



Final Drainage Report – Filing No. 1

## Waterview East Commercial El Paso County, Colorado

Prepared for:

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Project #: 196195001

Prepared: July 16, 2026

EDARP File No.: SF269

**Kimley»Horn**

## **CERTIFICATION**

### **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): \_\_\_\_\_  
Jessica McCallum, P.E.  
Colorado P.E. No. 59054  
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.

\_\_\_\_\_  
Joshua J. Palmer, P.E.  
County Engineer/ ECM Administrator  
Date

Conditions:

## Contents

|                                                            |           |
|------------------------------------------------------------|-----------|
| <b>CERTIFICATION .....</b>                                 | <b>1</b>  |
| DESIGN ENGINEER’S STATEMENT .....                          | 1         |
| OWNER/DEVELOPER’S STATEMENT .....                          | 1         |
| EL PASO COUNTY.....                                        | 1         |
| <b>INTRODUCTION .....</b>                                  | <b>3</b>  |
| PURPOSE AND SCOPE OF STUDY .....                           | 3         |
| LOCATION .....                                             | 3         |
| DESCRIPTION OF PROPERTY .....                              | 3         |
| <b>FLOODPLAIN STATEMENT .....</b>                          | <b>4</b>  |
| <b>DRAINAGE BASINS .....</b>                               | <b>4</b>  |
| MAJOR BASIN DESCRIPTIONS .....                             | 4         |
| MASTER DRAINAGE REPORT STUDY .....                         | 4         |
| EXISTING SUB-BASIN DESCRIPTIONS.....                       | 4         |
| PROPOSED SUB-BASIN DESCRIPTIONS .....                      | 6         |
| <b>DRAINAGE DESIGN CRITERIA.....</b>                       | <b>9</b>  |
| DEVELOPMENT CRITERIA REFERENCE.....                        | 9         |
| HYDROLOGIC SOIL GROUP.....                                 | 9         |
| HYDROLOGIC CRITERIA .....                                  | 10        |
| HYDRAULIC CRITERIA.....                                    | 10        |
| DETENTION.....                                             | 10        |
| <b>DRAINAGE FACILITY DESIGN .....</b>                      | <b>10</b> |
| GENERAL CONCEPT .....                                      | 10        |
| DRAINAGE FEE.....                                          | 11        |
| <b>THE FOUR STEP PROCESS .....</b>                         | <b>11</b> |
| <b>SUMMARY .....</b>                                       | <b>12</b> |
| <b>REFERENCES .....</b>                                    | <b>12</b> |
| <b>APPENDIX .....</b>                                      | <b>13</b> |
| <b>APPENDIX A – VICINITY MAP .....</b>                     | <b>14</b> |
| <b>APPENDIX B – FEMA FIRM PANEL AND SOILS MAP .....</b>    | <b>15</b> |
| <b>APPENDIX C – HYDROLOGIC CALCULATIONS .....</b>          | <b>16</b> |
| <b>APPENDIX D – HYDRAULIC CALCULATIONS .....</b>           | <b>17</b> |
| <b>APPENDIX E – MASTER DEVELOPMENT DRAINAGE PLANS.....</b> | <b>18</b> |
| <b>APPENDIX F – DRAINAGE EXHIBITS .....</b>                | <b>19</b> |

## INTRODUCTION

### ***PURPOSE AND SCOPE OF STUDY***

The purpose of this Final Drainage Report – Filing No. 1 (FDR) is to provide the drainage design calculations and drainage exhibit for the infrastructure improvements for Filing No. 1 for the Waterview East Subdivision (“the Project”) for Waterview Commercial Developers, LLC. 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 are described in further detail within the report.

### ***LOCATION***

The Project is located within part of the West ½ of Section 9, Township 15 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, County of El Paso, State of Colorado (“the Site”). The Site is bounded by Powers Boulevard (Highway 21) on the west, The Trails at Aspen Ridge Filing No. 1 to the east and to the south, and Bradley Road to the north. A vicinity map has been provided in the **Appendix A** of this report.

The Site is currently owned by Waterview East Developers, LLC. The site is currently being platted.

### ***DESCRIPTION OF PROPERTY***

The Site is approximately 22.1 acres consisting of undeveloped land with native vegetation and 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 the overall site will include commercial developments, including a convenience store, restaurants, storage units and retail stores. The infrastructure improvements for Filing No. 1 consist of an internal private drive within a Tract, overlot grading of Lots 1 and 2, right turn lane on Legacy Hill Drive, extension of Frontside Drive, utility main extensions, and a private extended detention basin.

A Topographic field survey was completed and updated for the Project by Ridgeline Land Surveying dated February 7<sup>th</sup>, 2023 and additional topographic information was provided on March 3<sup>rd</sup>, 2026 which are the basis for design for the drainage improvements.



## FLOODPLAIN STATEMENT

The Site is located outside the 100-year floodplain and within Zone X (an area of minimal flood hazard) as noted on the FEMA FIRM Map No. 08041C0768G revised on December 7, 2018 (See **Appendix B**).

## 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**. **Appendix E**

Appendix B

### 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”. The Offsite Commercial Development which consists of the Site represented in this FDR is required to provide on-site detention and can outfall to the existing storm sewer stub in the southeast portion of the Site. The allowable flows to the stub are 1.3 cfs and 19.4 cfs in the 5-year and 100-year event, respectively. The proposed 5-year and 100-year release rate from the proposed pond to the stub are 0.2 cfs and 10.9 cfs respectively.

Project not located within Sand Creek basin. Please revise.

Please include size and specify whether private or public

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 will require on-site detention. This report sizes a permanent extended detention basin to treat Lots 1 and 2 and a portion of the west property for future commercial development. 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. The existing sub-basins were modified due to the overlot grading procedures during the early grading permit process. The site has been divided into onsite subbasins, EX-1-EX-9, and one offsite basin, OS-1.

### Sub-Basin EX-1

The on-site sub-basin EX-1 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 2.43 acres along the western property line. Drainage flows overland from east to west at slopes ranging from 6-8%. 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 1.00 cfs and 6.38 cfs respectively.

Label inlet on map

### Sub-Basin EX-2

The on-site sub-basin EX-2 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 3.22 acres comprising the northeast portion of the property. Drainage flows overland from west to east via an existing swale at slopes of 2-8%. Flows are collected in the existing temporary sediment basin and eventually discharge to the curb and gutter within Legacy Hill Drive and are conveyed to an existing 10' Type R curb 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 1.49 cfs and 9.51 cfs respectively.

### Sub-Basin EX-3

The on-site sub-basin EX-3 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 0.63 acres comprising the east portion of the property. Drainage flows overland from west to east at slopes ranging from 6-15%. Flows are collected in the curb and gutter within Legacy Hill Drive and are conveyed to an existing 10' Type R curb 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 0.32 cfs and 2.02 cfs respectively.

### Sub-Basin EX-4

The on-site sub-basin EX-4 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 2.63 acres comprising the central portion of the property. Drainage flows overland from west to east at slopes ranging from 2-25%. Flows are collected in the temporary sediment basin and eventually discharge to the curb and gutter within Legacy Hill Drive and are conveyed to an existing 10' Type R curb 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 1.33 cfs and 8.49 cfs respectively.

### Sub-Basin EX-5

The on-site sub-basin EX-5 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 2.90 acres comprising the eastern property line. Drainage flows overland from west to east at slopes ranging from 5-15%. Flows are collected in the curb and gutter within Legacy Hill Drive and are conveyed to an existing 10' Type R curb 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 1.54 cfs and 9.82 cfs respectively.

#### Sub-Basin EX-6

The on-site sub-basin EX-6 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 0.97 acres along the eastern property line. Drainage flows overland from east to west at slopes ranging from 5-15%. Flows are collected in an existing temporary sediment basin before ultimately discharging and continuing southeast per **historic drainage conditions**. Runoff during the 5-year and 100-year events are 0.55 cfs and 3.53 cfs respectively.

#### Sub-Basin EX-7

The on-site sub-basin EX-7 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 7.18 acres within the central property of the property. Drainage flows overland from east to west at slopes ranging from 5-15%. Drainage flows overland from north to south via an existing swale at slopes of 1-15%. Flows are collected in the existing temporary sediment basin before ultimately discharging to the existing Powers Boulevard roadside ditch. Runoff during the 5-year and 100-year events are 3.03 cfs and 19.38 cfs respectively.

#### Sub-Basin EX-8

The on-site sub-basin EX-8 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 1.17 acres within the southeast portion of the property. Drainage flows overland from east to west at slopes ranging from 5-10%. Flows are discharged to the southeast per **historic drainage conditions**. Runoff during the 5-year and 100-year events are 0.58 cfs and 3.73 cfs respectively.

#### Sub-Basin EX-9

The on-site sub-basin EX-9 is undeveloped consisting of overlot graded conditions and existing vegetation with an area of 0.32 acres along the south property line. Drainage flows overland from north to south at slopes of 33%. Flows are discharged to the south per **historic drainage conditions**. Runoff during the 5-year and 100-year events are 0.22 cfs and 1.42 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 0.47 acres comprising the northern boundary of the Site. Drainage flows overland from north to south at slopes ranging from 5-33%. Flows convey via a swale to the existing temporary sediment basin before ultimately collected via existing curb and gutter along Legacy Drive, which are conveyed to an existing 10' Type R curb 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 0.22 cfs and 1.42 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. Sub-basins A1, A2, FD 1, FD 2, PR 1, PR 2, and P will be routed to the proposed extended detention basin and will outfall from the pond to the existing storm sewer stub. Sub-basins UD1, UD2, FS1, and FS2 will follow historic drainage patterns and are excluded per the exclusions listed in the

as overland, thru swale, inlet, c&g? Tell us where and what happens with flow

Please review and revise as necessary. These values should match the 5-year and 100-year peak flows calculated in Appendix C.

respective sub-basin descriptions.

### **Sub-Basin A1**

The on-site sub-basin A1 consists of native vegetation in the northeast portion of the site. Sub-Basin A1 encompasses Lot 1 which is to be developed into a future convenience store. Detailed drainage design of the convenience store and drainage basins will be provided with a separate Site Development Plan and Final Drainage Report submittal. The sub-basin has an area of 2.00 acres and a weighted imperviousness of 95%. Runoff in this basin will be collected by future proposed storm sewer infrastructure and routed to the 18" RCP storm sewer stub (Design Point A1) to discharge to the pond. Runoff during the 5-year and 100-year events are 5.92 cfs and 13.93 cfs respectively.

### **Sub-Basin A2**

The on-site sub-basin A2 consists of native vegetation in the north portion of the site. Sub-Basin A2 encompasses Lot 2 which is to be developed into a commercial user. Detailed drainage design of the commercial store and drainage basins will be provided with a separate Site Development Plan and Final Drainage Report submittal. The sub-basin has an area of 1.50 acres and a weighted imperviousness of 95%. Runoff in this basin will be collected by future proposed storm sewer infrastructure and routed to the 18" RCP storm sewer stub (Design Point A2) to discharge to the pond. Runoff during the 5-year and 100-year events are 4.48 cfs and 10.32 cfs respectively.

### **Sub-Basin FD1**

The on-site sub-basin FD1 consists of native vegetation in the northwest portion of the site and is a future development for commercial uses. The sub-basin has an area of 1.33 acres and a weighted imperviousness of 95%. Runoff in this basin will be collected by future proposed storm sewer infrastructure and routed to the 24" RCP storm sewer stub (Design Point FD1) to discharge to the pond. Runoff during the 5-year and 100-year events are 3.97 cfs and 9.16 cfs respectively.

### **Sub-Basin FD2**

The on-site sub-basin FD2 consists of native vegetation in the west portion of the site and is a future development for commercial uses. The sub-basin has an area of 0.86 acres and a weighted imperviousness of 95%. Runoff in this basin will be collected by future proposed storm sewer infrastructure and routed to the 24" RCP storm sewer stub (Design Point FD2) to discharge to the pond. Runoff during the 5-year and 100-year events are 2.67 cfs and 6.15 cfs respectively.

Type R?

### **Sub-Basin PR1**

The on-site sub-basin PR1 consists of the proposed private drive. The sub-basin has an area of 0.26 acres and a weighted imperviousness of 100%. Runoff in this basin will be collected by curb and gutter and routed to a proposed private 10' Type 2 curb inlet (Design Point PR1) to discharge to the pond. Runoff during the 5-year and 100-year events are 1.02 cfs and 2.30 cfs respectively.

0.61 acres

### Sub-Basin PR2

The on-site sub-basin PR2 consists of the proposed private drive. The sub-basin has an area of ~~0.26 acres~~ and a weighted imperviousness of 100%. Runoff in this basin will be collected by curb and gutter and routed to a proposed private 15' **Type 2** curb inlet (Design Point PR2) to discharge to the pond. Runoff during the 5-year and 100-year events are 2.38 cfs and 5.37 cfs respectively.

Type R?

### Sub-Basin P

The on-site sub-basin P consists of the proposed private extended detention basin. The sub-basin has an area of 1.38 acres and a weighted imperviousness of 0%. Runoff in this basin will be collected by the pond and discharge from the proposed outlet structure (Design Point P) before outfalling to the existing storm sewer stub. Runoff during the 5-year and 100-year events are 0.82 cfs and 5.22 cfs respectively.

### Sub-Basin FS1

The on-site sub-basin FS1 consists of the north portion of the proposed Frontside Drive extension. The sub-basin has an area of 0.31 acres and a weighted imperviousness of 100%. Runoff in this basin will be collected by curb and gutter and routed to an existing 10' **Type 2** curb inlet (Design Point FS1) following the Master Drainage Report design. Runoff during the 5-year and 100-year events are 1.23 cfs and 2.76 cfs respectively.

Include what flows the MDDP had designed the inlet for. Address if current flow is greater.

