Community & Economic
Development Department
www.adcogov.org

ADAMS COUNTY
COLORADO

4430 South Adams County Parkway
1st Floor, Suite W2000B
Brighton, CO 80601-8218
PHONE 720.523.6800
FAX 720.523.6967

Development Team Review Comments

The following comments have been provided by reviewers of your land use application. At this time, a resubmittal of your application is required before this case is ready to be scheduled for public hearing.

To prepare your resubmittal, you will be expected to provide:

- A response to each comment with a description of the revisions and the page of the response on the site plan;
- Any revised plans or renderings; and
- A list identifying any additional changes made to the original submission other than those required by staff.

Resubmittal documents must be provided electronically through e-mail or a flash drive delivered to the One-Stop Customer Service Center. The following items will be expected by our One-Stop Customer Service Center:

- One digital copy of all new materials
  - All digital materials shall be in a single PDF document
  - The single PDF document shall be bookmarked
  - If a Subdivision Improvements Agreement, Legal Description, or Development Agreement is required, then an additional Microsoft Word version of these documents shall also be provided
  - Electronic copies can be emailed to epermitcenter@adcogov.org as a PDF attachment. If the files are too large to attach, the email should include an unlocked Microsoft OneDrive link. Alternatively, the resubmittal can be delivered to the One-Stop counter on a flash drive.

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4430 South Adams County Parkway
1st Floor, Suite W2000
Brighton, CO 80601-8204
PHONE 720.523.6800
FAX 720.523.6998

Re-submittal Form

Case Name/ Number: RCU2023-00001

Case Manager: David DeBoskey

Re-submitted Items:

- [ ] Development Plan/ Site Plan
- [ ] Plat
- [ ] Parking/ Landscape Plan
- [X] Engineering Documents
- [ ] Subdivision Improvements Agreement (Microsoft Word version)
- [X] Other: Planner, Environment, Plan Coordination

*** All re-submittals must have this cover sheet and a cover letter addressing review comments.**

Please note the re-submittal review period is 21 days.

The cover letter must include the following information:

- Restate each comment that requires a response
- Provide a response below the comment with a description of the revisions
- Identify any additional changes made to the original document

For County Use Only:

Date Accepted:

Staff (accepting intake):

Resubmittal Active: Engineering; Planner; ~~Right-of-Way; Addressing; Building Safety~~; ~~Neighborhood Services~~; Environmental; ~~Parks; Attorney; Finance~~; Plan Coordination

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4430 South Adams County Parkway
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PHONE 720.523.6880
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EMAIL: epermitcenter@adcogov.org

Development Review Team Comments

Date: 2/13/2023

Project Number: RCU2023-00001

Project Name: GCSA Event Center Conditional Use Permit, Amendment No. 1

Commenting Division: Planner Review

Name of Reviewer: David DeBoskey

Date: 02/13/2023

Email:

Resubmittal Required

PLN01:

Because the county has not received anything regarding the previous application: RCU2021-00023, we want to ensure you still intend to fulfill the conditions precedent. Until all those conditions are met, the Event Center use is NOT allowed on 6539 Imboden Rd.

Please inform us if you intend to do all the conditions precedent, or if you would like this process to be a separate Conditional Use Permit, which is the same process and timeline as this amendment. If you still intend on the original CUP, let's discuss your progress. I want to do an entirely new CUP. I would still hold events. I will now be using the 13,200 sq ft building and 10 acres. The parking lot numbers per code 330 + 8 handicap and I provided 331 + 12 handicap and it is made up of asphalt recycle. The capacity is unknown at this time. Waiting for the approval of permit BDP22-2209. I have applied for a permit to build a new 6' fence, permit BDP22-2098 was issued on November 8,2022. Final inspection was done on December 15, 2022

Please refer to the, previously given to you, approval resolution for guidance on the conditions precedent.

PLN02:

Bennett Fire will have comments on this application. They will be sent to you at a later date.NOTED

Commenting Division: Environmental Analyst Review

Name of Reviewer: Katie Keefe

Date: 02/09/2023

Email:

Resubmittal Required

ENV1.Has the applicant obtained an onsite wastewater system USE permit from the health department for the additional and expanded use of the property?Permit is uploaded.

ENV2. The applicant must provide data on the indoor water usage and event population for the time period the event center has been in use. NOTED

ENV3. The applicant may need a permit for the expanded use, which impacts the volume of wastewater generation. NOTED

ENV3. Any onsite wastewater treatment system that handles more than 2000 GPD is subject to state (CDPHE) permitting.NOTED

More information is available at https://adamscountyhealthdepartment.org/septic-system-and-use-permits. Septic system applications can be mailed or dropped off at the S. Platte Crossing office or emailed to EHWaterProgram@adcogov.org

ENV4. Can the applicant provide documentation of a commercial groundwater well permit from the Division of Water Resources?Yes, it is included in this submittal.

ENV5. If the commercial well water system serves 25 or more persons on average, a minimum of 60 days per year it is subject to regulation by the Colorado Department of Public Health and Environment (CDPHE) as a non-community drinking water system. If the water system is not approved by CDPHE, or if it will need to be expanded, or to determine if the system meets the definition of a PWS, the applicant shall contact the CDPHE Drinking Water Section at (303) 692-3500 or https://www.colorado.gov/pacific/cdphe/drinking-water to determine requirements for the drinking water system. I am working with someone.

ENV6. Please provide specific information on measures that will be employed to control expected increase in fugitive dust and noise from the expanded use of the event center. Fence and landscaping has been installed on all four property corners. The driveway and parking lot are composed of asphalt recycle. I will water and compact after each event.

Commenting Division: Development Engineering Review

Name of Reviewer: Laurie Clark

Date: 02/09/2023

Email:

Resubmittal Required

ENG1: Flood Insurance Rate Map – FIRM Panel # (08001C0680H), Federal Emergency Management Agency, January 20, 2016. According to the above reference, the project site is NOT located within a delineated 100-year flood hazard zone; a floodplain use permit will not be required. NOTED.

ENG2: The project site is NOT within the County's MS4 Stormwater Permit area. Proposed improvements appear to disturb more than one (1) acre, therefore a State Permit COR400000 will be required. Applicant is responsible for installation and maintenance of Erosion and Sediment Control BMPs. Builder/developer is responsible for adhering to all the regulations of Adams County Ordinance 11 regarding illicit discharge. The applicant shall be responsible to ensure compliance with all Federal, State, and Local water quality construction requirements. . STATE PERMIT is provided with this submittal.

ENG3: Access shall comply with Access Permit ACC2020-00107. NOTED: NO CHANGES TO ACCESS PROPOSED.

ENG4: The Drainage Letter submitted previously under RCU2021-00023 shall be updated to reflect the proposed changes to the site. DRAINAGE LETTER REVISED FOR THIS SUBMITTAL.

ENG5: The Traffic Impact Study submitted previously under RCU2021-00023 shall be updated to reflect the proposed changes to the site. WAITING FOR REPORT, ONCE RECEIVED WILL UPLOAD

ENG6: The applicant is required to submit for review and receive approval of all construction documents (construction plans and reports) under the Adams County EGR process. Construction documents shall include, at a minimum, onsite and public improvements construction plans, drainage report, and traffic impact study. All construction documents must meet the requirements of the Adams County Development Standards and Regulations. NOTED: CONSTRUCTION PLANS HAVE BEEN UPDATED.

ENG7: The developer is required to construct roadway improvements and a turn lane adjacent to the proposed site as required by the approved traffic impact study. NOTED

ENG8: No building permits will be issued until all public improvements have been constructed, inspected and preliminarily accepted by the Adams County Public Works Department. NOTED

ENG9: The developer is responsible for the repair or replacement of any broken or damaged public infrastructure. NOTED

Commenting Division: Building Safety Review

Name of Reviewer: Heather Whitaker

Date: 01/26/2023

Email:

Complete

BSD1- Building permits would be required for each structure. Engineered plans will be required to obtain permits. NOTED

BSD2- Applicant should refer to commercial and industrial submittal requirements. Here is a link for your reference https://epermits.adcogov.org/sites/default/files/Commercial_Industrial%20Submittal%20Requirements_20_0.pdf NOTED

BSD3- Current adopted codes are the 2018 International Building Codes and the 2017 National Electrical Code. NOTED

BSD4- Applicant should contact Fire Department for their requirements. This is a separate permit, review, and inspection with your local fire department NOTED

WESTERN ENGINEERING CONSULTANTS, Inc LLC
127 S. Denver Avenue, Ft. Lupton, CO 80621
2501 Mill St. Brush, CO 80723
Office: 720-685-9951
Cell: 303-913-7341, Fax: 720-294-1330
Email: firstname.lastname@westerneci.com

March 01, 2023

Adams County Development Engineering Services
4430 S. Adams County Pkwy.
First Floor, Suite W2000B
Brighton, CO 80601

RE: ALDANA EVENT CENTER DRAINAGE NARRATIVE LETTER

Dear Adams County Engineering:

Western Engineering Consultants inc. LLC (WEC) appreciates the opportunity to submit this Drainage Narrative Letter for the Aldana Event Center on behalf of GCSA LLC.

The 39.90-acre property owned by GCSA LLC consists of a single parcel (0181706400006). The existing parcel is currently zoned A-3. This letter summarizes the drainage impact from the proposed improvements – asphalt millings driveway/access road, event center, asphalt millings parking lot, the proposed drainage swales, and the proposed Detention Pond.

Attached to this letter are the following:

- Vicinity Map
- Key map (Google Exhibit)
- FEMA Firmette
- NRCS Soils Report
- WEC Construction Plans
- Rational Method Runoff Calculations
- Drainage Swale Capacity Calculations

FLOODPLAIN
Pursuant to the attached exhibit (the current FEMA) – the entire property is **not** within a current or expected amended floodplain. It is located within an Area of Minimal Flood Hazard (Zone X) as seen in FIRM panel 08001C0680J dated September 28, 2018.

PARCEL DESCRIPTION
The property lies approximately 4,300 feet south of E 72th Ave, with Imboden Road along its east property line. The entire property is located in the Southeast 1/4 of Section 6, Township 3 South, Range 64 West of the 6th P.M. The existing site is currently undeveloped.

This site lies approximately 3 miles southeast of Denver International Airport and approximately 2.6 miles northwest of Colorado Air and Space Port. This site does fall under height restrictions from both airports, however since the site does not fall directly in line with a runway, the height of the building (35') falls well under the maximum allowable height per each airport's Part 77 surface.

MAJOR DRAINAGE STUDIES

This site is included in two major drainage studies – the *Box Elder Creek (Downstream of Jewell Avenue), Bear Gulch, and Coyote Run Major Drainageway Plan (2014 MDP)* prepared by Olsson Associates dated August 2014, and the *Preliminary Design Report for Lower Box Elder Creek Watershed Outfall Systems Planning (2001 OSP)* prepared by Wright Water Engineers, Inc. dated October 2001.

Both above-mentioned studies include this site within basin BG-77, Design Element 261, and assume an existing impervious value of 2.0% and a future impervious value of 85.0%. The existing and future runoff values can be seen in the table included in Appendix A under Design Point JUNCT_6261. The existing 10-year and 100-year peak flow values for Basin BG-77 are 98 cfs and 314 cfs, respectively.

PROPOSED IMPROVEMENTS

The overall 39.90-acre site has been designed to adequately convey developed runoff from the proposed improvements as well as the tributary offsite basins to the existing low point in the northeast corner of the site, following existing flow patterns. The developed runoff from the proposed parking lot improvements shall be routed to and treated by a proposed Detention Pond before being released into the existing drainageway that runs through the site.

A 26 foot gravel driveway/access road is proposed off Imboden Road that will provide access to the proposed event center. The access road has been designed to generally follow existing grades in order to maintain existing flow patterns. A 36” culvert is proposed where the access road will cross over an existing natural drainageway that runs through the site.

WEC has prepared and analyzed preliminary grading concepts for each basin and enclosed drainage calculations based on the proposed improvements of the overall property.

HISTORIC / EXISTING RATIONAL DRAINAGE DESCRIPTION

The entire 39.88-acre property has been mapped as a single Historic Basin.

Historically, the site drained towards the existing natural drainageway through the center of the site at roughly 2.4% (per USGS Manila, CO Quad Map). The runoff calculated for the 39.88-acre Historic Basin is 1.32 cfs and 46.05 cfs for the minor (5yr) and major (100yr) storm events, respectively.

The existing site was broken into three Existing Basins (E1, E2, and E3).

Basin E1 (1.69 acres) consists of the northwestern corner of the site that generally drains northwest and ultimately off-site at roughly 2.9%. The existing effective imperviousness for the basin is 31.27% as it contains the portion of the existing asphalt millings parking lot that has been installed for the proposed event center. The runoff calculated is 1.32 cfs and 4.86 cfs for the minor (5yr) and major (100yr) storm events, respectively.

Basin E2 (1.83 acres) consists of southwestern corner of the site that generally drains south and ultimately off-site at roughly 2.4%. The existing effective imperviousness for the basin is 11.01% as it contains a portion of the existing event center and a portion of the existing asphalt millings driveway/access road. The runoff calculated is 0.54 cfs and 6.45 cfs for the minor (5yr) and major (100yr) storm events, respectively.

Basin E3 (37.28 acres) consists of the remainder of the site east of the event center that generally drains from the highpoint of the site, at the event center location, east towards the existing natural drainageway through the site, and ultimately offsite at roughly 2.2%. The existing drainageway conveys water from the northeast corner of the site to the existing 36” culvert pair under Imboden Road (roughly 100 feet north of this site). The existing effective imperviousness for the basin is 4.59% as it contains a portion of the existing event center and a majority of the existing asphalt millings driveway/access road to the proposed building. The runoff calculated is 3.45 cfs and 72.51 cfs for the minor (5yr) and major (100yr) storm events, respectively.

DEVELOPED RATIONAL DRAINAGE ANALYSIS

Appendix B includes all Rational Method runoff calculations summarizing the 5, 10, and 100 year event runoff the proposed Developed Basins.

Currently, the grading and drainage design is intended to convey a majority of the runoff on site to the existing low point of the site following existing flow patterns through the use of drainage swales and road culverts. The developed runoff from the proposed parking lot improvements shall be routed to and treated by a proposed Detention Pond before being released into the existing drainageway that runs through the site. The portions of this site that are not proposed to be improved will continue to follow existing drainage patterns.

The site was broken into four developed basins (P1, P2, P3, & P4).

Basin P1 (1.61 acres) contains the northwestern corner of the site. Proposed improvements to this basin include fine grading and expansion of the asphalt millings parking lot that has already been installed. The basin will drain as it currently does from the building to the northwest, and ultimately off-site at roughly 2.9%. The developed effective imperviousness for the basin is 35.94%. The runoff calculated is 1.45 cfs and 5.13 cfs for the minor (5yr) and major (100yr) storm events, respectively.

Basin P2 (1.22 acres) contains the southeastern corner of the site. Proposed improvements to this basin include fine grading of a portion of the asphalt millings access road/driveway that has already been installed and a portion of the proposed building. The basin will drain as it currently does from the building to the south, and ultimately off-site at roughly 2.4%. The developed effective imperviousness for the basin is 15.49%. The runoff calculated is 0.52 cfs and 4.55 cfs for the minor (5yr) and major (100yr) storm events, respectively.

Basin P3 (11.42 acres) contains the portion of the site east of the event center and west of the existing drainageway though the site (roughly the extent of the proposed site improvements). Proposed improvements to this basin include a fine grading of the access road/driveway that has already been installed, the proposed extension of the asphalt millings parking lot, a portion of the proposed building, and the proposed drainage swales and Detention Pond. The basin will drain as it currently does from the building to the east and be captured by proposed drainage swales to be conveyed towards the proposed Detention Pond in the southeast corner of the basin. The developed effective imperviousness for the basin is 13.14%. The runoff calculated is 3.65 cfs and 35.00 cfs for the minor (5yr) and major (100yr) storm events, respectively. The Detention Pond has been designed to release into the existing drainageway within Basin P4.

Basin P4 (25.63 acres) contains the remainder of the site east of the proposed Detention Pond. Proposed improvements to this basin include a fine grading of the access road/driveway that has already been installed and the proposed drainageway enhancement in the northeast corner of the site. The basin will drain as it currently does from the access road towards the existing natural drainageway through the site, through the proposed drainageway enhancement, and ultimately offsite at the northeast corner of the site at roughly 2.2%. The existing drainageway conveys water from the northeast corner of the site to the existing 36” culvert pair under Imboden Road (roughly 100 feet north of this site). The developed effective imperviousness for the basin is 4.31%. The runoff calculated is 2.52 cfs and 38.42 cfs for the minor (5yr) and major (100yr) storm events, respectively.

CONVEYANCE DESIGN & ANALYSIS

The proposed grading of the site has been designed to adequately convey the developed runoff from this site to the proposed Detention Pond and ultimately to the existing low point in the northeast corner of the site through the use of drainage swales and road culverts, following existing flow patterns.

Proposed swales will capture proposed runoff from the event center, access road, and parking lot and convey it towards the proposed Detention Pond located just west of the existing natural drainageway that runs through the site. The Detention Pond will release runoff at a restricted rate per County Drainage Criteria into the existing drainageway. A drainageway enhancement swale has been designed in the northeast corner of the site in order to convey existing 100-year flows to the existing 36” culvert pair under Imboden Road without directing runoff onto the adjacent property to the north. The 36” culvert pair currently has capacity to convey 340 cfs, exceeding the existing 100-year event of 314 cfs.

A 24" culvert has been installed under the access road crossing of the existing natural drainageway. While this 24" culvert does allow flows to continue through this site without negatively effecting the surrounding properties, it is slightly undersized for the existing 10-year event of 98 cfs. A 36" culvert is therefore proposed to replace the existing 24" culvert in order sufficiently convey the existing 10-year flow rate.

Swale and culvert capacity calculations can be found in Appendix C.

STORMWATER DETENTION

Traditional stormwater storage and attenuation (water quality and detention) is currently proposed due to the proximity of the site to a major drainageway. A Detention Pond has been designed with an outlet structure and emergency overflow wall/channel and is proposed along the south of the site just west of the existing drainageway through the site.

Adams County Development Standards and Regulations and MHFD Drainage Criteria Volumes I-III were referenced for determining necessary storage volumes.

Four independent volumes were calculated – (1) WQCV, (2) Required 10 yr volume, (3) required 100 yr, volume, and (4) Available volume @ Emergency Overflow.

Detention Pond: (1) 3,662.2 cubic feet, (2) 6,345.3 cubic feet, (3) 22,140.2 cubic feet, and (4) 33,906.9 cubic feet.

Per Adams County Code section 9-01-11-01-01, the proposed Detention Pond is required to provide a minimum of 22,140.2 cubic feet to detain the 100-year storm runoff from the developed tributary basins. The designed detention pond has a capacity to store 33,906.9 cubic feet (the 100-year storm plus 1 foot of freeboard).

In accordance with MHFD and Adams County criteria, the max allowable release rates for the 11.42 developed tributary Basin P3 are 1.48 cfs and 9.71 cfs for the 5 year and 100 year storm events, respectively, based on the soil types of the basin. The proposed outlet structure has been designed to release the 5 year storm at a rate of 0.5 cfs and the 100 year storm at a rate of 9.70 cfs. Both the 5 and 100 year design release rates are below the allowable release rates per the Adams County Development Standards and Regulations (chapter 9, table 9.16). The restriction of the 100 year developed flow will result in off-site runoff from this site decreasing from 72.51 cfs (existing conditions – Basin E3) to 48.12 cfs (developed release rate plus Basin P4). The total developed runoff rate from Basins P3 and P4 of 48.12 cfs will significantly decrease the total flow within the existing drainageway through this site and into the existing regional facility just downstream of this site.

Water quality treatment for this site will be provided via overland runoff, the proposed drainage swales, and the proposed pond bottom and outlet structure. Since a majority of this site will remain undeveloped natural vegetation, all runoff from the proposed improvements will be treated as it is conveyed through the site. Most small storm events will infiltrate before leaving the site, and larger storm events will be routed through the proposed swales, detention pond, and existing drainageways through the site and released at the northeast corner of the site. The proposed drainageway enhancement will convey flows off-site without impacting the adjacent property to the north.

Per the 2001 OSP, an existing regional water quality and detention pond (BGO) existing approximately 100 feet north of this property on the east side of Imboden Road. The existing 36" culvert pair under Imboden discharges into this detention facility. The pond was designed to attenuate to existing imperviousness condition flow rates the flows from the developed imperviousness condition for the 10- and 100-year storm events and has a total volume of 34 acre-feet.

CONCLUSION

The proposed improvements for the Aldana Event Center will create additional imperviousness, however the attached drainage plan and supporting calculations enhance and significantly improve the current existing runoff conditions. The attached designs are intended to meet or exceed the minimum requirements of Adams County Storm Drainage and UDFCD criteria.

