Preliminary Drainage Report
JeniShay Farms
Colorado Springs, Colorado 80908

Prepared for:
El Paso County, CO

On Behalf of:
Phillip S. and Jennifer Miles
PO Box 88461
Colorado Springs, CO 80908
719-352-8886

Prepared by:
Lodestar Engineering, LLC
PO Box 88461
Colorado Springs, CO 80908
Phillip Shay Miles, PE
719-352-8886

February 25, 2021

PCD File #: SP209

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 master plan of the drainage basin. I accept responsibility for any liability caused b negligent acts, errors, or omissions on my part in preparing this report.

~~**CERTIFICATION STATEMENT:**~~

Signature: ___________________________________ Date: _____________________

Phillip Shay Miles, PE
Registered Professional Engineer State of Colorado No.40462

DEVELOPER'S STATEMENT:

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

Name of Owner/Developer: Phillip S. Miles

Authorized Signature: _____________________________Date: _______________

Title: Owner

Address: 15630 Fox Creek Lane, Colorado Springs, CO 80908

EL PASO COUNTY:

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

____ _______________________

Jennifer Irvine, P.E. Date
County Engineer / ECM Administrator

Conditions:

Delete "certification statement". [Unresolved]

Table of Contents

- Spillway Riprap

Appendix C – Plan (located in plan pocket)

- Drainage Plan
- ~~Preliminary Plat~~

delete preliminary plat

1. Purpose

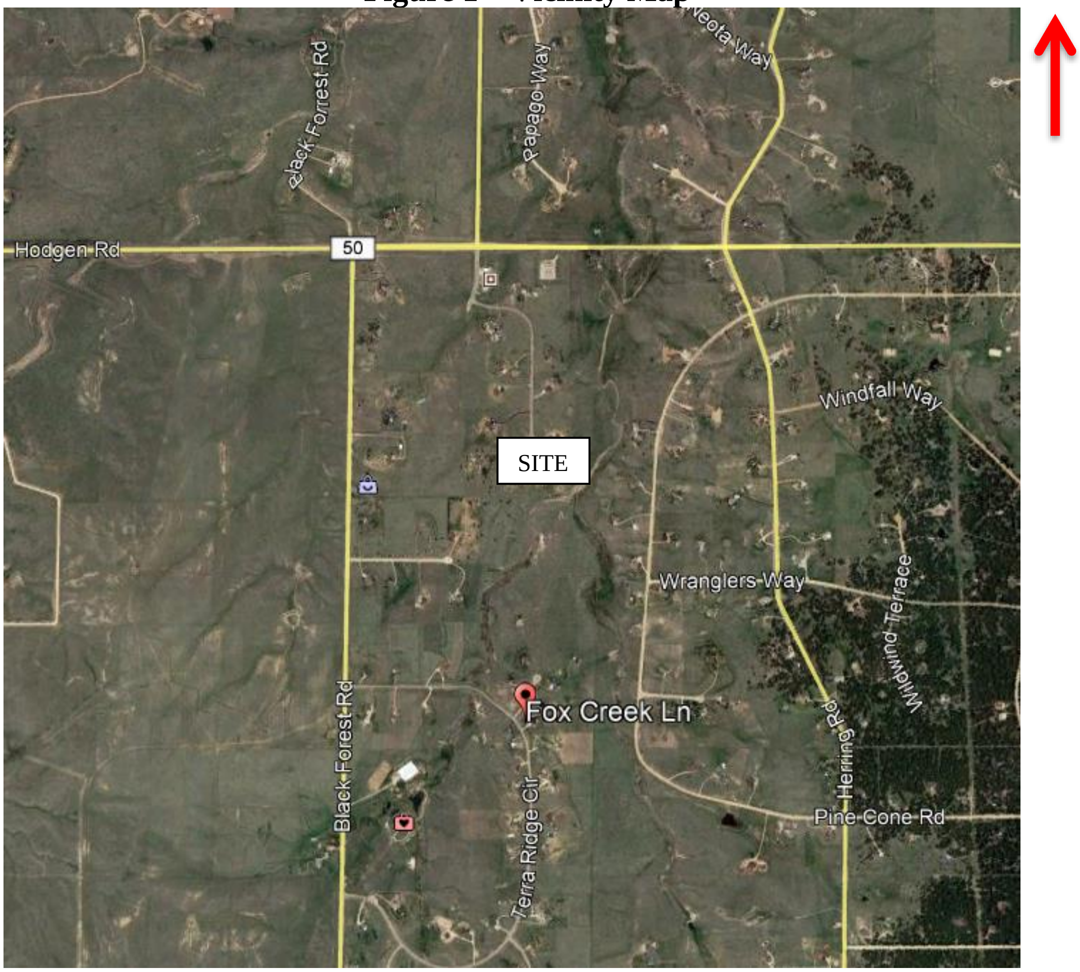
The purpose of this Preliminary Drainage Report for JeniShay Farms is to quantify and evaluate the impacts of stormwater runoff generated by this Project and to provide adequate water quality/detention treatment.

2. General Description

The JeniShay Farms property (Project) is a 52.6-acre single-family development consisting 9 lots and a public street (Fox Creek Lane) located within Black Forest, Colorado in El Paso County. The project will consist of a public street, detention pond, and new home construction and associated site elements typical of single-family residential development (e.g. – driveways, patios, landscaping, etc.). The property is bounded by Ridgeview Acres to the north, Whispering Hills Estates to the west Wildwood Village to the east, and Terra Ridge Estates to the south. All lots surrounding the subject property are all zoned RR-5. The entire 39.72-acre parcel lies within unincorporated El Paso County and is currently zoned RR-5.

This project is located in the Town of Black Forest, El Paso County, Colorado. Access to the site is off Fox Creek Lane. It is located in Section 29, Township 11 south, Range 65 west of the 6^{th} principal meridian. A vicinity map is provided below in Figure 1.

Figure 1 – Vicinity Map



The site is being re-platted from a portion of the Terra Ridge Filing No. 1 subdivision (lots 5 and 6) to be included in the newly formed JeniShay Farms subdivision. The site is bounded by large lot subdivision single-family development.

The existing site is covered with native grasses with a few randomly located ponderosa pines. The topography of the site is rolling hills with two drainage ways extending from south to north through the property. A 100 foot wide electric easement extends north to south along the eastern portion of the site.

3. Soils Conditions

The proposed development is 52.6 acres. Ground cover primarily consists of existing vegetation primarily consisting of native grass and shrubs.

The general topography of the land slopes to the south at slopes in the range of 2% to 30%. According to the Natural Resources Conservation Service (NRCS), the soils in this area consist of Peyton-Pring Complex and Tomah-Crowfoot loamy sands, and can be classified as a Hydrologic Soil Group (HSG) Types B. A soil map and map unit (soils type) descriptions intensity for the rational method calculation instead of the City IDF chart or equation?

If used for the rational method calculation provide the computed Rainfall Intensity-Duration-Frequency (IDF) Table/Chart. The table provided is the Rainfall Depth-Duration-Frequency Table.

...rties are provided in Appendix A. For the purposes of ...ised to define rational method runoff coefficients.

...om this project flows to the north and will initially ...imately discharges into East Cherry Creek.

4. Drainage Criteria

The hydrologic and hydraulic analysis performed in this report utilizes The City of Colorado Springs and El Paso County Drainage Criteria Manual (Vol 1, 1991) (Vol 2, 2002), The City of Colorado Springs (Chpt. 6, 2014, and the MHFD USDCM (Urban Storm Drainage Criteria Manual) Volumes 1 & 2. Stormwater runoff was determined using the Rational Method and was calculated for existing and proposed conditions for the 5-yr (minor) and 100-yr (major) recurrences. 1-hour rainfall depths were derived from NOAA Atlas 14, Volume 8, Version 2 specific to the Project location.

The following MHFD hydrologic and hydraulic software were used in this report:

- UD-Culvert v3.05 –Culvert and Erosion Protection Calculations

Provide an existing condition drainage map and provide narrative description of the design points and sub-basins.

[Unresolved.]

The current 21.5% impervious is contradictory to the exclusion from WQ stated in page 5 of this report. Update the impervious values and provide the existing condition drainage map/calculation and update the narrative. Undeveloped land impervious values is 2% (City DCM Table 6-6) while single family 5 acre lots are 7% (ECM Appendix L Table 3-1).

5.

5.

Ex

St... un... an... is ~2... ous ar... ff values for the project remain essentially the same.

Proposed

Proposed roadway construction and associated grading will create six (6) on-site basins and two (2) off-site basins. Refer to the drainage plan in Appendix C.

Design Point 1 flows are generated from basin B. Basin B consists of public roadway improvements to include pavement, and roadside ditches. Unconcentrated sheet flow across the pavement is collected in the adjacent ditch and is routed north to the proposed 18” storm culvert. At this location, runoff will be conveyed under the proposed roadway to the ditch on the east side ultimately discharging into the proposed water quality/detention pond facility.

Design Point 2 flows are generated from basins A and B. Basin A consists of public roadway improvements to include pavement, and roadside ditches. Unconcentrated sheet flow across the pavement is collected in the adjacent ditch and combines with basin B runoff and is routed north to design point 2. At this location, runoff will be conveyed in a riprap rundown channel to the forebay of the proposed water quality/detention pond facility. Riprap will be provided with a d50 of 9" and a thickness of 18" to prevent erosion prior to entering the concrete forebay. The proposed forebay will be ~95cf in volume. Flows into a 1.5' wide concrete trickle channel will be conveyed to the outlet structure micropool. Refer to the forebay and detention pond calculations located in Appendix B. The emergency overflow route is over the proposed spillway which has been designed to pass the peak flow from the 100yr flow event.

Design Point 3: The JR report shows flows entering the project site with a value of 369cfs (JR DP5). To route this flow to Fox Creek Design Point 3, this flow value (369cfs) and the time of concentration (Tc) for Design Point 5 from the JR report (0.765hrs = 45.9minutes) was held and a corresponding CA equivalent (rational method input) was calculated for routing to Design Point 4. The Tc for the JR flow (45.9) was added to the additional Tc (7.6 minutes) to route thru the site to Design Point 4, yielding a higher Tc (53.5) for Design Point 4 and was used to determine the peak flow (408). As a rough check, using the JR Design Point 5 report data and the 371 tributary acres with a resultant flow of 369cfs yields ~1.0cfs/acre. Our addition of off-site basin OS1 and onsite basin D (total 45acres) yielded a peak flow at Design Point 4 of 408cfs. Therefore, our project site had flows of ~0.87cfs/acre which is close to the 1.0cfs/acre value determined by JR.

Design Point 4 flows are generated from off-site basins OS1 and OS2, Design Point 3 as well as on-site basins C and D. Basin OS1 and OS2 consist of large lot single family subdivision development improvements with homes, driveways, sheds, and various outbuildings. Basin C consists of half of a segment of driveway pavement and fill slope. Runoff flows down the side slope and directly into the adjacent drainageway. Basin D consists of a naturally vegetated field which will have some minor impervious area additions from the proposed home sites. Runoff from basin D is routed directly into the drainageway and then to the north to design point 4. To enable the flows at this location to pass under the proposed driveway, three 48" culverts are proposed. Energy dissipation will be provided at the outfall to minimize the potential for erosion/local scour.

Basin E flows are generated from a naturally vegetated field and a short segment of driveway pavement. This basin runoff is not being treated in the proposed water quality/detention pond because of the topographical constraints on site. Basin E flows are routed in the existing drainageway to the northeast combining with another drainageway to the east near the northeastern lot corner.

Basin F flows are generated from a naturally vegetated field which will have home site construction. Basin E flows are routed in an existing drainageway on the east side of the property which combines with the aforementioned drainageway within basin E near the northeastern lot corner.

Basic C is not used.

Basins D, E & F are excluded from permanent water quality per ECM Appendix I Section I.7.1.B.5 since these contain large lot single family sites (greater than 2.5 ac) and will have a total lot impervious area of less than 10 percent.

5.2 Site Improvements

Utilities that exist within the project area a uth across the east half of the project. There a The existing electric lines are contained within

Add a sentence at the end of section 5.3 stating hydraulic analysis will be finalized in the Final Drainage Report submitted with the final plat application.

5.3 Hydraulic Calculations

Culverts

The calculations for the 18" culvert which routes ditch flows from basin B to basin A under the proposed driveway were performed using 2019 Civil3D design software and are contained in Appendix B. The triple 48" storm culverts routing the drainageway under the proposed driveway are also contained in Appendix B.

Ditch Capacities

The hydraulic analysis for the Fox Creek Lane roadway ditches was performed using 2019 Civil3D design software and are contained in Appendix B.

5.4 On-site Detention Requirements

A full spectrum water quality/detention pond is proposed for this site to provide water quality for developed flows as a result of this development. In addition to water quality, detention is provided in the pond design. Refer to section 7 in this report for additional information regarding water quality capture volume (WQCV) and detention (peak flow attenuation) flow requirements for this project.

The JeniShay Farms HOA will own and maintain the water quality/detention pond.

5.5 Compliance with Other Studies

The only studies related to this project are the Terra Ridge Filing No 1 and 2 reports (see references). The basins that are common to this project (Terra Ridge – basin 12 and 17) have only been modified slightly to account for the proposed roadway construction. Flows as determined in the Terra Ridge reports for the natural drainageway have been used and supplemented with the additional flows from the JeniShay Farms watershed to determine the on-site flow at the proposed driveway crossing.

Unresolved comment from Review #1:
Revise entire Four Step Process per ECM Section 1.7.2.A.

Specifically: switch Steps 2 and 3, and revise the heading and text of Step 4.

5.6 Four Step Process

<u>Step 1 – Runoff Reduction Practices</u>

This development address Low Impact Development strategies primarily through the utilization of roadway ditches. Runoff from the pavement sheet flows across the grass lined ditch side slopes which provides some level of water quality treatment.

<u>Step 2 – Implement BMPs that Provide a Water Quality Capture Volume with Slow Release</u>

On-site flow is directed to the on-site private proposed full-spectrum detention/water quality facility. The extended detention basin provides Water Quality Capture Volume (WQCV) required for this site and attenuates the peak flows releasing them at approximate historic runoff rates over a longer period by releasing Excess Urban Runoff Volume (EURV).

Step 3 – Stabilize Drainageways

Portions of the existing conditions runoff currently enter the on-site natural drainageway via overland flow across the vacant lots and via the proposed full-spectrum detention pond. Due to the minor anticipated extent of land disturbance and improvements on these large lots coupled with on-site detention; the amount of runoff entering the drainageways remains basically the same. Predevelopment levels of release of the Excess Urban Runoff Volume (EURV) help the drainageway maintain its current morphology by mimicking the natural historic runoff rates over a longer period by peak flow attenuation.

Step 4 – Source Control BMPs

Construction BMP's that will be implemented include silt fence, a vehicle tracking pad, a stabilized staging area, concrete washout, inlet protection, adequately installed vegetation, side slopes will be 3:1 or flatter, and straw bale ditch checks. The implementation of these BMP's is outlined in the Grading, Erosion and Stormwater Quality Control Plan and Stormwater Management Plan for the site. The Stormwater Management Plan also addresses materials storage and spill containment handling during construction to protect downstream receiving waters.

6. Water Quality

Stormwater that is generated from this Proj ... site in the form of unconcentrated sheet flow or is collected in ... ed thru the proposed water quality/detention facility outfalling via an 18" storm sewer pipe.

Update narrative. On Page 4 the report noted Basin C is not used.

The proposed on-site imperviousness of the area contributing to the pond is 30.3%. Basin C is the only area of improvements that has not been included in the sites imperviousness calculations because runoff cannot be physically treated in the proposed pond and yield extremely minor runoff values (Q5=0.5cfs, Q100=1.5cfs).

The proposed full spectrum extended detention basin (EDB) has been analyzed in this study based on the proposed site conditions as shown on the Drainage Plan. The pond facility provides 0.066acre-ft of water quality capture volume, 0.161acre-ft of excess urban runoff volume and 0.291 acre-ft of detention storage. The proposed EDB will release a peak flow 5.0cfs during the 100-year storm event. Outflows from the proposed EDB are released via a proposed 18" storm sewer pipe with a restrictor plate located within the outlet structure box. The outlet structure will have an orifice plate designed to drain the EURV over a period of 72 hours. The orifice plate will have 3 rows of holes. The lowest will be ¾" in diameter, and the second and third rows will be ½" in diameter. The EDB will have a rip rap emergency overflow spillway that will drain the 100yr peak flows (8.6cfs) in the event the outlet structure becomes entirely clogged or the pond is already full. The spillway will be constructed of rip rap with a d50 = 9", 18" thick, a crest length of 5.4' with 3:1 side slopes. Flow depth over the crest of the spillway during the 100yr event storm will be 0.56' with 1.0' of freeboard. A 10ft maintenance road has been provided

Add a sentence stating pond design will be finalized in the Final Drainage Report submitted with the final plat application.

extending from the private driveway to the bottom of the pond. The pond will be maintained using a skid loader. Refer to the design calculations in Appendix B for additional information.

