

Unresolved:  
Revise to Final Drainage Report  
- Early Grading Permit



Preliminary Drainage Report – Early Grading Permit

# Waterview East Commercial El Paso County, Colorado

Prepared for:

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Project #: 196195000

PCD Filing No.: SP-22-009

Prepared: March 23, 2023

**Kimley»Horn**

**CERTIFICATION**

Unresolved;  
Update Header to "Final  
Drainage Report"

**DESIGN ENGINEER'S STATEMENT**

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparation of this report.

SIGNATURE (Affix Seal): \_\_\_\_\_

Jared Roberts, P.E.  
Colorado P.E. No. 60470

Date

**OWNER/DEVELOPER'S STATEMENT**

I, the developer, have read and will comply with all the requirements specified in this Drainage Report and Plan.

\_\_\_\_\_  
Name of Developer

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Address:

**EL PASO COUNTY**

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

\_\_\_\_\_  
Josh Palmer, P.E.  
County Engineer/ ECM Administrator

\_\_\_\_\_  
Date

Conditions:

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## INTRODUCTION

### PURPOSE AND SCOPE OF STUDY

The purpose of this Preliminary Drainage Report (PDR) is to provide the hydrologic and preliminary grading exhibit and calculations and to document the drainage design methodology in support of the proposed Waterview East Subdivision ("the Project") for Waterview Commercial Investors, LLC. The finalized hydraulic design, including storm sewer and associated calculations will be provided with the Final Drainage Report. The Project is located within the jurisdictional limits of El Paso County ("the County"). Therefore, the hydrologic and grading design is based on the County's criteria which is described in further detail within the report.

### LOCATION

The Project is located within part of the West ½ West of the 6<sup>th</sup> Principal Meridian, County of El Paso, bounded by Powers Boulevard (Highway 21) on the north, Bradley Road on the east and to the south, and Bradley Road on the west in the **Appendix A** of this report.

The Site is currently owned by Waterview East Commercial Investors, LLC and is unplatted.

### DESCRIPTION OF PROPERTY

The Site is approximately 22.1 acres consisting of undeveloped land with native vegetation and is classified as Vegetation within the site is characterized primarily by prairie grasses along with some area of scrub brush and a limited occurrence of small oaks. The Site does not currently provide water quality or detention for the Project area. The existing land use is undeveloped vacant land. There are no existing irrigation ditches on the Site.

The existing topography consists of slopes ranging from 1% to 33%.

According to NRCS soil mapping data, USCS Type A and B soils are the primary soil type within the site. Soils present at the Site consist mainly of "Blakeland loamy sand" which represent a moderate hazard for erosion. **Appendix B** contains detailed NRCS soil data.

The development of this site will include commercial developments, including convenience store, restaurants, storage units and retail stores. Roadway improvements to the site will include mowing, clearing, and grubbing, weed control, paved access road construction, roadway grading, three onsite extended detention basins, native seeding, and water quality features. Permanent improvements outside of the scope of early grading will be evaluated under the Final Drainage Report.

A Topographic field survey was completed and updated for the Project by Ridgeline Land Surveying dated February 7<sup>th</sup>, 2023 and is the basis for design for the drainage improvements.

Unresolved:

Update paragraph. As previously stated in the review #1 comments to the GEC:

"Submit a separate final drainage report that is strictly associated with the proposed early grading operations and calculations for any drainage facilities being installed with the early grading such as sizing of temporary sediment basins, or temporary swales."

Unresolved:

"...included with the final plat application."



## DRAINAGE BASINS

### MAJOR BASIN DESCRIPTIONS

The western half of the Property lies within the Big Johnson drainage basin, and the eastern half of the Property lies within the West Fork of Jimmy Camp Creek drainage basin. The watershed is generally located in the central portion of El Paso County. Refer to **Appendix A** for the Flood Insurance Rate Map (FIRM) number 08041C0768G effective date, December 7, 2018. There was a Drainage Basin Planning Study conducted for the Big Johnson basin in February 1992; however, there has not been one conducted for the Sand Creek basin. Please see reference in the **Appendix**.

### MASTER DRAINAGE REPORT STUDY

The Waterview East commercial development project is part of the “Master Development Drainage Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge” Prepared by: Matrix Design Group September 2019. As outlined in the Master Drainage Plan, the “East Pond” was sized to include flows from the future “Commercial Lot south of Bradley Road and West of Legacy Drive”. In these watershed calculations a conservative weighted imperviousness value of 95% was used. This value is substantially higher than the calculated impervious value of 56% in proposed conditions.

As noted in the Master Drainage Plan, the eastern portion of the Site which is part of the West Fork Jimmy Camp Creek drainage basin will require on site detention. As noted in the Master Drainage Plan, the western portion of the Site which is part of the Big Johnson Reservoir drainage basin for future development of this lot “...On-site detention will be required and must discharge to the Powers Boulevard ditch.” Based on the pond sizing calculations and required on site detention, the proposed development is in compliance with the above-mentioned Master Drainage Plan. Offsite flows are addressed in the existing sub-basin descriptions below.

Excerpts from “Master Development Drainage Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge” Prepared by: Matrix Design Group June 2019 have been provided in **Appendix E**.

### EXISTING SUB-BASIN DESCRIPTIONS

Historically, runoff from the Site is split almost directly down the center. With the eastern portion of the Site heading east and the western portion of the site heading west. The site has been divided into 2 existing onsite subbasins, EX-1 and EX-2.

Per map there are 3 onsite basins and 1 offsite basin.

#### Sub-Basin EX-1

The on-site sub-basin EX-1 is undeveloped consisting of native grasses and shrubs with an area of 10.36 acres comprising the eastern half of the property. Drainage flows overland from west to the east at slopes ranging from 1-33%. Flows are collected in the existing curb and gutter along Legacy Drive and are conveyed to an existing 12" COS D-10-R inlet at the intersection of Legacy Drive and Frontside Drive. Flows are then carried through existing storm

infrastructure into East Pond as outlined in the “Master Development Drainage Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge” Prepared by: Matrix Design Group September 2019. Runoff during the 5-year and 100-year events are 3.54 cfs and 24.73 cfs respectively.

### Sub-Basin EX-2

The on-site sub-basin EX-2 is undeveloped consisting of native grasses and shrubs with an area of 11.50 acres comprising the western half of the property. Drainage flows overland from northeast to southwest at slopes ranging from 1-33%. Flows are collected in the existing roadside ditch along Powers Blvd and travel south where they are conveyed west through an existing 60” CMP under Powers Blvd and into Big Johnson Reservoir. Runoff during the 5-year and 100-year events are 2.62 cfs and 22.34 cfs respectively.

### Sub-Basin EX-3

The on-site sub-basin EX-3 is undeveloped, consisting of native grasses and shrubs, with a curb cut access. It has an area of 0.26 acres comprising a portion of the eastern site boundary. Drainage flows overland from west to east at slopes ranging from 1-25%. Flows are collected in the existing Frontside Drive curb and gutter and travels south where they are conveyed to existing storm infrastructure into the East Pond as outlined in the “Master Development Drainage Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge” Prepared by: Matrix Design Group September 2019. Runoff during the 5-year and 100-year events are 0.21 cfs and 0.91 cfs respectively.

### Sub-Basin OS-1

The off-site sub-basin OS-1 is undeveloped consisting of native grasses and shrubs with an area of 0.66 acres comprising the northern boundary of the Site. Drainage flows overland from north to south at slopes ranging from 5-33%. Flows convey through Basin EX-1 and are ultimately collected via existing curb and gutter along Legacy Drive, which are conveyed to an existing 12” COS D-10-R inlet at the intersection of Legacy Drive and Frontside Drive. Flows are then carried through existing storm infrastructure into East Pond as outlined in the “Master Development Drainage Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge” Prepared by: Matrix Design Group September 2019. Runoff during the 5-year and 100-year events are 0.19 cfs and 1.61 cfs respectively.

Refer to **Appendix F** for the Existing Drainage Conditions Map.

## PROPOSED SUB-BASIN DESCRIPTIONS

For the proposed condition, stormwater will generally maintain historic flow patterns for the east and west portions of the site. Proposed roadways internal to the site will alter some of the existing flow paths. **Proposed curb and gutter, and proposed storm inlets will convey flows to one of three proposed Private Full Spectrum Extended Detention Basins.** From there flows will outfall to existing historic drainage paths, which will ultimately outfall to existing natural drainage channels, sub regional pond, or water quality features. The proposed project has been divided into 28 on-site sub-basins and 1 off-site basin. **To satisfy the early grading permit requirements, these basins will be shown for reference, with only construction items associated with early grading to be shown. Construction of utility infrastructure as well as building footprints will not be constructed with this preliminary drainage report, and**

will be evaluated with the submittal of the final drainage report.

Unresolved:  
Combine sub-basins to  
what's draining into each  
TSB.

#### **Sub-Basin A1**

The on-site sub-basin A1 consists of proposed parking, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.67 acres and a weighted imperviousness of 73%. Runoff in this basin will travel overland and into a crossspan to proposed private on-grade Type D inlet at DP 1. Flows will then be conveyed to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.87 cfs and 4.70 cfs respectively.

#### **Sub-Basin A2**

The on-site sub-basin A2 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.33 acres and a weighted imperviousness of 66%. Runoff in this basin will travel overland into a proposed private sump Type D inlet at DP 2. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 0.85 cfs and 2.22 cfs respectively.

#### **Sub-Basin A3**

The on-site sub-basin A3 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.41 acres and a weighted imperviousness of 81%. Runoff in this basin will travel overland into a proposed private sump Type D inlet at DP 3. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.27 cfs and 3.10 cfs respectively.

#### **Sub-Basin A4**

The on-site sub-basin A4 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.31 acres and a weighted imperviousness of 95%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private on-grade Type D inlet at DP 4. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.04 cfs and 2.41 cfs respectively.

#### **Sub-Basin A5**

The on-site sub-basin A5 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.32 acres and a weighted imperviousness of 92%. Runoff in this basin will travel overland into a proposed private sump 4' COS D-10-R inlet at DP 5. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.12 cfs and 2.60 cfs respectively.

#### **Sub-Basin A6**

The on-site sub-basin A6 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.30 acres and a weighted imperviousness of 89%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private on-grade Type D inlet at DP 6. Flows will then be conveyed via proposed stormwater infrastructure to proposed

Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 0.97 cfs and 2.29 cfs respectively.

#### **Sub-Basin A7**

The on-site sub-basin A7 consists of proposed drive aisle, landscaping, and sidewalk. The sub-basin has an area of 0.39 acres and a weighted imperviousness of 92%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private sump Recessed Type C Inlet at DP 7. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.43 cfs and 3.33 cfs respectively.

#### **Sub-Basin A8**

The on-site sub-basin A8 consists of proposed drive aisle, landscaping, and sidewalk. The sub-basin has an area of 0.42 acres and a weighted imperviousness of 93%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private sump Recessed Type C Inlet at DP 8. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.54 cfs and 3.57 cfs respectively.

#### **Sub-Basin A9**

The on-site sub-basin A9 consists of proposed drive aisle, landscaping, and sidewalk. The sub-basin has an area of 0.41 acres and a weighted imperviousness of 93%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private sump Recessed Type C Inlet at DP 9. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.53 cfs and 3.55 cfs respectively.

#### **Sub-Basin A10**

The on-site sub-basin A10 consists of proposed drive aisle, landscaping, and sidewalk. The sub-basin has an area of 0.40 acres and a weighted imperviousness of 90%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private sump 12' COS D-10-R inlet at DP 10. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 2.63 cfs and 6.16 cfs respectively.

#### **Sub-Basin A11**

The on-site sub-basin A11 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.26 acres and a weighted imperviousness of 75%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private sump Type D inlet at DP 11. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 0.62 cfs and 1.56 cfs respectively.

#### **Sub-Basin A12**

The on-site sub-basin A12 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 1.05 acres and a weighted imperviousness of 79%. Runoff in this

basin will travel overland into a proposed private on-grade 8' COS D-10-R inlet at DP 12. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 2.59 cfs and 6.33 cfs respectively.

#### **Sub-Basin A13**

The on-site sub-basin A13 consists of proposed drive aisle, landscaping, and sidewalk. The sub-basin has an area of 0.11 acres and a weighted imperviousness of 86%. Runoff in this basin will travel overland into a proposed private sump Type C inlet at DP 13. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 0.37 cfs and 0.87 cfs respectively.

#### **Sub-Basin A14**

The on-site sub-basin A14 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.16 acres and a weighted imperviousness of 75%. Runoff in this basin will travel overland into a proposed private sump Type C inlet at DP 14. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 0.36 cfs and 0.89 cfs respectively.

#### **Sub-Basin A15**

The on-site sub-basin A15 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.39 acres and a weighted imperviousness of 89%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private on-grade Type C inlet at DP 15. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 1.25 cfs and 2.97 cfs respectively.

#### **Sub-Basin A16**

The on-site sub-basin A16 consists of proposed drive aisle, landscaping, roofing, and sidewalk. The sub-basin has an area of 0.75 acres and a weighted imperviousness of 94%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private on-grade Type C inlet at DP 16. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 2). Runoff during the 5-year and 100-year events are 2.66 cfs and 6.17 cfs respectively.

#### **Sub-Basin A17**

The on-site sub-basin A17 consists of proposed drive aisle, landscaping, and roofing. The sub-basin has an area of 0.83 acres and a weighted imperviousness of 65%. Runoff in this basin will travel overland into a proposed private on-grade Type C inlet at DP 17. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 3). Runoff during the 5-year and 100-year events are 1.55 cfs and 4.06 cfs respectively.

#### **Sub-Basin A18**



The on-site sub-basin A18 consists of proposed drive aisle, and roofing. The sub-basin has an area of 1.34 acres and a weighted imperviousness of 95%. Runoff in this basin will travel overland and into a proposed crossspan to a proposed private sump Type C inlet at DP 18. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 3). Runoff during the 5-year and 100-year events are 4.57 cfs and 10.60 cfs respectively.

#### **Sub-Basin A19**

The on-site sub-basin A19 consists of proposed drive aisle, and roofing. The sub-basin has an area of 0.60 acres and a weighted imperviousness of 95%. Runoff in this basin will travel overland into a proposed private on-grade Type C inlet at DP 19. Flows will then be conveyed via proposed stormwater infrastructure to proposed Private Full Spectrum Extended Detention Basin (Pond 3). Runoff during the 5-year and 100-year events are 2.14 cfs and 4.96 cfs respectively.

#### **Sub-Basin A20**

The on-site sub-basin A20 consists of proposed drive aisle, and roofing. The sub-basin has an area of 0.49 acres and a weighted imperviousness of 92%. Runoff in this basin will travel overland and into a proposed crossspan through a proposed curb cut at DP 20. Flows will then be conveyed down a proposed riprap channel directly into the proposed Private Full Spectrum Extended Detention Basin (Pond 3). Runoff during the 5-year and 100-year events are 1.33 cfs and 3.12 cfs respectively.

#### **Sub-Basin A21**

The on-site sub-basin A21 consists of proposed drive aisle, and roofing. The sub-basin has an area of 0.63 acres and a weighted imperviousness of 93%. Runoff in this basin will travel overland and into a proposed crossspan through a proposed curb cut at DP 21. Flows will then be conveyed down a proposed riprap channel directly into the proposed Private Full Spectrum Extended Detention Basin (Pond 3). Runoff during the 5-year and 100-year events are 1.99 cfs and 4.65 cfs respectively.

#### **Sub-Basin A22**

The on-site sub-basin A22 consists of proposed drive aisle, sidewalk, landscaping, and roofing. The sub-basin has an area of 2.10 acres and a weighted imperviousness of 61%. Runoff in this basin will travel overland via curb and gutter into a proposed private on-grade 8' COS D-10-R inlet at DP 22. Flows will then be conveyed through proposed stormwater infrastructure into the proposed Private Full Spectrum Extended Detention Basin (Pond 1). Runoff during the 5-year and 100-year events are 4.10 cfs and 10.94 cfs respectively.

#### **Sub-Basin PD-1**

The on-site sub-basin PD-1 consists of landscaping and proposed Private Full Spectrum Extended Detention Basin (Pond 1). The sub-basin has an area of 0.65 acres and a weighted imperviousness of 2%. Runoff in this basin will travel overland directly into Pond 1. Flows from Pond 1 will outfall at DP 23 into proposed storm infrastructure and flow into existing stormwater infrastructure located in Frontside Drive. Runoff during the 5-year and 100-year events are 0.19 cfs and 1.64 cfs respectively.

### **Sub-Basin PD-2**

The on-site sub-basin PD-2 consists of landscaping, roofing, and proposed Private Full Spectrum Extended Detention Basin (Pond 2). The sub-basin has an area of 0.74 acres and a weighted imperviousness of 26%. Runoff in this basin will flow directly into Pond 2. Flows from Pond 2 will outfall at DP 24 into proposed storm infrastructure and flow into existing stormwater infrastructure located in Frontside Drive. Runoff during the 5-year and 100-year events are 0.67 cfs and 2.57 cfs respectively.

### **Sub-Basin PD-3**

The on-site sub-basin PD-3 consists of landscaping and proposed Private Full Spectrum Extended Detention Basin (Pond 3). The sub-basin has an area of 0.21 acres and a weighted imperviousness of 2%. Runoff in this basin will flow directly into Pond 3. Flows from Pond 3 will outfall at DP 25 into the existing roadside ditch along Powers Blvd. Runoff during the 5-year and 100-year events are 0.08 cfs and 0.65 cfs respectively.

### **Sub-Basin OS-1**

The on-site sub-basin OS-1 consists of landscaping along the western property line. The sub-basin has an area of 2.05 acres and a weighted imperviousness of 4%. Runoff in this basin will flow offsite at DP 26 directly into the roadside ditch along Powers Blvd. Flows from this sub-basin will follow historic flow patterns. Runoff during the 5-year and 100-year events are 0.61 cfs and 4.46 cfs respectively.

The majority of this basin is landscaping and a short section of sidewalk. According to the El Paso County Engineering Criteria Manual, Section I.7.1.B.7, This area classifies as “Land Disturbance to Undeveloped Land that will Remain Undeveloped.” This area will follow native drainage patterns and remain undeveloped with no buildings or pavement and therefore classifies as an exclusion.