According to the El Paso County Engineering Criteria Manual, Section I.7.1.B.2.1, This area classifies as "Excluded Roadway Redevelopment." Sub-Basin FS1 and Sub-Basin FS2 total 0.6 acres which is less than 1 acre of additional paved area per mile of roadway to an existing roadway. This area will follow the drainage patterns as described in the Master Report.

### Sub-Basin FS2

The on-site sub-basin FS2 consists of the south portion of the proposed Frontside Drive extension. The sub-basin has an area of 0.29 acres and a weighted imperviousness of 100%. Runoff in this basin will be collected by curb and gutter and routed to a proposed private 5' **Type 2** curb inlet (Design Point FS2) to discharge to the pond. Runoff during the 5-year and 100-year events are 1.15 cfs and 2.58 cfs respectively.

According to the El Paso County Engineering Criteria Manual, Section I.7.1.B.2.1, This area classifies as "Excluded Roadway Redevelopment." Sub-Basin FS1 and Sub-Basin FS2 total 0.6 acres which is less than 1 acre of additional paved area per mile of roadway to an existing roadway. This area will follow the drainage patterns as described in the Master Report.

### Sub-Basin UD1

The on-site sub-basin UD1 consists of native vegetation east of the proposed pond, the proposed right turn lane on Legacy Hill Drive, and a portion of the private drive connecting to Legacy Hill Drive. The sub-basin has an area of 0.70 acres and a weighted imperviousness of 16.5%. Runoff in this basin will flow offsite to Legacy Hill Drive and Frontside Drive curb and gutter and be routed to the existing 10' Type R curb inlet within Frontside Drive (Design Point FS1). Flows from this sub-basin will follow historic flow patterns. Runoff during the 5-year and 100-year events are 0.77 cfs and ~~4.63 cfs~~ respectively.

According to the El Paso County Engineering Criteria Manual, Section I.7.1.B.2.1, This area

Please review and revise as necessary. This value should match the 100-year peak flow calculated in Appendix C.



classifies as “Excluded Roadway Redevelopment.” Sub-Basin UD1 consists of the added right-turn lane on Legal Hill Drive which totals 0.05 acres which is less than 1 acre of additional paved area per mile of roadway to an existing roadway. This area will follow the drainage patterns as described in the Master Report.

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” for the portion of UD1 that is landscaped area and within a Tract (0.62 acres). This area will follow native drainage patterns and remain undeveloped with no buildings or pavement and therefore classifies as an exclusion.

A portion of the proposed private drive (0.03 acres) that connects to Legal Hill Drive is also not captured and routed to the proposed pond due to existing topography. According to the El Paso County Engineering Criteria Manual, Section I.1.7.C.1.a up to 20% of the Site, not to exceed one (1) acre may be excluded from the WQCV calculations. The total site area of UD1 private drive and UD2 is 0.06 acres.

### **Sub-Basin UD2**

The on-site sub-basin UD2 consists of a small portion of the private drive connection to the extension of Frontside Drive. The sub-basin has an area of 0.03 acres and a weighted imperviousness of 100%. Runoff in this basin will flow offsite to Frontside Drive curb and gutter and be routed to the existing 10' Type R curb inlet within Frontside Drive (Design Point FS1). Flows from this sub-basin will follow historic flow patterns. Runoff during the 5-year and 100-year events are 0.13 cfs and 0.17 cfs respectively.

Sub-basin UD2 cannot be routed to the proposed pond due to existing topography. According to the El Paso County Engineering Criteria Manual, Section I.1.7.C.1.a up to 20% of the Site, not to exceed one (1) acre may be excluded from the WQCV calculations. The total site area of UD1 private drive and UD2 is 0.06 acres.

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 Mile High Flood Control District 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 of the proposed storm sewer and inlets are provided in **Appendix D**. Applicable design methods were utilized to analyze & size the proposed pond and storm sewer infrastructure which includes the use of the UD-Detention spreadsheet, rational calculations spreadsheet, and FlowMaster.

Proposed Drainage features on-site have been analyzed and sized for the following design storm events:

- Minor Storm: 5-year Storm Event
- Major Storm: 100-year Storm Event

## **DETENTION**

One full spectrum extended detention basin is proposed in order to maintain historic flows and water quality. Mile High Flood District UD-Detention Spreadsheet was utilized to design the pond outlet structures. The full spectrum extended detention basin is to be owned and maintained by The Waterview III Metropolitan District. The UD-Detention spreadsheet used to calculate WQCV and detention is included in **Appendix D**. Detailed information regarding exclusions and WQCV can be found in Step 2 of the Four-Step Process section below.

Detailed pond and outlet structure design can be found in the **Appendix D**. A pond summary table can be found below.

| <b>Pond</b> | <b>Contributing Basins</b> | <b>Total Contributing Basin Area (Acre)</b> | <b>WQCV (Ac-ft)</b> | <b>Total Volume Required (Ac-ft)</b> | <b>Total Volume Provided (Ac-ft)</b> | <b>100-YR Pond Outfall (CFS)</b> |
|-------------|----------------------------|---------------------------------------------|---------------------|--------------------------------------|--------------------------------------|----------------------------------|
| P           | A1-A2, FD1-FD2, PR1-PR2, P | 7.94                                        | 0.236               | 1.269                                | 2.117                                | 10.9                             |

## **DRAINAGE FACILITY DESIGN**

### **GENERAL CONCEPT**

The proposed drainage patterns will be in general conformance with the historic drainage patterns. To maintain historic flows, one full spectrum detention pond is proposed and will

capture and control the flows from the proposed development at less than or equal to historic rates.

Existing and proposed Drainage Maps can be found in **Appendix F**.

2026

### **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 fees consist of:

| Drainage Basin                | Drainage Basin Acreage | Drainage Fees per acre | Bridge Fees per acre |
|-------------------------------|------------------------|------------------------|----------------------|
| Big Johnson                   | 11.60 acres            | \$27,282               | \$3,523              |
| West Fork of Jimmy Camp Creek | 9.83 acres             | \$0                    | \$0                  |

**Total: \$357,338**

### **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** – Currently the Site is vacant undeveloped land. Development of the Site will increase current runoff conditions due to increased imperviousness values. The proposed detention pond will be used to capture stormwater, provide water quality treatment, and maintain flows discharging off site at or below historic levels. Individual lot developments will be required to implement runoff reduction techniques and meet the Four Step Process.

**Step 2. Provide a Water Quality Capture Volume** – Permanent water quality measures and detention facilities will be necessary for the Project. One full spectrum extended detention basin will treat the areas not excluded with either the Excluded Roadway Redevelopment (ECM Section I.7.1.B.2.1), Land Disturbance to Undeveloped Land that will Remain Undeveloped (ECM Section I.7.1.B.7), or 20% exclusion not to exceed 1 acre. (ECM Section I.1.7.C.1.a.).

**Step 3 Stabilize Drainageways**– The Site is 5200 ft from Jimmy Camp Creek. There are no open channels on or adjacent to this site, therefore no stabilization will be necessary. All new and re-development projects are required to construct or participate in the funding of channel stabilization measures by paying the Drainage Basin fees required at the time of plat recordation.

**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

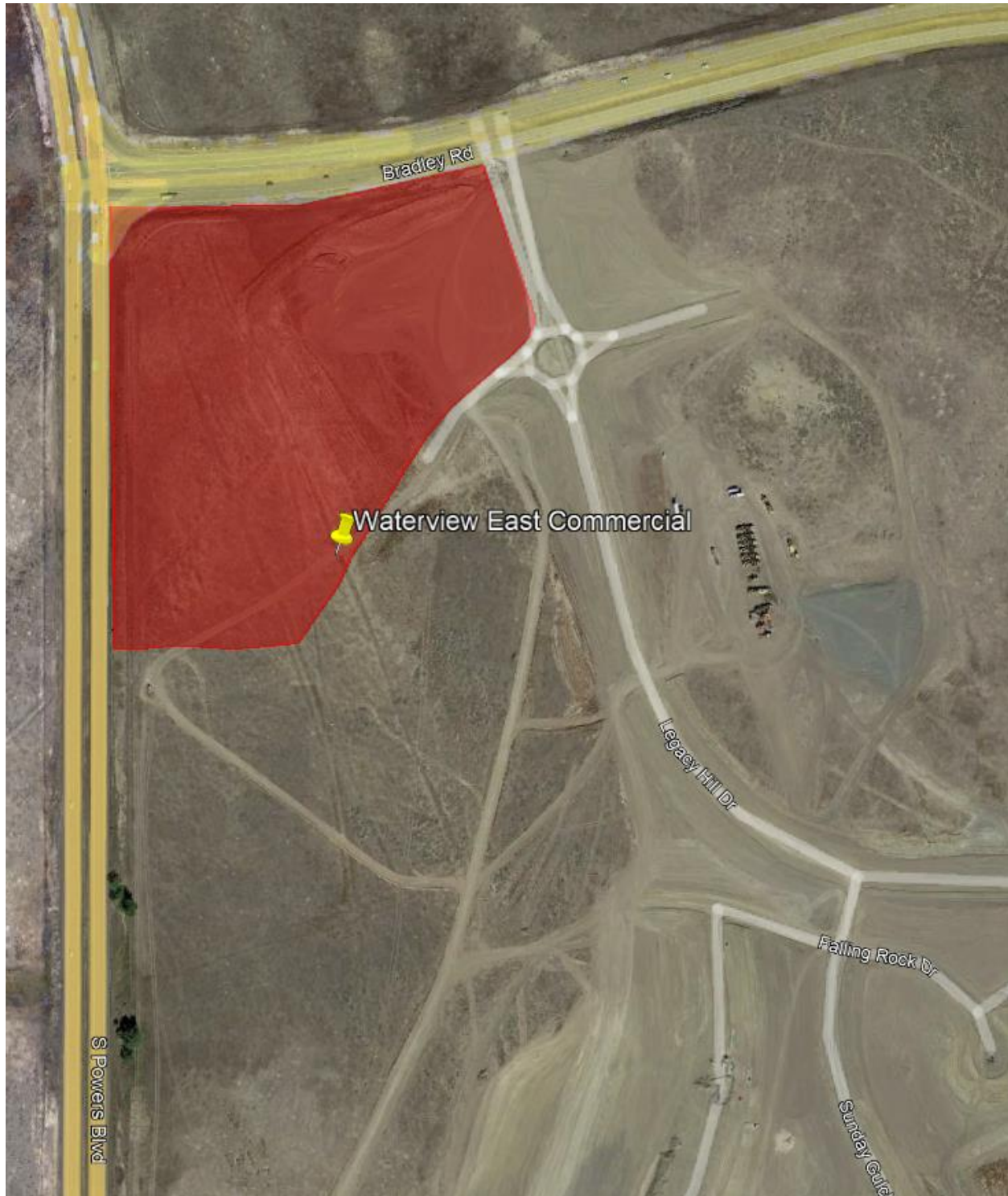
1. El Paso County “Engineering Criteria Manual” Volumes 1 & 2, dated October 31, 2018
2. Natural Resources Conservation Service, Web Soil Survey, dated April 29, 2022.
3. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0768G, Effective Date December 7, 2018, 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.

Provide comparison of what previous reports had as flows entering storm system from this site to what this report has.

## APPENDIX

**APPENDIX A – VICINITY MAP**

# Waterview East Commercial Vicinity Map (Not to Scale)



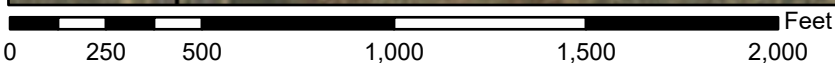
**APPENDIX B – FEMA FIRM PANEL AND SOILS MAP**



# National Flood Hazard Layer FIRMMette



104°41'3"W 38°45'44"N



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)<br>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                                                                                                                                         |
| MAP PANELS                  |  | Digital Data Available                                                                                                                                            |
|                             |  | No Digital Data Available                                                                                                                                         |
|                             |  | Unmapped                                                                                                                                                          |



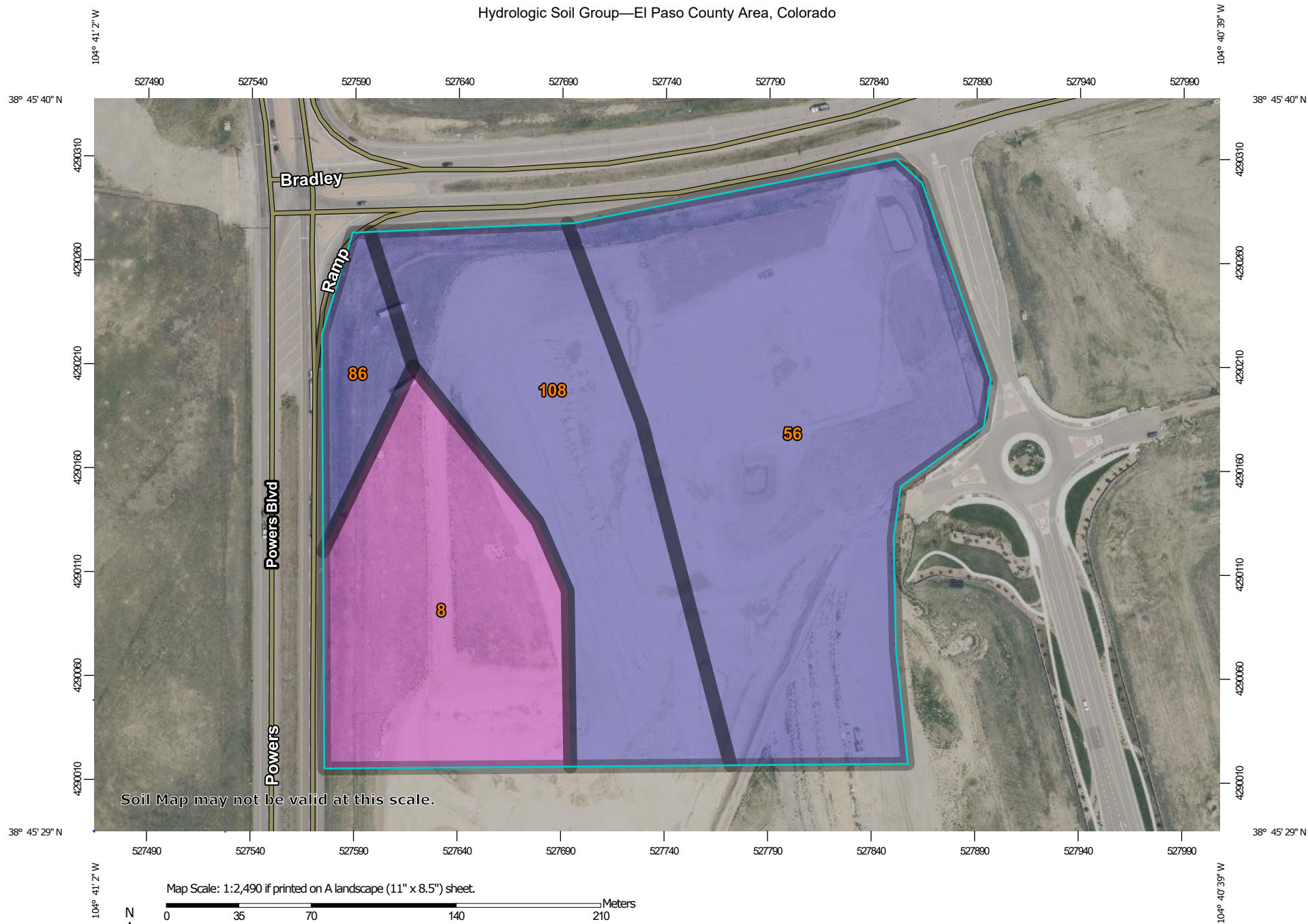
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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.