The slope downstream of the detention pond emergency spil
peak outflow during the 100yr event, assuming complete clo
cfs. The velocity of the flow for the 100yr event was calculat
a velocity of 4.50 fps which is below the 5.0 fps threshold re

[Unresolved] Replace with "requested". Pre-development grading is not a requirement but may be requested by the applicant at this stage of the land development process.

7. Erosion Control Plan

Pre-development grading is ~~required~~ with the preliminary plan application and a pre-development GEC and SWMP has been submitted separately as a stand-alone construction drawing. Refer to plans titled JeniShay Farms – Grading, Erosion and Stormwater Quality Control Plans, prepared by Lodestar Engineering, dated February 25, 2021.

8. Floodplain Statement

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) numbers 08041C0305G and08041C0315G dated December 7, 2018 this project is not located within a FEMA designated 100yr floodplain. Therefore, no map revisions will be necessary as a result of this project. A copy of the FIRM maps is provided in Appendix A.

9. Drainage and Bridge Fees

The drainage basin is located within the East Cherry Creek Drainage Basin.

The project is not located within a fee (drainage) basin and bridge fees are not required. Therefore, no drainage or bridge fees are required for this development.

10. Construction Cost Opinion

Item	Unit	Quantity	Unit Price	Extended Cost
18” Storm Pipe	LF	40	$65	$2,600
24” Storm Pipe	LF	20	$75	$1,500
48” Storm Pipe	LF	150	$120	$18,000
Outlet Structure	EA	1	$10,000	$10,000
Forebay	EA	1	$5,000	$5,000
Trickle Channel	LS	1	$2,500	$2,500
			Sub-total	$39,600
			Contingency 10%	$3,960
			TOTAL	$43,560

All storm system elements for this project are private and therefore there will be no reimbursement from El Paso County.

11. Summary

The Preliminary drainage report for JeniShay Farms was prepared using the El Paso County Engineering Criteria Manual, City of Colorado Springs Drainage Criteria Manuals, and Mile High Flood Control District Manuals. Stormwater quality and detention is provided by a proposed facility located on-site. No adverse downstream impacts are anticipated as a result of the proposed site improvements.

12. References

1. Engineering Criteria Manual, El Paso County, December 2016
2. Drainage Criteria Manual, Volumes I and II, El Paso County and City of Colorado Springs, Vol 1, 1991 and Vol 2, 2002
3. Drainage Criteria Manual, Chapter 6, City of Colorado Springs, May 2014
4. Urban Storm Drainage Criteria Manual (USDCM), Volumes I-III, Mile High Flood Control District (MHFD).
5. Preliminary drainage report for Terra Ridge Filing No. 1, JR Engineering, April 1997.
6. Preliminary drainage report for Terra Ridge Filing No. 2, JR Engineering, June 1999.
7. FEMA Flood Insurance Rate Map Numbers 08041C0305G and 08041C0305G, El Paso County, Colorado, December 7, 2018
8. Natural Resources Conservation Service, Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
9. United States Geological Survey (USGS) Topographic Quadrangle Map
10. NOAA Atlas 14, Volume 8, Version 2 Point Precipitation Frequency Data Server, https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Appendix A
Maps

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

El Paso County Area, Colorado

fox creek subdivision

October 13, 2019

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Soil Map

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

Soil Map

Map Scale: 1:5,510 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 250, 500, 1000, 1500

N

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 17, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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
14	Brussett loam, 1 to 3 percent slopes	1.2	1.0%
68	Peyton-Pring complex, 3 to 8 percent slopes	123.2	94.7%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	5.7	4.4%
Totals for Area of Interest		**130.1**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

14—Brussett loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367j
Elevation: 7,200 to 7,500 feet
Frost-free period: 115 to 125 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Brussett

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits

Typical profile

A - 0 to 8 inches: loam
BA - 8 to 12 inches: loam
Bt - 12 to 26 inches: clay loam
Bk - 26 to 60 inches: silt loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: Loamy Park (R048AY222CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

68—Peyton-Pring complex, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369f
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 40 percent
Pring and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

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

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: Sandy Divide (R049BY216CO)
Hydric soil rating: No

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Loamy Park (R048AY222CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 36b9
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Tomah and similar soils: 50 percent
Crowfoot and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Hills, alluvial fans
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose and/or residuum weathered from arkose

Typical profile

A - 0 to 10 inches: loamy sand
E - 10 to 22 inches: coarse sand
C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy Divide (R049BY216CO)
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Alluvial fans, hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 12 inches: loamy sand
E - 12 to 23 inches: sand
Bt - 23 to 36 inches: sandy clay loam
C - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy Divide (R049BY216CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

National Flood Hazard Layer FIRMette

FEMA

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
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 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 10/28/2019 at 7:40:48 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.

NOTES TO USERS

is for use in administering the National Flood Insurance Program. It does sarily identify all areas subject to flooding, particularly from local drainage f small size. The **community map repository** should be consulted for pdated or additional flood hazard information.

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mation Services
NGS12
Geodetic Survey
#9202
-West Highway
ng, MD 20910-3282

current elevation, description, and/or location information for **bench marks** this map, please contact the Information Services Branch of the National Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

information shown on this FIRM was provided in digital format by El Paso olorado Springs Utilities, City of Fountain, Bureau of Land Management, Oceanic and Atmospheric Administration, United States Geological Survey, son Consulting Engineers, Inc. These data are current as of 2006.

reflects more detailed and up-to-date **stream channel configurations and delineations** than those shown on the previous FIRM for this jurisdiction. plains and floodways that were transferred from the previous FIRM may adjusted to conform to these new stream channel configurations. As a Flood Profiles and Floodway Data tables in the Flood Insurance Study hich contains authoritative hydraulic data) may reflect stream channel that differ from what is shown on this map. The profile baselines depicted p represent the hydraulic modeling baselines that match the flood profiles way Data Tables if applicable, in the FIS report. As a result, the profile may deviate significantly from the new base map channel representation ppear outside of the floodplain.

limits shown on this map are based on the best data available at the time ion. Because changes due to annexations or de-annexations may have after this map was published, map users should contact appropriate officials to verify current corporate limit locations.

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EMA Map Service Center (MSC) via the FEMA Map Information eXchange 877-336-2627 for information on available products associated with this ailable products may include previously issued Letters of Map Change, a rance Study Report, and/or digital versions of this map. The MSC may reached by Fax at 1-800-358-9620 and its website at .msc.fema.gov/.

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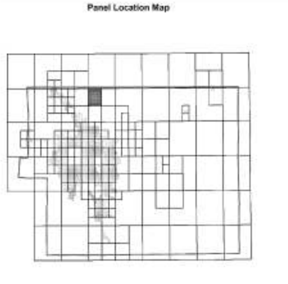
El Paso County Vertical Datum Offset Table

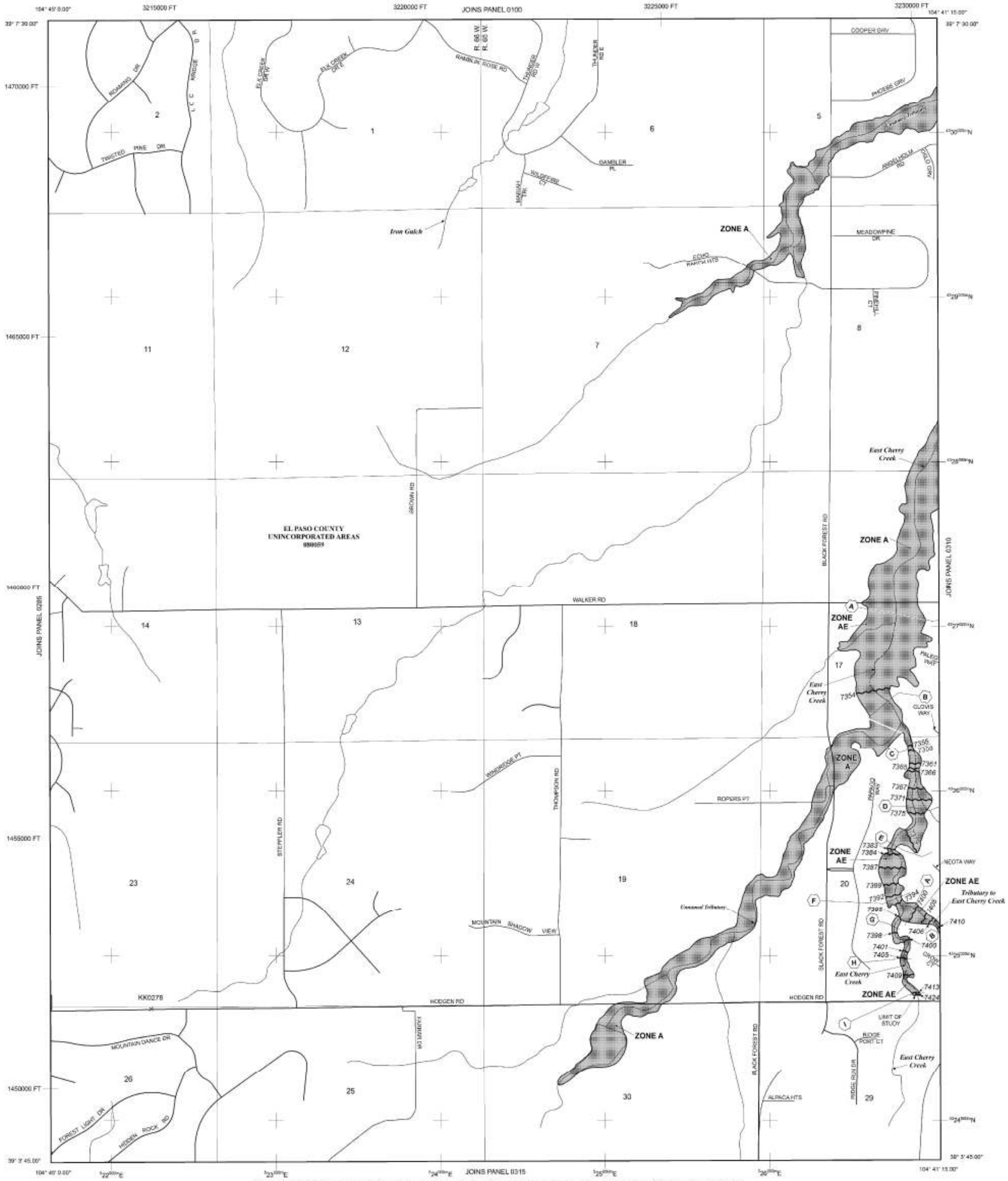
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



igital Flood Insurance Rate Map (DFIRM) was produced through a ating Technical Partner (CTP) agreement between the State of Colorado Conservation Board (CWCB) and the Federal Emergency Management (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 11 SOUTH, RANGE 65 WEST, AND TOWNSHIP 11 SOUTH, RANGE 66 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)—(A)	Cross section line
(23)----(23)	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000 N	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0305G

FIRM

FLOOD INSURANCE RATE M

EL PASO COUNTY,
COLORADO
AND INCORPORATED AR

PANEL 305 OF 1300

(SEE MAP INDEX FOR FIRM PANEL L

CONTAINS:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY	080059	0305

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUM
08041C0

MAP REV
DECEMBER 7,

Federal Emergency Management

NOTES TO USERS

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…s of the **floodways** were computed at cross sections and interpolated …ross sections. The floodways were based on hydraulic considerations with …requirements of the National Flood Insurance Program. Floodway widths … pertinent floodway data are provided in the Flood Insurance Study report …isdiction.

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…**ction** used in the preparation of this map was Universal Transverse …(UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. …s in datum, spheroid, projection or UTM zones zones used in the …n of FIRMs for adjacent jurisdictions may result in slight positional …s in map features across jurisdiction boundaries. These differences do not …accuracy of this FIRM.

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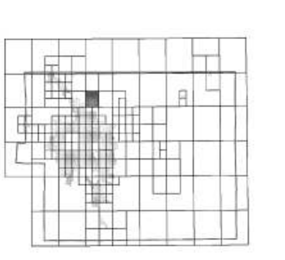
Panel Location Map



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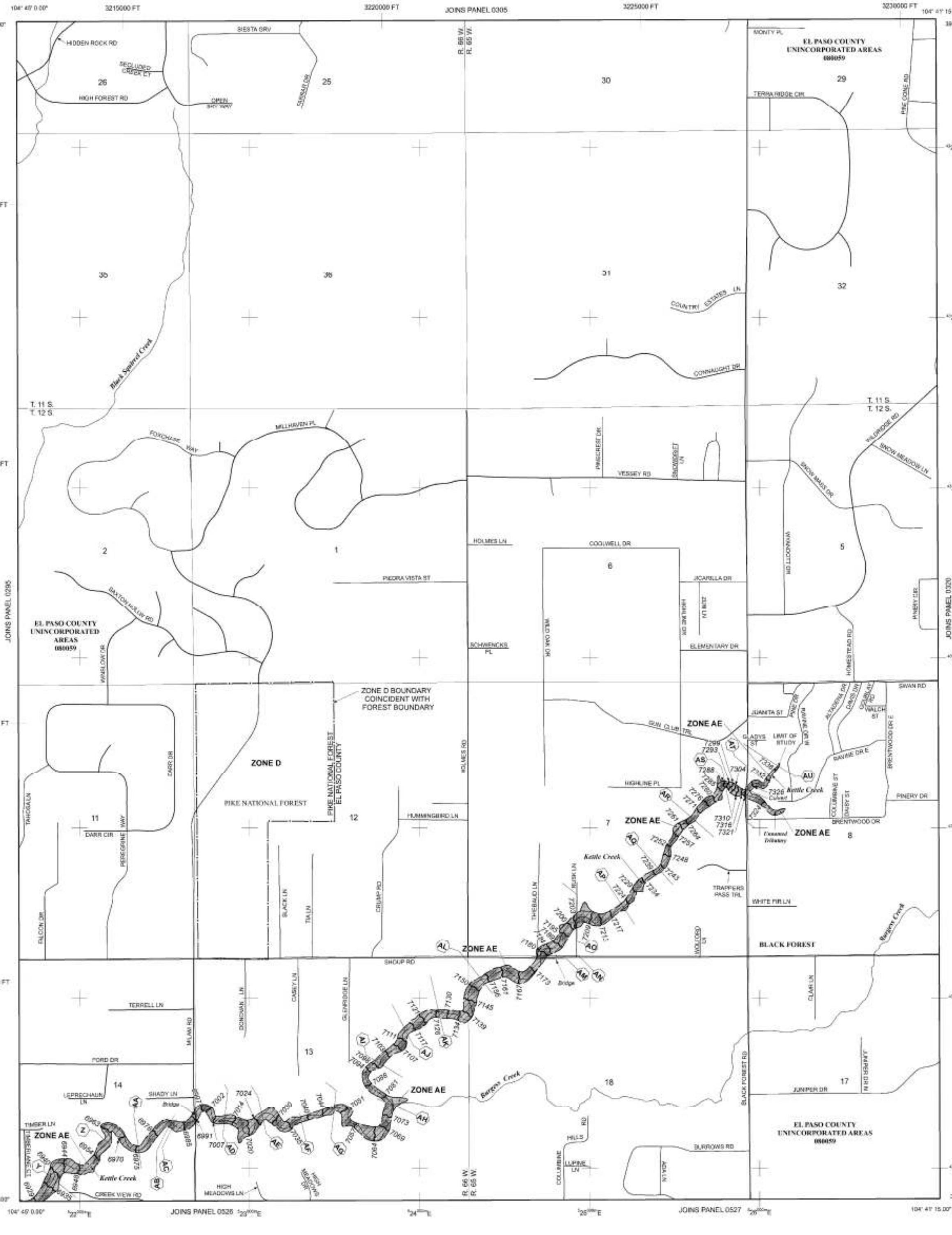

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT T… INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the floo… that has a 1% chance of being equaled or exceeded in any given year. The Special Floo… Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas … Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Floo… Elevation is the water-surface elevation of the 1% annual chance flood.

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ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chanc… flood by a flood control system that was subsequently decertified. Zon… AR indicates that the former flood control system is being restored t… provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal floo… protection system under construction; no Base Flood Elevation… determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Floo… Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Floo… Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must b… kept free of encroachment so that the 1% annual chance flood can be carried witho… substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood wi… average depths of less than 1 foot or with drainage areas less than … square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Ar…

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Ba… Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
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(A)——(A)	Cross section line
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• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations a… Special Flood Hazard Areas, to update map format, to add roads and road names, an… incorporate previously issued Letters of Map Revision.

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0315G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE M…

EL PASO COUNTY, COLORADO
AND INCORPORATED AR…

PANEL 315 OF 1300

(SEE MAP INDEX FOR FIRM PANEL L…

CONTAINS:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY	080059	0315

Notice to User: The **Map Number** shown below shoul… used when placing map orders; the **Community Num…** shown above should be used on insurance application… subject community.

MAP NUM…
08041C0…

MAP REV…
DECEMBER 7, …

Federal Emergency Management …

Appendix B
Calculations

Provide the rational method calculations for the onsite historic condition and provide a historic draiange map.