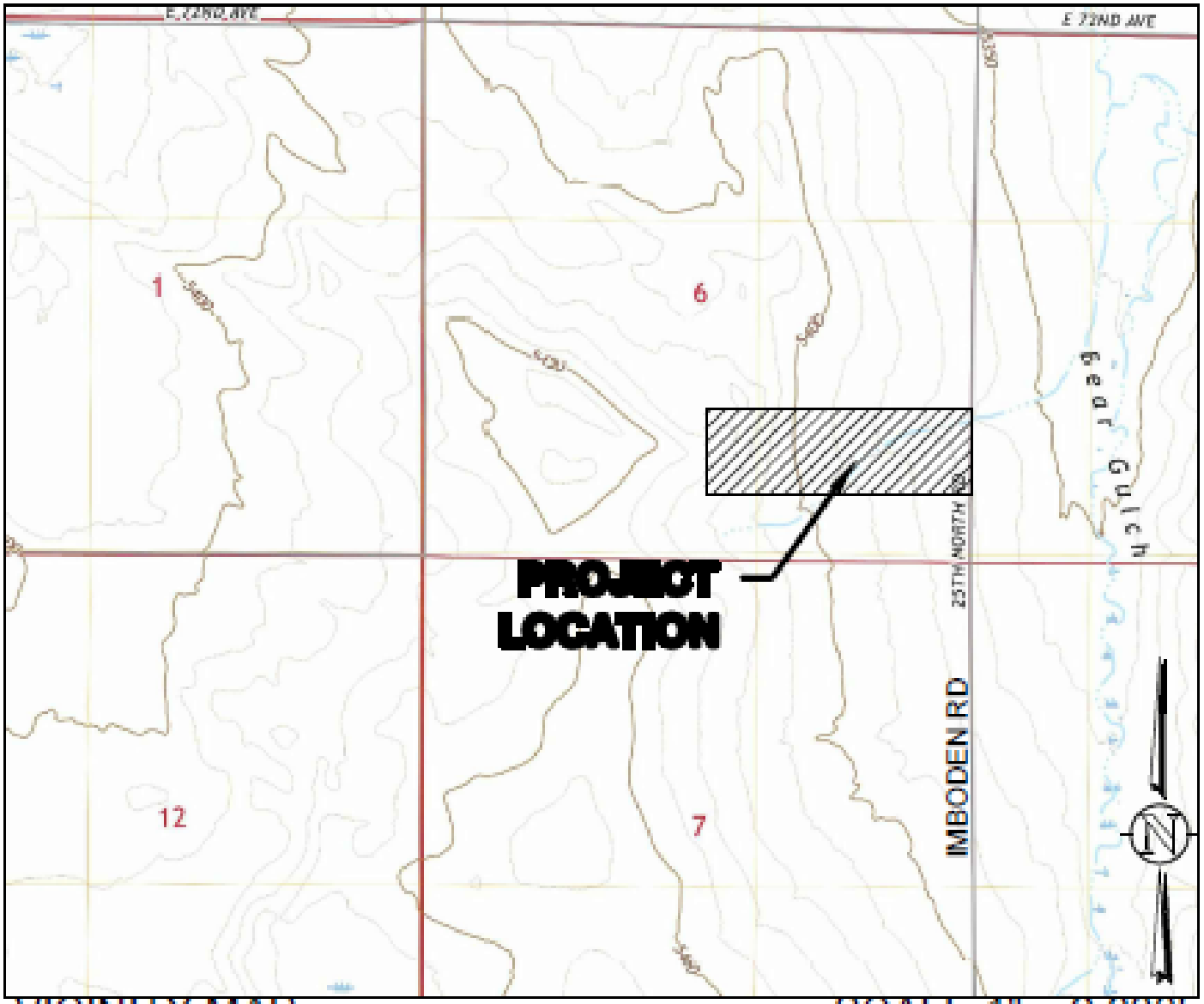
Sincerely,

Western Engineering Consultants inc., LLC
Chadwin F. Cox, P.E.
Senior Project Manager

Encl. Google Site Plan Exhibit, USGS Vicinity Map, NRCS Soils Report, WEC Drainage Plans, WEC Historic, Existing, & Developed Rational Drainage Calcs, and Swale Capacity Calculations

APPENDIX A

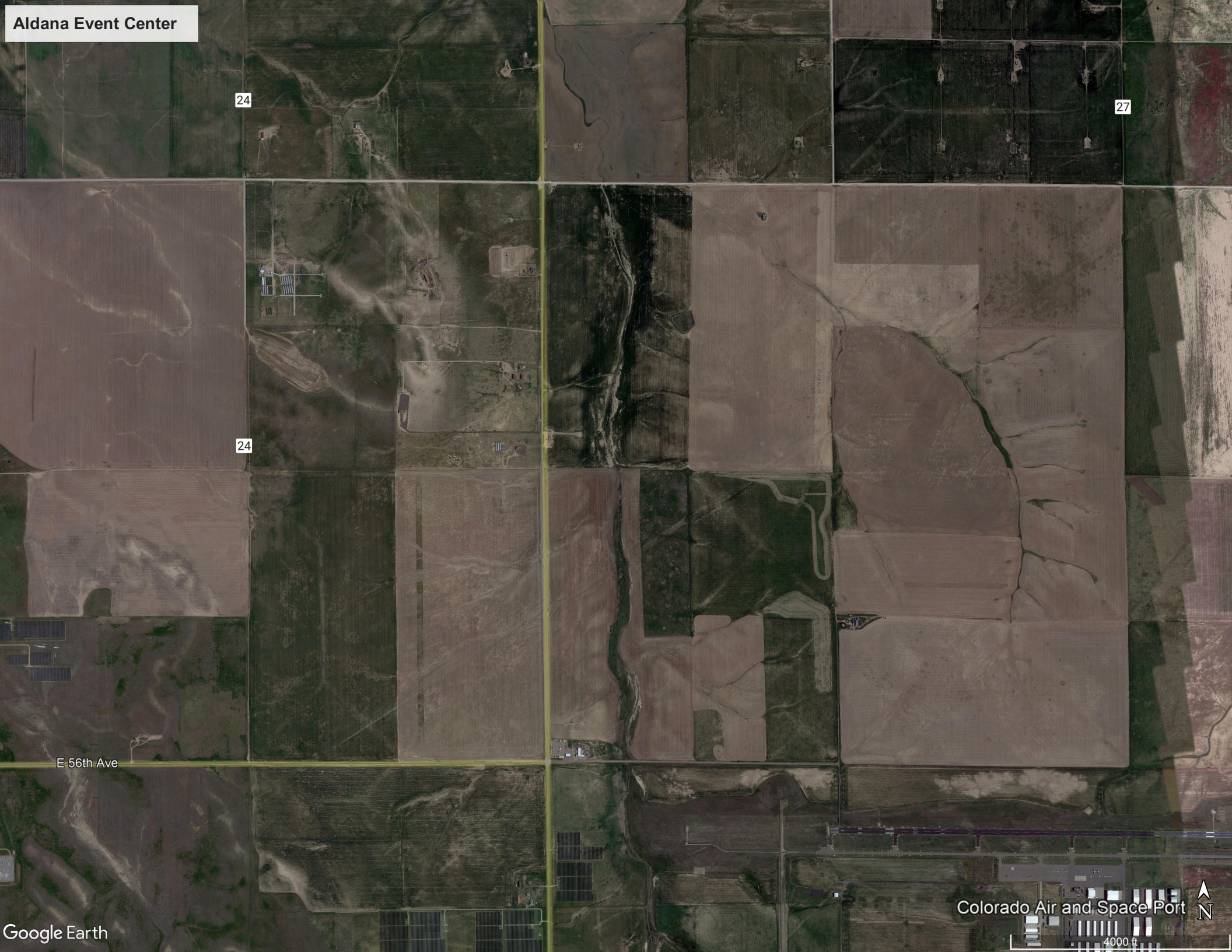
Vicinity Map (USGS) / Key Map / FEMA Firmette /
Soil Survey Map & Legend



VICINITY MAP SCALE 1" = 2,000'

SE 1/4 SECTION 6 TOWNSHIP 3 SOUTH RANGE 64 WEST

SHOWN VICINITY MAP TAKEN FROM USGS QUAD MAP - MANILA, CO


Aldana Event Center
24
27
24
E 56th Ave
Colorado Air and Space Port
N
4000 ft
Google Earth

National Flood Hazard Layer FIRMette

FEMA

104°35'36"W 39°49'7"N

104°34'58"W 39°48'39"N

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

1:6,000

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

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 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 12/10/2021 at 7:04 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.

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 Adams County Area, Parts of Adams and Denver Counties, Colorado

December 10, 2021

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

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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.

Custom Soil Resource Report
Soil Map

Map Scale: 1:4,640 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Adams County Area, Parts of Adams and Denver Counties, Colorado
Survey Area Data: Version 18, Aug 31, 2021

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

Date(s) aerial images were photographed: Jul 17, 2015—Oct 2, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
AsC	Ascalon sandy loam, 3 to 5 percent slopes	21.0	43.8%
PlB	Platner loam, 0 to 3 percent slopes	22.8	47.6%
TtD	Truckton loamy sand, 3 to 9 percent slopes	4.1	8.5%
Totals for Area of Interest		**48.0**	**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.

Adams County Area, Parts of Adams and Denver Counties, Colorado

AsC—Ascalon sandy loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tlnt
Elevation: 3,550 to 5,970 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Ascalon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bt1 - 6 to 12 inches: sandy clay loam
Bt2 - 12 to 19 inches: sandy clay loam
Bk - 19 to 35 inches: sandy clay loam
C - 35 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.1 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains, R072XY111KS - Sandy Plains

Hydric soil rating: No

Minor Components

Stoneham

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains, R072XY100KS - Loamy Tableland
Hydric soil rating: No

Vona

Percent of map unit: 8 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains, R072XY111KS - Sandy Plains
Hydric soil rating: No

Platner

Percent of map unit: 2 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains, R072XY100KS - Loamy Tableland
Hydric soil rating: No

PlB—Platner loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tln0
Elevation: 4,000 to 4,930 feet
Mean annual precipitation: 14 to 17 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Platner and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Platner

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed eolian deposits over tertiary aged alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 6 inches: loam
Bt1 - 6 to 11 inches: clay
Bt2 - 11 to 20 inches: clay
Bk1 - 20 to 27 inches: loam
Bk2 - 27 to 37 inches: sandy clay loam
C - 37 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

Minor Components

Ascalon

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY002CO - Loamy Plains
Hydric soil rating: No

Rago, rarely flooded

Percent of map unit: 4 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY036CO - Overflow
Hydric soil rating: No

Rago, ponded

Percent of map unit: 1 percent
Landform: Playas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R067BY010CO - Closed Upland Depression
Hydric soil rating: No

TtD—Truckton loamy sand, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 34wz
Elevation: 4,400 to 6,000 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 125 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Truckton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from mixed

Typical profile

H1 - 0 to 9 inches: loamy sand
H2 - 9 to 21 inches: sandy loam
H3 - 21 to 32 inches: loamy sand
H4 - 32 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
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 supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Vona

Percent of map unit: 8 percent
Hydric soil rating: No

Blakeland

Percent of map unit: 5 percent
Hydric soil rating: No

Tryon

Percent of map unit: 1 percent
Landform: Swales
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: Yes

Loup

Percent of map unit: 1 percent
Landform: Swales
Ecological site: R067BY029CO - Sandy Meadow
Hydric soil rating: Yes

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APPENDIX B

NOAA Atlas Rainfall / WEC Rational Method Runoff Calculations

NOAA Atlas 14, Volume 8, Version 2
Location name: Bennett, Colorado, USA*
Latitude: 39.8194°, Longitude: -104.5125°
Elevation: 5367.22 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	**0.236** (0.191-0.294)	**0.291** (0.234-0.362)	**0.390** (0.313-0.487)	**0.481** (0.384-0.604)	**0.622** (0.485-0.822)	**0.741** (0.561-0.988)	**0.871** (0.634-1.19)	**1.01** (0.705-1.41)	**1.21** (0.810-1.73)	**1.38** (0.891-1.98)
10-min	**0.346** (0.279-0.431)	**0.425** (0.343-0.531)	**0.570** (0.458-0.713)	**0.705** (0.562-0.885)	**0.911** (0.710-1.20)	**1.09** (0.821-1.45)	**1.27** (0.929-1.74)	**1.48** (1.03-2.07)	**1.78** (1.19-2.54)	**2.02** (1.30-2.89)
15-min	**0.422** (0.340-0.526)	**0.519** (0.418-0.647)	**0.696** (0.558-0.870)	**0.859** (0.686-1.08)	**1.11** (0.865-1.47)	**1.32** (1.00-1.76)	**1.56** (1.13-2.12)	**1.81** (1.26-2.52)	**2.17** (1.45-3.09)	**2.46** (1.59-3.53)
30-min	**0.571** (0.460-0.711)	**0.699** (0.563-0.872)	**0.934** (0.749-1.17)	**1.15** (0.919-1.45)	**1.49** (1.16-1.97)	**1.78** (1.34-2.37)	**2.09** (1.52-2.84)	**2.43** (1.69-3.39)	**2.92** (1.95-4.16)	**3.32** (2.14-4.75)
60-min	**0.704** (0.568-0.878)	**0.858** (0.691-1.07)	**1.14** (0.917-1.43)	**1.41** (1.13-1.77)	**1.83** (1.43-2.42)	**2.19** (1.66-2.92)	**2.58** (1.88-3.51)	**3.01** (2.10-4.20)	**3.63** (2.42-5.18)	**4.14** (2.67-5.93)
2-hr	**0.838** (0.680-1.04)	**1.02** (0.824-1.26)	**1.35** (1.09-1.68)	**1.67** (1.34-2.08)	**2.17** (1.71-2.85)	**2.60** (1.98-3.44)	**3.07** (2.26-4.15)	**3.59** (2.52-4.97)	**4.34** (2.92-6.15)	**4.95** (3.23-7.04)
3-hr	**0.916** (0.747-1.13)	**1.11** (0.901-1.36)	**1.47** (1.19-1.81)	**1.81** (1.46-2.24)	**2.34** (1.85-3.08)	**2.81** (2.15-3.71)	**3.32** (2.45-4.47)	**3.89** (2.75-5.36)	**4.70** (3.19-6.63)	**5.38** (3.52-7.60)
6-hr	**1.09** (0.895-1.33)	**1.30** (1.07-1.59)	**1.70** (1.39-2.09)	**2.08** (1.69-2.56)	**2.68** (2.13-3.48)	**3.19** (2.47-4.17)	**3.76** (2.80-5.01)	**4.38** (3.12-5.98)	**5.28** (3.61-7.38)	**6.02** (3.98-8.44)
12-hr	**1.33** (1.10-1.61)	**1.58** (1.30-1.91)	**2.03** (1.67-2.46)	**2.44** (2.00-2.98)	**3.09** (2.47-3.95)	**3.63** (2.82-4.69)	**4.22** (3.17-5.57)	**4.87** (3.50-6.58)	**5.80** (4.00-8.01)	**6.56** (4.37-9.10)
24-hr	**1.59** (1.32-1.91)	**1.89** (1.57-2.27)	**2.42** (2.00-2.91)	**2.88** (2.37-3.49)	**3.57** (2.86-4.50)	**4.14** (3.23-5.27)	**4.74** (3.57-6.17)	**5.39** (3.89-7.17)	**6.29** (4.36-8.58)	**7.01** (4.72-9.64)
2-day	**1.84** (1.54-2.20)	**2.21** (1.84-2.63)	**2.81** (2.34-3.36)	**3.33** (2.76-4.00)	**4.07** (3.27-5.05)	**4.66** (3.65-5.85)	**5.27** (3.98-6.75)	**5.90** (4.28-7.75)	**6.76** (4.72-9.10)	**7.43** (5.05-10.1)
3-day	**2.02** (1.69-2.39)	**2.38** (2.00-2.83)	**3.00** (2.51-3.56)	**3.52** (2.93-4.21)	**4.27** (3.44-5.27)	**4.87** (3.83-6.08)	**5.49** (4.17-7.00)	**6.13** (4.47-8.00)	**7.00** (4.91-9.37)	**7.68** (5.24-10.4)
4-day	**2.15** (1.81-2.54)	**2.52** (2.12-2.98)	**3.13** (2.63-3.72)	**3.67** (3.06-4.36)	**4.42** (3.58-5.44)	**5.03** (3.97-6.25)	**5.65** (4.31-7.18)	**6.30** (4.61-8.20)	**7.19** (5.06-9.59)	**7.88** (5.40-10.6)
7-day	**2.45** (2.07-2.87)	**2.84** (2.41-3.34)	**3.51** (2.96-4.13)	**4.07** (3.41-4.81)	**4.86** (3.95-5.92)	**5.49** (4.36-6.77)	**6.13** (4.70-7.72)	**6.79** (5.01-8.77)	**7.69** (5.46-10.2)	**8.39** (5.80-11.2)
10-day	**2.71** (2.30-3.17)	**3.14** (2.66-3.67)	**3.85** (3.26-4.51)	**4.44** (3.74-5.23)	**5.27** (4.30-6.38)	**5.92** (4.72-7.26)	**6.58** (5.07-8.24)	**7.26** (5.37-9.31)	**8.16** (5.81-10.7)	**8.86** (6.15-11.8)
20-day	**3.49** (2.98-4.04)	**4.00** (3.42-4.64)	**4.83** (4.12-5.62)	**5.52** (4.68-6.44)	**6.46** (5.29-7.72)	**7.18** (5.76-8.70)	**7.90** (6.12-9.77)	**8.62** (6.42-10.9)	**9.57** (6.87-12.4)	**10.3** (7.20-13.6)
30-day	**4.12** (3.54-4.75)	**4.71** (4.04-5.43)	**5.66** (4.84-6.54)	**6.43** (5.47-7.46)	**7.47** (6.14-8.87)	**8.26** (6.65-9.93)	**9.03** (7.03-11.1)	**9.80** (7.33-12.3)	**10.8** (7.78-13.9)	**11.5** (8.12-15.1)
45-day	**4.89** (4.22-5.61)	**5.59** (4.82-6.41)	**6.70** (5.76-7.71)	**7.59** (6.49-8.77)	**8.78** (7.24-10.3)	**9.66** (7.81-11.5)	**10.5** (8.23-12.8)	**11.4** (8.54-14.2)	**12.4** (8.99-15.9)	**13.2** (9.34-17.2)
60-day	**5.52** (4.78-6.31)	**6.32** (5.46-7.23)	**7.59** (6.54-8.70)	**8.60** (7.37-9.89)	**9.92** (8.20-11.6)	**10.9** (8.82-13.0)	**11.8** (9.27-14.4)	**12.7** (9.59-15.8)	**13.8** (10.1-17.7)	**14.6** (10.4-19.0)

[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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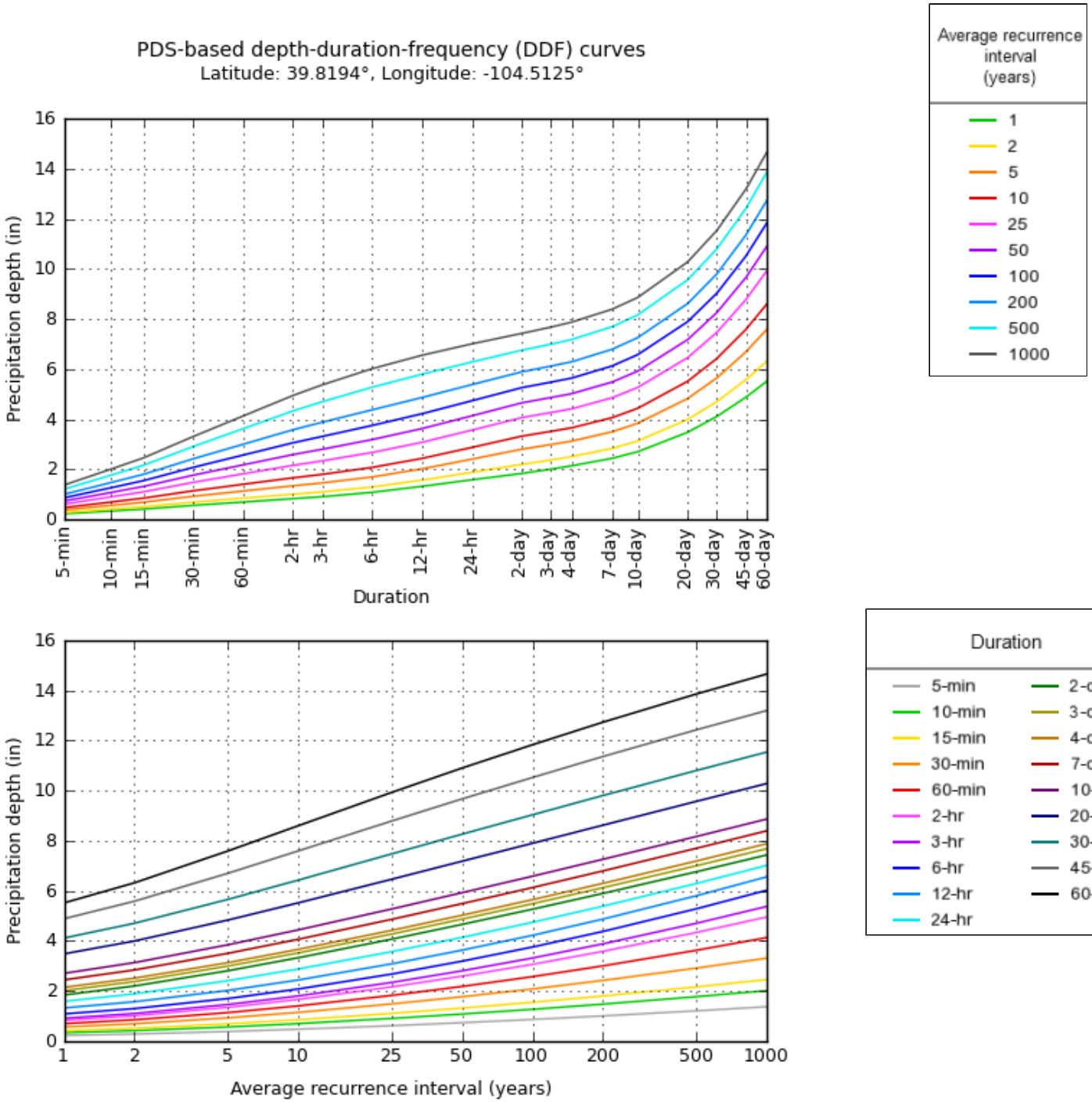
PF graphical



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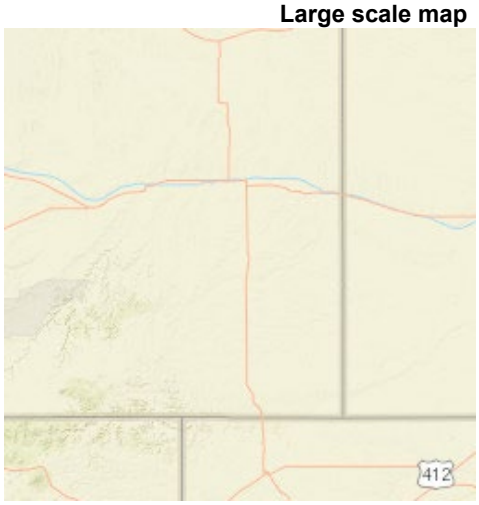
Maps & aerials

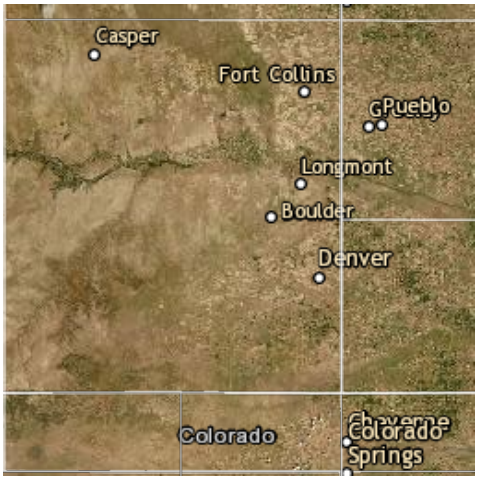
Small scale terrain

Large scale terrain

Large scale map



Large scale aerial



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Disclaimer

Historic Runoff Table - ALDANA EVENT CENTER							
BASIN	Impervious	C-YR	I	A	CIA(YR-historic)	Flow	DESIGN POINT
H							
C_2 (MHFD 2018)	2.00	0.01	0.89	39.88	0.35	cfs	H
C_5	2.00	0.03	1.18	39.88	1.32	cfs	
C_{10}	2.00	0.10	1.46	39.88	5.83	cfs	
C_{100}	2.00	0.43	2.68	39.88	46.05	cfs	

ALDANA EVENT CENTER - Historic Runoff Calcs

3/1/2023

for soils - C_2 C_5 C_{10} C_{100} --> from Table RO-5
**for Ti calculations - only C_5 is used

Ti= (.395*(1.1-C_5)*(Li^.5)) / (Si)^.333 From MHFD (UDFCD) 2018, Equation 6-3
Tt= (Lt / (60 * V)) From MHFD (UDFCD) 2018, Equation 6-4
I = (28.5 * P_1) / ((10 + Td)^0.786) From MHFD (UDFCD) 2018, Equation 5-1