Per the MDDP, the flows entering the Powers Blvd Ditch in the 100-year condition is 11.7 cfs. In the combined condition, Sub-Basin OS-1 and PD-3 will release into the powers ditch at 4.46 cfs and per historic flow, respectively, which will be lower than the flows designated per the MDDP.

### **Sub-Basin OS-2**

The on-site sub-basin OS-2 consists of landscaping, and drive aisle along the eastern property line. The sub-basin has an area of 4.78 acres and a weighted imperviousness of 28%. Runoff in this basin will flow from north to south through a drainage swale to DP 27, and then directly into Legacy Hill Dr where it will be carried by curb and gutter into the existing storm water infrastructure. Flows from this sub-basin will follow existing flow patterns. Runoff during the 5-year and 100-year events are 4.34 cfs and 15.81 cfs respectively.

A large portion of this basin is landscaping. According to the El Paso County Engineering Criteria Manual, Section I.7.1.B.7, This landscape area classifies as “Land Disturbance to Undeveloped Land that will Remain Undeveloped.” This area will follow native drainage patterns and remain undisturbed with no buildings or pavement and therefore classify as an exclusion.

The portions of the drive aisle from this basin that flow offsite will sheetflow into the proposed offsite sump Type R Inlets within Frontside Drive. These areas exceed the County’s maximum requirement of 20%, not to exceed 1 acre of total onsite imperviousness being untreated. However, after referencing the Master Development Drainage Report for the basin, it was

determined that the East Pond (Design Point M) has adequate capacity and can treat this additional flow. Please reference **Appendix E** for the UD-Detention spreadsheet for this pond with relevant acreages highlighted, as well as the Proposed Drainage Map showing tributary basins.

### **Sub-Basin OS-3**

The on-site sub-basin OS-3 consists of landscaping, and drive aisle along the southeast property line. The sub-basin has an area of 0.67 acres and a weighted imperviousness of 54%. Runoff in this basin will flow offsite at DP 28 directly into Legacy Hill Dr where it will be carried south by curb and gutter into the existing storm water infrastructure. Flows from this sub-basin will follow existing flow patterns. Runoff during the 5-year and 100-year events are 1.45 cfs and 4.03 cfs respectively.

This basin consists of landscaping and drive aisle. According to the El Paso County Engineering Criteria Manual, Section I.7.1.B.7, This landscape area classifies as “Land Disturbance to Undeveloped Land that will Remain Undeveloped.” This area will follow native drainage patterns and remain undisturbed with no buildings or pavement and therefore classify as an exclusion.

The portions of the drive aisle from this basin that flow offsite will sheetflow into the proposed offsite sump Type R Inlets within Frontside Drive. These areas exceed the County’s maximum requirement of 20%, not to exceed 1 acre of total onsite imperviousness being untreated. However, after referencing the Master Development Drainage Report for the basin, it was determined that the East Pond (Design Point M) has adequate capacity and can treat this additional flow. Please reference **Appendix E** for the UD-Detention spreadsheet for this pond with relevant acreages highlighted, as well as the Proposed Drainage Map showing tributary basins.

### **Sub-Basin OS-4**

The on-site sub-basin OS-4 consists of landscaping, along the northern property line. The sub-basin has an area of 0.67 acres and a weighted imperviousness of 2%. Runoff in this basin will flow onsite at DP 29 directly into the drainage swale in Sub Basin OS-2, where it will convey to Legacy Hill Dr and be conveyed via curb and gutter into the existing storm water infrastructure. Flows from this sub-basin will follow existing flow patterns. Runoff during the 5-year and 100-year events are 0.18 cfs and 1.55 cfs respectively.

Refer to **Appendix F** for the Proposed Drainage Conditions Map.

## **DRAINAGE DESIGN CRITERIA**

### ***DEVELOPMENT CRITERIA REFERENCE***

The proposed storm facilities are designed to be in compliance with the El Paso County Drainage Criteria Manual, Volumes 1 and 2 (The “CRITERIA”) and the Urban Storm Drainage Criteria Manual (the “MANUAL”). Site drainage is not significantly impacted by such constraints as utilities or existing development.

### ***HYDROLOGIC SOIL GROUP***

According to NRCS soil mapping data, USCS Type A and B soils are the primary soil type within



the site. Soils present at the Site consist mainly of “Blakeland loamy sand” which represent a moderate hazard for erosion. **Appendix B** contains detailed NRCS soil data.

### **HYDROLOGIC CRITERIA**

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the proposed drainage analysis per chapter 5 of the CRITERIA. Design runoff was calculated using the Rational Method for developed conditions as established in the CRITERIA and MANUAL. Runoff coefficients for the proposed development were determined using Table 5-1 of the CRITERIA by calculating weighted impervious values for each specific site basin. Based upon this approach, the drainage design provided for the Site is conservative and in keeping with the zoning and historic drainage concept for the area.

### **HYDRAULIC CRITERIA**

Hydraulic design, including pipe sizing, inlet sizing, HGL calculations, and other related designs will be provided with the Final Drainage Report.

#### **INLET AND PIPE SIZING**

Inlet and pipe sizing will not be included or installed with this early grading permit. Calculations will be provided with the Final Drainage Report.

Unresolved:  
Update to summarize  
the temporary facilities  
(swales, TSB, etc)  
installed with Early  
Grading.

#### **DETENTION POND SUMMARY**

Preliminary detention pond and water quality calculations have been completed. A total of three proposed private full spectrum extended detention basins have been designed for WQCV, EURV and 100-year flows. The three EDBs have been summarized below.

Pond	Approximate 100-yr Detention Volume Required (ac-ft)	Approximate WQCV Required (ac-ft)	Proposed 100-yr Volume (ac-ft)	Cumulative 100-yr Tributary Runoff (cfs)
1	0.264	0.046	0.397	12.58
2	1.200	0.210	1.618	55.29
3	0.687	0.120	0.902	28.05

Pond 1 services mainly the lot at the Northeast corner of the property. Flows are released at or below historic rates and are conveyed to Design Point 27 where it enters existing storm infrastructure.

Pond 2 consists of the northern half of the property not tributary to Pond 1. Flows are released at or below historic rates and are conveyed to Design Point 27 where it enters existing storm infrastructure.

Both Pond 1 and Pond 2 will combine flows and enter the existing Type R Inlet within Frontside Drive. Per the MDDP, Flows entering this inlet should be 1.3 CFS in the 5-year condition and 19.4 CFS in the 100-year condition. After design of the outlet structures, flows will release at or below these rates.

Pond 3 consists of the southern half of the site. Flows will be released into the Power Boulevard ditch, which accounts for 1.5 cfs in the 5-year condition, and 11.7 cfs in the 100-year condition. Outlet structures will be designed to release at or below these rates.

**Final calculations are not provided with this early grading permit. Hydraulic calculations will be provided with the Final Drainage Report. Please reference the associated Grading and Erosion Control Plan for temporary sediment basin sizings to match the final design intent.**

Ponds will be maintained by the metro district for the overall development. A maintenance access road will be provided with each pond, built per County standards.

## DRAINAGE FACILITY DESIGN

### GENERAL CONCEPT

Unresolved:  
Update. Right now all you are installing are temporary sediment basins, not EDBs.

The proposed development includes commercial building. The proposed development will decrease permeability on the site. This decrease has been accounted for in the Master Drainage Plan. The proposed drainage patterns will match historic patterns as much as possible and not significantly increase developed flows. The runoff within the site will be captured and treated via proposed private Full Spectrum Extended Detention Basins before being released into historic discharge points. There will be three (3) proposed Full Spectrum Detention Basins, also referred to as Pond 1, Pond 2, and Pond 3, throughout this report. **These final calculations will be provided in the Final Drainage Report.**

Provided in **Appendix C** are the hydrologic calculations used in pond sizing. Provided in **Appendix D** are preliminary pond sizing calculations, for reference. Existing and proposed Drainage Maps can be found in **Appendix F**.

### DRAINAGE FEE

The project is within the Big Johnson drainage basin, and the West Fork of Jimmy Camp Creek drainage basin which is a part of the El Paso County Drainage Basin Fee Program. Drainage and bridge fees will be finalized with the Final Drainage Report. Drainage fees shall be paid at the time of final plat recordation.

## THE FOUR STEP PROCESS

The Project was designed in accordance with the four-step process to minimize adverse impacts of urbanization, as outlined in the El Paso County Engineering Manual for BMP selection as noted below:

**Step 1. Employ Runoff Reduction Practices** – The project is proposing commercial development. The Site's proposed paved roadways will increase the Site's impervious area, however, the use of landscaping throughout the Site will slow runoff. The three proposed Full Spectrum Extended Detention Basins will be used to capture stormwater, provide water quality treatment, and maintain flows discharging off site at or below historic levels. Final design will be included in the Final Drainage Report.

**Step 2. Implement BMPs That Provide a Water Quality Capture Volume with Slow Release** – Permanent water quality measures and detention facilities will be necessary for the Project. Temporary water quality and erosion control measures will be provided during construction to prevent sediment laden water from discharging from the Site.

**Step 3 Stabilize Drainageways**– Stabilizing proposed roadside ditches, swales, and channels by designing them with slopes that control the flow rates. Placement of riprap upstream and downstream of culverts to help reduce erosion of the roadside ditches. Check dams will be used in areas with steeper grades to slow the runoff. We anticipate this will minimize erosion. Existing drainage ways will be graded to reduce the velocity of the water to minimize erosion.

**Step 4. Implement Site Specific and Other Source Control BMPs** – The erosion control construction BMPs of the Project were designed to reduce contamination. Source control BMPs include the use of vehicle tracking control, culvert protection, stockpile management, and stabilized staging areas.

## SUMMARY

This report has been prepared in accordance with El Paso County stormwater criteria. It outlines the Site design for the 5-year and 100-year storm events drainage system. The drainage design presented within this report conforms to the criteria presented in the CRITERIA and the MANUAL. Additionally, the Site runoff and storm drain facilities will not adversely affect the downstream and surrounding developments.

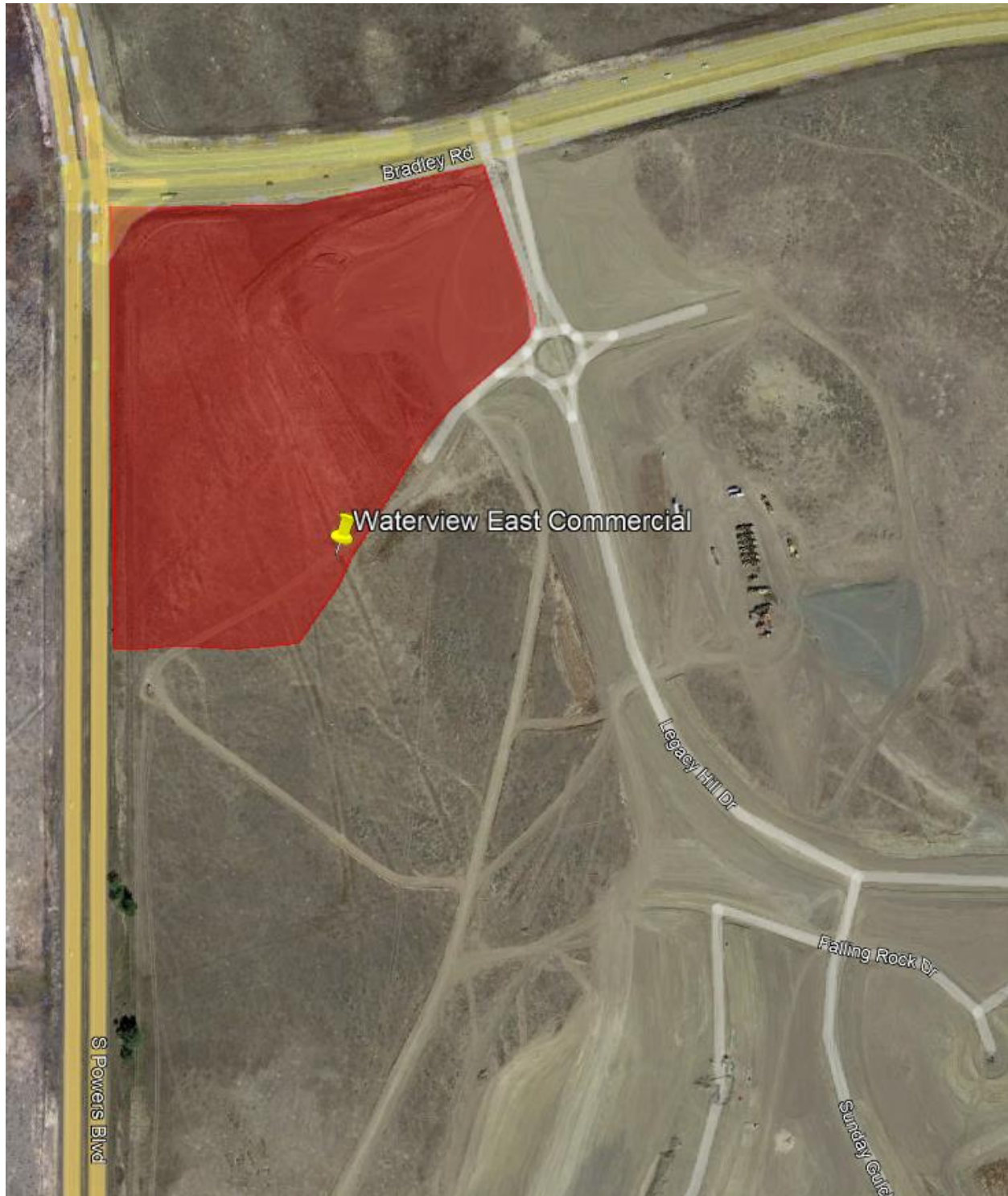
## REFERENCES

1. El Paso County "Engineering Criteria Manual" Volumes 1 & 2, dated October 31, 2018
2. Natural Resources Conservation Service, Web Soil Survey, dated April 29, 2022.
3. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0768G, Effective Date December 7, 2018, prepared by the Federal Emergency Management Agency (FEMA).
4. Master Development Drainage Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge" Prepared by: Matrix Design Group September 2019.

## APPENDIX

## **APPENDIX A – VICINITY MAP**

# Waterview East Commercial Vicinity Map (Not to Scale)



**APPENDIX B – FEMA FIRM PANEL AND SOILS MAP**



# National Flood Hazard Layer FIRMette



104°41'3"W 38°45'44"N



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

1:6,000

104°40'25"W 38°45'16"N

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 Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



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 **4/29/2022 at 2:29 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.





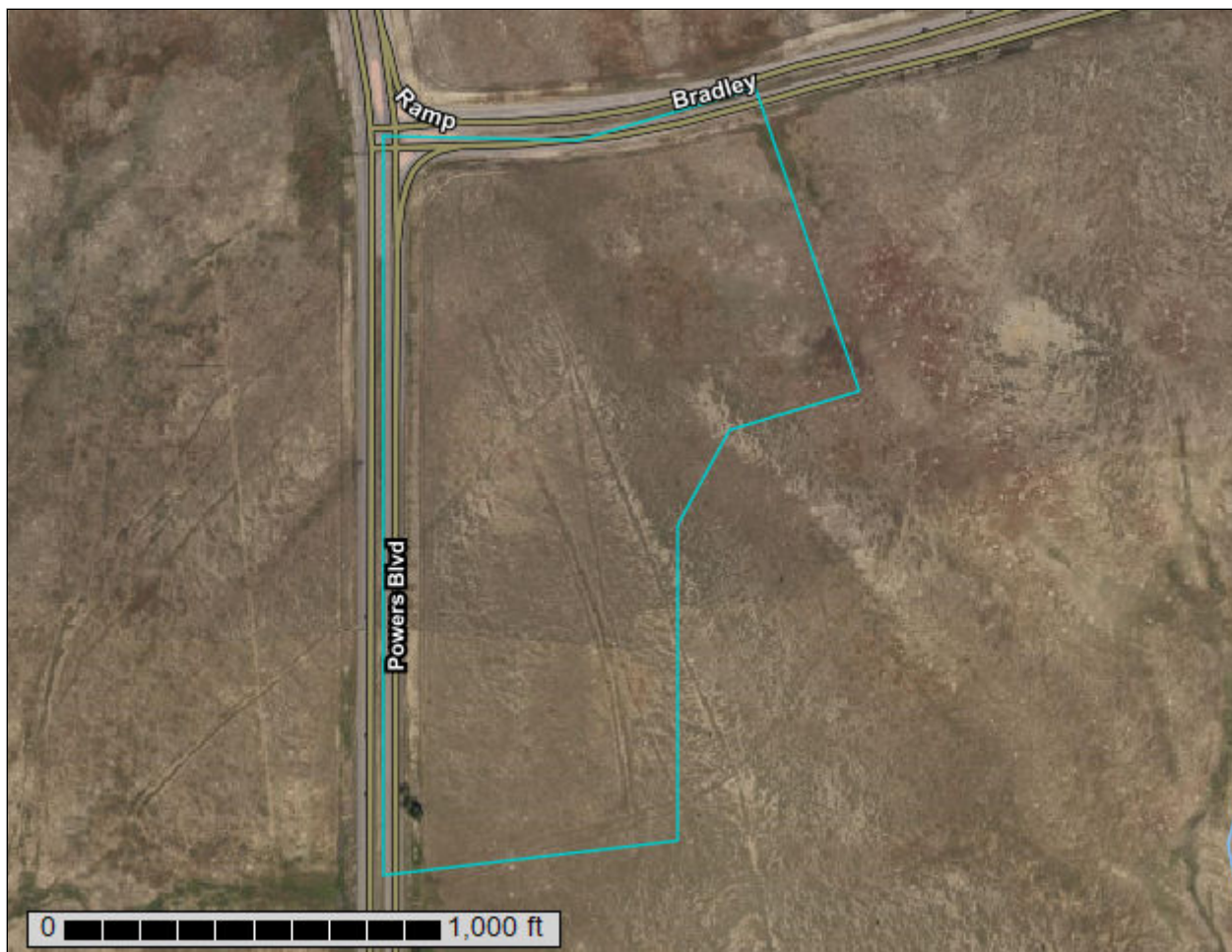
United States  
Department of  
Agriculture

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 El Paso County Area, Colorado



# Preface

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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](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.