Revise to preliminary

FINAL DRAINAGE REPORT

JeniShay Farms

(Composite Runoff Coefficient - 5 Year)

ON-SITE						
Basin	Area (acres)					C5
	Paved/Drive/Walk	Res >1acre	Gravel	Lawn/Meadow	TOTAL	
A	0.42	2.57	0.12	1.06	4.17	0.25
B	0.40	0.00	0.12	0.44	0.95	0.48
C						
D	0.00	15.02	0.00	0.00	15.02	0.20
E	0.03	5.35	0.00	0.00	5.38	0.20
F	0.00	14.13	0.00	0.00	14.13	0.20

OFF-SITE						
Basin	Area (acres)					C5
	Paved/Drive/Walks	Res >1acre	Gravel	Lawn/Meadow	TOTAL	
OS1	0.00	30.00	0.00	0.00	30.00	0.20
OS2	0.00	6.36	0.00	0.00	6.36	0.20

Per DCM Table 6-6

Surface	Runoff Coefficent
Paved/Drive/Walk	0.90
Res >1acre	0.20
Gravel	0.59
Lawn/Meadow	0.08

Staff recommends changing the C value for the onsite drainage. This is for a 1 acre residential lot. You may want to extrapolate or identify a comparative c value based on the 7% imperviousness in table 6-6

Similar comment applies for the 100yr condition

FINAL DRAINAGE REPORT

JeniShay Farms

(Composite Runoff Coefficient - 100 Year)

ON-SITE						
Basin	**Area (acres)**					**C100**
	Paved/Drive/Walk	**Res >1acre**	**Gravel**	**Lawn/Meadow**	**TOTAL**	
A	0.42	2.57	0.12	1.06	4.17	0.48
B	0.40	0.00	0.12	0.44	0.95	0.65
C						
D	0.00	15.02	0.00	0.00	15.02	0.44
E	0.03	5.35	0.00	0.00	5.38	0.44
F	0.00	14.13	0.00	0.00	14.13	0.44

OFF-SITE						
Basin	**Area (acres)**					**C100**
	Paved/Drive/Walks	**Res >1acre**	**Gravel**	**Lawn/Meadow**	**TOTAL**	
OS1	0.00	30.00	0.00	0.00	30.00	0.44
OS2	0.00	6.36	0.00	0.00	6.36	0.44

Per DCM Table 6-6

Surface	**Runoff Coefficent**
Paved/Drive/Walk	0.96
Res >1acre	0.44
Gravel	0.70
Lawn/Meadow	0.35

FINAL DRAINAGE REPORT

JeniShay Farms

(Percentage of Imperviousness)

ON-SITE: PROPOSED						
Basin	***Area (acres)***					***% Imp***
	Paved/Drive/Walk	***Res >1acre***	***Gravel***	***Lawn/Meadow***	***TOTAL***	
A	0.42	2.57	0.12	1.06	4.17	25.26
B	0.40	0.00	0.12	0.44	0.95	52.36
C						
D	0.00	15.02	0.00	0.00	15.02	20.00
E	0.03	5.35	0.00	0.00	5.38	20.43
F	0.00	14.13	0.00	0.00	14.13	20.00
Totals	**0.94**	**37.08**	**0.23**	**1.75**	**40.00**	**21.44**

OFF-SITE: PROPOSED						
Basin	***Area (acres)***					***% Imp***
	Paved/Drive/Walks	***Res >1acre***	***Gravel***	***Lawn/Meadow***	***TOTAL***	
OS1	0.00	30.00	0.00	0.00	30.00	20.00
OS2	0.00	6.36	0.00	0.00	6.36	20.00
Totals	**0.00**	**36.36**	**0.00**	**0.00**	**36.36**	**20.00**

TO POND: PROPOSED						
A,B	**0.82**	**2.57**	**0.23**	**1.50**	**5.13**	**30.29**

Per DCM Table 6-6

Surface	**% Impervious**
Paved/Drive/Walk	100
Res >1acre	20
Gravel	80
Lawn/Meadow	2

Update the percent impervious per ECM Appendix L Table 3-1.

Revise or provide an explanation on how this was derived. These seems high. The upstream development are generally 5 ac or larger lots.

NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado Springs, Colorado, USA*
Latitude: 39.0612°, Longitude: -104.6936°
Elevation: 7469.19 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	**0.237** (0.193-0.293)	**0.288** (0.234-0.356)	**0.375** (0.304-0.466)	**0.453** (0.365-0.564)	**0.567** (0.444-0.737)	**0.661** (0.504-0.868)	**0.760** (0.558-1.02)	**0.865** (0.608-1.19)	**1.01** (0.683-1.43)	**1.13** (0.739-1.61)
10-min	**0.347** (0.283-0.429)	**0.421** (0.343-0.521)	**0.550** (0.446-0.682)	**0.663** (0.535-0.826)	**0.831** (0.650-1.08)	**0.968** (0.738-1.27)	**1.11** (0.817-1.50)	**1.27** (0.891-1.75)	**1.48** (1.00-2.10)	**1.65** (1.08-2.36)
15-min	**0.423** (0.345-0.523)	**0.514** (0.418-0.635)	**0.670** (0.544-0.831)	**0.809** (0.652-1.01)	**1.01** (0.793-1.32)	**1.18** (0.900-1.55)	**1.36** (0.997-1.82)	**1.54** (1.09-2.13)	**1.81** (1.22-2.56)	**2.02** (1.32-2.88)
30-min	**0.604** (0.492-0.746)	**0.732** (0.596-0.905)	**0.955** (0.774-1.18)	**1.15** (0.928-1.43)	**1.44** (1.13-1.87)	**1.68** (1.28-2.20)	**1.93** (1.42-2.59)	**2.19** (1.54-3.03)	**2.57** (1.73-3.63)	**2.86** (1.87-4.09)
60-min	**0.769** (0.626-0.950)	**0.921** (0.749-1.14)	**1.19** (0.968-1.48)	**1.44** (1.16-1.80)	**1.82** (1.43-2.37)	**2.13** (1.63-2.81)	**2.47** (1.82-3.33)	**2.84** (2.00-3.93)	**3.36** (2.27-4.77)	**3.78** (2.48-5.40)
2-hr	**0.933** (0.765-1.15)	**1.11** (0.908-1.36)	**1.43** (1.17-1.76)	**1.73** (1.41-2.14)	**2.19** (1.74-2.86)	**2.59** (1.99-3.40)	**3.01** (2.24-4.05)	**3.48** (2.47-4.80)	**4.15** (2.83-5.86)	**4.70** (3.10-6.67)
3-hr	**1.02** (0.840-1.25)	**1.20** (0.987-1.47)	**1.54** (1.26-1.89)	**1.87** (1.52-2.30)	**2.38** (1.90-3.10)	**2.82** (2.19-3.70)	**3.31** (2.47-4.44)	**3.85** (2.75-5.30)	**4.63** (3.18-6.53)	**5.28** (3.50-7.47)
6-hr	**1.19** (0.986-1.44)	**1.38** (1.14-1.68)	**1.75** (1.45-2.13)	**2.12** (1.74-2.59)	**2.71** (2.19-3.53)	**3.24** (2.53-4.23)	**3.82** (2.88-5.11)	**4.47** (3.23-6.13)	**5.43** (3.76-7.62)	**6.22** (4.16-8.75)
12-hr	**1.40** (1.16-1.68)	**1.61** (1.34-1.94)	**2.03** (1.69-2.46)	**2.45** (2.02-2.97)	**3.12** (2.53-4.02)	**3.71** (2.92-4.81)	**4.36** (3.31-5.79)	**5.10** (3.70-6.93)	**6.17** (4.30-8.60)	**7.06** (4.75-9.86)
24-hr	**1.63** (1.37-1.95)	**1.90** (1.59-2.27)	**2.41** (2.01-2.88)	**2.88** (2.39-3.47)	**3.63** (2.95-4.61)	**4.27** (3.37-5.47)	**4.97** (3.79-6.52)	**5.74** (4.19-7.73)	**6.86** (4.81-9.47)	**7.78** (5.27-10.8)
2-day	**1.90** (1.60-2.25)	**2.25** (1.89-2.66)	**2.86** (2.40-3.40)	**3.42** (2.85-4.08)	**4.24** (3.45-5.31)	**4.93** (3.91-6.24)	**5.67** (4.33-7.34)	**6.45** (4.73-8.59)	**7.57** (5.33-10.3)	**8.46** (5.78-11.7)
3-day	**2.09** (1.77-2.46)	**2.46** (2.08-2.91)	**3.13** (2.63-3.70)	**3.72** (3.11-4.42)	**4.59** (3.74-5.71)	**5.31** (4.22-6.68)	**6.08** (4.66-7.83)	**6.90** (5.07-9.13)	**8.05** (5.69-10.9)	**8.97** (6.15-12.3)
4-day	**2.25** (1.91-2.64)	**2.64** (2.23-3.10)	**3.32** (2.80-3.92)	**3.93** (3.30-4.66)	**4.83** (3.95-5.99)	**5.58** (4.45-6.99)	**6.37** (4.90-8.18)	**7.22** (5.33-9.52)	**8.41** (5.96-11.4)	**9.36** (6.44-12.8)
7-day	**2.65** (2.26-3.09)	**3.06** (2.60-3.58)	**3.78** (3.21-4.43)	**4.43** (3.74-5.21)	**5.38** (4.43-6.62)	**6.18** (4.95-7.69)	**7.02** (5.43-8.96)	**7.92** (5.88-10.4)	**9.19** (6.56-12.4)	**10.2** (7.07-13.9)
10-day	**3.00** (2.56-3.49)	**3.44** (2.94-4.01)	**4.21** (3.59-4.92)	**4.90** (4.15-5.75)	**5.91** (4.87-7.23)	**6.75** (5.42-8.36)	**7.63** (5.92-9.69)	**8.57** (6.38-11.2)	**9.88** (7.08-13.3)	**10.9** (7.61-14.8)
20-day	**3.99** (3.43-4.60)	**4.57** (3.93-5.28)	**5.55** (4.76-6.43)	**6.39** (5.45-7.44)	**7.60** (6.28-9.17)	**8.56** (6.91-10.5)	**9.56** (7.46-12.0)	**10.6** (7.93-13.7)	**12.0** (8.65-16.0)	**13.1** (9.20-17.7)
30-day	**4.80** (4.15-5.52)	**5.51** (4.75-6.34)	**6.68** (5.74-7.70)	**7.65** (6.55-8.87)	**9.01** (7.46-10.8)	**10.1** (8.15-12.2)	**11.1** (8.72-13.9)	**12.2** (9.19-15.7)	**13.7** (9.90-18.1)	**14.8** (10.4-19.9)
45-day	**5.81** (5.04-6.65)	**6.68** (5.78-7.65)	**8.07** (6.97-9.27)	**9.21** (7.91-10.6)	**10.7** (8.90-12.7)	**11.9** (9.65-14.3)	**13.0** (10.2-16.1)	**14.2** (10.7-18.1)	**15.7** (11.3-20.5)	**16.8** (11.9-22.4)
60-day	**6.67** (5.80-7.60)	**7.66** (6.65-8.74)	**9.23** (7.99-10.6)	**10.5** (9.03-12.1)	**12.2** (10.1-14.3)	**13.4** (10.9-16.1)	**14.6** (11.5-17.9)	**15.7** (11.9-19.9)	**17.2** (12.5-22.4)	**18.2** (13.0-24.3)

[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.

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PF graphical

Final Drainage Report

JeniShay Farms

(Basin Summary)

From Area Runoff Coefficient Summary				*OVERLAND FLOW TIME*				*TRAVEL TIME*					TOTAL	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 *From DCM Table 6-6*	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Conveyance Coeff.	Slope *(%)*	Length *(ft)*	Velocity *(fps)*	T_t *(min)*	*(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
A	4.17	0.25	0.48	0.30	150	10	9.8	15	4.0%	320	3.0	1.8	11.6	3.9	6.6	***4.1***	***13.1***
B	0.95	0.48	0.65	0.30	10	3.3	1.5	15	5.6%	1285	3.5	6.0	7.5	4.6	7.6	***2.1***	***4.7***
C																	
D	15.02	0.20	0.44	0.30	300	24	13.0	10	5.0%	240	2.2	1.8	14.8	3.5	5.9	***10.6***	***39.2***
E	5.38	0.20	0.44	0.30	300	20	13.9	15	4.9%	70	3.3	0.4	14.2	3.6	6.0	***3.9***	***14.3***
F	14.13	0.20	0.44	0.30	300	28	12.4	15	3.2%	1180	2.7	7.3	19.7	3.1	5.2	***8.8***	***32.5***
OS1	30.00	0.20	0.44	0.30	300	12	16.4	15	3.0%	815	2.6	5.2	21.6	3.0	5.0	***17.8***	***65.9***
OS2	6.36	0.20	0.44	0.30	300	10	17.4	15	3.0%	580	2.6	3.7	21.1	3.0	5.0	***3.8***	***14.1***

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: PSM
Date: 10/28/2019
Checked by: PSM

FINAL DRAINAGE REPORT

JeniShay Farms

(Surface Routing Summary)

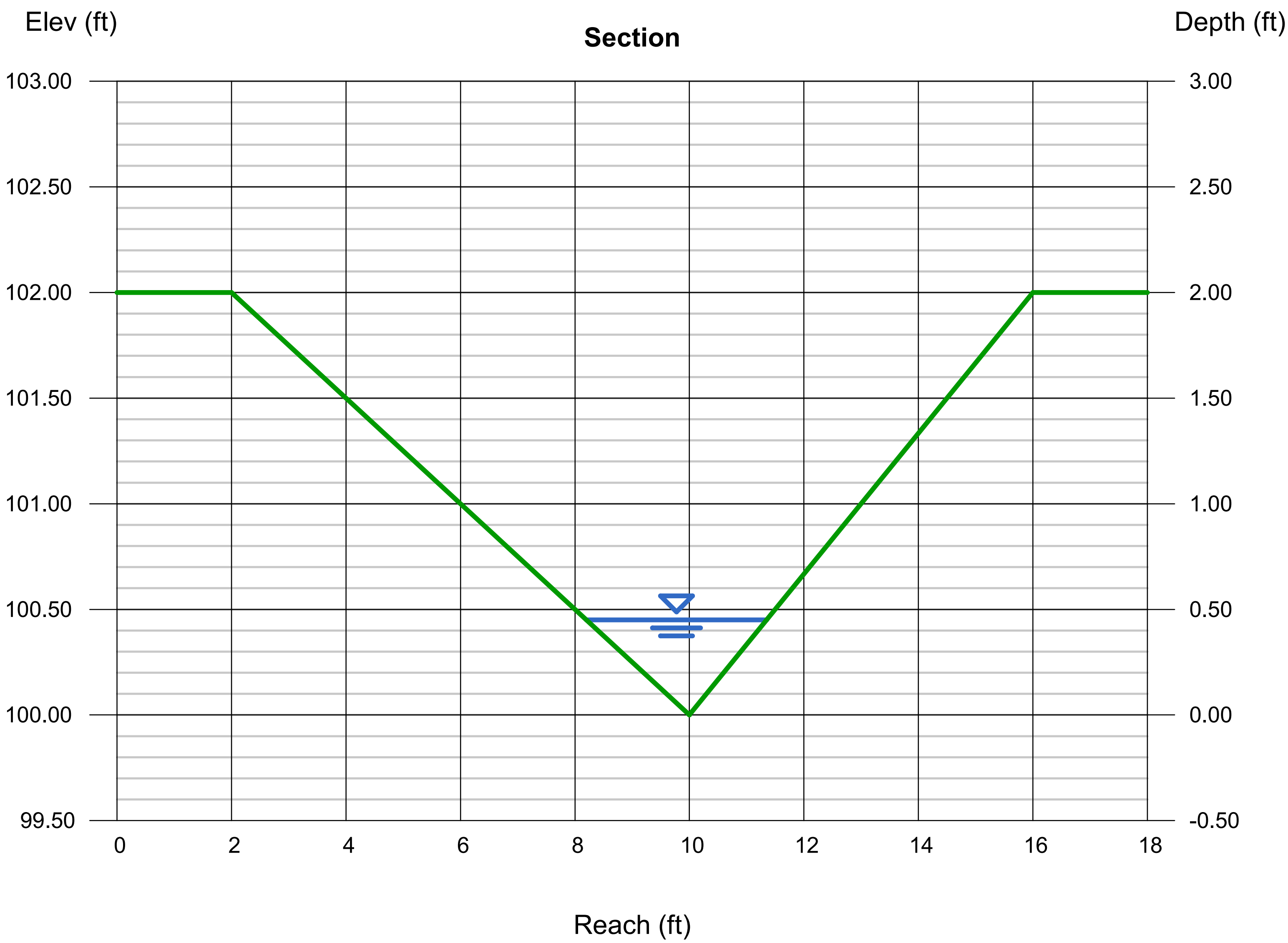
					Intensity		Flow		
Design Point(s)	***Contributing Basins/Design Points***	***Equivalent CA_5***	***Equivalent CA_{100}***	***Maximum T_C***	***I_5***	***I_{100}***	***Q_5***	***Q_{100}***	***Comments***
1	B	0.46	0.62	7.5	4.6	7.6	***2.1***	***4.7***	***To proposed 18" culvert***
2	DP1, A	1.50	2.62	11.6	3.9	6.6	***5.8***	***17.3***	***To proposed pond (inflow)***
3	JR ENG DP-005	47.97	118.08	45.9	1.8	3.1	***86.3***	***366.0***	***Creek flow at entrance to property***
4	DP3, OS1, OS2, D	58.25	140.69	53.5	1.7	2.9	***99.0***	***408.0***	***To proposed Triple 48" culverts***