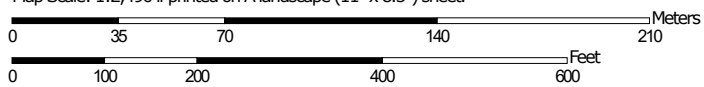
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory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

# Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.

Map Scale: 1:2,490 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

3/10/2026  
Page 1 of 4



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

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

#### Soil Rating Lines

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

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado  
 Survey Area Data: Version 23, Aug 29, 2025

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

Date(s) aerial images were photographed: Jul 23, 2024—Aug 4, 2024

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

## Hydrologic Soil Group

| Map unit symbol                    | Map unit name                                          | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------------------|--------|--------------|----------------|
| 8                                  | Blakeland loamy sand, 1 to 9 percent slopes            | A      | 4.3          | 22.0%          |
| 56                                 | Nelson-Tassel fine sandy loams, 3 to 18 percent slopes | B      | 9.2          | 47.3%          |
| 86                                 | Stoneham sandy loam, 3 to 8 percent slopes             | B      | 0.9          | 4.8%           |
| 108                                | Wiley silt loam, 3 to 9 percent slopes                 | B      | 5.1          | 25.9%          |
| <b>Totals for Area of Interest</b> |                                                        |        | <b>19.5</b>  | <b>100.0%</b>  |

## Description

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

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

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

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

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

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

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

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

## **APPENDIX C – HYDROLOGIC CALCULATIONS**

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

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)

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

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   |

Soil Type

For Commercial and HSG A&B:

C<sub>2</sub>= 0.79  
C<sub>5</sub>= 0.81  
C<sub>10</sub>= 0.83  
C<sub>100</sub>=0.888

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

For Lawn and HSG A&B:

C<sub>2</sub> = 0.02  
C<sub>5</sub>=0.08  
C<sub>10</sub>=0.15  
C<sub>100</sub>=0.35

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

For Paved and HSG A&B:

C<sub>10</sub>=0.92  
C<sub>100</sub>=0.96

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

Weighted Imperviousness Calculations Existing

Commercial

| SUB-BASIN | AREA<br>(SF) | AREA<br>(Acres) | COMMERCIAL<br>AREA | COMMERCIAL<br>IMPERVIOUSNESS | ROOF |      |      |      | LANDSCAPE<br>AREA | LANDSCAPE<br>IMPERVIOUSNESS | LANDSCAPE |      |      |      | PAVEMENT<br>AREA | PAVEMENT<br>IMPERVIOUSNESS | PAVEMENT |      |      |      | WEIGHTED<br>IMPERVIOUSNESS | WEIGHTED COEFFICIENTS |      |      |      |
|-----------|--------------|-----------------|--------------------|------------------------------|------|------|------|------|-------------------|-----------------------------|-----------|------|------|------|------------------|----------------------------|----------|------|------|------|----------------------------|-----------------------|------|------|------|
|           |              |                 |                    |                              | C2   | C5   | C10  | C100 |                   |                             | C2        | C5   | C10  | C100 |                  |                            | C2       | C5   | C10  | C100 |                            | C2                    | C5   | C10  | C100 |
| EX1       | 106,009      | 2.43            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 106,009           | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX2       | 140,051      | 3.22            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 140,051           | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX3       | 27,246       | 0.63            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 27,246            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX4       | 114,570      | 2.63            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 114,570           | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX5       | 126,148      | 2.90            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 126,148           | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX6       | 42,130       | 0.97            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 42,130            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX7       | 312,684      | 7.18            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 312,684           | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX8       | 51,044       | 1.17            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 51,044            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| EX9       | 13,732       | 0.32            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 13,732            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| OS1       | 20,296       | 0.47            |                    | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 20,296            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 |                  | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| Total     | 953,910      | 21.90           | 0                  | 95%                          | 0.71 | 0.74 | 0.75 | 0.80 | 953,910           | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 0                | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |



## Waterview East Commercial Final Plat 1

Existing

| <div> <div>McDonald's - Drainage Report</div> <div>Proposed Runoff Calculations</div> <div>Time of Concentration</div> </div> <div> <div>Forest &amp; Meadow 2.50</div> <div>Fallow or Cultivation 5.00</div> <div>Short Grass Pasture &amp; Lawns 7.00</div> <div>Nearly Bare Ground 10.00</div> <div>Grassed Waterway 15.00</div> <div>Paved Area &amp; Shallow Gutter 20.00</div> </div> <div>Watercourse Coefficient</div> |                |              |          |      |                         |         |          |                  |         |        |              |           |                               |              |          |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|----------|------|-------------------------|---------|----------|------------------|---------|--------|--------------|-----------|-------------------------------|--------------|----------|-----------------|
| 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 |                 |
| EX1                                                                                                                                                                                                                                                                                                                                                                                                                            | EX1            | 106,009      | 2.43     | 0.15 | 100                     | 4.0%    | 11.0     | 1215             | 1.0%    | 10.00  | 1.0          | 20.3      | 31.3                          | 1315         | 17.3     | 17.3            |
| EX2                                                                                                                                                                                                                                                                                                                                                                                                                            | EX2            | 140,051      | 3.22     | 0.15 | 100                     | 8.7%    | 8.5      | 520              | 3.0%    | 10.00  | 1.7          | 5.0       | 13.5                          | 620          | 13.4     | 13.4            |
| EX3                                                                                                                                                                                                                                                                                                                                                                                                                            | EX3            | 27,246       | 0.63     | 0.15 | 100                     | 4.0%    | 11.0     | 55               | 15.0%   | 10.00  | 3.9          | 0.2       | 11.2                          | 155          | 10.9     | 10.9            |
| EX4                                                                                                                                                                                                                                                                                                                                                                                                                            | EX4            | 114,570      | 2.63     | 0.15 | 100                     | 9.0%    | 8.4      | 341              | 5.0%    | 10.00  | 2.2          | 2.5       | 10.9                          | 441          | 12.5     | 10.9            |
| EX5                                                                                                                                                                                                                                                                                                                                                                                                                            | EX5            | 126,148      | 2.90     | 0.15 | 100                     | 19.0%   | 6.5      | 425              | 5.0%    | 10.00  | 2.2          | 3.2       | 9.7                           | 525          | 12.9     | 9.7             |
| EX6                                                                                                                                                                                                                                                                                                                                                                                                                            | EX6            | 42,130       | 0.97     | 0.15 | 100                     | 13.0%   | 7.4      | 75               | 6.0%    | 10.00  | 2.4          | 0.5       | 7.9                           | 175          | 11.0     | 7.9             |
| EX7                                                                                                                                                                                                                                                                                                                                                                                                                            | EX7            | 312,684      | 7.18     | 0.15 | 100                     | 25.0%   | 6.0      | 1040             | 1.0%    | 10.00  | 1.0          | 17.3      | 23.3                          | 1140         | 16.3     | 16.3            |
| EX8                                                                                                                                                                                                                                                                                                                                                                                                                            | EX8            | 51,044       | 1.17     | 0.15 | 100                     | 2.0%    | 13.8     | 140              | 1.0%    | 10.00  | 1.0          | 2.3       | 16.1                          | 240          | 11.3     | 11.3            |
| EX9                                                                                                                                                                                                                                                                                                                                                                                                                            | EX9            | 13,732       | 0.32     | 0.15 | 25                      | 33.0%   | 2.7      | 0                | 0.0%    | 10.00  | 0.2          | 0.0       | 5.0                           | 25           | 10.1     | 5.0             |
| OS1                                                                                                                                                                                                                                                                                                                                                                                                                            | OS1            | 20,296       | 0.47     | 0.15 | 100                     | 3.0%    | 12.1     | 355              | 2.5%    | 10.00  | 1.6          | 3.7       | 15.8                          | 455          | 12.5     | 12.5            |

Waterview East Commercial Final Plat 1

Existing

~~McDonald's~~ Drainage Report  
~~Proposed~~ Runoff Calculations  
(Rational Method Procedure)

Design Storm 5 Year

| 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 |       |
| EX1               | EX1         | 2.43     | 0.15         | 17.3          | 0.37  | 2.73    | 1.00  |                   |       |         |       |       |
| EX2               | EX2         | 3.22     | 0.15         | 13.4          | 0.48  | 3.08    | 1.49  |                   |       |         |       |       |
| EX3               | EX3         | 0.63     | 0.15         | 10.9          | 0.09  | 3.37    | 0.32  |                   |       |         |       |       |
| EX4               | EX4         | 2.63     | 0.15         | 10.9          | 0.39  | 3.37    | 1.33  |                   |       |         |       |       |
| EX5               | EX5         | 2.90     | 0.15         | 9.7           | 0.43  | 3.54    | 1.54  |                   |       |         |       |       |
| EX6               | EX6         | 0.97     | 0.15         | 7.9           | 0.15  | 3.81    | 0.55  |                   |       |         |       |       |
| EX7               | EX7         | 7.18     | 0.15         | 16.3          | 1.08  | 2.81    | 3.03  |                   |       |         |       |       |
| EX8               | EX8         | 1.17     | 0.15         | 11.3          | 0.18  | 3.32    | 0.58  |                   |       |         |       |       |
| EX9               | EX9         | 0.32     | 0.15         | 5.0           | 0.05  | 4.38    | 0.21  |                   |       |         |       |       |
| OS1               | OS1         | 0.47     | 0.15         | 12.5          | 0.07  | 3.18    | 0.22  |                   |       |         |       |       |

## Waterview East Commercial Final Plat 1

Existing

~~McDonald's~~ - 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 |       |
| EX1               | EX1         | 2.43     | 0.45         | 17.3          | 1.10  | 5.83    | 6.38  |                   |       |         |       |       |
| EX2               | EX2         | 3.22     | 0.45         | 13.4          | 1.45  | 6.58    | 9.51  |                   |       |         |       |       |
| EX3               | EX3         | 0.63     | 0.45         | 10.9          | 0.28  | 7.19    | 2.02  |                   |       |         |       |       |
| EX4               | EX4         | 2.63     | 0.45         | 10.9          | 1.18  | 7.18    | 8.49  |                   |       |         |       |       |
| EX5               | EX5         | 2.90     | 0.45         | 9.7           | 1.30  | 7.54    | 9.82  |                   |       |         |       |       |
| EX6               | EX6         | 0.97     | 0.45         | 7.9           | 0.44  | 8.11    | 3.53  |                   |       |         |       |       |
| EX7               | EX7         | 7.18     | 0.45         | 16.3          | 3.23  | 6.00    | 19.38 |                   |       |         |       |       |
| EX8               | EX8         | 1.17     | 0.45         | 11.3          | 0.53  | 7.08    | 3.73  |                   |       |         |       |       |
| EX9               | EX9         | 0.32     | 0.45         | 5.0           | 0.14  | 9.33    | 1.32  |                   |       |         |       |       |
| OS1               | OS1         | 0.47     | 0.45         | 12.5          | 0.21  | 6.78    | 1.42  |                   |       |         |       |       |

This DP should be larger than basin flows, as DP7 should combine with it or create a new DP for combined flow.

