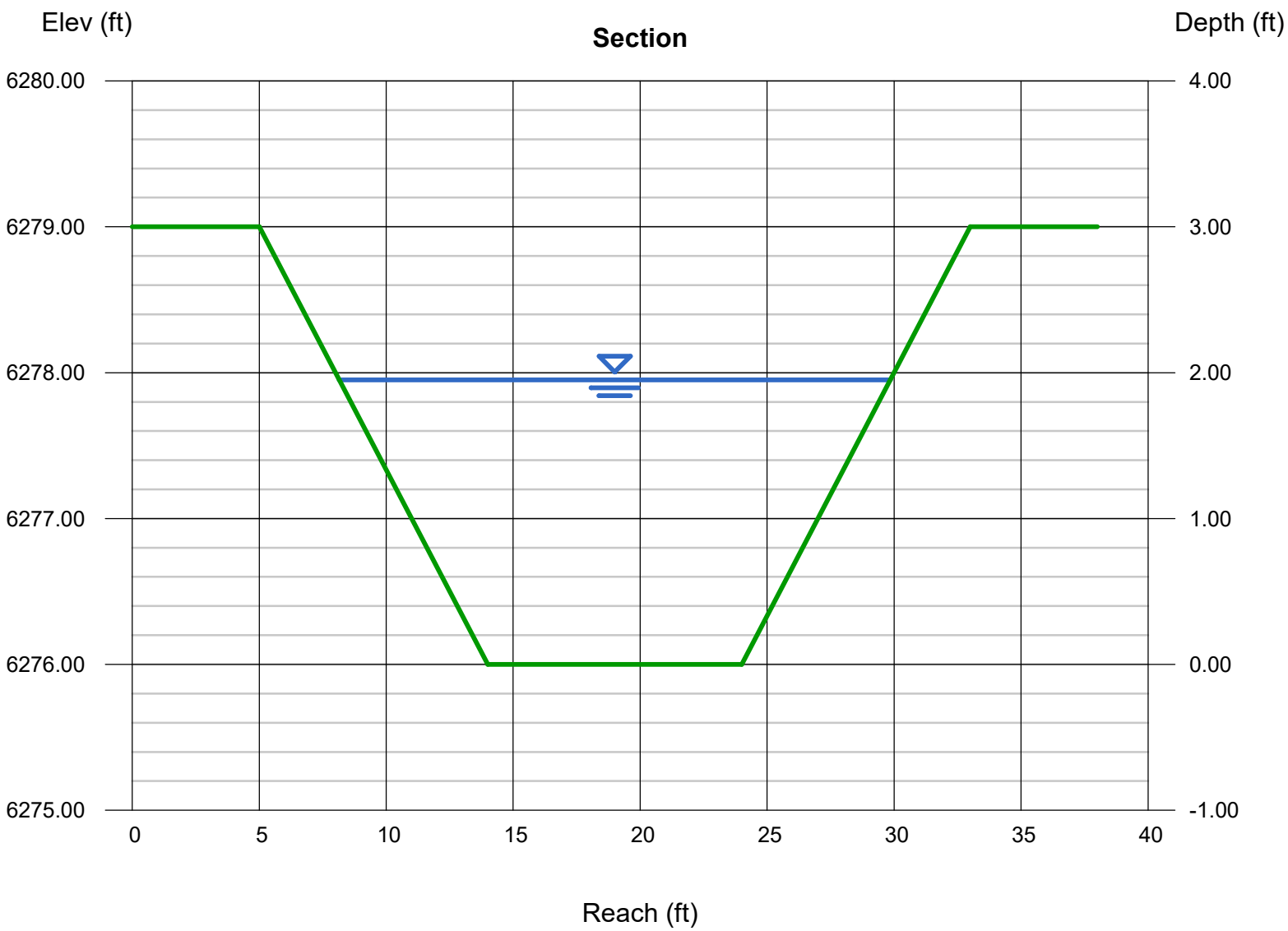
Bottom Width (ft)	=	10.00
Side Slopes (z:1)	=	3.00, 3.00
Total Depth (ft)	=	3.00
Invert Elev (ft)	=	6276.00
Slope (%)	=	0.50
N-Value	=	0.040

Calculations

Compute by:		Known Q
Known Q (cfs)	=	100.50

Highlighted

Depth (ft)	=	1.95
Q (cfs)	=	100.50
Area (sqft)	=	30.91
Velocity (ft/s)	=	3.25
Wetted Perim (ft)	=	22.33
Crit Depth, Yc (ft)	=	1.28
Top Width (ft)	=	21.70
EGL (ft)	=	2.11



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 3 2022

OS-E Diversion Channel

Triangular

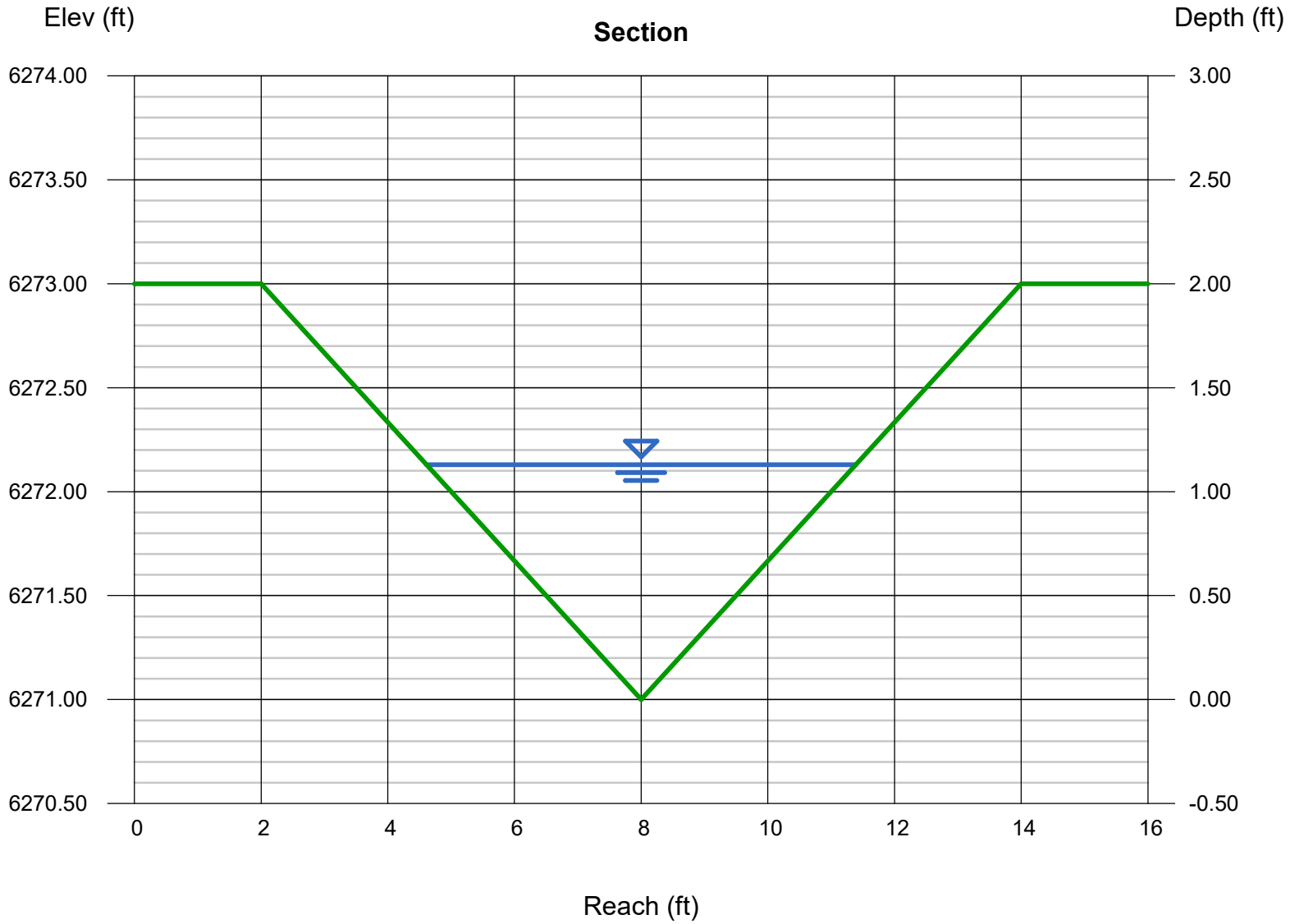
Side Slopes (z:1)	=	3.00, 3.00
Total Depth (ft)	=	2.00
Invert Elev (ft)	=	6271.00
Slope (%)	=	1.40
N-Value	=	0.040

Calculations

Compute by:		Known Q
Known Q (cfs)	=	10.90

Highlighted

Depth (ft)	=	1.13
Q (cfs)	=	10.90
Area (sqft)	=	3.83
Velocity (ft/s)	=	2.85
Wetted Perim (ft)	=	7.15
Crit Depth, Yc (ft)	=	0.97
Top Width (ft)	=	6.78
EGL (ft)	=	1.26



NOAA Atlas 14, Volume 8, Version 2
Location name: Cimarron Hills, Colorado, USA*
Latitude: 38.8377°, Longitude: -104.6941°
Elevation: 6285.18 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.238 (0.200-0.286)	0.289 (0.242-0.348)	0.378 (0.315-0.456)	0.457 (0.379-0.554)	0.573 (0.461-0.728)	0.669 (0.523-0.860)	0.771 (0.579-1.02)	0.880 (0.631-1.19)	1.03 (0.708-1.44)	1.15 (0.767-1.62)
10-min	0.349 (0.292-0.419)	0.423 (0.354-0.509)	0.553 (0.461-0.667)	0.669 (0.554-0.811)	0.839 (0.675-1.07)	0.980 (0.766-1.26)	1.13 (0.848-1.49)	1.29 (0.924-1.75)	1.51 (1.04-2.11)	1.69 (1.12-2.38)
15-min	0.425 (0.357-0.511)	0.516 (0.432-0.621)	0.674 (0.563-0.814)	0.815 (0.676-0.989)	1.02 (0.823-1.30)	1.20 (0.934-1.54)	1.38 (1.03-1.81)	1.57 (1.13-2.13)	1.84 (1.26-2.57)	2.06 (1.37-2.90)
30-min	0.647 (0.543-0.778)	0.783 (0.656-0.943)	1.02 (0.852-1.23)	1.23 (1.02-1.50)	1.55 (1.24-1.97)	1.81 (1.41-2.32)	2.08 (1.56-2.74)	2.37 (1.70-3.21)	2.78 (1.91-3.88)	3.11 (2.07-4.38)
60-min	0.863 (0.724-1.04)	1.02 (0.853-1.23)	1.30 (1.09-1.58)	1.57 (1.31-1.91)	1.99 (1.61-2.55)	2.35 (1.84-3.04)	2.74 (2.07-3.64)	3.17 (2.28-4.32)	3.79 (2.61-5.30)	4.30 (2.86-6.04)
2-hr	1.08 (0.912-1.29)	1.25 (1.06-1.50)	1.59 (1.34-1.91)	1.92 (1.60-2.31)	2.44 (2.00-3.12)	2.90 (2.30-3.74)	3.40 (2.59-4.50)	3.97 (2.88-5.39)	4.80 (3.33-6.68)	5.48 (3.67-7.66)
3-hr	1.19 (1.01-1.42)	1.36 (1.15-1.62)	1.71 (1.44-2.04)	2.06 (1.73-2.47)	2.64 (2.18-3.39)	3.16 (2.52-4.08)	3.74 (2.87-4.95)	4.41 (3.22-5.98)	5.39 (3.77-7.50)	6.21 (4.18-8.65)
6-hr	1.36 (1.17-1.61)	1.54 (1.32-1.82)	1.92 (1.63-2.28)	2.31 (1.96-2.76)	2.98 (2.49-3.82)	3.59 (2.90-4.62)	4.28 (3.32-5.64)	5.07 (3.74-6.86)	6.25 (4.41-8.66)	7.24 (4.91-10.0)
12-hr	1.51 (1.30-1.77)	1.73 (1.49-2.03)	2.18 (1.87-2.57)	2.63 (2.24-3.11)	3.37 (2.83-4.26)	4.03 (3.27-5.13)	4.77 (3.72-6.23)	5.61 (4.17-7.51)	6.85 (4.86-9.40)	7.88 (5.38-10.8)
24-hr	1.68 (1.46-1.96)	1.95 (1.70-2.28)	2.48 (2.15-2.91)	2.99 (2.57-3.51)	3.78 (3.18-4.72)	4.48 (3.65-5.63)	5.24 (4.10-6.75)	6.08 (4.54-8.06)	7.31 (5.21-9.94)	8.32 (5.72-11.4)
2-day	1.91 (1.68-2.22)	2.24 (1.96-2.59)	2.83 (2.47-3.29)	3.38 (2.94-3.95)	4.22 (3.57-5.20)	4.94 (4.05-6.15)	5.72 (4.50-7.29)	6.57 (4.93-8.61)	7.78 (5.58-10.5)	8.77 (6.08-11.9)
3-day	2.08 (1.84-2.40)	2.44 (2.15-2.82)	3.08 (2.70-3.56)	3.66 (3.19-4.25)	4.53 (3.83-5.53)	5.26 (4.32-6.49)	6.04 (4.77-7.65)	6.89 (5.18-8.97)	8.09 (5.82-10.8)	9.06 (6.30-12.2)
4-day	2.23 (1.97-2.56)	2.61 (2.31-3.00)	3.27 (2.88-3.78)	3.87 (3.39-4.49)	4.77 (4.05-5.79)	5.51 (4.54-6.78)	6.30 (4.99-7.95)	7.15 (5.40-9.28)	8.35 (6.03-11.1)	9.31 (6.50-12.6)
7-day	2.60 (2.32-2.98)	3.02 (2.69-3.46)	3.75 (3.33-4.30)	4.40 (3.87-5.07)	5.35 (4.56-6.45)	6.13 (5.08-7.49)	6.96 (5.54-8.72)	7.84 (5.95-10.1)	9.08 (6.59-12.0)	10.1 (7.07-13.5)
10-day	2.93 (2.63-3.34)	3.39 (3.03-3.86)	4.17 (3.71-4.77)	4.86 (4.30-5.58)	5.87 (5.02-7.03)	6.69 (5.56-8.12)	7.55 (6.04-9.41)	8.47 (6.45-10.9)	9.74 (7.10-12.9)	10.8 (7.59-14.4)
20-day	3.87 (3.50-4.38)	4.45 (4.01-5.04)	5.41 (4.86-6.15)	6.24 (5.57-7.12)	7.41 (6.37-8.77)	8.34 (6.98-10.0)	9.29 (7.47-11.5)	10.3 (7.88-13.0)	11.6 (8.53-15.2)	12.7 (9.02-16.8)
30-day	4.66 (4.23-5.25)	5.35 (4.85-6.03)	6.48 (5.85-7.33)	7.43 (6.66-8.44)	8.74 (7.53-10.3)	9.76 (8.19-11.6)	10.8 (8.70-13.2)	11.8 (9.09-14.9)	13.2 (9.71-17.1)	14.3 (10.2-18.9)
45-day	5.65 (5.16-6.34)	6.50 (5.92-7.30)	7.86 (7.13-8.85)	8.97 (8.08-10.1)	10.5 (9.04-12.2)	11.6 (9.76-13.7)	12.7 (10.3-15.4)	13.8 (10.6-17.2)	15.2 (11.2-19.6)	16.2 (11.7-21.4)
60-day	6.50 (5.95-7.27)	7.49 (6.85-8.39)	9.05 (8.24-10.2)	10.3 (9.32-11.6)	12.0 (10.3-13.8)	13.2 (11.1-15.5)	14.3 (11.6-17.3)	15.5 (12.0-19.3)	16.9 (12.5-21.7)	17.9 (12.9-23.5)