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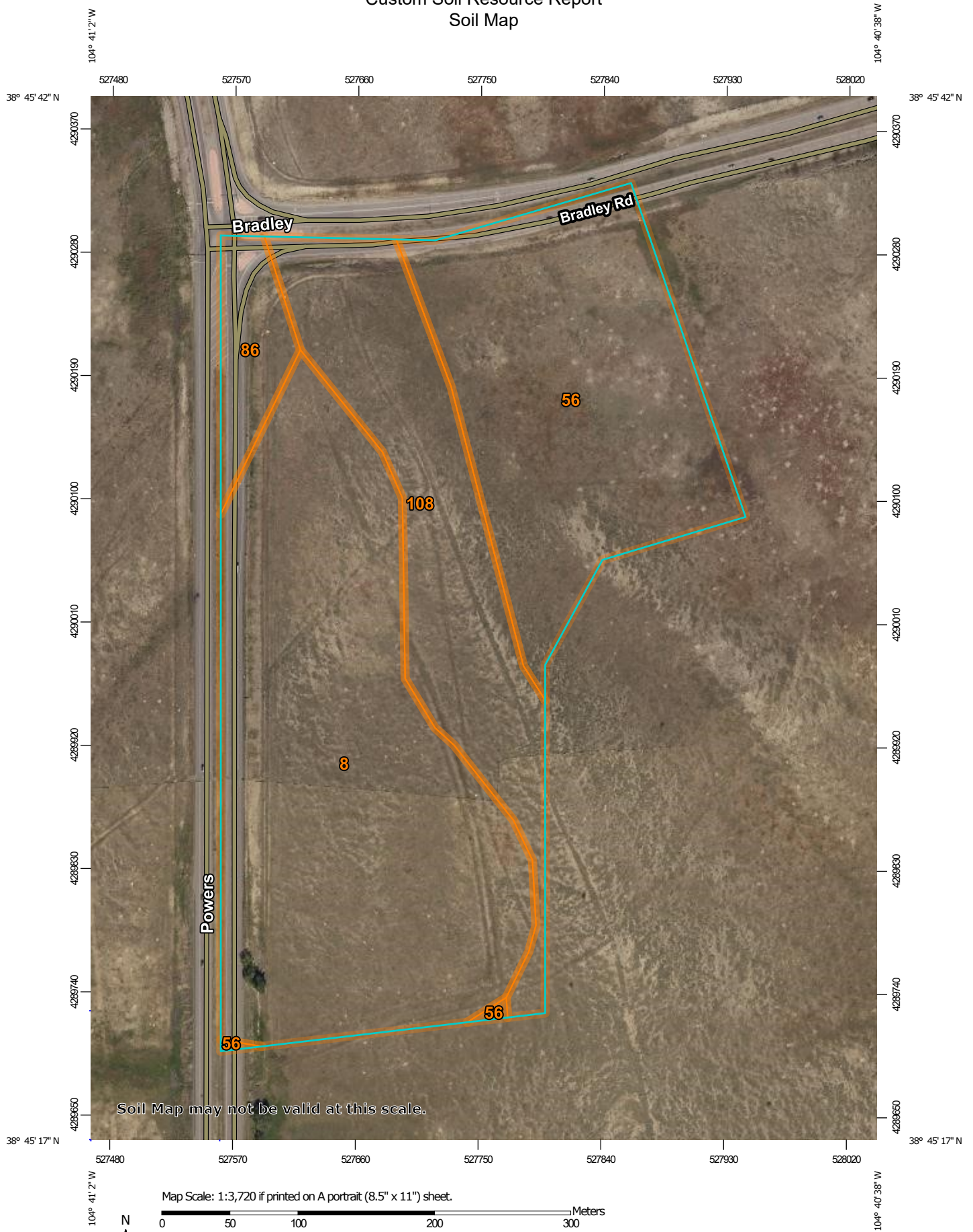
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# Soil Map

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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: 1:3,720 if printed on A portrait (8.5" x 11") sheet.

0 50 100 200 300 Meters  
0 150 300 600 900 Feet

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



# Custom Soil Resource Report

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

### Water Features

 Streams and Canals

### Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

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

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	19.2	45.9%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	12.2	29.3%
86	Stoneham sandy loam, 3 to 8 percent slopes	1.8	4.3%
108	Wiley silt loam, 3 to 9 percent slopes	8.6	20.5%
<b>Totals for Area of Interest</b>		<b>41.8</b>	<b>100.0%</b>

## 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.



## Custom Soil Resource Report

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

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

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

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

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

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

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

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

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

## El Paso County Area, Colorado

### 8—Blakeland loamy sand, 1 to 9 percent slopes

#### Map Unit Setting

*National map unit symbol:* 369v  
*Elevation:* 4,600 to 5,800 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 46 to 48 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Blakeland and similar soils:* 98 percent  
*Minor components:* 2 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Blakeland

##### Setting

*Landform:* Hills, flats  
*Landform position (three-dimensional):* Side slope, talus  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from sedimentary rock and/or eolian deposits  
derived from sedimentary rock

##### Typical profile

*A - 0 to 11 inches:* loamy sand  
*AC - 11 to 27 inches:* loamy sand  
*C - 27 to 60 inches:* sand

##### Properties and qualities

*Slope:* 1 to 9 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Somewhat excessively drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 5 percent  
*Available water supply, 0 to 60 inches:* Low (about 4.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R049XB210CO - Sandy Foothill  
*Hydric soil rating:* No

#### Minor Components

##### Other soils

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

**56—Nelson-Tassel fine sandy loams, 3 to 18 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 3690

*Elevation:* 5,600 to 6,400 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 48 to 52 degrees F

*Frost-free period:* 135 to 155 days

*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Nelson and similar soils:* 55 percent

*Tassel and similar soils:* 40 percent

*Minor components:* 5 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Nelson**

**Setting**

*Landform:* Hills

*Landform position (three-dimensional):* Side slope, crest

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Calcareous residuum weathered from interbedded sedimentary rock

**Typical profile**

*A - 0 to 5 inches:* fine sandy loam

*Ck - 5 to 23 inches:* fine sandy loam

*Cr - 23 to 27 inches:* weathered bedrock

**Properties and qualities**

*Slope:* 3 to 12 percent

*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high  
(0.06 to 2.00 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 to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Very low (about 2.8 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* B  
*Ecological site:* R067BY045CO - Shaly Plains  
*Other vegetative classification:* SHALY PLAINS (069AY046CO)  
*Hydric soil rating:* No

**Description of Tassel**

**Setting**

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Calcareous slope alluvium over residuum weathered from sandstone

**Typical profile**

*A - 0 to 4 inches:* fine sandy loam  
*C - 4 to 10 inches:* fine sandy loam  
*Cr - 10 to 14 inches:* weathered bedrock

**Properties and qualities**

*Slope:* 3 to 18 percent  
*Depth to restrictive feature:* 6 to 20 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Available water supply, 0 to 60 inches:* Very low (about 1.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* D  
*Ecological site:* R067BY045CO - Shaly Plains  
*Other vegetative classification:* SHALY PLAINS (069AY046CO)  
*Hydric soil rating:* No

**Minor Components**

**Other soils**

*Percent of map unit:* 4 percent  
*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:* 1 percent  
*Landform:* Depressions  
*Hydric soil rating:* Yes

## 86—Stoneham sandy loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 36b2  
*Elevation:* 5,100 to 6,500 feet  
*Mean annual precipitation:* 13 to 15 inches  
*Mean annual air temperature:* 48 to 52 degrees F  
*Frost-free period:* 135 to 155 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Stoneham and similar soils:* 95 percent  
*Minor components:* 5 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Stoneham

#### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Calcareous loamy alluvium

#### Typical profile

*A - 0 to 4 inches:* sandy loam  
*Bt - 4 to 8 inches:* sandy clay loam  
*Btk - 8 to 11 inches:* sandy clay loam  
*Ck - 11 to 60 inches:* loam

#### Properties and qualities

*Slope:* 3 to 8 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 high to high  
(0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 15 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* High (about 9.5 inches)

#### Interpretive groups

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

## Custom Soil Resource Report

*Other vegetative classification:* SANDY PLAINS (069AY026CO)

*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

## 108—Wiley silt loam, 3 to 9 percent slopes

### Map Unit Setting

*National map unit symbol:* 367b

*Elevation:* 5,200 to 6,200 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 48 to 52 degrees F

*Frost-free period:* 135 to 155 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Wiley and similar soils:* 95 percent

*Minor components:* 5 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Wiley

#### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Calcareous silty eolian deposits

#### Typical profile

*A - 0 to 4 inches:* silt loam

*Bt - 4 to 16 inches:* silt loam

*Bk - 16 to 60 inches:* silt loam

#### Properties and qualities

*Slope:* 3 to 9 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 high to high  
(0.60 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

## Custom Soil Resource Report

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 15 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* High (about 11.5 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 4e

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* B

*Ecological site:* R067BY002CO - Loamy Plains

*Other vegetative classification:* LOAMY PLAINS (069AY006CO)

*Hydric soil rating:* No

### **Minor Components**

#### **Other soils**

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### **Pleasant**

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

# **Soil Information for All Uses**

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## **Suitabilities and Limitations for Use**

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

## **Land Management**

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

### **Erosion Hazard (Road, Trail)**

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).



## Custom Soil Resource Report

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.


Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report  
Map—Erosion Hazard (Road, Trail)








## MAP LEGEND

### Area of Interest (AOI)






 Area of Interest (AOI)

### Soils






#### Soil Rating Polygons

 Very severe  
 Severe  
 Moderate  
 Slight  
 Not rated or not available


#### Soil Rating Lines

 Very severe  
 Severe  
 Moderate  
 Slight  
 Not rated or not available

#### Soil Rating Points




 Very severe  
 Severe  
 Moderate  
 Slight  
 Not rated or not available

### Water Features


 Streams and Canals

### Transportation

 Rails  
 Interstate Highways

 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

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

**Tables—Erosion Hazard (Road, Trail)**

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	Moderate	Blakeland (98%)	Slope/erodibility (0.50)	19.2	45.9%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	Moderate	Nelson (55%)	Slope/erodibility (0.50)	12.2	29.3%
86	Stoneham sandy loam, 3 to 8 percent slopes	Moderate	Stoneham (95%)	Slope/erodibility (0.50)	1.8	4.3%
108	Wiley silt loam, 3 to 9 percent slopes	Moderate	Wiley (95%)	Slope/erodibility (0.50)	8.6	20.5%
<b>Totals for Area of Interest</b>					<b>41.8</b>	<b>100.0%</b>

Rating	Acres in AOI	Percent of AOI
Moderate	41.8	100.0%
<b>Totals for Area of Interest</b>	<b>41.8</b>	<b>100.0%</b>

**Rating Options—Erosion Hazard (Road, Trail)***Aggregation Method: Dominant Condition**Component Percent Cutoff: None Specified**Tie-break Rule: Higher*

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## Custom Soil Resource Report

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## **APPENDIX C – HYDROLOGIC CALCULATIONS**

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
Calculated by: JAR

SUMMARY - EXISTING RUNOFF TABLE						
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100- YR RUNOFF (CFS)
1	EX-1	10.36	3.54	24.73	3.54	24.73
2	EX-2	11.50	2.62	22.34	2.62	22.34
3	EX-3	0.26	0.21	0.91	0.21	0.91



$$I = \frac{28.5 P_1}{(10 + T_D)^{0.786}}$$

Where:

I = rainfall intensity (inches per hour)

P<sub>1</sub> = one-hour rainfall depth (inches) from NOAA Atlas 14

Point Precipitation Frequency Estimates, Colorado Springs, CO

T<sub>c</sub> = storm duration (minutes)

$$P_1 = \begin{matrix} \text{2-yr} & \text{5-yr} & \text{10-yr} & \text{100-yr} \\ \text{1.01} & \text{1.29} & \text{1.56} & \text{2.75} \end{matrix}$$

Time Intensity Frequency Tabulation

TIME	2 YR	5 YR	10 YR	100 YR
5	3.43	4.38	5.29	9.33
10	2.73	3.49	4.22	7.44
15	2.29	2.93	3.54	6.24
30	1.58	2.02	2.45	4.31
60	1.02	1.30	1.58	2.78
120	0.63	0.80	0.97	1.71

Weighted Imperviousness Calculations - Existing Conditions

SUB-BASIN	AREA (SF)	AREA (Acres)	ROOF AREA	ROOF IMPERVIOUSNESS	ROOF				LANDSCAPE AREA	LANDSCAPE IMPERVIOUSNESS	LANDSCAPE				PAVEMENT AREA	PAVEMENT IMPERVIOUSNESS	PAVEMENT				WEIGHTED IMPERVIOUSNESS	WEIGHTED COEFFICIENTS			
					C2	C5	C10	C100			C2	C5	C10	C100			C2	C5	C10	C100		C2	C5	C10	C100
EX-1	451188	10.36	0	90%	0.71	0.73	0.75	0.81	10.03	2%	0.03	0.09	0.17	0.36	0.33	100%	0.89	0.90	0.92	0.96	5%	0.06	0.12	0.19	0.38
EX-2	501101	11.50	0	90%	0.71	0.73	0.75	0.81	11.50	2%	0.03	0.09	0.17	0.36	0.00	100%	0.89	0.90	0.92	0.96	2%	0.03	0.09	0.17	0.36
EX-3	11114	0.26	0	90%	0.71	0.73	0.75	0.81	0.21	2%	0.03	0.09	0.17	0.36	0.04	100%	0.89	0.90	0.92	0.96	18%	0.17	0.22	0.29	0.46
OS-1	28574	0.66	0	90%	0.71	0.73	0.75	0.81	0.66	2%	0.03	0.09	0.17	0.36	0.00	100%	0.89	0.90	0.92	0.96	2%	0.03	0.09	0.17	0.36
TOTAL	963,403	22.77	0.00	90%	0.71	0.73	0.75	0.81	22.41	2%	0.03	0.09	0.17	0.36	0.37	100%	0.89	0.90	0.92	0.96	4%	0.04	0.10	0.18	0.37

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

<b>Waterview East Commercial</b> <b>Existing Runoff Calculations</b> <b>Time of Concentration</b>																
					Watercourse Coefficient											
					Forest & Meadow			Short Grass Pasture & Lawns			Grassed Waterway					
					Fallow or Cultivation			Nearly Bare Ground			Paved Area & Shallow Gutter					
DESIGN POINT	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)				T(c) CHECK (URBANIZED BASINS)				FINAL T(c)
	DRAIN BASIN	AREA sq. ft.	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	L/180+10	min.
1	EX-1	451,188	10.36	0.12	100	3.4%	12.1	742	9.7%	7.00	2.2	5.7	17.8	842	14.7	14.7
2	EX-2	501,101	11.50	0.09	100	2.8%	13.1	1710	5.6%	7.00	1.7	17.2	30.3	1810	20.1	20.1
3	EX-3	11,114	0.26	0.22	100	9.6%	7.6	40	0.6%	7.00	0.5	1.2	8.8	140	10.8	8.8
4	OS-1	28,574	0.66	0.09	34	33.0%	3.4	625	2.8%	7.00	1.2	8.9	12.3	659	13.7	12.3

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

<b>Waterview East Commercial</b> <b>Existing Runoff Calculations</b> <i>(Rational Method Procedure)</i>												
<i>Design Storm 5 Year</i>												
BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
1	EX-1	10.36	0.12	14.7	1.20	2.96	3.54				3.54	
2	EX-2	11.50	0.09	20.1	1.04	2.53	2.62				2.62	
3	EX-3	0.26	0.22	8.8	0.06	3.66	0.21				0.21	
4	OS-1	0.66	0.09	12.3	0.06	3.20	0.19				0.19	

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

<b>Waterview East Commercial</b> <b>Existing Runoff Calculations</b> <i>(Rational Method Procedure)</i>												
<i>Design Storm 100 Year</i>												
BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
1	EX-1	10.36	0.38	14.7	3.92	6.30	24.73				24.73	
2	EX-2	11.50	0.36	20.1	4.14	5.40	22.34				22.34	
3	EX-3	0.26	0.46	8.8	0.12	7.80	0.91				0.91	
4	OS-1	0.66	0.36	12.3	0.24	6.83	1.61				1.61	

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

SUMMARY - PROPOSED RUNOFF TABLE						
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
1	A1	0.67	1.87	4.70	1.87	4.70
2	A2	0.33	0.85	2.22	0.85	2.22
3	A3	0.41	1.27	3.10	1.27	3.10
4	A4	0.31	1.04	2.41	1.04	2.41
5	A5	0.32	1.12	2.60	1.12	2.60
6	A6	0.30	0.97	2.29	0.97	2.29
7	A7	0.39	1.43	3.33	1.43	3.33
8	A8	0.42	1.54	3.57	1.54	3.57
9	A9	0.41	1.53	3.55	1.53	3.55
10	A10	0.75	2.63	6.16	2.63	6.16
11	A11	0.26	0.62	1.56	0.62	1.56
12	A12	1.05	2.59	6.33	2.59	6.33
13	A13	0.11	0.37	0.87	0.37	0.87
14	A14	0.16	0.36	0.89	0.36	0.89
15	A15	0.39	1.25	2.97	1.25	2.97
16	A16	0.75	2.66	6.17	2.66	6.17
17	A17	0.83	1.55	4.06	1.55	4.06
18	A18	1.34	4.57	10.60	4.57	10.60
19	A19	0.60	2.14	4.96	2.14	4.96
20	A20	0.49	1.33	3.12	1.33	3.12
21	A21	0.63	1.99	4.65	1.99	4.65
22	A22	2.10	4.10	10.94	4.10	10.94
23	PD-1	0.65	0.19	1.64	0.19	1.64
24	PD-2	0.74	0.67	2.57	0.67	2.57
25	PD-3	0.21	0.08	0.65	0.08	0.65
26	OS-1	2.05	0.61	4.46	0.61	4.46
27	OS-2	4.78	4.34	15.81	4.52	17.37
28	OS-3	0.67	1.45	4.03	1.45	4.03
29	OS-4	0.61	0.18	1.55	0.18	1.55