Existing

| SUMMARY - <del>PROPOSED</del> RUNOFF TABLE |                   |                    |                          |                            |                               |                                 |
|--------------------------------------------|-------------------|--------------------|--------------------------|----------------------------|-------------------------------|---------------------------------|
| DESIGN POINT                               | BASIN DESIGNATION | BASIN AREA (ACRES) | DIRECT 5-YR RUNOFF (CFS) | DIRECT 100-YR RUNOFF (CFS) | CUMMULATIVE 5-YR RUNOFF (CFS) | CUMMULATIVE 100-YR RUNOFF (CFS) |
| EX1                                        | EX1               | 2.43               | 1.00                     | 6.38                       | 1.00                          | 6.38                            |
| EX2                                        | EX2               | 3.22               | 1.49                     | 9.51                       | 1.49                          | 9.51                            |
| EX3                                        | EX3               | 0.63               | 0.32                     | 2.02                       | 0.32                          | 2.02                            |
| EX4                                        | EX4               | 2.63               | 1.33                     | 8.49                       | 1.33                          | 8.49                            |
| EX5                                        | EX5               | 2.90               | 1.54                     | 9.82                       | 1.54                          | 9.82                            |
| EX6                                        | EX6               | 0.97               | 0.55                     | 3.53                       | 0.55                          | 3.53                            |
| EX7                                        | EX7               | 7.18               | 3.03                     | 19.38                      | 0.00                          | 0.00                            |
| EX8                                        | EX8               | 1.17               | 0.58                     | 3.73                       | 0.58                          | 3.73                            |
| EX9                                        | EX9               | 0.32               | 0.21                     | 1.32                       | 0.21                          | 1.32                            |
| OS1                                        | OS1               | 0.47               | 0.22                     | 1.42                       | 0.22                          | 1.42                            |

This DP should be larger than basin flows, as it combines DP2 thru DP 5 & OS-1, or create a new DP for combined flow

For Commercial and HSG A&B:

C<sub>2</sub>= 0.79  
C<sub>5</sub>= 0.81  
C<sub>10</sub>= 0.83  
C<sub>100</sub>=0.888

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

For Lawn and HSG A&B:

C<sub>2</sub> = 0.02  
C<sub>5</sub>=0.08  
C<sub>10</sub>=0.15  
C<sub>100</sub>=0.35

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

For Paved and HSG A&B:

C<sub>10</sub>=0.92  
C<sub>100</sub>=0.96

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

Weighted Imperviousness Calculations Proposed

Commercial

| SUB-BASIN | AREA<br>(SF) | AREA<br>(Acres) | COMMERCIAL<br>AREA | COMMERCIAL<br>IMPERVIOUSNESS | -ROOF- |      |      |      | LANDSCAPE<br>AREA | LANDSCAPE<br>IMPERVIOUSNESS | LANDSCAPE |      |      |      | PAVEMENT<br>AREA | PAVEMENT<br>IMPERVIOUSNESS | PAVEMENT |      |      |      | WEIGHTED<br>IMPERVIOUSNESS | WEIGHTED COEFFICIENTS |      |      |      |
|-----------|--------------|-----------------|--------------------|------------------------------|--------|------|------|------|-------------------|-----------------------------|-----------|------|------|------|------------------|----------------------------|----------|------|------|------|----------------------------|-----------------------|------|------|------|
|           |              |                 |                    |                              | C2     | C5   | C10  | C100 |                   |                             | C2        | C5   | C10  | C100 |                  |                            | C2       | C5   | C10  | C100 |                            | C2                    | C5   | C10  | C100 |
| A1        | 87,080       | 2.00            | 87,080             | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 0                | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 95.0%                      | 0.71                  | 0.74 | 0.75 | 0.80 |
| A2        | 65,455       | 1.50            | 65,455             | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 0                | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 95.0%                      | 0.71                  | 0.74 | 0.75 | 0.80 |
| FD 1      | 58,085       | 1.33            | 58,085             | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 0                | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 95.0%                      | 0.71                  | 0.74 | 0.75 | 0.80 |
| FD 2      | 37,475       | 0.86            | 37,475             | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 0                | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 95.0%                      | 0.71                  | 0.74 | 0.75 | 0.80 |
| PR 1      | 11,298       | 0.26            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 11,298           | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 100.0%                     | 0.89                  | 0.90 | 0.90 | 0.95 |
| PR 2      | 26,381       | 0.61            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 26,381           | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 100.0%                     | 0.89                  | 0.90 | 0.90 | 0.95 |
| P         | 60,255       | 1.38            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 60,255            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 0                | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 0.0%                       | 0.04                  | 0.15 | 0.30 | 0.45 |
| A1-P      | 346,029      | 7.94            | 248,095            | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 60,255            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 37,679           | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 79.0%                      | 0.61                  | 0.65 | 0.69 | 0.76 |
| UD 1      | 30,463       | 0.70            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 25,449            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 5,014            | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 16.5%                      | 0.18                  | 0.27 | 0.40 | 0.53 |
| UD 2      | 1,488        | 0.03            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 1,488            | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 100.0%                     | 0.89                  | 0.90 | 0.90 | 0.95 |
| FS 1      | 13,589       | 0.31            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 13,589           | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 100.0%                     | 0.89                  | 0.90 | 0.90 | 0.95 |
| FS 2      | 12,683       | 0.29            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 0                 | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 12,683           | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 100.0%                     | 0.89                  | 0.90 | 0.90 | 0.95 |
| UD1-FS2   | 58,223       | 1.34            | 0                  | 95%                          | 0.71   | 0.74 | 0.75 | 0.80 | 25,449            | 0%                          | 0.04      | 0.15 | 0.30 | 0.45 | 32,774           | 100%                       | 0.89     | 0.90 | 0.90 | 0.95 | 56.3%                      | 0.52                  | 0.57 | 0.64 | 0.73 |

Waterview East Commercial Final Plat 1  
Drainage Report  
El Paso County, CO

3/10/2026  
Calculated by: JJM

### Waterview East Commercial Final Plat 1

| <div> <div>McDonald's - Drainage Report</div> <div>Proposed Runoff Calculations</div> <div>Time of Concentration</div> </div> <div> <div>Forest &amp; Meadow 2.50</div> <div>Short Grass Pasture &amp; Lawns 7.00</div> <div>Grassed Waterway 15.00</div> <div>Fallow or Cultivation 5.00</div> <div>Nearly Bare Ground 10.00</div> <div>Paved Area &amp; Shallow Gutter 20.00</div> </div> <div>Watercourse Coefficient</div> |                |              |          |      |                         |         |          |                  |         |        |              |           |                               |              |          |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|----------|------|-------------------------|---------|----------|------------------|---------|--------|--------------|-----------|-------------------------------|--------------|----------|-----------------|
| 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 |                 |
| A1                                                                                                                                                                                                                                                                                                                                                                                                                             | A1             | 87,080       | 2.00     | 0.74 | 100                     | 2.0%    | 5.2      | 275              | 2.0%    | 20.00  | 2.8          | 1.6       | 6.8                           | 375          | 12.1     | 6.8             |
| A2                                                                                                                                                                                                                                                                                                                                                                                                                             | A2             | 65,455       | 1.50     | 0.74 | 100                     | 2.0%    | 5.2      | 250              | 2.0%    | 20.00  | 2.8          | 1.5       | 6.7                           | 350          | 11.9     | 6.7             |
| FD 1                                                                                                                                                                                                                                                                                                                                                                                                                           | FD 1           | 58,085       | 1.33     | 0.74 | 100                     | 2.0%    | 5.2      | 250              | 2.0%    | 20.00  | 2.8          | 1.5       | 6.7                           | 350          | 11.9     | 6.7             |
| FD 2                                                                                                                                                                                                                                                                                                                                                                                                                           | FD 2           | 37,475       | 0.86     | 0.74 | 100                     | 2.0%    | 5.2      | 110              | 2.0%    | 20.00  | 2.8          | 0.6       | 5.8                           | 210          | 11.2     | 5.8             |
| PR 1                                                                                                                                                                                                                                                                                                                                                                                                                           | PR 1           | 11,298       | 0.26     | 0.90 | 35                      | 2.5%    | 1.6      | 375              | 1.8%    | 20.00  | 2.7          | 2.3       | 5.0                           | 410          | 12.3     | 5.0             |
| PR 2                                                                                                                                                                                                                                                                                                                                                                                                                           | PR 2           | 26,381       | 0.61     | 0.90 | 38                      | 2.0%    | 1.8      | 453              | 3.0%    | 20.00  | 3.5          | 2.2       | 5.0                           | 491          | 12.7     | 5.0             |
| P                                                                                                                                                                                                                                                                                                                                                                                                                              | P              | 60,255       | 1.38     | 0.15 | 100                     | 25.0%   | 6.0      | 250              | 25.0%   | 7.00   | 3.5          | 1.2       | 7.2                           | 350          | 11.9     | 7.2             |
| FS1                                                                                                                                                                                                                                                                                                                                                                                                                            | UD 1           | 30,463       | 0.70     | 0.27 | 15                      | 2.0%    | 4.7      | 571              | 6.0%    | 20.00  | 4.9          | 1.9       | 6.6                           | 586          | 13.3     | 6.6             |
| FS1                                                                                                                                                                                                                                                                                                                                                                                                                            | UD 2           | 1,488        | 0.03     | 0.90 | 60                      | 5.0%    | 1.7      | 0                | 0.0%    | 20.00  | 0.3          | 0.0       | 5.0                           | 60           | 10.3     | 5.0             |
| FS 1                                                                                                                                                                                                                                                                                                                                                                                                                           | FS 1           | 13,589       | 0.31     | 0.90 | 26                      | 2.0%    | 1.5      | 350              | 2.0%    | 20.00  | 2.8          | 2.1       | 5.0                           | 376          | 12.1     | 5.0             |
| FS 2                                                                                                                                                                                                                                                                                                                                                                                                                           | FS 2           | 12,683       | 0.29     | 0.90 | 26                      | 2.0%    | 1.5      | 350              | 2.0%    | 20.00  | 2.8          | 2.1       | 5.0                           | 376          | 12.1     | 5.0             |

## Waterview East Commercial Final Plat 1

~~McDonald's~~ - Drainage Report  
 Proposed Runoff Calculations  
 (Rational Method Procedure)

Design Storm 5 Year

| 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 |                                                          |
| A1                | A1          | 2.00     | 0.74         | 6.8           | 1.48  | 4.00    | 5.92  |                   |       |         |       |                                                          |
| A2                | A2          | 1.50     | 0.74         | 6.7           | 1.11  | 4.03    | 4.48  |                   |       |         |       |                                                          |
| FD 1              | FD 1        | 1.33     | 0.74         | 6.7           | 0.99  | 4.03    | 3.97  |                   |       |         |       |                                                          |
| FD 2              | FD 2        | 0.86     | 0.74         | 5.8           | 0.64  | 4.19    | 2.67  |                   |       |         |       |                                                          |
| PR 1              | PR 1        | 0.26     | 0.90         | 5.0           | 0.23  | 4.38    | 1.02  |                   |       |         |       |                                                          |
| PR 2              | PR 2        | 0.61     | 0.90         | 5.0           | 0.55  | 4.38    | 2.38  |                   |       |         |       |                                                          |
| P                 | P           | 1.38     | 0.15         | 7.2           | 0.21  | 3.93    | 0.82  | 7.2               | 5.2   | 3.93    | 20.44 | cumulative runoff basins A1, A2, PR 1, PR 2, P, FD1, FD2 |
| FS1               | UD 1        | 0.70     | 0.27         | 6.6           | 0.19  | 4.03    | 0.77  |                   |       |         |       |                                                          |
| FS1               | UD 2        | 0.03     | 0.90         | 5.0           | 0.03  | 4.38    | 0.13  |                   |       |         |       |                                                          |
| FS 1              | FS 1        | 0.31     | 0.90         | 5.0           | 0.28  | 4.38    | 1.23  |                   |       |         |       |                                                          |
| FS 2              | FS 2        | 0.29     | 0.90         | 5.0           | 0.26  | 4.38    | 1.15  |                   |       |         |       |                                                          |

Need final cumulative flow for this DP

Cumulative flows need to be added for various design points, to properly size storm system.



## Waterview East Commercial Final Plat 1

~~McDonald's~~ - Drainage Report  
 Proposed Runoff Calculations  
 (Rational Method Procedure)

Design Storm 100 Year

| 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 |                                                          |
| A1                | A1          | 2.00     | 0.80         | 6.8           | 1.60  | 8.52    | 13.63 |                   |       |         |       |                                                          |
| A2                | A2          | 1.50     | 0.80         | 6.7           | 1.20  | 8.58    | 10.32 |                   |       |         |       |                                                          |
| FD 1              | FD 1        | 1.33     | 0.80         | 6.7           | 1.07  | 8.58    | 9.16  |                   |       |         |       |                                                          |
| FD 2              | FD 2        | 0.86     | 0.80         | 5.8           | 0.69  | 8.93    | 6.15  |                   |       |         |       |                                                          |
| PR 1              | PR 1        | 0.26     | 0.95         | 5.0           | 0.25  | 9.33    | 2.30  |                   |       |         |       |                                                          |
| PR 2              | PR 2        | 0.61     | 0.95         | 5.0           | 0.58  | 9.33    | 5.37  |                   |       |         |       |                                                          |
| P                 | P           | 1.38     | 0.45         | 7.2           | 0.62  | 8.38    | 5.22  | 7.2               | 6.0   | 5.33    | 32.00 | cumulative runoff basins A1, A2, PR 1, PR 2, P, FD1, FD2 |
| FS1               | UD 1        | 0.70     | 0.76         | 6.6           | 0.53  | 8.60    | 4.54  |                   |       |         |       |                                                          |
| FS1               | UD 2        | 0.03     | 0.53         | 5.0           | 0.02  | 9.33    | 0.17  |                   |       |         |       |                                                          |
| FS 1              | FS 1        | 0.81     | 0.95         | 5.0           | 0.30  | 9.33    | 2.76  |                   |       |         |       |                                                          |
| FS 2              | FS 2        | 0.29     | 0.95         | 5.0           | 0.28  | 9.33    | 2.58  |                   |       |         |       |                                                          |

According to the Time of Concentration Calculation Table on Page 31 of this report,

$$C_{100}=0.53$$

$$C_{100}=0.95$$

Please review and revise the calculations as necessary so that runoff coefficients shown in this table match the values calculated in the table on Page 31.