	2	5	10	100
1-Hour Point Rainf	**0.858**	**1.14**	**1.41**	**2.58**

H **Historic - 2, 5, 10, 100 yr** **39.879** acres
NRCS Type 10% A, 45% B, 45% C

		Length	Slope	C_{yr} - see frequency left	Ti**	Velocity	Tt	Tc	Use Tc	I	A	$CIA_{5\ existing}$	
2yr				0.01	29.19	1.38	28.54	57.73	57.73	0.89	39.88	0.35	**cfs**
	initial	500	0.034									$CIA_{10\ existing}$	
5yr	travel	2,360	0.019	0.03	29.19	1.38	28.54	57.73	57.73	1.18	39.88	1.32	**cfs**
		2860										$CIA_{10\ existing}$	
10yr	Overland flow			0.10	29.19	1.38	28.54	57.73	57.73	1.46	39.88	5.83	**cfs**
	300 ft max for urban, 500 ft max for rural												
	Remainder carried as travel											$CIA_{100\ existing}$	
100yr		Cv=	10	0.43	29.19	1.38	28.54	57.73	57.73	2.68	39.88	46.05	**cfs**

39.879 acres

H	**Undeveloped**	**Gravel**	**Building**	**Concrete**	**Water/Aphalt**	
NRCS Type 10% A, 45% B, 45% C						**EFFECTIVE**
Imperviousness %	2	40.00	90.00	100.00	100.00	**2.00**
C2	0.01	0.2905	0.739	0.8355	0.8355	**0.01**
C5	0.028	0.333	0.7635	0.8565	0.8565	**0.03**
C10	0.1	0.3925	0.7835	0.8655	0.8655	**0.10**
C100	0.4315	0.609	0.8415	0.89	0.89	**0.43**
AREA	39.879	0.00	0.00	0.00	0.00	39.88

0.000 acres

H2	**Undeveloped**	**Gravel**	**Building**	**Concrete**	**Water/Aphalt**	
NRCS Type 100% B						**EFFECTIVE**
Imperviousness %	2	40.00	90.00	100.00	100.00	**#DIV/0!**
C2	0.01	0.29	0.74	0.84	0.84	**#DIV/0!**
C5	0.01	0.32	0.76	0.86	0.86	**#DIV/0!**
C10	0.07	0.38	0.78	0.86	0.86	**#DIV/0!**
C100	0.44	0.61	0.84	0.89	0.89	**#DIV/0!**
AREA	0.000	0.00	0.00	0.00	0.00	0.00

TABLE RO-2 (taken from MHFD (UDFCD Manual - Vol. I)

Type of Land Surface	Conveyance coefficient,
Heavy Meadow	2.5
Tillage/field	5
Short pasture/Lawns	7
Nearly Bare Ground	10.00
Grassed Waterway	15.00
Paved areas and shallow paved swales	20.00

Existing Runoff Table - ALDANA EVENT CENTER							
BASIN	Impervious	C-YR	I	A	CIA(YR-existing)	Flow	DESIGN POINT
EX SITE							
C_2 (MHFD 2018)	6.08	0.04	1.36	39.88	2.22	cfs	
C_5	6.08	0.06	1.81	39.88	4.40	cfs	
C_{10}	6.08	0.13	2.23	39.88	11.71	cfs	
C_{100}	6.08	0.45	4.09	39.88	73.44	cfs	
E1							
C_2 (MHFD 2018)	31.27	0.20	2.70	1.69	0.93	cfs	E1
C_5	31.27	0.22	3.59	1.69	1.32	cfs	
C_{10}	31.27	0.22	4.44	1.69	1.69	cfs	
C_{100}	31.27	0.35	8.12	1.69	4.86	cfs	
E2							
C_2 (MHFD 2018)	11.01	0.08	2.60	1.83	0.39	cfs	E2
C_5	11.01	0.09	3.45	1.83	0.54	cfs	
C_{10}	11.01	0.14	4.27	1.83	1.07	cfs	
C_{100}	11.01	0.45	7.81	1.83	6.45	cfs	
E3							
C_2 (MHFD 2018)	4.59	0.03	1.36	37.28	1.52	cfs	E3
C_5	4.59	0.05	1.80	37.28	3.45	cfs	
C_{10}	4.59	0.13	2.23	37.28	10.83	cfs	
C_{100}	4.59	0.48	4.08	37.28	72.51	cfs	

ALDANA EVENT CENTER - Existing Runoff Calcs

3/1/2023

for soils - C2 C_5 C_{10} C_{100} = from Table RO-5
**for Ti calculations - only C_5 is used

Ti= (.395*(1.1-C_5)*($Li^{.5}$)) / ($Si)^{.333}$ From MHFD (UDFCD) 2018, Equation 6-3
Tt= (Lt / (60 * V)) From MHFD (UDFCD) 2018, Equation 6-4
I = (28.5 * P_1) / ((10 + Td)$^{0.786}$) From MHFD (UDFCD) 2018, Equation 5-1

	2	5	10	100
1-Hour Point Rainfall	**0.858**	**1.14**	**1.41**	2.58

2018 MHFD >>> Tc Check = (26-17i) + [Ltravel / (60*(14i + 9)(So)^.5)]

EX SITE	**Existing - 2, 5, 10, 100 yr**			**39.879** acres									
	NRCS Type 10% A, 45% B, 45% C		C_{yr} - see frequency left	Ti**	Velocity	Tt	Tc	check	Use Tc	I	A	**CIA_5 existing**	
2yr			0.04	4.20	1.85	25.30	29.51	57.08	29.51	1.36	39.88		2.22 **cfs**
		Length	Slope									**CIA_5 existing**	
	initial	20	0.083										
5yr	travel	2,815	0.022	0.06	4.20	1.85	25.30	29.51	57.08	29.51	1.81	39.88	4.40 **cfs**
		2835										**CIA_{10} existing**	
10yr	Overland flow			0.13	4.20	1.85	25.30	29.51	57.08	29.51	2.23	39.88	11.71 **cfs**
	300 ft max for urban, 500 ft max for rural												
	Remainder carried as travel											**CIA_{100} existing**	
100yr	Cv=	12.5		0.45	4.20	1.85	25.30	29.51	57.08	29.51	4.09	39.88	73.44 **cfs**
E1	**Existing - 2, 5, 10, 100 yr**			**1.691** acres									
	NRCS Type 100% A		C_{yr} - see frequency left	Ti**	Velocity	Tt	Tc	check	Use Tc	I	A	**CIA_5 existing**	
2yr			0.20	4.37	2.13	2.11	6.49	22.66	6.49	2.70	1.69		0.93 **cfs**
		Length	Slope									**CIA_5 existing**	
	initial	30	0.083										
5yr	travel	270	0.029	0.22	4.37	2.13	2.11	6.49	22.66	6.49	3.59	1.69	1.32 **cfs**
		300										**CIA_{10} existing**	
10yr	Overland flow			0.22	4.37	2.13	2.11	6.49	22.66	6.49	4.44	1.69	1.69 **cfs**
	300 ft max for urban, 500 ft max for rural												
	Remainder carried as travel											**CIA_{100} existing**	
100yr	Cv=	12.5		0.35	4.37	2.13	2.11	6.49	22.66	6.49	8.12	1.69	4.86 **cfs**
E2	**Existing - 2, 5, 10, 100 yr**			**1.826** acres									
	NRCS Type 10% A, 90% B		C_{yr} - see frequency left	Ti**	Velocity	Tt	Tc	check	Use Tc	I	A	**CIA_5 existing**	
2yr			0.08	4.11	1.94	3.23	7.33	27.96	7.33	2.60	1.83		0.39 **cfs**
		Length	Slope									**CIA_5 existing**	
	initial	20	0.083										
5yr	travel	375	0.024	0.09	4.11	1.94	3.23	7.33	27.96	7.33	3.45	1.83	0.54 **cfs**
		395										**CIA_{10} existing**	
10yr	Overland flow			0.14	4.11	1.94	3.23	7.33	27.96	7.33	4.27	1.83	1.07 **cfs**
	300 ft max for urban, 500 ft max for rural												
	Remainder carried as travel											**CIA_{100} existing**	
100yr	Cv=	12.5		0.45	4.11	1.94	3.23	7.33	27.96	7.33	7.81	1.83	6.45 **cfs**
E3	**Existing - 2, 5, 10, 100 yr**			**37.278** acres									
	NRCS Type 50% B, 50% C		C_{yr} - see frequency left	Ti**	Velocity	Tt	Tc	check	Use Tc	I	A	**CIA_5 existing**	
2yr			0.03	4.24	1.85	25.30	29.55	58.02	29.55	1.36	37.28		1.52 **cfs**
		Length	Slope									**CIA_5 existing**	
	initial	20	0.083										
5yr	travel	2,815	0.022	0.05	4.24	1.85	25.30	29.55	58.02	29.55	1.80	37.28	3.45 **cfs**
		2835										**CIA_{10} existing**	
10yr	Overland flow			0.13	4.24	1.85	25.30	29.55	58.02	29.55	2.23	37.28	10.83 **cfs**
	300 ft max for urban, 500 ft max for rural												
	Remainder carried as travel											**CIA_{100} existing**	
100yr	Cv=	12.5		0.48	4.24	1.85	25.30	29.55	58.02	29.55	4.08	37.28	72.51 **cfs**

39.879 acres

EX SITE	Undeveloped	Gravel	Building	Concrete	Water/Asphalt	
NRCS Type 10% A, 45% B, 45% C						EFFECTIVE
Imperviousness %	2	40.00	90.00	100.00	100.00	**6.08**
C2	0.01	0.2905	0.739	0.8355	0.8355	**0.04**
C5	0.028	0.333	0.7635	0.8565	0.8565	**0.06**
C10	0.1	0.3925	0.7835	0.8655	0.8655	**0.13**
C100	0.4315	0.609	0.8415	0.89	0.89	**0.45**
AREA	36.195	3.25	0.34	0.00	0.10	39.88

1.691 acres

E1	Undeveloped	Gravel	Building	Concrete	Water/Asphalt	
NRCS Type 100% A						EFFECTIVE
Imperviousness %	2	40.00	90.00	100.00	100.00	**31.27**
C2	0.01	0.25	0.73	0.84	0.84	**0.20**
C5	0.01	0.27	0.75	0.87	0.87	**0.22**
C10	0.01	0.28	0.77	0.87	0.87	**0.22**
C100	0.13	0.42	0.81	0.89	0.89	**0.35**
AREA	0.503	1.10	0.09	0.00	0.00	1.69

1.826 acres

E2	Undeveloped	Gravel	Building	Concrete	Water/Asphalt	
NRCS Type 10% A, 90% B						EFFECTIVE
Imperviousness %	2	40.00	90.00	100.00	100.00	**11.01**
C2	0.01	0.286	0.739	0.84	0.84	**0.08**
C5	0.01	0.315	0.759	0.861	0.861	**0.09**
C10	0.064	0.37	0.779	0.861	0.861	**0.14**
C100	0.409	0.591	0.837	0.89	0.89	**0.45**
AREA	1.557	0.14	0.12	0.00	0.00	1.83

37.278 acres

E3	Undeveloped	Gravel	Building	Concrete	Water/Asphalt	
NRCS Type 50% B, 50% C						EFFECTIVE
Imperviousness %	2	40.00	90.00	100.00	100.00	**4.59**
C2	0.01	0.30	0.74	0.84	0.84	**0.03**
C5	0.03	0.34	0.77	0.86	0.86	**0.05**
C10	0.11	0.41	0.79	0.87	0.87	**0.13**
C100	0.47	0.63	0.85	0.89	0.89	**0.48**
AREA	35.051	2.00	0.12	0.00	0.10	37.28

TABLE RO-2 (taken from MHFD (UDFCD) Manual - Vol. I)	
Type of Land Surface	Conveyance coefficient, Cv
Heavy Meadow	2.5
Tillage/field	5
Short pasture/Lawns	7
Nearly Bare Ground	10.00
Grassed Waterway	15.00
Paved areas and shallow paved swales	20.00

Developed Runoff Table - ALDANA EVENT CENTER							
BASIN	Impervious	C-YR	I	A	CIA(YR-DEVELOPED)	cfs	DESIGN POINT
DS SITE							
C_2 (MHFD 2018)	8.45	0.06	1.36	39.88	3.20	cfs	
C_5	8.45	0.08	1.81	39.88	5.79	cfs	
C_{10}	8.45	0.15	2.24	39.88	13.37	cfs	
C_{100}	8.45	0.46	4.09	39.88	75.37	cfs	
P1							
C_2 (MHFD 2018)	35.94	0.23	2.72	1.61	1.02	cfs	1
C_5	35.94	0.25	3.62	1.61	1.45	cfs	
C_{10}	35.94	0.26	4.47	1.61	1.86	cfs	
C_{100}	35.94	0.39	8.19	1.61	5.13	cfs	
P2							
C_2 (MHFD 2018)	15.49	0.12	2.62	1.22	0.37	cfs	2
C_5	15.49	0.12	3.48	1.22	0.52	cfs	
C_{10}	15.49	0.17	4.30	1.22	0.91	cfs	
C_{100}	15.49	0.47	7.86	1.22	4.55	cfs	
P3							
C_2 (MHFD 2018)	13.14	0.09	1.99	11.42	2.14	cfs	3
C_5	13.14	0.12	2.64	11.42	3.65	cfs	
C_{10}	13.14	0.20	3.26	11.42	7.32	cfs	
C_{100}	13.14	0.51	5.97	11.42	35.00	cfs	
P4							
C_2 (MHFD 2018)	4.31	0.03	1.54	25.63	1.08	cfs	4
C_5	4.31	0.05	2.05	25.63	2.52	cfs	
C_{10}	4.31	0.10	2.53	25.63	6.32	cfs	
C_{100}	4.31	0.32	4.63	25.63	38.42	cfs	

ALDANA EVENT CENTER - Developed Runoff Calcs (% Max Bldg-Pavement)

3/1/2023

See below for effective C values as calculated from Table RO-5
For Tt calculations - only C_5 is used

$Ti = (.395*(1.1-C_5)*(Li^{.5})) / (Si)^{.333}$ From MHFD (UDFCD) 2018, Equation 6-3
$Tt = (Lt / (60 * V))$ From MHFD (UDFCD) 2018, Equation 6-4
$I = (28.5 * P_1) / ((10 + Td)^{0.786})$ From MHFD (UDFCD) 2018, Equation 5-1

	2	5	10	100
Point Rainfall	**0.858**	**1.14**	**1.41**	**2.58**

2018 MHFD >>> Tc Check = (26-17i) + [Ltravel / (60*(14i + 9)(So)^.5)]

				C_5	Ti	Velocity	Tt	Tc	check	Use Tc	C_{yr} - see above	I	A	
DS SITE	**Developed -2, 5, 10, 100 yr**				**39.88** acres									
	NRCS Type 10% A, 45% B, 45% C													**CIA_5 developed**
2yr				0.08	4.13	1.85	25.30	29.43	55.62	29.43	0.06	1.36	39.88	3.20 **cfs**
		Length	Slope											
	initial	20	0.083											**CIA_5 developed**
5yr	travel	2,815	0.022	0.08	4.13	1.85	25.30	29.43	55.62	29.43	0.08	1.81	39.88	5.79 **cfs**
		2,835	0.022											
														CIA_{10} developed
10yr	Overland flow			0.08	4.13	1.85	25.30	29.43	55.62	29.43	0.15	2.24	39.88	13.37 **cfs**
	300 ft max for urban, 500 ft max for rural													
	Remainder carried as travel													**CIA_{100} developed**
100yr	Cv=	12.50		0.08	4.13	1.85	25.30	29.43	55.62	29.43	0.46	4.09	39.88	75.37 **cfs**

				C_5	Ti	Velocity	Tt	Tc	check	Use Tc	C_{yr} - see above	I	A	
P1	**Developed -2, 5, 10, 100 yr**				**1.61** acres									
	NRCS Type 100% A													**CIA_5 developed**
2yr				0.25	4.21	2.13	2.11	6.33	21.77	6.33	0.23	2.72	1.61	1.02 **cfs**
		Length	Slope											
	initial	30	0.083											**CIA_5 developed**
5yr	travel	270	0.029	0.25	4.21	2.13	2.11	6.33	21.77	6.33	0.25	3.62	1.61	1.45 **cfs**
		300	0.034											
														CIA_{10} developed
10yr	Overland flow			0.25	4.21	2.13	2.11	6.33	21.77	6.33	0.26	4.47	1.61	1.86 **cfs**
	300 ft max for urban, 500 ft max for rural													
	Remainder carried as travel													**CIA_{100} developed**
100yr	Cv=	12.50		0.25	4.21	2.13	2.11	6.33	21.77	6.33	0.39	8.19	1.61	5.13 **cfs**

				C_5	Ti	Velocity	Tt	Tc	check	Use Tc	C_{yr} - see above	I	A	
P2	**Developed -2, 5, 10, 100 yr**				**1.22** acres									
	NRCS Type 10% A, 90% B													**CIA_5 developed**
2yr				0.12	3.95	1.94	3.23	7.18	26.98	7.18	0.12	2.62	1.22	0.37 **cfs**
		Length	Slope											
	initial	20	0.083											**CIA_5 developed**
5yr	travel	375	0.024	0.12	3.95	1.94	3.23	7.18	26.98	7.18	0.12	3.48	1.22	0.52 **cfs**
		395	0.027											
														CIA_{10} developed
10yr	Overland flow			0.12	3.95	1.94	3.23	7.18	26.98	7.18	0.17	4.30	1.22	0.91 **cfs**
	300 ft max for urban, 500 ft max for rural													
	Remainder carried as travel													**CIA_{100} developed**
100yr	Cv=	12.50		0.12	3.95	1.94	3.23	7.18	26.98	7.18	0.47	7.86	1.22	4.55 **cfs**

P3 **Developed -2, 5, 10, 100 yr** — **11.42** acres

NRCS Type 50% B, 50% C

		Length	Slope	C_5	Ti	Velocity	Tt	Tc	check	Use Tc	C_{yr} - see above	I	A	$CIA_{developed}$	
2yr				0.12	3.96	1.85	10.43	14.39	35.79	14.39	0.09	1.99	11.42	**CIA_5 developed**	2.14 **cfs**
	initial	20	0.083												
5yr	travel	1,160	0.022	0.12	3.96	1.85	10.43	14.39	35.79	14.39	0.12	2.64	11.42	**CIA_5 developed**	3.65 **cfs**
		1,180	0.023												
10yr	Overland flow			0.12	3.96	1.85	10.43	14.39	35.79	14.39	0.20	3.26	11.42	**CIA_{10} developed**	7.32 **cfs**
	300 ft max for urban, 500 ft max for rural														
	Remainder carried as travel														
100yr	Cv=		12.50	0.12	3.96	1.85	10.43	14.39	35.79	14.39	0.51	5.97	11.42	**CIA_{100} developed**	35.00 **cfs**

P4 **Developed -2, 5, 10, 100 yr** — **25.63** acres

NRCS Type 50% A, 50% C/D

		Length	Slope	C_5	Ti	Velocity	Tt	Tc	check	Use Tc	C_{yr} - see above	I	A	$CIA_{developed}$	
2yr				0.05	9.04	1.85	14.65	23.70	44.34	23.70	0.03	1.54	25.63	**CIA_5 developed**	1.08 **cfs**
	initial	35	0.020												
5yr	travel	1,630	0.022	0.05	9.04	1.85	14.65	23.70	44.34	23.70	0.05	2.05	25.63	**CIA_5 developed**	2.52 **cfs**
		1,665	0.022												
10yr	Overland flow			0.05	9.04	1.85	14.65	23.70	44.34	23.70	0.10	2.53	25.63	**CIA_{10} developed**	6.32 **cfs**
	300 ft max for urban, 500 ft max for rural														
	Remainder carried as travel														
100yr	Cv=		12.50	0.05	9.04	1.85	14.65	23.70	44.34	23.70	0.32	4.63	25.63	**CIA_{100} developed**	38.42 **cfs**

DS SITE	TOTAL AREA Landscaping	39.879 acres Gravel	Building	Concrete	Water/ Asphalt	
NRCS Type 10% A, 45% B, 45% C						EFFECTIVE
I	2	40.00	90.00	100.00	100.00	**8.45**
C2	0.01	0.2905	0.739	0.8355	0.8355	**0.06**
C5	0.028	0.333	0.7635	0.8565	0.8565	**0.08**
C10	0.1	0.3925	0.7835	0.8655	0.8655	**0.15**
C100	0.4315	0.609	0.8415	0.89	0.89	**0.46**
AREA	33.90	5.41	0.34	0.02	0.21	39.879

P1	TOTAL AREA Landscaping	1.610 acres Gravel	Building	Concrete	Water/ Asphalt	
NRCS Type 100% A						EFFECTIVE
I	2	40.00	90.00	100.00	100.00	**35.94**
C2	0.01	0.25	0.73	0.84	0.84	**0.23**
C5	0.01	0.27	0.75	0.87	0.87	**0.25**
C10	0.01	0.28	0.77	0.87	0.87	**0.26**
C100	0.13	0.42	0.81	0.89	0.89	**0.39**
AREA	0.29	1.24	0.09	0.00	0.00	1.610

P2	TOTAL AREA Landscaping	1.219 acres Gravel	Building	Concrete	Water/ Asphalt	
NRCS Type 10% A, 90% B						EFFECTIVE
I	2	40.00	90.00	100.00	100.00	**15.49**
C2	0.01	0.29	0.74	0.84	0.84	**0.12**
C5	0.01	0.32	0.76	0.86	0.86	**0.12**
C10	0.06	0.37	0.78	0.86	0.86	**0.17**
C100	0.41	0.59	0.84	0.89	0.89	**0.47**
AREA	0.95	0.14	0.12	0.00	0.00	1.219

P3	TOTAL AREA Landscaping	11.416 acres Gravel	Building	Concrete	Water/ Asphalt	
NRCS Type 50% B, 50% C						EFFECTIVE
I	2	40.00	90.00	100.00	100.00	**13.14**
C2	0.01	0.30	0.74	0.84	0.84	**0.09**
C5	0.03	0.34	0.77	0.86	0.86	**0.12**
C10	0.11	0.41	0.79	0.87	0.87	**0.20**
C100	0.47	0.63	0.85	0.89	0.89	**0.51**
AREA	8.23	3.06	0.12	0.00	0.00	11.416

P4	TOTAL AREA Landscaping	25.629 acres Gravel	Building	Concrete	Water/ Asphalt	
NRCS Type 50% A, 50% C/D						EFFECTIVE
I	2	40.00	90.00	100.00	100.00	**4.31**
C2	0.01	0.28	0.74	0.84	0.84	**0.03**
C5	0.03	0.32	0.76	0.86	0.86	**0.05**
C10	0.08	0.36	0.78	0.87	0.87	**0.10**
C100	0.31	0.54	0.83	0.89	0.89	**0.32**
AREA	24.43	0.98	0.00	0.02	0.21	25.629