Weighted Imperviousness Calculations

SUB-BASIN	AREA (SF)	AREA (Acres)	ROOF AREA	ROOF IMPERVIOUSNESS	ROOF				LANDSCAPE AREA	LANDSCAPE IMPERVIOUSNESS	LANDSCAPE				PAVEMENT AREA	PAVEMENT IMPERVIOUSNESS	PAVEMENT				WEIGHTED IMPERVIOUSNESS	WEIGHTED COEFFICIENTS			
					C2	C5	C10	C100			C2	C5	C10	C100			C2	C5	C10	C100		C2	C5	C10	C100
A1	29196	0.67	0.25	90%	0.71	0.73	0.75	0.81	0.16	2%	0.03	0.09	0.17	0.36	0.26	100%	0.89	0.90	0.92	0.96	73%	0.62	0.64	0.68	0.76
A2	14430	0.33	0.13	90%	0.71	0.73	0.75	0.81	0.10	2%	0.03	0.09	0.17	0.36	0.10	100%	0.89	0.90	0.92	0.96	66%	0.56	0.59	0.62	0.72
A3	17922	0.41	0.17	90%	0.71	0.73	0.75	0.81	0.06	2%	0.03	0.09	0.17	0.36	0.18	100%	0.89	0.90	0.92	0.96	81%	0.69	0.71	0.74	0.81
A4	13342	0.31	0.16	90%	0.71	0.73	0.75	0.81	-	2%	0.03	0.09	0.17	0.36	0.15	100%	0.89	0.90	0.92	0.96	95%	0.80	0.81	0.83	0.88
A5	13734	0.32	0.10	90%	0.71	0.73	0.75	0.81	0.01	2%	0.03	0.09	0.17	0.36	0.20	100%	0.89	0.90	0.92	0.96	92%	0.79	0.81	0.83	0.88
A6	13231	0.30	0.12	90%	0.71	0.73	0.75	0.81	0.02	2%	0.03	0.09	0.17	0.36	0.16	100%	0.89	0.90	0.92	0.96	89%	0.76	0.78	0.80	0.86
A7	17111	0.39	-	90%	0.71	0.73	0.75	0.81	0.03	2%	0.03	0.09	0.17	0.36	0.36	100%	0.89	0.90	0.92	0.96	92%	0.82	0.83	0.86	0.91
A8	18143	0.42	-	90%	0.71	0.73	0.75	0.81	0.03	2%	0.03	0.09	0.17	0.36	0.39	100%	0.89	0.90	0.92	0.96	93%	0.83	0.85	0.87	0.92
A9	18021	0.41	-	90%	0.71	0.73	0.75	0.81	0.03	2%	0.03	0.09	0.17	0.36	0.39	100%	0.89	0.90	0.92	0.96	93%	0.83	0.84	0.87	0.92
A10	32454	0.75	0.10	90%	0.71	0.73	0.75	0.81	0.07	2%	0.03	0.09	0.17	0.36	0.58	100%	0.89	0.90	0.92	0.96	90%	0.79	0.81	0.83	0.89
A11	11290	0.26	0.07	90%	0.71	0.73	0.75	0.81	0.06	2%	0.03	0.09	0.17	0.36	0.13	100%	0.89	0.90	0.92	0.96	75%	0.64	0.67	0.70	0.78
A12	45772	1.05	-	90%	0.71	0.73	0.75	0.81	0.23	2%	0.03	0.09	0.17	0.36	0.82	100%	0.89	0.90	0.92	0.96	79%	0.70	0.72	0.76	0.83
A13	4637	0.11	-	90%	0.71	0.73	0.75	0.81	0.02	2%	0.03	0.09	0.17	0.36	0.09	100%	0.89	0.90	0.92	0.96	86%	0.77	0.79	0.81	0.88
A14	6932	0.16	0.04	90%	0.71	0.73	0.75	0.81	0.04	2%	0.03	0.09	0.17	0.36	0.09	100%	0.89	0.90	0.92	0.96	75%	0.65	0.67	0.70	0.78
A15	16786	0.39	0.25	90%	0.71	0.73	0.75	0.81	0.02	2%	0.03	0.09	0.17	0.36	0.11	100%	0.89	0.90	0.92	0.96	89%	0.73	0.75	0.77	0.83
A16	32766	0.75	0.04	90%	0.71	0.73	0.75	0.81	0.04	2%	0.03	0.09	0.17	0.36	0.66	100%	0.89	0.90	0.92	0.96	94%	0.83	0.84	0.87	0.92
A17	36266	0.83	0.34	90%	0.71	0.73	0.75	0.81	0.26	2%	0.03	0.09	0.17	0.36	0.24	100%	0.89	0.90	0.92	0.96	65%	0.55	0.58	0.62	0.71
A18	58375	1.34	0.72	90%	0.71	0.73	0.75	0.81	-	2%	0.03	0.09	0.17	0.36	0.62	100%	0.89	0.90	0.92	0.96	95%	0.79	0.81	0.83	0.88
A19	26189	0.60	0.30	90%	0.71	0.73	0.75	0.81	-	2%	0.03	0.09	0.17	0.36	0.30	100%	0.89	0.90	0.92	0.96	95%	0.80	0.82	0.84	0.89
A20	21287	0.49	0.37	90%	0.71	0.73	0.75	0.81	-	2%	0.03	0.09	0.17	0.36	0.12	100%	0.89	0.90	0.92	0.96	92%	0.75	0.77	0.79	0.85
A21	27276	0.63	0.43	90%	0.71	0.73	0.75	0.81	-	2%	0.03	0.09	0.17	0.36	0.19	100%	0.89	0.90	0.92	0.96	93%	0.77	0.78	0.80	0.86
A22	91562	2.10	0.29	90%	0.71	0.73	0.75	0.81	0.80	2%	0.03	0.09	0.17	0.36	1.01	100%	0.89	0.90	0.92	0.96	61%	0.54	0.57	0.61	0.71
PD-1	28372	0.65	-	90%	0.71	0.73	0.75	0.81	0.65	2%	0.03	0.09	0.17	0.36	-	100%	0.89	0.90	0.92	0.96	2%	0.03	0.09	0.17	0.36
PD-2	32272	0.74	0.15	90%	0.71	0.73	0.75	0.81	0.54	2%	0.03	0.09	0.17	0.36	0.05	100%	0.89	0.90	0.92	0.96	26%	0.22	0.27	0.33	0.49
PD-3	9268	0.21	-	90%	0.71	0.73	0.75	0.81	0.21	2%	0.03	0.09	0.17	0.36	-	100%	0.89	0.90	0.92	0.96	2%	0.03	0.09	0.17	0.36
OS-1	89106	2.05	-	90%	0.71	0.73	0.75	0.81	2.00	2%	0.03	0.09	0.17	0.36	0.05	100%	0.89	0.90	0.92	0.96	4%	0.05	0.11	0.19	0.37
OS-2	208367	4.78	-	90%	0.71	0.73	0.75	0.81	3.53	2%	0.03	0.09	0.17	0.36	1.26	100%	0.89	0.90	0.92	0.96	28%	0.26	0.30	0.37	0.52
OS-3	29397	0.67	-	90%	0.71	0.73	0.75	0.81	0.32	2%	0.03	0.09	0.17	0.36	0.36	100%	0.89	0.90	0.92	0.96	54%	0.49	0.52	0.57	0.68
OS-4	26532	0.61	-	90%	0.71	0.73	0.75	0.81	0.61	2%	0.03	0.09	0.17	0.36	-	100%	0.89	0.90	0.92	0.96	2%	0.03	0.09	0.17	0.36
TOTAL	990,036	22.73	4.05	90%	0.71	0.73	0.75	0.81	9.83	2%	0.03	0.09	0.17	0.36	8.85	100%	0.89	0.90	0.92	0.96	56%	0.49	0.52	0.57	0.67

Pond 1 Imperviousness:	47.18%
Pond 2 Imperviousness:	79.52%
Pond 3 Imperviousness:	83.42%



**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

<b>Waterview East Commercial - Drainage Report</b> <b>Proposed Runoff Calculations</b> <b>Time of Concentration</b>																
					Forest & Meadow 2.50				Short Grass Pasture & Lawns 7.00				Grassed Waterway 15.00			
					Fallow or Cultivation 5.00				Nearly Bare Ground 10.00				Paved Area & Shallow Gutter 20.00			
DESIGN POINT	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)				T(t) min.	T(c) CHECK (URBANIZED BASINS)			FINAL T(c) min.
	DRAIN BASIN	AREA sq. ft.	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps		COMP. T(c)	TOTAL LENGTH	L/180+10	
1	A1	29,196	0.67	0.64	100	7.6%	4.3	110	1.0%	20.00	2.0	0.9	5.2	210	11.2	5.2
2	A2	14,430	0.33	0.59	60	15.6%	2.9	20	3.1%	20.00	3.5	0.1	5.0	80	10.4	5.0
3	A3	17,922	0.41	0.71	70	7.5%	3.1	70	1.6%	20.00	2.5	0.5	5.0	140	10.8	5.0
4	A4	13,342	0.31	0.81	100	0.8%	5.7	23	0.8%	20.00	1.8	0.2	5.9	123	10.7	5.9
5	A5	13,734	0.32	0.81	60	3.0%	2.9	65	2.8%	20.00	3.3	0.3	5.0	125	10.7	5.0
6	A6	13,231	0.30	0.78	100	1.0%	5.9	38	1.0%	20.00	2.0	0.3	6.2	138	10.8	6.2
7	A7	17,111	0.39	0.83	50	2.6%	2.5	216	1.4%	20.00	2.4	1.5	5.0	266	11.5	5.0
8	A8	18,143	0.42	0.85	50	3.2%	2.2	218	2.1%	20.00	2.9	1.3	5.0	268	11.5	5.0
9	A9	18,021	0.41	0.84	50	3.6%	2.2	216	2.9%	20.00	3.4	1.1	5.0	266	11.5	5.0
10	A10	32,454	0.75	0.81	80	3.1%	3.3	220	3.4%	20.00	3.7	1.0	5.0	300	11.7	5.0
11	A11	11,290	0.26	0.67	100	0.8%	8.6	63	1.1%	20.00	2.1	0.5	9.1	163	10.9	9.1
12	A12	45,772	1.05	0.72	100	0.5%	8.7	388	2.8%	20.00	3.3	1.9	10.6	488	12.7	10.6
13	A13	4,637	0.11	0.79	20	0.2%	4.4	92	2.0%	20.00	2.8	0.5	5.0	112	10.6	5.0
14	A14	6,932	0.16	0.67	100	0.5%	9.9	134	0.8%	20.00	1.8	1.2	11.1	234	11.3	11.1
15	A15	16,786	0.39	0.75	60	1.0%	5.0	30	3.0%	20.00	3.5	0.1	5.1	90	10.5	5.1
16	A16	32,766	0.75	0.84	100	2.0%	3.7	329	1.7%	20.00	2.6	2.1	5.8	429	12.4	5.8
17	A17	36,266	0.83	0.58	100	0.5%	12.0	300	0.9%	20.00	1.9	2.6	14.6	400	12.2	12.2
18	A18	58,375	1.34	0.81	100	2.7%	3.8	269	1.4%	20.00	2.4	1.9	5.7	369	12.1	5.7
19	A19	26,189	0.60	0.82	50	3.1%	2.5	240	2.3%	20.00	3.0	1.3	5.0	290	11.6	5.0
20	A20	21,287	0.49	0.77	100	0.5%	7.6	222	0.8%	20.00	1.8	2.1	9.7	322	11.8	9.7
21	A21	27,276	0.63	0.78	100	1.6%	5.0	156	0.8%	20.00	1.8	1.5	6.5	256	11.4	6.5
22	A22	91,562	2.10	0.57	100	1.4%	8.7	247	1.5%	20.00	2.4	1.7	10.4	347	11.9	10.4
23	PD-1	28,372	0.65	0.09	100	2.0%	14.7	201	4.8%	7.00	1.5	2.2	16.9	301	11.7	11.7
24	PD-2	32,272	0.74	0.27	100	1.9%	12.3	116	7.0%	7.00	1.9	1.0	13.3	216	11.2	11.2
25	PD-3	9,268	0.21	0.09	60	15.0%	5.8	60	2.0%	7.00	1.0	1.0	6.8	120	10.7	6.8
26	OS-1	89,106	2.05	0.11	100	6.1%	9.9	1220	3.0%	7.00	1.2	16.8	26.7	1320	17.3	17.3
27	OS-2	208,367	4.78	0.30	100	11.3%	6.5	670	1.8%	7.00	0.9	11.9	18.4	770	14.3	14.3
28	OS-3	29,397	0.67	0.52	50	4.9%	4.4	148	3.9%	7.00	1.4	1.8	6.2	198	11.1	6.2
29	OS-4	26,532	0.61	0.09	36	33.0%	3.5	625	2.8%	8.00	1.3	7.8	11.3	661	13.7	11.3

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

<b>Waterview East Commercial - Drainage Report</b> <b>Proposed Runoff Calculations</b> <i>Design Storm 5 Year</i> <i>(Rational Method Procedure)</i>												
BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
1	A1	0.67	0.64	5.2	0.43	4.33	1.87				1.87	
2	A2	0.33	0.59	5.0	0.19	4.38	0.85				0.85	
3	A3	0.41	0.71	5.0	0.29	4.38	1.27				1.27	
4	A4	0.31	0.81	5.9	0.25	4.18	1.04				1.04	
5	A5	0.32	0.81	5.0	0.25	4.38	1.12				1.12	
6	A6	0.30	0.78	6.2	0.24	4.12	0.97				0.97	
7	A7	0.39	0.83	5.0	0.33	4.38	1.43				1.43	
8	A8	0.42	0.85	5.0	0.35	4.38	1.54				1.54	
9	A9	0.41	0.84	5.0	0.35	4.38	1.53				1.53	
10	A10	0.75	0.81	5.0	0.60	4.38	2.63				2.63	
11	A11	0.26	0.67	9.1	0.17	3.62	0.62				0.62	
12	A12	1.05	0.72	10.6	0.76	3.41	2.59				2.59	
13	A13	0.11	0.79	5.0	0.08	4.38	0.37				0.37	
14	A14	0.16	0.67	11.1	0.11	3.34	0.36				0.36	
15	A15	0.39	0.75	5.1	0.29	4.34	1.25				1.25	
16	A16	0.75	0.84	5.8	0.63	4.20	2.66				2.66	
17	A17	0.83	0.58	12.2	0.48	3.22	1.55				1.55	
18	A18	1.34	0.81	5.7	1.08	4.22	4.57				4.57	
19	A19	0.60	0.82	5.0	0.49	4.38	2.14				2.14	
20	A20	0.49	0.77	9.7	0.38	3.54	1.33				1.33	
21	A21	0.63	0.78	6.5	0.49	4.07	1.99				1.99	
22	A22	2.10	0.57	10.4	1.19	3.44	4.10				4.10	
23	PD-1	0.65	0.09	11.7	0.06	3.27	0.19				0.19	
24	PD-2	0.74	0.27	11.2	0.20	3.33	0.67				0.67	
25	PD-3	0.21	0.09	6.8	0.02	4.00	0.08				0.08	
26	OS-1	2.05	0.11	17.3	0.22	2.73	0.61				0.61	
27	OS-2	4.78	0.30	14.3	1.45	2.99	4.34				4.52	Includes OS-4
28	OS-3	0.67	0.52	6.2	0.35	4.12	1.45				1.45	
29	OS-4	0.61	0.09	11.3	0.05	3.32	0.18				0.18	

**Waterview East Commercial**  
**Drainage Report**  
**El Paso County, CO**

3/15/2023  
 Calculated by: JAR

Waterview East Commercial - Drainage Report												
Proposed Runoff Calculations				Design Storm 100 Year								
(Rational Method Procedure)												
BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
1	A1	0.67	0.76	5.2	0.51	9.22	4.70				4.70	
2	A2	0.33	0.72	5.0	0.24	9.33	2.22				2.22	
3	A3	0.41	0.81	5.0	0.33	9.33	3.10				3.10	
4	A4	0.31	0.88	5.9	0.27	8.90	2.41				2.41	
5	A5	0.32	0.88	5.0	0.28	9.33	2.60				2.60	
6	A6	0.30	0.86	6.2	0.26	8.77	2.29				2.29	
7	A7	0.39	0.91	5.0	0.36	9.33	3.33				3.33	
8	A8	0.42	0.92	5.0	0.38	9.33	3.57				3.57	
9	A9	0.41	0.92	5.0	0.38	9.33	3.55				3.55	
10	A10	0.75	0.89	5.0	0.66	9.33	6.16				6.16	
11	A11	0.26	0.78	9.1	0.20	7.71	1.56				1.56	
12	A12	1.05	0.83	10.6	0.87	7.26	6.33				6.33	
13	A13	0.11	0.88	5.0	0.09	9.33	0.87				0.87	
14	A14	0.16	0.78	11.1	0.12	7.12	0.89				0.89	
15	A15	0.39	0.83	5.1	0.32	9.26	2.97				2.97	
16	A16	0.75	0.92	5.8	0.69	8.95	6.17				6.17	
17	A17	0.83	0.71	12.2	0.59	6.85	4.06				4.06	
18	A18	1.34	0.88	5.7	1.18	9.00	10.60				10.60	
19	A19	0.60	0.89	5.0	0.53	9.33	4.96				4.96	
20	A20	0.49	0.85	9.7	0.41	7.54	3.12				3.12	
21	A21	0.63	0.86	6.5	0.54	8.67	4.65				4.65	
22	A22	2.10	0.71	10.4	1.49	7.33	10.94				10.94	
23	PD-1	0.65	0.36	11.7	0.23	6.98	1.64				1.64	
24	PD-2	0.74	0.49	11.2	0.36	7.11	2.57				2.57	
25	PD-3	0.21	0.36	6.8	0.08	8.53	0.65				0.65	
26	OS-1	2.05	0.37	17.3	0.77	5.83	4.46				4.46	
27	OS-2	4.78	0.52	14.3	2.48	6.38	15.81				17.37	Includes OS-4
28	OS-3	0.67	0.68	6.2	0.46	8.79	4.03				4.03	
29	OS-4	0.61	0.36	11.3	0.22	7.09	1.55				1.55	

## APPENDIX D – HYDRAULIC CALCULATIONS

This section is not needed for early grading.

