DRAINAGE REPORT
FOR
ASPHALT CONCRETE RECYCLING
(TRACT 6 & 10 VALLEY GARDENS SUBDIVISION)

Asphalt Concrete Recycling, LLC
705 Crestfield Grove
Colorado Springs, CO 80906
(719) 210-9460
Contact: Duane Hays

March 23, 2020
Project No. 25176.00

Prepared By:
JR Engineering, LLC
5475 Tech Center Drive
Colorado Springs, CO 80919
719-593-2593

El Paso County PCD File No. PPR-19-052

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

COLORADO LICENSED MIKE BRAMLETT MB 32314 5/21/20 PROFESSIONAL ENGINEER

Mike Bramlett, Colorado P.E. # 32314
For and On Behalf of JR Engineering, LLC

5/21/20
Date

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

Business Name: Asphalt Concrete Recycling, Inc.

By:

Title: Member

Address: 235 S Franceville Coal Mine
Colorado Springs, CO 80929

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

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

Date

Conditions:

CONTENTS

PURPOSE

This document is the Drainage Report for Tract 6 and 10 of the existing Valley Gardens subdivision, County of El Paso, State of Colorado. Tract 6 and 10 are being developed together for the purpose of running a concrete and asphalt recycling facility. The land was previously vacant and undeveloped. However, this report has been prepared to reflect the proposed and intended use of the site, as an asphalt and concrete recycling facility. The purpose of this report is to:

1. Identify on-site and off-site drainage patterns.
2. Recommend storm water facilities to collect and convey storm runoff from the proposed development to appropriate discharge and/or retention locations.
3. Recommend water quality and detention facilities to control discharge release rates to below historic.
4. Demonstrate compliance with surrounding major drainage basin planning studies, master development drainage plans and flood insurance studies.

GENERAL LOCATION AND DESCRIPTION

Location

The subject site is approximately 13.21 acres and located approximately 600 feet southwest of the intersection of Janitell Road and East Las Vegas Street within a mixed commercial and industrial area of Colorado Springs, Colorado. The site consists of two adjacent parcels of land, parcel 6429101011 (tract 10), totaling approximately 8.07 acres and parcel 6428201008 (tract 6), totaling 5.14 acres. The site is bounded to the north by Spring Creek, to the west by Fountain Creek, to the south by Janitell Road, and to the east by an existing industrial zoned parcel 6428201009, also known as 2102 Janitell Road, or Tract 3 of the Valley Gardens subdivision. A vicinity map is presented in Appendix A.

Description of Property

The subject site is currently vacant and undeveloped and consists of sparse native vegetation coverage In general, the site slopes from east to southwest at slopes ranging from 1-8%, towards Spring Creek and Fountain Creek which border the southern and western sides of the site respectively.

Per a NRCS web soil survey, the site is made up of Type A and B soils. Type A soils cover roughly 32% of the site while Type B soils cover 68% of the site. Group A soils have a high infiltration rate when thoroughly wet. Type B soils have a moderate infiltration when thoroughly wet. A NRCS soil survey map has been presented in Appendix A.

There are no known existing wells on the site.

Floodplain Statement

Based on the FEMA FIRM Map number 08041C0741G, dated December 7, 2018, the site lies within Zone AE and Zone X of the floodplain surrounding Spring Creek and Fountain Creek. Zone AE is defined as area subject to inundation by the 1-percent-annual-chance flood event. Zone X is defined as area outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. All proposed development within Filing 1 will occur in Zone X. The FIRM Map has been presented in Appendix A.

DRAINAGE BASINS AND SUBBASINS

Existing Major Basin Descriptions

The site lies within the Spring Creek Drainage Basin based on the "*Spring Creek Drainage Basin Planning Study*" prepared by URS Consultants in October 1993. The Spring Creek Drainage Basin covers approximately 7.0 square miles, of which 6.9 square miles lie within Colorado Springs City limits, and the remaining 0.1 square miles are located in El Paso County, CO. The basin generally slopes from east to southwest with the outfall being Fountain Creek. The existing channel slopes range from 0.5% to 4.0% with the majority of slopes being near 1.0%.

The site is adjacent to reach 16 as identified in the "Spring Creek DBPS" and was analyzed for stability and capacity. The report stated that because this reach was "one of the last few remaining natural channel settings in the basin" that "the amount of channel improvements and resulting disruption of the existing habitat" should be minimized to protect the existing riparian habitat. The DBPS recommended utilizing drop structures to lessen the channel slope adjacent to the project site and installing riprap at select locations to protect banks from erosion. However, the improvements identified lie off-site, on a private parcel owned by others that is currently being developed. The drainage report on file for parcel 6429101029, on which the improvements from the DBPS lie, stated the Creek adjacent to the site is stable. No offsite channel improvements are recommended to be completed with the development this report supports.

Existing Sub-basin Drainage

On-site, existing sub-basin drainage patterns are generally from northeast to southwest. The site is generally very flat, with large areas sloping at less than 1%. Because of this, drain paths are mostly undefined, and runoff sheet flows across the site or infiltrates. Two existing basins were delineated to analyze the existing flows on the site. There are no major or significant offsite flows that enter the subject site. However, in the northeast corner of the property, Spring Creek flows onto and then off of the subject site. All flow is contained within the existing creek banks, and therefore, this flow is not included in the existing sub-basin analysis. There are no existing storm water facilities located on site, and no existing utilities other than over-head electric lines. There are no known wells or irrigation facilities located on-site. Below are existing basin descriptions and an existing drainage map is included in the appendices.

Existing Basin EX-A is approximately 4.47 acres in area and consists mostly of undeveloped, sparsely vegetated open space. An existing concrete stockpile and a portion of an existing asphalt stockpile also lies within existing Basin EX-A. Runoff generated (Q5 = 1.0 cfs, and Q100 = 6.0 cfs), sheet flows south and west towards a low point on the existing north/west side boundary line bordering Spring Creek at design point 1.

Existing Basin EX-B is approximately 9.30 acres in area and consists mostly of undeveloped, sparsely vegetated open space. A small portion of the neighboring parcel to the east (Valley Gardens Tract 3) is tributary to the project site; however, the majority of the neighboring parcel's runoff is intercepted by an existing swale and pipe along the border with the project site and carried directly to the Janitell Road Right-Of-Way. The offsite drainage patterns decribed above were confirmed by a field visit conducted by JR Engineering on January 21st 2020. A portion of an existing asphalt stockpile also lies within existing Basin EX-B. Runoff generated (Q5 = 1.9 cfs, and Q100 = 13.3 cfs), sheet flows south and west towards a low point on the existing south/west side boundary line bordering Janitell Road at design point 2.

Proposed Sub-basin Drainage

The proposed improvements for the subject site include the addition of an asphalt entry road to access the project site from Janitell Road. The asphalt road will extend to the proposed office trailer and truck scale, but will transition to a gravel road section north of the proposed scale and trailer location. The proposed trailer will be bordered to the north/east by a truck scale and to the south by a proposed asphalt parking area. The proposed gravel road will circle the entire project site (other than the asphalt section) and will provide vehicle and equipment access to stock pile areas. Within the boundaries of the proposed access road, there will be a material storage and processing area intended to house the equipment and materials necessary for the proposed asphalt and concrete recycling activities. A proposed grass lined swale will border the proposed access road and collect runoff generated from the adjacent roadway and transport it to the southwest side of the site where a proposed extended detention basin lies. Below are proposed sub-basin descriptions. Refer to the appendices for a proposed conditions drainage map.

Proposed Basin A is approximately 10.89 acres in area and consists of a proposed office trailer, truck scale, asphalt and gravel roadways, and asphalt parking area, proposed material stockpiles and processing areas, and open space/landscaped areas. The entirety of proposed Basin A is to be graded per the proposed contours shown on the proposed conditions drainage map included in the appendices. The proposed grading maintains the general existing drainage patterns from east to southwest. The access road has been designed to slope towards the inside of the site access road, with the exception of the length of road along the detention pond, and a proposed grass lined swale borders the inner edge of the road and collects runoff generated from the proposed roadway. The proposed swales will transport water to a low point on the southwest side of the site, where two proposed 12" private HDPE culvert pipes with 12" flared end sections will transport water underneath the access road to the west, to a proposed concrete bottom forebay located within the private full-spectrum extended detention basin. The entire stockpile area will also be graded to sheet

flow towards the retention pond and proposed culvert pipes. All runoff (Q5 = 7.2 cfs, Q100 = 23.3 cfs) generated in Basin A will be tributary to and contained within the proposed extended detention basin. Proposed basin A contains nearly all of the proposed developed area on-site. Only a very small portion of the proposed access drive is not able to be captured and is discussed further in the proposed Basin C description below.

Proposed Basin B is approximately 2.17 acres in area and includes open space undeveloped areas along the site's northern and western boundaries. There is no proposed development in proposed Basin B except for some minor grading. All runoff generated (Q5 = 0.8 cfs, Q100 = 6.0 cfs), sheet flows towards the site's northern and western boundary and flows offsite towards Spring Creek or Fountain Creek generally at design point 2. This basins outfall is generally consistent with the outfall location of existing Basin EX-A, and Q5 flows have been decreased to this location in the proposed condition.
Proposed Basin C is approximately 0.70 acres in area and includes open space undeveloped areas and a small portion of the proposed asphalt access drive along the site's southern and western boundaries. All runoff generated (Q5 = 0.4 cfs, Q100 = 2.3 cfs), sheet flows towards the site's southern boundary and flows offsite towards Janitell Road, generally at design point 3. This basins outfall is generally consistent with the outfall location of existing Basin EX-B, and flows have been decreased to this location in the proposed condition.

DRAINAGE DESIGN CRITERIA

Development Criteria Reference

Storm drainage analysis and design criteria for the project were taken from the "*City of Colorado Spring/El Paso County Drainage Criteria Manual*" Volumes 1 and 2 (EPCDCM), dated October 12, 1994, the "*Urban Storm Drainage Criteria Manual"* Volumes 1 - 3 (USDCM) and Chapter 6 and Section 3.2.1 of Chapter 13 of the "Colorado Springs Drainage Criteria Manual (CCSDCM), dated May 2014, as adopted by El Paso County.

Hydrologic Criteria

All hydrologic data was obtained from the "El Paso Drainage Criteria Manual" Volumes 1 and 2, and the "Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual" Volumes 1, 2, and 3. Onsite drainage improvements were designed based on the 5 year (minor) storm event and the 100-year (major) storm event. Rational Method calculations were prepared, in accordance with Section 13.3.2.1. of the CCSDCM, for the sub-basins that directly impact the sizing of ditches and local street culverts. Rational method calculations are presented in the appendices.

Urban Drainage and Flood Control District's UD-Detention, Version 3.07 workbook was used for pond sizing. Required detention volumes were designed per USDCM and CCS/EPCDCM. Pond sizing spreadsheets are presented in the appendices.

DRAINAGE FACILITY DESIGN

General Concept

The proposed stormwater conveyance system was designed to convey the developed runoff from proposed Basin A to a proposed private full spectrum extended detention basin. The pond was designed to retain the 100 year design storm or 0.63 acre-feet. Runoff generated onsite is tributary to the detention basin via two, twelve inch HDPE culvert pipes that outfall into a proposed concrete bottom forebay, sized to contain greater than 3% of the WQCV (>160 cu-ft) and release water at rate no more than 2% of the peak 100 year undetained discharge rate (approximately <0.46 cfs). The forebay outfalls into a proposed four foot wide concrete trickle channel that slopes from the forebay to the proposed outlet structure. The outlet structure has been designed to detain the WQCV for 40 hours, the EURV for 70 hours, and to release the 100 year storm at a maximum of 90 percent of pre-development rates.

The pond also includes an emergency spillway which has been designed to pass the undetained, 100-year peak flow rate tributary to the pond at a flow depth of approximately 0.6 feet. The spillway includes over a foot of free board above the design water surface elevation to the top of embankment which is approximately 5851 feet in elevation. The crest of the spillway is at an elevation of 5847.5. The entire site has been graded to include a berm along the outside limits of the access road with a top elevation of 5851, where the adjacent grade is less than the top of berm.

Specific Details

Four Step Process to Minimize Adverse Impacts of Urbanization

In accordance with the El Paso County Drainage Criteria Manual Volume 2, this site has implemented the four step process to minimize adverse impacts of urbanization. The four step process includes reducing runoff volumes, stabilizing drainageways, treating the water quality capture volume (WQCV), and consider the need for Industrial Commercial BMP's.

Step 1, Reducing Runoff Volumes: As shown by the attached drainage maps and rational calculations, the runoff leaving the subject site in the proposed condition, is less than the runoff presently leaving the site, in its existing condition. Furthermore, grass swales are proposed to transport developed runoff, which will promote infiltration during conveyance, thus further reducing the runoff volumes generated from the site.

Step 2, Stabilize Drainageways: The flow tributary to adjacent and downstream drainageways has been reduced per the proposed design. Therefore, no downstream stabilizations BMP's are proposed as part of this project.

Step 3, Provide WQCV: All developed flows from this site are treated via the proposed extended detention basin including a forebay, trickle channel, and full spectrum outlet structure. Therefore, the WQCV is treated.

Step 4 Consider the need for Industrial and Commercial BMP's: The proposed design utilizes site grading and a proposed extended detention basin to capture all developed flows, and treat them on-site. This will ensure that no adverse downstream or adjacent impacts are created as a result of the proposed project site.

Erosion Control Plan

The El Paso County Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate must be submitted with each Final Drainage Report. The Erosion Control Plan for this site is submitted concurrently with this report.

Operation & Maintenance

In order to ensure the function and effectiveness of the stormwater infrastructure, maintenance activities such as inspection, routine maintenance, restorative maintenance, rehabilitation and repair, are required. All proposed drainage structures will be maintained by the site owner/developer. A 12' wide gravel maintenance access road has been included to access the trickle channel, forebay, and outlet structure of the extended detention basin.

Drainage and Bridge Fees

Drainage and Bridge Fees were paid at the time of the Final Plat for the Valley Gardens subdivision, which this site is a part of.

SUMMARY

The proposed development remains consistent with pre-development drainage conditions with the construction of the recommended drainage improvements, including ditches, culverts, and extended detention basin improvements. The proposed development will not adversely affect the offsite major Drainageways or surrounding development. This report meets the latest El Paso County Drainage Criteria requirements for this site and is in accordance with the previously approved reports.