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Feb 26 2021

Basin A ditch 100yr Sta. 6+50

Triangular		**Highlighted**	
Side Slopes (z:1)	= 4.00, 3.00	Depth (ft)	= 0.45
Total Depth (ft)	= 2.00	Q (cfs)	= 2.620
		Area (sqft)	= 0.71
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 3.70
Slope (%)	= 4.80	Wetted Perim (ft)	= 3.28
N-Value	= 0.030	Crit Depth, Yc (ft)	= 0.52
		Top Width (ft)	= 3.15
Calculations		EGL (ft)	= 0.66
Compute by:	Known Q		
Known Q (cfs)	= 2.62		



Channel Report

Basin A ditch 100yr Sta. 10+00

Triangular

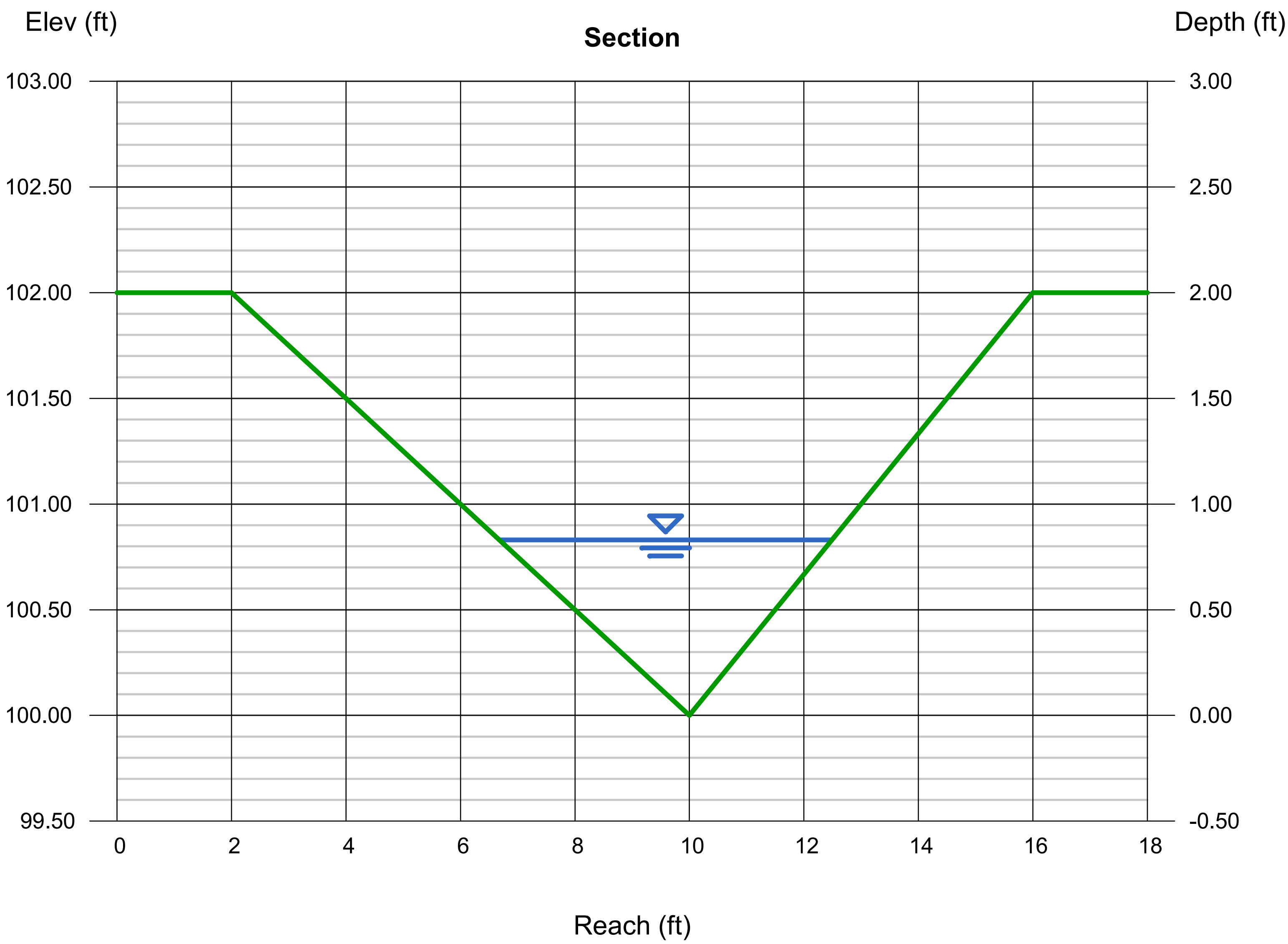
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.00

Highlighted

Depth (ft)	= 0.83
Q (cfs)	= 10.00
Area (sqft)	= 2.41
Velocity (ft/s)	= 4.15
Wetted Perim (ft)	= 6.05
Crit Depth, Yc (ft)	= 0.88
Top Width (ft)	= 5.81
EGL (ft)	= 1.10



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. | Friday, Feb 26 2021

Basin A ditch 100yr Sta. 12+00

Triangular
Side Slopes (z:1) = 4.00, 3.00
Total Depth (ft) = 2.00

Invert Elev (ft) = 100.00
Slope (%) = 2.10
N-Value = 0.030

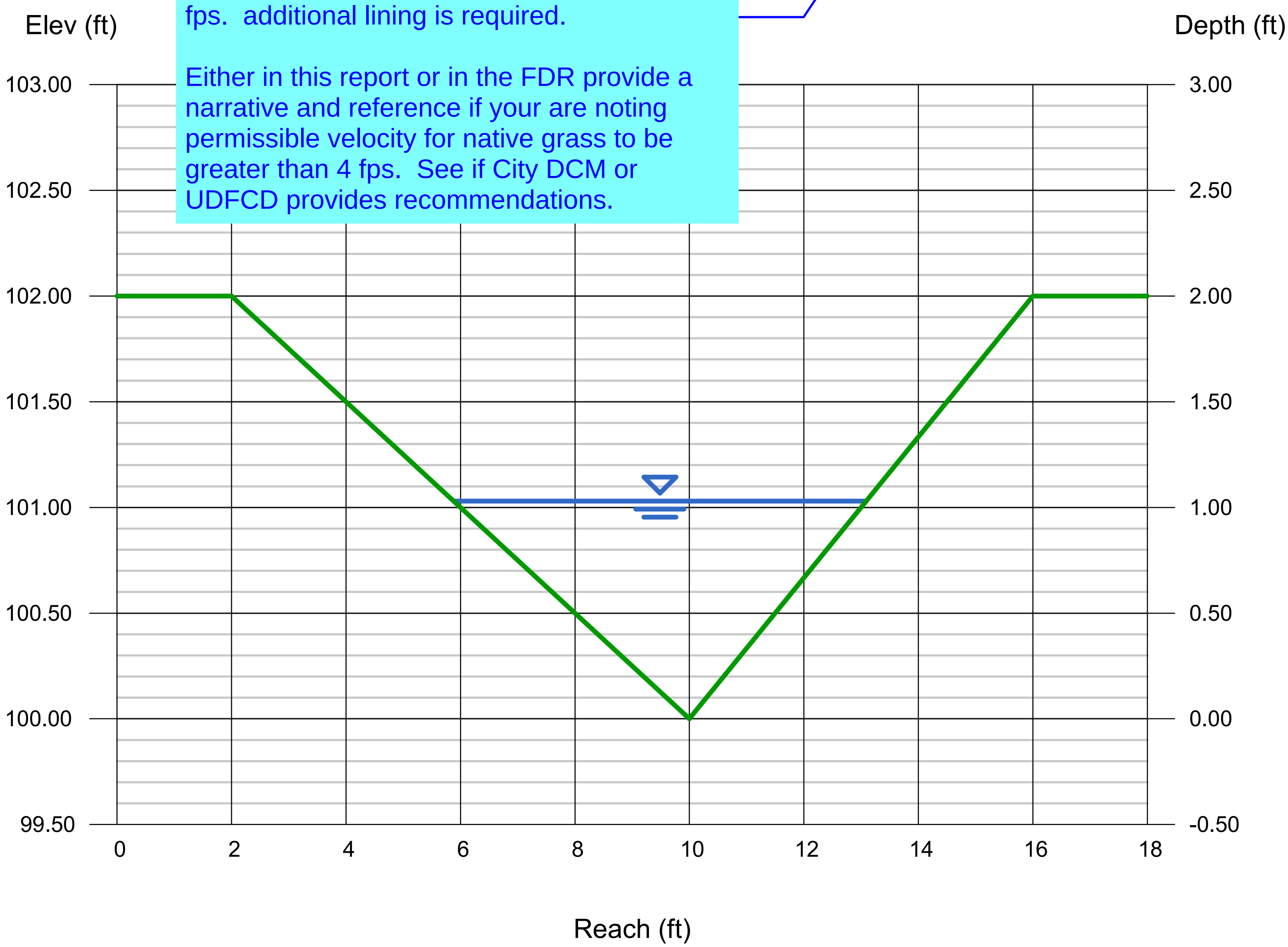
Calculations
Compute by: Known Q
Known Q (cfs) = 16.50

Highlighted
Depth (ft) = 1.03
Q (cfs) = 16.50
Area (sqft) = 3.71
Velocity (ft/s) = 4.44
Wetted Perim (ft) = 7.50
Crit Depth, Yc (ft) = 1.07
Top Width (ft) = 7.21
EGL (ft) = 1.34

FYI: Hydraulic analysis will be reviewed in detail with the final drainage report in conjunction with the construction drawings.

The 4.44 exceeds short native grass which typically have allowable velocities of 3 to 4 fps. additional lining is required.

Either in this report or in the FDR provide a narrative and reference if your are noting permissible velocity for native grass to be greater than 4 fps. See if City DCM or UDFCD provides recommendations.

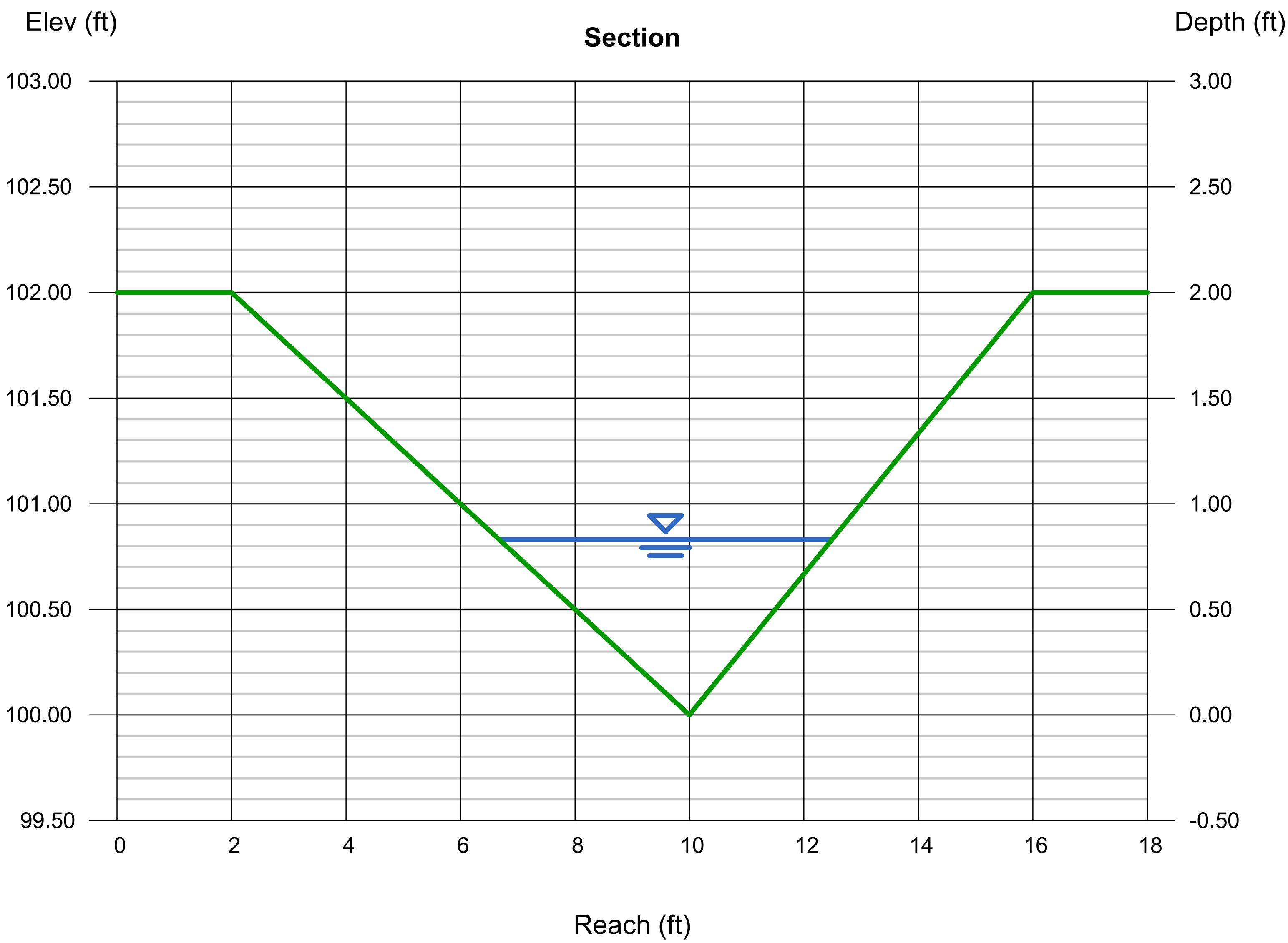


Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Feb 26 2021

Basin A + B ditch 100yr Rundown to Pond

Triangular		**Highlighted**	
Side Slopes (z:1)	= 4.00, 3.00	Depth (ft)	= 0.83
Total Depth (ft)	= 2.00	Q (cfs)	= 17.80
		Area (sqft)	= 2.41
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 7.38
Slope (%)	= 7.60	Wetted Perim (ft)	= 6.05
N-Value	= 0.030	Crit Depth, Yc (ft)	= 1.10
		Top Width (ft)	= 5.81
Calculations		EGL (ft)	= 1.68
Compute by:	Known Q		
Known Q (cfs)	= 17.80		



Channel Report

Channel downstream of emergency overflow

Trapezoidal

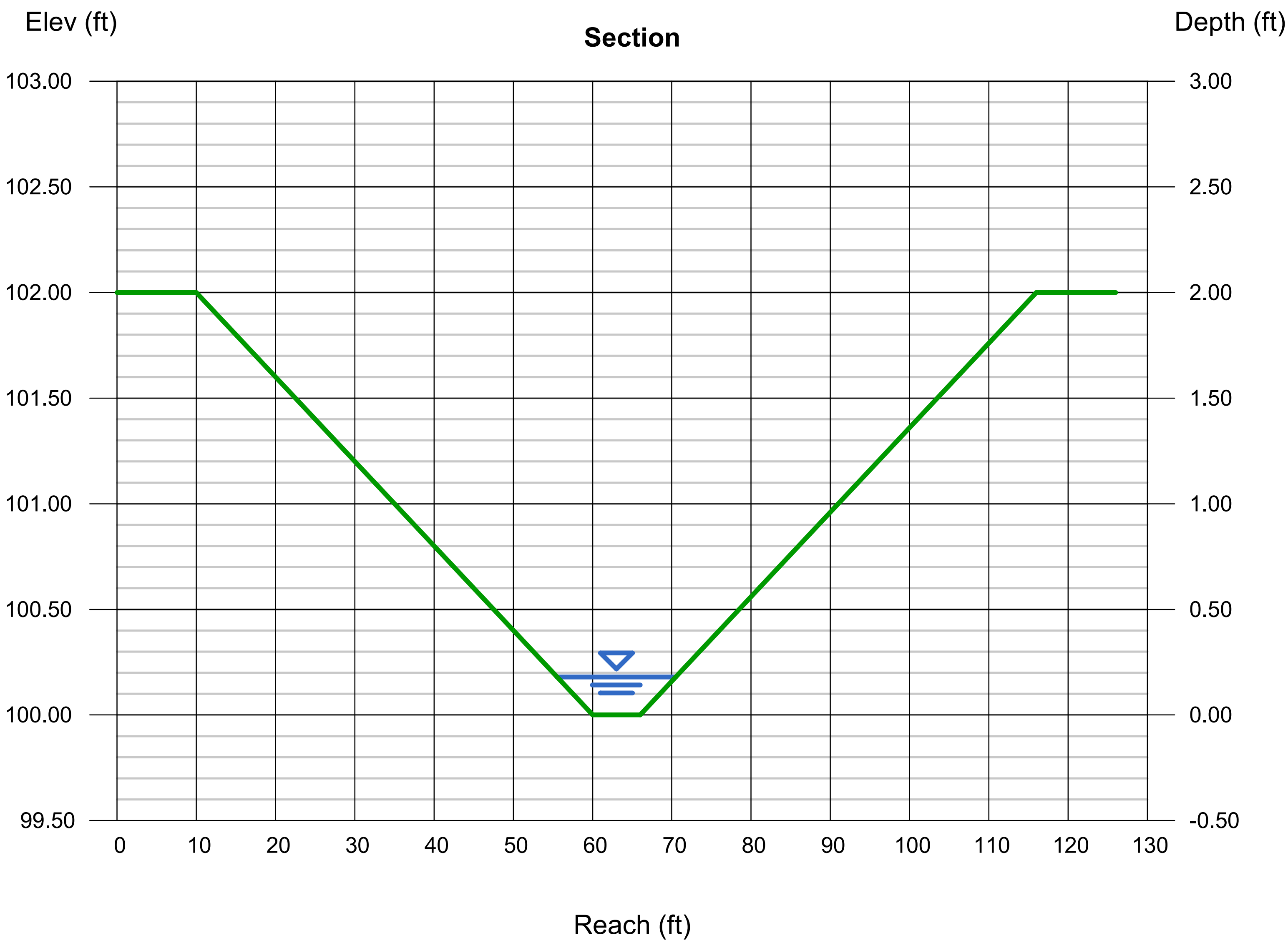
Bottom Width (ft)	=	6.00
Side Slopes (z:1)	=	25.00, 25.00
Total Depth (ft)	=	2.00
Invert Elev (ft)	=	100.00
Slope (%)	=	14.00
N-Value	=	0.030