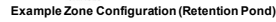
Please provide calculations for swales, which will direct flows through the site.

Please provide calculations for TSB ponds.

FOR REFERENCE ONLY

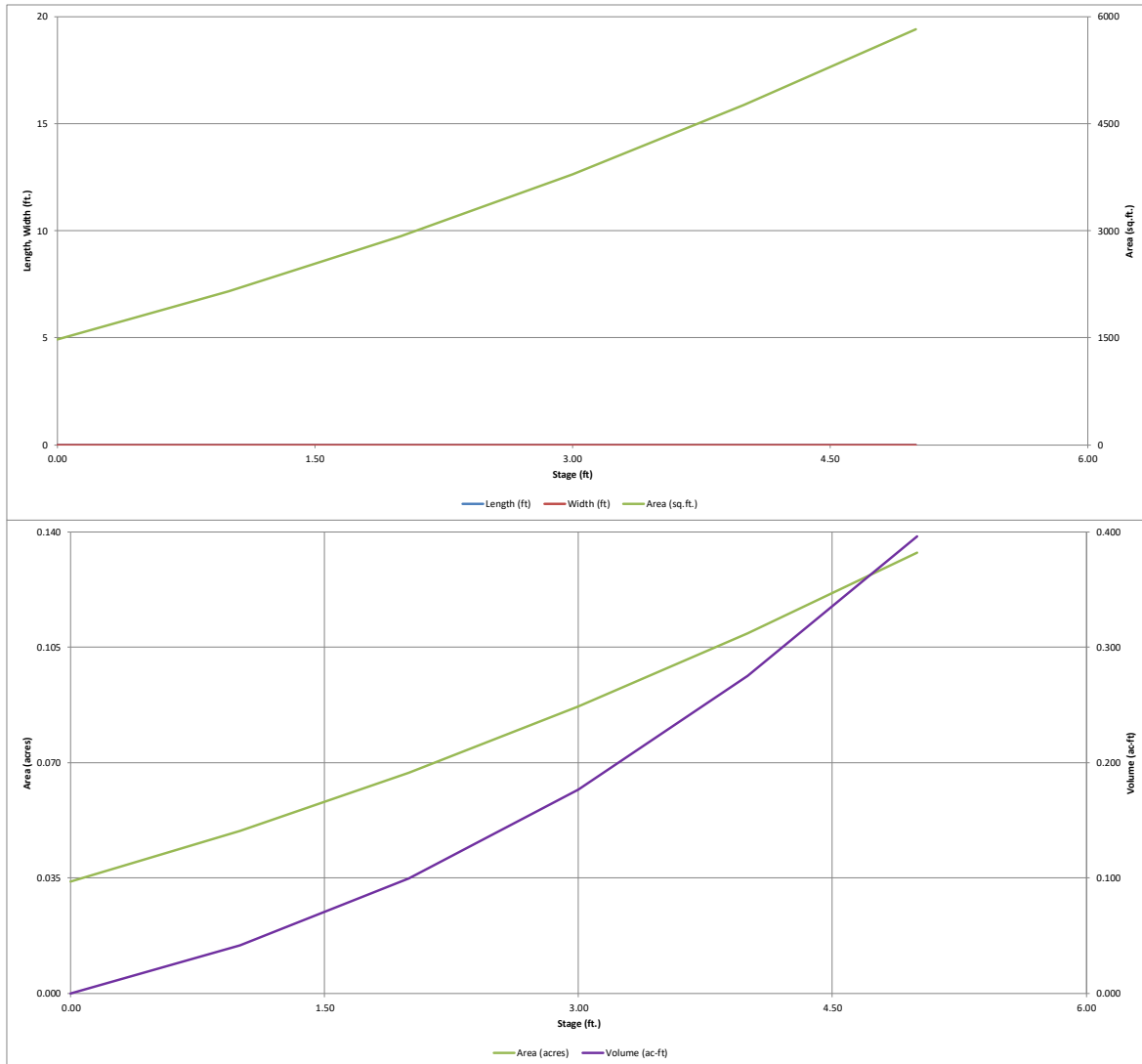
## MHFD-Detention, Version 4.04 (February 2021)

**Basin ID: Pond 1**



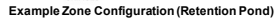
	acre-feet
	acre-feet
1.01	inches
1.29	inches
1.56	inches
2.00	inches
2.25	inches
2.75	inches
	inches

FOR REFERENCE ONLY



FOR REFERENCE ONLY

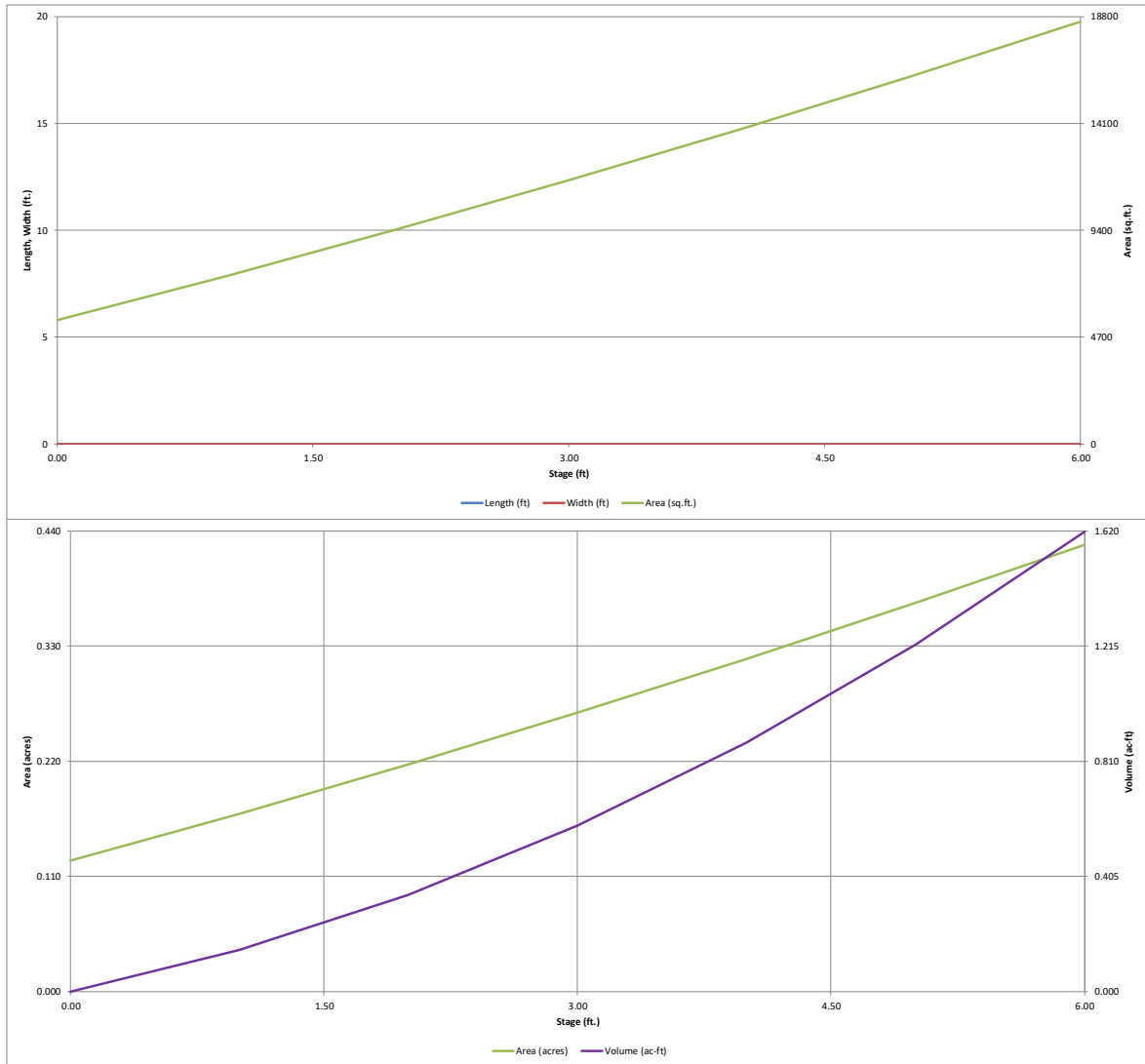
## MHFD-Detention, Version 4.04 (February 2021)

Basin ID: Pond 2

	acre-feet
	acre-feet
1.01	inches
1.29	inches
1.56	inches
2.00	inches
2.25	inches
2.75	inches
	inches

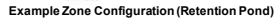
FOR REFERENCE ONLY





FOR REFERENCE ONLY

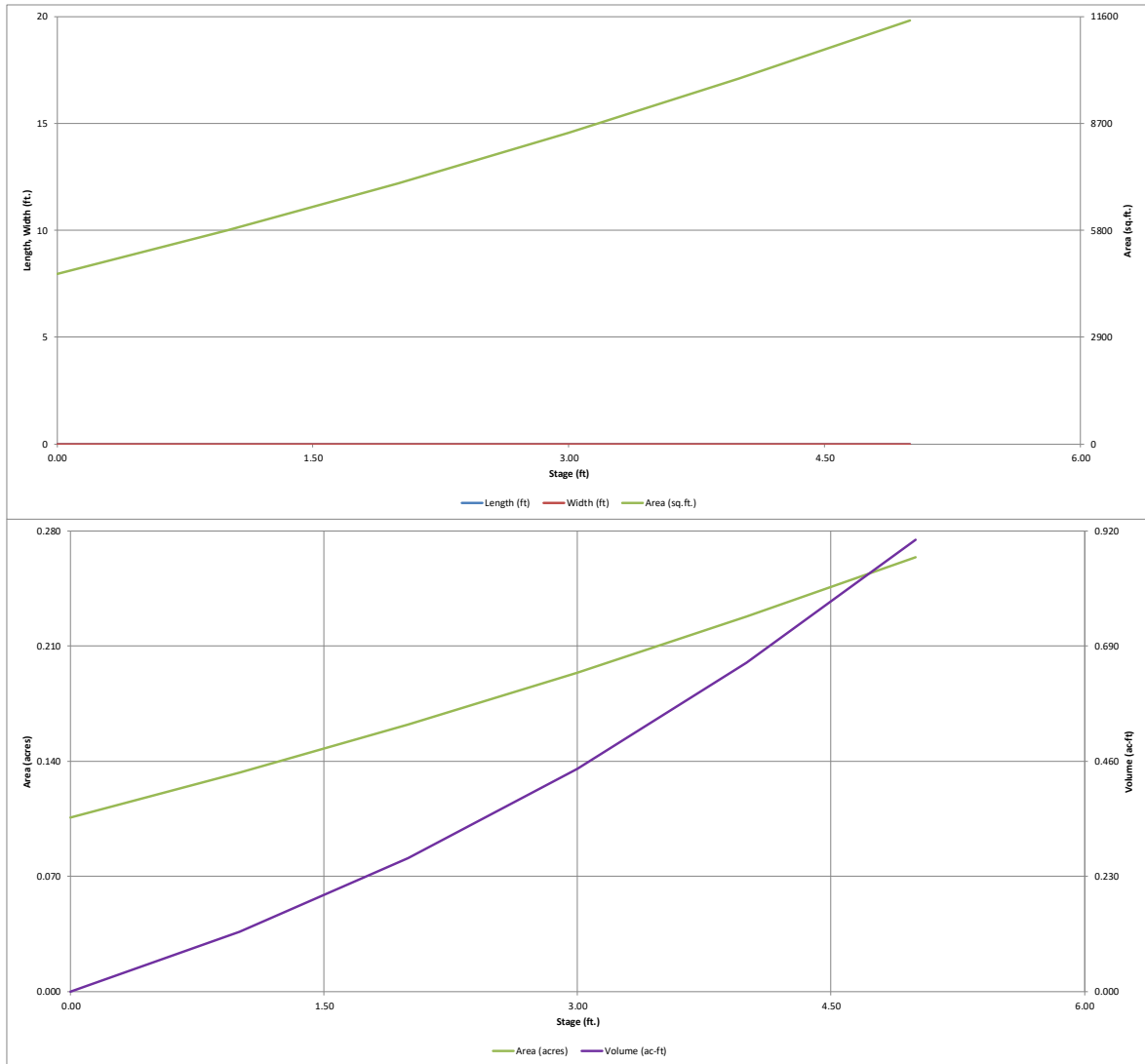
## MHFD-Detention, Version 4.04 (February 2021)

Basin ID: Pond 3

FOR REFERENCE ONLY

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



FOR REFERENCE ONLY

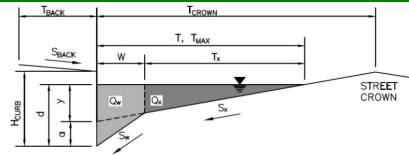
Waterview East - Tributary Drainage Basins				
Pond ID	Tributary Basins	Impervious Area	Total Area	% Impervious
Pond 1	A22, PD-1	1.3	2.75	47.3%
Pond 2	A1-A16, PD-2	6.1	7.76	78.6%
Pond 3	A17-A21, PD-3	3.63	4.1	88.5%
Total		11.03	14.61	75.5%

FOR REFERENCE ONLY

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:

Inlet ID: **DP 27 EX. INLET****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK}$	=	50.0	ft
$S_{BACK}$	=	0.100	ft/ft
$n_{BACK}$	=	0.020	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	44.0	ft
$W$	=	2.00	ft
$S_x$	=	0.017	ft/ft
$S_w$	=	0.083	ft/ft
$S_o$	=	0.000	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX}$	22.0	44.0	ft
$d_{MAX}$	6.0	12.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

MINOR STORM Allowable Capacity is not applicable to Sump Condition

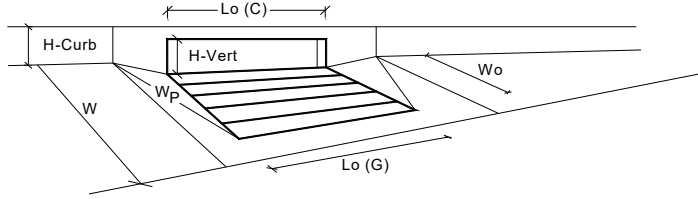
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow}$	SUMP	SUMP	cfs

FOR REFERENCE ONLY

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)		MINOR		MAJOR		
Type of Inlet	Colorado Springs D-10-R	Type =		Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a' from above)		a <sub>local</sub> =		4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =		1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =		6.0	10.6	inches
<b>Grate Information</b>		MINOR		MAJOR		Override Depths
Length of a Unit Grate		L <sub>o</sub> (G) =		N/A	N/A	feet
Width of a Unit Grate		W <sub>o</sub> =		N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =		N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>f</sub> (G) =		N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =		N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =		N/A	N/A	
<b>Curb Opening Information</b>		MINOR		MAJOR		
Length of a Unit Curb Opening		L <sub>o</sub> (C) =		12.00	12.00	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =		8.00	8.00	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =		8.00	8.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =		81.00	81.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>p</sub> =		2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>f</sub> (C) =		0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =		3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =		0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>		MINOR		MAJOR		
Depth for Grate Midwidth		d <sub>Grate</sub> =		N/A	N/A	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =		0.33	0.71	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =		N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =		0.87	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =		N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		MINOR		MAJOR		
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q <sub>s</sub> =		8.9	32.1	cfs
		Q <sub>PEAK REQUIRED</sub> =		8.0	31.0	cfs

FOR REFERENCE ONLY

## **APPENDIX E – MASTER DEVELOPMENT DRAINAGE PLANS**



b. The **fully developed conditions** for the site are as follows:

1. **Big Johnson Reservoir:**

Under proposed conditions, developed flows for the westernmost drainage basin (Big Johnson Reservoir) will be directed into a proposed full spectrum detention pond on the west side of the site approximately 2,030 feet south of the intersection of Bradley Road and Powers Boulevard. Sub-basins and Design Points within this major basin are summarized in Tables 3.3, 3.4, and 3.5 below:

<b>Table 3.3</b> <b><u>Trails at Aspen Ridge</u></b> <b>Big Johnson Reservoir</b> <b>Proposed Conditions - Sub-basin Summary</b>			
Basin	Area	Q5	Q100
	acres	cfs	cfs
Big Johnson Reservoir	14.1	21.2	46.8
N			
O	11.7	17.4	38.4
P	8.52	22.0	43.9
Q	2.4	4.2	8.8
OS-2	11.4	1.7	11.7

<b>Table 3.4</b> <b><u>Trails at Aspen Ridge</u></b> <b>Big Johnson Reservoir</b> <b>Proposed Design Point Summary</b>					
Design Point	Sub-Basins	Downstream Design Point	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
N	N	P	14.1	21.2	46.8
O	O	P	11.7	17.4	38.4
P (Into West Pond)	N, O, P	West Pond Discharge	34.7	47.6	101.5
<b>West Pond Discharge (UD-Detention)</b>	N, O, P	Powers Ditch		1.0	28.3
Q	Q	Powers Ditch	2.4	4.9	10.3
OS-2 (This sub-basin is just southeast of the Powers and Bradley intersection. Flows which might have flowed across TAR to the Powers ditch will be diverted to the ditch prior to entering the TAR property.)	OS-2	Powers Ditch	11.4	1.7	11.7

**Table 3.8**  
**Trails at Aspen Ridge**  
**West Fork - Jimmy Camp Creek**  
**Proposed Design Point Flow Description**