P6	TOTAL AREA Landscaping	0.000 acres Gravel	Building	Concrete	Water/ Asphalt	
NRCS Type 50% B, 50% C/D						EFFECTIVE
I	2	40.00	90.00	100.00	100.00	**#DIV/0!**
C2	0.01	0.30	0.74	0.84	0.84	**#DIV/0!**
C5	0.03	0.34	0.77	0.86	0.86	**#DIV/0!**
C10	0.11	0.41	0.79	0.87	0.87	**#DIV/0!**
C100	0.47	0.63	0.85	0.89	0.89	**#DIV/0!**
AREA	0.00	0.00	0.00	0.00	0.00	0.000

TABLE RO-2 (taken from MHFD (UDFCD) Manual - Vol. I)	
Type of Land Surface	Conveyance coefficient, Cv
Heavy Meadow	2.5
Tillage/field	5
Short pasture/Lawns	7
Nearly Bare Ground	10.00
Grassed Waterway	15.00
Paved areas and shallow paved swales	20.00

APPENDIX C

Channel & Culvert Capacities

REQUIRED DETENTION (FULL SPECTRUM EMPIRICAL for COMPARISON)

UDFCD 2018 VOL 1 thru 3

IN ACCORDANCE WITH MHFD, THE EFFECTIVE IMPERVIOUSNESS OF THE TOTAL AREA IS USED TO CALCULATE WQCV, EURV, & 100YR VOL IN LIEU OF THE SUMMATION OF EACH BASIN
(CORRECT VALUE INDICATED BY AN ARROW)

WATER QUALITY CALCULATIONS

from Figure EDB-2, 40 hr drain @ I, WQCV= noted below

BASIN	Actual I	Used Herein I	A acres	WQCV (in/watershed)	WQCV DEPTH in (FIG 3-1)	WQCV OTHER (in/watershed)	WQCV acre ft	
P3	13.14	14.00	11.42	0.09	0.43	0.09	0.084	
TOTAL	**13.14**	**14.00**	**11.42**	0.09	0.43	0.09	0.084	
				0.09	**0.43**	**0.09**	**0.084**	← **WQCV (ZONE 1)**

EXCESS URBAN RUNOFF VOLUME (EURV)

BASIN	Actual I	Used Herein I	A acres	NCS SOIL TYPE %	$EURV_A$ (in/watershed)	$EURV_B$ (in/watershed)	$EURV_C$ (in/watershed)	WEIGHTED AVE. EURV (in/watershed)	EURV** acre ft	
P3	13.14	14.00	11.42	NRCS Type 50% B, 50% C	0.14	0.16	0.14	0.15	0.146	
TOTAL	**13.14**	**14.00**	**11.42**	**0.00**	0.14	0.16	0.14	0.15	0.146	
					0.14	**0.16**	**0.14**	**0.15**	**0.146**	← **EURV**
									0.062	← **ZONE 2**

100YR VOLUME

BASIN	Actual I	Used Herein I	A acres	1hr Rainfall Depth in	NCS SOIL TYPE %	V_{100} (in/watershed)	V_{100} acre ft	
P3	13.14	14.00	11.42	2.58	NRCS Type 50% B, 50% C	0.53	0.508	
TOTAL	**13.14**	**14.00**	**11.42**	**2.58**	**0.00**	0.53	0.508	
						0.53	**0.508**	← **100YR VOL**
							0.363	← **ZONE 3**

FOREBAY CALCS

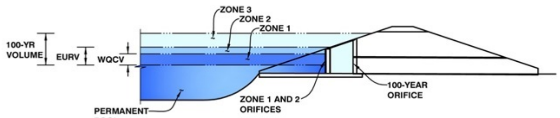
FOREBAY	BASINS	A acres	WQCV cubic feet	Min Reqd Vol % of WQCV	Min Reqd Vol cubic feet	Max Depth (in)	Forebay Dimensions	Forebay Volume (ft^3)	Release Rate 2% of Dev Q (cfs)	Weir Width (in)
SW	P3	11.42	3,662.2	2%	73.2	12	9' * 9'	81	0.70	4.20

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **ALDANA EVENT CENTER**

Basin ID: **DETENTION POND**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	11.50	acres
Watershed Length =	1,000	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	14.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	50.0%	percent
Percentage Hydrologic Soil Groups C/D =	50.0%	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) =	0.085	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.147	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	0.075	acre-feet	0.86	inches
5-yr Runoff Volume (P1 = 1.14 in.) =	0.171	acre-feet	1.14	inches
10-yr Runoff Volume (P1 = 1.41 in.) =	0.343	acre-feet	1.41	inches
25-yr Runoff Volume (P1 = 1.83 in.) =	0.800	acre-feet	1.83	inches
50-yr Runoff Volume (P1 = 2.19 in.) =	1.125	acre-feet	2.19	inches
100-yr Runoff Volume (P1 = 2.58 in.) =	1.554	acre-feet	2.58	inches
500-yr Runoff Volume (P1 = 3.63 in.) =	2.572	acre-feet	3.63	inches
Approximate 2-yr Detention Volume =	0.078	acre-feet		
Approximate 5-yr Detention Volume =	0.150	acre-feet		
Approximate 10-yr Detention Volume =	0.235	acre-feet		
Approximate 25-yr Detention Volume =	0.334	acre-feet		
Approximate 50-yr Detention Volume =	0.373	acre-feet		
Approximate 100-yr Detention Volume =	0.511	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.085	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.062	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.364	acre-feet
Total Detention Basin Volume =	0.511	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 = 1.00 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		
	--	1.00	--	--	--	375	0.009	212	0.005
	--	2.00	--	--	--	2,469	0.057	1,635	0.038
	--	3.00	--	--	--	7,120	0.163	6,429	0.148
	--	4.00	--	--	--	8,557	0.196	14,268	0.328
	--	5.00	--	--	--	10,094	0.232	23,593	0.542
	--	6.00	--	--	--	11,731	0.269	34,505	0.792
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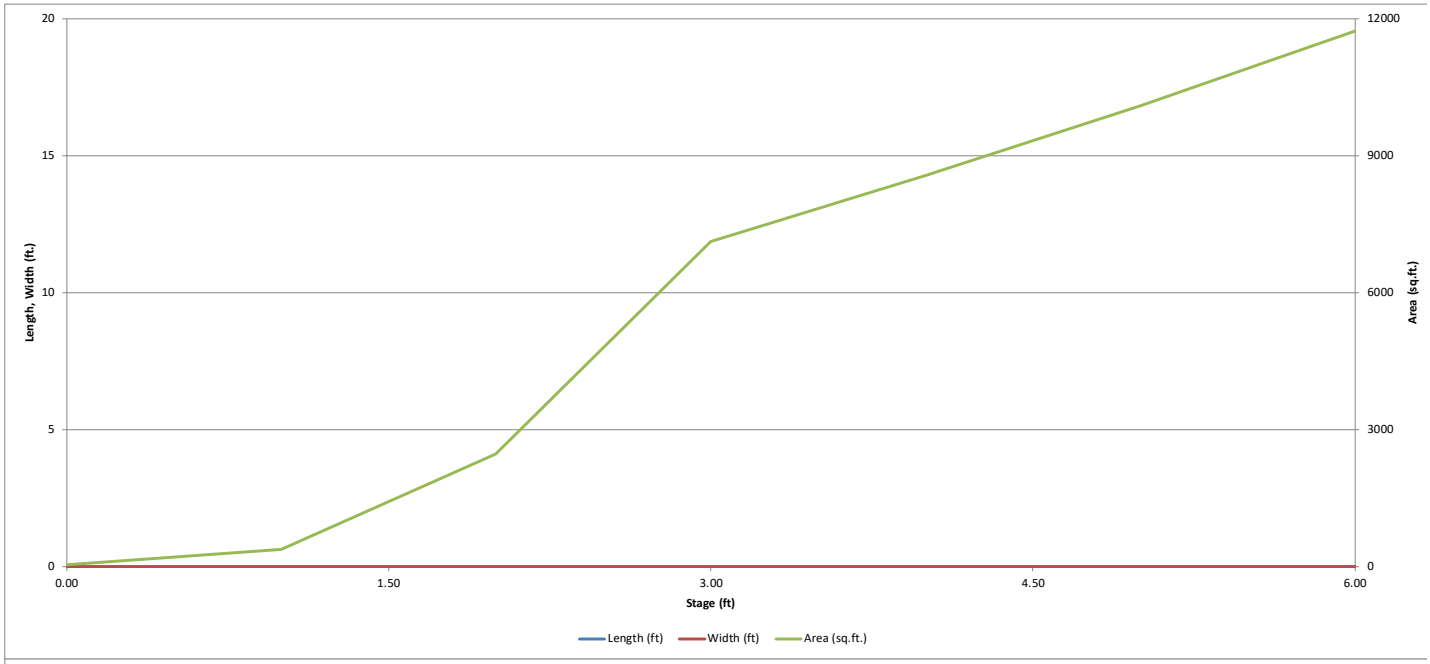
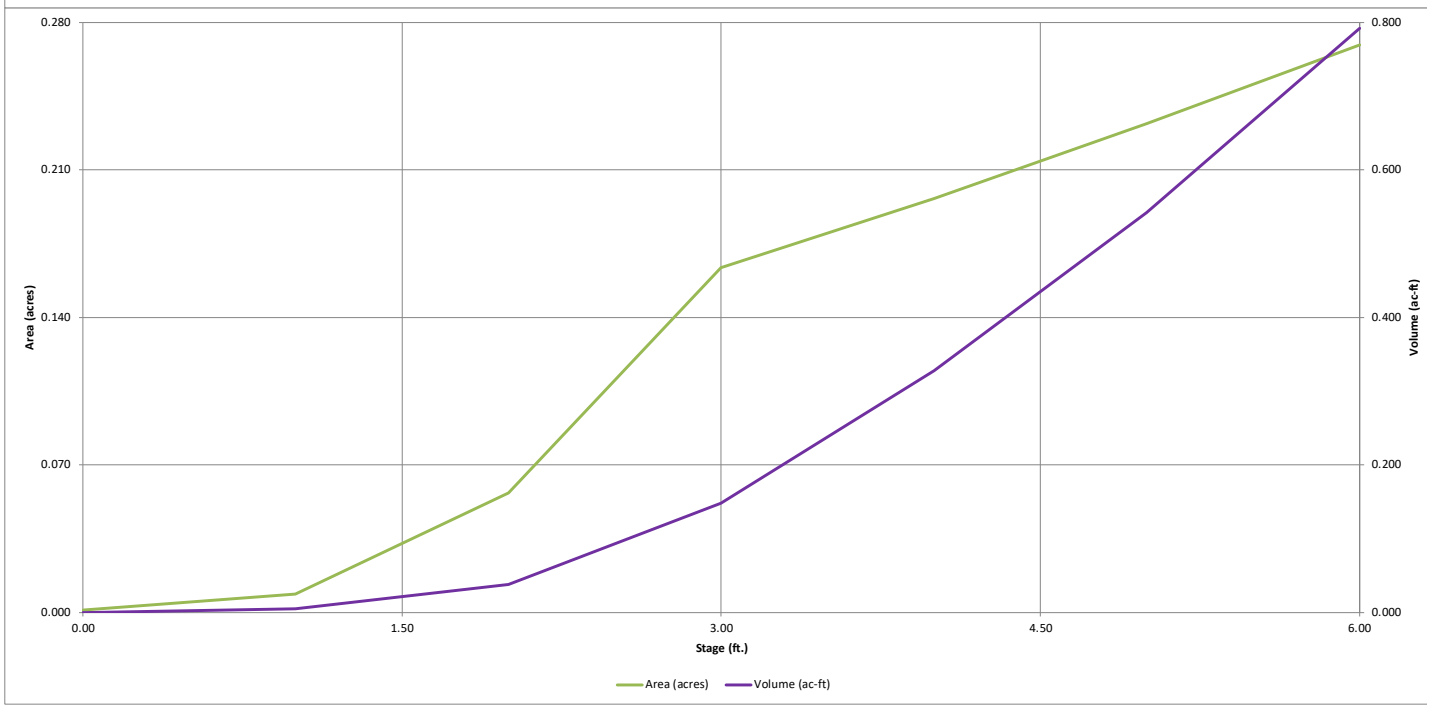
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



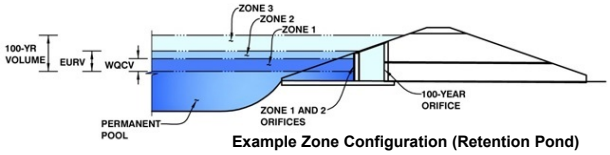


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **ALDANA EVENT CENTER**

Basin ID: **DETENTION POND**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.55	0.085	Orifice Plate
Zone 2 (EURV)	3.00	0.062	Rectangular Orifice
Zone 3 (100-year)	4.87	0.364	Weir&Pipe (Restrict)
Total (all zones)		0.511	

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)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	2.083E-03	ft^2
Depth at top of Zone using Orifice Plate =	2.55	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	10.20	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.30	sq. inches (diameter = 5/8 inch)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	0.85	1.70					
Orifice Area (sq. inches)	0.30	0.30	0.30					

	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)

	Zone 2 Rectangular	Not Selected			Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	2.55	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.30	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	3.00	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.23	N/A	feet
Vertical Orifice Height =	5.40	N/A	inches				
Vertical Orifice Width =	8.00		inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.00	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.25	N/A	feet
Overflow Weir Front Edge Length =	5.00	N/A	feet	Overflow Weir Slope Length =	5.15	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	20.26	N/A	
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.94	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.97	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.89	N/A	ft^2
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	0.38	N/A	feet
Restrictor Plate Height Above Pipe Invert =	7.80		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.21	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

Calculated Parameters for Spillway

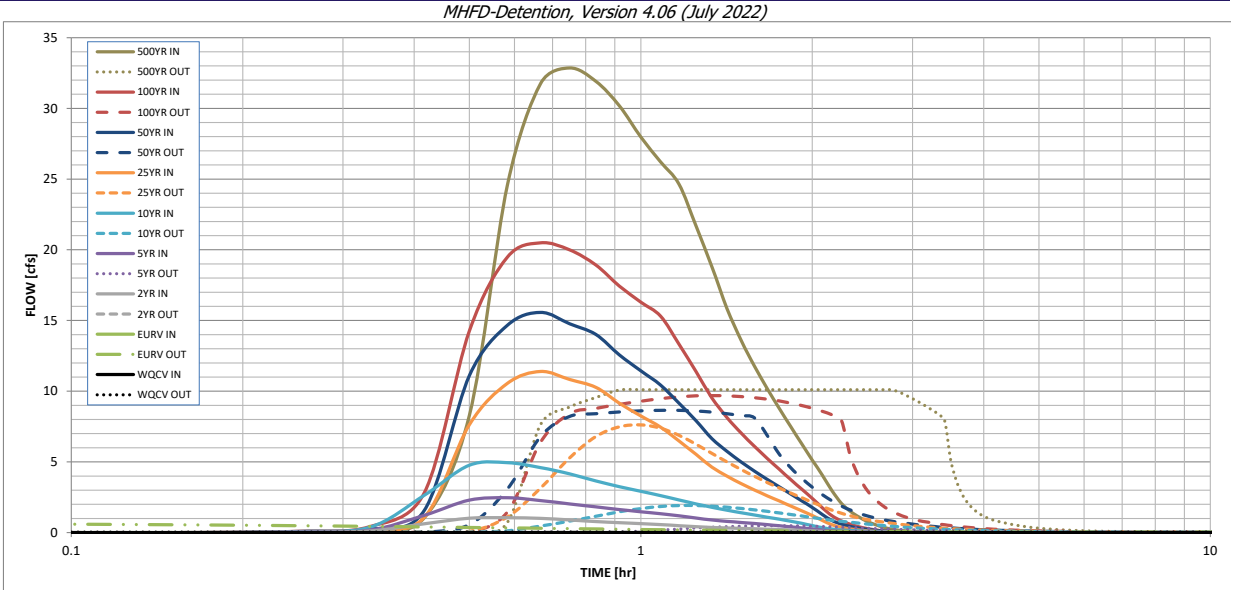
Routed Hydrograph Results

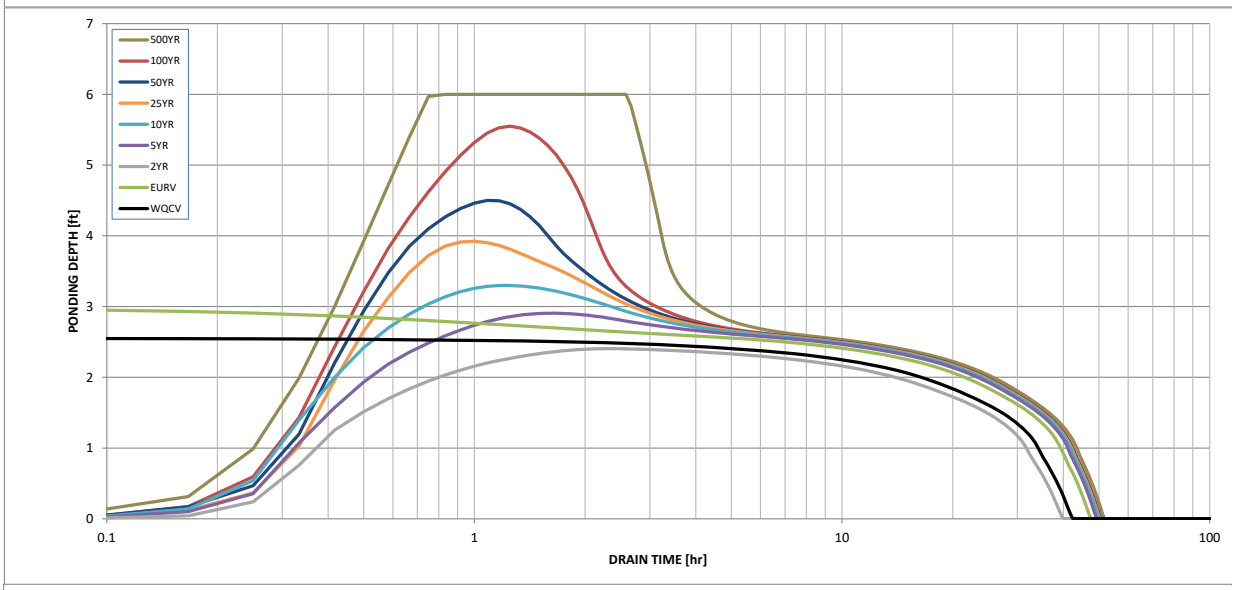
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

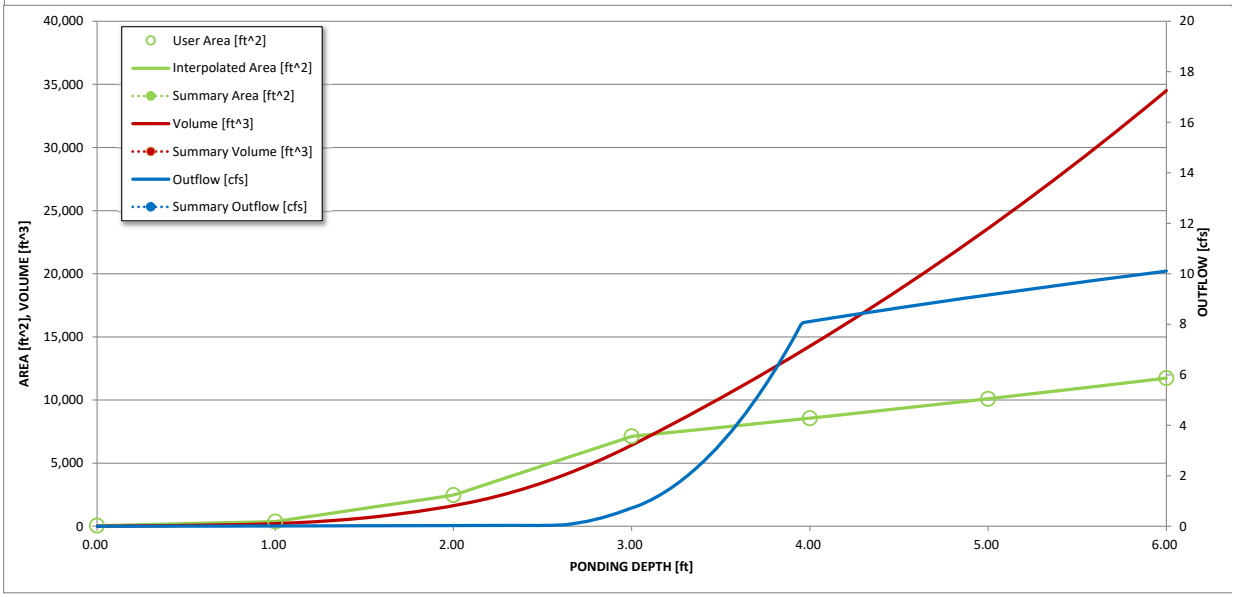
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.41	1.83	2.19	2.58	3.63
CUHP Runoff Volume (acre-ft) =	0.085	0.147	0.075	0.171	0.343	0.800	1.125	1.554	2.572
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.075	0.171	0.343	0.800	1.125	1.554	2.572
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	1.2	3.6	10.0	14.1	19.0	31.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.10	0.31	0.87	1.23	1.65	2.71
Peak Inflow Q (cfs) =	N/A	N/A	1.1	2.5	4.9	11.4	15.6	20.5	32.9
Peak Outflow Q (cfs) =	0.0	0.7	0.0	0.5	1.9	7.6	8.7	9.7	10.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.5	0.8	0.6	0.5	0.3
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Plate	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.3	0.4	0.4	0.4
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) =	37	40	35	41	38	30	26	21	12
Time to Drain 99% of Inflow Volume (hours) =	**40**	44	38	45	43	40	38	35	31
Maximum Ponding Depth (ft) =	2.56	3.00	2.40	2.91	3.30	3.92	4.50	5.55	6.00
Area at Maximum Ponding Depth (acres) =	0.12	0.16	0.10	0.15	0.17	0.19	0.21	0.25	0.27
Maximum Volume Stored (acre-ft) =	0.086	0.148	0.069	0.132	0.196	0.312	0.428	0.672	0.792