Based on your calculated  $T_c$  for cumulative runoff,

$$I = 28.5(2.75)/((10+7.2)^{0.786}) = 8.38 \text{ in/hr}$$

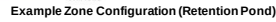
Please verify that intensity formula used for this calculation is correct after addressing runoff coefficient comments on Page 30.

| SUMMARY - PROPOSED RUNOFF TABLE |                   |                    |                          |                            |                               |                                 |
|---------------------------------|-------------------|--------------------|--------------------------|----------------------------|-------------------------------|---------------------------------|
| DESIGN POINT                    | BASIN DESIGNATION | BASIN AREA (ACRES) | DIRECT 5-YR RUNOFF (CFS) | DIRECT 100-YR RUNOFF (CFS) | CUMMULATIVE 5-YR RUNOFF (CFS) | CUMMULATIVE 100-YR RUNOFF (CFS) |
| A1                              | A1                | 2.00               | 5.92                     | 13.63                      | 5.92                          | 13.63                           |
| A2                              | A2                | 1.50               | 4.48                     | 10.32                      | 4.48                          | 10.32                           |
| FD 1                            | FD 1              | 1.33               | 3.97                     | 9.16                       | 3.97                          | 9.16                            |
| FD 2                            | FD 2              | 0.86               | 2.67                     | 6.15                       | 2.67                          | 6.15                            |
| PR 1                            | PR 1              | 0.26               | 1.02                     | 2.30                       | 1.02                          | 2.30                            |
| PR 2                            | PR 2              | 0.61               | 2.38                     | 5.37                       | 2.38                          | 5.37                            |
| P                               | P                 | 1.38               | 0.82                     | 5.22                       | 20.44                         | 32.00                           |
| FS1                             | UD 1              | 0.70               | 0.77                     | 4.54                       | 0.77                          | 4.54                            |
| FS1                             | UD 2              | 0.03               | 0.13                     | 0.17                       | 0.13                          | 0.17                            |
| FS 1                            | FS 1              | 0.31               | 1.23                     | 2.76                       | 1.23                          | 2.76                            |
| FS 2                            | FS 2              | 0.29               | 1.15                     | 2.58                       | 1.15                          | 2.58                            |

## APPENDIX D – HYDRAULIC CALCULATIONS

- Provide inlet calculations
- Provide calculations for sizing of spillway riprap

## MHFD-Detention, Version 4.08 (April 2026)

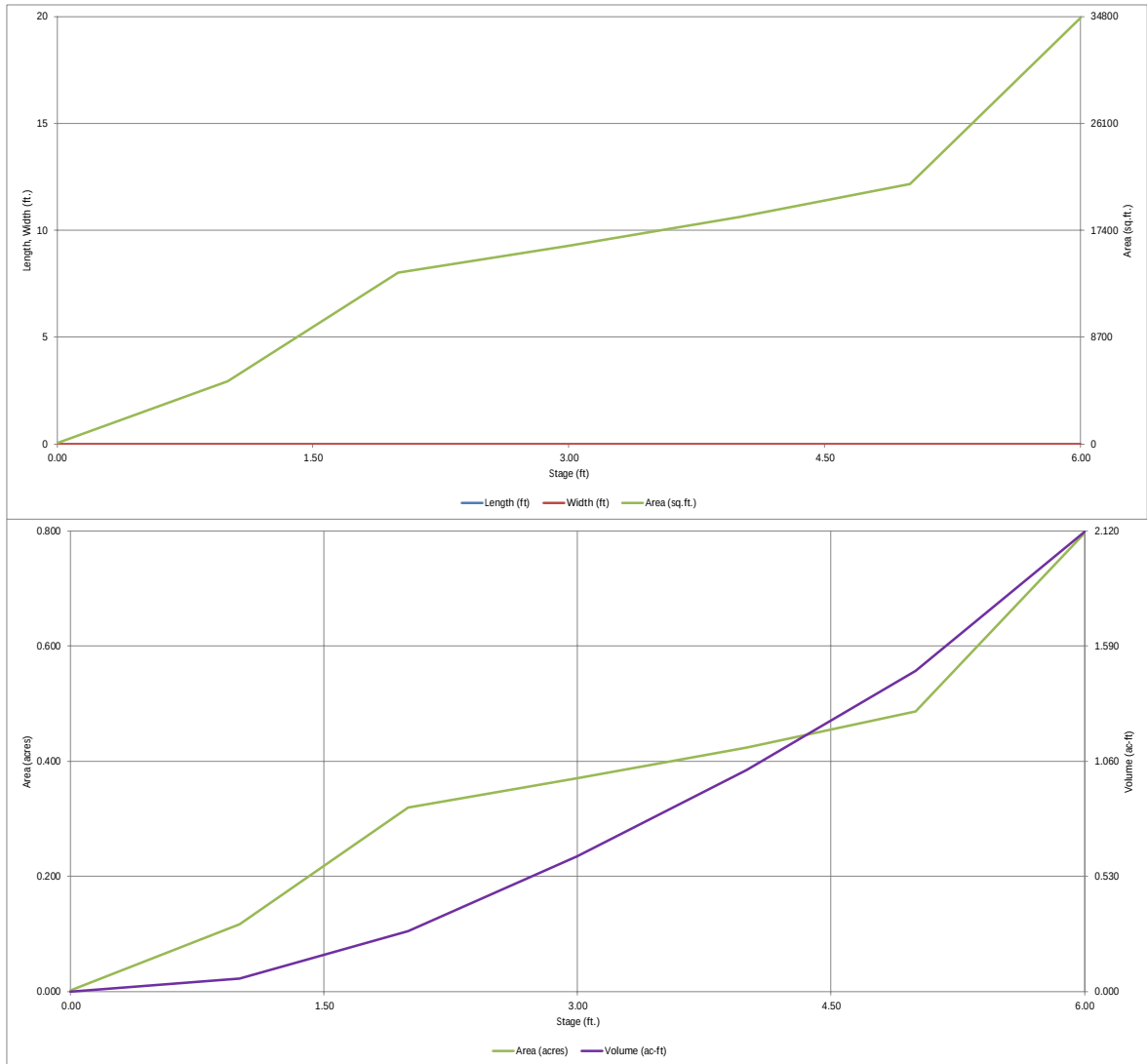
Basin ID: A1-A2, FD1-FD-2, PR1-PR2, P

|                   |  |
|-------------------|--|
| Depth Increment = |  |
|-------------------|--|

[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.08 (April 2026)



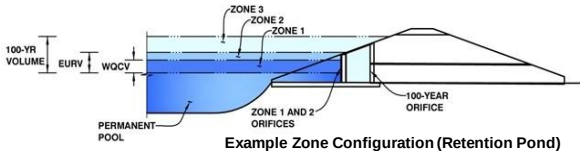
- ✓ = calcs match details in plans  
✗ = calcs do not match details in plans

## DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.08 (April 2026)

Project: Waterview East Filing No. 1

Basin ID: A1-A2, FD1-FD-2, PR1-PR2, P



Example Zone Configuration (Retention Pond)

|                   | Estimated Stage (ft) | Estimated Volume (ac-ft) | Outlet Type          |
|-------------------|----------------------|--------------------------|----------------------|
| Zone 1 (WQCV)     | 1.87                 | 0.236                    | Orifice Plate        |
| Zone 2 (EURV)     | 3.44                 | 0.554                    | Orifice Plate        |
| Zone 3 (100-year) | 4.57                 | 0.478                    | Weir&Pipe (Restrict) |
| Total (all zones) |                      | 1.269                    |                      |

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

Underdrain Orifice Invert Depth = N/A ft (distance below the filtration media surface)  
Underdrain Orifice Diameter = N/A inches

Calculated Parameters for Underdrain  
Underdrain Orifice Area = N/A ft<sup>2</sup>  
Underdrain Orifice Centroid = N/A feet

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

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate = 3.44 ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing = N/A inches  
Orifice Plate: Orifice Area per Row = 1.63 sq. inches (diameter = 1-7/16 inches)

Calculated Parameters for Plate  
WQ Orifice Area per Row = 1.132E-02 ft<sup>2</sup>  
Elliptical Half-Width = N/A feet  
Elliptical Slot Centroid = N/A feet  
Elliptical Slot Area = N/A ft<sup>2</sup>

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

|                                  | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| ✓ Stage of Orifice Centroid (ft) | 0.00             | 1.15             | 1.80             |                  |                  |                  |                  |                  |
| ✓ Orifice Area (sq. inches)      | 1.63             | 1.63             | 1.63             |                  |                  |                  |                  |                  |

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice  
Vertical Orifice Area = Not Selected N/A ft<sup>2</sup>  
Vertical Orifice Centroid = Not Selected N/A feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal)

✓ Overflow Weir Front Edge Height, H<sub>o</sub> = 3.50 ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length = 3.41 feet  
✓ Overflow Weir Grate Slope = 0.00 H:V  
Horiz. Length of Weir Sides = 2.91 feet  
Overflow Grate Type = Type C Grate  
Debris Clogging % = 50%

where did you get this value from? I see 3ft on the plans.

where did you get this value from? I see 4ft on the plans.

Height of Grate Upper Edge, H<sub>u</sub> = 3.50 feet  
Overflow Weir Slope Length = 2.91 feet  
Grate Open Area / 100-yr Orifice Area = 3.91  
w/o Debris = 6.91 ft<sup>2</sup>  
w/ Debris = 3.45 ft<sup>2</sup>

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

✓ Depth to Invert of Outlet Pipe = 3.00 ft (distance below basin bottom at Stage = 0 ft)  
✓ Outlet Pipe Diameter = 18.00 inches  
✓ Restrictor Plate Height Above Pipe Invert = 18.00 inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Outlet Orifice Area = 1.77 ft<sup>2</sup>  
Outlet Orifice Centroid = 0.75 feet  
Half-Central Angle of Restrictor Plate on Pipe = 3.14 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

✓ Spillway Invert Stage = 4.16 ft (relative to basin bottom at Stage = 0 ft)  
✓ Spillway Crest Length = 15.00 feet  
✓ Spillway End Slopes = 4.00 H:V  
✓ Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway  
Spillway Design Flow Depth = 0.74 feet  
Stage at Top of Freeboard = 5.90 feet  
Basin Area at Top of Freeboard = 0.77 acres  
Basin Volume at Top of Freeboard = 2.04 acre-ft