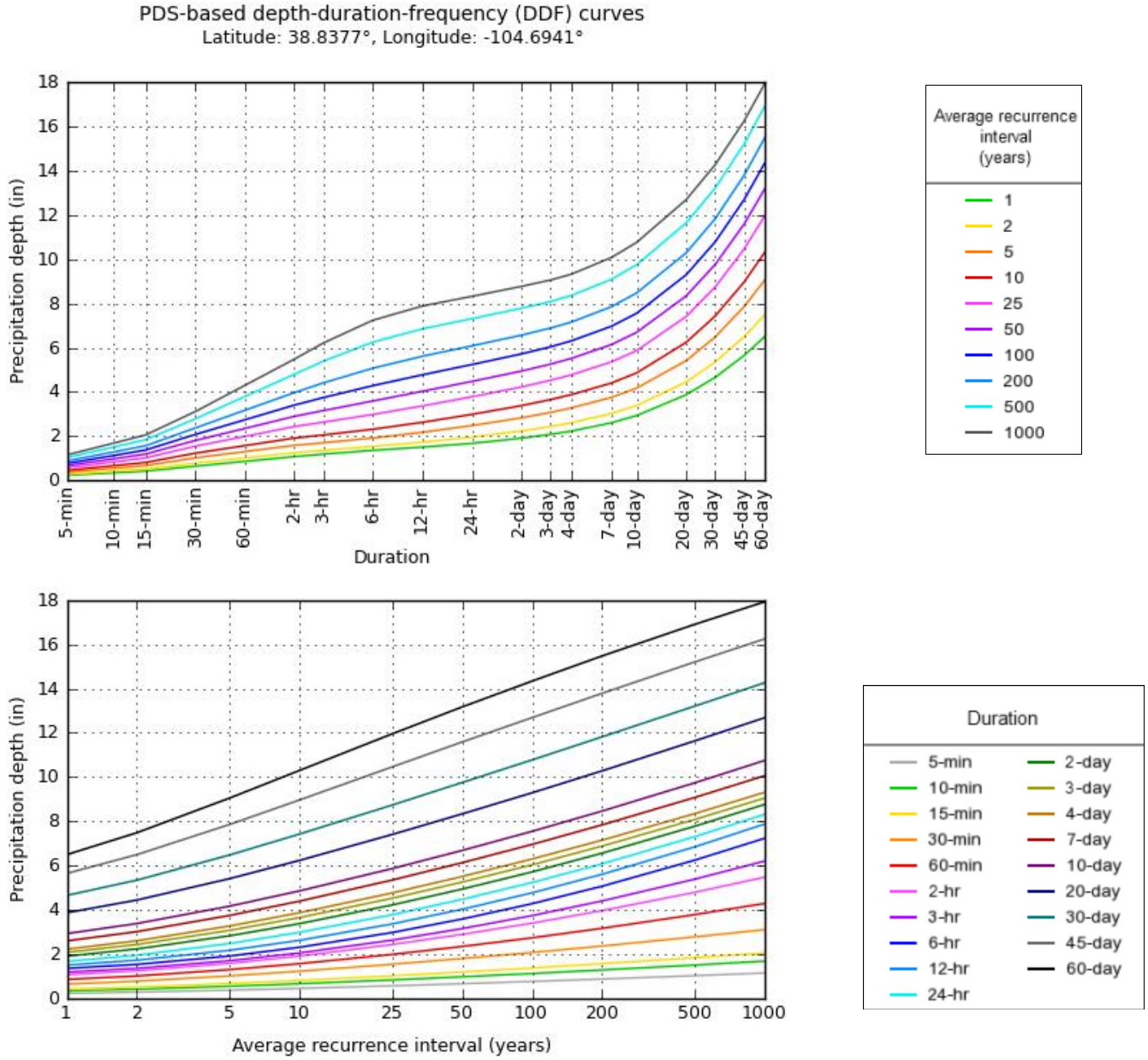
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



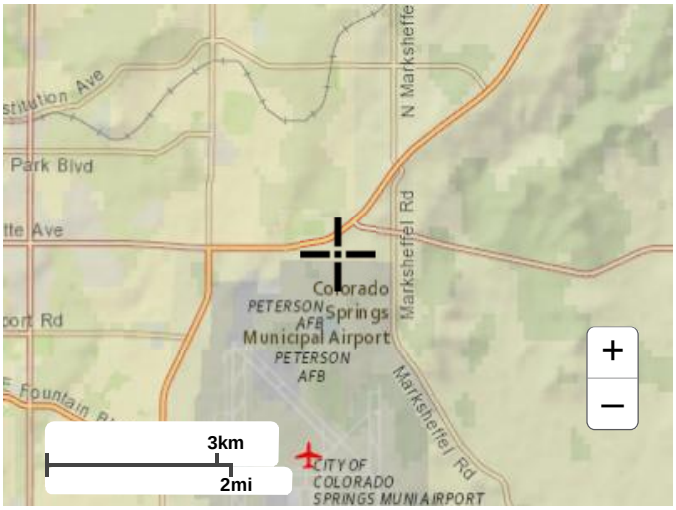
NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Thu May 5 18:17:53 2022

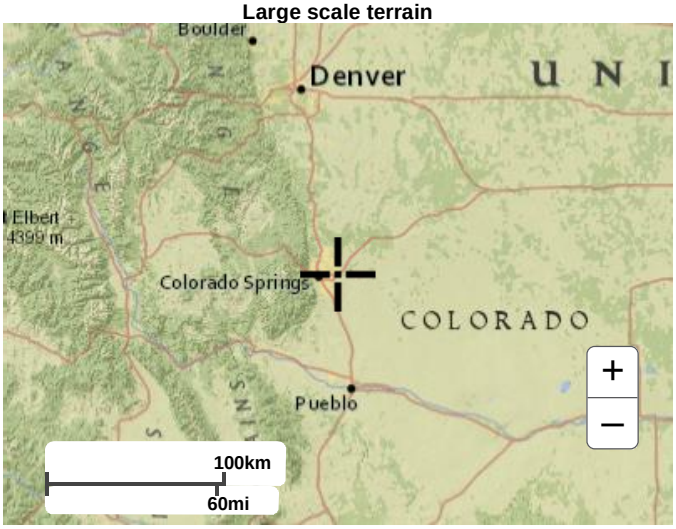
Back to Top

Maps & aerials

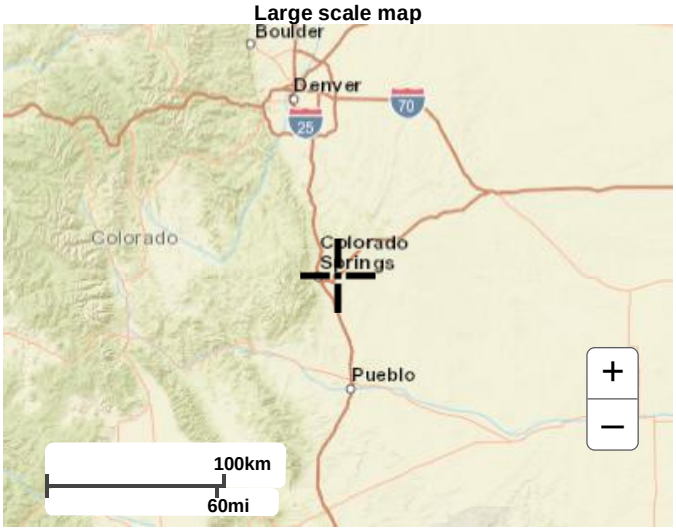
Small scale terrain



Large scale terrain



Large scale map



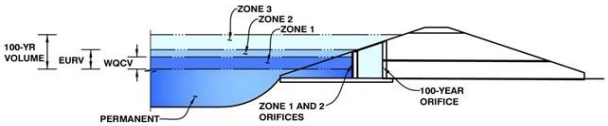
Large scale aerial

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Hampton Partners

Basin ID: East Half



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	12.27	acres
Watershed Length =	740	ft
Watershed Length to Centroid =	350	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	49.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.208	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.689	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.02 in.) =	0.411	acre-feet	1.02	inches
5-yr Runoff Volume (P1 = 1.3 in.) =	0.548	acre-feet	1.30	inches
10-yr Runoff Volume (P1 = 1.57 in.) =	0.689	acre-feet	1.57	inches
25-yr Runoff Volume (P1 = 1.99 in.) =	0.987	acre-feet	1.99	inches
50-yr Runoff Volume (P1 = 2.35 in.) =	1.282	acre-feet	2.35	inches
100-yr Runoff Volume (P1 = 2.74 in.) =	1.653	acre-feet	2.74	inches
500-yr Runoff Volume (P1 = 3.79 in.) =	2.650	acre-feet	3.79	inches
Approximate 2-yr Detention Volume =	0.380	acre-feet		
Approximate 5-yr Detention Volume =	0.506	acre-feet		
Approximate 10-yr Detention Volume =	0.639	acre-feet		
Approximate 25-yr Detention Volume =	0.868	acre-feet		
Approximate 50-yr Detention Volume =	1.019	acre-feet		
Approximate 100-yr Detention Volume =	1.198	acre-feet		

Please refer to table 6-2 of City of Colorado Springs 2014 DCMV1 which the County adopted.