Calculations

Compute by:		Known Q
Known Q (cfs)	=	8.50

Highlighted

Depth (ft)	=	0.18
Q (cfs)	=	8.500
Area (sqft)	=	1.89
Velocity (ft/s)	=	4.50
Wetted Perim (ft)	=	15.01
Crit Depth, Yc (ft)	=	0.28
Top Width (ft)	=	15.00
EGL (ft)	=	0.49



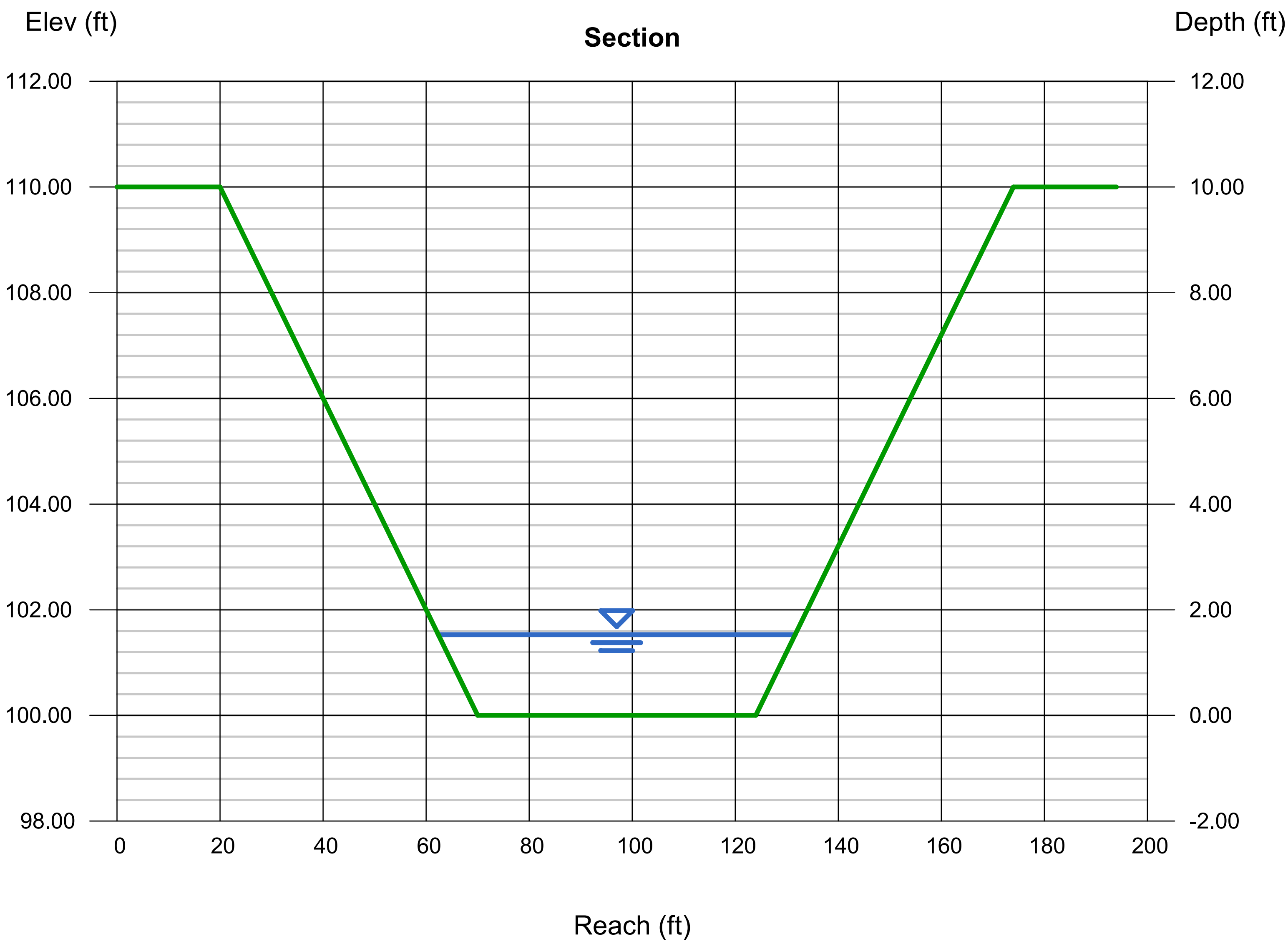
Channel Report

West Existing Channel 1

Trapezoidal
Bottom Width (ft) = 54.00
Side Slopes (z:1) = 5.00, 5.00
Total Depth (ft) = 10.00
Invert Elev (ft) = 100.00
Slope (%) = 0.70
N-Value = 0.035

Calculations
Compute by: Known Q
Known Q (cfs) = 408.00

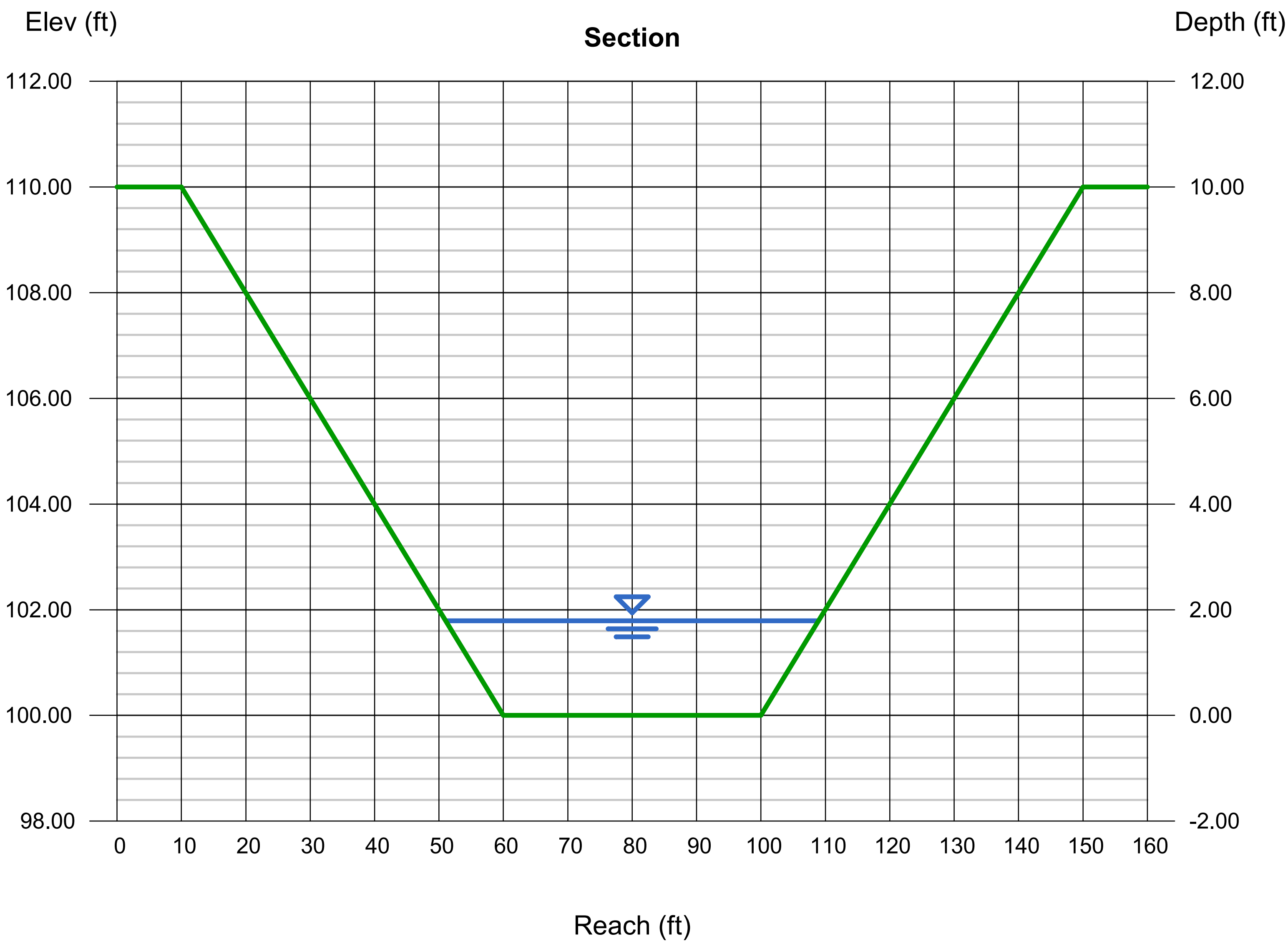
Highlighted
Depth (ft) = 1.53
Q (cfs) = 408.00
Area (sqft) = 94.32
Velocity (ft/s) = 4.33
Wetted Perim (ft) = 69.60
Crit Depth, Yc (ft) = 1.17
Top Width (ft) = 69.30
EGL (ft) = 1.82



Channel Report

West Existing Channel Section 2

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 40.00	Depth (ft)	= 1.79
Side Slopes (z:1)	= 5.00, 5.00	Q (cfs)	= 408.00
Total Depth (ft)	= 10.00	Area (sqft)	= 87.62
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 4.66
Slope (%)	= 0.70	Wetted Perim (ft)	= 58.25
N-Value	= 0.035	Crit Depth, Yc (ft)	= 1.40
		Top Width (ft)	= 57.90
Calculations		EGL (ft)	= 2.13
Compute by:	Known Q		
Known Q (cfs)	= 408.00		



Culvert Report

Basin A + B Pond Access Culvert

Invert Elev Dn (ft)	= 100.00
Pipe Length (ft)	= 15.00
Slope (%)	= 2.00
Invert Elev Up (ft)	= 100.30
Rise (in)	= 24.0
Shape	= Circular
Span (in)	= 24.0
No. Barrels	= 1
n-Value	= 0.022
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

Embankment

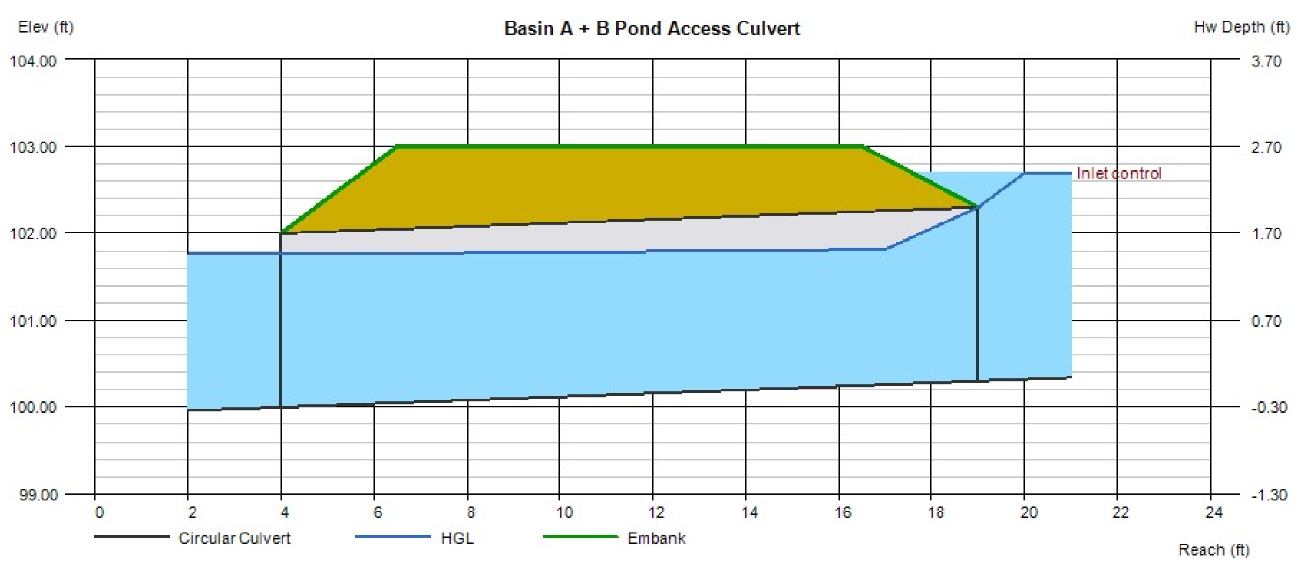
Top Elevation (ft)	= 103.00
Top Width (ft)	= 10.00
Crest Width (ft)	= 10.00

Calculations

Qmin (cfs)	= 17.80
Qmax (cfs)	= 17.80
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 17.80
Qpipe (cfs)	= 17.80
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 6.08
Veloc Up (ft/s)	= 6.93
HGL Dn (ft)	= 101.76
HGL Up (ft)	= 101.82
Hw Elev (ft)	= 102.70
Hw/D (ft)	= 1.20
Flow Regime	= Inlet Control



Culvert Report

18inch Culvert

Invert Elev Dn (ft)	=	100.00
Pipe Length (ft)	=	40.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	100.40
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Rough tapered inlet throat
Coeff. K,M,c,Y,k	=	0.519, 0.64, 0.021, 0.9, 0.5

Embankment

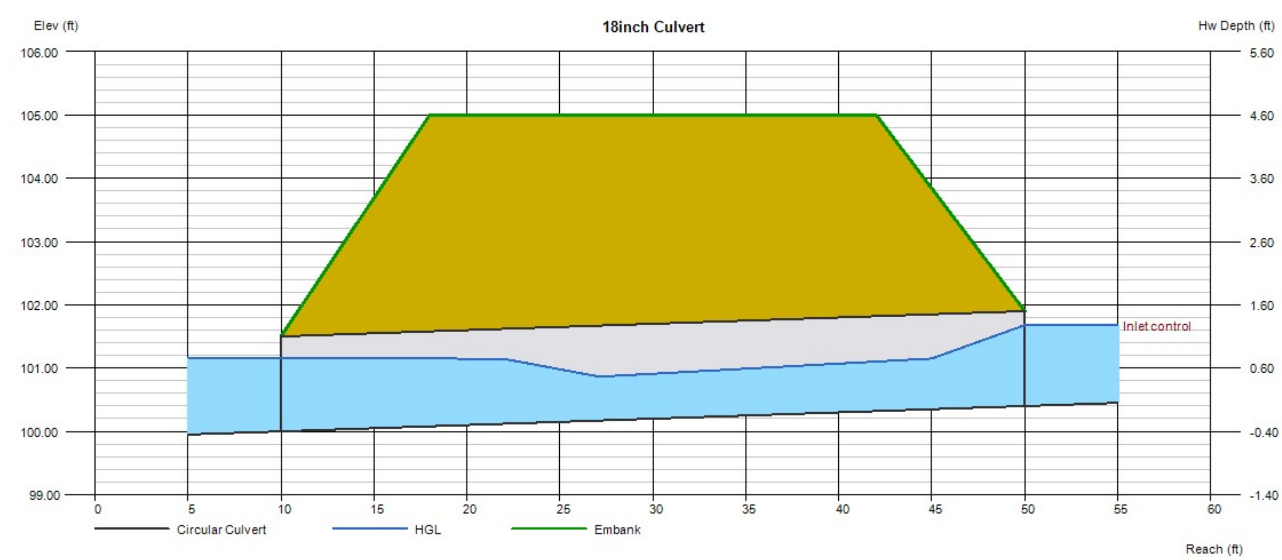
Top Elevation (ft)	=	105.00
Top Width (ft)	=	24.00
Crest Width (ft)	=	150.00