Design Point	Description
OS-1	<ul style="list-style-type: none"> <li>- This design point is at the downstream end of the offsite sub-basin north of Bradley Road. Flows in this sub-basin will sheet flow to the road ditch running along Bradley and Powers Boulevard. Once channelized in the ditch flows will be directed to a proposed 24-inch RCP storm pipe sleeved into one of the existing 42-inch CMP cross road pipes and conveyed on to design point A.</li> <li>- Please note that approximately 7.3 acres of the area tributary to this design point have been diverted from the Big Johnson Reservoir by CDOT construction of Powers Boulevard. Future development of that portion of the tributary sub-basin must redirect these flows to the Big Johnson Reservoir to maintain compliance with the two relevant DBPS reports.</li> <li>- Development of the OS-1 Sub-basin will require onsite detention and an FDR.</li> </ul>
A	<ul style="list-style-type: none"> <li>- This design point is at the manhole (MH-3) receiving flows from DP OS-1 to the north and flows from Sub-basin A captured in the two pairs of inlets on Frontside Drive to the east and west of its intersection with Legacy Drive. These flows will be conveyed on via 30-inch storm pipe to design point B.</li> <li>- Flows from the required onsite detention from the two commercial lots on either side of Legacy Drive will be picked up in the back of the inlets. A 24-inch storm pipe will be stubbed out for the west commercial lot (Inlet 1-A) and an 18-inch will be stubbed out for the east commercial lot (Inlet 3-A).</li> </ul>
B	<ul style="list-style-type: none"> <li>- This design point is at a manhole (MH-108) just downstream of an on-grade inlet (1-B) capturing gutter flows from the west half of Legacy Drive reflected in Sub-basin B. These flows are carried downstream via 30-inch storm pipe to design point C.</li> </ul>
C	<ul style="list-style-type: none"> <li>- This design point is a manhole (MH-6) which combines storm sewer flows from design point B with storm sewer flows from Sub-basin C. Flows in Sub-basin C will sheet flow off the residential lots and into the street curb and gutter. The road gutters will convey these flows on to be captured in four pairs of sump inlets (1-C through 8-C) and conveyed to the design point. The combined flows will be conveyed downstream via 42-inch storm pipe to design point D.</li> </ul>
D	<ul style="list-style-type: none"> <li>- This design point is at a manhole (MH-117) just downstream of an at-grade inlet (1-D) capturing flows from Sub-basin D. Flows in Sub-basin D will sheet flow to the Legacy Road curb and gutter. These gutter flows are captured in the at-grade inlet and combined with storm sewer flows from design point C and carried on via 42-inch storm pipe to design point E.</li> </ul>
E	<ul style="list-style-type: none"> <li>- This design point is located at a manhole (MH-15) just downstream of a pair of sump inlets capturing flows from Sub-basin E. Flows in Sub-basin E will sheet flow across the park area until being captured in the curb and gutter along Falling Rock Drive. Concentrated gutter flows will then be captured by the sump inlets and conveyed on via storm sewer to the design point. These flows will be combined with flows from design point D and carried on via 48-inch storm pipe to design point G.</li> </ul>

Project Name:  
Project Location:  
Designer  
Notes:

Trails at Aspen Ridge (Waterview II)  
El Paso County, CO  
JTS  
Proposed Condition

Average Channel Velocity  
Average Slope for Initial Flow

4 ft/s  
0.04 ft/ft

(If specific channel vel is used, this will be ignored)  
(If Elevations are used, this will be ignored)

Channel Flow Type Key						
Heavy Meadow	2					
Tillage/Field	3					
Short Pasture and Lawns	4					
Nearly Bare Ground	5					
Grassed Waterway	6					
Paved Areas	7					

		Area		Rational 'C' Values															Flow Lengths						Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate				SWMM Values	
Sub-basin	Comments	sf	acres	Surface Type 1 Residential 1/8 or less (65% Imp.)			Surface Type 2 Pavement (100% Imp.)			Surface Type 3 Park (7% Imp.)			Surface Type 4 Undeveloped (2% Imp.)			Composite		Percent Impervious	Initial	True Initial	Channel	True Channel	Average (decimal)	Initial Tc (min)	Average (%)	Channel Flow Type (See Key above) Ground Type	Velocity (ft/s)	Channel Tc (min)	Total (min)	i5 in/hr	Q5 cfs	i100 in/hr	Q100 cfs	Q5 cfs	Q100 cfs
				C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100	Area	C5	C100																		
West Fork-Jimmy Camp Creek OS-1	- The most northwestern portion of this basin (7.268 Acres) outside of the proposed Trails at Aspen Ridge development was rerouted out of the Big Johnson Reservoir basin by CDOT construction of Powers Boulevard and Bradley Road. Future development of the rerouted area will require routing the flows back to the Big Johnson Reservoir to return the area to compliance with the relevant DBPS studies.	853,954	19.60	0.45	0.59		0.90	0.96		0.65	0.80		0.09	0.36	853954	0.09	0.36	2.00	780.00	300.00	300.00	780.00	0.10	23.57	1.40	5	1.2	11.0	34.6	2.23	4.0	3.75	26.7	1.1	16.2
A	-Drainage area is upstream of two pairs of inlets near roundabout at intersection of Frontside Dr. and Legacy Dr. -Development of adjacent commercial lots will require FDR and onsite detention. -Note: The Commercial development will have 95% impervious (per DCM), but since it is required to detain prior to discharging to storm sewer the C values reflect undeveloped commercial areas.	804,622	18.47	0.45	0.59	22315	0.90	0.96	78609	0.65	0.80		0.09	0.36	703698	0.18	0.42	13.32	861.00	300.00	869.00	1430.00	0.06	26.77	1.10	7	2.1	11.4	38.1	2.10	7.0	3.54	28.0	5.0	34.6
B	- At grade inlet approximately 400 feet downstream of roundabout.	46,101	1.06	0.45	0.59	46101	0.90	0.96		0.65	0.80		0.09	0.36		0.45	0.59	65.00	185.00	185.00	400.00	400.00	0.04	9.86	3.40	7	3.7	1.8	11.7	3.86	1.9	6.48	4.1	2.5	7.0
C	- Includes the area north of Moose Meadow Street and between Beartrack Point and Sidewinder Drive and four pairs of sump inlets	648,154	14.88	0.45	0.59	627120	0.90	0.96	21034	0.65	0.80		0.09	0.36		0.46	0.60	66.14	162.00	162.00	822.00	822.00	0.05	8.51	3.29	7	3.6	3.8	12.3	3.77	26.3	6.34	57.2	19.5	58.9
D	-drainage area upstream of at grade inlet approximately 575 feet south of Moose Meadow Street.	96,065	2.21	0.45	0.59		0.90	0.96	14,978	0.65	0.80	81087	0.09	0.36		0.69	0.82	21.50	473.00	300.00	555.00	728.00	0.06	8.85	4.00	7	4.0	3.0	11.9	3.83	5.9	6.44	11.8	4.1	14.2
E	- Located at a pair of sump inlets at the intersection of Sunday Gulch and Falling Rock Drive.	373,189	8.57	0.45	0.59	49513	0.90	0.96	40601	0.65	0.80	283075	0.09	0.36		0.65	0.79	24.81	859.00	300.00	1450.00	2009.00	0.07	12.39	4.00	7	4.0	8.4	20.8	2.96	16.6	4.97	33.9	12.8	39.1
F	-Represents area captured by at grade inlets on Lazy Ridge Drive and Wagon Hammer Drive, as well as sump inlets west of the intersection of Lookout Court and Sunday Gulch.	569,234	13.07	0.45	0.59	569234	0.90	0.96		0.65	0.80		0.09	0.36		0.45	0.59	65.00	332.00	300.00	868.00	900.00	0.07	11.14	2.00	7	2.8	5.3	16.4	3.32	19.7	5.57	43.3	15.4	46.2
G	-At grade inlet on the east side of Sunday Gulch near intersection with Lookout Court.	48,227	1.11	0.45	0.59	48227	0.90	0.96		0.65	0.80		0.09	0.36		0.45	0.59	65.00	80.00	80.00	667.00	667.00	0.05	6.12	2.45	7	3.1	3.6	9.7	4.15	2.1	6.97	4.6	2.1	6.1
H	-This represents the area draining to Buffalo Horn Drive with the exception any flow by from the at grade inlets in Sub-basin F.	1,022,296	23.47	0.45	0.59	921233	0.90	0.96	39,492	0.65	0.80	61571	0.09	0.36		0.48	0.62	62.86	250.00	250.00	1074.00	1074.00	0.04	11.13	2.00	7	2.8	6.3	17.5	3.22	36.6	5.42	79.1	26.8	80.4

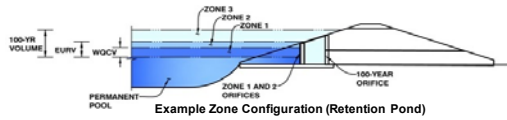
		Area		Rational 'C' Values														Flow Lengths						Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate					SWMM Values	
Sub-basin	Comments	sf	acres	Surface Type 1 Residential 1/8 or less (65% Imp.)			Surface Type 2 Pavement (100% Imp.)			Surface Type 3 Park (7% Imp.)			Surface Type 4 Undeveloped (2% Imp.)			Composite		Percent Impervious	Initial	True	Channel	True Channel	Average (decimal)	Initial	Average (%)	Channel Flow Type (See Key above) Ground Type	Velocity (ft/s)	Channel	Total	i5	Q5	i100	Q100	Q5	Q100
				C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100	Area	C5	C100		ft	Length ft	ft	Length ft	Slope	Tc (min)	Slope		(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	cfs	cfs
I	-Represents area draining to the proposed sump inlet at the end of the cul-de-sac on Falling Rock Drive.	344,236	7.90	0.45	0.59	305401	0.90	0.96	31104	0.65	0.80	7731	0.09	0.36		0.50	0.63	66.86	153.00	153.00	1104.00	1104.00	0.05	7.88	2.61	7	3.2	5.7	13.6	3.62	14.3	6.08	30.4	10.5	31.8
J	-Represents drainage area tributary to sump inlets near intersection of Redshirt Point and Big Johnson Drive.	229,049	5.26	0.45	0.59	70187	0.90	0.96	158,862	0.65	0.80		0.09	0.36		0.76	0.85	89.28	266.00	266.00	909.00	909.00	0.09	4.77	3.20	7	3.6	4.2	9.0	4.27	17.2	7.17	32.2	11.1	32.7
K	-This sub-basin is tributary to the future sump inlets near the intersection of Big Johnson Drive and Roundhouse Drive.	1,414,842	32.48	0.45	0.59	1414842	0.90	0.96		0.65	0.80		0.09	0.36		0.45	0.59	65.00	400.00	300.00	1400.00	1500.00	0.06	13.26	3.50	7	3.7	6.7	19.9	3.02	44.5	5.07	98.0	33.3	101.7
Marksheffel Tributary to Jimmy Camp Creek L	-Represents entire drainage area to the Northeast Pond.	330,836	7.59	0.45	0.59	259741	0.90	0.96		0.65	0.80	71095	0.09	0.36		0.49	0.64	52.54	290.00	290.00	490.00	490.00	0.05	10.88	5.40	7	4.6	1.8	12.6	3.73	14.1	6.27	30.5		
West Fork-Jimmy Camp Creek M	Drainage area in and around East Full Spectrum Detention Pond	447,971	10.29	0.45	0.59		0.90	0.96		0.65	0.80	447971	0.09	0.36		0.65	0.80	7.00	437.00	300.00	10.00	147.00	0.06	9.32	1.00	7	2.0	1.2	10.5	4.02	27.1	6.75	56.0	14.2	61.8
Big Johnson Reservoir N	-Represents area upstream of sump inlets near intersection of Natural Bridge Trail and Blue Miner Street.	614,283	14.10	0.45	0.59	614283	0.90	0.96		0.65	0.80		0.09	0.36		0.45	0.59	65.00	150.00	150.00	1229.00	1229.00	0.03	9.94	2.50	7	3.2	6.5	16.4	3.32	21.2	5.58	46.8		
O	-Represents area upstream of sump inlet at intersection of Rainy Creek Trail and Triple Tree Loop	510,492	11.72	0.45	0.59	510,492	0.90	0.96	0	0.65	0.80	0	0.09	0.36	0	0.45	0.59	65.00	104.00	104.00	1230.00	1230.00	0.02	9.47	1.40	7	2.4	8.7	18.1	3.17	16.8	5.32	37.1		
P	-Drainage area in and around the West Pond.	370,936	8.52	0.45	0.59		0.90	0.96	70,884	0.65	0.80	300052	0.09	0.36		0.70	0.83	24.77	560.00	300.00	378.00	638.00	0.06	9.43	2.00	7	2.8	3.8	13.2	3.67	22.0	6.16	43.9		
Q	-This area is infeasible to detain and discharges to the Powers Boulevard Ditch -Less than one acre (0.31 Acres) of developed area is within the Big Johnson Reservoir Basin, therefore, compliance with the county's MS4 permit is maintained.	106,017	2.43	0.45	0.59	38,063	0.90	0.96	0	0.65	0.80	67,954	0.09	0.36	0	0.58	0.72	27.82	143.00	143.00	687.00	687.00	0.06	6.08	3.35	4	1.3	9.0	15.1	3.45	4.9	5.80	10.3		
R	-This area is infeasible to detain and discharges to the swale at the southeast corner of the property. -Less than one acre (0.67 Acres) of developed area is within the West Fork Jimmy Camp Creek Basin, therefore, compliance with the county's MS4 permit is maintained.	81,300	1.87	0.45	0.59		0.90	0.96		0.65	0.80	81300	0.09	0.36		0.65	0.80	7.00	21.00	21.00	220.00	220.00	0.33	1.16	10.00	5	3.2	1.2	5.0	5.10	6.2	8.58	12.9	1.7	7.8
OS-2	- Commercially zoned lot just southeast of the intersection of Bradley and Powers. This area will be required to provide its own detention which must discharge to the Powers Boulevard Ditch.	498,467	11.44	0.45	0.59		0.90	0.96		0.65	0.80		0.09	0.36	498467	0.09	0.36	2.00	971.00	300.00	1411.00	2082.00	0.04	34.50	2.83	5	1.7	20.7	55.2	1.67	1.7	2.81	11.7		

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Trails at Aspen Ridge

Basin ID: Approximated future detention for Commercial lot South of Bradley Road and West of Legacy Drive



Example Zone Configuration (Retention Pond)

## Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	13.43	acres
Watershed Length =	894	ft
Watershed Slope =	0.070	ft/ft
Watershed Imperviousness =	95.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.501	acre-feet
Excess Urban Runoff Volume (EURV) =	1.436	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.234	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	1.600	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	1.926	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	2.252	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	2.517	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	2.867	acre-feet
500-yr Runoff Volume (P1 = 3.55 in.) =	4.110	acre-feet
Approximate 2-yr Detention Volume =	1.158	acre-feet
Approximate 5-yr Detention Volume =	1.504	acre-feet
Approximate 10-yr Detention Volume =	1.831	acre-feet
Approximate 25-yr Detention Volume =	1.964	acre-feet
Approximate 50-yr Detention Volume =	2.037	acre-feet
Approximate 100-yr Detention Volume =	2.102	acre-feet

Optional User Override	1-hr Precipitation
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.55	inches

## Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.501	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.935	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.666	acre-feet
Total Detention Basin Volume =	2.102	acre-feet
Initial Surcharge Volume (ISV) =	65	ft³
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H <sub>total</sub> ) =	4.00	ft
Depth of Trickle Channel (H <sub>TC</sub> ) =	0.50	ft
Slope of Trickle Channel (S <sub>TC</sub> ) =	0.005	ft/ft
Slopes of Main Basin Sides (S <sub>main</sub> ) =	4	H:V
Basin Length-to-Width Ratio (R <sub>L/W</sub> ) =	2	
Initial Surcharge Area (A <sub>ISV</sub> ) =	198	ft²
Surcharge Volume Length (L <sub>ISV</sub> ) =	14.1	ft
Surcharge Volume Width (W <sub>ISV</sub> ) =	14.1	ft
Depth of Basin Floor (H <sub>100OR</sub> ) =	1.22	ft
Length of Basin Floor (L <sub>100OR</sub> ) =	262.3	ft
Width of Basin Floor (W <sub>100OR</sub> ) =	135.8	ft
Area of Basin Floor (A <sub>100OR</sub> ) =	35,621	ft²
Volume of Basin Floor (V <sub>100OR</sub> ) =	15,609	ft³
Depth of Main Basin (H <sub>MAIN</sub> ) =	1.95	ft
Length of Main Basin (L <sub>MAIN</sub> ) =	278.0	ft
Width of Main Basin (W <sub>MAIN</sub> ) =	151.4	ft
Area of Main Basin (A <sub>MAIN</sub> ) =	42,086	ft²
Volume of Main Basin (V <sub>MAIN</sub> ) =	75,793	ft³
Calculated Total Basin Volume (V <sub>total</sub> ) =	2.102	acre-feet