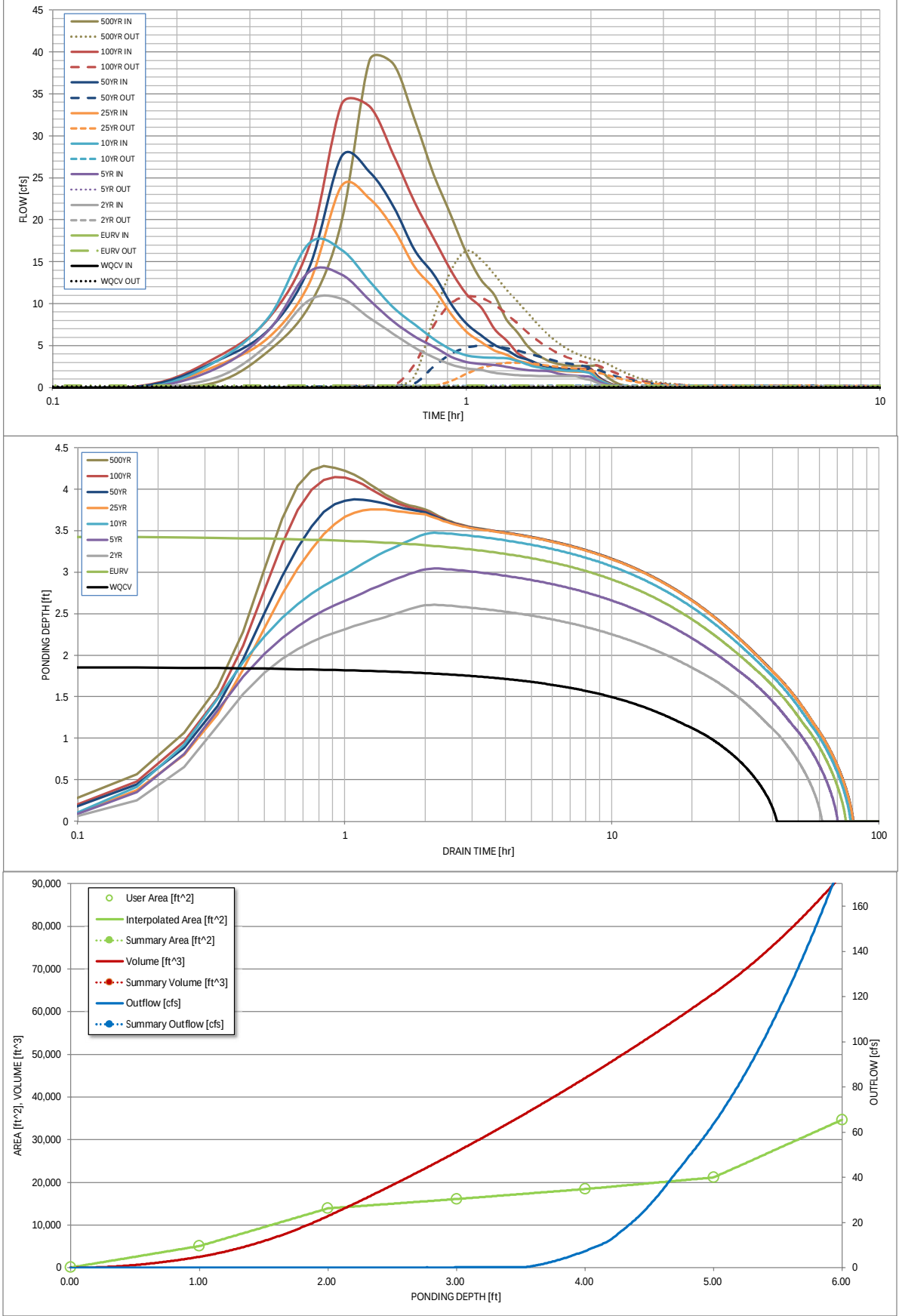
### Routed Hydrograph Results

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

|                                               | WQCV  | EURV  | 2 Year | 5 Year | 10 Year | 25 Year         | 50 Year         | 100 Year        | 500 Year |
|-----------------------------------------------|-------|-------|--------|--------|---------|-----------------|-----------------|-----------------|----------|
| Design Storm Return Period                    | N/A   | N/A   | 1.01   | 1.29   | 1.56    | 2.00            | 2.25            | 2.75            | 3.14     |
| One-Hour Rainfall Depth (in)                  | N/A   | N/A   | 1.01   | 1.29   | 1.56    | 2.00            | 2.25            | 2.75            | 3.14     |
| CUHP Runoff Volume (acre-ft)                  | 0.236 | 0.790 | 0.512  | 0.675  | 0.844   | 1.140           | 1.304           | 1.643           | 1.902    |
| Inflow Hydrograph Volume (acre-ft)            | N/A   | N/A   | 0.512  | 0.675  | 0.844   | 1.140           | 1.304           | 1.643           | 1.902    |
| CUHP Predevelopment Peak Q (cfs)              | N/A   | N/A   | 0.3    | 0.6    | 2.2     | 6.8             | 8.8             | 13.1            | 16.1     |
| OPTIONAL Override Predevelopment Peak Q (cfs) | N/A   | N/A   |        |        |         |                 |                 |                 |          |
| Predevelopment Unit Peak Flow, q (cfs/acre)   | N/A   | N/A   | 0.03   | 0.07   | 0.28    | 0.86            | 1.11            | 1.65            | 2.03     |
| Peak Inflow Q (cfs)                           | N/A   | N/A   | 10.6   | 13.8   | 17.2    | 24.1            | 27.6            | 33.8            | 39.0     |
| Peak Outflow Q (cfs)                          | 0.1   | 0.3   | 0.2    | 0.2    | 0.3     | 3.0             | 5.0             | 10.9            | 16.3     |
| Ratio Peak Outflow to Predevelopment Q        | N/A   | N/A   | N/A    | 0.4    | 0.1     | 0.4             | 0.6             | 0.8             | 1.0      |
| Structure Controlling Flow                    | Plate | Plate | Plate  | Plate  | Plate   | Overflow Weir 1 | Overflow Weir 1 | Overflow Weir 1 | Spillway |
| Max Velocity through Gate 1 (fps)             | N/A   | N/A   | N/A    | N/A    | N/A     | 0.4             | 0.7             | 1.5             | 2.0      |
| Max Velocity through Gate 2 (fps)             | N/A   | N/A   | N/A    | N/A    | N/A     | N/A             | N/A             | N/A             | N/A      |
| Time to Drain 97% of Inflow Volume (hours)    | 38    | 66    | 55     | 62     | 69      | 68              | 67              | 64              | 63       |
| Time to Drain 99% of Inflow Volume (hours)    | 40    | 71    | 58     | 66     | 74      | 75              | 74              | 73              | 72       |
| Maximum Ponding Depth (ft)                    | 1.87  | 3.44  | 2.61   | 3.05   | 3.48    | 3.76            | 3.88            | 4.15            | 4.28     |
| Area at Maximum Ponding Depth (acres)         | 0.29  | 0.39  | 0.35   | 0.37   | 0.40    | 0.41            | 0.42            | 0.43            | 0.44     |
| Maximum Volume Stored (acre-ft)               | 0.239 | 0.792 | 0.480  | 0.638  | 0.804   | 0.920           | 0.966           | 1.081           | 1.142    |

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.08 (April 2026)



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

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

## Inflow Hydrographs

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

|               | SOURCE  | CUHP       | CUHP       | CUHP         | CUHP         | CUHP          | CUHP          | CUHP          | CUHP           | CUHP           |
|---------------|---------|------------|------------|--------------|--------------|---------------|---------------|---------------|----------------|----------------|
| Time Interval | TIME    | WQCV [cfs] | EURV [cfs] | 2 Year [cfs] | 5 Year [cfs] | 10 Year [cfs] | 25 Year [cfs] | 50 Year [cfs] | 100 Year [cfs] | 500 Year [cfs] |
| 5.00_min      | 0:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 0:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 0:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.22          | 0.28           | 0.71           |
|               | 0:15:00 | 0.00       | 0.00       | 1.26         | 2.38         | 3.25          | 2.67          | 3.26          | 3.69           | 4.45           |
|               | 0:20:00 | 0.00       | 0.00       | 5.24         | 6.91         | 8.45          | 6.05          | 6.97          | 8.34           | 9.76           |
|               | 0:25:00 | 0.00       | 0.00       | 10.45        | 13.81        | 17.22         | 12.47         | 14.33         | 16.90          | 19.88          |
|               | 0:30:00 | 0.00       | 0.00       | 10.59        | 13.46        | 16.44         | 24.06         | 27.59         | 33.81          | 39.04          |
|               | 0:35:00 | 0.00       | 0.00       | 8.28         | 10.41        | 12.67         | 22.53         | 25.72         | 33.51          | 38.59          |
|               | 0:40:00 | 0.00       | 0.00       | 6.43         | 7.88         | 9.55          | 18.98         | 21.62         | 27.78          | 31.96          |
|               | 0:45:00 | 0.00       | 0.00       | 4.77         | 6.12         | 7.53          | 14.40         | 16.40         | 22.13          | 25.47          |
|               | 0:50:00 | 0.00       | 0.00       | 3.64         | 4.90         | 5.82          | 11.89         | 13.54         | 17.85          | 20.55          |
|               | 0:55:00 | 0.00       | 0.00       | 2.79         | 3.72         | 4.55          | 8.80          | 10.04         | 13.98          | 16.10          |
|               | 1:00:00 | 0.00       | 0.00       | 2.32         | 3.07         | 3.86          | 6.69          | 7.64          | 11.18          | 12.89          |
|               | 1:05:00 | 0.00       | 0.00       | 2.14         | 2.82         | 3.63          | 5.48          | 6.27          | 9.60           | 11.09          |
|               | 1:10:00 | 0.00       | 0.00       | 1.79         | 2.73         | 3.55          | 4.47          | 5.11          | 7.05           | 8.15           |
|               | 1:15:00 | 0.00       | 0.00       | 1.61         | 2.49         | 3.53          | 3.94          | 4.49          | 5.64           | 6.52           |
|               | 1:20:00 | 0.00       | 0.00       | 1.50         | 2.25         | 3.18          | 3.26          | 3.72          | 4.12           | 4.77           |
|               | 1:25:00 | 0.00       | 0.00       | 1.45         | 2.11         | 2.70          | 2.91          | 3.31          | 3.30           | 3.81           |
|               | 1:30:00 | 0.00       | 0.00       | 1.40         | 2.03         | 2.40          | 2.46          | 2.79          | 2.76           | 3.19           |
|               | 1:35:00 | 0.00       | 0.00       | 1.38         | 1.98         | 2.23          | 2.20          | 2.49          | 2.46           | 2.84           |
|               | 1:40:00 | 0.00       | 0.00       | 1.37         | 1.69         | 2.12          | 2.05          | 2.31          | 2.32           | 2.67           |
|               | 1:45:00 | 0.00       | 0.00       | 1.37         | 1.53         | 2.05          | 1.97          | 2.22          | 2.26           | 2.61           |
|               | 1:50:00 | 0.00       | 0.00       | 1.37         | 1.43         | 2.02          | 1.93          | 2.17          | 2.24           | 2.59           |
|               | 1:55:00 | 0.00       | 0.00       | 1.09         | 1.38         | 1.93          | 1.91          | 2.15          | 2.24           | 2.59           |
|               | 2:00:00 | 0.00       | 0.00       | 0.92         | 1.27         | 1.70          | 1.90          | 2.14          | 2.24           | 2.59           |
|               | 2:05:00 | 0.00       | 0.00       | 0.54         | 0.74         | 1.00          | 1.12          | 1.26          | 1.32           | 1.53           |
|               | 2:10:00 | 0.00       | 0.00       | 0.31         | 0.43         | 0.58          | 0.66          | 0.74          | 0.77           | 0.89           |
|               | 2:15:00 | 0.00       | 0.00       | 0.16         | 0.23         | 0.31          | 0.36          | 0.40          | 0.42           | 0.49           |
|               | 2:20:00 | 0.00       | 0.00       | 0.08         | 0.13         | 0.17          | 0.20          | 0.22          | 0.23           | 0.27           |
|               | 2:25:00 | 0.00       | 0.00       | 0.03         | 0.05         | 0.07          | 0.09          | 0.10          | 0.10           | 0.11           |
|               | 2:30:00 | 0.00       | 0.00       | 0.01         | 0.01         | 0.01          | 0.02          | 0.02          | 0.02           | 0.03           |
|               | 2:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 2:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 2:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 2:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 2:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 6:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |



## DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.08 (April 2026)

### Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

[illegible]



DATE STARTED: 3/11/2026

\*This spreadsheet is based on the UD-BMP EDB tab. Yellow cells are for user input

Formulas

WQCV<sub>DESIGN</sub>=  
Input the proper drain time  
coefficient (TBL 3-2, Ch. 3  
Vol 3, USDCM)

$$a * ((0.91 * i^3 - 1.19i^2 + 0.78i) / 12) * TCA$$

a= 1.0

12 hrs, a = 0.8

24 hrs, a= 0.9

40 hrs\*, a=1.0

\*Use 1.0 if there is No attenuation

Min. Forebay Vol

3%

Source: Tbl EDB 4 UDFCD

| FOREBAY NAME | TOTAL<br>CONTRIBUTING<br>AREA (TCA) (ac) | i    | WQCV <sub>DESIGN</sub><br>(ac-ft) | V <sub>FMIN</sub> (ac-ft) | V <sub>FMIN</sub> (cf) | D <sub>F</sub> (ft) | A <sub>FMIN</sub> (SF) |
|--------------|------------------------------------------|------|-----------------------------------|---------------------------|------------------------|---------------------|------------------------|
| A            | 5.09                                     | 0.95 | 0.19                              | 0.0057                    | 249.3                  | 1.0                 | 249.3                  |
| B            | 1.47                                     | 0.97 | 0.06                              | 0.0017                    | 75.0                   | 1.0                 | 75.0                   |

| Forebay A | Basin(s)           | Area (acres) | Weighting<br>Factors<br>(A <sub>i</sub> /A <sub>TOTAL</sub> ) | i (I%/100%)           | (Weighting<br>Factors) * i |
|-----------|--------------------|--------------|---------------------------------------------------------------|-----------------------|----------------------------|
|           | A1                 | 2.00         | 0.39                                                          | 0.95                  | 0.37                       |
|           | A2                 | 1.50         | 0.29                                                          | 0.95                  | 0.28                       |
|           | PR 1               | 0.26         | 0.05                                                          | 1.00                  | 0.05                       |
|           | FD1                | 1.33         | 0.26                                                          | 0.95                  | 0.25                       |
|           | A <sub>TOTAL</sub> | 5.09         | acres                                                         | i <sub>weighted</sub> | 0.95                       |
| Forebay B | Basin(s)           | Area (acres) | Weighting<br>Factors<br>(A <sub>i</sub> /A <sub>TOTAL</sub> ) | i (I%/100%)           | (Weighting<br>Factors) * i |
|           | PR 2               | 0.61         | 0.41                                                          | 1.00                  | 0.41                       |
|           | FD 2               | 0.86         | 0.59                                                          | 0.95                  | 0.56                       |
|           | B <sub>TOTAL</sub> | 1.47         | acres                                                         | i <sub>weighted</sub> | 0.97                       |

MINIMUM DIMENSIONS FOREBAY A

FOREBAY MINIMUM DIMENSIONS

- \*Check Incoming Pipe size fits requirements of Figure 9-43
- \* Sizing follows trapezoidal formula. Need to solve for base width

|                            |           |
|----------------------------|-----------|
| Min. Area (A)              | 249.30 SF |
| Incoming Pipe Diameter (D) | 2.50 ft   |
| $W_1 (2*D)$                | 5.00 ft   |
| $h_1$                      | 1.88 ft   |
| $h_2$                      | 2.00 ft   |
| $h_3$                      | 2.00 ft   |
| $h_0$                      | 0.67 ft   |
| $H (Eh_i)$                 | 6.54 ft   |

$$W_2 = W_1 + [2 * H * \tan(30^\circ)]$$

$$\tan(30^\circ) = 0.58 \quad \text{*This formula ensures degree output}$$

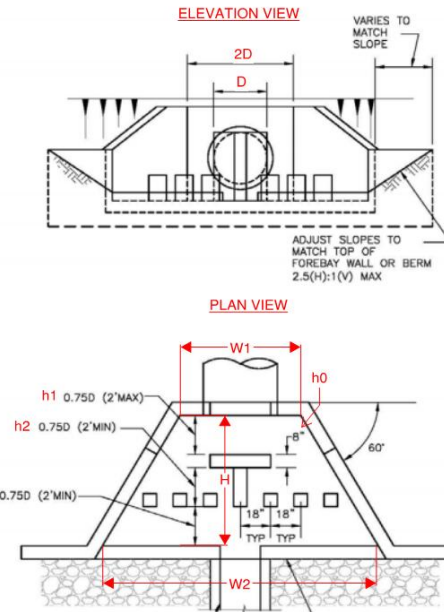
$$W_2 = 12.55 \text{ ft}$$

$$\text{Actual Area} = ((W_1 + W_2) / 2) * H$$

$$A = 57.42 \text{ SF}$$

Greater than minimum Area?