REFERENCES:

1. City of Colorado Springs Drainage Criteria Manual Volume 1, City of Colorado Springs, CO, May 2014.

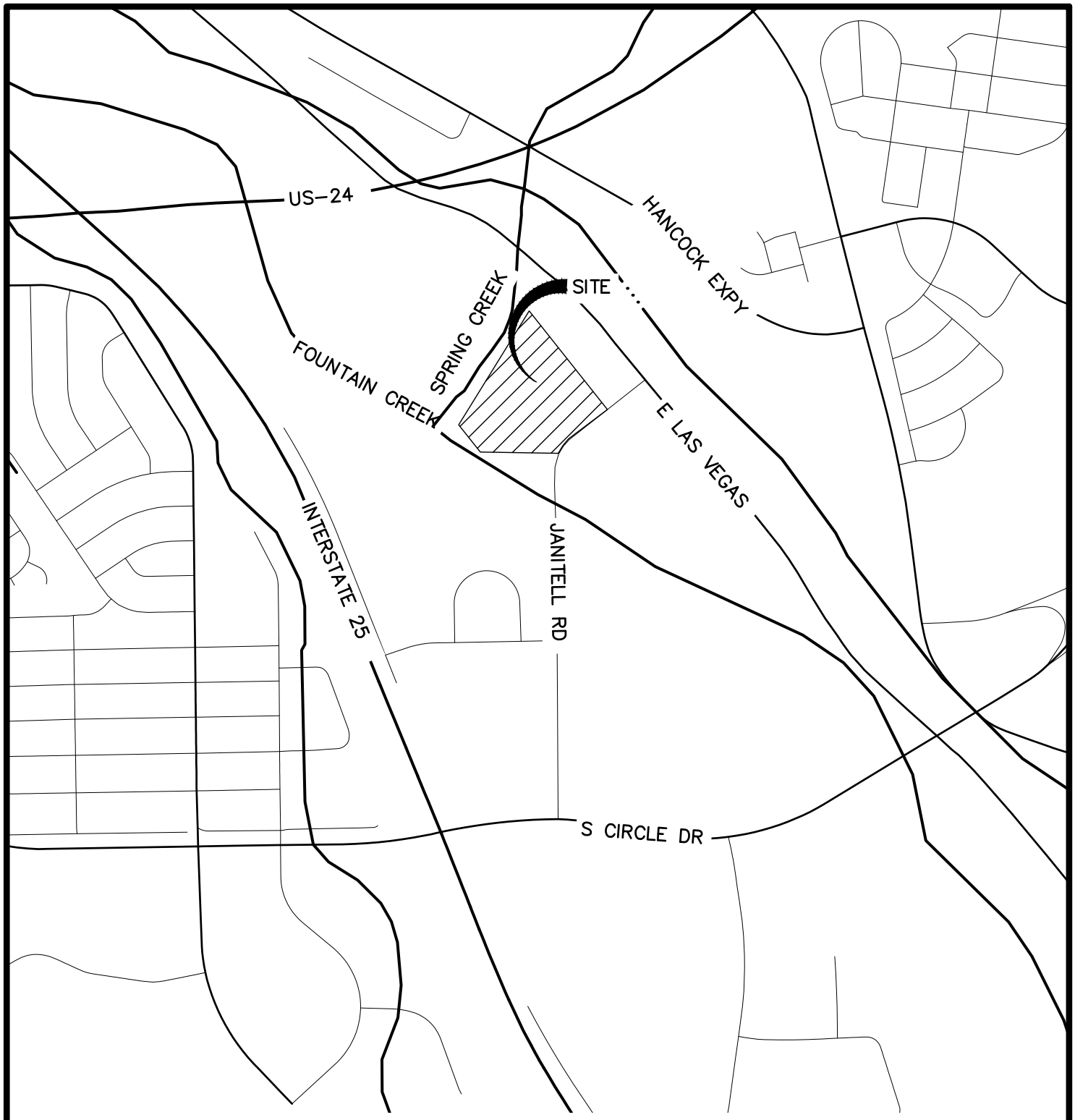
2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Latest Revision.

3. Spring Creek Drainage Basin Planning Study", prepared by URS Consultants in October 1993.

4. "Hydrologic Group Rating for El Paso County Area, Colorado", USDA-Natural Resources Conservation Service, National Cooperative Soil Survey. Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov. [June 21, 2017]

APPENDIX A

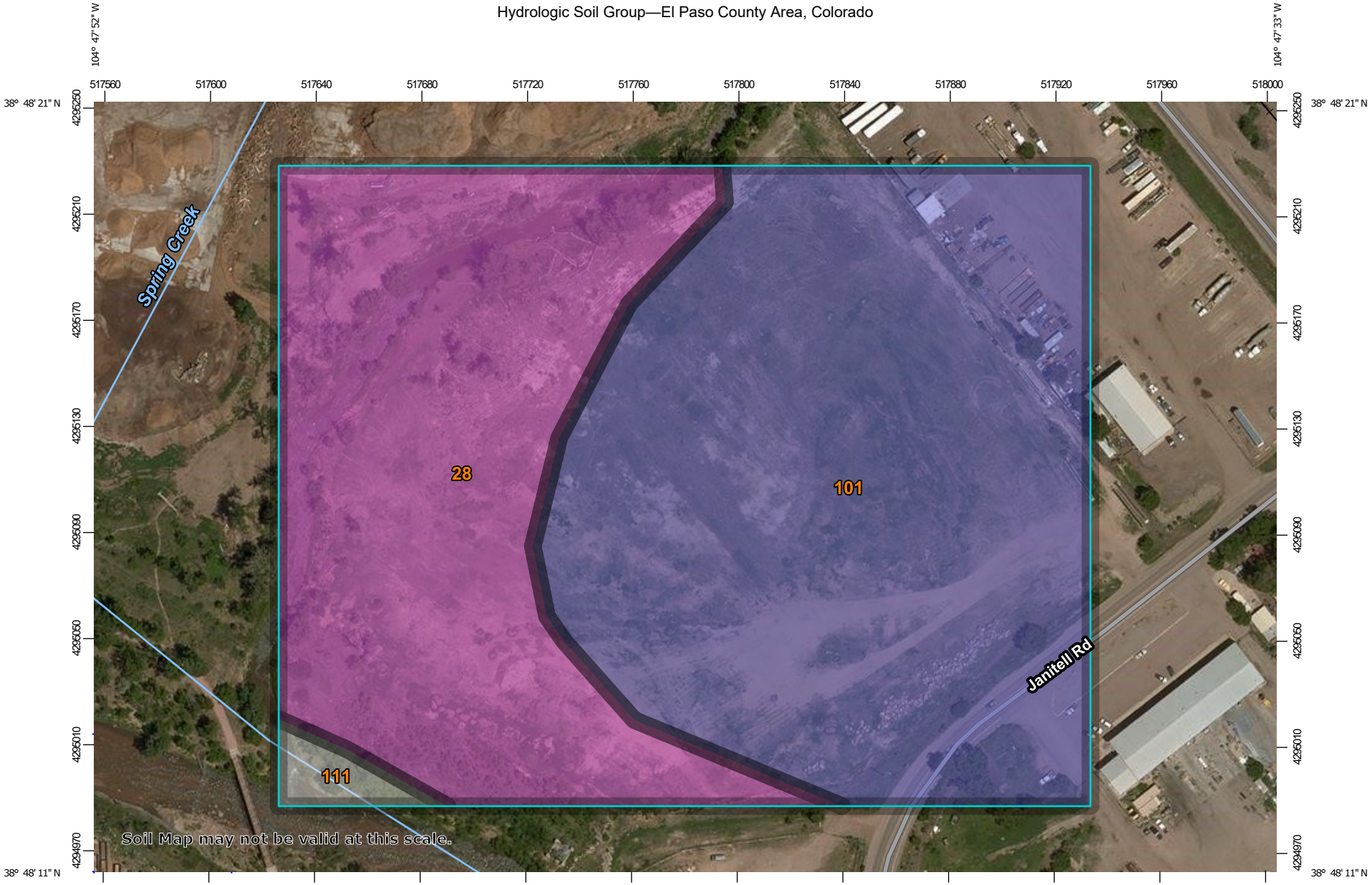
FIGURES AND EXHIBITS



VICINITY MAP
ACR SITE DEVELOPMENT PLAN
25176.00
11/08/19
SHEET 1 OF 1

J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com



Map Scale: 1:2,050 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 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: Jun 3, 2014—Jun 17, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A	7.4	40.4%
101	Ustic Torrifluvents, loamy	B	10.7	58.1%
111	Water		0.3	1.5%
Totals for Area of Interest			**18.4**	**100.0%**

Description

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

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

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

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

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

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

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

possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

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

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

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

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

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

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

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

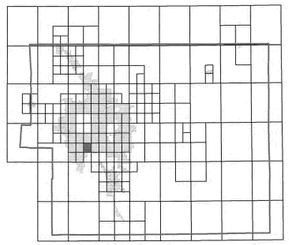
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

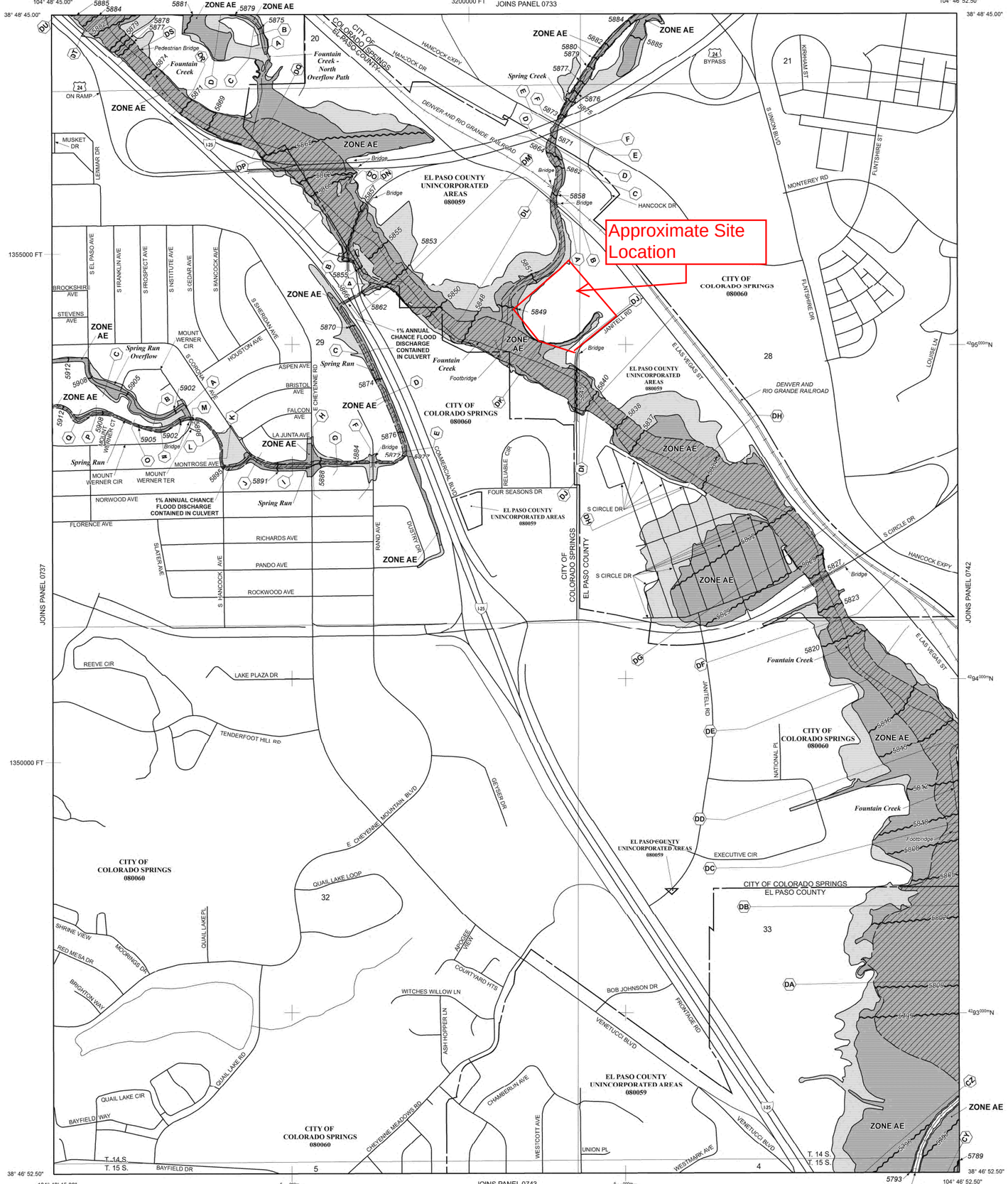
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



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

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



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 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

Floodplain boundary

Floodway boundary

Zone D Boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

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)

4275000mN 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" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0741G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 741 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0741	G
EL PASO COUNTY	080059	0741	G

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

MAP NUMBER
08041C0741G

MAP REVISED

APPENDIX B

HYDROLOGIC/HYDRAULIC CALCULATIONS

COMPOSITE % IMPERVIOUS & COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

Subdivision: ACR - EXISTING
Location: El Paso County

Project Name: ACR - EXISTING
Project No.: 2000-5176.00
Calculated By: REB
Checked By:
Date: 1/22/20

Basin ID	Total Area (ac)	Hardscape (100% Impervious)				Roofs (90% Impervious)				Gravel (80% Impervious)				Stock Pile Areas (20% Impervious)				Lawns (0% Impervious)				Basins Total Weighted C Values		Basins Total Weighted
		C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	
EX-A	4.47	0.90	0.96	0.00	0.0%	0.73	0.81	0.00	0.0%	0.59	0.70	0.00	0.0%	0.20	0.44	0.73	3.3%	0.08	0.35	3.74	0.0%	0.10	0.36	3.3%
EX-B	9.30	0.90	0.96	0.00	0.0%	0.73	0.81	0.00	0.0%	0.59	0.70	0.00	0.0%	0.20	0.44	0.54	4.6%	0.08	0.35	8.76	0.0%	0.09	0.36	4.6%
TOTAL	**13.77**																							**4.2%**

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: ACR - EXISTING
Location: El Paso County

Project Name: ACR - EXISTING
Project No.: 2000-5176.00
Calculated By: REB
Checked By:
Date: 1/22/20

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (ft)	S_o (%)	t_i (min)	L_t (ft)	S_t (%)	K	VEL. (ft/s)	t_t (min)	COMP. t_c (min)	TOTAL LENGTH (ft)	Urbanized t_c (min)	t_c (min)
EX-A	4.47	B	3%	0.10	0.36	100	3.2%	12.3	800	0.3%	10.0	0.5	24.3	36.6	900.0	51.2	36.6
EX-B	9.30	B	5%	0.09	0.36	100	3.3%	12.3	900	0.6%	10.0	0.8	19.4	31.7	1000.0	45.3	31.7

NOTES:

$$t_c = t_i + t_t$$ Equation 6-2

Where:

t_c = computed time of concentration (minutes)

t_i = overland (initial) flow time (minutes)

t_t = channelized flow time (minutes).