Depth Increment =	0.1	ft							
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		14.1	14.1	198		0.005		
ISV	0.33		14.1	14.1	198		0.005	63	0.001
	0.40		14.1	14.1	198		0.005	77	0.002
	0.50		14.1	14.1	198		0.005	97	0.002
	0.60		14.1	14.1	198		0.005	117	0.003
	0.70		14.1	14.1	198		0.005	137	0.003
	0.80		14.1	14.1	198		0.005	157	0.004
	0.90		26.3	20.1	528		0.012	186	0.004
	1.00		46.7	30.1	1,405		0.032	279	0.006
	1.10		67.1	40.1	2,690		0.062	480	0.011
	1.20		87.5	50.1	4,383		0.101	830	0.019
	1.30		107.9	60.1	6,484		0.149	1,370	0.031
	1.40		128.3	70.1	8,992		0.206	2,141	0.049
	1.50		148.7	80.1	11,909		0.273	3,182	0.073
	1.60		169.1	90.1	15,234		0.350	4,536	0.104
	1.70		189.5	100.1	18,967		0.435	6,243	0.143
	1.80		209.9	110.1	23,108		0.530	8,343	0.192
	1.90		230.3	120.1	27,656		0.635	10,878	0.250
	2.00		250.7	130.1	32,613		0.749	13,888	0.319
Floor	2.05		260.9	135.1	35,245		0.809	15,584	0.358
	2.10		262.8	136.2	35,790		0.822	17,724	0.407
	2.20		263.6	137.0	36,110		0.829	21,319	0.489
Zone 1 (WQCV)	2.22		263.7	137.2	36,174		0.830	22,042	0.506
	2.30		264.4	137.8	36,431		0.836	24,946	0.573
	2.40		265.2	138.6	36,753		0.844	28,605	0.657
	2.50		266.0	139.4	37,077		0.851	32,297	0.741
	2.60		266.8	140.2	37,402		0.859	36,021	0.827
	2.70		267.6	141.0	37,728		0.866	39,777	0.913
	2.80		268.4	141.8	38,056		0.874	43,566	1.000
	2.90		269.2	142.6	38,384		0.881	47,388	1.088
	3.00		270.0	143.4	38,715		0.889	51,243	1.176
	3.10		270.8	144.2	39,046		0.896	55,131	1.266
	3.20		271.6	145.0	39,378		0.904	59,053	1.356
Zone 2 (EURV)	3.29		272.3	145.7	39,679		0.911	62,610	1.437
	3.30		272.4	145.8	39,712		0.912	63,007	1.446
	3.40		273.2	146.6	40,048		0.919	66,995	1.538
	3.50		274.0	147.4	40,384		0.927	71,017	1.630
	3.60		274.8	148.2	40,722		0.935	75,072	1.723
	3.70		275.6	149.0	41,061		0.943	79,161	1.817
	3.80		276.4	149.8	41,401		0.950	83,284	1.912
	3.90		277.2	150.6	41,743		0.958	87,441	2.007
Zone 3 (100-year)	4.00		278.0	151.4	42,086		0.966	91,633	2.104
	4.10		278.8	152.2	42,430		0.974	95,858	2.201
	4.20		279.6	153.0	42,775		0.982	100,119	2.298
	4.30		280.4	153.8	43,122		0.990	104,413	2.397
	4.40		281.2	154.6	43,470		0.998	108,743	2.496
	4.50		282.0	155.4	43,819		1.006	113,107	2.597
	4.60		282.8	156.2	44,170		1.014	117,507	2.698
	4.70		283.6	157.0	44,521		1.022	121,941	2.799
	4.80		284.4	157.8	44,874		1.030	126,411	2.902
	4.90		285.2	158.6	45,229		1.038	130,916	3.005
	5.00		286.0	159.4	45,585		1.046	135,457	3.110
	5.10		286.8	160.2	45,941		1.055	140,033	3.215
	5.20		287.6	161.0	46,300		1.063	144,645	3.321
	5.30		288.4	161.8	46,659		1.071	149,293	3.427
	5.40		289.2	162.6	47,020		1.079	153,977	3.535
	5.50		290.0	163.4	47,382		1.088	158,697	3.643
	5.60		290.8	164.2	47,745		1.096	163,454	3.752
	5.70		291.6	165.0	48,110		1.104	168,246	3.862
	5.80		292.4	165.8	48,476		1.113	173,076	3.973
	5.90		293.2	166.6	48,843		1.121	177,942	4.085

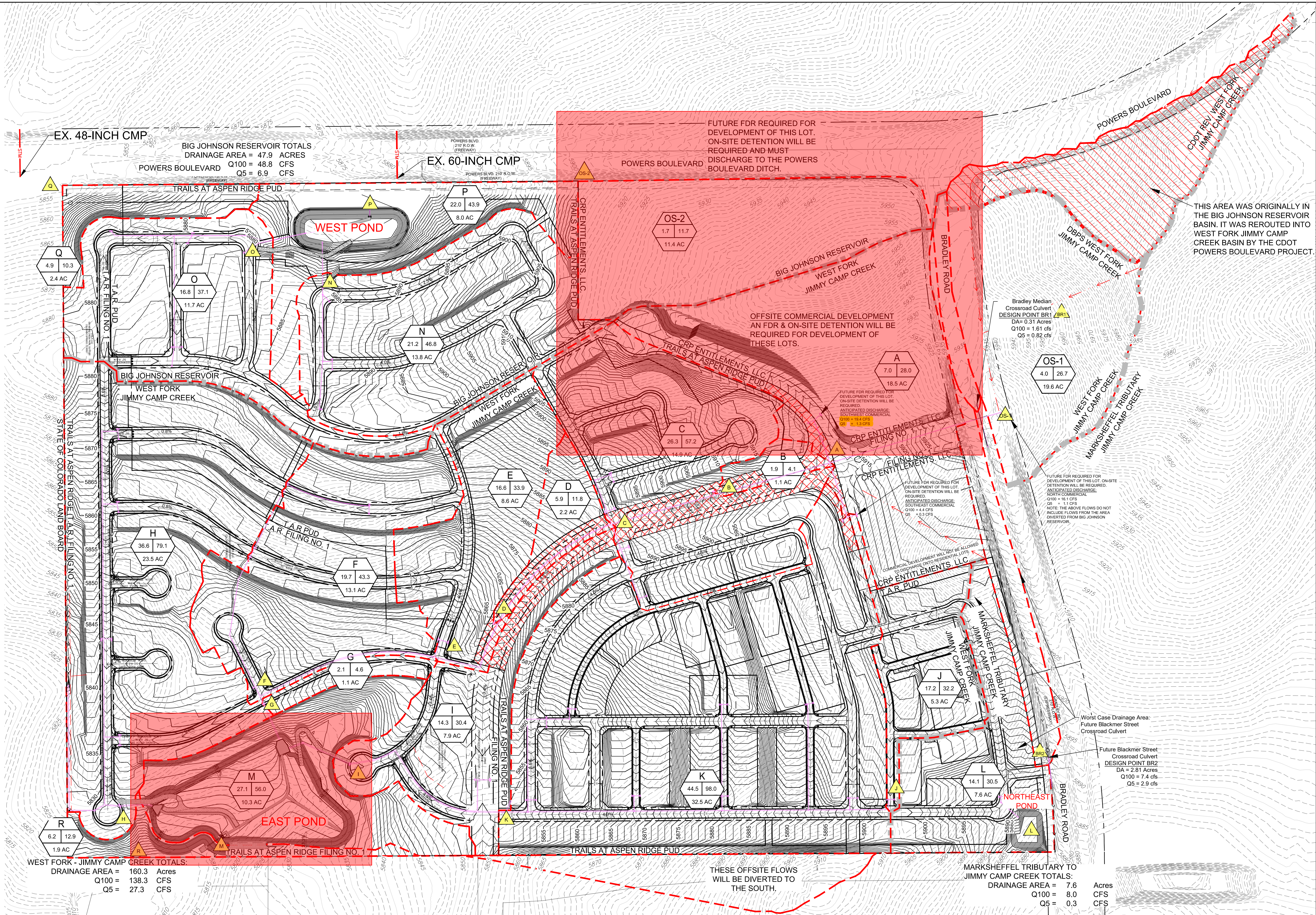






Trails at Aspen Ridge Big Johnson Reservoir Proposed Design Point Summary					
Point	Sub-Basins	Downstream Design Point	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
	N	P	14.1	21.2	46.8
	O	P	11.7	16.8	37.1
(Pond)	N, O, P	West Pond Discharge	34.3	47.1	100.6
(ion)	N, O, P	Powers Ditch		1.0	28.3
	Q	Powers Ditch	2.4	4.9	10.3
	OS-2	Powers Ditch	11.4	1.7	11.7

Trails at Aspen Ridge Marksheffel Tributary to Jimmy Camp Creek Proposed Design Point Summary					
Design Point	Sub-Basins	Downstream Design Point	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
L	L	Northeast Pond Discharge	7.6	14.1	30.5
Northeast Pond Discharge	L	Bradley Road Ditch		0.3	8
BR1	BR1	Bradley Road Ditch	0.3	0.8	1.6
BR2	BR2	Bradley Road Ditch	2.8	2.9	7.4



VERTICAL BENCHMARK:

BASIS OF BEARING:

PREPARED UNDER MY  
DIRECT SUPERVISION, FOR  
AND ON BEHALF OF MATRIX  
DESIGN GROUP, INC.



COLA, LLC.			
TRAILS AT ASPEN RIDGE: FILING #1 & PUD			
MDDP-AMENDMENT &			
PRELIMINARY DRAINAGE REPORT			
DESIGNED BY: JTS	SCALE:	DATE ISSUED: September 2019	DR-02
DRAWN BY: JTS	HORIZ.:	SHEET NO. 2 OF 2 SHEETS	
CHECKED BY:	VERT.:		



## **APPENDIX F – DRAINAGE EXHIBITS**



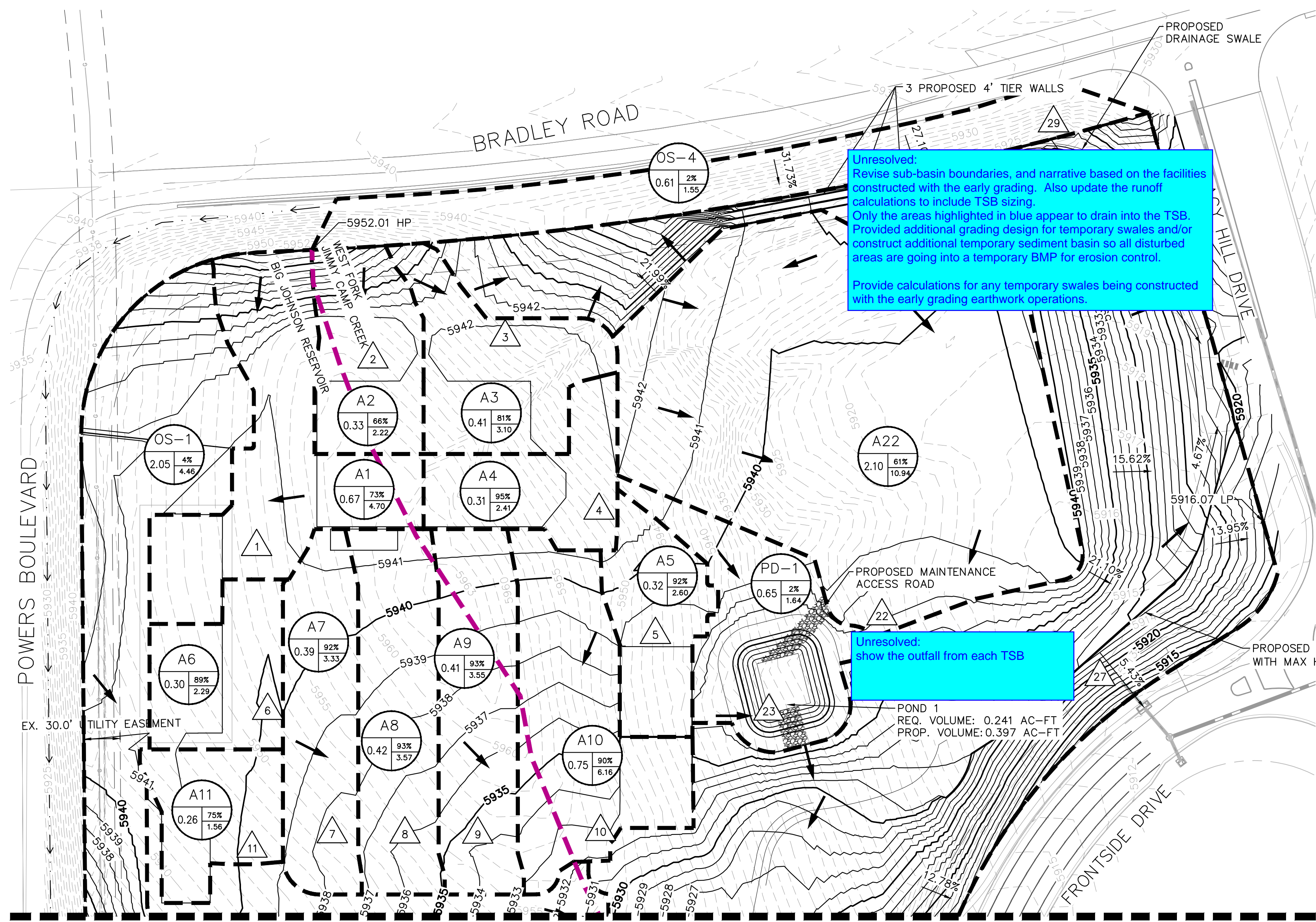
[illegible]

SUMMARY - EXISTING RUNOFF TABLE						
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
1	EX-1	10.36	3.54	24.73	3.54	24.73
2	EX-2	11.50	2.62	22.34	2.62	22.34
3	EX-3	0.26	0.21	0.91	0.21	0.91
4	OS-1	0.66	0.19	1.61	0.19	1.61

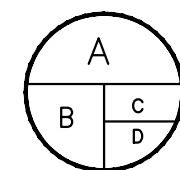
[illegible]



K:\COS\_LA\196195000 - Waterview East Commercial\CADD\PlanSheets\CD\_DR\_EARLY GRADING.dwg Roberts, Jared 3/23/2023 1:10 PM



LEGEND

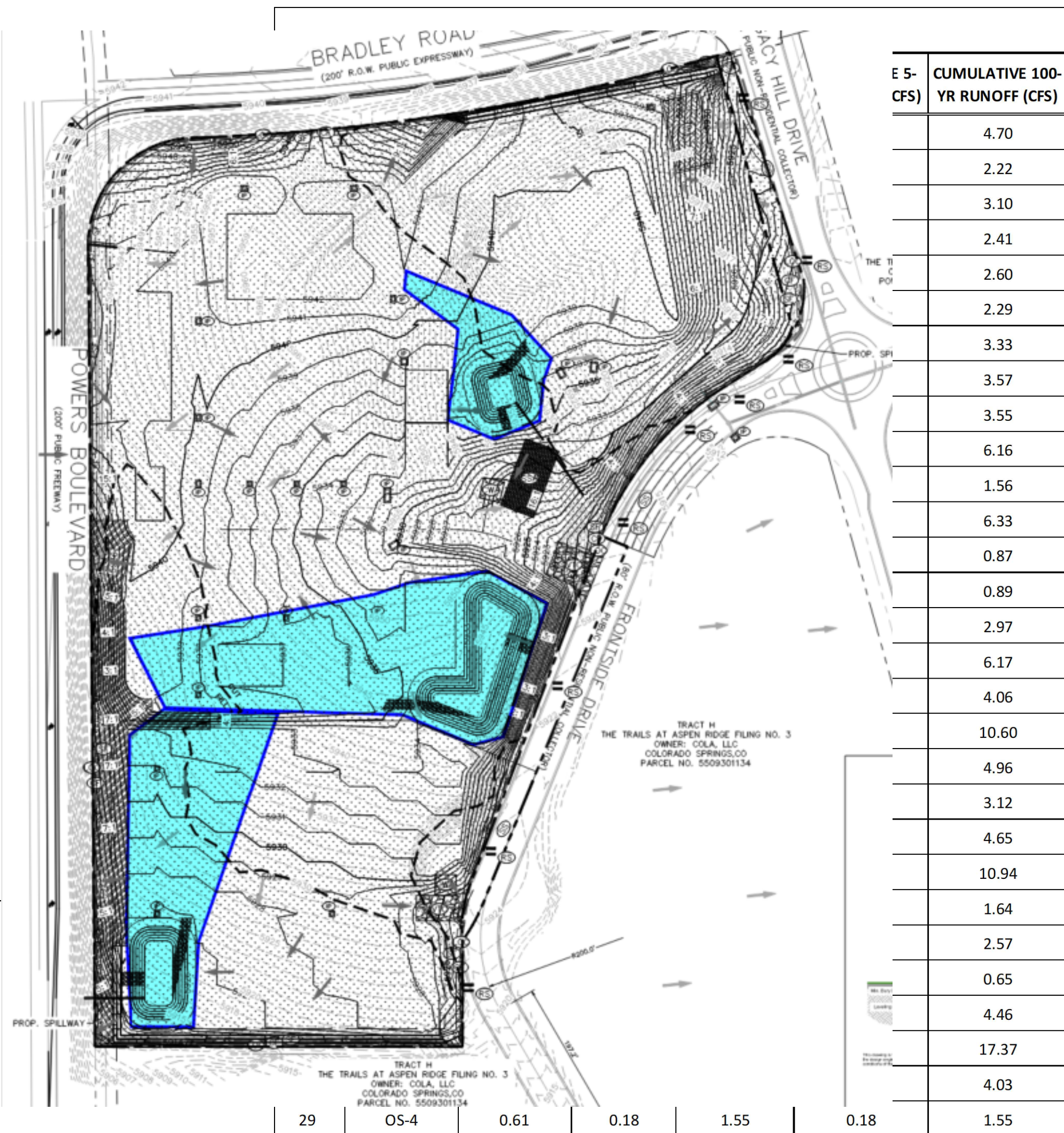


A = BASIN DESIGNATION  
B = AREA (ACRES)  
C = BASIN IMPERVIOUSNESS  
D = 100-YR DESIGN STORM RUNOFF (CFS)



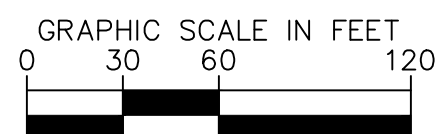
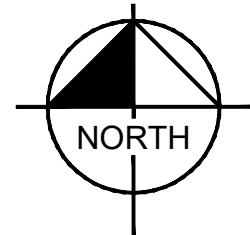
DESIGN POINT  
FLOW DIRECTION  
MAJOR DRAINAGE BASIN BOUNDARY  
DRAINAGE BASIN BOUNDARY  
PROPERTY LINE  
PROPOSED MAJOR CONTOUR  
PROPOSED MINOR CONTOUR  
EXISTING MAJOR CONTOUR  
EXISTING MAJOR CONTOUR  
EXISTING STORM SEWER  
EXISTING STORM MANHOLE  
EXISTING STORM INLET

GRADING REFLECTS  
EARLY GRADING  
PERMIT. PROPOSED  
UTILITIES AND FINAL  
CONDITIONS TO BE  
EVALUATED WITH FINAL  
DRAINAGE REPORT.