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.208	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.481	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.508	acre-feet
Total Detention Basin Volume =	1.198	acre-feet
Initial Surcharge Volume (ISV) =	27	ft^3
Initial Surcharge Depth (ISD) =	1.00	ft
Width of Main Basin (W_{MAIN}) =	115.7	ft
Area of Main Basin (A_{MAIN}) =	24,696	ft^2
Volume of Main Basin (V_{MAIN}) =	45,462	ft^3
Calculated Total Basin Volume (V_{total}) =	1.191	acre-feet

Table 6-2. Rainfall Depths for Colorado Springs

Return Period	1-Hour Depth	6-Hour Depth
2	1.19	1.70
5	1.50	2.10
10	1.75	2.40
25	2.00	2.90
50	2.25	3.20
100	2.52	3.50
Where Z = 6.840 ft/100		

Depth Increment = 0.10 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		5.2	5.2	27		0.001		
ISV	1.00		5.2	5.2	27		0.001	27	0.001
	1.10		5.2	5.2	27		0.001	30	0.001
	1.20		5.2	5.2	27		0.001	33	0.001
	1.30		5.2	5.2	27		0.001	35	0.001
	1.40		5.2	5.2	27		0.001	38	0.001
	1.50		5.2	5.2	27		0.001	41	0.001
	1.60		25.6	15.2	390		0.009	58	0.001
	1.70		46.0	25.2	1,160		0.027	132	0.003
	1.80		66.4	35.2	2,339		0.054	304	0.007
	1.90		86.8	45.2	3,925		0.090	614	0.014
	2.00		107.2	55.2	5,920		0.136	1,103	0.025
	2.10		127.6	65.2	8,322		0.191	1,811	0.042
	2.20		148.0	75.2	11,133		0.256	2,781	0.064
	2.30		168.4	85.2	14,352		0.329	4,051	0.093
	2.40		188.8	95.2	17,978		0.413	5,665	0.130
Floor	2.44		197.0	99.2	19,543		0.449	6,415	0.147
	2.50		197.5	99.7	19,685		0.452	7,592	0.174
Zone 1 (WQCV)	2.58		198.1	100.3	19,876		0.456	9,174	0.211
	2.60		198.3	100.5	19,924		0.457	9,572	0.220
	2.70		199.1	101.3	20,163		0.463	11,576	0.266
	2.80		199.9	102.1	20,404		0.468	13,605	0.312
	2.90		200.7	102.9	20,646		0.474	15,657	0.359
	3.00		201.5	103.7	20,890		0.480	17,734	0.407
	3.10		202.3	104.5	21,135		0.485	19,835	0.455
	3.20		203.1	105.3	21,381		0.491	21,961	0.504
	3.30		203.9	106.1	21,628		0.497	24,111	0.554
	3.40		204.7	106.9	21,877		0.502	26,287	0.603
	3.50		205.5	107.7	22,127		0.508	28,487	0.654
Zone 2 (EURV)	3.57		206.0	108.3	22,302		0.512	30,042	0.690
	3.60		206.3	108.5	22,378		0.514	30,712	0.705
	3.70		207.1	109.3	22,630		0.520	32,962	0.757
	3.80		207.9	110.1	22,884		0.525	35,238	0.809
	3.90		208.7	110.9	23,139		0.531	37,539	0.862
	4.00		209.5	111.7	23,395		0.537	39,866	0.915
	4.10		210.3	112.5	23,653		0.543	42,218	0.969
	4.20		211.1	113.3	23,912		0.549	44,596	1.024
	4.30		211.9	114.1	24,172		0.555	47,001	1.079
	4.40		212.7	114.9	24,433		0.561	49,431	1.135
	4.50		213.5	115.7	24,696		0.567	51,887	1.191
	4.52		213.6	115.9	24,748		0.568	52,382	1.203
	4.60		214.3	116.5	24,960		0.573	54,370	1.248
	4.70		215.1	117.3	25,225		0.579	56,879	1.306
	4.80		215.9	118.1	25,491		0.585	59,415	1.364
	4.90		216.7	118.9	25,759		0.591	61,978	1.423
	5.00		217.5	119.7	26,028		0.598	64,567	1.482
	5.10		218.3	120.5	26,299		0.604	67,183	1.542
	5.20		219.1	121.3	26,570		0.610	69,827	1.603
	5.30		219.9	122.1	26,843		0.616	72,497	1.664
	5.40		220.7	122.9	27,117		0.623	75,195	1.726
	5.50		221.5	123.7	27,393		0.629	77,921	1.789
	5.60		222.3	124.5	27,670		0.635	80,674	1.852
	5.70		223.1	125.3	27,948		0.642	83,455	1.916
	5.80		223.9	126.1	28,227		0.648	86,264	1.980
	5.90		224.7	126.9	28,508		0.654	89,100	2.045
	6.00		225.5	127.7	28,790		0.661	91,965	2.111
	6.10		226.3	128.5	29,073		0.667	94,858	2.178
	6.20		227.1	129.3	29,357		0.674	97,780	2.245

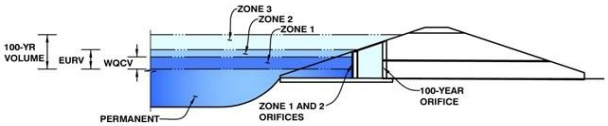
Provide outlet structure calc.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Hampton Partners

Basin ID: West Half



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	12.76	acres
Watershed Length =	740	ft
Watershed Length to Centroid =	350	ft
Watershed Slope =	0.026	ft/ft
Watershed Imperviousness =	49.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

Note: L / W Ratio < 1

L / W Ratio = 0.99

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.216	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.717	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.02 in.) =	0.427	acre-feet	1.02	inches
5-yr Runoff Volume (P1 = 1.3 in.) =	0.570	acre-feet	1.30	inches
10-yr Runoff Volume (P1 = 1.57 in.) =	0.717	acre-feet	1.57	inches
25-yr Runoff Volume (P1 = 1.99 in.) =	1.026	acre-feet	1.99	inches
50-yr Runoff Volume (P1 = 2.35 in.) =	1.333	acre-feet	2.35	inches
100-yr Runoff Volume (P1 = 2.74 in.) =	1.720	acre-feet	2.74	inches
500-yr Runoff Volume (P1 = 3.79 in.) =	2.758	acre-feet	3.79	inches
Approximate 2-yr Detention Volume =	0.395	acre-feet		
Approximate 5-yr Detention Volume =	0.526	acre-feet		
Approximate 10-yr Detention Volume =	0.665	acre-feet		
Approximate 25-yr Detention Volume =	0.903	acre-feet		
Approximate 50-yr Detention Volume =	1.059	acre-feet		
Approximate 100-yr Detention Volume =	1.246	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.216	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.500	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.529	acre-feet
Total Detention Basin Volume =	1.246	acre-feet
Initial Surcharge Volume (ISV) =	28	ft^3
Initial Surcharge Depth (ISD) =	1.00	ft
Total Available Detention Depth (H_{total}) =	4.50	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	28	ft^2
Surcharge Volume Length (L_{ISV}) =	5.3	ft
Surcharge Volume Width (W_{ISV}) =	5.3	ft
Depth of Basin Floor (H_{FLOOR}) =	0.97	ft
Length of Basin Floor (L_{FLOOR}) =	203.2	ft
Width of Basin Floor (W_{FLOOR}) =	102.3	ft
Area of Basin Floor (A_{FLOOR}) =	20,791	ft^2
Volume of Basin Floor (V_{FLOOR}) =	6,979	ft^3
Depth of Main Basin (H_{MAIN}) =	2.03	ft
Length of Main Basin (L_{MAIN}) =	219.4	ft
Width of Main Basin (W_{MAIN}) =	118.6	ft
Area of Main Basin (A_{MAIN}) =	26,016	ft^2
Volume of Main Basin (V_{MAIN}) =	47,410	ft^3
Calculated Total Basin Volume (V_{total}) =	1.250	acre-feet

Depth Increment = 0.10 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		5.3	5.3	28		0.001		
ISV	1.00		5.3	5.3	28		0.001	28	0.001
	1.10		5.3	5.3	28		0.001	31	0.001
	1.20		5.3	5.3	28		0.001	34	0.001
	1.30		5.3	5.3	28		0.001	37	0.001
	1.40		5.3	5.3	28		0.001	40	0.001
	1.50		5.3	5.3	28		0.001	42	0.001
	1.60		25.7	15.3	394		0.009	60	0.001
	1.70		46.1	25.3	1,168		0.027	135	0.003
	1.80		66.5	35.3	2,349		0.054	307	0.007
	1.90		86.9	45.3	3,939		0.090	618	0.014
	2.00		107.3	55.3	5,937		0.136	1,109	0.025
	2.10		127.7	65.3	8,342		0.192	1,819	0.042
	2.20		148.1	75.3	11,156		0.256	2,791	0.064
	2.30		168.5	85.3	14,378		0.330	4,064	0.093
	2.40		188.9	95.3	18,007		0.413	5,680	0.130
Floor	2.47		203.2	102.3	20,791		0.477	7,037	0.162
	2.50		203.4	102.6	20,864		0.479	7,661	0.176
Zone 1 (WQCV)	2.59		204.2	103.3	21,085		0.484	9,549	0.219
	2.60		204.2	103.4	21,110		0.485	9,760	0.224
	2.70		205.0	104.2	21,356		0.490	11,883	0.273
	2.80		205.8	105.0	21,604		0.496	14,031	0.322
	2.90		206.6	105.8	21,854		0.502	16,204	0.372
	3.00		207.4	106.6	22,104		0.507	18,402	0.422
	3.10		208.2	107.4	22,356		0.513	20,625	0.473
	3.20		209.0	108.2	22,609		0.519	22,874	0.525
	3.30		209.8	109.0	22,864		0.525	25,147	0.577
	3.40		210.6	109.8	23,119		0.531	27,446	0.630
	3.50		211.4	110.6	23,376		0.537	29,771	0.683
Zone 2 (EURV)	3.57		212.0	111.1	23,557		0.541	31,414	0.721
	3.60		212.2	111.4	23,634		0.543	32,122	0.737
	3.70		213.0	112.2	23,894		0.549	34,498	0.792
	3.80		213.8	113.0	24,155		0.555	36,900	0.847
	3.90		214.6	113.8	24,417		0.561	39,329	0.903
	4.00		215.4	114.6	24,680		0.567	41,784	0.959
	4.10		216.2	115.4	24,945		0.573	44,265	1.016
	4.20		217.0	116.2	25,211		0.579	46,773	1.074
	4.30		217.8	117.0	25,478		0.585	49,307	1.132
	4.40		218.6	117.8	25,746		0.591	51,868	1.191
Zone 3 (100-year)	4.50		219.4	118.6	26,016		0.597	54,457	1.250
	4.60		220.2	119.4	26,287		0.603	57,072	1.310
	4.70		221.0	120.2	26,560		0.610	59,714	1.371
	4.80		221.8	121.0	26,833		0.616	62,384	1.432
	4.90		222.6	121.8	27,108		0.622	65,081	1.494
	5.00		223.4	122.6	27,384		0.629	67,805	1.557
	5.10		224.2	123.4	27,662		0.635	70,558	1.620
	5.20		225.0	124.2	27,940		0.641	73,338	1.684
	5.30		225.8	125.0	28,220		0.648	76,146	1.748
	5.40		226.6	125.8	28,502		0.654	78,982	1.813
	5.50		227.4	126.6	28,784		0.661	81,846	1.879
	5.60		228.2	127.4	29,068		0.667	84,739	1.945
	5.70		229.0	128.2	29,353		0.674	87,660	2.012
	5.80		229.8	129.0	29,640		0.680	90,609	2.080
	5.90		230.6	129.8	29,927		0.687	93,588	2.148
	6.00		231.4	130.6	30,216		0.694	96,595	2.218
	6.10		232.2	131.4	30,506		0.700	99,631	2.287
	6.20		233.0	132.2	30,798		0.707	102,696	2.358
	6.30		233.8	133.0	31,091		0.714	105,791	2.429

APPENDIX C

Excerpts of Existing Reports

NEW DOC

J·R ENGINEERING
A Westrian Company

PRELIMINARY DRAINAGE REPORT
FOR
FIRST WING DEVELOPMENT

May 2005
Revised July 2005

Prepared For:

COWPERWOOD COMPANY
6102 Broadway, Suite B-2
San Antonio, TX 78209
(210) 930-5192

Prepared By:

JR ENGINEERING
4310 ArrowsWest Drive
Colorado Springs, CO 80907
(719) 593-2593

Job No. 9965.10

PRELIMINARY DRAINAGE REPORT
FOR FIRST WING DEVELOPMENT

PURPOSE

The purpose of this preliminary drainage report is to identify and estimate existing and proposed drainage patterns, determine storm water runoff quantities resulting from First Wing Development Filings No. 1 and 2, and to recommend proposed drainage facilities within the development. Additionally, this report will show that there will be no impacts from this development downstream.