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$ Equation 6-4

Where:

t_t = channelized flow time (travel time, min)
L_t = waterway length (ft)
S_o = waterway slope (ft/ft)
V_t = travel time velocity (ft/sec) = $K\sqrt{S_o}$
K = NRCS conveyance factor (see Table 6-2).

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}}$$ Equation 6-3

Where:

t_i = overland (initial) flow time (minutes)
C_5 = runoff coefficient for 5-year frequency (from Table 6-4)
L_i = length of overland flow (ft)
S_o = average slope along the overland flow path (ft/ft).

$$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$ Equation 6-5

Where:

t_c = minimum time of concentration for first design point when less than t_c from Equation 6-1.
L_t = length of channelized flow path (ft)
i = imperviousness (expressed as a decimal)
S_t = slope of the channelized flow path (ft/ft).

Use a minimum t_c value of 5 minutes for urbanized areas and a minimum t_c value of 10 minutes for areas that are not considered urban. Use minimum values even when calculations result in a lesser time of concentration.

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: ACR - EXISTING
Location: El Paso County
Design Storm: 5-Year

Project Name: ACR - EXISTING
Project No.: 2000-5176.
Calculated By: REB
Checked By:
Date: 1/22/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	1	EX-A	4.47	0.10	36.6	0.45	2.18	1.0															Surface runoff from Basin EX-A, offsite to DP-1
	2	EX-B	9.30	0.09	31.7	0.81	2.40	1.9															Surface runoff from Basin EX-B, offsite to DP-2

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: ACR - EXISTING
Location: El Paso County
Design Storm: 100-Year

Project Name: ACR - EXISTING
Project No.: 2000-5176.0
Calculated By: REB
Checked By:
Date: 1/22/20

Description	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	1	EX-A	4.47	0.36	36.6	1.63	3.66	6.0															Surface runoff from Basin EX-A, offsite to DP-1
	2	EX-B	9.30	0.36	31.7	3.30	4.03	13.3															Surface runoff from Basin EX-B, offsite to DP-2

COMPOSITE % IMPERVIOUS & COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

Subdivision: ACR
Location: El Paso County

Project Name: ACR
Project No.: 2000-5176.00
Calculated By: REB
Checked By:
Date: 1/22/20

Basin ID	Total Area (ac)	Hardscape (100% Impervious)				Roofs (90% Impervious)				Gravel (80% Impervious)				Stock Pile Areas (20% Impervious)				Lawns (0% Impervious)				Basins Total Weighted C Values		Basins Total Weighted
		C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	Area (ac)	Weighted % Imp.	C_5	C_{100}	
A	10.89	0.90	0.96	0.39	3.6%	0.73	0.81	0.02	0.1%	0.59	0.70	1.40	10.3%	0.20	0.44	6.00	11.0%	0.08	0.35	3.08	0.0%	0.24	0.47	25.0%
B	2.17	0.90	0.96	0.00	0.0%	0.73	0.81	0.00	0.0%	0.59	0.70	0.00	0.0%	0.20	0.44	0.00	0.0%	0.08	0.35	2.17	0.0%	0.08	0.35	0.0%
C	0.70	0.90	0.96	0.02	3.3%	0.73	0.81	0.00	0.0%	0.59	0.70	0.00	0.0%	0.20	0.44	0.00	0.0%	0.08	0.35	0.68	0.0%	0.11	0.37	3.3%
TOTAL	**13.76**																							**20.0%**

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: ACR
Location: El Paso County

Project Name: ACR
Project No.: 2000-5176.00
Calculated By: REB
Checked By:
Date: 1/22/20

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (ft)	S_o (%)	t_i (min)	L_t (ft)	S_t (%)	K	VEL. (ft/s)	t_t (min)	COMP. t_c (min)	TOTAL LENGTH (ft)	Urbanized t_c (min)	t_c (min)
A	10.89	B	25%	0.24	0.47	130	1.6%	15.1	800	0.8%	15.0	1.3	10.1	25.3	930.0	33.9	25.3
B	2.17	B	0%	0.08	0.35	30	3.3%	6.8	10	3.3%	15.0	2.7	0.1	6.9	40.0	26.1	6.9
C	0.70	B	3%	0.11	0.37	40	12.0%	5.0	10	12.0%	15.0	5.2	0.0	5.0	50.0	25.5	5.0

NOTES:

$$t_c = t_i + t_t$$ Equation 6-2

Where:

t_c = computed time of concentration (minutes)

t_i = overland (initial) flow time (minutes)

t_t = channelized flow time (minutes).

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$ Equation 6-4

Where:

t_t = channelized flow time (travel time, min)
L_t = waterway length (ft)
S_o = waterway slope (ft/ft)
V_t = travel time velocity (ft/sec) = $K\sqrt{S_o}$
K = NRCS conveyance factor (see Table 6-2).

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}}$$ Equation 6-3

Where:

t_i = overland (initial) flow time (minutes)
C_5 = runoff coefficient for 5-year frequency (from Table 6-4)
L_i = length of overland flow (ft)
S_o = average slope along the overland flow path (ft/ft).

$$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$ Equation 6-5

Where:

t_c = minimum time of concentration for first design point when less than t_c from Equation 6-1.
L_t = length of channelized flow path (ft)
i = imperviousness (expressed as a decimal)
S_t = slope of the channelized flow path (ft/ft).

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

Use a minimum t_c value of 5 minutes for urbanized areas and a minimum t_c value of 10 minutes for areas that are not considered urban. Use minimum values even when calculations result in a lesser time of concentration.

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: ACR
Location: El Paso County
Design Storm: 5-Year

Project Name: ACR
Project No.: 2000-5176.
Calculated By: REB
Checked By:
Date: 1/22/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	1	A	10.89	0.24	25.3	2.62	2.74	7.2															Surface runoff from Basin A, outfalls to proposed detention pond at DP-1
	2	B	2.17	0.08	6.9	0.17	4.69	0.8															Surface runoff from Basin B, outfalls offsite to Spring Creek @ DP-2
	3	C	0.70	0.11	5.0	0.07	5.16	0.4															Surface runoff from Basin C, outfalls offsite to Janitell Road @ DP-3

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: ACR
Location: El Paso County
Design Storm: 100-Year

Project Name: ACR
Project No.: 2000-5176.0
Calculated By: REB
Checked By:
Date: 1/22/20

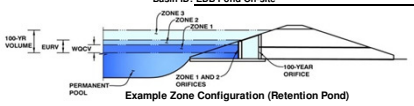
Description	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	1	A	10.89	0.47	25.3	5.07	4.60	23.3															Surface runoff from Basin A, outfalls to proposed detnetion pond at DP-1
	2	B	2.17	0.35	6.9	0.76	7.88	6.0															Surface runoff from Basin B, outfalls offsite to Spring Creek @ DP-2
	3	C	0.70	0.37	5.0	0.26	8.67	2.3															Surface runoff from Basin C, outfalls offsite to Janitell Road @ DP-3

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: ACR

Basin ID: EDB Pond On-site



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	10.89	acres
Watershed Length =	1,000	ft
Watershed Slope =	0.011	ft/ft
Watershed Imperviousness =	25.00%	percent
Percentage Hydrologic Soil Group A =	19.9%	percent
Percentage Hydrologic Soil Group B =	80.1%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.122	acre-feet
Excess Urban Runoff Volume (EURV) =	0.272	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.200	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.286	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.444	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.772	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	1.005	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	1.314	acre-feet
500-yr Runoff Volume (P1 = 3 in.) =	1.856	acre-feet
Approximate 2-yr Detention Volume =	0.187	acre-feet
Approximate 5-yr Detention Volume =	0.268	acre-feet
Approximate 10-yr Detention Volume =	0.397	acre-feet
Approximate 25-yr Detention Volume =	0.478	acre-feet
Approximate 50-yr Detention Volume =	0.513	acre-feet
Approximate 100-yr Detention Volume =	0.622	acre-feet

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.00	inches

Stage-Storage Calculation

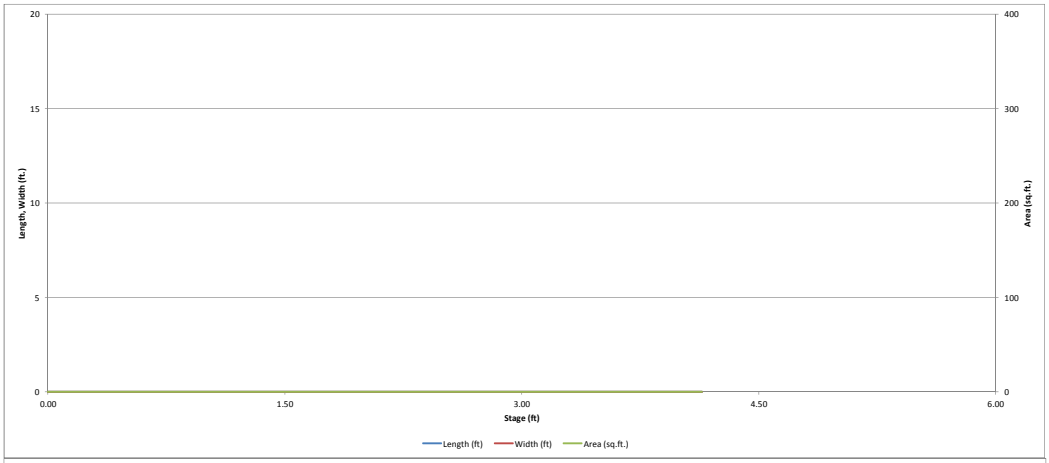
Zone 1 Volume (WQCV) =	0.122	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.150	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.350	acre-feet
Total Detention Basin Volume =	0.622	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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

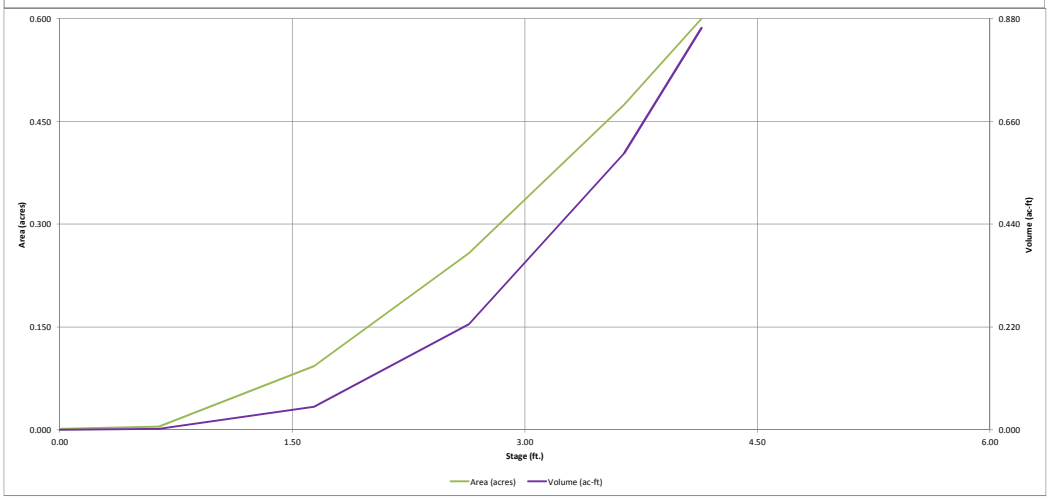
Depth Increment = 1 ft

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	--	--	--	50	0.001		
5844	--	0.64	--	--	--	192	0.004	76	0.002
5845	--	1.64	--	--	--	4,043	0.093	2,155	0.049
5846	--	2.64	--	--	--	11,236	0.258	9,834	0.226
5847	--	3.64	--	--	--	20,665	0.474	25,785	0.592
5847.5	--	4.14	--	--	--	26,131	0.600	37,484	0.861

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



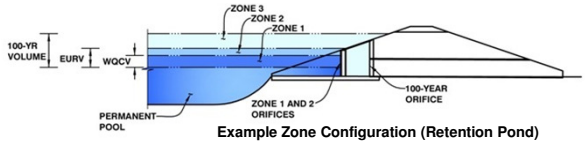


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: ACR

Basin ID: EDB Pond On-site



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.17	0.122	Orifice Plate
Zone 2 (EURV)	2.81	0.150	Orifice Plate
Zone 3 (100-year)	3.71	0.350	Weir&Pipe (Restrict)
		0.622	Total

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 Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

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)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.72	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	0.47	sq. inches (diameter = 3/4 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	3.264E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
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	0.75	1.83					
Orifice Area (sq. inches)	0.47	0.47	0.47					

	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)

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

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.03	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	3.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.03	N/A	feet
Over Flow Weir Slope Length =	3.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	7.67	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	6.30	N/A	ft^2
Overflow Grate Open Area w/ Debris =	3.15	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	8.50		inches

Q100

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.82	N/A	ft^2
Outlet Orifice Centroid =	0.41	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.52	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.14	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	15.00	feet
Spillway End Slopes =	0.17	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