PBMP SUMMARY TABLE		
BASINS	PBMP TRIBUTARY AREA (AC)	PBMP
A22, PD-1	2.7500	EDB - PD-1
A1-A16, PD-2	7.7600	EDB - PD-2
A17-A21, PD-3	4.1000	EDB - PD-3
OS-1 - OS-3	7.5000	EXCLUDED

EXCLUDED BASED ON EL PASO COUNTY ENGINEERING CRITERIA MANUAL, SECTION 1.7.1.B.7, "LAND DISTURBANCE TO UNDEVELOPED LAND THAT WILL REMAIN UNDEVELOPED."



WATERVIEW EAST COMMERCIAL  
CONSTRUCTION DOCUMENTS  
PROPOSED DRAINAGE MAP

PRELIMINARY  
FOR REVIEW ONLY  
NOT FOR  
CONSTRUCTION  
Kimley»Horn  
Kimley-Horn and Associates, Inc.

PROJECT NO.  
196195000

SHEET

DR-1

Kimley»Horn

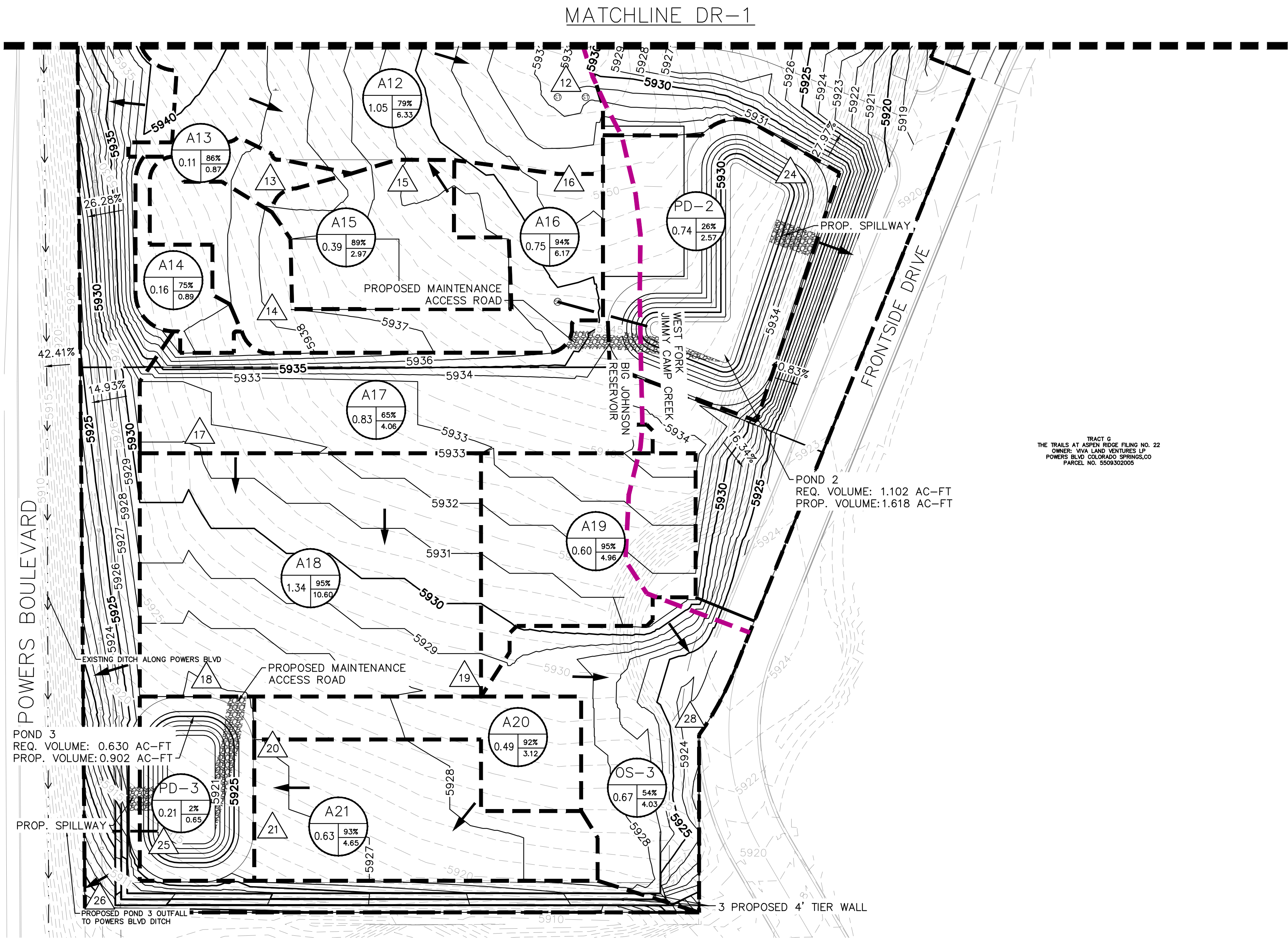
2022 KIMLEY-HORN AND ASSOCIATES, INC.  
2 North Nevada Avenue, Suite 300  
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: JAR  
DRAWN BY: JAR  
CHECKED BY: EUG  
DATE: 05/06/2022

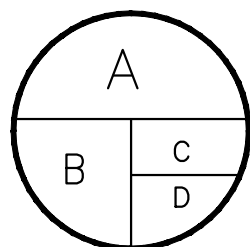
NO. REVISION BY DATE APPR



K:\COS\_LA\196195000 - Waterview East Commercial\CADD\PlanSheets\CD\_DR\_EARLY GRADING.dwg Roberts, Jared 3/23/2023 1:08 PM



LEGEND



A = BASIN DESIGNATION  
B = AREA (ACRES)  
C = 100-YR COMPOSITE RUNOFF COEFFICIENT  
D = 100-YR DESIGN STORM RUNOFF (CFS)

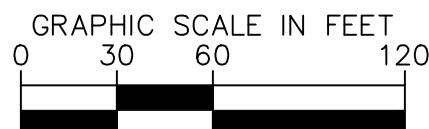
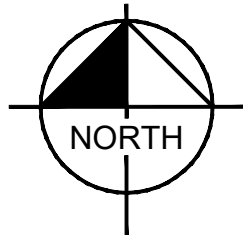


DESIGN POINT  
FLOW DIRECTION  
MAJOR DRAINAGE BASIN BOUNDARY  
DRAINAGE BASIN BOUNDARY  
PROPERTY LINE  
PROPOSED MAJOR CONTOUR  
PROPOSED MINOR CONTOUR  
EXISTING MAJOR CONTOUR  
EXISTING MAJOR CONTOUR  
EXISTING STORM SEWER  
EXISTING STORM MANHOLE  
EXISTING STORM INLET

GRADING REFLECTS  
EARLY GRADING  
PERMIT. PROPOSED  
UTILITIES AND FINAL  
CONDITIONS TO BE  
EVALUATED WITH FINAL  
DRAINAGE REPORT.

Unresolved:  
Update note to  
identify FDR for the  
final plat.

SUMMARY - PROPOSED RUNOFF TABLE						
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
1	A1	0.67	1.87	4.70	1.87	4.70
2	A2	0.33	0.85	2.22	0.85	2.22
3	A3	0.41	1.27	3.10	1.27	3.10
4	A4	0.31	1.04	2.41	1.04	2.41
5	A5	0.32	1.12	2.60	1.12	2.60
6	A6	0.30	0.97	2.29	0.97	2.29
7	A7	0.39	1.43	3.33	1.43	3.33
8	A8	0.42	1.54	3.57	1.54	3.57
9	A9	0.41	1.53	3.55	1.53	3.55
10	A10	0.75	2.63	6.16	2.63	6.16
11	A11	0.26	0.62	1.56	0.62	1.56
12	A12	1.05	2.59	6.33	2.59	6.33
13	A13	0.11	0.37	0.87	0.37	0.87
14	A14	0.16	0.36	0.89	0.36	0.89
15	A15	0.39	1.25	2.97	1.25	2.97
16	A16	0.75	2.66	6.17	2.66	6.17
17	A17	0.83	1.55	4.06	1.55	4.06
18	A18	1.34	4.57	10.60	4.57	10.60
19	A19	0.60	2.14	4.96	2.14	4.96
20	A20	0.49	1.33	3.12	1.33	3.12
21	A21	0.63	1.99	4.65	1.99	4.65
22	A22	2.10	4.10	10.94	4.10	10.94
23	PD-1	0.65	0.19	1.64	0.19	1.64
24	PD-2	0.74	0.67	2.57	0.67	2.57
25	PD-3	0.21	0.08	0.65	0.08	0.65
26	OS-1	2.05	0.61	4.46	0.61	4.46
27	OS-2	4.78	4.34	15.81	4.52	17.37
28	OS-3	0.67	1.45	4.03	1.45	4.03
29	OS-4	0.61	0.18	1.55	0.18	1.55



Know what's below.  
Call before you dig.

**Kimley»Horn**

2022 KIMLEY-HORN AND ASSOCIATES, INC.  
2 North Nevada Avenue, Suite 300  
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: JAR  
DRAWN BY: JAR  
CHECKED BY: EUG  
DATE: 05/06/2022

WATERVIEW EAST COMMERCIAL  
CONSTRUCTION DOCUMENTS  
PROPOSED DRAINAGE MAP - EARLY GRADING

PRELIMINARY  
FOR REVIEW ONLY  
NOT FOR  
CONSTRUCTION  
**Kimley»Horn**  
Kimley-Horn and Associates, Inc.

PROJECT NO.  
196195000

SHEET

DR-2

NO. REVISION BY DATE APPR



# V3\_Early Grading - Final Drainage Report.pdf Markup Summary

## Callout (8)

 <p>Preliminary Drainage Report –</p>	<p><b>Subject:</b> Callout <b>Page Label:</b> 1 <b>Author:</b> CDurham <b>Date:</b> 6/20/2023 5:17:23 PM <b>Status:</b> <b>Color:</b> <span style="background-color: red; color: white;"> </span> <b>Layer:</b> <b>Space:</b></p>	<p>Unresolved: Revise to Final Drainage Report - Early Grading Permit</p>
 <p>Preliminary Drainage Report – Early Grading Permit Washburn East Commercial, El Paso County, CO</p>	<p><b>Subject:</b> Callout <b>Page Label:</b> 2 <b>Author:</b> CDurham <b>Date:</b> 6/19/2023 5:23:18 PM <b>Status:</b> <b>Color:</b> <span style="background-color: red; color: white;"> </span> <b>Layer:</b> <b>Space:</b></p>	<p>Unresolved; Update Header to "Final Drainage Report"</p>
 <p>Implementation of the site will include commercial developments, including various residential, commercial and other developments. The drainage report is to be prepared under my direction and supervision and not belief. Said drainage report has been prepared in County for drainage reports and said report is in drainage basin. I accept responsibility for any liability.</p>	<p><b>Subject:</b> Callout <b>Page Label:</b> 4 <b>Author:</b> CDurham <b>Date:</b> 6/20/2023 5:38:45 PM <b>Status:</b> <b>Color:</b> <span style="background-color: red; color: white;"> </span> <b>Layer:</b> <b>Space:</b></p>	<p>Unresolved: "...included with the final plat application."</p>
 <p>4 Type R inlets are in 5' increments</p>	<p><b>Subject:</b> Callout <b>Page Label:</b> 5 <b>Author:</b> CDurham <b>Date:</b> 6/20/2023 5:19:32 PM <b>Status:</b> <b>Color:</b> <span style="background-color: red; color: white;"> </span> <b>Layer:</b> <b>Space:</b></p>	<p>Type R inlets are in 5' increments.</p>
 <p>5 Type R inlets are in 5' increments</p>	<p><b>Subject:</b> Callout <b>Page Label:</b> 6 <b>Author:</b> CDurham <b>Date:</b> 6/20/2023 5:20:17 PM <b>Status:</b> <b>Color:</b> <span style="background-color: red; color: white;"> </span> <b>Layer:</b> <b>Space:</b></p>	<p>Type R inlets are in 5' increments.</p>
 <p>5 Final Drainage report</p>	<p><b>Subject:</b> Callout <b>Page Label:</b> 6 <b>Author:</b> CDurham <b>Date:</b> 6/20/2023 5:21:07 PM <b>Status:</b> <b>Color:</b> <span style="background-color: red; color: white;"> </span> <b>Layer:</b> <b>Space:</b></p>	<p>Final Drainage report</p>

and other along Legacy Drive, which are converted to an  
as indicated on Legacy Drive and County Road 200 are  
on information on East Portland Avenue 2 for "Water"  
on information on Legacy Drive and County Road 200 for  
on Legacy Drive and County Road 200. Aerial survey for  
on Legacy Drive and County Road 200. Aerial survey for  
on Legacy Drive and County Road 200. Aerial survey for

ing Drainage Conditions (see  
on Legacy Drive and County Road 200. Aerial survey for  
on Legacy Drive and County Road 200. Aerial survey for  
on Legacy Drive and County Road 200. Aerial survey for  
on Legacy Drive and County Road 200. Aerial survey for  
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on Legacy Drive and County Road 200. Aerial survey for

INAL

Unresolved:  
Update note to  
identify FDR for the  
final plat.

**Subject:** Callout  
**Page Label:** 6  
**Author:** CDurham  
**Date:** 6/20/2023 5:22:41 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

c&g, inlets, EDB's are not being built with early  
grading. Map should show how flows are moving  
across site with grading activities alone and no  
infrastructure being built.

**Subject:** Callout  
**Page Label:** [1] DR-2  
**Author:** CDurham  
**Date:** 6/20/2023 5:38:07 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved:  
Update note to identify FDR for the final plat.

## Cloud (1)



**Subject:** Cloud  
**Page Label:** 13  
**Author:** CDurham  
**Date:** 6/20/2023 5:33:50 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

## Cloud+ (1)



**Subject:** Cloud+  
**Page Label:** 4  
**Author:** CDurham  
**Date:** 6/19/2023 5:24:50 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved:  
Update paragraph. As previously stated in the  
review #1 comments to the GEC:  
"Submit a separate final drainage report that is  
strictly associated with the proposed early grading  
operations and calculations for any drainage  
facilities being installed with the early grading such  
as sizing of temporary sediment basins, or  
temporary swales."

## Highlight (4)

sample from "Master Development Drainage Plan Amendment for  
Legacy Drive and County Road 200" Prepared by: J  
2 have been provided in Appendix E.  
**EXISTING SUB-BASIN DESCRIPTIONS**  
tionally, runoff from the Site is split almost directly down the car  
the Site heading east and the western portion of the site head  
ded into 2 existing onsite sub-basins: EX-1 and EX-2.  
**Sub-Basin EX-1**  
Sub-Basin EX-1 is undeveloped consisting of native gra  
at 10.0% slope comprising the eastern half of the property. Run  
at to the east at slopes ranging from 1.30%. Flows are collected  
along Legacy Drive and are conveyed to an existing 12" CDS  
junction of Legacy Drive and Frontside Drive. Flows are then co


**Subject:** Highlight  
**Page Label:** 5  
**Author:** CDurham  
**Date:** 6/20/2023 5:18:36 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

e collect  
ng 12' C  
are then

**Subject:** Highlight  
**Page Label:** 5  
**Author:** CDurham  
**Date:** 6/20/2023 5:19:04 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

12'

ately colle  
ng 12' CC  
carried th

**Subject:** Highlight  
**Page Label:** 6  
**Author:** CDurham  
**Date:** 6/20/2023 5:19:57 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**




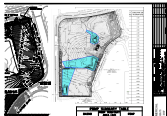

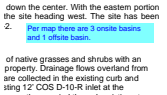
**Subject:** Highlight  
**Page Label:** 6  
**Author:** CDurham  
**Date:** 6/20/2023 5:21:43 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:** Proposed curb and gutter, and proposed storm inlets will convey flows to one of three proposed Private Full Spectrum Extended Detention Basins.


Image (1)



**Subject:** Image  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 6/20/2023 5:37:14 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

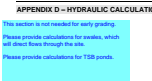
Text Box (8)




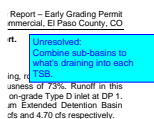
**Subject:** Text Box  
**Page Label:** 5  
**Author:** CDurham  
**Date:** 6/20/2023 5:18:51 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:** Per map there are 3 onsite basins and 1 offsite basin.



**Subject:** Text Box  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 6/20/2023 5:23:18 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:** See comment on PDR for existing map.

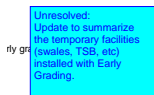


**Subject:** Text Box  
**Page Label:** 55  
**Author:** CDurham  
**Date:** 6/20/2023 5:31:23 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:** This section is not needed for early grading.  
  
Please provide calculations for swales, which will direct flows through the site.  
  
Please provide calculations for TSB ponds.



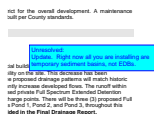
**Subject:** Text Box  
**Page Label:** 7  
**Author:** CDurham  
**Date:** 6/20/2023 5:33:03 PM  
**Status:**  
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**Space:**

Unresolved:  
Combine sub-basins to what's draining into each TSB.



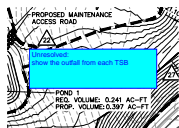
**Subject:** Text Box  
**Page Label:** 13  
**Author:** CDurham  
**Date:** 6/20/2023 5:34:05 PM  
**Status:**  
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**Space:**

Unresolved:  
Update to summarize the temporary facilities (swales, TSB, etc) installed with Early Grading.



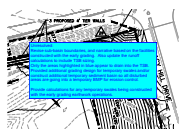
**Subject:** Text Box  
**Page Label:** 14  
**Author:** CDurham  
**Date:** 6/20/2023 5:34:54 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved:  
Update. Right now all you are installing are temporary sediment basins, not EDBs.



**Subject:** Text Box  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 6/20/2023 5:36:38 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved:  
show the outfall from each TSB



**Subject:** Text Box  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 6/20/2023 5:37:02 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved:  
Revise sub-basin boundaries, and narrative based on the facilities constructed with the early grading. Also update the runoff calculations to include TSB sizing.  
Only the areas highlighted in blue appear to drain into the TSB. Provided additional grading design for temporary swales and/or construct additional temporary sediment basin so all disturbed areas are going into a temporary BMP for erosion control.

Provide calculations for any temporary swales being constructed with the early grading earthwork operations.