FORMULA  
0.75D (2' MAX)  
0.75D (2' MIN.)  
0.75D (2' MIN.)  
\* $h_0$  is a constant 8"



No. Calculate H using formula below

\*If your actual area is smaller than the required forebay area, back-calculate H from required forebay area and determine  $h_3$  by subtracting all  $h_i$  values

$$A = ((W_1 + W_2) / 2) * H$$

$$W_2 = W_1 + [2 * H * \tan(30^\circ)]$$

$$0 = \tan 30^\circ H^2 + W_1 H - A$$

$$0 = 196.08 \text{ Goal Seek}$$

$$\text{New } H = 23.7 \text{ ft}$$

$$\text{New } W_2 = 32.4 \text{ ft}$$

$$\text{New } h_3 = 19.2 \text{ ft}$$

$$A_{\text{PROVIDED}} = 63 \text{ SF from CAD}$$

$$\text{HEADWALL TOP ELEV.} = \text{Pipe IE} + 1.5 * D$$

$$\text{Pipe IE} = 5910.00 \text{ ft}$$

$$\text{HEADWALL TOP ELEV.} = 5913.75 \text{ ft}$$

FOREBAY NOTCH SIZING: FOREBAY A

Wall with Rect. Notch ( $W_N$  equation from UD-BMP spreadsheet)

Undet. 100-year Peak Discharge 35.41 cfs (input from StormCAD)

Forebay Discharge Flow % 2%

$$Q_F = \text{Undet. 100-yr discharge} * \text{Forebay Disch. \%}$$

$$Q_F = 0.71 \text{ cfs}$$

$$\text{Width of Notch}(W_N) = Q_F / (3.33 * D_F^{1.5}) * 12 + 0.2 * (D_F * 12)$$

$$D_F = 1 \text{ ft (Taken from input above)}$$

$$W_N = 5.0 \text{ in}$$

MINIMUM DIMENSIONS FOREBAY B

FOREBAY MINIMUM DIMENSIONS

- \*Check Incoming Pipe size fits requirements of Figure 9-43
- \* Sizing follows trapezoidal formula. Need to solve for base width

|                                                |       |                                     |
|------------------------------------------------|-------|-------------------------------------|
| Min. Area (A)                                  | 74.96 | SF                                  |
| Incoming Pipe Diameter (D)                     | 2.00  | ft                                  |
| $W_1 (2 \cdot D)$                              | 4.00  | ft                                  |
| $h_1$                                          | 1.50  | ft                                  |
| $h_2$                                          | 2.00  | ft                                  |
| $h_3$                                          | 2.00  | ft                                  |
| $h_0$                                          | 0.67  | ft                                  |
| $H (E_{h_i})$                                  | 6.17  | ft                                  |
| $W_2 = W_1 + [2 \cdot H \cdot \tan(30^\circ)]$ |       |                                     |
| $\tan(30^\circ) =$                             | 0.58  | *This formula ensures degree output |
| $W_2 =$                                        | 11.12 | ft                                  |

FORMULA  
0.75D (2' MAX)  
0.75D (2' MIN.)  
0.75D (2' MIN.)  
\* $h_0$  is a constant 8"

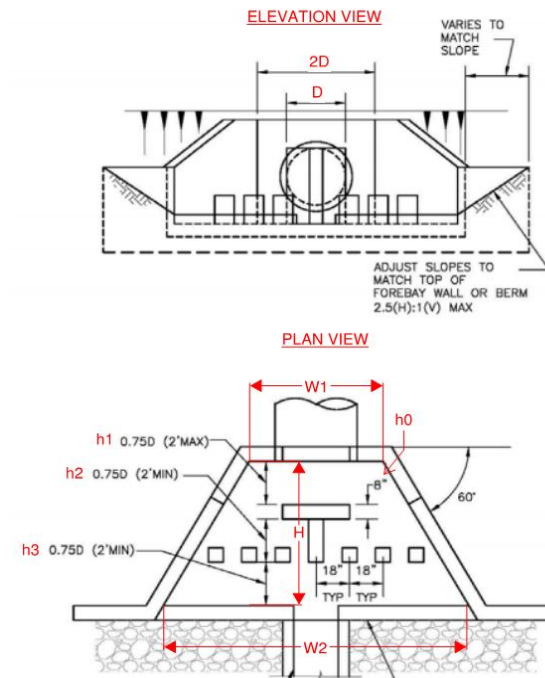
Actual Area=  $((W_1 + W_2)/2) \cdot H$   
A= 46.62 SF  
Greater than minimum Area?

No. Calculate W2 using formula below

\*If your actual area is smaller than the required forebay area, back-calculate H from required forebay area and determine  $h_3$  by subtracting all  $h_i$  values

|                       |                                          |
|-----------------------|------------------------------------------|
| A=                    | $((W_1 + W_2)/2) \cdot H$                |
| $W_2 =$               | $W_1 + [2 \cdot H \cdot \tan(30^\circ)]$ |
| 0=                    | $\tan 30^\circ H^2 + W_1 H - A$          |
| 0=                    | 330.46 Goal Seek                         |
| New H=                | 23.3 ft                                  |
| New $W_2 =$           | 30.9 ft                                  |
| New $h_3 =$           | 19.1 ft                                  |
| $A_{\text{PROVIDED}}$ | 50 SF from CAD                           |

HEADWALL TOP ELEV.= Pipe IE + 1.5\*D  
Pipe IE= 5910.00 ft  
HEADWALL TOP ELEV.= 5913.00 ft



FOREBAY NOTCH SIZING: FOREBAY B

Wall with Rect. Notch ( $W_N$  equation from UD-BMP spreadsheet)  
Undet. 100-year Peak Discharge 11.52 cfs (input from StormCAD)  
Forebay Discharge Flow % 2%  
 $Q_F =$  Undet. 100-yr discharge \* Forebay Disch. %  
 $Q_F =$  0.23 cfs  
Width of Notch( $W_N$ )=  $Q_F / (3.33 \cdot D_F^{1.5}) \cdot 12 + 0.2 \cdot (D_F \cdot 12)$   
 $D_F =$  1 ft (Taken from input above)  
 $W_N =$  3.2 in

This spreadsheet is intended for sizing multiple forebays for a single site.

Designer Instructions

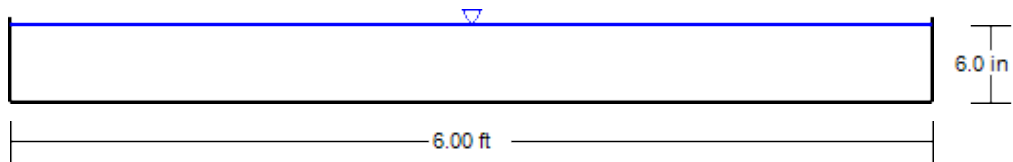
- 1 Make sure your imperviousness tab is set up and ordered correctly
- 2 Determine number of forebays required
  
- 3 Set proper drain time coefficient
- 4 Set minimum forebay volume percent
- 5 Input proper forebay depth
- 6 Ensure that Sub basins are linking proper areas and %imperviousness values from Imperviousness sheet
- 7 Input pipe diameter to obtain minimum area required for trapezoidal SF
- 8 If minimum area is less than required forebay surface area, then a goal seek function will be used to solve a quadratic function. Refer to the note on the goal-seek cell.
- 9 Always check the first forebay quadratic solution. Generally the positive solution is the right answer. If there are two positive solutions, use engineering judgement to select the proper value

## Worksheet for Trickle Channel

|                       |                      |
|-----------------------|----------------------|
| Project Description   |                      |
| Friction Method       | Manning              |
| Solve For             | Formula<br>Discharge |
| Input Data            |                      |
| Roughness Coefficient | 0.013                |
| Channel Slope         | 0.011 ft/ft          |
| Normal Depth          | 6.0 in               |
| Bottom Width          | 6.00 ft              |
| Results               |                      |
| Discharge             | 20.44 cfs            |
| Flow Area             | 3.0 ft <sup>2</sup>  |
| Wetted Perimeter      | 7.0 ft               |
| Hydraulic Radius      | 5.1 in               |
| Top Width             | 6.00 ft              |
| Critical Depth        | 8.5 in               |
| Critical Slope        | 0.004 ft/ft          |
| Velocity              | 6.81 ft/s            |
| Velocity Head         | 0.72 ft              |
| Specific Energy       | 1.22 ft              |
| Froude Number         | 1.699                |
| Flow Type             | Supercritical        |
| GVF Input Data        |                      |
| Downstream Depth      | 0.0 in               |
| Length                | 0.0 ft               |
| Number Of Steps       | 0                    |
| GVF Output Data       |                      |
| Upstream Depth        | 0.0 in               |
| Profile Description   | N/A                  |
| Profile Headloss      | 0.00 ft              |
| Downstream Velocity   | Infinity ft/s        |
| Upstream Velocity     | Infinity ft/s        |
| Normal Depth          | 6.0 in               |
| Critical Depth        | 8.5 in               |
| Channel Slope         | 0.011 ft/ft          |
| Critical Slope        | 0.004 ft/ft          |

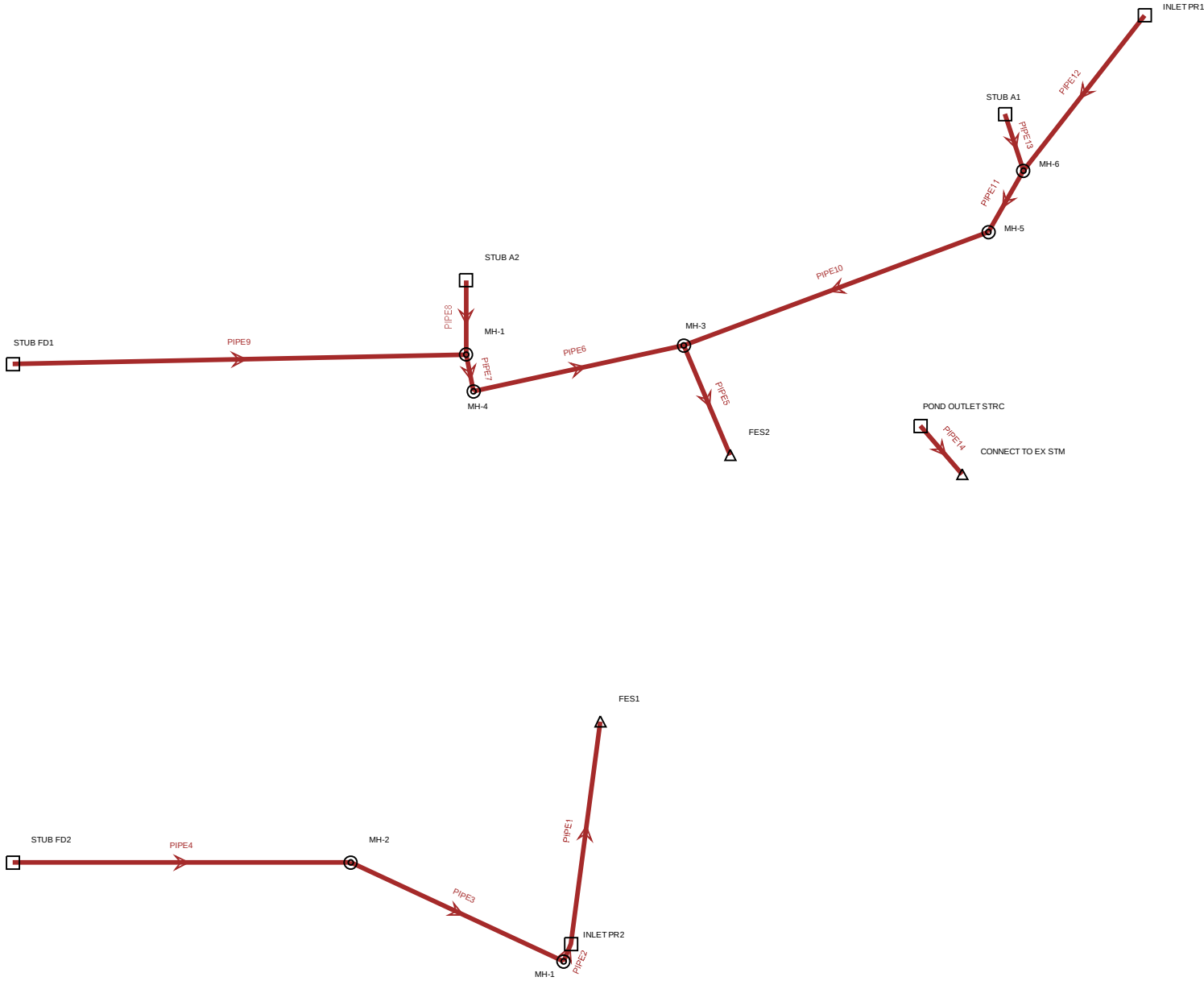
## Cross Section for Trickle Channel

| Project Description   |             |
|-----------------------|-------------|
| Friction Method       | Manning     |
|                       | Formula     |
| Solve For             | Discharge   |
| Input Data            |             |
| Roughness Coefficient | 0.013       |
| Channel Slope         | 0.011 ft/ft |
| Normal Depth          | 6.0 in      |
| Bottom Width          | 6.00 ft     |
| Discharge             | 20.44 cfs   |