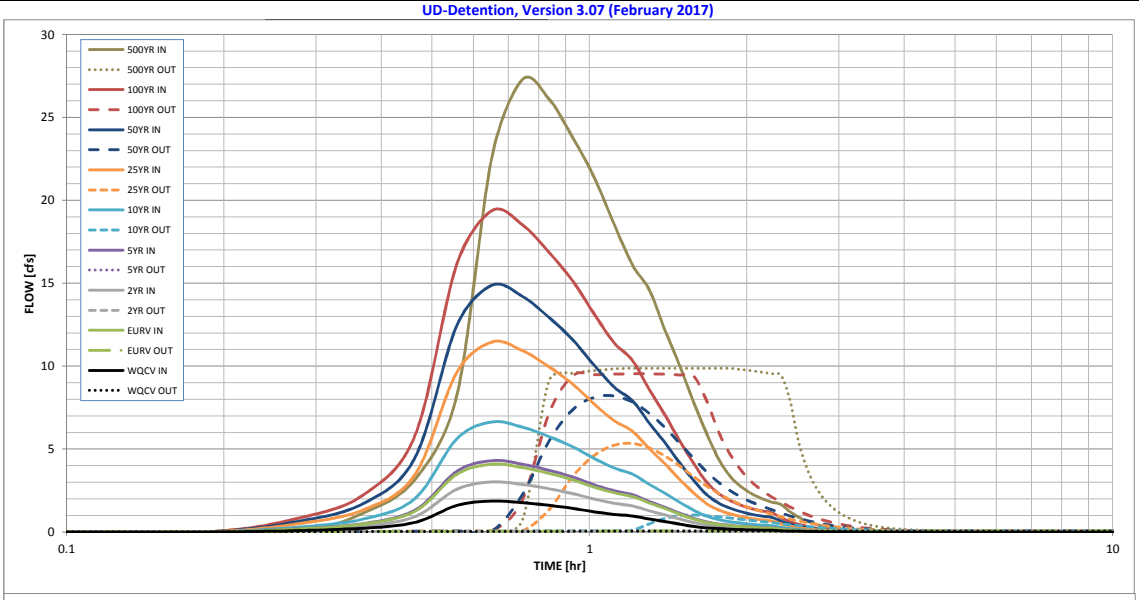
Spillway Design Flow Depth=	0.56	feet
Stage at Top of Freeboard =	5.70	feet
Basin Area at Top of Freeboard =	0.60	acres

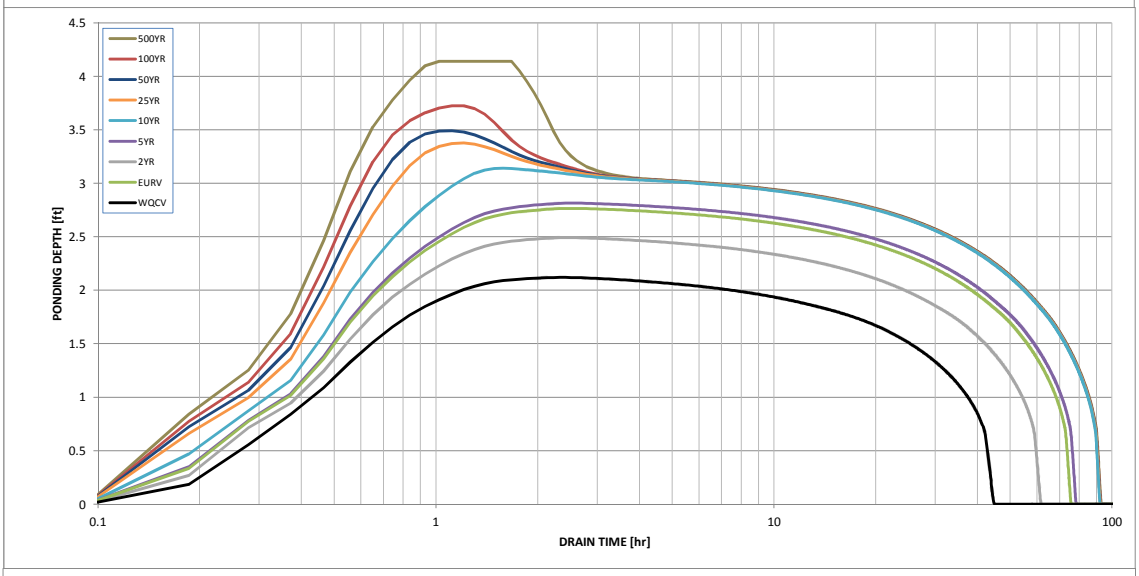
Routed Hydrograph Results

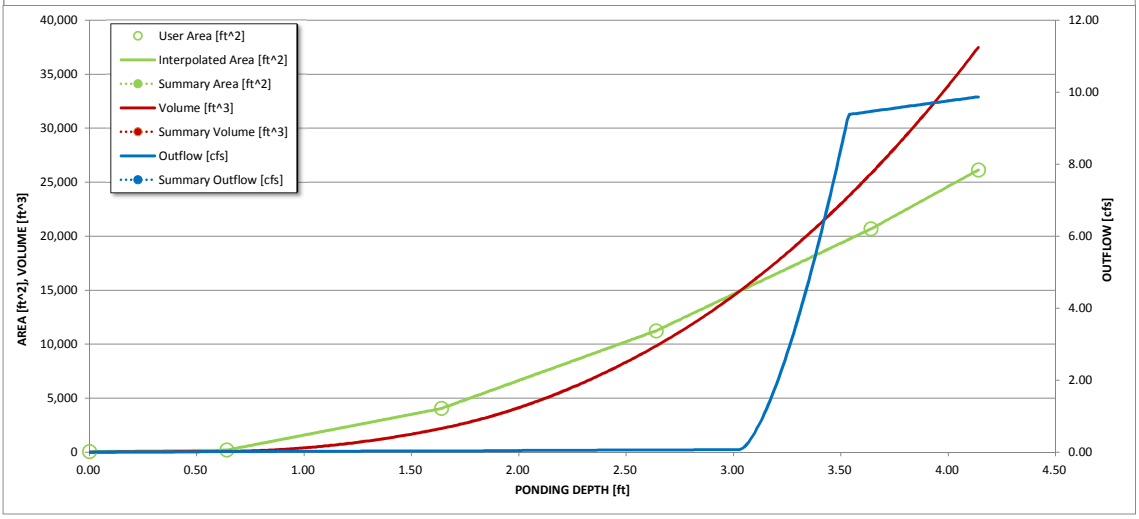
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.00
Calculated Runoff Volume (acre-ft) =	0.122	0.272	0.200	0.286	0.444	0.772	1.005	1.314	1.856
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.122	0.271	0.200	0.286	0.444	0.771	1.005	1.313	1.856
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.14	0.47	0.68	0.96	1.43
Predevelopment Peak Q (cfs) =	0.0	0.0	0.1	0.2	1.5	5.2	7.5	10.5	15.5
Peak Inflow Q (cfs) =	1.9	4.1	3.0	4.3	6.6	11.5	14.9	19.4	27.3
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.1	1.0	5.3	8.2	9.5	9.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.7	1.0	1.1	0.9	0.6
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.9	1.3	1.5	1.6
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	69	56	71	83	79	76	73	67
Time to Drain 99% of Inflow Volume (hours) =	**43**	72	59	75	88	86	85	83	81
Maximum Ponding Depth (ft) =	2.12	2.77	2.49	2.81	3.14	3.38	3.49	3.72	4.14
Area at Maximum Ponding Depth (acres) =	0.17	0.28	0.23	0.29	0.37	0.42	0.44	0.49	0.60
Maximum Volume Stored (acre-ft) =	0.112	0.258	0.189	0.273	0.382	0.472	0.523	0.631	0.861

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs **UD-Detention, Version 3.07 (February 2017)**

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.58 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph	0:11:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	0:16:44	0.09	0.18	0.14	0.19	0.30	0.51	0.65	0.84	1.17
0.896	0:22:19	0.23	0.49	0.36	0.52	0.79	1.36	1.76	2.29	3.21
	0:27:54	0.58	1.26	0.94	1.33	2.04	3.50	4.53	5.88	8.23
	0:33:29	1.60	3.48	2.58	3.66	5.61	9.63	12.45	16.16	22.61
	0:39:04	1.86	4.08	3.01	4.29	6.63	11.45	14.87	19.38	27.27
	0:44:38	1.77	3.88	2.87	4.09	6.32	10.94	14.21	18.53	26.11
	0:50:13	1.60	3.53	2.61	3.72	5.75	9.96	12.94	16.87	23.76
	0:55:48	1.42	3.14	2.31	3.31	5.13	8.90	11.58	15.12	21.33
	1:01:23	1.21	2.70	1.98	2.84	4.42	7.69	10.03	13.11	18.53
	1:06:58	1.06	2.36	1.73	2.48	3.85	6.70	8.73	11.40	16.10
	1:12:32	0.96	2.13	1.57	2.24	3.49	6.07	7.91	10.33	14.60
	1:18:07	0.78	1.74	1.28	1.84	2.87	5.02	6.55	8.59	12.17
	1:23:42	0.62	1.41	1.03	1.49	2.33	4.11	5.37	7.06	10.03
	1:29:17	0.47	1.07	0.78	1.13	1.79	3.17	4.17	5.50	7.85
	1:34:52	0.34	0.79	0.57	0.83	1.32	2.37	3.13	4.15	5.98
	1:40:26	0.25	0.57	0.42	0.61	0.96	1.71	2.27	3.03	4.39
	1:46:01	0.20	0.45	0.33	0.47	0.75	1.32	1.74	2.32	3.34
	1:51:36	0.16	0.37	0.27	0.39	0.62	1.09	1.43	1.89	2.72
	1:57:11	0.14	0.32	0.23	0.33	0.52	0.92	1.21	1.60	2.29
	2:02:46	0.12	0.28	0.20	0.29	0.46	0.81	1.06	1.40	2.01
	2:08:20	0.11	0.25	0.18	0.26	0.41	0.73	0.96	1.26	1.80
	2:13:55	0.10	0.23	0.17	0.25	0.38	0.67	0.88	1.16	1.65
	2:19:30	0.08	0.17	0.12	0.18	0.28	0.49	0.65	0.85	1.22
	2:25:05	0.06	0.12	0.09	0.13	0.21	0.36	0.47	0.62	0.89
	2:30:40	0.04	0.09	0.07	0.10	0.15	0.27	0.35	0.46	0.65
	2:36:14	0.03	0.07	0.05	0.07	0.11	0.20	0.26	0.34	0.48
	2:41:49	0.02	0.05	0.03	0.05	0.08	0.14	0.18	0.24	0.35
	2:47:24	0.01	0.03	0.02	0.04	0.06	0.10	0.13	0.17	0.25
	2:52:59	0.01	0.02	0.02	0.02	0.04	0.07	0.09	0.13	0.18
	2:58:34	0.01	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.12
	3:04:08	0.00	0.01	0.01	0.01	0.01	0.03	0.04	0.05	0.08
	3:09:43	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.04
	3:15:18	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
	3:20:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:26:28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:32:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:37:37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:43:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:48:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:54:22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:59:56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:11:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:16:41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:22:16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:27:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:33:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:39:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:50:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	5:06:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:12:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:18:04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:23:38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:29:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:34:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:51:32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:57:07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:02:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:08:17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:13:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:19:26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:25:01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:30:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:36:11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:41:46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Weir Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jan 23 2020

FOREBAY NOTCH SIZING

Rectangular Weir

Crest	= Sharp
Bottom Length (ft)	= 0.25
Total Depth (ft)	= 1.25

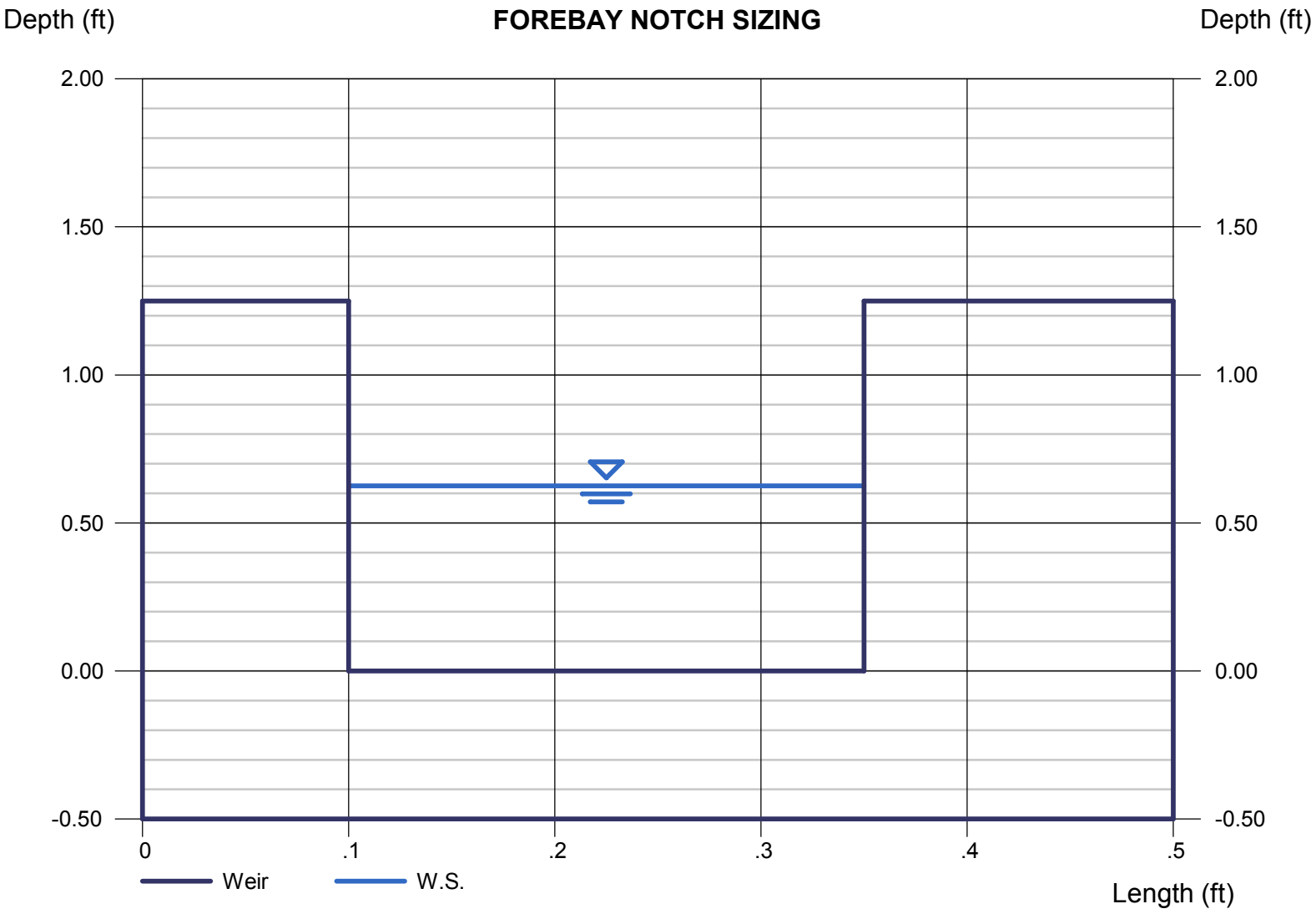
Calculations

Weir Coeff. Cw	= 3.33
Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.63
Q (cfs)	= 0.411
Area (sqft)	= 0.16
Velocity (ft/s)	= 2.63
Top Width (ft)	= 0.25