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	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]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	0:15:00	0.00	0.00	0.02	0.05	0.07	0.06	0.08	0.09	0.15
	0:20:00	0.00	0.00	0.12	0.17	0.37	0.16	0.23	0.41	1.04
	0:25:00	0.00	0.00	0.63	1.22	2.64	1.08	1.56	2.81	8.28
	0:30:00	0.00	0.00	1.01	2.30	4.77	7.63	11.10	14.25	24.59
	0:35:00	0.00	0.00	1.05	2.46	4.94	10.55	14.67	19.49	31.75
	0:40:00	0.00	0.00	1.01	2.27	4.60	11.39	15.57	20.49	32.85
	0:45:00	0.00	0.00	0.89	2.03	4.15	10.83	14.76	19.99	31.92
	0:50:00	0.00	0.00	0.78	1.82	3.66	10.28	14.01	18.92	30.19
	0:55:00	0.00	0.00	0.70	1.63	3.25	9.15	12.57	17.44	27.97
	1:00:00	0.00	0.00	0.63	1.48	2.92	8.25	11.44	16.30	26.21
	1:05:00	0.00	0.00	0.57	1.33	2.62	7.46	10.43	15.30	24.65
	1:10:00	0.00	0.00	0.49	1.19	2.31	6.48	9.16	13.32	21.68
	1:15:00	0.00	0.00	0.42	1.03	2.03	5.53	7.91	11.39	18.80
	1:20:00	0.00	0.00	0.37	0.89	1.79	4.63	6.65	9.52	15.84
	1:25:00	0.00	0.00	0.33	0.80	1.59	4.00	5.75	8.14	13.59
	1:30:00	0.00	0.00	0.30	0.72	1.41	3.46	4.99	7.03	11.76
	1:35:00	0.00	0.00	0.27	0.65	1.24	3.01	4.35	6.10	10.20
	1:40:00	0.00	0.00	0.24	0.56	1.09	2.61	3.77	5.25	8.79
	1:45:00	0.00	0.00	0.22	0.48	0.95	2.24	3.24	4.48	7.49
	1:50:00	0.00	0.00	0.19	0.41	0.81	1.88	2.73	3.75	6.27
	1:55:00	0.00	0.00	0.16	0.33	0.65	1.54	2.25	3.07	5.13
	2:00:00	0.00	0.00	0.13	0.26	0.50	1.21	1.78	2.42	4.06
	2:05:00	0.00	0.00	0.09	0.19	0.35	0.86	1.28	1.75	2.96
	2:10:00	0.00	0.00	0.07	0.13	0.25	0.55	0.85	1.19	2.08
	2:15:00	0.00	0.00	0.05	0.10	0.19	0.37	0.60	0.83	1.50
	2:20:00	0.00	0.00	0.04	0.08	0.15	0.26	0.43	0.59	1.09
	2:25:00	0.00	0.00	0.03	0.06	0.12	0.18	0.31	0.41	0.79
	2:30:00	0.00	0.00	0.03	0.05	0.10	0.13	0.23	0.28	0.56
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	2:45:00	0.00	0.00	0.01	0.02	0.04	0.05	0.08	0.08	0.17
	2:50:00	0.00	0.00	0.01	0.02	0.03	0.03	0.06	0.06	0.12
	2:55:00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.05	0.09
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	3:15:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.03
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
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	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION POND

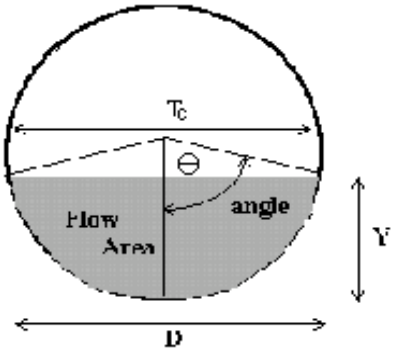
100 YEAR DETENTION VOLUME - WATER SURFACE
ESTIMATED POND (TYPICAL) VOLUME vs ELEVATION

POND OUTLET INVERT		**5389.42**	**ELEVATION**
WQCV:	**3,662.2 ft^3**	**5391.52**	**ELEVATION**
REQUIRED EURV:	**6,345.3 ft^3**	**5392.06**	**ELEVATION**
REQUIRED 100 yr per EURV:	**22,140.2 ft^3**	**5393.91**	**ELEVATION**
Avail Vol @ Emer Overflow:	**33,906.9 ft^3**	**5395.00**	**ELEVATION**
DESIGN 100 yr RELEASE POND A		**9.70**	**CFS**

ELEV	AREA	t	VOL	ACCUM	ACUM (ac-ft)
5,390.00	375.0				
		1.00	1,268.8	1,268.8	0.03
5,391.00	2,469.1				
		1.00	4,594.1	5,862.9	0.13
5,392.00	7,120.3				
		1.00	7,827.5	13,690.4	0.31
5,393.00	8,556.7				
		1.00	9,314.5	23,004.9	0.53
5,394.00	10,093.6				
		1.00	10,902.0	33,906.9	0.78
5,395.00	11,731.0				

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: Aldana Event Center
Pipe ID: Proposed 24" Pond Outlet Pipe



Design Information (Input)			
Pipe Invert Slope	So =	0.0167	ft/ft
Pipe Manning's n-value	n =	0.0150	
Pipe Diameter	D =	24.00	inches
Design discharge	**Q =**	**9.70**	**cfs**

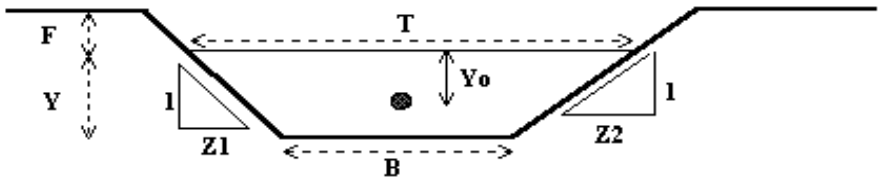
Full-flow Capacity (Calculated)			
Full-flow area	Af =	3.14	sq ft
Full-flow wetted perimeter	Pf =	6.28	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	25.40	cfs

Calculation of Normal Flow Condition			
Half Central Angle (0<Theta<3.14)	Theta =	1.43	radians
Flow area	An =	1.29	sq ft
Top width	Tn =	1.98	ft
Wetted perimeter	Pn =	2.85	ft
Flow depth	Yn =	0.86	ft
Flow velocity	Vn =	7.54	fps
Discharge	Qn =	9.70	cfs
Percent Full Flow	Flow =	38.2%	of full flow
Normal Depth Froude Number	Fr_n =	1.65	supercritical

Calculation of Critical Flow Condition			
Half Central Angle (0<Theta-c<3.14)	Theta-c =	1.68	radians
Critical flow area	Ac =	1.80	sq ft
Critical top width	Tc =	1.99	ft
Critical flow depth	Yc =	1.11	ft
Critical flow velocity	Vc =	5.40	fps
Critical Depth Froude Number	Fr_c =	1.00	

Normal Flow Analysis - Trapezoidal Channel

Project: Aldana Event Center
Channel ID: Pond Spillway Wall



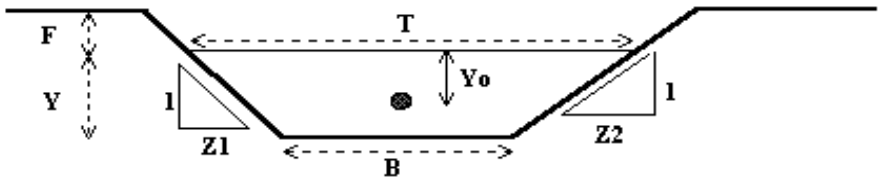
Design Information (Input)			
Channel Invert Slope	So =	0.0050	ft/ft
Manning's n	n =	0.015	
Bottom Width	B =	25.00	ft
Left Side Slope	Z1 =	0.01	ft/ft
Right Side Slope	Z2 =	0.01	ft/ft
Freeboard Height	F =	0.00	ft
Design Water Depth	Y =	**0.59**	ft

Normal Flow Condtion (Calculated)			
Discharge	**Q =**	**70.70**	cfs
Froude Number	**Fr =**	**1.10**	
Flow Velocity	**V =**	**4.79**	fps
Flow Area	A =	14.75	sq ft
Top Width	T =	25.01	ft
Wetted Perimeter	P =	26.18	ft
Hydraulic Radius	R =	0.56	ft
Hydraulic Depth	D =	0.59	ft
Specific Energy	Es =	0.95	ft
Centroid of Flow Area	Yo =	0.29	ft
Specific Force	Fs =	0.93	kip

Normal Flow Analysis - Trapezoidal Channel

Project: Aldana Event Center

Channel ID: Pond Spillway Channel - Max Capacity



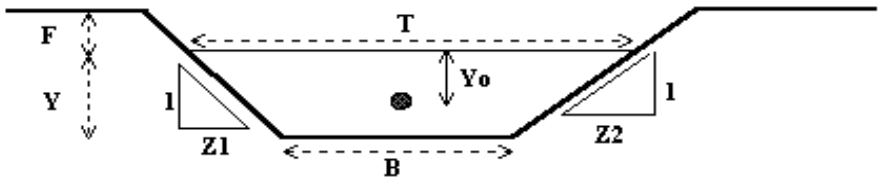
Design Information (Input)			
Channel Invert Slope	So =	0.0050	ft/ft
Manning's n	n =	0.015	
Bottom Width	B =	25.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Slope	Z2 =	4.00	ft/ft
Freeboard Height	F =	0.00	ft
Design Water Depth	Y =	**1.09**	ft

Normal Flow Condtion (Calculated)			
Discharge	**Q =**	**215.94**	cfs
Froude Number	**Fr =**	**1.22**	
Flow Velocity	**V =**	**6.75**	fps
Flow Area	A =	32.00	sq ft
Top Width	T =	33.72	ft
Wetted Perimeter	P =	33.99	ft
Hydraulic Radius	R =	0.94	ft
Hydraulic Depth	D =	0.95	ft
Specific Energy	Es =	1.80	ft
Centroid of Flow Area	Yo =	0.52	ft
Specific Force	Fs =	3.86	kip

Normal Flow Analysis - Trapezoidal Channel

Project: Aldana Event Center

Channel ID: Drainage Swales & Roadside Ditch



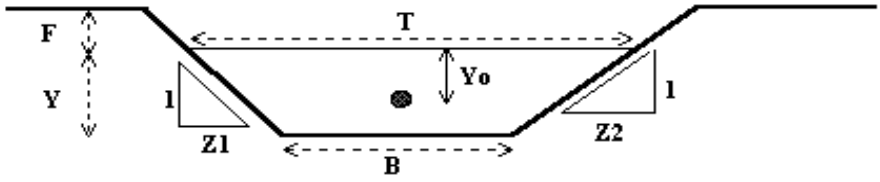
Design Information (Input)			
Channel Invert Slope	So =	0.0150	ft/ft
Manning's n	n =	0.030	
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Slope	Z2 =	4.00	ft/ft
Freeboard Height	F =	0.00	ft
Design Water Depth	Y =	**1.00**	ft

Normal Flow Condtion (Calculated)			
Discharge	**Q =**	**15.02**	cfs
Froude Number	**Fr =**	**0.94**	
Flow Velocity	**V =**	**3.76**	fps
Flow Area	A =	4.00	sq ft
Top Width	T =	8.00	ft
Wetted Perimeter	P =	8.25	ft
Hydraulic Radius	R =	0.49	ft
Hydraulic Depth	D =	0.50	ft
Specific Energy	Es =	1.22	ft
Centroid of Flow Area	Yo =	0.33	ft
Specific Force	Fs =	0.19	kip

Normal Flow Analysis - Trapezoidal Channel

Project: Aldana Event Center

Channel ID: Proposed Drainageway Enhancement

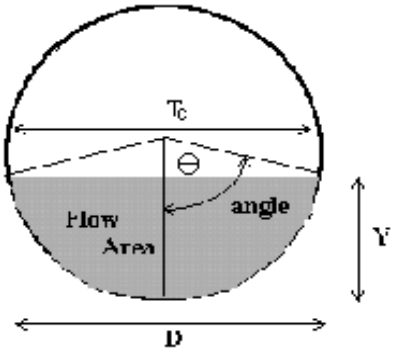


Design Information (Input)			
Channel Invert Slope	So =	0.0157	ft/ft
Manning's n	n =	0.030	
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	5.00	ft/ft
Right Side Slope	Z2 =	5.00	ft/ft
Freeboard Height	F =		ft
Design Water Depth	Y =	**2.85**	ft

Normal Flow Condtion (Calculated)			
Discharge	**Q =**	**315.89**	cfs
Froude Number	**Fr =**	**1.15**	
Flow Velocity	**V =**	**7.78**	fps
Flow Area	A =	40.61	sq ft
Top Width	T =	28.50	ft
Wetted Perimeter	P =	29.06	ft
Hydraulic Radius	R =	1.40	ft
Hydraulic Depth	D =	1.43	ft
Specific Energy	Es =	3.79	ft
Centroid of Flow Area	Yo =	0.94	ft
Specific Force	Fs =	7.15	kip

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: Aldana Event Center
Pipe ID: 24" Road Culvert



Design Information (Input)			
Pipe Invert Slope	So =	0.0100	ft/ft
Pipe Manning's n-value	n =	0.0150	
Pipe Diameter	D =	24.00	inches
Design discharge	**Q =**	**19.50**	**cfs**

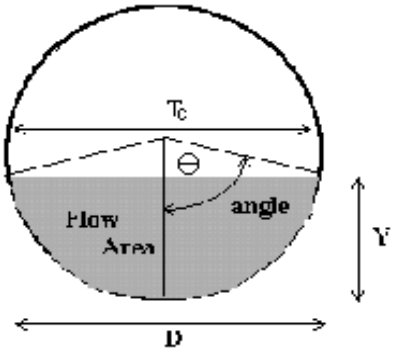
Full-flow Capacity (Calculated)			
Full-flow area	Af =	3.14	sq ft
Full-flow wetted perimeter	Pf =	6.28	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	19.66	cfs

Calculation of Normal Flow Condition			
Half Central Angle (0<Theta<3.14)	Theta =	2.25	radians
Flow area	An =	2.73	sq ft
Top width	Tn =	1.56	ft
Wetted perimeter	Pn =	4.49	ft
Flow depth	Yn =	1.62	ft
Flow velocity	Vn =	7.13	fps
Discharge	Qn =	19.50	cfs
Percent Full Flow	Flow =	99.2%	of full flow
Normal Depth Froude Number	Fr_n =	0.95	subcritical

Calculation of Critical Flow Condition			
Half Central Angle (0<Theta-c<3.14)	Theta-c =	2.20	radians
Critical flow area	Ac =	2.67	sq ft
Critical top width	Tc =	1.62	ft
Critical flow depth	Yc =	1.59	ft
Critical flow velocity	Vc =	7.29	fps
Critical Depth Froude Number	Fr_c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: Aldana Event Center
Pipe ID: Proposed 36" Access Road Culvert



Design Information (Input)			
Pipe Invert Slope	So =	0.0290	ft/ft
Pipe Manning's n-value	n =	0.0150	
Pipe Diameter	D =	36.00	inches
Design discharge	**Q =**	**98.00**	**cfs**

Full-flow Capacity (Calculated)			
Full-flow area	Af =	7.07	sq ft
Full-flow wetted perimeter	Pf =	9.42	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	98.70	cfs

Calculation of Normal Flow Condition			
Half Central Angle (0<Theta<3.14)	Theta =	2.25	radians
Flow area	An =	6.16	sq ft
Top width	Tn =	2.34	ft
Wetted perimeter	Pn =	6.74	ft
Flow depth	Yn =	2.44	ft
Flow velocity	Vn =	15.92	fps
Discharge	Qn =	98.00	cfs
Percent Full Flow	Flow =	99.3%	of full flow
Normal Depth Froude Number	Fr_n =	1.73	supercritical

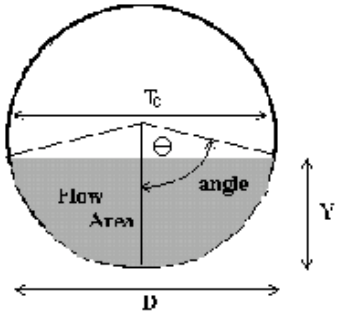
Calculation of Critical Flow Condition			
Half Central Angle (0<Theta-c<3.14)	Theta-c =	2.75	radians
Critical flow area	Ac =	6.98	sq ft
Critical top width	Tc =	1.14	ft
Critical flow depth	Yc =	2.89	ft
Critical flow velocity	Vc =	14.04	fps
Critical Depth Froude Number	Fr_c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: Aldana Event Center

Pipe ID: Existing Imboden 36" Culvert (Single Pipe)



Design Information (Input)			
Pipe Invert Slope	So =	0.0910	ft/ft
Pipe Manning's n-value	n =	0.0150	
Pipe Diameter	D =	36.00	inches
Design discharge	Q =	170.00	cfs

Full-Flow Capacity (Calculated)			
Full-flow area	Af =	7.07	sq ft
Full-flow wetted perimeter	Pf =	9.42	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	174.85	cfs

Calculation of Normal Flow Condition			
Half Central Angle (0<Theta<3.14)	Theta =	2.20	radians
Flow area	An =	6.03	sq ft
Top width	Tn =	2.42	ft
Wetted perimeter	Pn =	6.61	ft
Flow depth	Yn =	2.39	ft
Flow velocity	Vn =	28.19	fps
Discharge	Qn =	170.01	cfs
Percent of Full Flow	Flow =	97.2%	of full flow
Normal Depth Froude Number	Fr_n =	3.15	supercritical

Calculation of Critical Flow Condition			
Half Central Angle (0<Theta-c<3.14)	Theta-c =	3.01	radians
Critical flow area	Ac =	7.07	sq ft
Critical top width	Tc =	0.39	ft
Critical flow depth	Yc =	2.99	ft
Critical flow velocity	Vc =	24.06	fps
Critical Depth Froude Number	Fr_c =	1.00	

APPENDIX D

WEC Drainage Plans

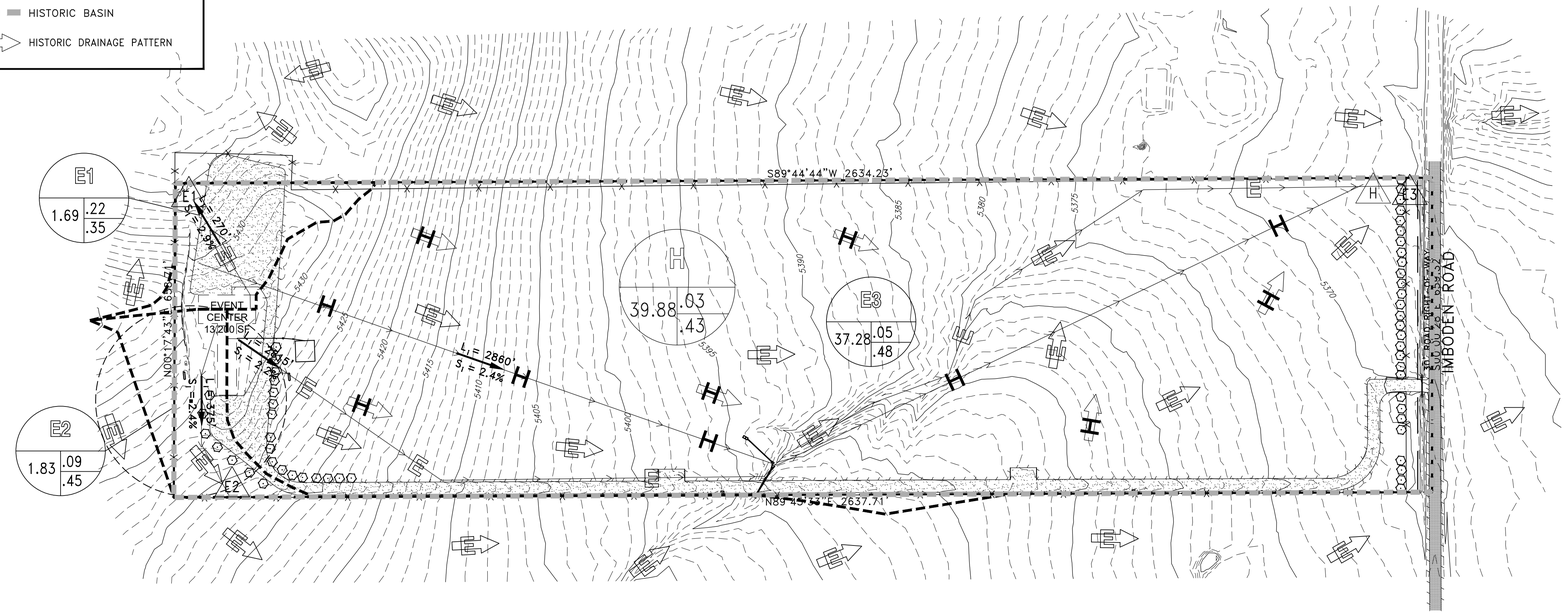
EXISTING DRAINAGE LEGEND

E — EXISTING SUB-BASIN DESIGNATION
1.12 | .73 — C5
.83 — C100
AREA IN ACRES
8 — DESIGN POINT
EXISTING BASIN
EXISTING DRAINAGE PATTERN

HISTORIC DRAINAGE LEGEND

H — HISTORIC SUB-BASIN DESIGNATION
1.12 | .73 — C5
.83 — C100
AREA IN ACRES
HISTORIC BASIN
HISTORIC DRAINAGE PATTERN

L - INITIAL LENGTH $L_i = LI$
S - INTIAL SLOPE $S_i = SI$
L - TRAVEL LENGTH $L_t = LT$
S - TRAVEL SLOPE $S_t = ST$
*** AVERAGE SLOPE INCLUDES ROOF SLOPE OF 8.33%**



Historic Runoff Table - ALDANA EVENT CENTER

BASIN	Impervious	C-YR	I	A	CIA(Y R-historic)	Flow	DESIGN POINT
H							
C_2 (MHFD 2018)	2.00	0.01	0.89	39.88	0.35	cfs	H
C_5	2.00	0.03	1.18	39.88	1.32	cfs	
C_{10}	2.00	0.10	1.46	39.88	5.83	cfs	
C_{100}	2.00	0.43	2.68	39.88	46.05	cfs	

Existing Runoff Table - ALDANA EVENT CENTER

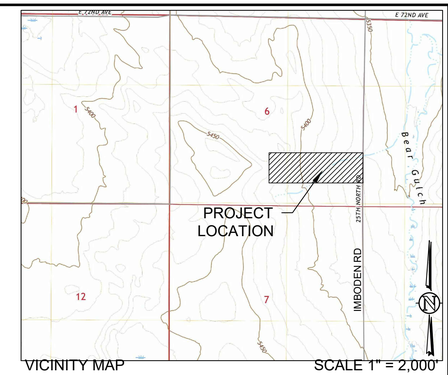
BASIN	Impervious	C-YR	I	A	CIA(Y R-existing)	Flow	DESIGN POINT
E1							
C_2 (MHFD 2018)	31.27	0.20	2.70	1.69	0.93	cfs	E1
C_5	31.27	0.22	3.59	1.69	1.32	cfs	
C_{10}	31.27	0.22	4.44	1.69	1.69	cfs	
C_{100}	31.27	0.35	8.12	1.69	4.86	cfs	
E2							
C_2 (MHFD 2018)	11.01	0.08	2.60	1.83	0.39	cfs	E2
C_5	11.01	0.09	3.45	1.83	0.54	cfs	
C_{10}	11.01	0.14	4.27	1.83	1.07	cfs	
C_{100}	11.01	0.45	7.81	1.83	6.45	cfs	
E3							
C_2 (MHFD 2018)	4.59	0.03	1.36	37.28	1.52	cfs	E3
C_5	4.59	0.05	1.80	37.28	3.45	cfs	
C_{10}	4.59	0.13	2.23	37.28	10.83	cfs	
C_{100}	4.59	0.48	4.08	37.28	72.51	cfs	

EXISTING SITE
EFFECTIVE
IMPERVIOUSNESS

Existing Runoff Table - ALDANA EVENT CENTER

BASIN	Impervious	C-YR	I	A	CIA(Y R-existing)	Flow	DESIGN POINT
EX SITE							
C_2 (MHFD 2018)	6.08	0.04	1.36	39.88	2.22	cfs	
C_5	6.08	0.06	1.81	39.88	4.40	cfs	
C_{10}	6.08	0.13	2.23	39.88	11.71	cfs	
C_{100}	6.08	0.45	4.09	39.88	73.44	cfs	

150 75 0 150 300
FULL SCALE: 1" = 150'
HALF SCALE: 1" = 300'



VICINITY MAP SCALE 1" = 2,000'
SE 1/4 SECTION 6 TOWNSHIP 3 SOUTH RANGE 64 WEST
SHOWN VICINITY MAP TAKEN FROM USGS QUAD MAP - MANILA, CO

NOTES

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SEE HORIZONTAL AND VERTICAL CONTROL SURVEY AS PROVIDED BY AMERICAN WEST LAND SURVEYING CO. – DATED NOVEMBER 11, 2021.