Calculations

Qmin (cfs)	=	4.70
Qmax (cfs)	=	4.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.70
Qpipe (cfs)	=	4.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.19
Veloc Up (ft/s)	=	4.67
HGL Dn (ft)	=	101.17
HGL Up (ft)	=	101.23
Hw Elev (ft)	=	101.68
Hw/D (ft)	=	0.85
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Oct 28 2019

Triple 48inch Culverts

Invert Elev Dn (ft)	=	100.00
Pipe Length (ft)	=	50.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	100.50
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	3
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Rough tapered inlet throat
Coeff. K,M,c,Y,k	=	0.519, 0.64, 0.021, 0.9, 0.5

Embankment

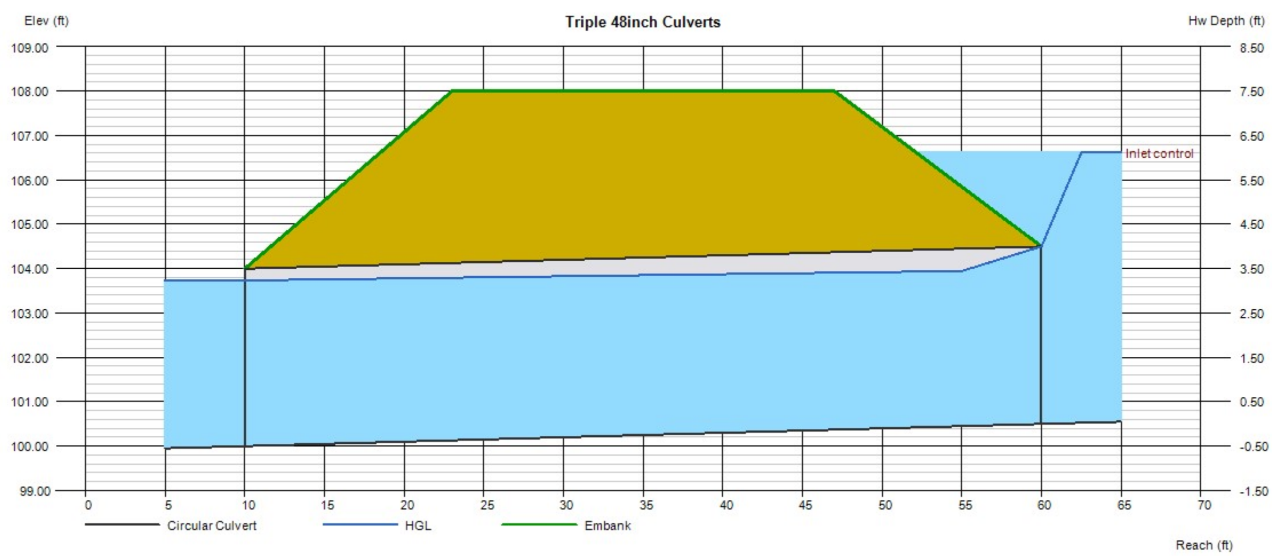
Top Elevation (ft)	=	108.00
Top Width (ft)	=	24.00
Crest Width (ft)	=	150.00

Calculations

Qmin (cfs)	=	408.00
Qmax (cfs)	=	408.00
Tailwater Elev (ft)	=	(dc+D)/2

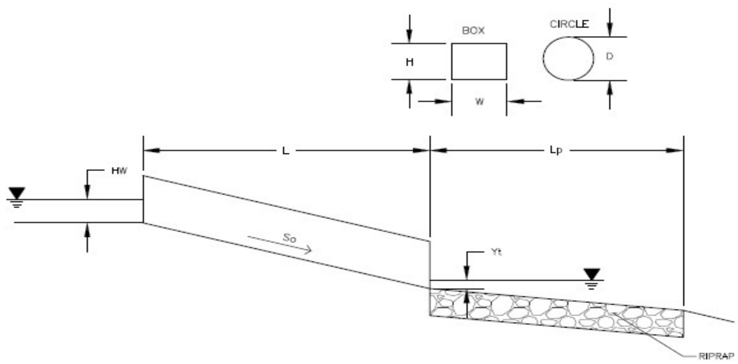
Highlighted

Qtotal (cfs)	=	408.00
Qpipe (cfs)	=	408.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	11.14
Veloc Up (ft/s)	=	11.75
HGL Dn (ft)	=	103.74
HGL Up (ft)	=	103.97
Hw Elev (ft)	=	106.62
Hw/D (ft)	=	1.53
Flow Regime	=	Inlet Control



Determination of Culvert Headwater and Outlet Protection

Project: JeniShay Farms
Basin ID: Triple 48" Culvert Outfall



Soil Type:
Choose One:
(●) Sandy
( ) Non-Sandy

Supercritical Flow! Using Da to calculate protection type.

Design Information (Input):

Design Discharge	Q =	408	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	48	inches
Inlet Edge Type (Choose from pull-down list)		Grooved End Projection	
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	Height (Rise) =		ft
Barrel Width (Span) in Feet	Width (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	No =	3	
Inlet Elevation	Elev IN =	100.5	ft
Outlet Elevation **OR** Slope	Elev OUT =	100	ft
Culvert Length	L =	50	ft
Manning's Roughness	n =	0.012	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	Elev Y_t =	103.75	ft
Max Allowable Channel Velocity	V =	5	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	3.75	ft
Flow Area at Max Channel Velocity	A_t =	27.20	ft^2
Culvert Cross Sectional Area Available	A =	12.57	ft^2
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.21	
Sum of All Losses Coefficients	k_s =	1.41	ft
Culvert Normal Depth	Y_n =	2.89	ft
Culvert Critical Depth	Y_c =	3.47	ft
Tailwater Depth for Design	d =	3.74	ft
Adjusted Diameter **OR** Adjusted Rise	D_a =	3.44	ft
Expansion Factor	1/(2*tan(Θ)) =	6.31	
Flow/Diameter$^{2.5}$ **OR** Flow/(Span * Rise$^{1.5}$)	Q/D^2.5 =	4.25	$ft^{0.5}/s$
Froude Number	Fr =	1.50	**Supercritical!**
Tailwater/Adjusted Diameter **OR** Tailwater/Adjusted Rise	Yt/D =	1.09	
Inlet Control Headwater	HW_I =	6.44	ft
Outlet Control Headwater	HW_O =	5.80	
Design Headwater Elevation	**HW =**	**106.94**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.61**	**HW/D > 1.5!**
Minimum Theoretical Riprap Size	d_{50} =	5	in
Nominal Riprap Size	d_{50} =	6	in
UDFCD Riprap Type	**Type =**	**VL**	
Length of Protection	**L_p =**	**21**	**ft**
Width of Protection	**T =**	**8**	**ft**

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer:
Company:
Date:
Project:
Location:

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.19	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.47	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event	2.47	
Max Intensity for Optional User Defined Storm	2.46506		

Provide a summary discussion of the LID worksheet assumption/results. Where was this applied to? The UD-Detention worksheet does not appear to use the site effective imperviousness.

Include an exhibit showing the UIA, RPA, SPA, A1 and A2 areas

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	A1	A2	B
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.832	3.338	0.951
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.254
Unconnected Impervious Area (UIA, acres)	0.542	0.514	0.259
Receiving Pervious Area (RPA, acres)	0.290	0.768	0.132
Separate Pervious Area (SPA, acres)	0.000	2.056	0.306
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0.832	3.338	0.951
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	26.7%
Unconnected Impervious Area (UIA, %)	65.1%	15.4%	27.2%
Receiving Pervious Area (RPA, %)	34.9%	23.0%	13.9%
Separate Pervious Area (SPA, %)	0.0%	61.6%	32.2%
A_R (RPA / UIA)	0.535	1.494	0.510
I_a Check	0.650	0.400	0.660
f / I for WQCV Event:	1.7	1.7	1.7
f / I for 5-Year Event:	0.5	0.5	0.5
f / I for 100-Year Event:	0.3	0.3	0.3
f / I for Optional User Defined Storm CUHP:	0.31	0.31	0.31
IRF for WQCV Event:	0.00	0.00	0.00
IRF for 5-Year Event:	0.92	0.86	0.92
IRF for 100-Year Event:	0.97	0.91	0.97
IRF for Optional User Defined Storm CUHP:	0.97	0.91	0.97
Total Site Imperviousness: I_{total}	65.1%	15.4%	53.9%
Effective Imperviousness for WQCV Event:	0.0%	0.0%	26.7%
Effective Imperviousness for 5-Year Event:	59.8%	13.2%	51.8%
Effective Imperviousness for 100-Year Event:	63.2%	14.0%	53.2%
Effective Imperviousness for Optional User Defined Storm CUHP:	63.2%	14.0%	53.2%

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	2.9%	10.1%	1.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:	3.6%	5.7%	1.4%											

Total Site Imperviousness:	**30.6%**
Total Site Effective Imperviousness for WQCV Event:	**5.0%**
Total Site Effective Imperviousness for 5-Year Event:	**28.0%**
Total Site Effective Imperviousness for 100-Year Event:	**29.3%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	**29.3%**

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

JeniShay Farms
(Forebay Calculations)

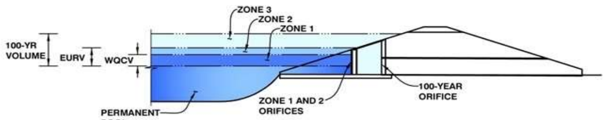
WQCV Equation			
WQCV = a(0.91*(I)^3 - 1.19*I^2 + 0.78*I)			
(per UDFCD eq 3-1)	Solve	WQCV = water quality capture volume (watershed inches)	
	1	a = 40-hr drain time coefficient (per UDFCD Vol 3 Table 3-2)	
	0.306	I = imperviousness (%/100) (per imperviousness calculations)	
	Solution =	**0.15**	
Water Quality Capture Volume Required			
V = (WQCV/12)*A	Solve	V = required storage volume (acre-ft)	
(per UDFCD eq 3-3)	0.15	WQCV = water quality capture volume (watershed inches)	
	5.13	A = tributary watershed area (acre)	
	Solution =	**0.066**	acre-ft
	Solution =	**2855**	ft^3
Water Quality Capture Volume Required (per UDFCD: Basins 5 to 20 acres = 3%)			
V = (WQCV*.03)	Solve	V = required storage volume (ft^3), minimum	
	2855	WQCV Required (ft^3)	
	Solution =	**85.7**	ft^3 - *Minimum*
	Solution =	**95.0**	ft^3 - *Per geometric design*
Peak Release Rate			
Q = V/T	Solve	Q = peak release rate (ft^3/s)	
	95.0	V = required storage volume (ft^3)	
	300	T = 5 minute drain time (s)	
	Solution =	**0.317**	ft^3/s
Area of Orifice			
Ao = Q/(Cd*2*g*h)	Solve	Ao = area of orifice (ft^2)	
(orifice equation)	0.317	Q = peak release rate (ft^3/s)	
	0.6	Cd = coefficient of discharge	
	32.17	g = gravitational constant (ft/s)^2	
	1.5	h = head (ft) - *per forebay design depth*	
	Solution =	**0.00547**	(ft^2)
	Solution =	**0.7875**	(in^2)
Release Pipe Size			
D = (4*A)/pi)^2	Solve	D = diameter of pipe (in)	
	0.7875	Ao = area of orifice (in^2)	
	3.1416	pi	
	Solution =	**1.01**	(in)
Release Pipe Size (8" Minimum)			
	Solution =	**8.00**	(in)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: **Fox Creek Estates**

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	5.13	acres
Watershed Length =	950	ft
Watershed Length to Centroid =	450	ft
Watershed Slope =	0.047	ft/ft
Watershed Imperviousness =	30.60%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	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) =	0.066	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.161	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.92 in.) =	0.096	acre-feet	0.92	inches
5-yr Runoff Volume (P1 = 1.19 in.) =	0.153	acre-feet	1.19	inches
10-yr Runoff Volume (P1 = 1.44 in.) =	0.231	acre-feet	1.44	inches
25-yr Runoff Volume (P1 = 1.82 in.) =	0.413	acre-feet	1.82	inches
50-yr Runoff Volume (P1 = 2.13 in.) =	0.539	acre-feet	2.13	inches
100-yr Runoff Volume (P1 = 2.47 in.) =	0.706	acre-feet	2.47	inches
500-yr Runoff Volume (P1 = 3.36 in.) =	1.089	acre-feet	3.36	inches
Approximate 2-yr Detention Volume =	0.089	acre-feet		
Approximate 5-yr Detention Volume =	0.131	acre-feet		
Approximate 10-yr Detention Volume =	0.197	acre-feet		
Approximate 25-yr Detention Volume =	0.253	acre-feet		
Approximate 50-yr Detention Volume =	0.277	acre-feet		
Approximate 100-yr Detention Volume =	0.338	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.066	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.096	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.177	acre-feet
Total Detention Basin Volume =	0.338	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = 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	--	--	--	485	0.011		
	--	0.50	--	--	--	748	0.017	308	0.007
7443	--	1.00	--	--	--	1,050	0.024	758	0.017
	--	1.50	--	--	--	1,426	0.033	1,377	0.032
7444	--	2.00	--	--	--	1,945	0.045	2,219	0.051
	--	2.50	--	--	--	2,598	0.060	3,355	0.077
7445	--	3.00	--	--	--	2,976	0.068	4,749	0.109
	--	3.50	--	--	--	3,524	0.081	6,374	0.146
7446	--	4.00	--	--	--	4,258	0.098	8,319	0.191
	--	4.50	--	--	--	4,930	0.113	10,616	0.244
7447	--	5.00	--	--	--	5,787	0.133	13,295	0.305
	--	5.50	--	--	--	6,340	0.146	16,327	0.375
7448	--	6.00	--	--	--	7,480	0.172	19,782	0.454
7448.9	--	6.90	--	--	--	8,711	0.200	27,068	0.621
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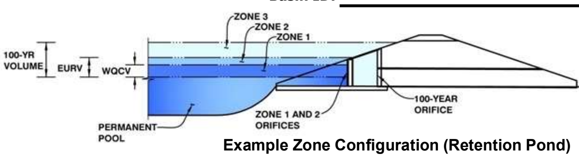
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: Fox Creek Estates

Basin ID:



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.30	0.066	Orifice Plate
Zone 2 (EURV)	3.68	0.096	Orifice Plate
Zone 3 (100-year)	5.25	0.177	Weir&Pipe (Restrict)
Total (all zones)		0.338	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Calculated Parameters for Plate

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	3.68	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	14.60	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.23	2.45					
Orifice Area (sq. inches)	0.47	0.17	0.17					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.68	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.31	N/A	feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	2.58	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	15.39	N/A	
Horiz. Length of Weir Sides =	2.50	N/A	feet	Overflow Grate Open Area w/o Debris =	7.22	N/A	ft^2
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	3.61	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.47	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.27	N/A	feet
Restrictor Plate Height Above Pipe Invert =	5.60		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.18	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage=	4.91	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.56	feet
Spillway Crest Length =	5.40	feet	Stage at Top of Freeboard =	6.47	feet
Spillway End Slopes =	3.00	H:V	Basin Area at Top of Freeboard =	0.19	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.54	acre-ft