minimum size recommended to prevent clogging



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Sunday, Mar 29 2020

EDB Outlet Pipe - Max Flow

Circular

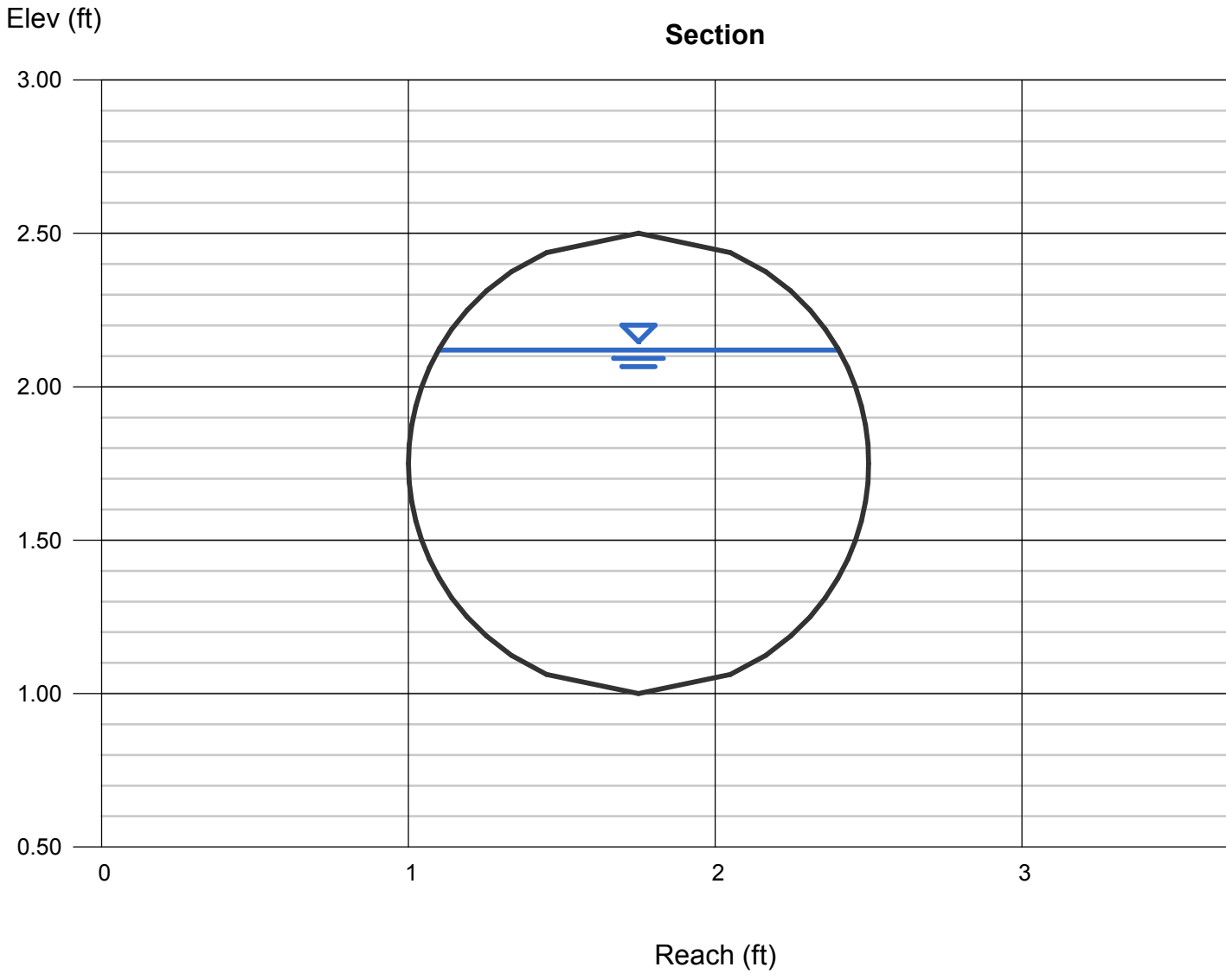
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.50

Highlighted

Depth (ft)	= 1.12
Q (cfs)	= 9.500
Area (sqft)	= 1.42
Velocity (ft/s)	= 6.70
Wetted Perim (ft)	= 3.14
Crit Depth, Yc (ft)	= 1.19
Top Width (ft)	= 1.30
EGL (ft)	= 1.82



Weir Report

ACR - EDB EMERGENCY SPILLWAY

Trapezoidal Weir

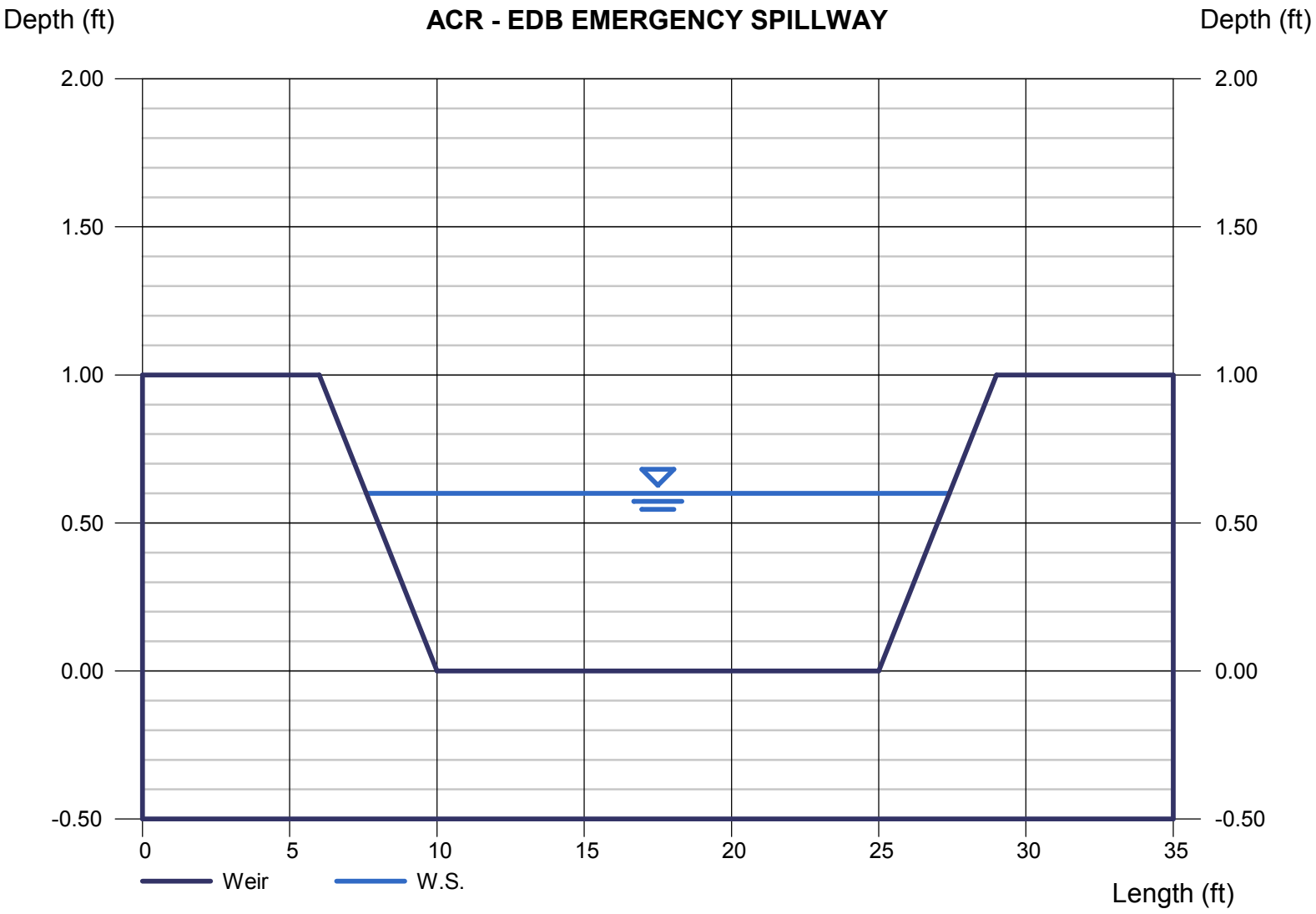
Crest	= Sharp
Bottom Length (ft)	= 15.00
Total Depth (ft)	= 1.00
Side Slope (z:1)	= 4.00

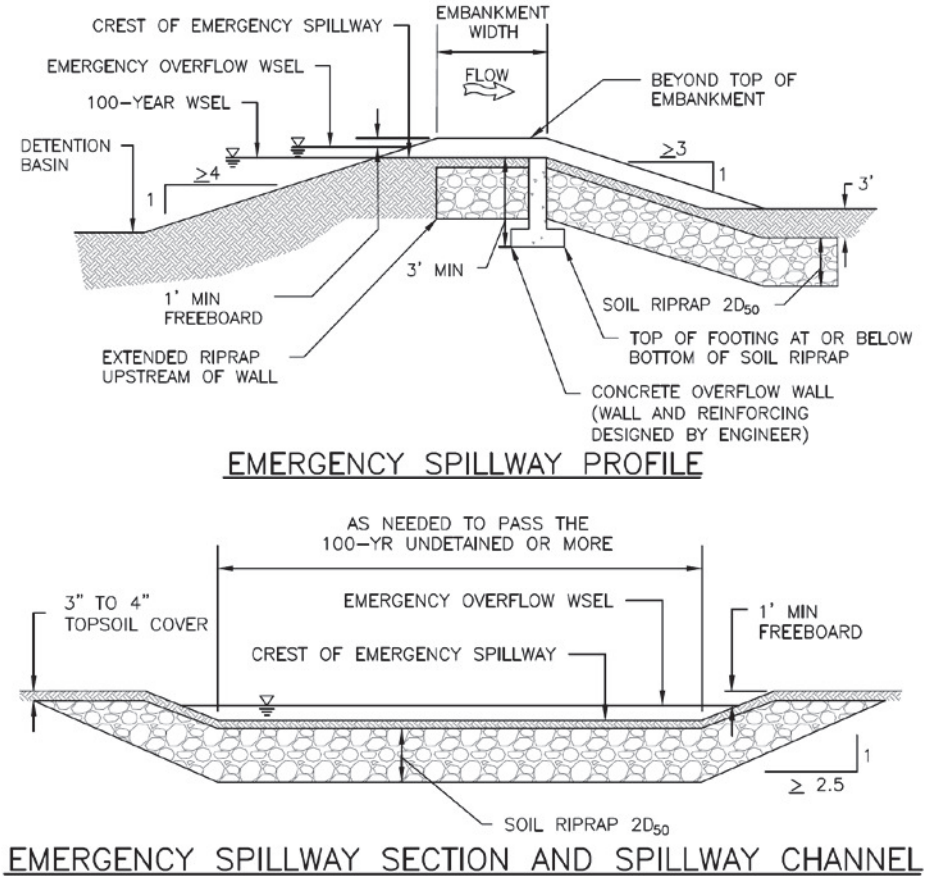
Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 24.00

Highlighted

Depth (ft)	= 0.60
Q (cfs)	= 24.00
Area (sqft)	= 10.44
Velocity (ft/s)	= 2.30
Top Width (ft)	= 19.80