GENERAL DESCRIPTION

The proposed First Wing Development occupies a 37.0-acre site in El Paso County in the north half of the northwest quarter of Section 17, Township 14 South, Range 65 West of the Sixth Principal Meridian in the County of El Paso. The site is bounded on the northwest by an existing retail development, on the north by Space Village Road, on the west by Peterson Road, and on the east by undeveloped land owned by the city of Colorado Springs. Peterson Air Force Base borders the south side of this site. First Wing Development has been planned in two filings; Filing No. 1 occupies the western-most 14 acres of the site and will be developed in two phases. The first phase will be the 6.9-acre Cowperwood SAIC site that will be developed immediately; the remaining second phase will be developed at some indefinite point in the future. Filing No. 2 occupies the eastern-most 23 acres and will be developed at some indefinite point in the future. (See VICINITY MAP in the Appendix).

EXISTING DRAINAGE CONDITIONS

The First Wing Development site drains into two basins. The western-most 10 acres currently drain towards Sand Creek Basin while the remaining 27 acres drain to Peterson Air Field Basin. Existing drainage flows overland to the southern boundary of the site and onto Peterson Air Force Base. There are no existing drainage facilities on-site. (See EXISTING DRAINAGE MAP in the Appendix).

Basin OS-3 encompasses the 0.7 acres of Space Village from the high point north of Filing No. 1 to the ridgeline that divides Filing No. 2. Drainage from this area flows south across the street section onto Filing No. 2. Properties north of Space Village drain to the north side of the road where they are conveyed in roadside ditches away from our site. Historic flows from this off-site basin are 5 cfs in the 5-year storm and 9 cfs in the 100-year storm. (See the EXISTING BASIN PARAMETERS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix).

The 0.8 acres of Space Village from the ridgeline that divides Filing No. 2 to its eastern boundary comprise Basin OS-4. Drainage from this area flows south across the street section onto Filing No. 2. Properties north of Space Village drain to the north side of the road where they are conveyed in roadside ditches away from our site. Historic flows from this off-site basin are 5 cfs in the 5-year storm and 9 cfs in the 100-year storm. (See the EXISTING BASIN PARAMETERS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix).

Basin EX-1 is comprised of the western 10.3 acres of Filing No. 1 and drains to the Sand Creek Drainage Basin. The land in this basin is currently undeveloped. All storm runoff flows overland to the southern boundary of the site and onto Peterson Air Force Base. (See the EXISTING BASIN PARAMETERS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix).

Along the boundary of Filing No. 1, 4.4 acres make up Basin EX-2. This basin drains to the Peterson Drainage Basin, specifically to the low point in the southwest corner of Filing No. 1. The land in this basin is currently undeveloped. All storm runoff flows overland to the low point and onto Peterson Air Force Base. (See the EXISTING BASIN PARAMETERS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix).

Basin EX-3 includes 11.4 acres along the boundary between the filings and the western half of Filing No. 2. This basin drains to the Peterson Drainage Basin. The land in this basin is currently undeveloped. All storm runoff flows overland to southwest corner of Filing No. 2 and onto Peterson Air Force Base. (See the EXISTING BASIN PARAMETERS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix).

The eastern half of Filing No. 2 comprises Basin EX-4 (11.0 acres). This basin drains to the Peterson Drainage Basin. The land in this basin is currently undeveloped. All storm runoff flows overland to the lowpoint along the southern boundary of the site in the middle of the basin and onto Peterson Air Force Base. (See the EXISTING BASIN PARAMETERS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix).

The hydrologic calculations shown in the Appendix for the existing conditions calculate the historic drainage rates of the existing drainage basins. These rates are 6 cfs for the 5-year storm and 16 cfs for the 100-year storm for basin EX-1; basin EX-2 runoff is Q_5 =3 cfs and Q_{100} = 7 cfs; historic rates for basin EX-3 are 7 cfs and 18 cfs for the 5 and 100-year storms respectively; and basin EX-4 runoff is Q_5 =7 cfs and Q_{100} = 18 cfs.

PROPOSED DRAINAGE CONDITIONS

First Wing Development Filing No. 1 is a 14-acre proposed business development. The 6.9-acre Cowperwood SAIC site will be developed immediately including one 85,000 square foot office building and the road through phase two which provides access to Space Village Drive. Development of phase two will include one 120,000 square foot office building and required parking. There are currently no plans to develop this portion of the site.

Runoff from 3.6-acre Basin A will be directed to the west pond as surface runoff and through gutter pans. These flows will enter the west pond through a curb chase located along the eastern boundary of the pond at Design Point 1 (Q_5 = 14cfs, Q_{100} = 27 cfs). Drainage from the pond will flow offsite into the Sand Creek Basin. (See PROPOSED DRAINAGE MAP and PROPOSED HYDROLOGIC CALCULATIONS in Appendix.)

Draining flows from proposed Basin B will collect in an inlet directly south of the phase 1 building (at design point 2) and will flow overland into Pond 1 along the western boundary of the site (Q_5 = 10cfs, Q_{100} = 19 cfs). (See PROPOSED DRAINAGE MAP and HYDROLOGIC CALCULATIONS in Appendix.)

Flows from Basin C (Q_5 = 4cfs, Q_{100} = 8 cfs) will flow via curb and gutter to the west onto Peterson Road at DP 4.

Basin D is comprised of 6.7 acres along the eastern boundary of the site and will have developed flows of Q_5 = 27 cfs, Q_{100} = 51 cfs. This area will be developed in the second phase of development. Developed storm runoff will drain via surface flow to pond 2, the pond in the southeast corner of Filing No. 1.

Two detention ponds will be built in Filing No. 1. Pond 1 will be built in conjunction with Phase 1; Pond 2 will be built with Phase 2. Runoff will be conveyed to the detention ponds via overland flow, channelized flows in gutter pans and swales. (See PROPOSED DRAINAGE MAP in the Appendix.) The detention ponds will restrict flows to historic rates and were sized using Haestad Methods Pond Pack software. (See Detention Pond Design below.)

The remaining 23 acres, which form Filing No. 2, will remain zoned for a heavy industrial district (PHID) including a maximum of 400,000 square feet of industrial space. There are currently no plans to plans to develop this portion of the site. Storm runoff from Filing No. 2 (Basin E) will continue to flow into Peterson Drainage Basin. A detention pond will be built in the southeast corner of the site. Runoff (Q_5 = 95 cfs, Q_{100} = 178 cfs) will be conveyed to the detention pond (Design Point 8) via overland flows and channelized flows in gutter pans. (See PROPOSED DRAINAGE MAP and HYDROLOGIC CALCULATIONS in Appendix.) This detention pond will restrict flows to historic rates (Design Point 9) and was sized using Haestad Methods Pond Pack software. (See Detention Pond Design below.)

DRAINAGE BASIN TRANSFERS

Existing on-site basins EX-2, EX-3 and EX-4 flow to Peterson Drainage Basin for a total area of 26.8 acres. Only basin EX-1, area of 10.3 acres, currently flows to Sand Creek Drainage Basin. Once development of Filing No. 1 occurs, proposed basins D and E will flow to Peterson Drainage Basin. This will be a total area of 29.5 acres, for an increase of 2.7 acres from the existing tributary area. This 2.7-acre increase in tributary area will not affect the basin downstream because the detention ponds being proposed for basins D and E will restrict flows to

The detention pond in Filing No. 2 will collect drainage from proposed Basin E to be developed as part of Filing No. 2. (See the PROPOSED DRAINAGE MAP in the Appendix.) This pond was sized using Haestad Methods Pond Pack software. The necessary capacity is 3.4 acre-ft to store the developed flows of Q_5 = 95 cfs and Q_{100} = 178 cfs (DP 8). The bottom elevation of the pond will be 6100.00 and the top of berm elevation is 6106.00. The 100-year water surface elevation is 6105.2'. Flows from the pond will outfall through an outfall structure on the south side of the pond. The flow through this structure will be restricted to the historic flows of Q_5 = 14 cfs and Q_{100} = 36 cfs (DP 10). These flow rates represent a combination of the historic flows at design points 9 and 10. Since there will be no water exiting Filing No. 2 at design point 9, flows equal to the historic flows from Filing No. 2 onto Peterson Air Force Base will be released at design point 10.

Erosion control for flows exiting the First Wing Development and flowing onto Peterson Air Force Base will be addressed in the Final Drainage Report.

DRAINAGE DESIGN CRITERIA

This report has been prepared in accordance with the 1991 County Drainage Criteria Manual, revised October 1994. All proposed and existing basin flows were determined using the Rational Method. (See PROPOSED HYDROLOGIC CALCULATIONS and EXISTING HYDROLOGIC CALCULATIONS in the Appendix). All proposed drainage systems were designed to handle runoff from both the initial design storm (5 year event) and the major design storm (100 year event). All proposed culverts are 18" or greater in diameter, per El Paso County standards. Preliminary detention ponds were sized using Haestead Methods Pond Pack software.

FLOODPLAIN STATEMENT

The First Wing Development site is not within a designated F.E.M.A. Floodplain as determined by the Flood Insurance Rate Map, Community Panel Number 02041 CO754 F, effective date March 17, 1997. (See FLOOD INSURANCE RATE MAP OF EL PASO COUNTY in the Appendix).

FIRST WING
PRELIMINARY DRAINAGE REPORT
(Area Runoff Summary)

		Historic Weighted		Historic Weighted	
BASIN	TOTAL AREA (Acres)	C(5)	C(100)	CA(5)	CA(100)
EX-1	10.3	0.25	0.35	2.57	3.60
EX-2	4.4	0.25	0.35	1.11	1.55
EX-3	11.4	0.25	0.35	2.86	4.00
EX-4	11.0	0.25	0.35	2.76	3.86
OS-1	0.6	0.90	0.95	0.53	0.56
OS-2	9.8	0.71	0.78	7.01	7.64
OS-3	0.7	0.90	0.95	0.67	0.71
OS-4	0.8	0.90	0.95	0.71	0.75

FIRST WING PRELIMINARY DRAINAGE REPORT
(Proposed Area Runoff Summary)

		WEIGHTED		*WEIGHTED*		*Historic Weighted*		*Historic Weighted*	
BASIN	TOTAL AREA *(Acres)*	C(5)	C(100)	CA(5)	CA(100)	C(5)	C(100)	CA(5)	CA(100)
A	3.6	**0.77**	**0.83**	**2.79**	**3.00**	**0.25**	**0.35**	**0.90**	**1.26**
B	2.6	**0.74**	**0.80**	**1.92**	**2.08**	**0.25**	**0.35**	**0.65**	**0.91**
C	1.4	**0.76**	**0.82**	**1.06**	**1.15**	**0.25**	**0.35**	**0.35**	**0.49**
D	6.7	**0.78**	**0.84**	**5.25**	**5.65**	**0.25**	**0.35**	**1.68**	**2.35**
E	22.8	**0.90**	**0.95**	**20.54**	**21.68**	**0.25**	**0.35**	**5.71**	**7.99**

FIRST WING
PRELIMINARY DRAINAGE REPORT
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL	C(5)	C(100)	C(5)	Length	Height	Tc	Length	Slope	Velocity	Tc	TOTAL	I(5)	I(100)	Q(5)	Q(100)
	(Acres)				(ft)	(ft)	(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
EX-1	10.3	0.25	0.35	0.25	825	32	29.2	0 0	10.0% 4.0%	11.1 7.0	0.0 0.0	29.2	2.5	4.4	6	16
EX-2	4.4	0.25	0.35	0.25	765	32	27.4	0	12.0%	12.1	0.0	27.4	2.5	4.5	3	7
EX-3	11.4	0.25	0.35	0.25	765	32	27.4					27.4	2.5	4.5	7	18
EX-4	11.0	0.25	0.35	0.25	765	32	27.4					27.4	2.5	4.5	7	18
OS-1	0.6	0.90	0.95					450	3.1%	6.2	1.2	1.2	6.4	11.3	3	6
OS-2	9.8	0.71	0.78					1750	1.1%	3.7	7.9	7.9	4.5	7.9	31	61
OS-3	0.7	0.90	0.95					50	2.0%	4.9	0.2	0.2	6.9	12.2	5	9
OS-4	0.8	0.90	0.95					50	2.0%	4.9	0.2	0.2	6.9	12.2	5	9