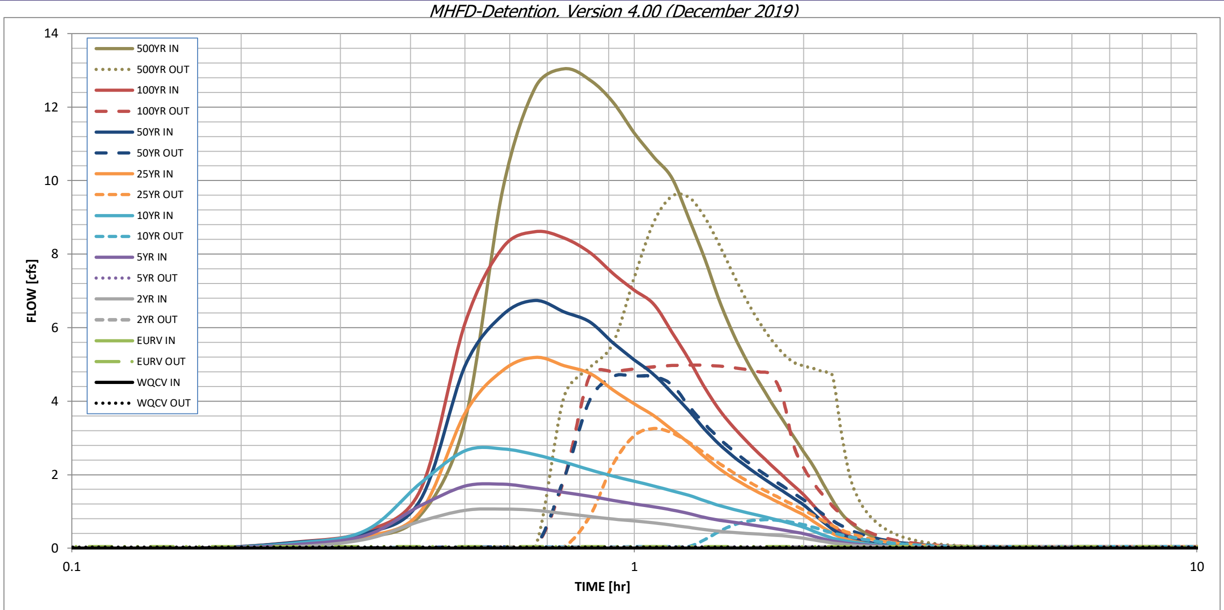
Routed Hydrograph Results

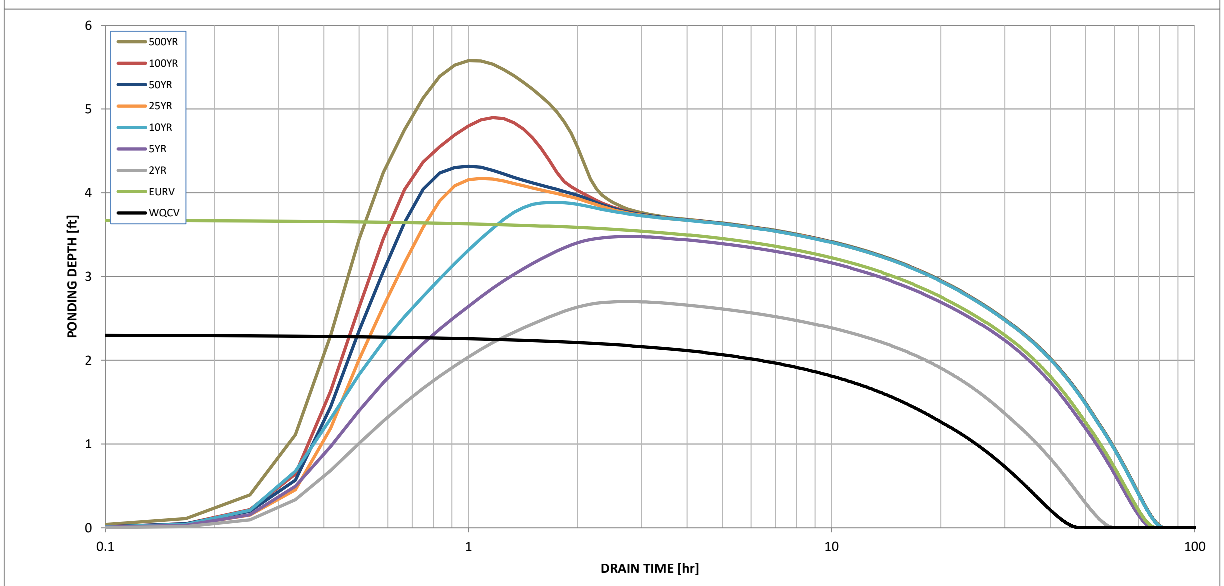
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

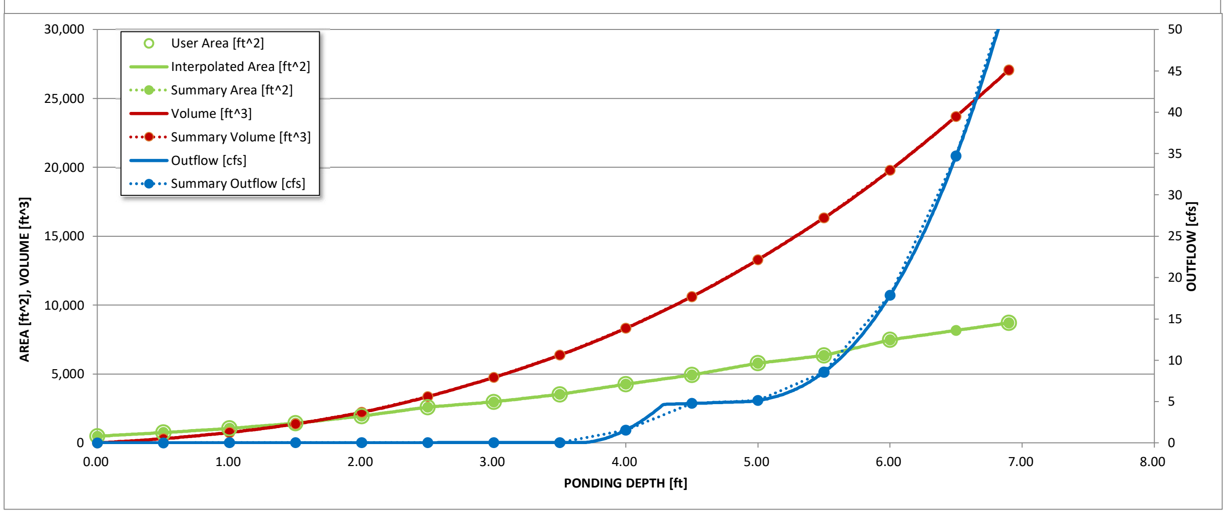
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.92	1.19	1.44	1.82	2.13	2.47	3.36
CUHP Runoff Volume (acre-ft) =	0.066	0.161	0.096	0.153	0.231	0.413	0.539	0.706	1.089
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.096	0.153	0.231	0.413	0.539	0.706	1.089
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.4	1.1	3.2	4.4	6.1	9.7
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.07	0.22	0.62	0.86	1.19	1.89
Peak Inflow Q (cfs) =	N/A	N/A	1.1	1.7	2.7	5.2	6.7	8.6	13.0
Peak Outflow Q (cfs) =	0.0	0.0	0.0	0.0	0.8	3.3	4.7	5.0	10.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.7	1.0	1.1	0.8	1.1
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.4	0.6	0.7	0.7
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	41	67	52	66	68	63	60	56	49
Time to Drain 99% of Inflow Volume (hours) =	**44**	72	55	71	75	72	70	68	65
Maximum Ponding Depth (ft) =	2.31	3.68	2.70	3.48	3.89	4.17	4.32	4.90	5.33
Area at Maximum Ponding Depth (acres) =	0.05	0.09	0.06	0.08	0.09	0.10	0.11	0.13	0.14
Maximum Volume Stored (acre-ft) =	0.066	0.161	0.089	0.144	0.179	0.208	0.223	0.291	0.350

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







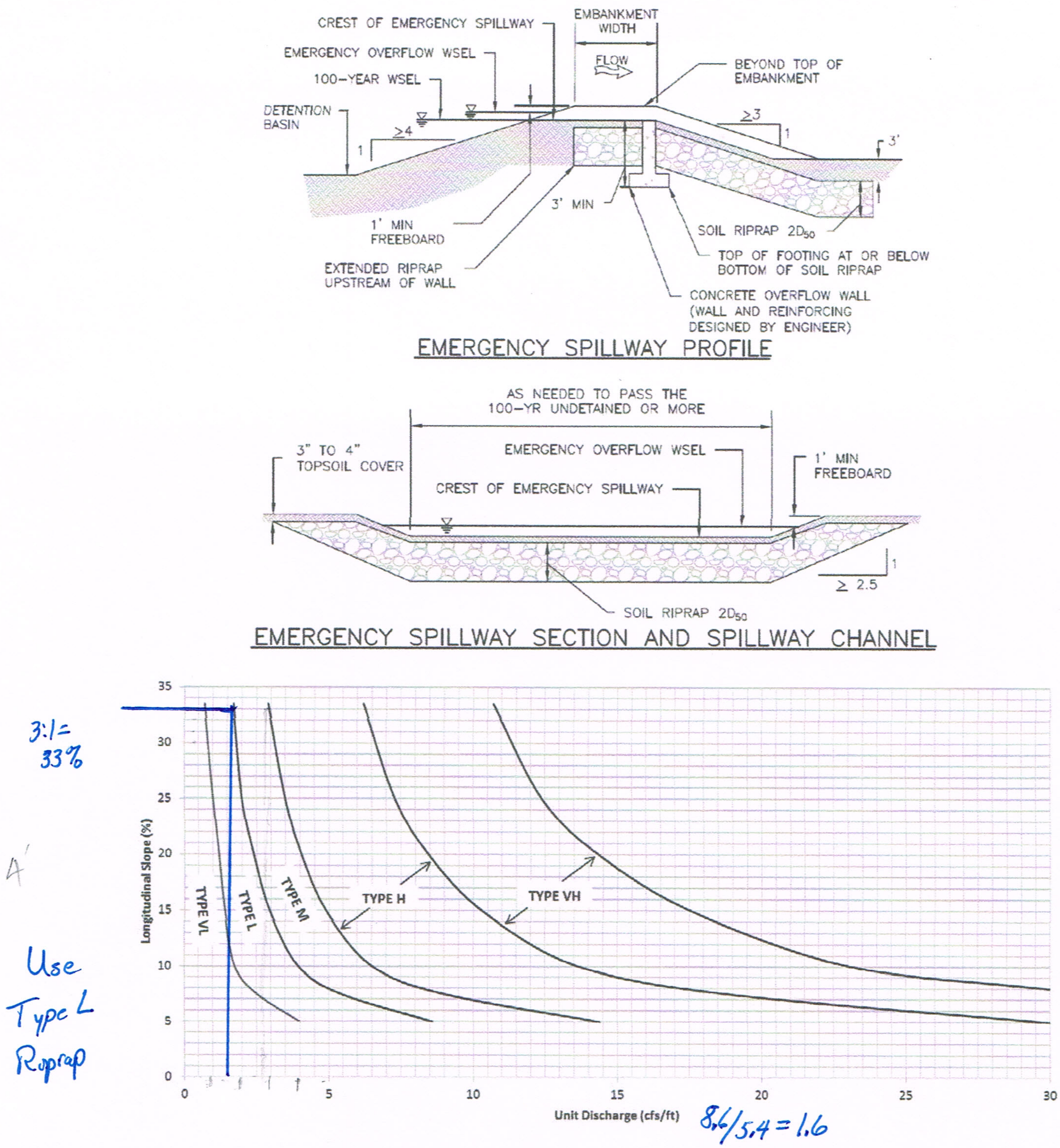
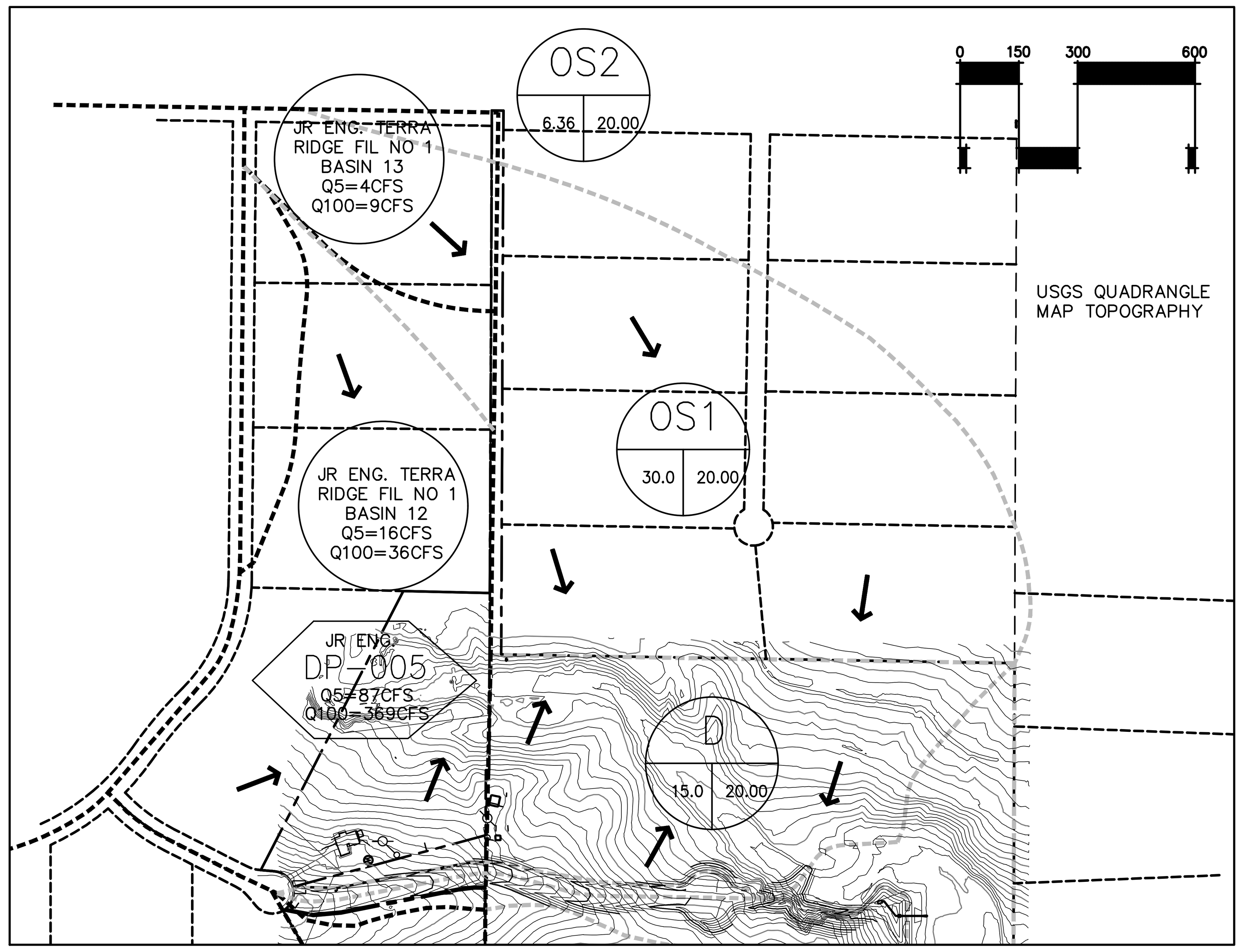
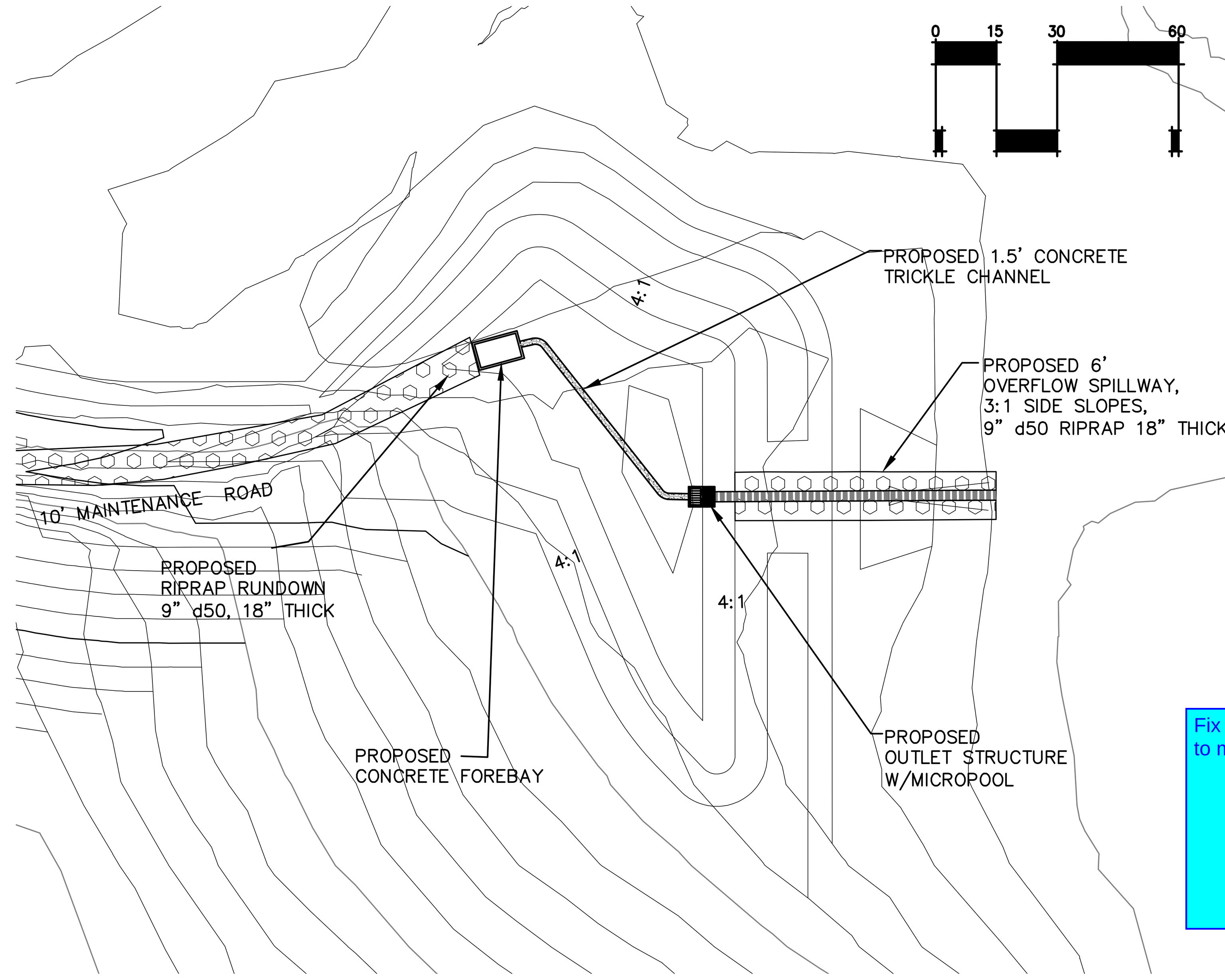