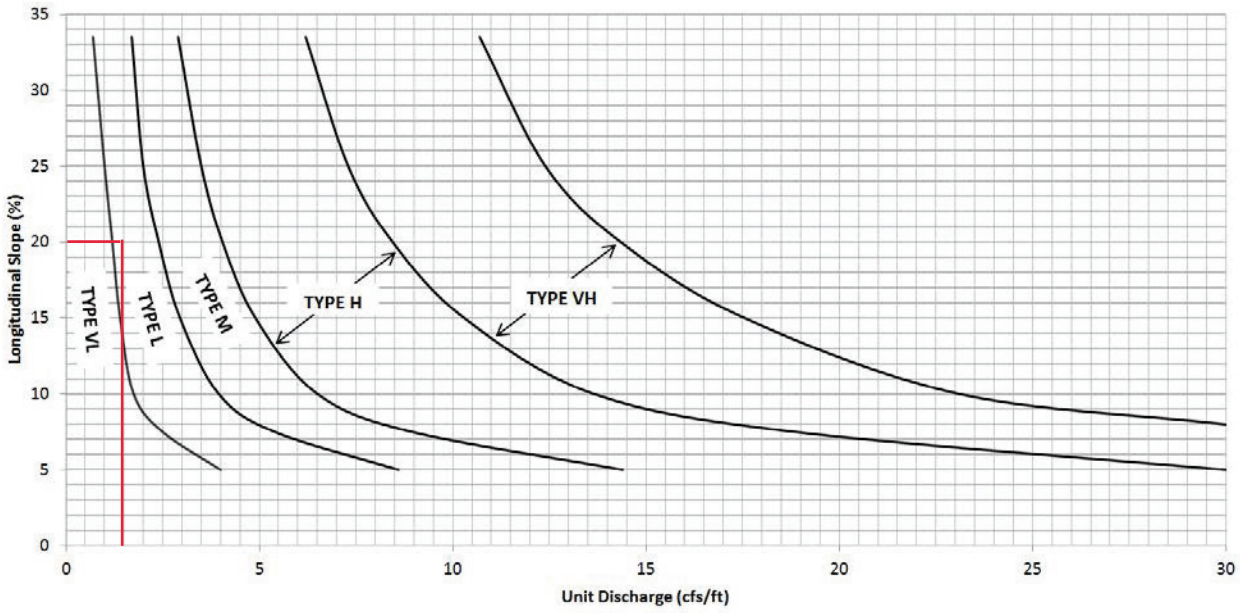
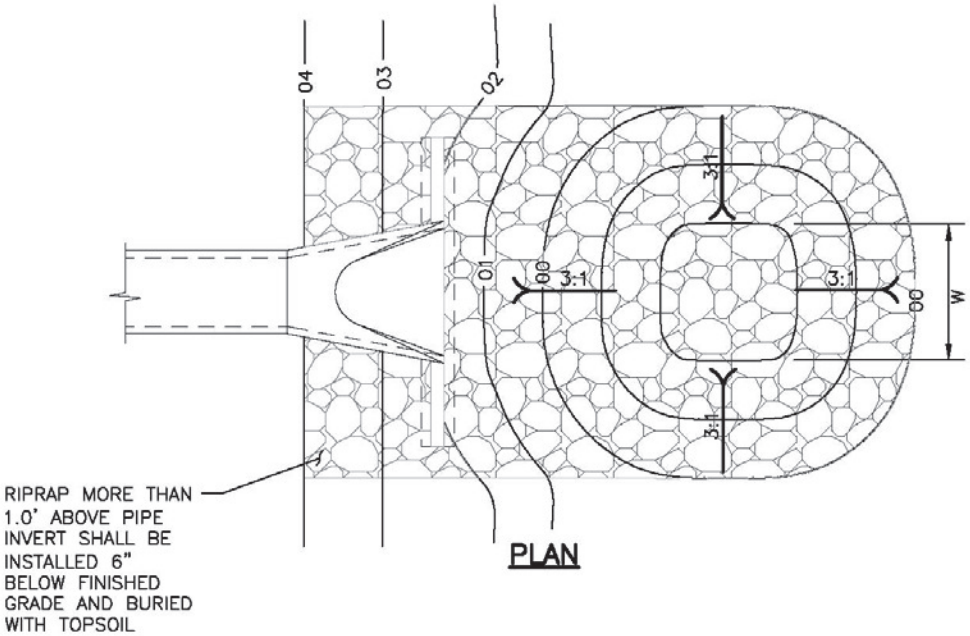
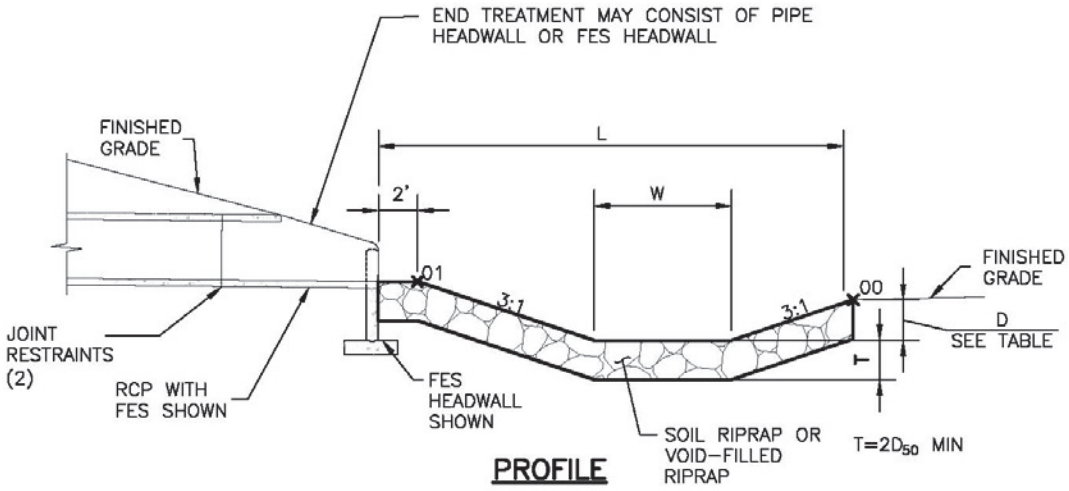


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)





PIPE SIZE OR BOX HEIGHT	D	W*	L
18" – 24"	1'–0"	4'	15'
30" – 36"	1'–6"	6'	20'
42" – 48"	2'–0"	7'	24'
54" – 60"	2'–6"	8'	28'
66" – 72"	3'–0"	9'	32'

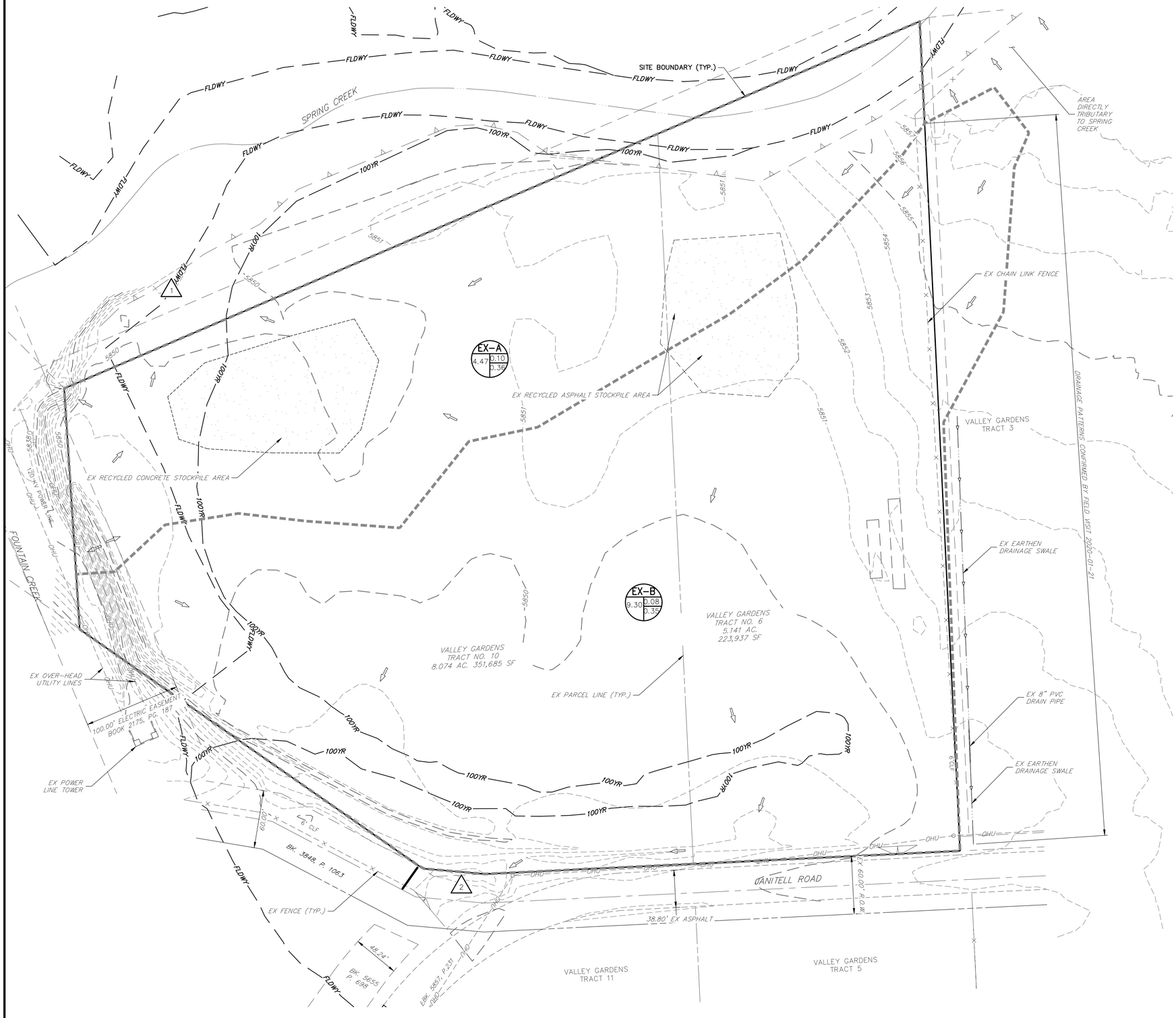
* IF OUTLET PIPE IS A BOX CULVERT WITH A WIDTH GREATER THAN W, THEN W = CULVERT WIDTH

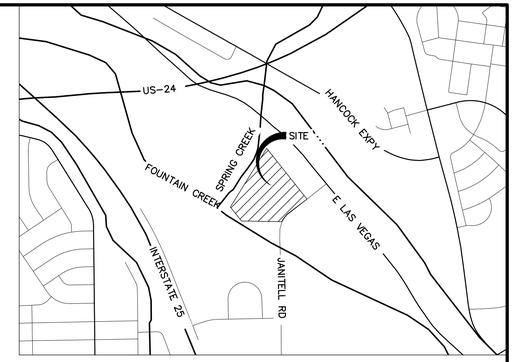
Figure 9-37. Low tailwater riprap basin

APPENDIX C

DRAINAGE MAPS

ASPHALT CONCRETE RECYCLING
EXISTING CONDITIONS DRAINAGE MAP





VICINITY MAP
SCALE: NTS

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
EX-A	4.47	3%	0.10	0.36	36.6	1.0	6.0
EX-B	9.30	5%	0.09	0.36	31.7	1.9	13.3

DESIGN POINT SUMMARY TABLE

DP	Q5	Q100
1	1.0	6.0
2	1.9	13.3

LAYER LINETYPE LEGEND

	EXISTING	PROPOSED
SECTION LINE		
BOUNDARY LINE		
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
ELECTRIC	E	E
FIBER OPTIC	FO	FO
GAS MAIN	G	G
IRRIGATION MAIN	IRR	IRR
OVERHEAD UTILITY	OHU	OHU
SANITARY SEWER	S	S
STORM SEWER		
TELEPHONE	T	T
WATER MAIN	W	W
SWALE/WATERWAY FLOWLINE		
INDEX CONTOUR	6100	6100
INTERMEDIATE CONTOUR		
DEPRESSION CONT. (INDEX)	6100	6100
DEPRESSION CONT. (INTER)		
CURB & GUTTER		
WALL		

BASIN ID — ID / AC / C5 / C100

DESIGN POINT DESIGNATION — 4

FLOW DIRECTION (PROPOSED)
FLOW DIRECTION (EXISTING)
SUB-BASIN DRAINAGE AREA

50 25 0 50 100
ORIGINAL SCALE: 1" = 50'

2000-5176.00
ASPHALT CONCRETE RECYCLING
EXISTING CONDITIONS DRAINAGE MAP
2020-01-20
SHEET 1 OF 1

J·R ENGINEERING
A Westrian Company
Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

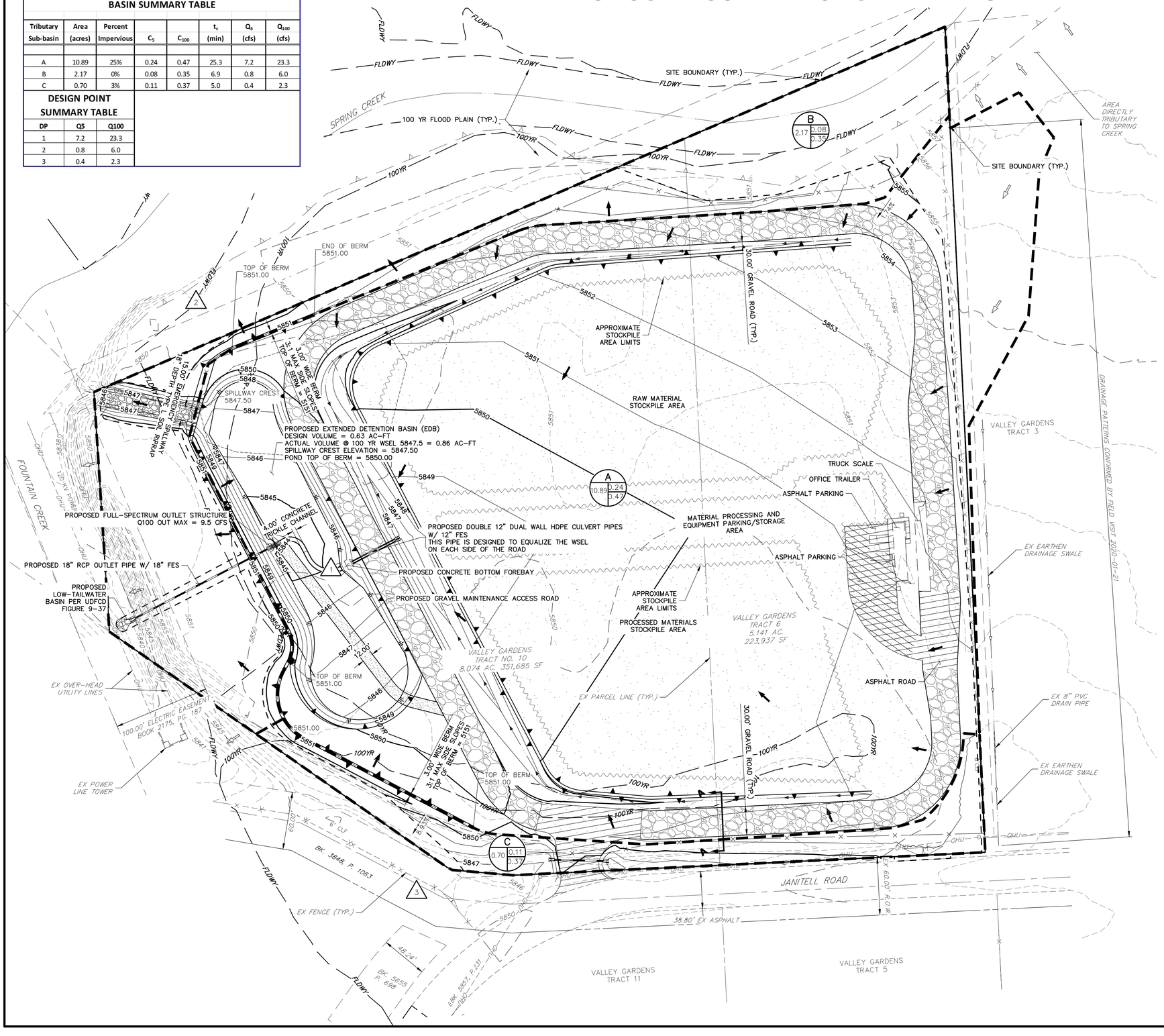
ASPHALT CONCRETE RECYCLING
PROPOSED CONDITIONS DRAINAGE MAP

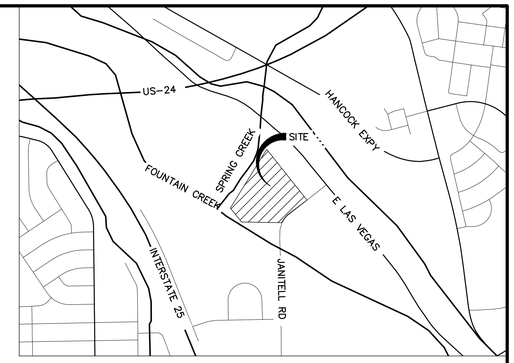
BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
A	10.89	25%	0.24	0.47	25.3	7.2	23.3
B	2.17	0%	0.08	0.35	6.9	0.8	6.0
C	0.70	3%	0.11	0.37	5.0	0.4	2.3