FIRST WING
PRELIMINARY DRAINAGE REPORT
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL	C(5)	C(100)	C(5)	Length	Height	Tc	Length	Slope	Velocity	Tc	TOTAL	I(5)	I(100)	Q(5)	Q(100)
	(Acres)				(ft)	(ft)	(min)	(ft)	(%)	(fps)	(mins)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
A NW	3.6	0.77	0.83	0.77				575	1.6%	4.4	2.2	5.0	5.1	9.1	14	27
B SE	2.6	0.74	0.80	0.74				460	1.5%	4.3	1.8	5.0	5.1	9.1	10	19
C SOUTH	1.4	0.76	0.82	0.76				300	1.0%	3.5	1.4	5.0	5.1	9.1	5	10
D PHASE 2	6.7	0.78	0.84	0.78				300	1.0%	3.5	1.4	5.0	5.1	9.1	27	51
E FILING 2	22.8	0.90	0.95	0.90				1500	1.0%	3.5	7.1	7.1	4.6	8.2	95	178

FIRST WING PRELIMINARY DRAINAGE REPORT
(Existing Flows at Design Points)

Historic Flows					*Intensity*		*Flow*	
Design Point(s)	*Contributing Basins*	*Equivalent CA(5)*	*Equivalent CA(100)*	*Maximum Tc*	*I(5)*	*I(100)*	*Q(5)*	*Q(100)*
5	OS-1, EX-1	3.10	4.15	29.19	2.5	4.4	*8*	*18*
7	EX-2	1.11	1.55	27.4	2.5	4.5	*3*	*7*
9	EX-3	2.86	4.00	27.4	2.5	4.5	*7*	*18*
10	EX-4	2.76	3.86	27.4	2.5	4.5	*7*	*18*
11	OS-2	7.01	7.64	7.9	4.5	7.9	*31*	*61*

FIRST WING PRELIMINARY DRAINAGE REPORT
(Developed Flows at Design Points)

Developed Flows					*Intensity*		*Flow*	
Design Point(s)	*Contributing Basins*	*Equivalent CA(5)*	*Equivalent CA(100)*	*Maximum Tc*	*I(5)*	*I(100)*	*Q(5)*	*Q(100)*
1	A	2.79	3.00	5.00	5.1	9.1	*14*	*27*
2	B	1.92	2.08	5.00	5.1	9.1	*10*	*19*
3	Phase 1 Detention Pond						*2*	*8*
4	C	1.06	1.15	5.00	5.1	9.1	*5*	*10*
5	Design points 3 & 4						*8*	*18*
6	D	5.25	5.65	5.00	5.1	9.1	*27*	*51*
7	Phase 2 Detention Pond						*3*	*7*
8	E	20.54	21.68	7.14	4.6	8.2	*95*	*178*
10	Filing No. 2 Detention Pond						*14*	*36*
11	OS-2: Flows along Peterson Road	7.01	7.64	7.95	4.5	7.9	*31*	*61*

COWPERWOOD SAIC

COUNTY OF EL PASO, STATE OF COLORADO

PROPOSED DRAINAGE MAP

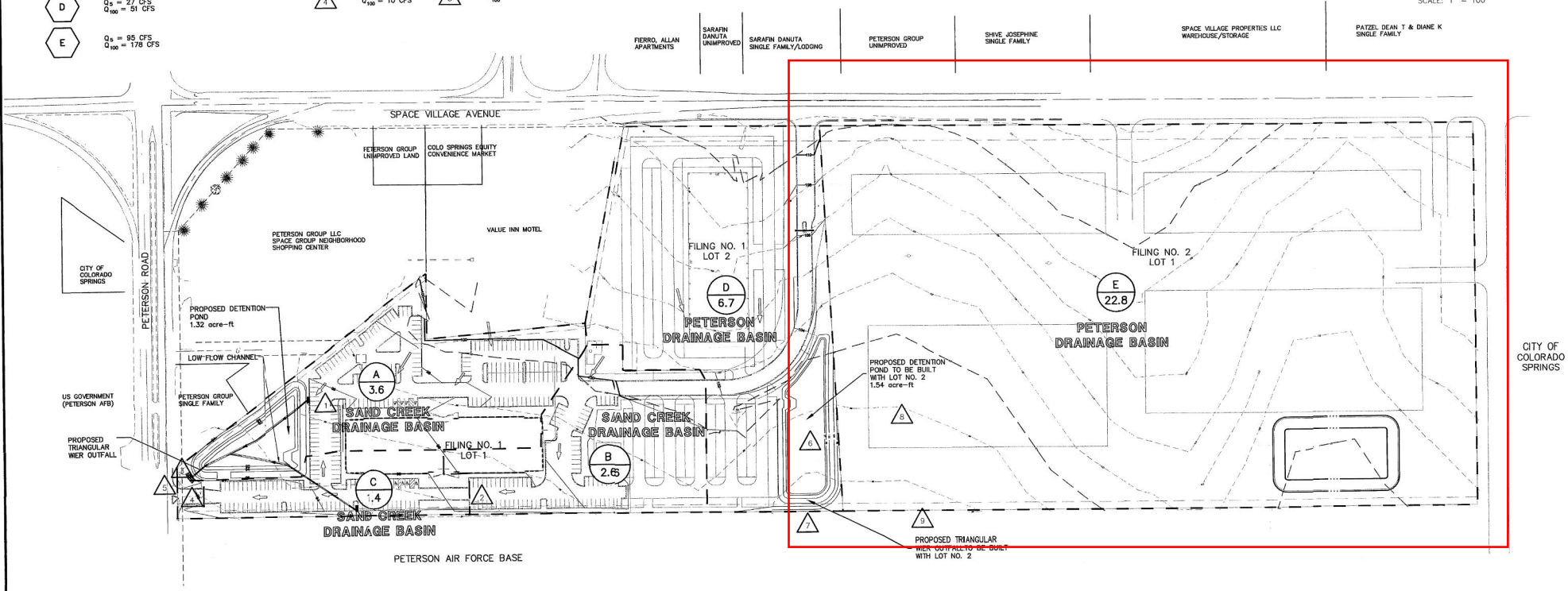
JULY 2005

PROPOSED DRAINAGE BASIN FLOWS

A	Q_5 = 14 CFS, Q_{100} = 27 CFS
B	Q_5 = 10 CFS, Q_{100} = 19 CFS
C	Q_5 = 4 CFS, Q_{100} = 8 CFS
D	Q_5 = 27 CFS, Q_{100} = 51 CFS
E	Q_5 = 95 CFS, Q_{100} = 178 CFS

PROPOSED DESIGN POINTS

1	Q_5 = 14 CFS, Q_{100} = 27 CFS	5	Q_5 = 8 CFS, Q_{100} = 18 CFS	9	Q_{55} = 14 CFS, Q_{100} = 36 CFS		
2	Q_5 = 10 CFS, Q_{100} = 19 CFS	6	Q_5 = 27 CFS, Q_{100} = 51 CFS	11	Q_{55} = 31 CFS, Q_{100} = 61 CFS		
3	Q_5 = 2 CFS, Q_{100} = 8 CFS	7	Q_5 = 3 CFS, Q_{100} = 7 CFS				
4	Q_5 = 5 CFS, Q_{100} = 10 CFS	8	Q_5 = 95 CFS, Q_{100} = 178 CFS				



UNTIL SUCH TIME AS THESE DRAWINGS ARE ADDOPTED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THE USE OF THESE DRAWINGS FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR
COWPERWOOD COMPANY
6102 BROADWAY, SUITE B-2
SAN ANTONIO, TX 78209

J-R ENGINEERING
A Westrian Company
4970 Arroyo/West Drive • Colorado Springs, CO 80907
719-593-7593 • Fax 719-593-0693
www.jr-engineering.com

No.	REVISION	BY	DATE

H-SCALE	1"=100'
V-SCALE	N/A
DATE	3/11/05
DESIGNED BY	AMH
DRAWN BY	AMH

COWPERWOOD SAIC

PRELIMINARY DRAINAGE REPORT

PROPOSED DRAINAGE MAP

SHEET 1 OF 2

JOB NO. 29965.20

COWPERWOOD SAIC

COUNTY OF EL PASO, STATE OF COLORADO

EXISTING DRAINAGE MAP

JULY 2005

EXISTING DRAINAGE BASIN FLOWS

EX-1	Q_5 = 6 CFS, Q_{100} = 16 CFS
EX-2	Q_5 = 3 CFS, Q_{100} = 7 CFS
EX-3	Q_5 = 7 CFS, Q_{100} = 18 CFS
EX-4	Q_5 = 7 CFS, Q_{100} = 18 CFS

DESIGN POINT SUMMARY

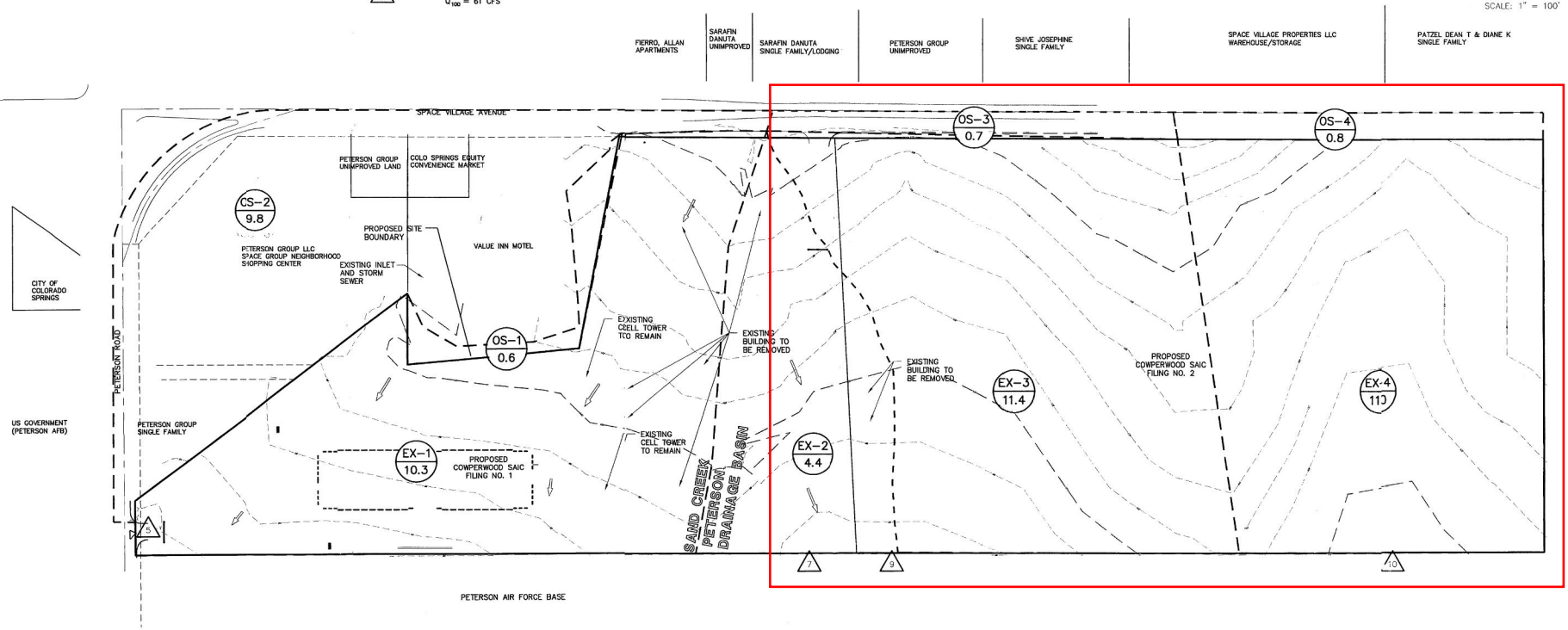
5	Q_5 = 8 CFS, Q_{100} = 18 CFS
7	Q_5 = 3 CFS, Q_{100} = 7 CFS
9	Q_5 = 7 CFS, Q_{100} = 18 CFS
10	Q_5 = 7 CFS, Q_{100} = 18 CFS
11	Q_5 = 31 CFS, Q_{100} = 61 CFS

LEGEND

DESCRIPTION	SYMBOL
BASIN IDENTIFIER	EX-1
AREA IN ACRES	6.7
DESIGN POINT	2
EXISTING DRAINAGE ARROW	
EXISTING GROUND CONTOUR	
EXISTING DRAINAGE BOUNDARY	

100 50 0 100 200

SCALE: 1" = 100'