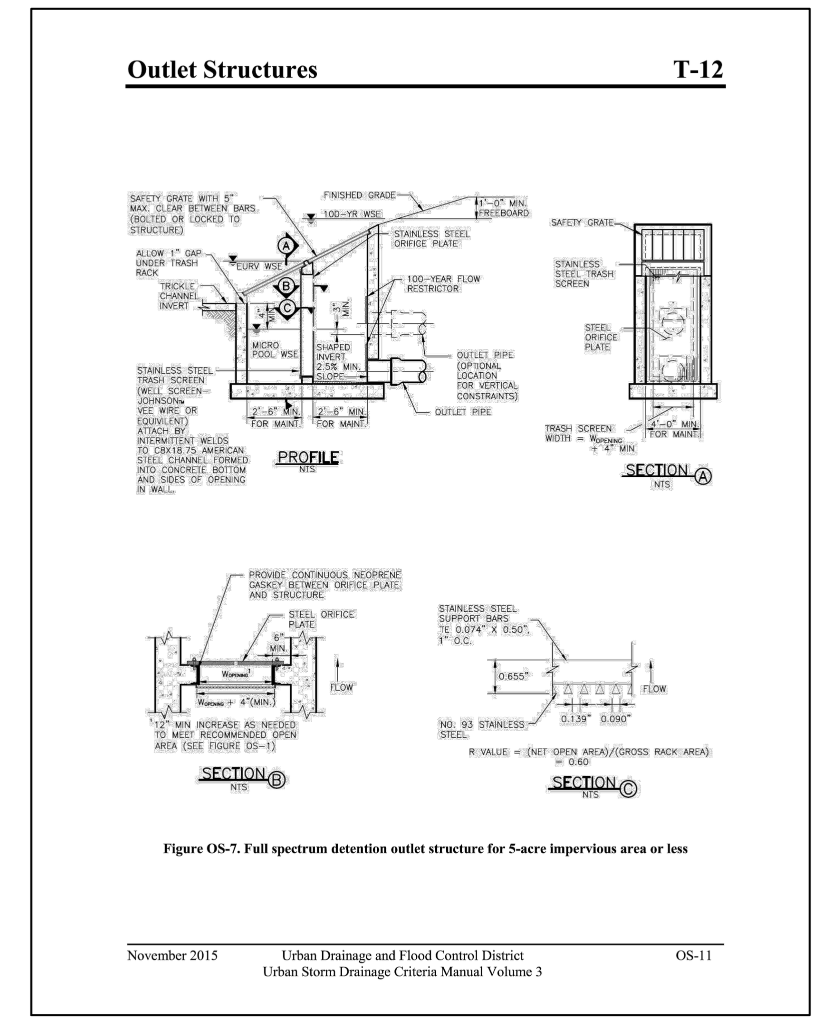
Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)



OFF-SITE BASINS
1"=300'

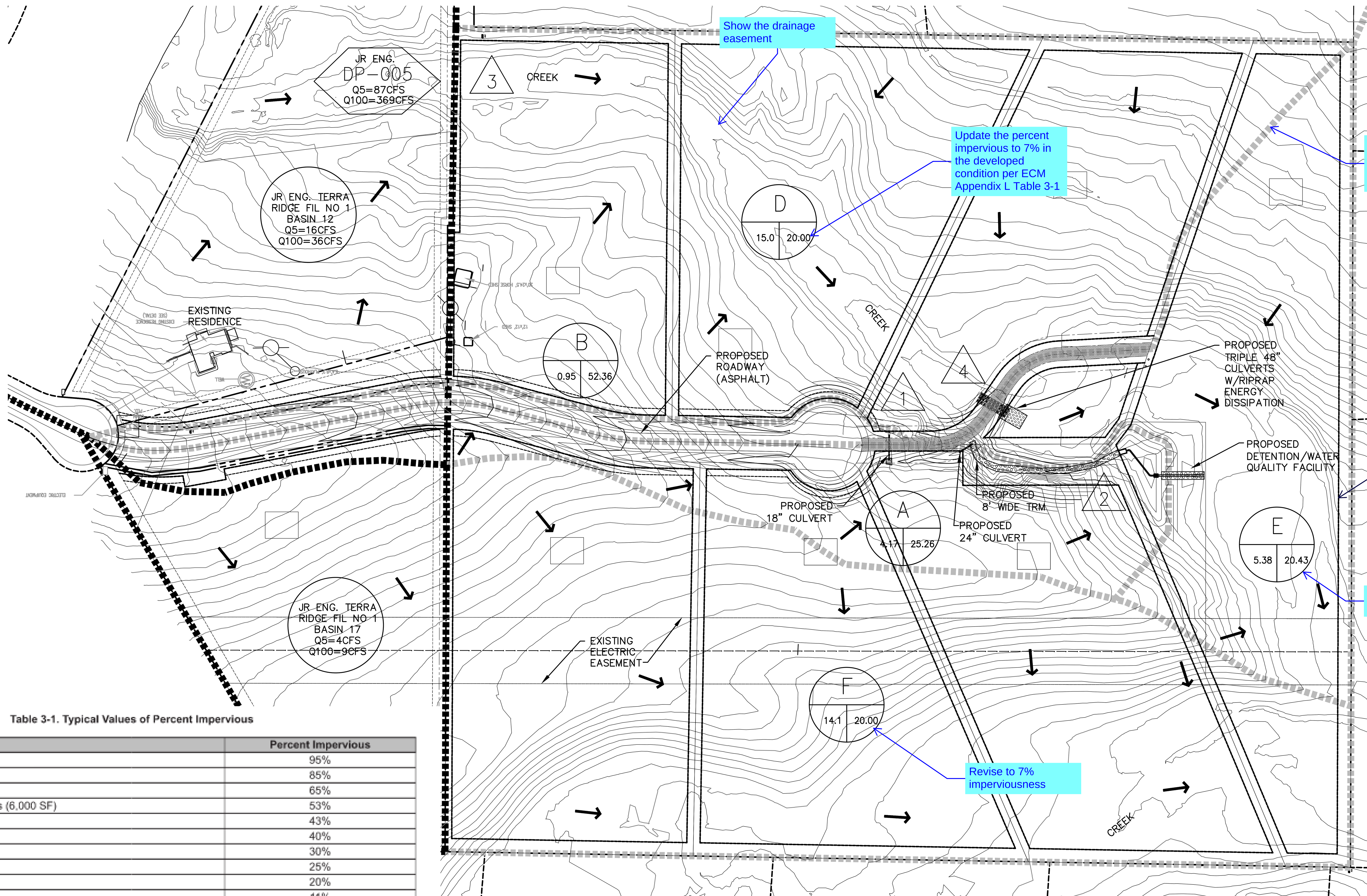


DETENTION/WATER QUALITY FACILITY
1"=30'



Fix existing contour line type to match the legend.

NORTH



Add an ultimate DP on both the existing and proposed drainage map.
Developed condition flow at this point must be equal to or less than historic.
[Unresolved]

Table 3-1. Typical Values of Percent Impervious

Type of Development	Percent Impervious
Commercial	95%
Industrial	85%
Multi-Family	65%
Single Family - 0.1377 acre lots (6,000 SF)	53%
Single-Family - 0.20 acre lots	43%
Single-Family - 0.25 acre lots	40%
Single-Family - 0.33 acre lots	30%
Single-Family - 0.5 acre lots	25%
Single-Family - 1.0 acre lots	20%
Single-Family - 2.5 acre lots	11%
Single-Family - 5 acre lots	7%

The total impervious area may also be determined from direct measurement made by the developer. A developer

ON-SITE BASINS
1"=100'

LEGEND

A / 1.25 / 1.25	BASIN ID; % IMPERVIOUS; AREA (ACRES)
△ 1	DESIGN POINT
▪▪▪▪▪	DRAINAGE BASIN BOUNDARY
- - - -	EXISTING CONTOUR (2')
———	PROPOSED CONTOUR (2')
→	SURFACE FLOW DIRECTION

RUNOFF COEFFICIENT SUMMARY

BASIN	AREA (ACRES)	C5	C100
A	4.17	0.25	0.48
B	0.95	0.48	0.65
C	N/A	N/A	N/A
D	15.02	0.20	0.44
E	5.38	0.20	0.44
F	14.13	0.20	0.44
OS1	30.00	0.20	0.44
OS2	6.36	0.20	0.44

RUNOFF SUMMARY

DESIGN POINT	Q5	Q100
1	2.1	4.7
2	5.8	17.3
3	86.3	369.0
4	99.0	408.0

WATER QUALITY/DETENTION SUMMARY

FACILITY TYPE	EXTENDED DET. BASIN
WQCV	0.066 ACRE-FT
EURV	0.161 ACRE-FT
100-YR STORAGE REQUIRED	0.338 ACRE-FT
100-YR STORAGE PROVIDED	0.454 ACRE-FT
100-YR PEAK OUTFLOW Q	5.0 CFS

LODESTAR ENGINEERING, LLC
FORENSICS, CIVIL, DRAINAGE, LAND DEVELOPMENT
COLORADO SPRINGS CO 80908

ISSUED 10/28/19
REVISIONS

JENISHAY FARMS
TOWN OF BLACK FOREST
EL PASO COUNTY, COLORADO

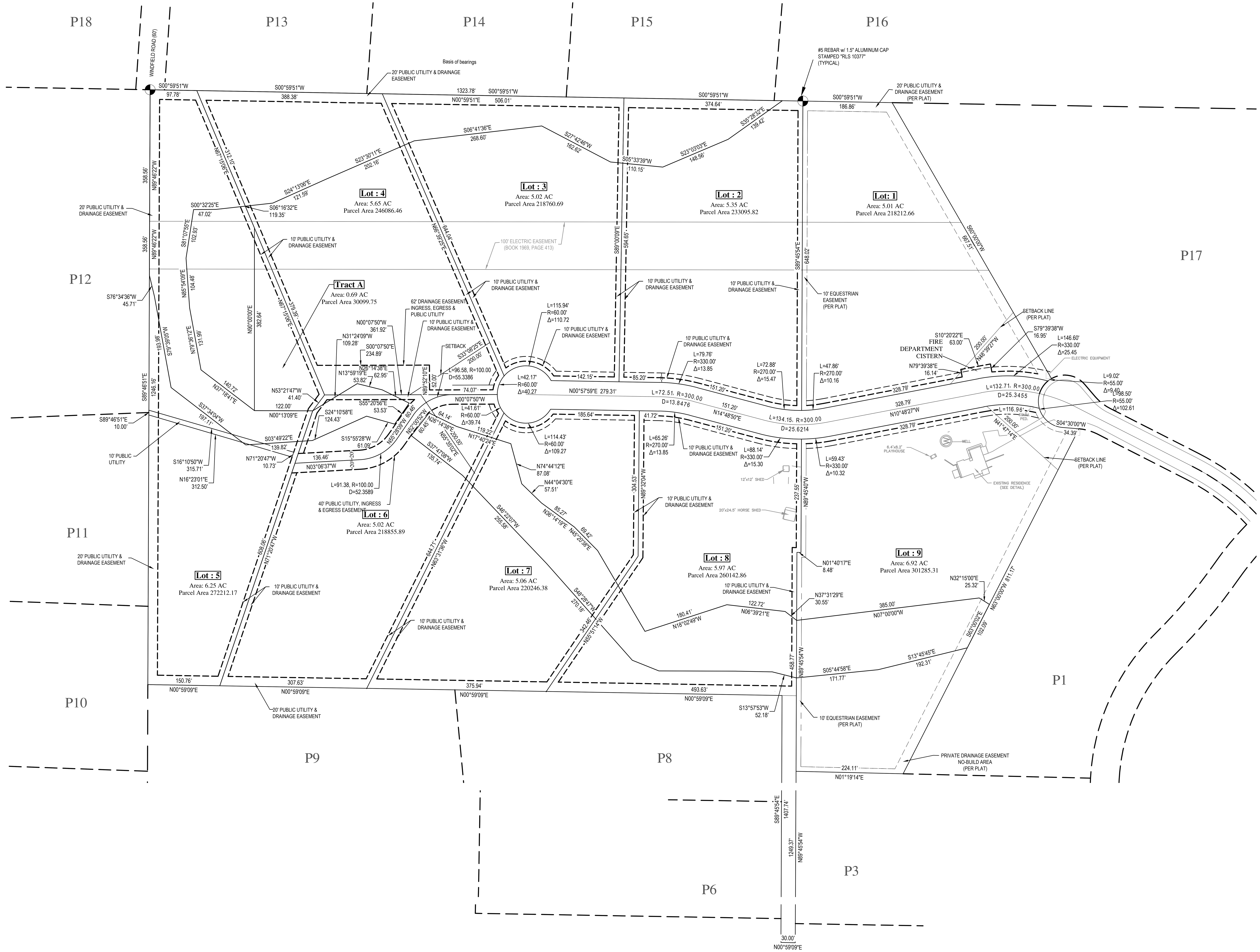
DRAINAGE PLAN

D1
SHEET NO.

Preliminary Plat
JENISHAY FARMS

Remove sheet

Title Vacation & Replat of Lots 5 and 6, Terra Ridge Filing No. 1, Together with 7 Lots in JeniShay Farms
A Portion of Section 29, Township 11 South, Range 65 West of the 6th P.M., El Paso County, Colorado



As Replatted

ADJACENT PROPERTY DESCRIPTION	
P1	Not a part of this subdivision Robb Peters 51293--02-004 Lot 4, Terra Ridge Fil. No 1 Zoned RR-5
P2	Not a part of this subdivision Mark Davis 51293--02-003 Lot 3, Terra Ridge Fil. No 1 Zoned RR-5
P3	Not a part of this subdivision Justin Sumpter 51293--02-002 Lot 2, Terra Ridge Fil. No 1 Zoned RR-5
P4	Not a part of this subdivision Eric Mikuska 51293--02-001 Lot 1, Terra Ridge Fil. No 1 Zoned RR-5
P5	Not a part of this subdivision Diana Gard 51293--01-008 Lot 8, Whispering Hills Estates Zoned RR-5
P6	Not a part of this subdivision Rhonda Barr 51293--01-007 Lot 7, Whispering Hills Estates Zoned RR-5
P7	Not a part of this subdivision Christopher Humlicek 51293--01-006 Lot 6, Whispering Hills Estates Zoned RR-5
P8	Not a part of this subdivision David Khaliqi 51293--01-005 Lot 5, Whispering Hills Ests Zoned RR-5
P9	Not a part of this subdivision Todd Andrews 51293--01-004 Lot 4, Whispering Hills Ests Zoned RR-5
P10	Not a part of this subdivision Richard Martinez 51290--04-013 Lot 8, Ridgeview Acres Zoned RR-5
P11	Not a part of this subdivision Temmer Family Trust 51290--04-012 Lot 7, Ridgeview Acres Zoned RR-5
P12	Not a part of this subdivision Kimberly Tebrugge 51290--04-011 Lot 6, Ridgeview Acres Zoned RR-5
P13	Not a part of this subdivision Roy & Julie Heare 51290--05-002 Lot 148, Wildwood Village Unit 3 Zoned RR-5
P14	Not a part of this subdivision David Porter 51290--05-001 Lot 149, Wildwood Village Unit 3 Zoned RR-5
P15	Not a part of this subdivision Paul Gavin 51290--05-001 Lot 149, Wildwood Village Unit 3 Zoned RR-5
P16	Not a part of this subdivision Edwin Bedford 51290--05-004 Lot 151, Wildwood Village Unit 4 Zoned RR-5
P17	Not a part of this subdivision Hugo Oregel 51293--02-007 Lot 1, Terra Ridge Fil No. 2 Zoned RR-5
P18	Not a part of this subdivision Ricardo Torres 51290--04-001 Lot 147, Wildwood Village Unit No 3 Zoned RR-5

NOTES:

All points found indicated by -- -- are as shown on plat.

All points set indicated by -- -- are rebar with attached Surveyor's cap mkd "PLS 23890" unless otherwise shown on plat.

All measured, used or pro-rated information indicated by S0°12'10"E–518.51'.

All record information indicated by (S0°12'10"E–518.90').

All bearings are relative to the east line of JeniShay Farms as monumented and shown, and was asumed S00°12'10"E.

All reasearch for recorded easements or rights-of-way was done by EmpireTitle of Colorado Springs, LLC., File No. 54837ECS, dated: May 29, 2018.