SEE COVER SHEET FOR BASIS OF BEARING & BENCHMARK.

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SYMBOL LEGEND

45 DEG BEND
22.5 DEG BEND
RESTRAINED PLUG
RESTRAINED TEE
WATER METER
RESTRAINED CROSS
FIRE HYDRANT
RESTRAINED VALVE
THRUST BLOCK TB
GATE VALVE GV
CURB STOP
PIPE CROSSING
MANHOLE
MANHOLE W/ FLOW DIRECTION
RD ROOF DRAIN
EXISTING RECYCLED ASPHALT
EXISTING CONC
EXISTING ASPHALT
PROPOSED RECYCLED ASPHALT
PROPOSED CONC
PROPOSED ASPHALT

LINETYPE LEGEND

LOT / PROPERTY / SECTION LINE
RIGHT OF WAY LINE
EASEMENT
SETBACK
TO BE ABANDONED LOT LINE
EXISTING BUILDING, CURB
EDGE of ASPHALT or GRAVEL RD
CHAINLINK FENCE
WIRE FENCE
POND WQ W/S
SWALE
EXISTING OVERHEAD ELEC
EXISTING ELECTRICAL LINE
EXISTING STORM LINE
EXISTING SANITARY LINE
EXISTING WATER LINE
EXISTING GAS LINE
EXISTING FIBER OPTIC LINE
EXISTING TELEPHONE LINE
PROPOSED SANITARY LINE
PROPOSED SANITARY SERVICE
PROPOSED STORM LINE
PROPOSED WATER LINE
PROPOSED WATER SERVICE
PROPOSED GAS LINE
PROPOSED ELECTRIC LINE
PROPOSED TELEPHONE LINE

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Western Engineering Consultants, inc LLC

No.	REVISION	DATE	BY
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CONTACT:
LLARICXE ALDANA
6657 IMBODEN RD
WATKINS, CO 80137
(303) 435-3021

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CHECKED BY: CFC
PROJECT NO. 01-0406.002.00
DOC CON # 0009-H&EX DRNG

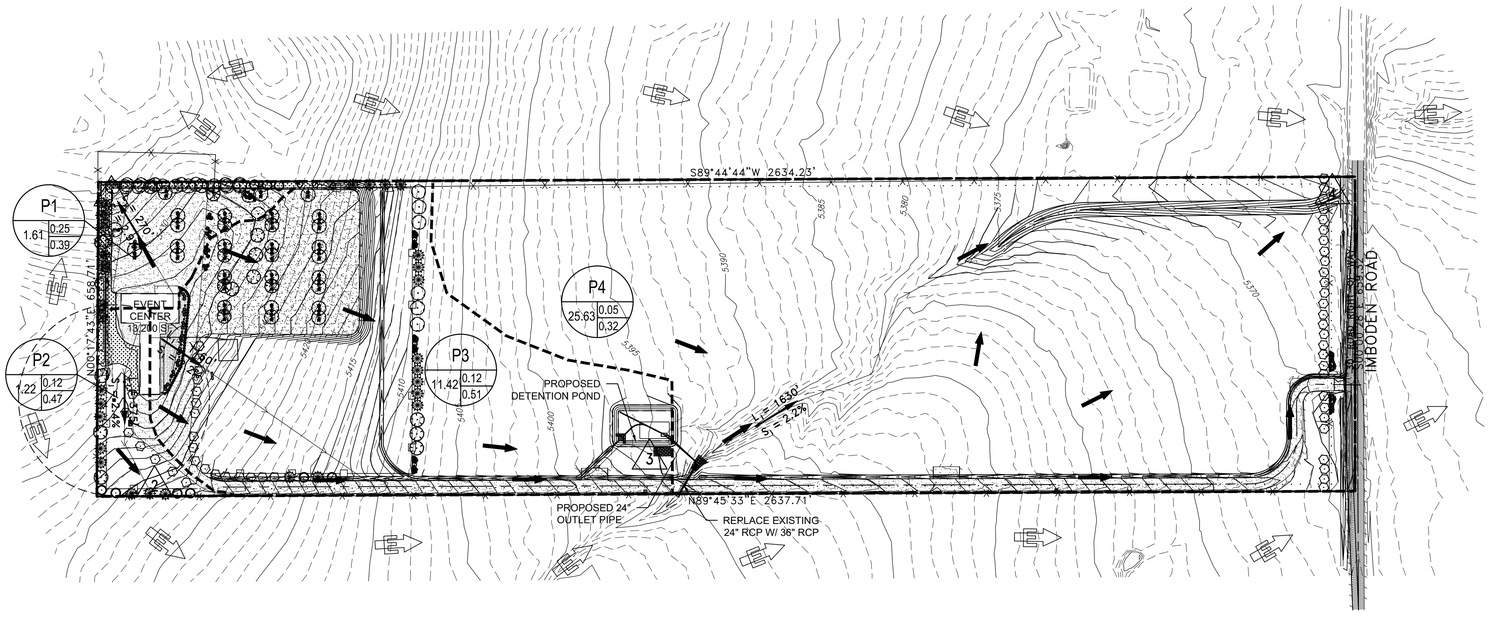
DEVELOPED DRAINAGE LEGEND

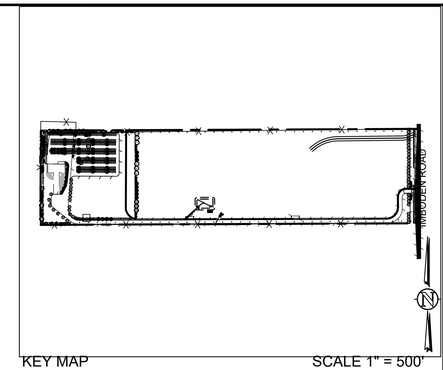
B1 — SUB-BASIN DESIGNATION
3.20 | .58 — C5
.88 — C100
AREA IN ACRES

DEVELOPED BASIN
PROPOSED DRAINAGE PATTERN
DESIGN POINT

L - INITIAL LENGTH
S - INTIAL SLOPE
L - TRAVEL LENGTH
S - TRAVEL SLOPE
L_I= LI, S_I= SI
L_T= LT, S_T= ST

* AVERAGE SLOPE INCLUDES ROOF SLOPE OF 8.33%





KEY MAP SCALE 1" = 500'

NOTES

THIS PLAN IS INTENDED AS THE DEVELOPED DRAINAGE PLAN FOR THE ALDANA EVENT CENTER.

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Developed Runoff Table - ALDANA EVENT CENTER

BASIN	Impervious	C-YR	I	A	CIA(Y R-DEVELOPED)	cfs	DESIGN POINT
P1							
C_2 (MHFD 2018)	35.94	0.23	2.72	1.61	1.02	cfs	1
C_5	35.94	0.25	3.62	1.61	1.45	cfs	
C_{10}	35.94	0.26	4.47	1.61	1.86	cfs	
C_{100}	35.94	0.39	8.19	1.61	5.13	cfs	
P2							
C_2 (MHFD 2018)	15.49	0.12	2.62	1.22	0.37	cfs	2
C_5	15.49	0.12	3.48	1.22	0.52	cfs	
C_{10}	15.49	0.17	4.30	1.22	0.91	cfs	
C_{100}	15.49	0.47	7.86	1.22	4.55	cfs	
P3							
C_2 (MHFD 2018)	13.14	0.09	1.99	11.42	2.14	cfs	3
C_5	13.14	0.12	2.64	11.42	3.65	cfs	
C_{10}	13.14	0.20	3.26	11.42	7.32	cfs	
C_{100}	13.14	0.51	5.97	11.42	35.00	cfs	
P4							
C_2 (MHFD 2018)	4.31	0.03	1.54	25.63	1.08	cfs	4
C_5	4.31	0.05	2.05	25.63	2.52	cfs	
C_{10}	4.31	0.10	2.53	25.63	6.32	cfs	
C_{100}	4.31	0.32	4.63	25.63	38.42	cfs	

DEVELOPED SITE EFFECTIVE IMPERVIOUSNESS

Developed Runoff Table - ALDANA EVENT CENTER

BASIN	Impervious	C-YR	I	A	CIA(Y R-DEVELOPED)	cfs	DESIGN POINT
DS SITE							
C_2 (MHFD 2018)	8.45	0.06	1.36	39.88	3.20	cfs	
C_5	8.45	0.08	1.81	39.88	5.79	cfs	
C_{10}	8.45	0.15	2.24	39.88	13.37	cfs	
C_{100}	8.45	0.46	4.09	39.88	75.37	cfs	

150 75 0 150 300
FULL SCALE: 1" = 150'
HALF SCALE: 1" = 300'

SYMBOL LEGEND

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RESTRAINED PLUG
RESTRAINED TEE
WATER METER
RESTRAINED CROSS
FIRE HYDRANT
RESTRAINED VALVE
THRUST BLOCK TB
GATE VALVE GV
CURB STOP
PIPE CROSSING
MANHOLE
MANHOLE W/ FLOW DIRECTION
RD ROOF DRAIN
EXISTING RECYCLED ASPHALT
EXISTING CONC
EXISTING ASPHALT
PROPOSED RECYCLED ASPHALT
PROPOSED CONC
PROPOSED ASPHALT

LINETYPE LEGEND

LOT / PROPERTY / SECTION LINE
RIGHT OF WAY LINE
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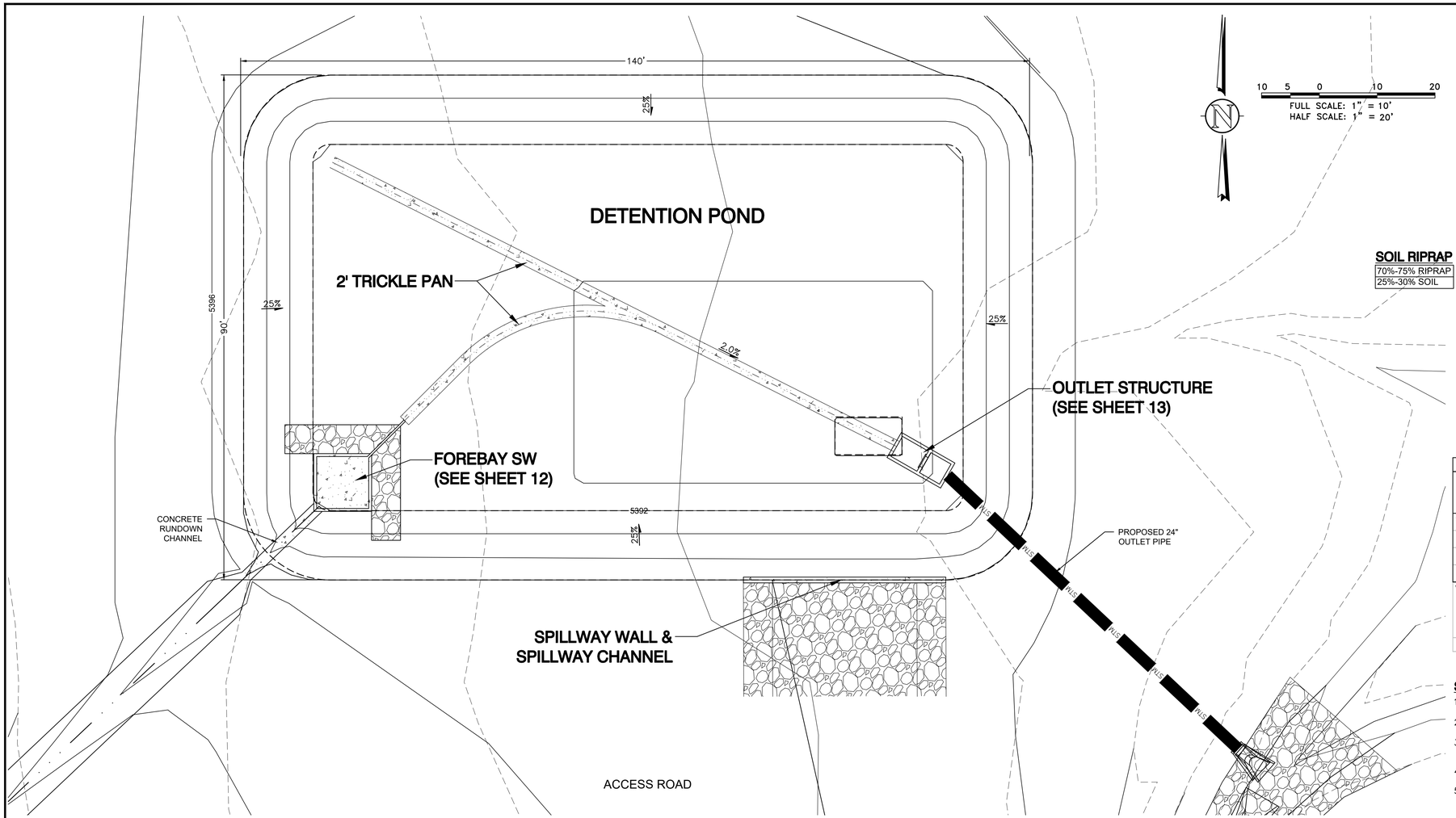
10 OF 23



BEDDING GRADATION

UDFCD Table MD-11		
	Percent Weight by Passing Square-Mesh Sieves	
U.S. Standard Sieve Size	Type I CDOT Sect. 703.01	Type II CDOT Sect. 703.09 Class A
3 inches	-----	90-100
1 1/2 inches	-----	-----
3/4 inches	-----	20-90
3/8 inches	100	-----
#4	95-100	0-20
#16	45-80	-----
#50	10-30	-----
#100	2-10	-----
#200	0-2	0-3

SOIL RIPRAP

70%-75% RIPRAP
25%-30% SOIL

Classification & Gradation of Ordinary Riprap UDFCD Table MD-7

Riprap Designation	% Smaller Than Given Size by Weight	Intermediate Rock Dimensions (inches)	d50 (inches)*
Type VL	70–100	12	
	50–70	9	
	35–50	6	6**
	2–10	2	
Type L	70–100	15	
	50–70	12	
	35–50	9	9**
	2–10	3	
Type M	70–100	21	
	50–70	18	
	35–50	12	12**
	2–10	4	
Type H	70–100	30	
	50–70	24	
	35–50	18	18
	2–10	6	

RIPRAP BEDDING REQUIREMENTS

UDFCD Table MD-12 (Volume 1)			
	Minimum Bedding Thickness (inches)		
	Fine-Grained Soils*		Coarse-Grained soils**
Riprap Designation	Type I	Type II	Type II
VL (d_{50} =6 in), L (d_{50}=9 in)	4	4	6
M (d_{50} =12 in)	4	4	6
H (d_{50} =18 in)	4	6	8
VH (d_{50} =24 in)	4	6	8

* May substitute one 12-inch layer of type II bedding. The substitution of one layer of type II bedding shall not be permitted at drop structures. The use of a combination of filter fabric and Type II bedding at drop structures is acceptable.

**Fifty percent or more by weight retained on the #40 sieve.

STRUCTURAL NOTES:

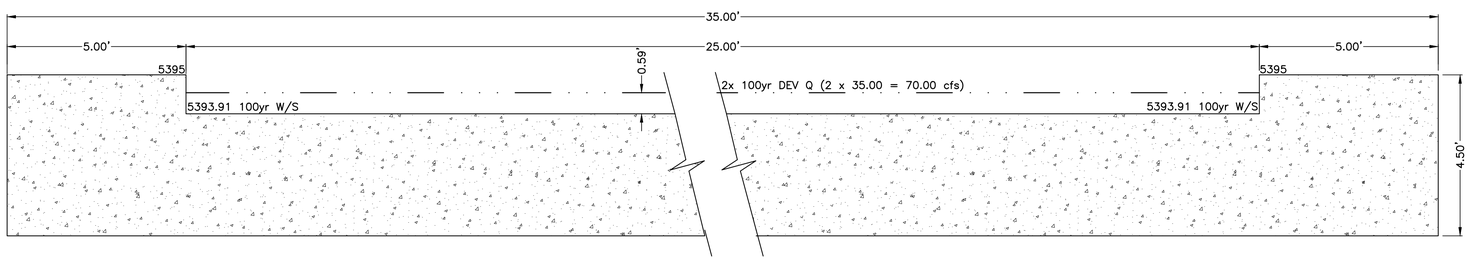
1. ALL CONCRETE SHALL BE C.D.O.T. CLASS B CAST IN PLACE.
2. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFER 3/4".
3. ALL REINFORCING BARS SHALL HAVE A MINIMUM 2–1/2" CLEARANCE AND COVER.
4. ALL REINFORCING BARS SHALL BE EPOXY COATED.
5. ALL STEPS SHALL BE IN ACCORDANCE WITH AASHTO M199.

POND A WATER SURFACE TABLE		
STORM EVENT	REQUIRED VOLUME (CFT)	WATER SURFACE ELEV
WQCV	3,662	5391.52
10 YR	6,345	5392.06
100 YR	22,140	5393.91
POND OVERFLOW	33,907	5395.00

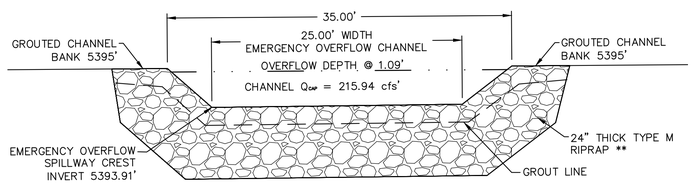
REINFORCE WALL WITH DOUBLE MAT - #4 REBAR 12" O.C. EACH WAY.

REINFORCEMENT:

1. BAR REINFORCEMENT SHALL BE ASTM A615, (GRADE 60), DEFORMED, EPOXY COATED, UNLESS NOTED OTHERWISE. ALL REINFORCING SHALL BE FREE OF MUD, ICE OR OTHER LAITENANCE THAT COULD LESSEN ANCHORAGE AND BOND TO THE SURROUNDING CONCRETE.
2. REBAR SUPPORTS: MANUFACTURE REBAR SUPPORTS FROM STEEL WIRE, PLASTIC, OR PRECAST CONCRETE ACCORDING TO CRSI's "MANUAL OF STANDARD PRACTICE".
3. PLACEMENT: COMPLY WITH CRSI's "MANUAL OF STANDARD PRACTICE" FOR PLACING REINFORCEMENT.
4. CONCRETE COVER AND PROTECTION FOR REINFORCING BARS SHALL CONFORM TO ACI 318, PART 3, CHAPTER 7, SECTION 7.7.1 "CAST-IN-PLACE CONCRETE NONPRESTRESSED" UNLESS NOTED OTHERWISE.