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

PREPARED FOR
COWPERWOOD COMPANY
6102 BROADWAY, SUITE B-2
SAN ANTONIO, TX 78209

J-R ENGINEERING
A Westrian Company
4231 Arrowhead Drive • Colorado Springs, CO 80907
719-593-2593 • Fax 719-593-5603
www.jrengineering.com

No.	REVISION	BY	DATE

H-SCALE	1"=100'
V-SCALE	N/A
DATE	3/11/05
DESIGNED BY	AMH
DRAWN BY	AMH
CHECKED BY	

COWPERWOOD SAIC

PRELIMINARY DRAINAGE REPORT

EXISTING DRAINAGE MAP

SHEET 2 OF 2

JOB NO. 29965.200

ADDENDUM TO
DRAINAGE LETTER

HIGHWAY 24 EASTGATE BUSINESS PARK

A REPLAT OF LOT 3, HILLCREST ACRES

November 20, 2008

Revised
December 29, 2008

Revised
January 8, 2009

Revised
December 5, 2011

Prepared for

LACA-LOJA LLP

Oliver E. Watts, Consulting Engineer, Inc.
Colorado Springs, Colorado

RECEIVED
DEC 0 6 2011
EPC DEVELOPMENT SERVICES

VR-08-012

OLIVER E. WATTS, PE-LS
OLIVER E. WATTS, CONSULTING ENGINEER, INC.
CIVIL ENGINEERING AND SURVEYING
614 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907
(719) 593-0173
fax (719) 265-9660
olliewatts@aol.com

December 5, 2011

El Paso County D.O.T.
3460 Marksheffel Road
Colorado Springs, CO 80922

ATTN: Paul Danley

SUBJECT: Addendum to Drainage Letter
Highway 24 Eastgate Business Park

Gentlemen

Transmitted herewith for your review and approval is the addendum to the drainage letter for the Highway 24 Eastgate Business Park, which is a replat of Lot 3, Hillcrest Acres. The original drainage letter was dated January 28, 2005, and was approved by the County Engineer on February 7, 2005. This addendum revises the water quality outlet in the existing detention pond to a standard CDOT inlet box, similar to those used on the recent COSMIX project.

There will be no change in the approved runoff as a result of this subdivision. Please contact our office if we may provide any further information.

Oliver E. Watts, Consulting Engineer, Inc.

BY: _____
Oliver E. Watts, President

Encl:

Drainage Letter 3 pages
Computations, 5 Pages
SCS Soils Map and Interpretation Sheet
Backup Information, 3 pages
Drainage Plan, Dwg 04-3486-07
Detention Pond Details, Dwg 04-3486-11

1. 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.

Oliver E. Watts, Consulting Engineer, Inc.

OLIVER E. WATTS REGISTERED 9853 COLORADO

Oliver E. Watts Colo. PE-LS No. 9853

2. OWNERS / DEVELOPER'S STATEMENT:

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

Laca-Loja, LP

By: _____
James Whidden
P.O. Box 75903
Colorado Springs, CO 80970
492-5001

3. EL PASO COUNTY:

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

_____ 12-20-11
Andre P. Brackin, P.E., date
County Engineer / ECM Administrator

Conditions:

4. LOCATION AND DESCRIPTION:

The Highway 24 Eastgate Business Park is a replat of Lot 3, Hillcrest Acres, and is located on the north side of Space Village Boulevard East of Peterson Road and South of Highway 24, as shown on the enclosed drainage plan. An approved drainage report is on file for Lots 2 and 3, Hillcrest Acres, as prepared by Professional Consultants, Inc., June, 2002. This report will accompany the replat of Lot 3 and the associated development plan so that a number of storage buildings may be constructed on Lot 3. Condominium plats will be prepared as the units are constructed, as required by El Paso County. The drainage for Lot 3 is associated with the detention pond on Lot 2, the capacity for which is analyzed as part of this report. The pond exists and the details of the design are not part of this report

This subdivision lies within the boundaries of the Peterson Field Drainage Basin. This report complies with the requirements of the Master Plan for that basin.

5. METHOD AND CRITERIA:

The criteria used for all computations in this report are that specified in the City County Drainage Criteria Manual. All computations are enclosed for reference and review.

The soils in this subdivision have been mapped by the local office of the USDA/SCS and a copy of their soils map and interpretation sheet are enclosed. All soils within the drainage basins associated with this report are of hydrologic group "A".

6. DESCRIPTION OF RUNOFF:

Basin "A" shown on the enclosed drainage plan comprises this lot and the area south of the centerline of Highway 24 that flows into it. The inflow will be of a sheet flow type until the driveways serving the storage units are encountered, which will have an inverted crown typical of all similar storage units, in which the runoff will be channelized. The runoff will be routed to the end of the existing asphalt driveways at the northerly end of Lot 2, where a total of 19.5 cfs / 35.3 cfs (5-year / 100-year runoffs) will discharge into Lot 2. The normal grading of the driveways will accommodate this runoff as shown on the enclosed computation sheets, any one of which would accommodate the total. This runoff will be routed to the existing detention pond in Lot 2 by existing driveways through an existing concrete pan off of the driveway adjacent to the ponds. The easterly half of Lot 2 is presently constructed, including the detention pond and outfall facilities. The above runoff will be combined with that of Lot 2 (Basin "B"), including the anticipated developed runoff from the westerly portion, and a total of 31.9 cfs / 58.0 cfs will outfall into the detention pond.

The design for the detention pond was approved with the drainage report for Lots 2 and 3, Hillcrest Acres and is not part of this report. A check on the capacity of this pond is computed, and it is determined that a total of 23,900 cubic feet of detention would be required to mitigate the total development of these two lots to the 100-year historic runoff value of 6.2 cfs / 20.9 cfs, as shown on the enclosed computations. According to the referenced drainage report for Lots 2 and 3, Hillcrest Acres, a total detention of 44,072 cubic feet is available, more that adequate to accommodate this proposed development, which occurs at elevation 84.30 in the existing pond. The pond has also been checked for the capacity of the two year storm, and found more than adequate. The water surface elevations for these storms are shown on the drainage plan.

There will be no negative impact to offsite properties as a result of this development.

The site has been graded for some time to accommodate this proposed development and only finish grading remains, which is less than one acre of disturbance. Therefore a temporary sediment basin and State permit will not be required. The BMP's related to the finish grading and the below described work are shown on the design drawings.

7. Water Quality Detention

The existing detention pond was surveyed and the enclosed storage sheet was developed in accordance with Volume 2 of the Drainage Criteria Manual. Enclosed is a computation sheet for a sand filter basin. The required detention for water quality for the entire site is 0.264 AF (11,500 CF), which occurs at elevation 82.93. Riprap is added to each of the three inlet slabs and to the outlet of the pond outlet pipe. A standard CDOT outlet structure with a trash rack and perforated orifice plate will be added at the inlet to the existing pond outlet pipe. This will provide added staging of the design runoff for additional benefit to downstream properties. The details of the pond design are shown on the enclosed sheet.

8. Fees

The Commissioners determined in their meeting of January 8, 2009 that drainage fees would be due as part of the subdivision process. It was also agreed that 2008 fees would be computed, and that 50% of the construction cost for the detention pond would be credited against the fees. The fees have been paid as follows.

Total area = 4.54 acres x (70% impervious – 11% SF impervious)

2008 Fees: Drainage: 4.54X0.59X $9232.00 = **$ 24,728**

Bridge: 4.54X0.59X $ 700 = **$ 1,875**

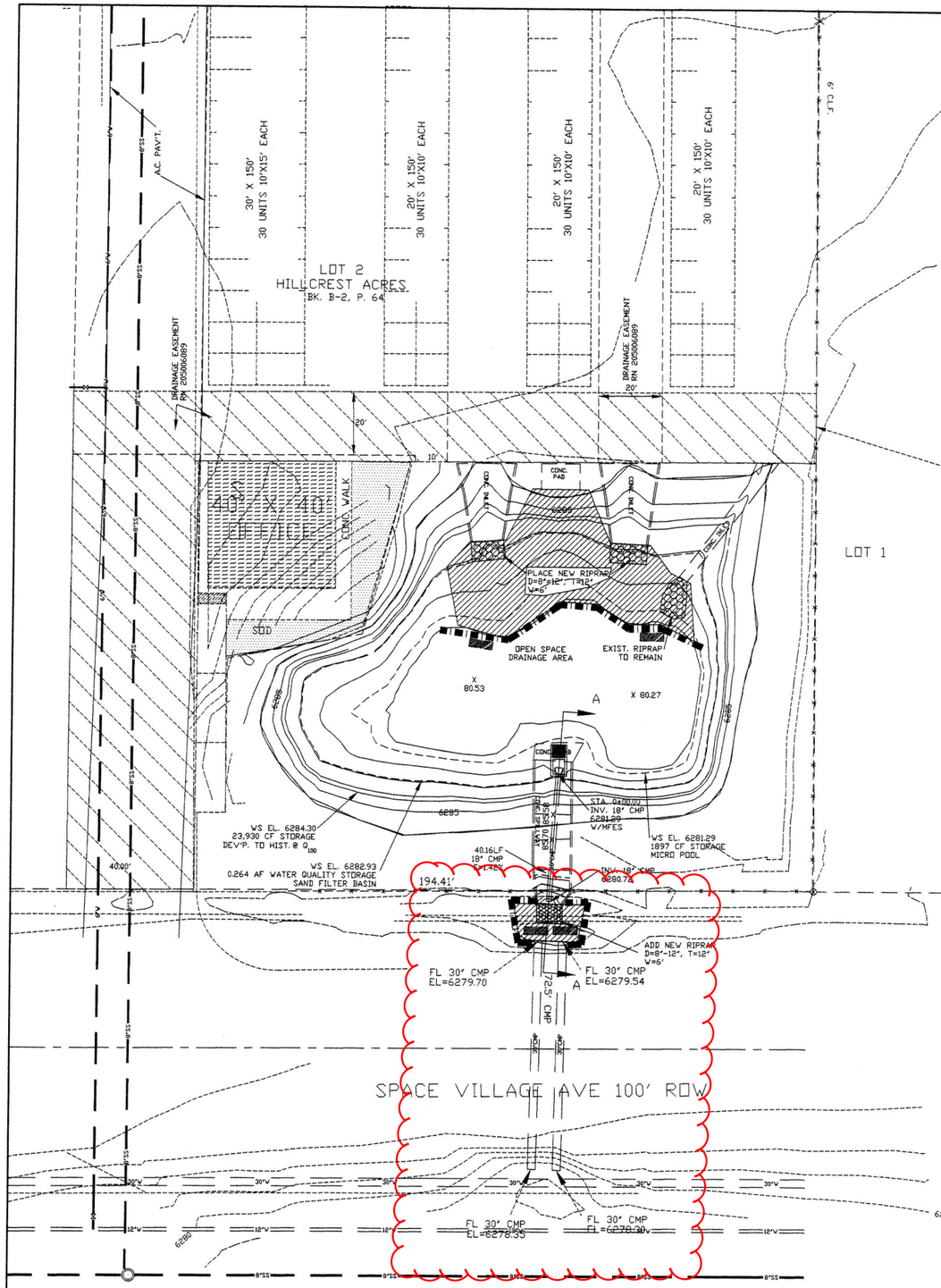
Detention Pond Cost Estimate:

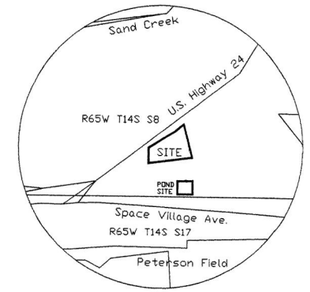
Item No.	Description	Quantity	Unit Cost	Cost
1	Existing Pond Earthwork	240 CY	$ 3.00	$ 720.00
2	Existing Concrete Inlets & Spillway	1603 SF	5.00	8015.00
3	Existing 18" CMP outlet	40 LF	25.00	1000.00
4	Proposed Riprap	1 CY	100.00	100.00
5	Proposed Pond Outlet	1 EA	3000.00	3000.00
	Subtotal Construction Cost			$12835.00
	Engineering		10%	1283.50
	Total Estimated Cost			$14118.50

Net Drainage Fees Due: $ 24,728 - 50% x 12,835.00 = **$ 18,310.50**

Total Bridge Fees Due: **$1875.00**

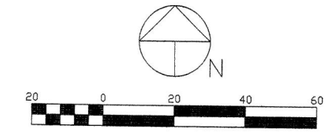
Total fees due: $20,185.50





VICINITY MAP

1"=1000'