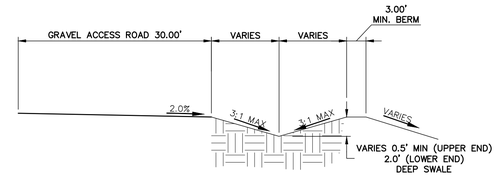
DESIGN POINT SUMMARY TABLE

DP	Q5	Q100
1	7.2	23.3
2	0.8	6.0
3	0.4	2.3





VICINITY MAP
SCALE: NTS



A-A TYPICAL DIVERSION DITCH CROSS SECTION
NTS

NOTE:

1. SEE GESC PLANS FOR POND STRUCTURE DETAILS

LAYER LINETYPE LEGEND

	EXISTING	PROPOSED
SECTION LINE		
BOUNDARY LINE		
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
ELECTRIC	E	E
FIBER OPTIC	FO	FO
GAS MAIN	G	G
IRRIGATION MAIN	IRR	IRR
OVERHEAD UTILITY	OHU	OHU
SANITARY SEWER	S	S
STORM SEWER		
TELEPHONE	T	T
WATER MAIN	W	W
SWALE/WATERWAY FLOWLINE		
INDEX CONTOUR	6100	6100
INTERMEDIATE CONTOUR		
DEPRESSION CONT. (INDEX)	6100	6100
DEPRESSION CONT. (INTER)		
CURB & GUTTER		
WALL		

BASIN ID — ID / AC / C5 / C100

DESIGN POINT DESIGNATION — 4

FLOW DIRECTION (PROPOSED)
FLOW DIRECTION (EXISTING)
SUB-BASIN DRAINAGE AREA

50 25 0 50 100
ORIGINAL SCALE: 1" = 50'

2000-5176.00
ASPHALT CONCRETE RECYCLING
PROPOSED CONDITIONS DRAINAGE MAP
2020-05-21
SHEET 1 OF 1

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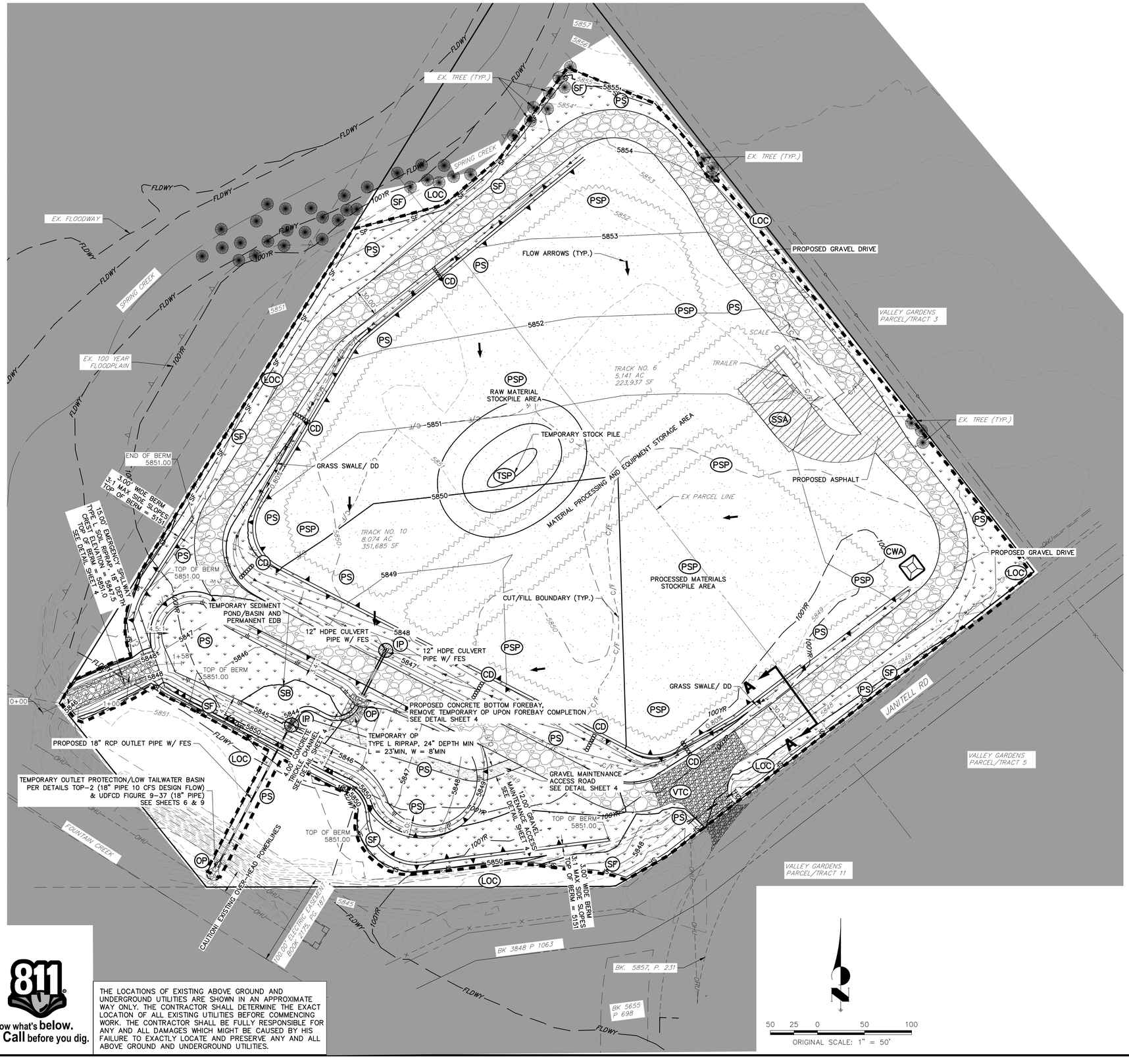
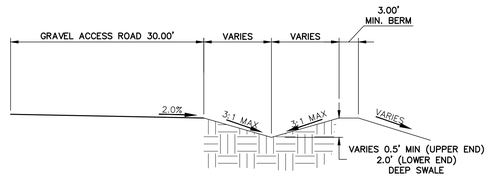
A Westrian Company
Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com





TYPICAL DIVERSION DITCH CROSS SECTION
A–A
NTS

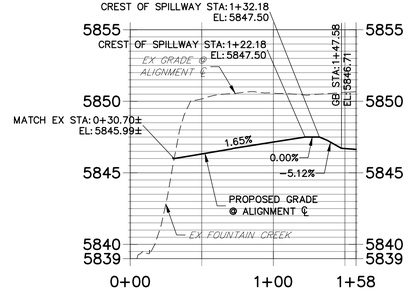
LEGEND

TEMPORARY SEDIMENT BASIN	SB	TOE / TOP
SILT FENCE	SF	SF
STABILIZED STAGING AREA	SSA	
VEHICLE TRACKING CONTROL	VTC	
TEMPORARY STOCK PILE	TSP	
EROSION CONTROL BLANKET	ECB	
INLET PROTECTION	IP	
OUTLET PROTECTION	OP	
LIMITS OF CONSTRUCTION	LOC	
CONCRETE WASHOUT AREA	CWA	
PERMANENT SEEDING	PS	
CHECK DAM	CD	
PERMANENT STOCK PILE	PSP	

GROUND COVER LEGEND

GRAVEL	
PERMANENT MATERIAL STOCKPILES	
PERMANENT SEEDING	
ASPHALT PAVING	

EMERGENCY SPILLWAY PROFILE STA 0+00.00 TO 1+57.79



811 Know what's below. Call before you dig.

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Fort Collins 970-491-9888 • www.jrengineering.com

BY	DATE	No.	REVISION

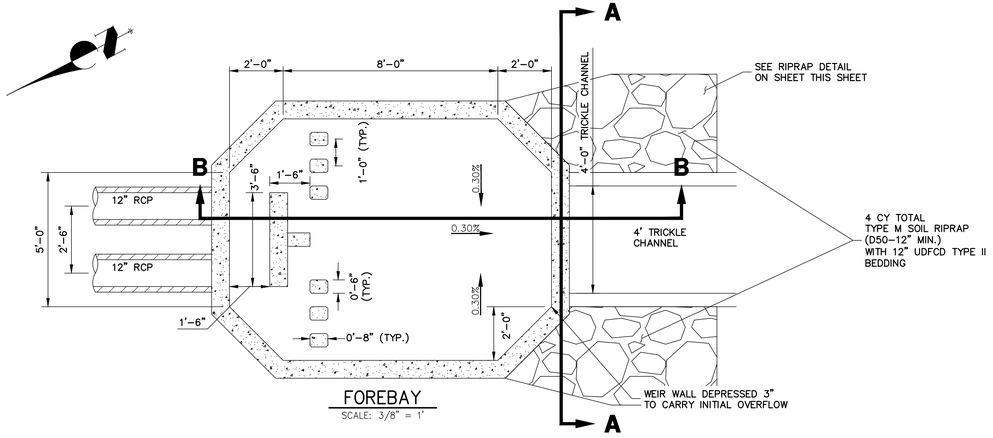
H-SCALE	1"=50'
V-SCALE	N/A
DATE	05/21/20
DESIGNED BY	RB
DRAWN BY	JEA
CHECKED BY	

ACR SITE DEVELOPMENT PLAN

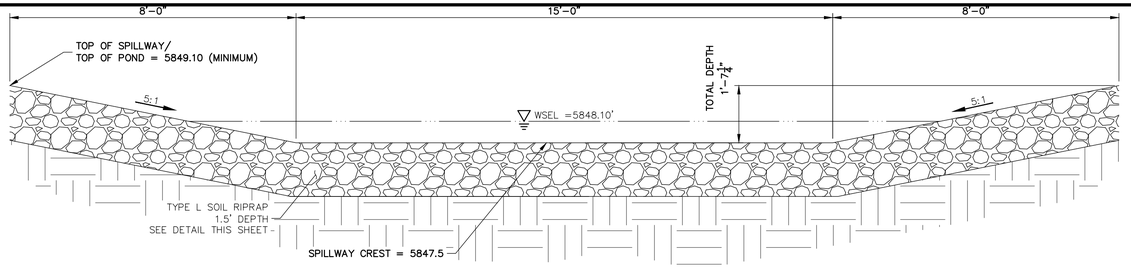
GRADING AND EROSION CONTROL PLAN

SHEET 3 OF 9

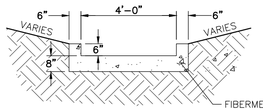
JOB NO. 25176.00



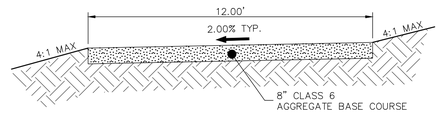
FOREBAY
SCALE: 3/8" = 1'



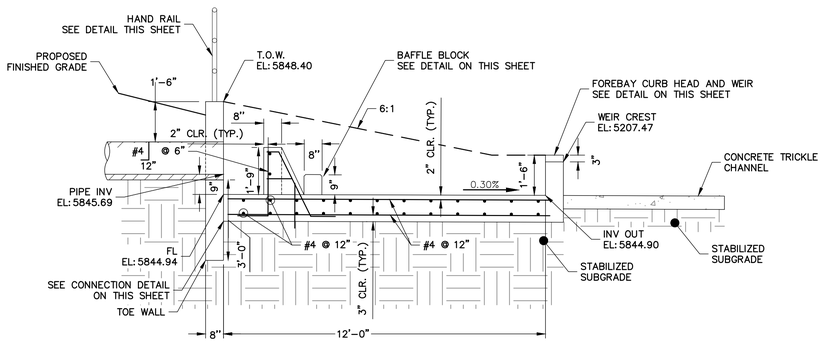
POND EMERGENCY SPILLWAY
SCALE: N.T.S.



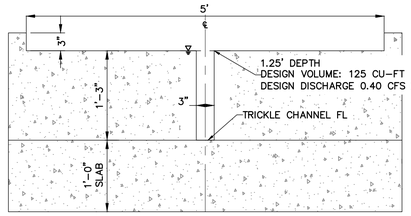
POND TRICKLE CHANNEL
N.T.S.



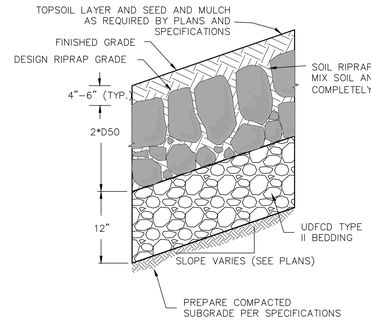
GRAVEL MAINTENANCE ACCESS ROAD TYPICAL SECTION
N.T.S.



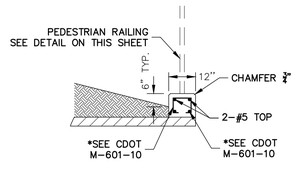
FOREBAY SECTION B–B
SCALE: 3/8" = 1'



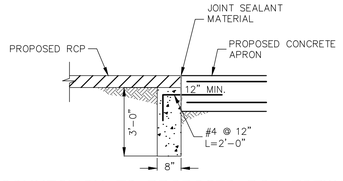
A FOREBAY
SCALE: 1" = 1'



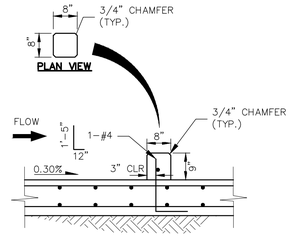
SOIL RIPRAP EMBANKMENT PROTECTION WITH BEDDING TYP. SECTION
N.T.S.