DETENTION POND EMERGENCY SPILLWAY WALL
SCALE 1" = 2'



** GROUT LOWER 20" OF 24" THICK TYPE M RIPRAP

EMERGENCY OVERFLOW CHANNEL DETAIL

SCALE 1" = 2.0' VIEW IS NORTH

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1	REV PER 3RD AMENDMENT NO. 1	03/03/23	CFC
2			

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01-0406.002.00

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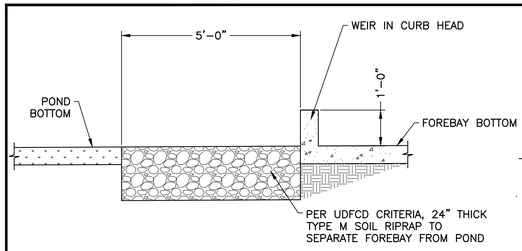
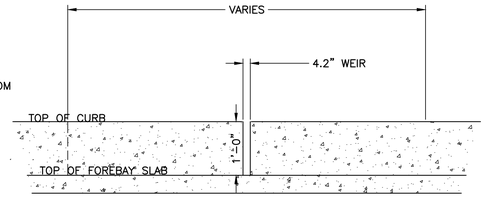
0011-POND PLAN

11 OF 23

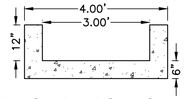


TYPICAL FOREBAY CROSS SECTION
SCALE 1" = 2'

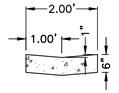


WEIR FOR RELEASE FROM FOREBAY PER UDFCD EQN. SO-13
SEE DRAINAGE REPORT APPENDIX FOR CALCULATIONS

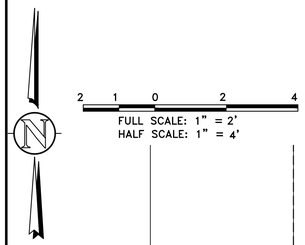
TYPICAL FOREBAY WEIR
SCALE 1" = 2'

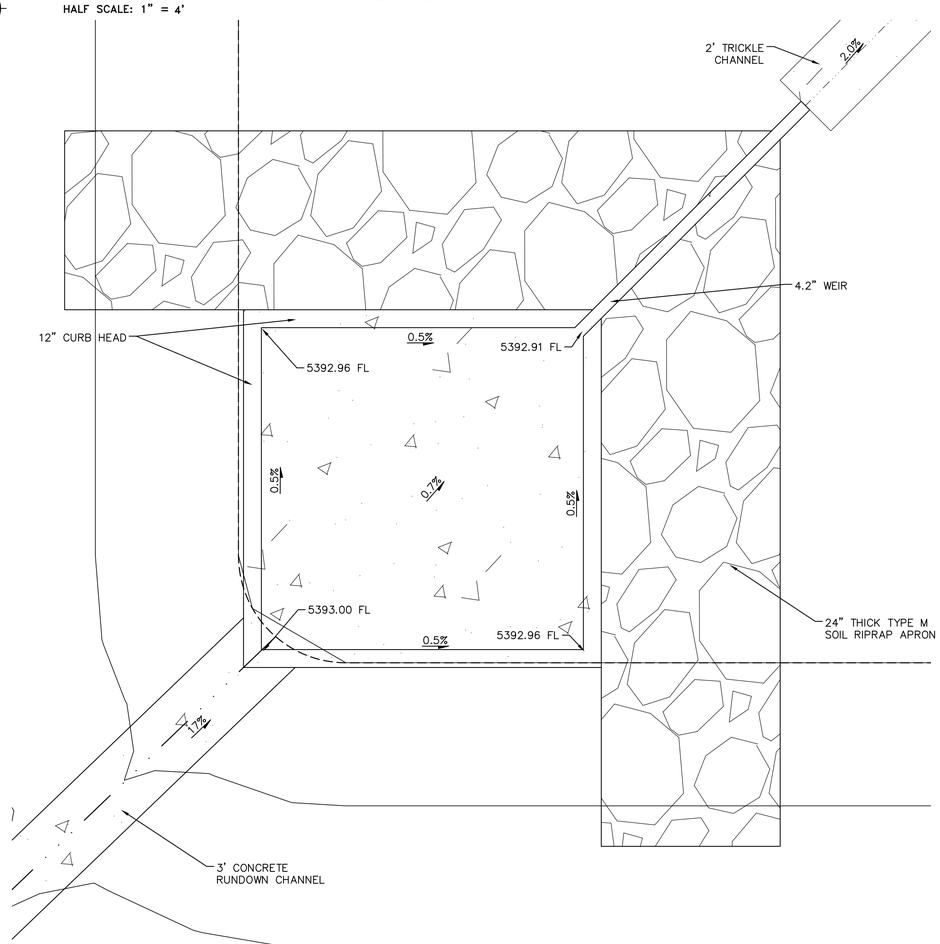


TYPICAL RUNDOWN CHANNEL
SCALE 1" = 2'



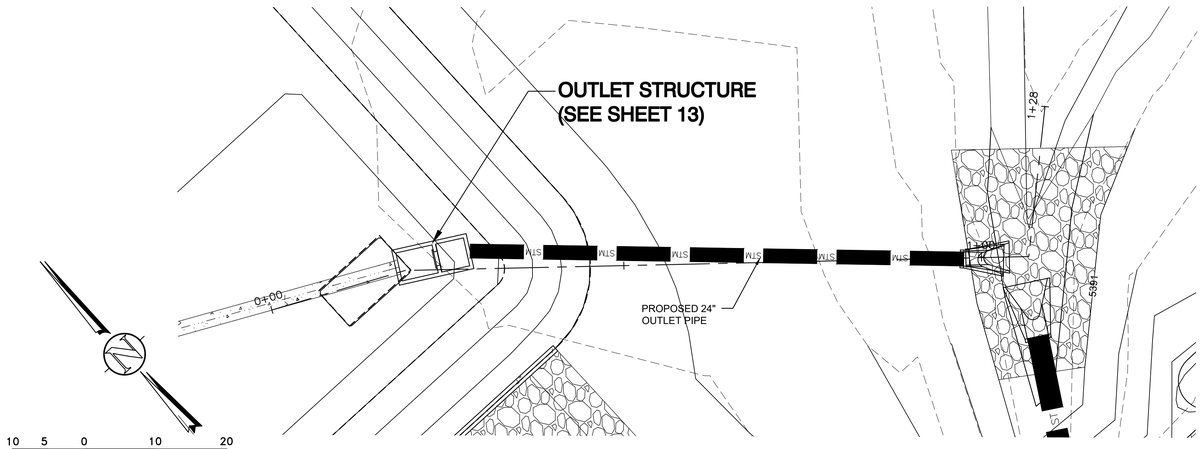
TYPICAL TRICKLE CHANNEL
SCALE 1" = 2'

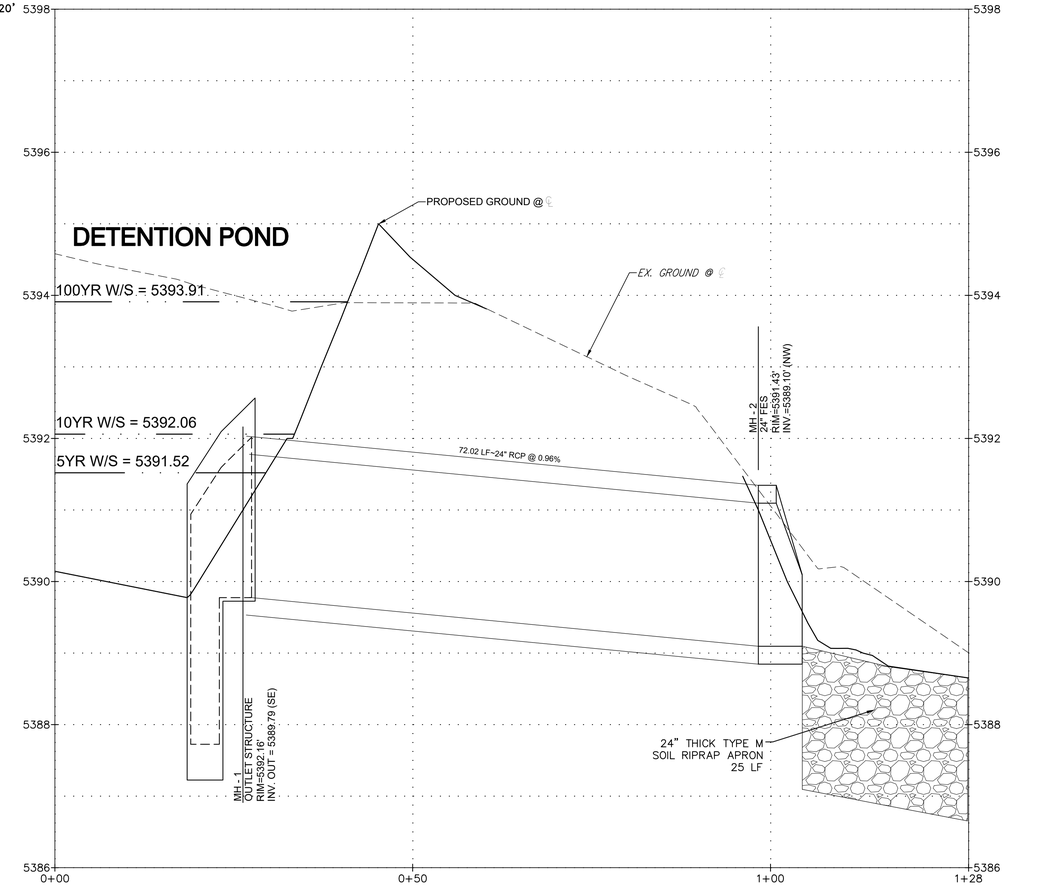




SW FOREBAY (9'x9')
1" = 2'

POND A WATER SURFACE TABLE		
STORM EVENT	REQUIRED VOLUME (CFT)	WATER SURFACE ELEV
WQCV	3,662	5391.52
10 YR	6,345	5392.06
100 YR	22,140	5393.91
POND OVERFLOW	33,907	5395.00





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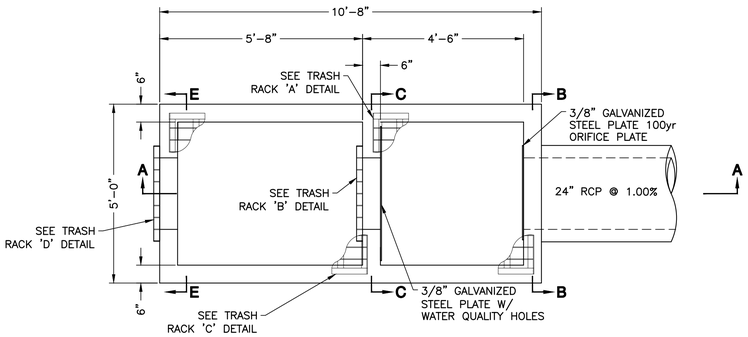
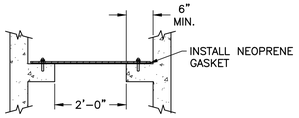
POND A WATER SURFACE TABLE		
STORM EVENT	REQUIRED VOLUME (CFT)	WATER SURFACE ELEV
WQCV	3,662	5391.52
10 YR	6,345	5392.06
100 YR	22,140	5393.91
POND OVERFLOW	33,907	5395.00

STRUCTURAL NOTES:

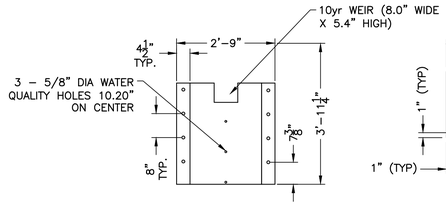
1. ALL CONCRETE SHALL BE C.D.O.T. CLASS B CAST IN PLACE.
2. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFER 3/4".
3. ALL REINFORCING BARS SHALL HAVE A MINIMUM 2" CLEARANCE.
4. ALL REINFORCING BARS SHALL BE EPOXY COATED.
5. ALL STEPS SHALL BE IN ACCORDANCE WITH AASHTO M199.



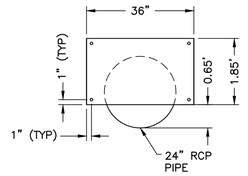
PLAN VIEW
SCALE 1" = 2'



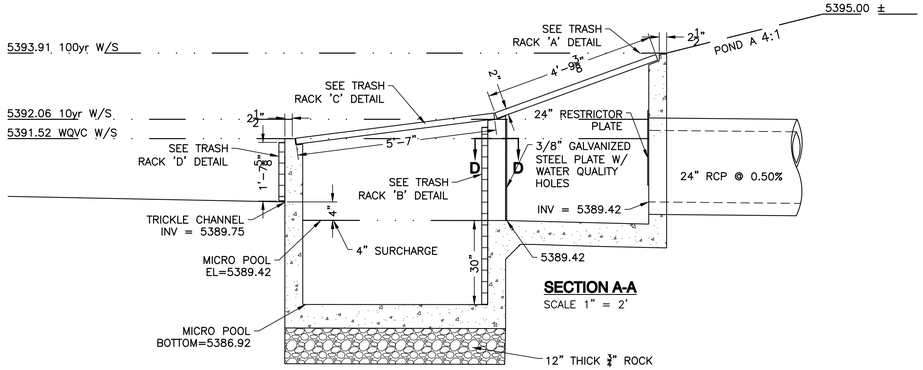
SECTION D-D
SCALE 1" = 2'



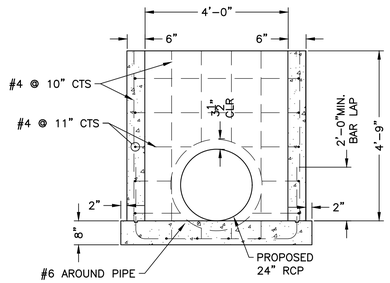
3/8" GALVANIZED STEEL PLATE W/ WATER QUALITY HOLES
SCALE 1" = 2'



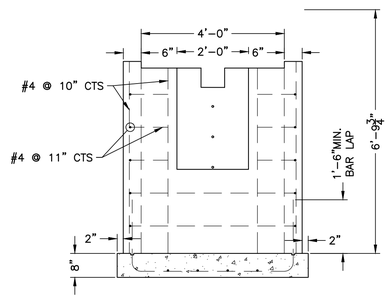
3/8" GALVANIZED STEEL PLATE 100yr ORIFICE PLATE
SCALE 1" = 2'



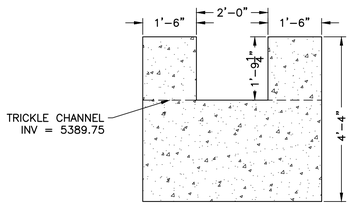
SECTION A-A
SCALE 1" = 2'



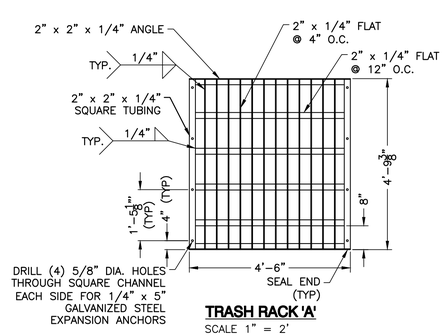
SECTION B-B
SCALE 1" = 2'



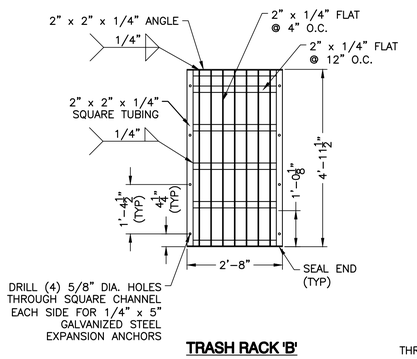
SECTION C-C
SCALE 1" = 2'



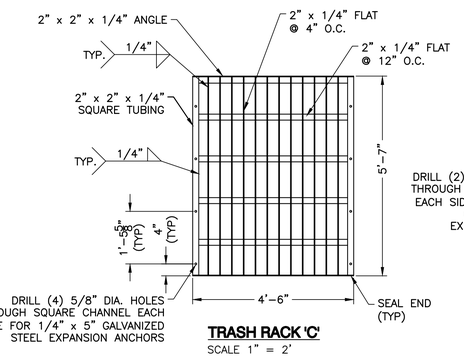
SECTION E-E
SCALE 1" = 2'



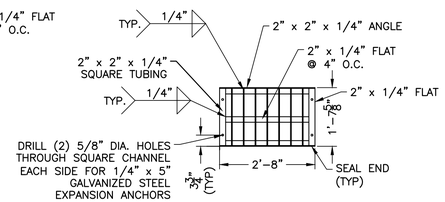
TRASH RACK 'A'
SCALE 1" = 2'



TRASH RACK 'B'
SCALE 1" = 2'



TRASH RACK 'C'
SCALE 1" = 2'



TRASH RACK 'D'
SCALE 1" = 2'

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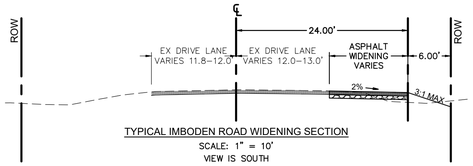


TYPICAL IMBODEN ROAD WIDENING SECTION

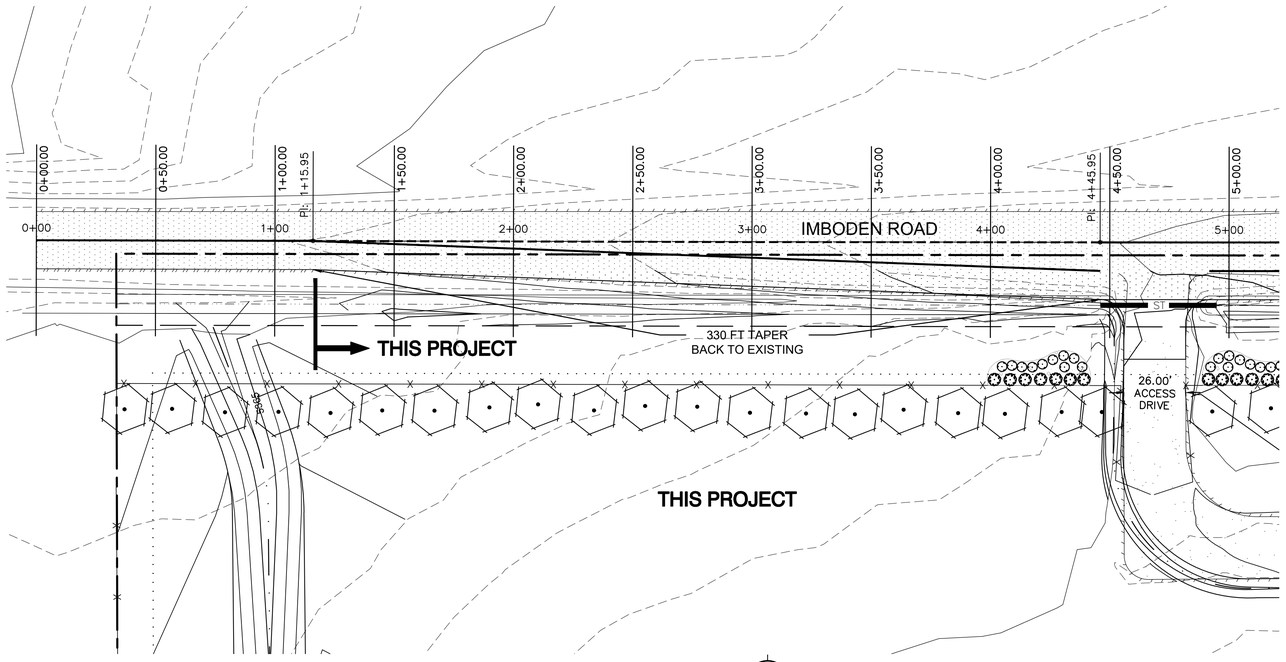
SCALE: 1" = 10'

VIEW IS SOUTH

LOT 2

HAVANA ESTATES TWO

(FILE 17, MAP 607, REC. NO. C0225699)



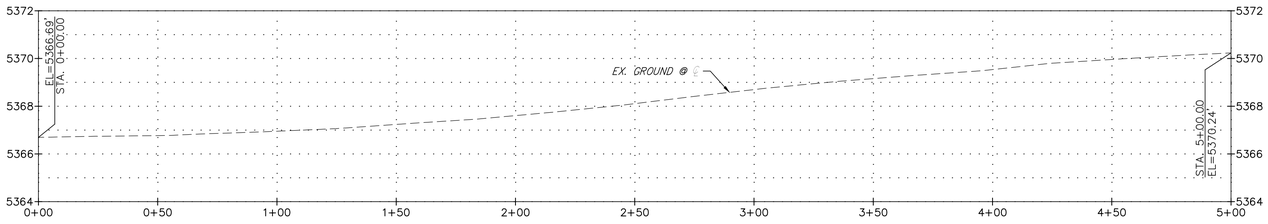
30 15 0 30 60

FULL HORIZONTAL SCALE: 1" = 30'

HALF HORIZONTAL SCALE: 1" = 60'

FULL VERTICAL SCALE: 1" = 3'

HALF VERTICAL SCALE: 1" = 6'

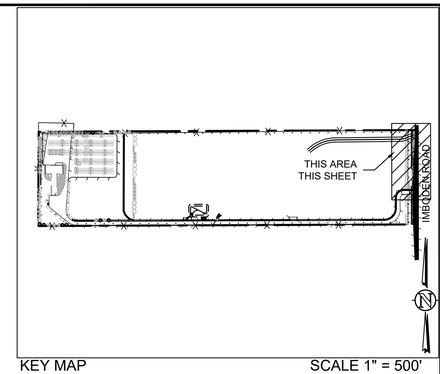


EXISTING IMBODEN ROAD CL PROFILE

STA. 0+00 TO 5+00

GRADING LEGEND

	EXISITNG MAJOR CONTOUR
	EXISTING MINOR CONTOUR
5132.12 × G	EXISITNG SPOT ELEVATION
1.0%	EXISTING SLOPE
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
5132.15 ✱ FG	PROPOSED SPOT ELEVATION
2.0%	PROPOSED SLOPE



KEY MAP SCALE 1" = 500'

NOTES

THIS PLAN IS INTENDED AS THE IMBODEN ROAD PLAN & PROFILE FOR THE ALDANA EVENT CENTER.

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IT IS THE OWNER AND/OR THE CONTRACTOR'S RESPONSIBILITY TO ATTAIN ALL APPROPRIATE PERMITS AND REVIEW APPROVALS FROM THE STATE OF COLORADO AND ADAMS COUNTY RESPECTIVELY.

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SYMBOL LEGEND

45 DEG BEND		THRUST BLOCK	TB
22.5 DEG BEND		GATE VALVE	GV
RESTRAINED PLUG		CURB STOP	
RESTRAINED TEE		PIPE CROSSING	
WATER METER		MANHOLE	
RESTRAINED CROSS		MANHOLE W/ FLOW DIRECTION	
FIRE HYDRANT		ROOF DRAIN	RD
RESTRAINED VALVE			
		PROPOSED GRAVEL	
EXISTING CONC		PROPOSED CONC	
EXISTING ASPHALT		PROPOSED ASPHALT	

LINETYPE LEGEND

	LOT / PROPERTY / SECTION LINE
	RIGHT OF WAY LINE
	EASEMENT
	SETBACK
	TO BE ABANDONED LOT LINE
	EXISTING BUILDING, CURB
	EDGE of ASPHALT or GRAVEL RD
	CHAINLINK FENCE
	WIRE FENCE
	POND WQ W/S
	SWALE
OHE	EXISTING OVERHEAD ELEC
EL	EXISTING ELECTRICAL LINE
ST	EXISTING STORM LINE
SA	EXISTING SANITARY LINE
W	EXISTING WATER LINE
GA	EXISTING GAS LINE
FO	EXISTING FIBER OPTIC LINE
T	EXISTING TELEPHONE LINE
SA	PROPOSED SANITARY LINE
SS	PROPOSED SANITARY SERVICE
ST	PROPOSED STORM LINE
WA	PROPOSED WATER LINE
WAS	PROPOSED WATER SERVICE
GA	PROPOSED GAS LINE
EL	PROPOSED ELECTRIC LINE
T	PROPOSED TELEPHONE LINE

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CONTACT:
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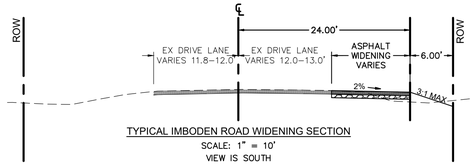
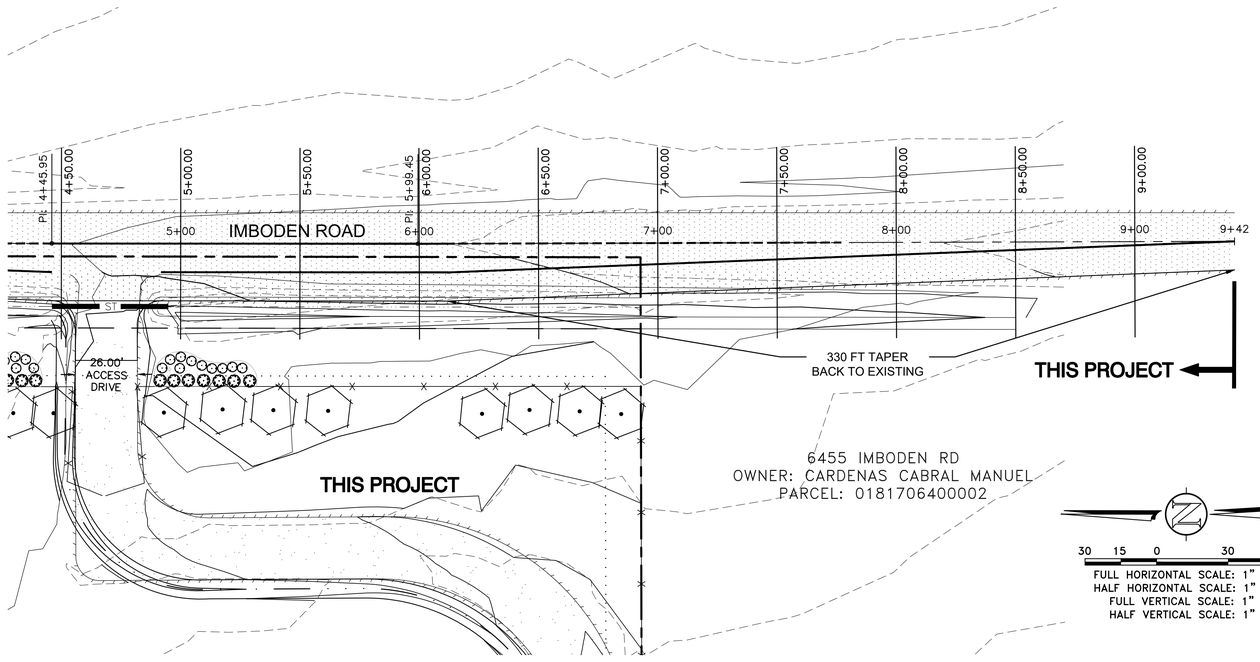
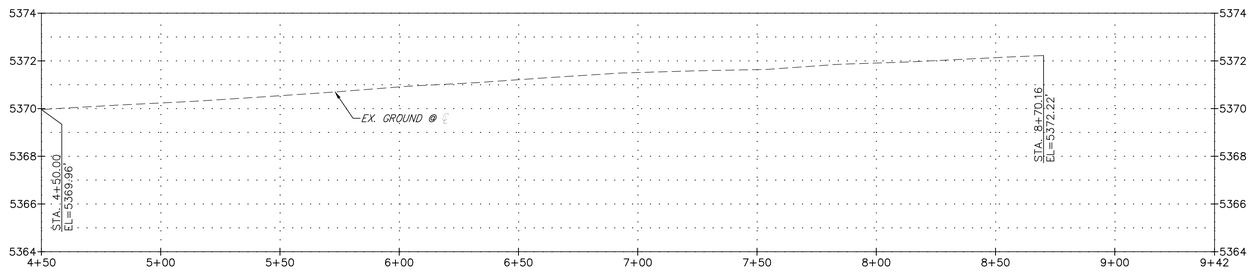