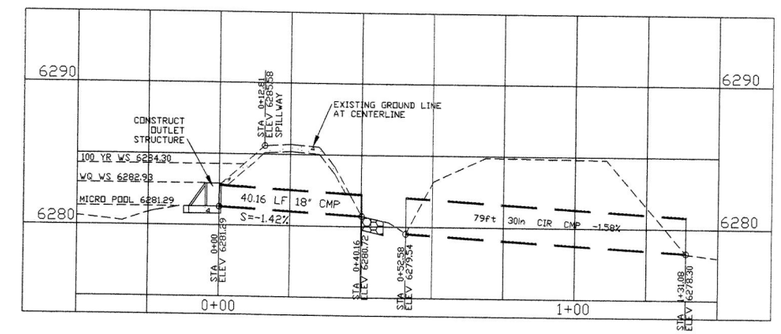
Scale 1" = 20'

Contour Interval: 1'

NGVD, 1929 ADJUSTMENT

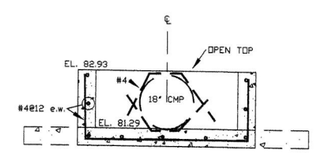
LEGEND:

- ⊗ FOUND 1/2" IRON PIPE
- ◻ FOUND 1-1/4" AL. CAP, #19620 ON #5 REBAR
- ⊕ FOUND CDOT 3-1/4" AL. CAP, #25361

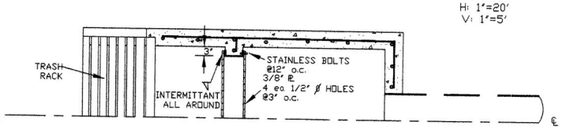


SECTION A-A
STORM SEWER OUTFALL

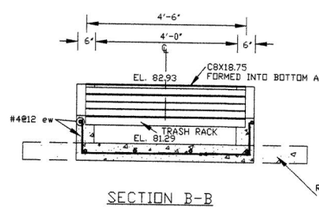
SCALE:
H: 1"=20'
V: 1"=5'



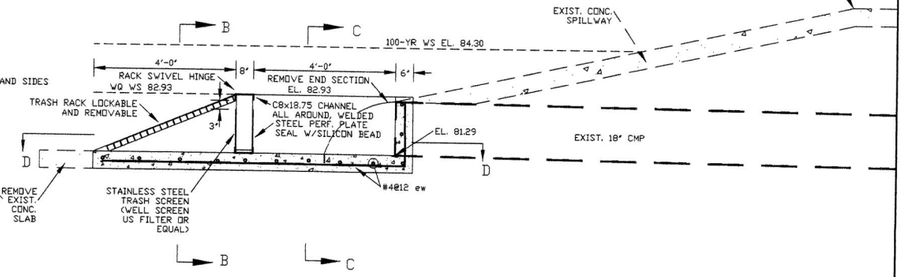
SECTION C-C



SECTION D-D



SECTION B-B

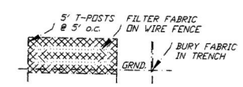


OUTLET STRUCTURE

1/2"=1'-0"

SILT DAM

1/8" = 1'-0"



SILT FENCE

1/8" = 1'0"

EROSION CONTROL LEGEND:

- SILT FENCE
- SILT DAM
- RESEEDED AREAS
  (ALL DISTURBED AREAS
  IN ADDITION TO THOSE SHOWN)
  USE EL PASO DOT STD. SEED MIX.
  POND BOTTOM NOT TO BE RESEEDED
  BUT REGRADED SMOOTH

Prepared by the office of:
Oliver E. Watts, Consulting Engineer, Inc.
614 Elkton Drive
Colorado Springs, CO 80907
(719) 593-0173
OllieWatts@aol.com

DRAWN BY: O.E. WATTS	APPROVED BY:	REVISIONS 12-1-08 REVISED PER COUNTY COMMENTS	DEW / ESW
DATE: 11-6-08	PROJ. NO.	12-29-08 REVISED PER COUNTY COMMENTS	DEW
DWG. NO.: 04-3486-11	DWG.		
SURVEYED BY: DEV, ESW, 11-6-08			

OLIVER E. WATTS
CONSULTING ENGINEER
COLORADO SPRINGS

PROJECT
HIGHWAY 24 EASTGATE SUBDIVISION
EL PASO COUNTY, COLORADO

SHT. NAME
DETENTION POND DETAILS

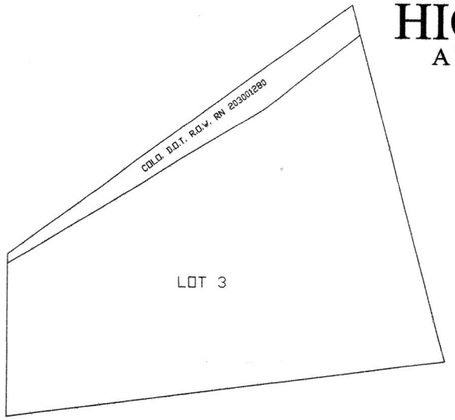
SHT. NO.
1
OF
1

HIGHWAY 24 EASTGATE BUSINESS PARK

A VACATION, REPLAT AND CONDOMINIUM PLAT OF LOT 3, HILLCREST ACRES

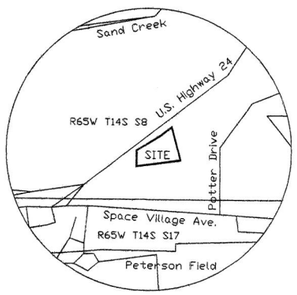
EL PASO COUNTY, COLORADO

DRAINAGE PLAN



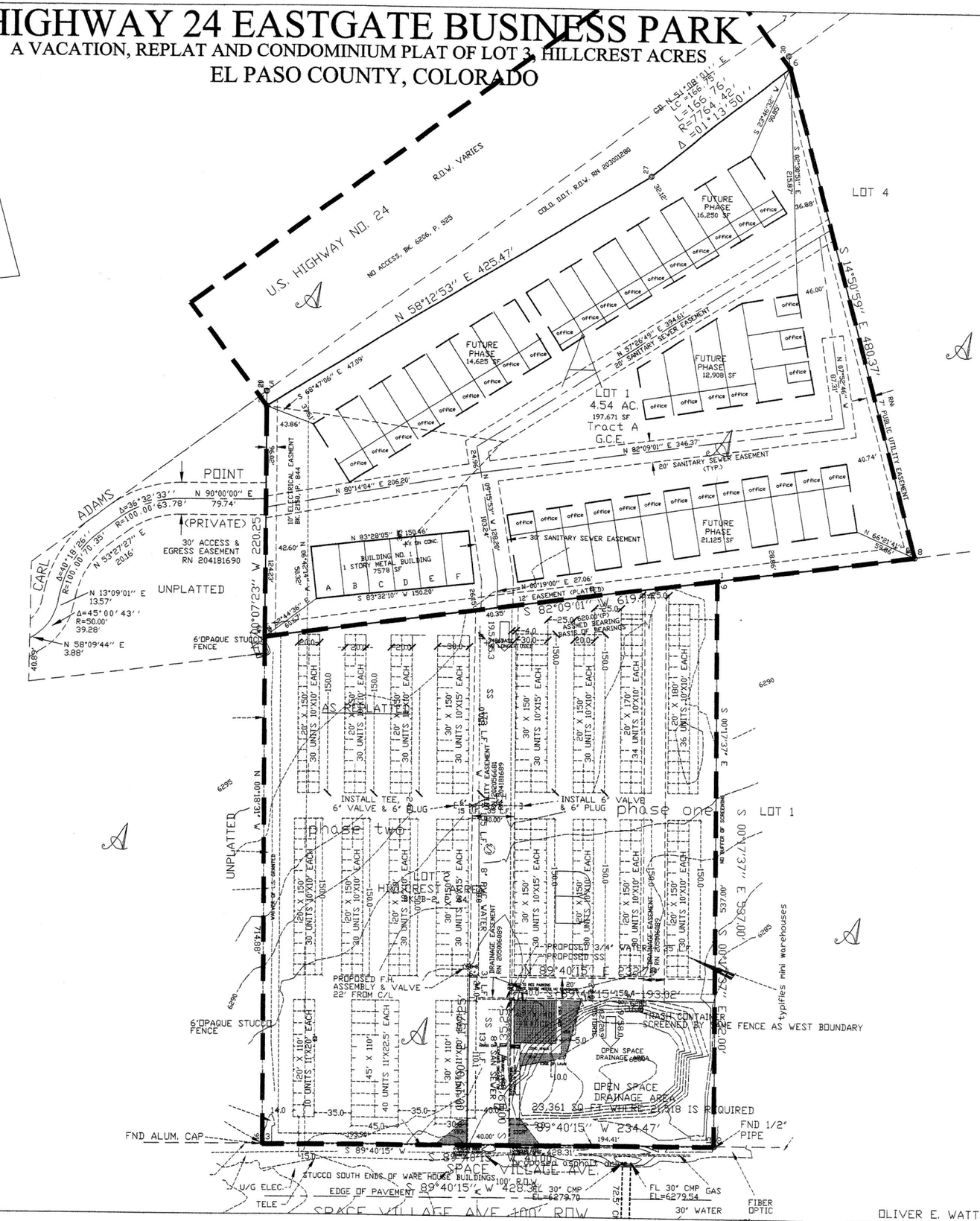
AS CURRENTLY PLATTED

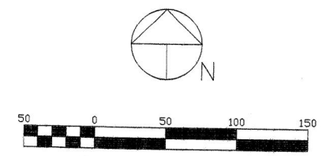
1"=100'



VICINITY MAP

1"=1000'





Scale 1" = 50'

LEGEND:

- FOUND 1/2" IRON PIPE
- FOUND 1-1/4" AL. CAP, #19620 ON #5 REBAR
- FOUND CDOT 3-1/4" AL. CAP, #25361
- EXISTING BUILDING, SEE ADDITIONAL SHEETS
- FUTURE BUILDING, RESERVED FOR FUTURE DEVELOPMENT

LEGEND:

- 29.0\60.7 — RUNOFF IN CFS: 5-YEAR/100-YEAR
- A — LIMIT OF DRAINAGE BASIN AND DESIGNATION
- EXISTING STORM SEWER AS LABELED
- PROPOSED STORM SEWER AS LABELED
- LIMIT OF SOILS TYPE AND GROUP

PREPARED BY THE OFFICE OF:
OLIVER E. WATTS PE-LS
CONSULTING ENGINEER
614 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
(719) 593-0173
ollie.watts@aol.com