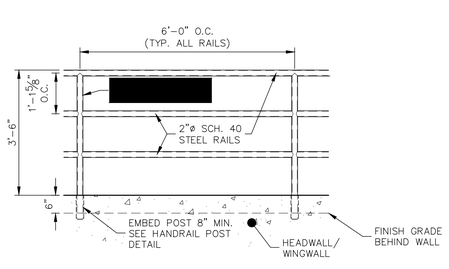
RCP HEADWALL
SCALE: N.T.S.



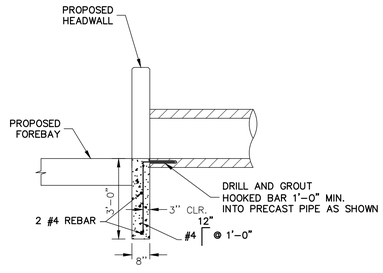
CONNECTION TO PROPOSED RCP TOEWALL
SCALE: N.T.S.



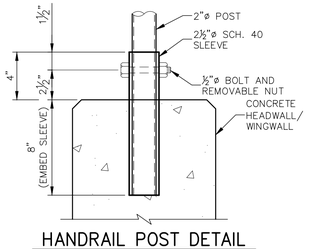
FOREBAY BAFFLE BLOCK SECTION
SCALE: 1/2"=1'



PEDESTRIAN RAILING DETAIL
SCALE: 1/2"=1'



RCP TOEWALL
SCALE: N.T.S.



HANDRAIL POST DETAIL
SCALE: 1"=6"

TYPE M RIPRAP

INTERMEDIATE ROCK DIMENSION (IN.)	PERCENT PASSING (%)
21	70–100
18	50–70
12	35–50
4	2–10

*TYPE M RIPRAP Dso=12".
Dso = MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.

RIPRAP NOTES:

1. SOIL RIPRAP DETAILS ARE APPLICABLE TO SLOPED AREAS. REFER TO THE SITE PLAN ACTUAL LOCATION AND LIMITS.
2. MIX UNIFORMLY 65% RIPRAP BY VOLUME WITH 35% OF APPROVED SOIL BY VOLUME PRIOR TO PLACEMENT.
3. PLACE STONE–SOIL MIX TO RESULT IN SECURELY INTERLOCKED ROCK AT THE DESIGN THICKNESS AND GRADE. COMPACT AND LEVEL TO ELIMINATE ALL VOIDS AND ROCKS PROJECTING ABOVE DESIGN RIPRAP TOP GRADE.
4. CRIMP OR TACKIFY MULCH OR USE APPROVED HYDROMULCH AS CALLED FOR IN THE PLANS AND SPECIFICATIONS.
5. ROCK SHALL BE HARD, DURABLE, ANGULAR IN SHAPE, AND FREE FROM CRACKS, OVERBURDEN, SHALE, AND ORGANIC MATTER.
6. NEITHER BREADTH NOR THICKNESS OF A SINGLE STONE SHOULD BE LESS THAN ONE–THIRD ITS LENGTH, AND ROUNDED STONE SHOULD BE AVOIDED.
7. THE ROCK SHOULD SUSTAIN A LOSS OF NOT MORE THAN 40% AFTER 500 REVOLUTIONS IN AN ABRASION TEST (LOS ANGELES MACHINE ASTM C–535–69) AND SHOULD SUSTAIN A LOSS OF NOT MORE THAN 10% AFTER 12 CYCLES OF FREEZING AND THAWING (AASHTO TEST 103 FOR LEDGE ROCK PROCEDURE A).
8. ROCK HAVING A MINIMUM SPECIFIC GRAVITY OF 2.65 IS PREFERRED; HOWEVER, IN NO CASE SHOULD ROCK HAVE A SPECIFIC GRAVITY LESS THAN 2.50.

CAST-IN-PLACE STRUCTURAL NOTES:

1. ALL CONCRETE SHALL BE CLASS D IN ACCORDANCE WITH CDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.
3. ALL CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS SHALL BE APPROVED BY THE ENGINEER.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.
5. STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH CDOT STD. M–206–1.
6. DO NOT BACKFILL UNTIL CONCRETE HAS REACHED DESIGN STRENGTH, F'c.
7. GRADE 60 REINFORCING STEEL AND EPOXY COATED ARE REQUIRED.
8. THE MINIMUM LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS SHALL BE:

BAR SIZE:	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH:	1'–3"	1'–6"	1'–10"	2'–2"	3'–8"	4'–8"	5'–11"	7'–3"

9. THE MINIMUM LAP SPLICE LENGTH FOR BLACK REINFORCING BARS SHALL BE:

BAR SIZE:	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH:	1'–0"	1'–4"	1'–7"	1'–10"	2'–5"	3'–1"	3'–11"	4'–10"

10. REINFORCING BARS SHALL BE DEFORMED AND SHALL HAVE A MINIMUM OF 2" CLEARANCE.
11. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED ¾".
12. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATIONS OF EXISTING STRUCTURES AND EXISTING UTILITIES, PRIOR TO CONSTRUCTION OF THE CAST–IN–PLACE STRUCTURES. FIELD MODIFICATIONS OF PRECAST UNITS TO ACCOMMODATE CAST–IN–PLACE STRUCTURES WILL ONLY BE ACCEPTABLE WITH THE ENGINEER'S APPROVAL.
13. CONTRACTOR SHALL SUBMIT STEEL REINFORCING SHOP DRAWINGS FOR ALL CAST–IN–PLACE STRUCTURES FOR ENGINEER'S APPROVAL PRIOR TO CONSTRUCTION.

WALL NOTES:

1. HEADWALLS FOR PIPES SHALL BE CONSTRUCTED IN ACCORDANCE WITH CDOT STANDARD PLAN M–601–10.
2. WINGWALLS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CDOT STANDARD PLAN M–601–20.

ENGINEER'S STATEMENT

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLANS.

COLORADO REGISTERED MIKE A. BRAMLETT 32314 PROFESSIONAL ENGINEER

MIKE A. BRAMLETT, P.E. — DATE
COLORADO P.E. 32314
FOR AND ON BEHALF OF JR ENGINEERING, LLC

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

PREPARED FOR
ACR SITE DEVELOPMENT
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(719) 338–9902
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A Westrian Company
Centennial 303–740–9393 • Colorado Springs 719–593–2593
Fort Collins 970–491–9888 • www.jrengineering.com

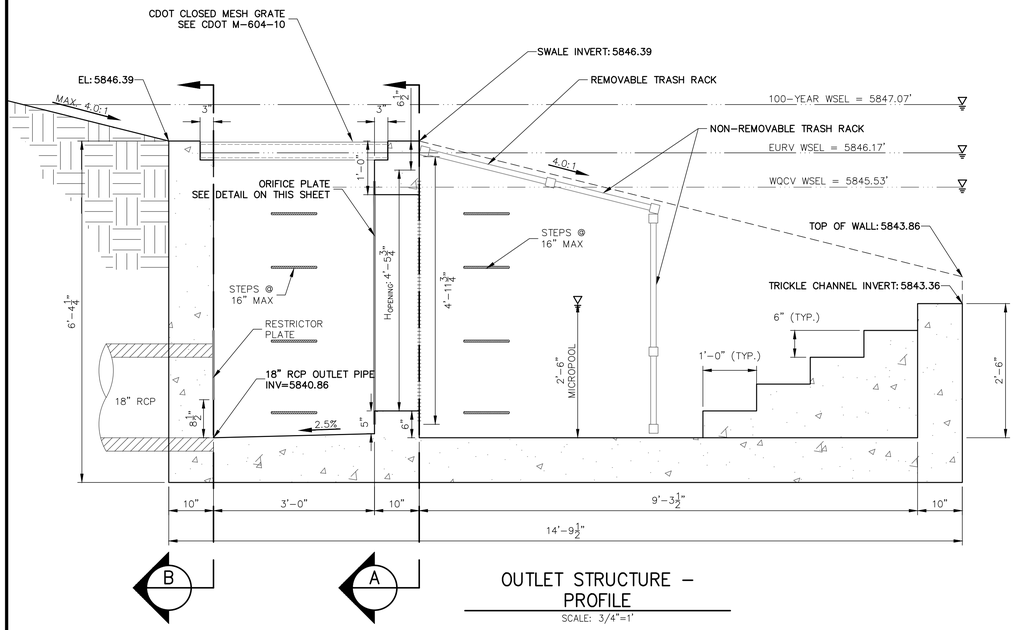
No.	REVISION	BY	DATE

H–SCALE AS SHOWN | DESIGNED BY RB
V–SCALE AS SHOWN | DRAWN BY JEA
DATE 05/21/20 | CHECKED BY

ACR SITE DEVELOPMENT PLAN
POND STRUCTURE DETAILS

SHEET 4 OF 9
JOB NO. 25176.00

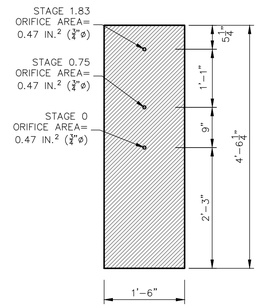
X:\25\10000.all\25176000\Drawings\Sheet Dwgs\GESC\25176000POND_DT01.dwg, POND STRUCTURE DETAILS, 5/21/2020 10:39:56 AM, CS



OUTLET STRUCTURE – PROFILE

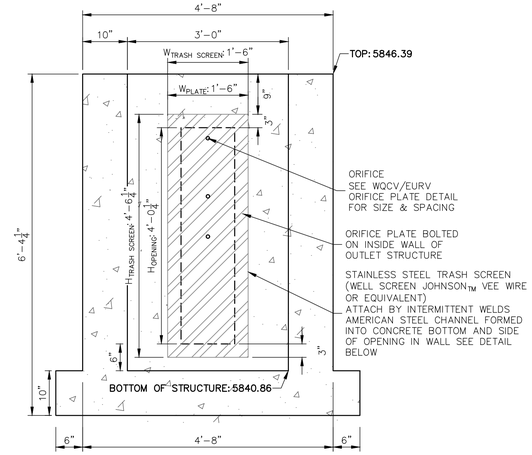
SCALE: 3/4"=1'

EURV/WQCV ORIFICE PLATE:
4'-6¼" x 1'-6" x ½" THICK FLOW GALVANIZED STEEL FLOW CONTROL PLATE. PROVIDE CONTINUOUS NEOPRENE GASKET MATERIAL BETWEEN THE ORIFICE PLATE AND CONCRETE. BOLT PLATE TO CONCRETE @ 12" MAX O.C., 1½" FROM PLATE EDGE.



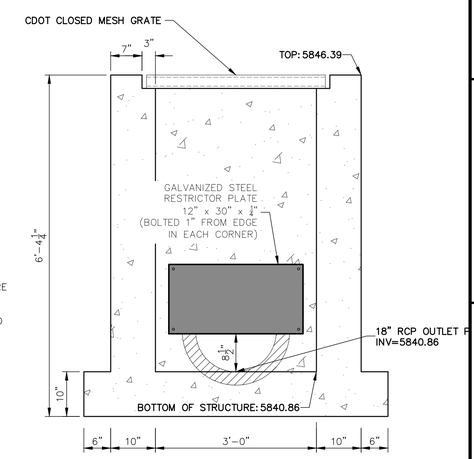
WQCV/EURV ORIFICE PLATE DETAIL

SCALE: 3/4"=1'



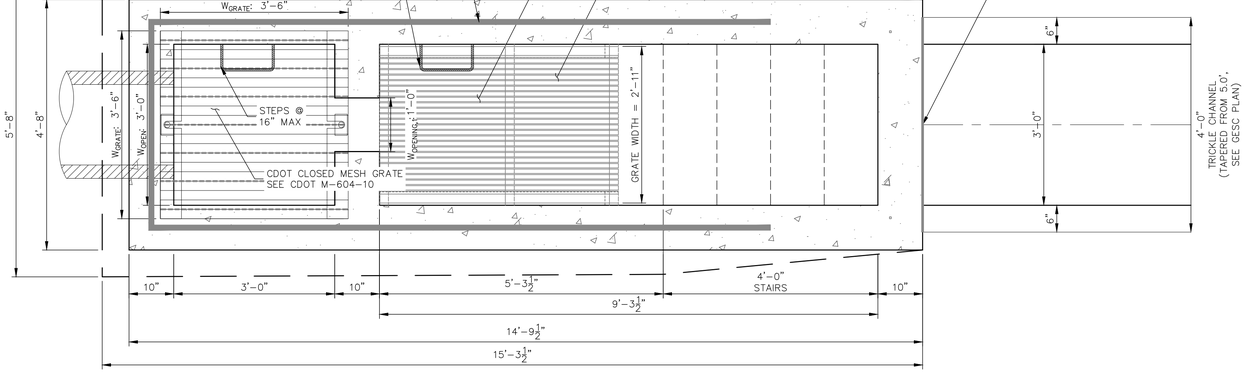
A SECTION A AT ORIFICE (FRONT) WALL

SCALE: 3/4"=1'



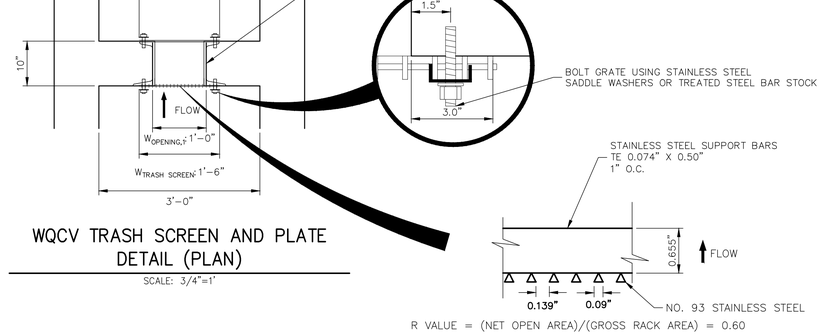
B SECTION B AT OUTLET (REAR) WALL

SCALE: 3/4"=1'



OUTLET STRUCTURE – PLAN

SCALE: 3/4"=1'



WQCV TRASH SCREEN AND PLATE DETAIL (PLAN)

SCALE: 3/4"=1'

R VALUE = (NET OPEN AREA)/(GROSS RACK AREA) = 0.60

TRASH SCREEN DETAIL

N.T.S.

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H-SCALE 3/4" = 1'
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ACR SITE DEVELOPMENT PLAN

POND STRUCTURE DETAILS

SHEET 5 OF 9

JOB NO. 25176.00