TYPICAL IMBODEN ROAD WIDENING SECTION
SCALE: 1" = 10'
VIEW IS SOUTH

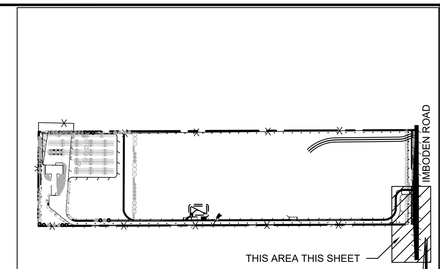




EXISTING IMBODEN ROAD CL PROFILE
STA. 4+50 TO 9+42

GRADING LEGEND

	EXISITNG MAJOR CONTOUR
	EXISTING MINOR CONTOUR
5132.12 × G	EXISITNG SPOT ELEVATION
1.0%	EXISTING SLOPE
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
5132.15 ✱ FG	PROPOSED SPOT ELEVATION
2.0%	PROPOSED SLOPE



KEY MAP SCALE 1" = 500'

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SYMBOL LEGEND

45 DEG BEND	THRUST BLOCK TB
22.5 DEG BEND	GATE VALVE GV
RESTRAINED PLUG	CURB STOP
RESTRAINED TEE	PIPE CROSSING
WATER METER	MANHOLE
RESTRAINED CROSS	MANHOLE W/ FLOW DIRECTION
FIRE HYDRANT	RD ROOF DRAIN
RESTRAINED VALVE	
	PROPOSED GRAVEL
EXISTING CONC	PROPOSED CONC
EXISTING ASPHALT	PROPOSED ASPHALT

LINETYPE LEGEND

	LOT / PROPERTY / SECTION LINE
	RIGHT OF WAY LINE
	EASEMENT
	SETBACK
	TO BE ABANDONED LOT LINE
	EXISTING BUILDING, CURB
	EDGE of ASPHALT or GRAVEL RD
	CHAINLINK FENCE
	WIRE FENCE
	POND WQ W/S
	SWALE
OHE	EXISTING OVERHEAD ELEC
EL	EXISTING ELECTRICAL LINE
ST	EXISTING STORM LINE
SA	EXISTING SANITARY LINE
W	EXISTING WATER LINE
GA	EXISTING GAS LINE
FO	EXISTING FIBER OPTIC LINE
T	EXISTING TELEPHONE LINE
SA	PROPOSED SANITARY LINE
SS	PROPOSED SANITARY SERVICE
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GA	PROPOSED GAS LINE
EL	PROPOSED ELECTRIC LINE
T	PROPOSED TELEPHONE LINE

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No.	REVISION	DATE	BY	CHK
0	INITIAL RELEASE	03/01/23	CFC	

CKSA LLC
CONTACT:
LLARICXE ALDANA
6657 IMBODEN RD
WATKINS, CO 80137
(303) 435–3021

EX IMBODEN ROAD P&P
ALDANA EVENT CENTER
6539 IMBODEN RD
ADAMS COUNTY, COLORADO

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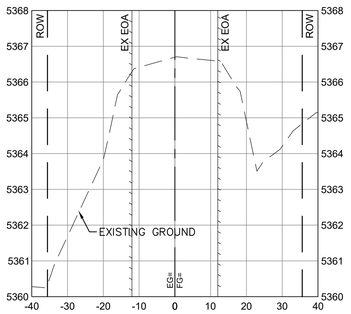
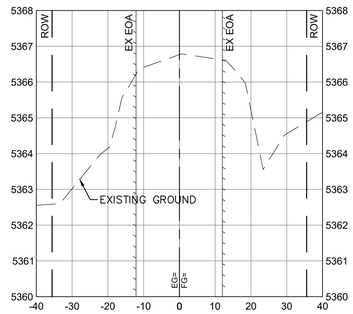
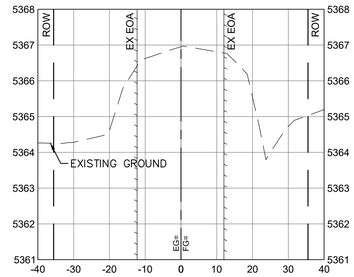
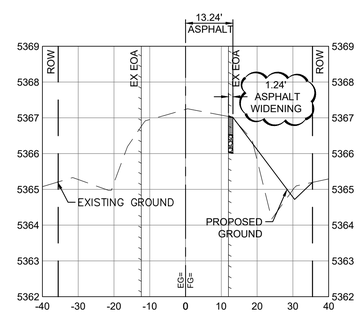
INITIAL PLAN RELEASE: 03/01/23
DESIGNED BY: CFC
DRAWN BY: CFC
CHECKED BY: CFC
PROJECT NO. 01–0406.002.00
DOC CON # 0002–IMB P&P

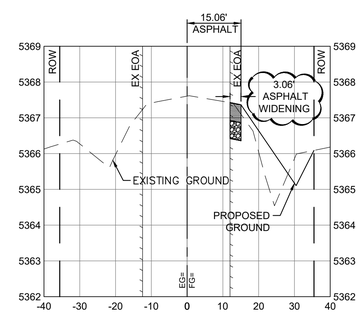
2 OF 3





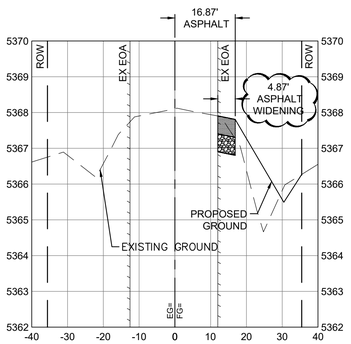


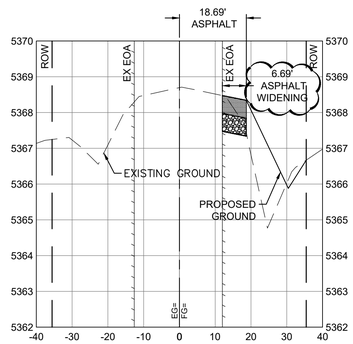


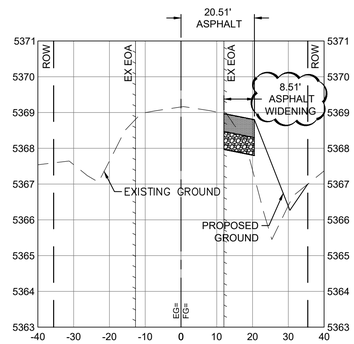


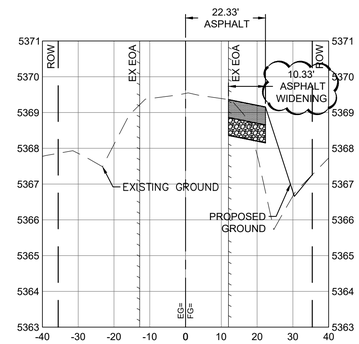
TAPER

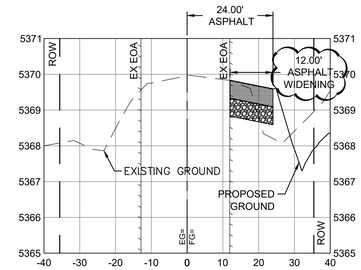
FULL
SECTION











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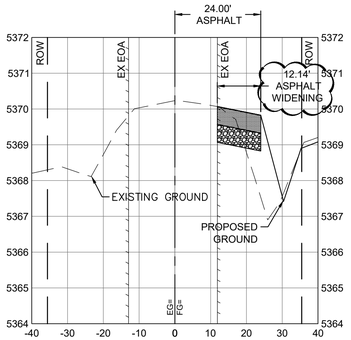

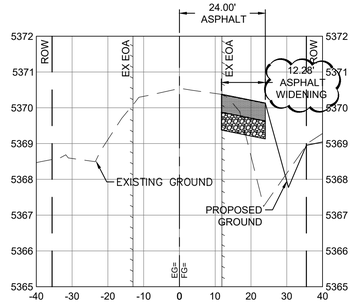

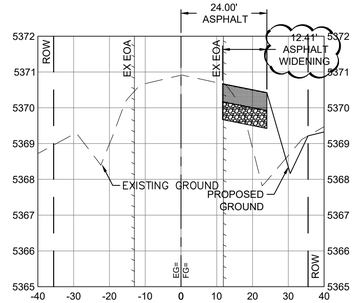

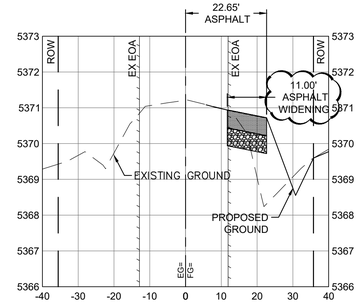

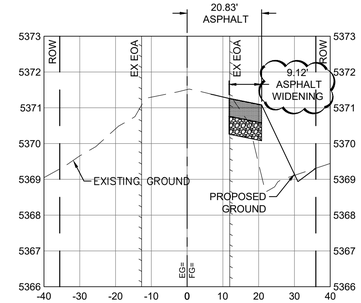

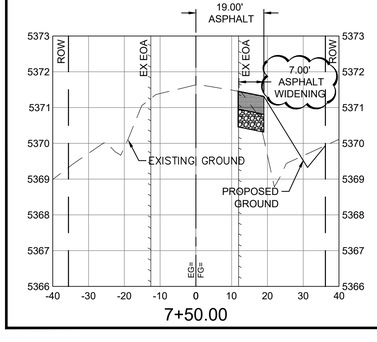

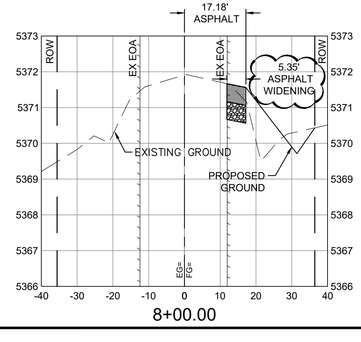

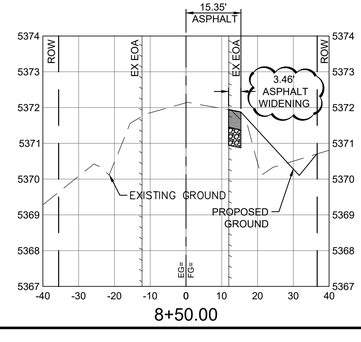

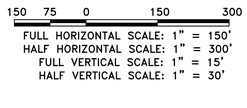

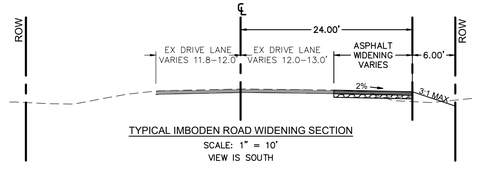

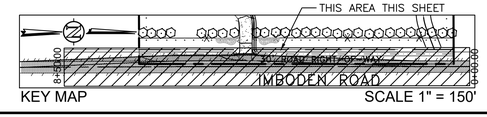

127 S. DENVER AVE
FT. LUPTON, CO 80621
www.westernec.com
email@westernec.com
(720) 685-9951
FAX (720) 294-1330
Western Engineering Consultants, inc LLC

No.	REVISION	DATE	BY
0	INITIAL RELEASE	03/01/23	CFC

CONTACT:
LLARICXE ALDANA
6657 IMBODEN RD
WATKINS, CO 80137
(303) 435-3021

TYPICAL CROSS SECTIONS
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INITIAL PLAN RELEASE: 03/01/23
DESIGNED BY: CFC
DRAWN BY: CFC
CHECKED BY: CFC

PROJECT NO.
01-0406.002.00

DOC CON #
0003-XSEC

3 OF 3

ADAMS COUNTY
HEALTH DEPARTMENT
Your Health. Our Mission.

Adams County Health Department
7190 Colorado Blvd., Suite 200
Commerce City, CO 80022

Permit to Repair An On-site Waste Water Treatment System

PROPERTY INFORMATION:

Address: 6539 Imboden Road
Watkins CO 80137
County: Adams
APN: 0181706400006

Dwelling Type: Commercial
No. of Bedrooms: 0
Water Supply: Private Well
Onsite ID:

OWNER INFORMATION: Maria Aldana

Address: PO Box 5
Watkins CO 80137-0005
Phone: (303) 435-3021

PERMIT INFORMATION: STS1126 **Permit Type:** Repair Major

Tank 1

Tank Capacity Built (Gal):	1500 Gallons
Tank Type:	T-Treatment
Tank Material:	P-Poly
Tank Baffle:	Tees
No of Compartments:	2
Effluent Screen?	

Tank 2

Tank Capacity Built (Gal):	1000 Gallons
Tank Type:	T-Treatment
Tank Material:	P-Poly
Tank Baffle:	Tees
No of Compartments:	2
Effluent Screen?	

Tank 3

Tank Capacity Built (Gal):	1500 Gallons
Tank Type:	T-Treatment
Tank Material:	P-Poly
Tank Baffle:	Tees
No of Compartments:	2
Effluent Screen?	

System Design:

System Designed By: Kurt Rollin, P.E.
Design Date: 04/17/2023
Design Number: 18-0095.001
Electrical Inspection Required? No

NOTE: A “Not Specified” comment indicates that either the information was not available or not applicable at the time the permit was issued.

Associated Professionals

Business Name:
Name: ,

OWTS - Installer
NAWT Certification:
Phone:
Email:

FOR AN ON-SITE WASTE WATER TREATMENT SYSTEM

LIMITATIONS AND DISCLAIMER

A Permit to **Repair** shall expire 4 Weeks from the date of issuance unless extended to a fixed date upon request by the Applicant and approved by Adams County Health Department.

ADAMS COUNTY
HEALTH DEPARTMENT
Your Health. Our Mission.

Adams County Health Department
7190 Colorado Blvd., Suite 200
Commerce City, CO 80022

Permit to Repair An On-site Waste Water Treatment System

PROPERTY INFORMATION:

Address: 6539 Imboden Road
Watkins CO 80137

County: Adams

APN: 0181706400006

Dwelling Type: Commercial

No. of Bedrooms: 0

Water Supply: Private Well

Onsite ID:

OWNER INFORMATION: Maria Aldana

Address: PO Box 5
Watkins CO 80137-0005

Phone: (303) 435-3021

PERMIT INFORMATION: STS10374

Permit Type: Repair Major

Permit Valid from 04/20/2023 to 04/20/2024

*Kian McIntosh - 04/20/2023

ADAMS COUNTY
HEALTH DEPARTMENT
Your Health. Our Mission.

Adams County Health Department
7190 Colorado Blvd., Suite 200
Commerce City, CO 80022

PROPERTY INFORMATION:

Address: 6539 Imboden Road
Watkins CO 80137

County: Adams

APN: 0181706400006

Dwelling Type: Commercial

No. of Bedrooms: 0

Water Supply: Private Well

Onsite ID:

OWNER INFORMATION: Maria Aldana

Address: PO Box 5
Watkins CO 80137-0005

Phone: (303) 435-3021

PERMIT INFORMATION: STS10374 **Permit Type:** Repair Major

Permit Comments

Install the system per CES Consultants, Design No. 18-0095.01, dated 07/06/2022, revised 02/01/2023 and 04/17/2023. If discrepancies are discovered between the referenced design and this permit, notify Adams County Health Department (ACHD) before proceeding with installation.

Install two 1500-gallon two-compartment treatment tanks followed by one 1000-gallon two-compartment treatment tank in series. The tanks must be approved by CDPHE and be installed no deeper than 48 inches below grade with risers to grade. The sewer line must be installed at least 22 inches below grade, or if not, must be protected from freezing. The soil treatment area shall consist of 5 new trenches with 25 Infiltrator chambers per trench. The westernmost trench shall be abandoned, and the remaining 3 trenches shall be extended to have an additional 15 new Infiltrator chambers per trench. A total of 170 new chambers are to be installed. Install the chambers a minimum of 24 inches and a maximum of 48 inches below grade, while maintaining fall from the tank to the soil treatment area. The trenches must be no more than 3 feet wide and have a minimum of 4 feet of native undisturbed soil between each trench. The 1000-gallon septic tank shall be connected to a new 22"x15"x15" Tuf-Tite 9-port distribution box (or approved equal). Each of the 8 trenches shall be independently connected to the distribution box to evenly distribute effluent to each trench.

Observe all regulation setbacks. Install all system components at depths specified relative to the site benchmark. As a permit for a similar proposed system was issued on 07/12/2022, a site visit was not completed by ACHD.

ACHD requires that the applicant complete and submit a "United States Environmental Protection Agency (US EPA) Shallow Injection Well Inventory Request Form" for this commercial system before final approval of the system will be issued.

COLORADO
Department of Public Health & Environment

CERTIFICATION TO DISCHARGE
UNDER
CDPS GENERAL PERMIT COR400000
STORMWATER ASSOCIATED WITH CONSTRUCTION ACTIVITIES

Certification Number: **COR420077**

This Certification to Discharge specifically authorizes:

Owner GCSA LLC
Operator GCSA LLC
to discharge stormwater from the facility identified as

Event Center

To the waters of the State of Colorado, including, but not limited to:

Bear Gulch, Box Elder Creek

Facility Activity :	Commercial Development
Disturbed Acres:	17.50 acres
Facility Located at:	6539 Imboden Rd Watkins CO 80137 Adams County Latitude 39.81484 Longitude -104.588345
Specific Information (if applicable):	

Certification is issued and effective: 04/17/2023
Expiration date of general permit: 3/31/2024

This certification under the permit requires that specific actions be performed at designated times. The certification holder is legally obligated to comply with all terms and conditions of the permit.

This certification was approved by:
Randi Johnson-Hufford, Permits Unit 1 Manager
Permits Section
Water Quality Control Division

COLORADO
Division of Water Resources
Department of Natural Resources

WELL PERMIT NUMBER 86379-F
RECEIPT NUMBER 10013402

ORIGINAL PERMIT APPLICANT(S)

GCSA LLC (LLARICXE ALDANA)

APPROVED WELL LOCATION

Water Division: 1 Water District: 1
Designated Basin: N/A
Management District: N/A
County: ADAMS
Parcel Name: N/A
Physical Address: 6539 IMBODEN RD WATKINS, CO 80137

SW 1/4 SE 1/4 Section 6 Township 3.0 S Range 64.0 W Sixth P.M.

UTM COORDINATES (Meters, Zone:13, NAD83)

Easting: 534848.0 Northing: 4407251.0

PERMIT TO CONSTRUCT A NEW WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT
CONDITIONS OF APPROVAL

1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
3) Approved pursuant to CRS 37-90-137(4) and the findings of the State Engineer dated December 8, 2021.
4) The use of groundwater from this well is limited to commercial, irrigation of not more than 1 acre and use in 2 single family dwellings.
5) Production from this well is restricted to the Upper Arapahoe aquifer, which corresponds to the interval between 695 feet and 870 feet below the ground surface.
6) The pumping rate of this well shall not exceed 50 GPM.
7) The average annual amount of groundwater to be withdrawn shall not exceed 8.5 acre-feet and the total volume of groundwater to be withdrawn shall not exceed 850 acre-feet.
8) The entire length of the hole shall be geophysically logged as required by Rule 9 of the Statewide Nontributary Ground Water Rules prior to installing casing.
9) The owner shall mark the well in a conspicuous location with well permit number(s), name of the aquifer, and court case number(s) as appropriate. The owner shall take necessary means and precautions to preserve these markings.
10) A totalizing flow meter must be installed on this well and maintained in good working order. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request.
11) This well shall be constructed more than 600 feet from any existing well, completed in the same aquifer, that is not owned by the applicant.
12) This well shall be constructed not more than 200 feet from the location specified on this permit.
13) Pursuant to CRS 37-90-137(9)(b) and the Denver Basin Rules, no more than 98% of the nontributary groundwater withdrawn annually shall be consumed and the well owner shall demonstrate to the reasonable satisfaction of the State Engineer that no more than 98% of the water withdrawn will be consumed.
14) This well is subject to administration by the Division Engineer in accordance with applicable decrees, statutes, rules, and regulations.

NOTE: This well is withdrawing water from a non-renewable aquifer. While the withdrawals from this aquifer are administered based on a 100 year aquifer life, water level declines may prevent this well from diverting the permitted amounts for that 100 years.

NOTE: To ensure a maximum productive life of this well, perforated casing should be set through the entire producing interval of the approved zone or aquifer indicated above.

WELL PERMIT NUMBER 86379-F **RECEIPT NUMBER 10013402**

NOTE: This permit will expire on the expiration date unless the well is constructed and a pump is installed by that date. A Well Construction and Yield Estimate Report (GWS-31) and Pump Installation and Production Equipment Test Report (GWS-32) must be submitted to the Division of Water Resources to verify the well has been constructed and the pump has been installed. A one-time extension of the expiration date may be available. Contact the DWR for additional information or refer to the extension request form (GWS-64) available at: dwr.colorado.gov

NOTE: This well will be completed in a Type 1 aquifer penetrating only one confining layer and must be constructed in accordance with Well Construction Rule 10.4.5.1 (2 CCR 402-2).

Issued By JOANNA WILLIAMS

Date Issued: 12/8/2021

Expiration Date: 12/8/2023

PERMIT HISTORY

11-29-2022 PERMIT EXTENDED