CURRENT THROUGH 12-2-04 FIELD WORK DEW

12-1-08

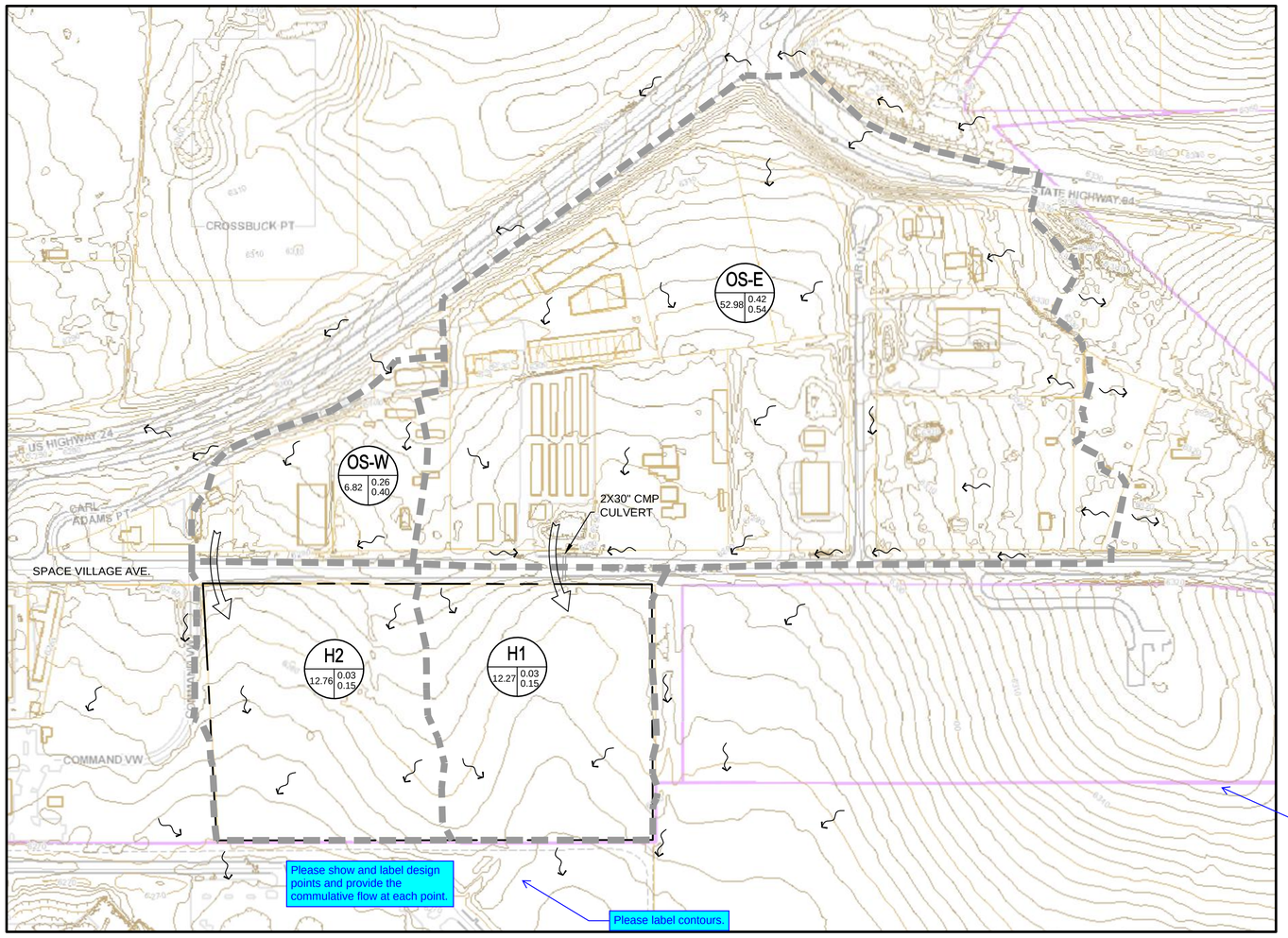
APPENDIX D

Drainage Maps

0 SPACE VILLAGE AVENUE

A PORTION OF THE NW 1/4 OF SEC. 17, T14S,
R65W, OF THE 6th P.M., EL PASO COUNTY, COLORADO
PRELIMINARY DRAINAGE PLAN

EXISTING CONDITION & OFF-SITE



Please show and label design points and provide the commulative flow at each point.

Please label contours.

Please identify linetype and include in the legend if applicable.

NORTH

0 100 200 400

SCALE: 1"= 200'

LEGEND

PROPERTY LINE

HISTORIC BASIN LINE

OFF-SITE BASIN CONTRIBUTION

OS — SUBBASIN ID

0.12 — SUBBASIN AREA (ACRES)

0.30 — 5-YR RUNOFF COEFFICENT

0.60 — 100-YR RUNOFF COEFFICENT

EXISTING BASINS

EXISTING CONDITION BASIN SUMMARY

BASIN ID	AREA (AC)	C5	C100	Q5 (CFS)	Q100 (CFS)	NOTES
H1	12.27	0.03	0.15	0.67	6.04	SHEET FLOW TO PETERSON AFB
H2	12.76	0.03	0.15	0.74	6.41	SHEET FLOW TO PETERSON AFB
OS-E	52.98	0.42	0.54	46.76	100.48	ENTERS SITE AT 2X 30" CMP AT SV
OS-W	6.82	0.26	0.40	4.17	10.91	ROAD OVERTOPPING CONTRIBUTION

Please use the same naming in the report for consistency.

Please delineate the time of concentration paths for each basin on the drainage map.

STERLING DESIGN ASSOCIATES
Civil Engineers | Landscape Architects
2009 W. Littleton Blvd. #300 Littleton, CO 80120
303.794.4727 | www.SterlingDesignAssociates.com

STERLING DESIGN ASSOCIATES, LLC

ISSUES & REVISIONS

NO.: 1 DATE: BY:
DESCRIPTION:

NO.: 2 DATE: - BY: -
DESCRIPTION: -

NO.: 3 DATE: - BY: -
DESCRIPTION: -

NO.: 4 DATE: - BY: -
DESCRIPTION: -

NO.: 5 DATE: - BY: -
DESCRIPTION: -

NO.: 6 DATE: - BY: -
DESCRIPTION: -

DATE: **05/12/2022**

SCALE: **1" = 20'**

PROJECT MANAGER: **JS**

PROJECT NO.: **-**

DRAWN BY: **JT**

DRAWING FILE: **-**

PROJECT:

0 SPACE VILLAGE AVENUE
COLORADO SPRINGS, CO

CLIENT:

COMMERCIAL BUILDING SERVICES
7561 S. GRANT STR., SUITE A-4
LITTLETON, COLORADO 80122

TEL: (303) 730-3001

SHEET TITLE:

PRELIMINARY DRAINAGE PLAN

SHEET NUMBER:

1 OF 2

0 SPACE VILLAGE AVENUE

A PORTION OF THE NW 1/4 OF SEC. 17, T14S,
R65W, OF THE 6th P.M., EL PASO COUNTY, COLORADO
PRELIMINARY DRAINAGE PLAN

PROPOSED CONDITION

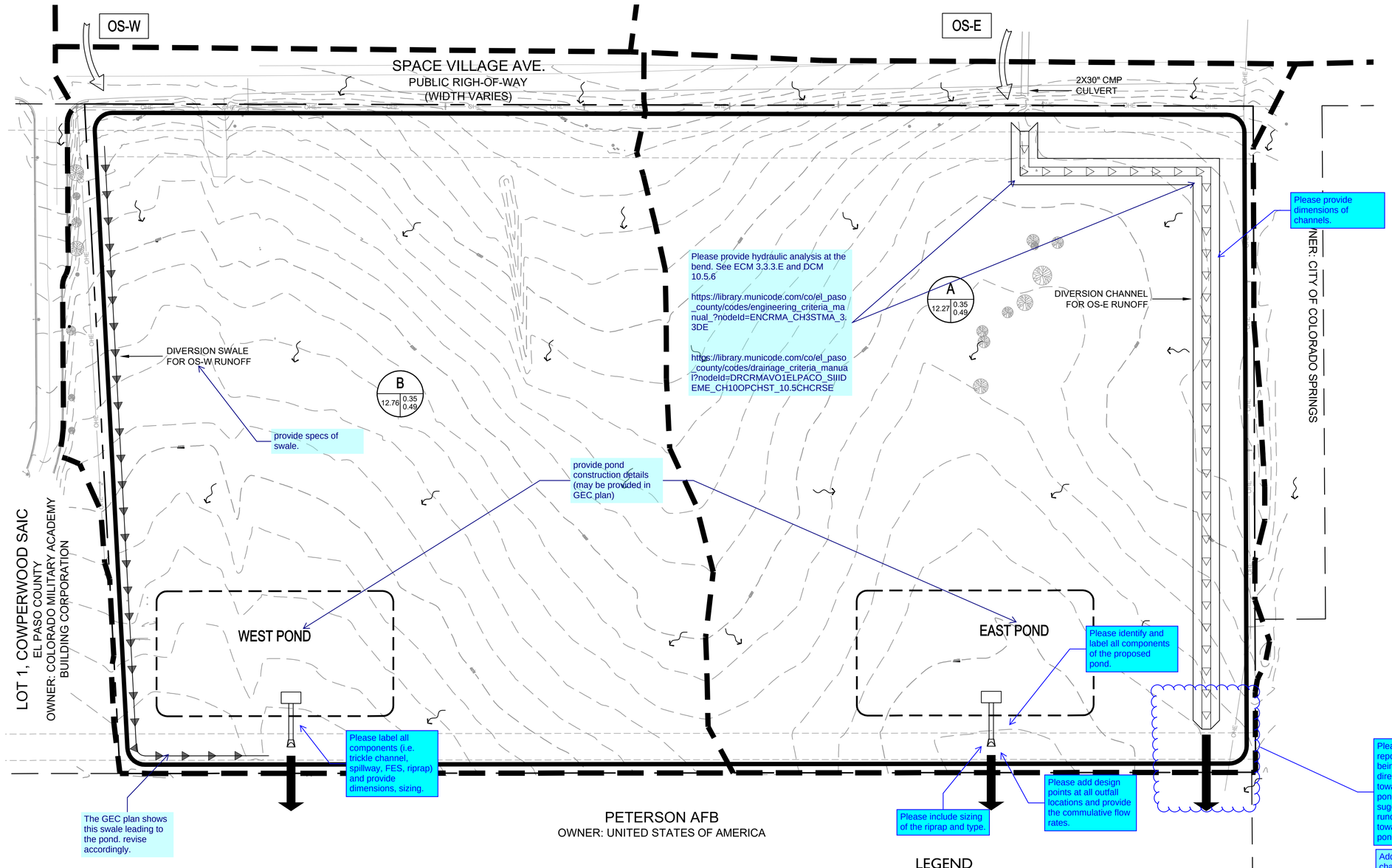
Please revise drainage maps as the Grading and Erosion Control Plan shows a different design and layout.

Please create a basic overview map (or modify existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc) and those areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#). A summary table on the current map would also be acceptable (example provided):

PBMP SUMMARY TABLE

BASINS	PBMP TRIBUTARY AREA (AC)	PBMP
A1.1	1.43	RG-A1.1
A3.1	1.87	RG-A3.1
B1,B2	8.60	EDB-B
OA2,A2	0.95	EXCLUDED*

* EXCLUDED BASED ON < 1-ACRE OF DEVELOPED ROADWAY AREA PER ECM APP. I.7.C.1.a



Please provide hydraulic analysis at the bend. See ECM 3.3.3.E and DCM 10.5,6

https://library.municode.com/co/el_paso_county/codes/engineering_criteria_manual_?nodeId=ENCRMA_CH3STMA_3.3DE

https://library.municode.com/co/el_paso_county/codes/drainage_criteria_manual?nodeId=DRCRMAVO1ELPACO_SIIIDEME_CH10OPCHST_10.5CHCRSE

Please provide dimensions of channels.

provide specs of swale.

provide pond construction details (may be provided in GEC plan)

Please identify and label all components of the proposed pond.

Please label all components (i.e. trickle channel, spillway, FES, riprap) and provide dimensions, sizing.

The GEC plan shows this swale leading to the pond. revise accordingly.

Please include sizing of the riprap and type.

Please add design points at all outfall locations and provide the commulative flow rates.

Please identify in the report why the flow is being directed in this direction instead of towards the detention pond. The contours suggest historical runoff patterns flow towards the proposed pond.

Additionally, the channel shown on the GEC plan is being directed to the pond. Please address/revise accordingly.

NORTH

SCALE: 1"= 60'

0 30 60 120

PROPOSED CONDITION BASIN SUMMARY

BASIN ID	AREA (AC)	C5	C100	Q5 (CFS)	Q100 (CFS)	NOTES
A	12.27	0.35	0.49	12.97	30.43	100-YR DETAINED <90% HISTORIC
B	12.76	0.35	0.49	13.56	31.84	100-YR DETAINED <90% HISTORIC
OS-E	52.98	0.42	0.54	46.76	100.48	DIVERTED AROUND PERIMETER
OS-W	6.82	0.26	0.40	4.17	10.91	DIVERTED AROUND PERIMETER

Please delineate the time of concentration paths for each basin.

LEGEND

PROPERTY LINE

PROPOSED BASIN LINE

OFF-SITE BASIN CONTRIBUTION

DISCHARGE TO OFF-SITE

OS — SUBBASIN ID
0.12 — SUBBASIN AREA (ACRES)
0.30 — 5-YR RUNOFF COEFFICENT
0.60 — 100-YR RUNOFF COEFFICENT

STERLING DESIGN ASSOCIATES
Civil Engineers | Landscape Architects
2009 W. Littleton Blvd. #300 Littleton, CO 80120
303.794.4727 | www.SterlingDesignAssociates.com

STERLING DESIGN ASSOCIATES, LLC

ISSUES & REVISIONS

NO.: 1 DATE: BY:
DESCRIPTION:
NO.: 2 DATE: - BY: -
DESCRIPTION: -
NO.: 3 DATE: - BY: -
DESCRIPTION: -
NO.: 4 DATE: - BY: -
DESCRIPTION: -
NO.: 5 DATE: - BY: -
DESCRIPTION: -
NO.: 6 DATE: - BY: -
DESCRIPTION: -

DATE: 05/12/2022
SCALE:
PROJECT MANAGER:
PROJECT NO.: -
DRAWN BY:
DRAWING FILE: -

PROJECT:

0 SPACE VILLAGE AVENUE
COLORADO SPRINGS, CO

CLIENT:

COMMERCIAL BUILDING SERVICES
7561 S. GRANT STR., SUITE A-4
LITTLETON, COLORADO 80122

TEL: (303) 730-3001

SHEET TITLE:

SHEET NUMBER:

2 OF 2