V: 1  
H: 1

Scenario: 100-Year





Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

## 5-Year

Catch Basin Table - Time: 0.00 hours

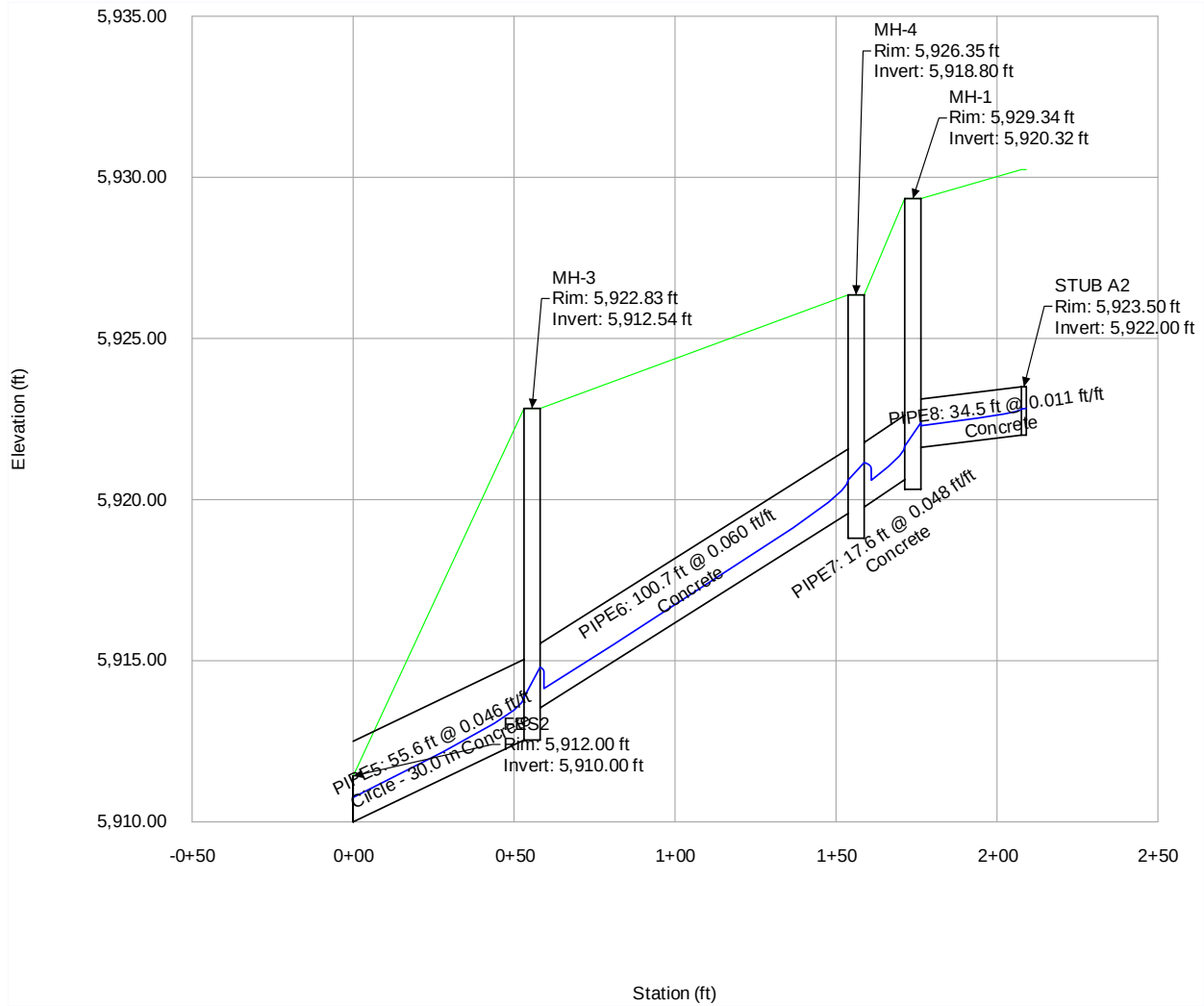
| ID                                      | Label                                       | Elevation<br>(Ground)<br>(ft) | Elevation (Rim)<br>(ft) | Elevation<br>(Invert)<br>(ft) | Inlet Type   | Capture<br>Efficiency<br>(Calculated)<br>(%) |
|-----------------------------------------|---------------------------------------------|-------------------------------|-------------------------|-------------------------------|--------------|----------------------------------------------|
| 65                                      | INLET PR1                                   | 5,921.69                      | 5,921.69                | 5,916.49                      | Full Capture | 100.0                                        |
| 70                                      | INLET PR2                                   | 5,919.42                      | 5,919.42                | 5,913.49                      | Full Capture | 100.0                                        |
| 72                                      | POND OUTLET<br>STRC                         | 5,910.00                      | 5,910.00                | 5,907.00                      | Full Capture | 100.0                                        |
| 66                                      | STUB A1                                     | 5,925.03                      | 5,918.89                | 5,917.39                      | Full Capture | 100.0                                        |
| 67                                      | STUB A2                                     | 5,930.24                      | 5,923.50                | 5,922.00                      | Full Capture | 100.0                                        |
| 68                                      | STUB FD1                                    | 5,934.62                      | 5,925.99                | 5,923.99                      | Full Capture | 100.0                                        |
| 69                                      | STUB FD2                                    | 5,933.07                      | 5,926.80                | 5,924.80                      | Full Capture | 100.0                                        |
| Hydraulic<br>Grade Line<br>(In)<br>(ft) | Flow<br>(Additional<br>Subsurface)<br>(cfs) |                               |                         |                               |              |                                              |
| 5,916.84                                | 1.02                                        |                               |                         |                               |              |                                              |
| 5,914.31                                | 2.38                                        |                               |                         |                               |              |                                              |
| 5,907.17                                | 0.20                                        |                               |                         |                               |              |                                              |
| 5,918.35                                | 5.92                                        |                               |                         |                               |              |                                              |
| 5,922.83                                | 4.48                                        |                               |                         |                               |              |                                              |
| 5,924.71                                | 3.97                                        |                               |                         |                               |              |                                              |
| 5,925.38                                | 2.67                                        |                               |                         |                               |              |                                              |

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

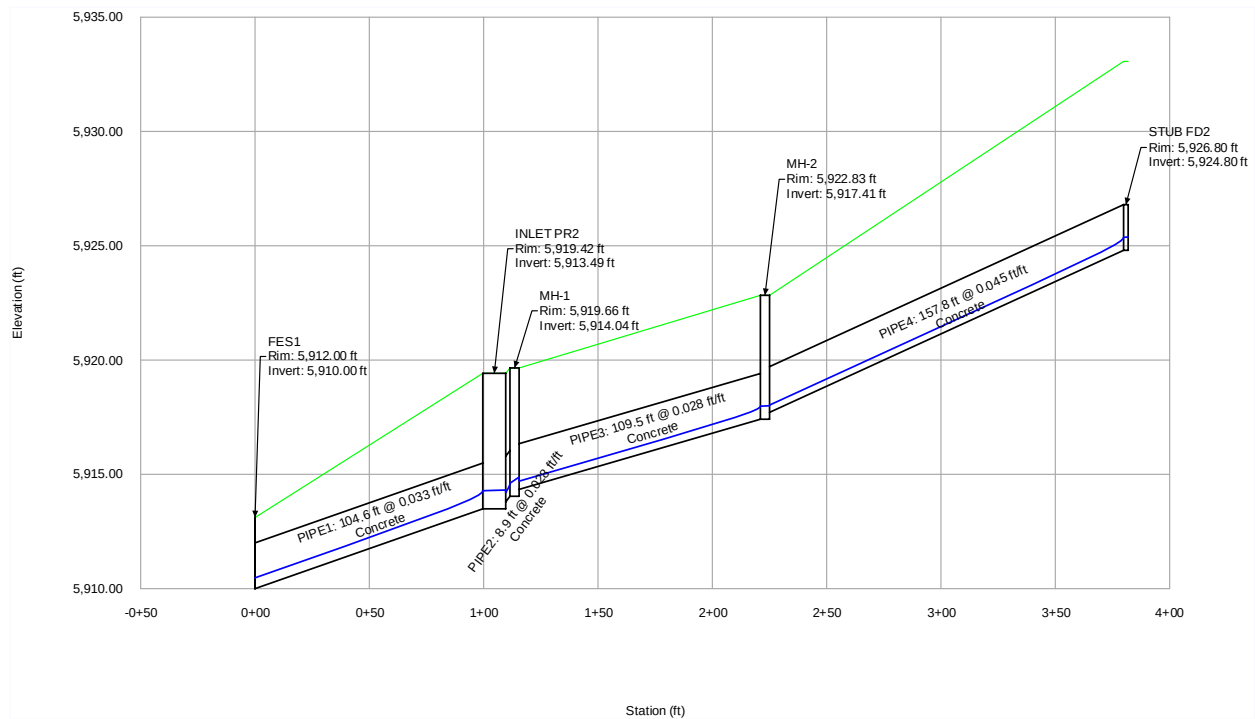
5-Year  
Conduit Table - Time: 0.00 hours

| Label       | Start Node       | Invert (Start) (ft) | Stop Node                    | Invert (Stop) (ft) | Length (User Defined) (ft) | Slope (Calculated) (ft/ft) | Diameter (in) |
|-------------|------------------|---------------------|------------------------------|--------------------|----------------------------|----------------------------|---------------|
| PIPE1       | INLET PR2        | 5,913.49            | FES1                         | 5,910.00           | 104.6                      | 0.033                      | 24.0          |
| PIPE2       | MH-1             | 5,914.04            | INLET PR2                    | 5,913.79           | 8.9                        | 0.028                      | 24.0          |
| PIPE3       | MH-2             | 5,917.41            | MH-1                         | 5,914.34           | 109.5                      | 0.028                      | 24.0          |
| PIPE4       | STUB FD2         | 5,924.80            | MH-2                         | 5,917.71           | 157.8                      | 0.045                      | 24.0          |
| PIPE5       | MH-3             | 5,912.54            | FES2                         | 5,910.00           | 55.6                       | 0.046                      | 30.0          |
| PIPE6       | MH-4             | 5,919.57            | MH-3                         | 5,913.53           | 100.7                      | 0.060                      | 24.0          |
| PIPE7       | MH-1             | 5,920.62            | MH-4                         | 5,919.77           | 17.6                       | 0.048                      | 24.0          |
| PIPE8       | STUB A2          | 5,922.00            | MH-1                         | 5,921.62           | 34.5                       | 0.011                      | 18.0          |
| PIPE9       | STUB FD1         | 5,923.99            | MH-1                         | 5,921.46           | 211.6                      | 0.012                      | 24.0          |
| PIPE10      | MH-5             | 5,914.94            | MH-3                         | 5,913.53           | 151.7                      | 0.009                      | 24.0          |
| PIPE11      | MH-6             | 5,915.44            | MH-5                         | 5,915.14           | 32.9                       | 0.009                      | 24.0          |
| PIPE12      | INLET PR1        | 5,916.49            | MH-6                         | 5,915.64           | 91.9                       | 0.009                      | 24.0          |
| PIPE13      | STUB A1          | 5,917.39            | MH-6                         | 5,915.72           | 27.9                       | 0.060                      | 18.0          |
| PIPE14      | POND OUTLET STRC | 5,907.00            | CONNECT TO EX STM            | 5,906.14           | 29.8                       | 0.029                      | 18.0          |
| Manning's n | Flow (cfs)       | Velocity (ft/s)     | Flow / Capacity (Design) (%) |                    |                            |                            |               |
| 0.013       | 5.05             | 8.92                | 12.2                         |                    |                            |                            |               |
| 0.013       | 2.67             | 6.97                | 7.0                          |                    |                            |                            |               |
| 0.013       | 2.67             | 6.96                | 7.0                          |                    |                            |                            |               |
| 0.013       | 2.67             | 8.21                | 5.6                          |                    |                            |                            |               |
| 0.013       | 15.39            | 13.43               | 17.6                         |                    |                            |                            |               |
| 0.013       | 8.45             | 12.74               | 15.3                         |                    |                            |                            |               |
| 0.013       | 8.45             | 11.79               | 17.0                         |                    |                            |                            |               |
| 0.013       | 4.48             | 5.92                | 40.6                         |                    |                            |                            |               |
| 0.013       | 3.97             | 5.78                | 16.0                         |                    |                            |                            |               |
| 0.013       | 6.94             | 6.15                | 31.9                         |                    |                            |                            |               |
| 0.013       | 6.94             | 6.15                | 31.9                         |                    |                            |                            |               |
| 0.013       | 1.02             | 3.54                | 4.7                          |                    |                            |                            |               |
| 0.013       | 5.92             | 11.83               | 23.0                         |                    |                            |                            |               |
| 0.013       | 0.20             | 3.36                | 1.1                          |                    |                            |                            |               |

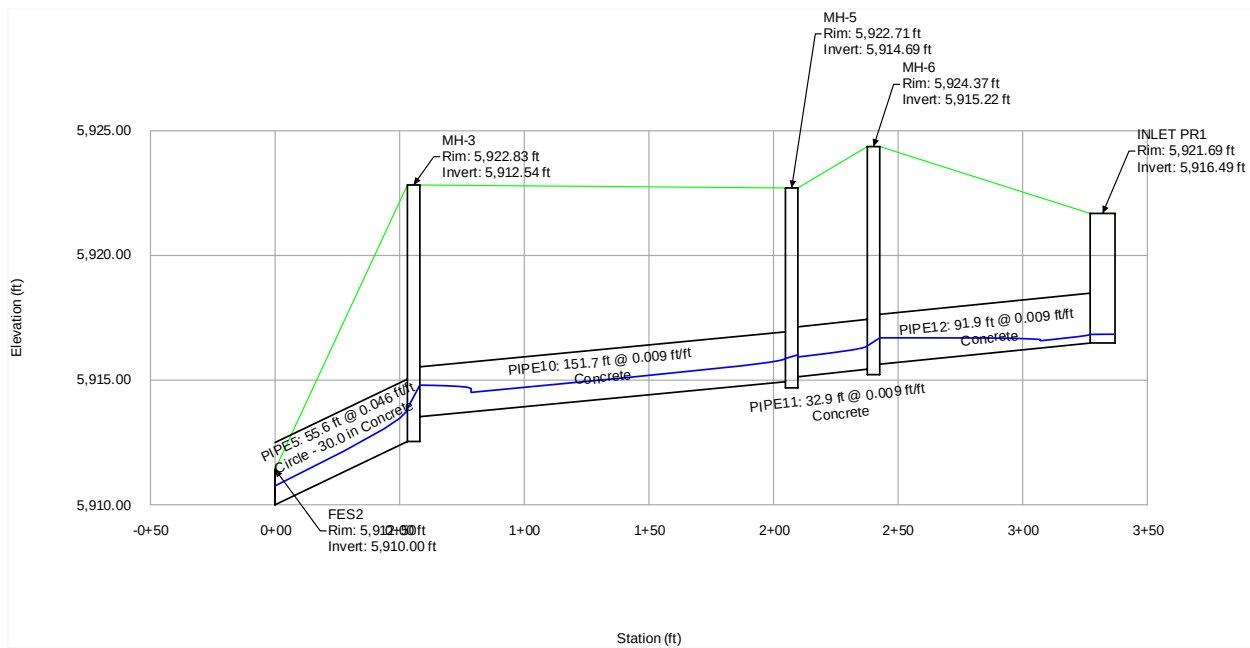
## Engineering Profile - STM NW (5-year)



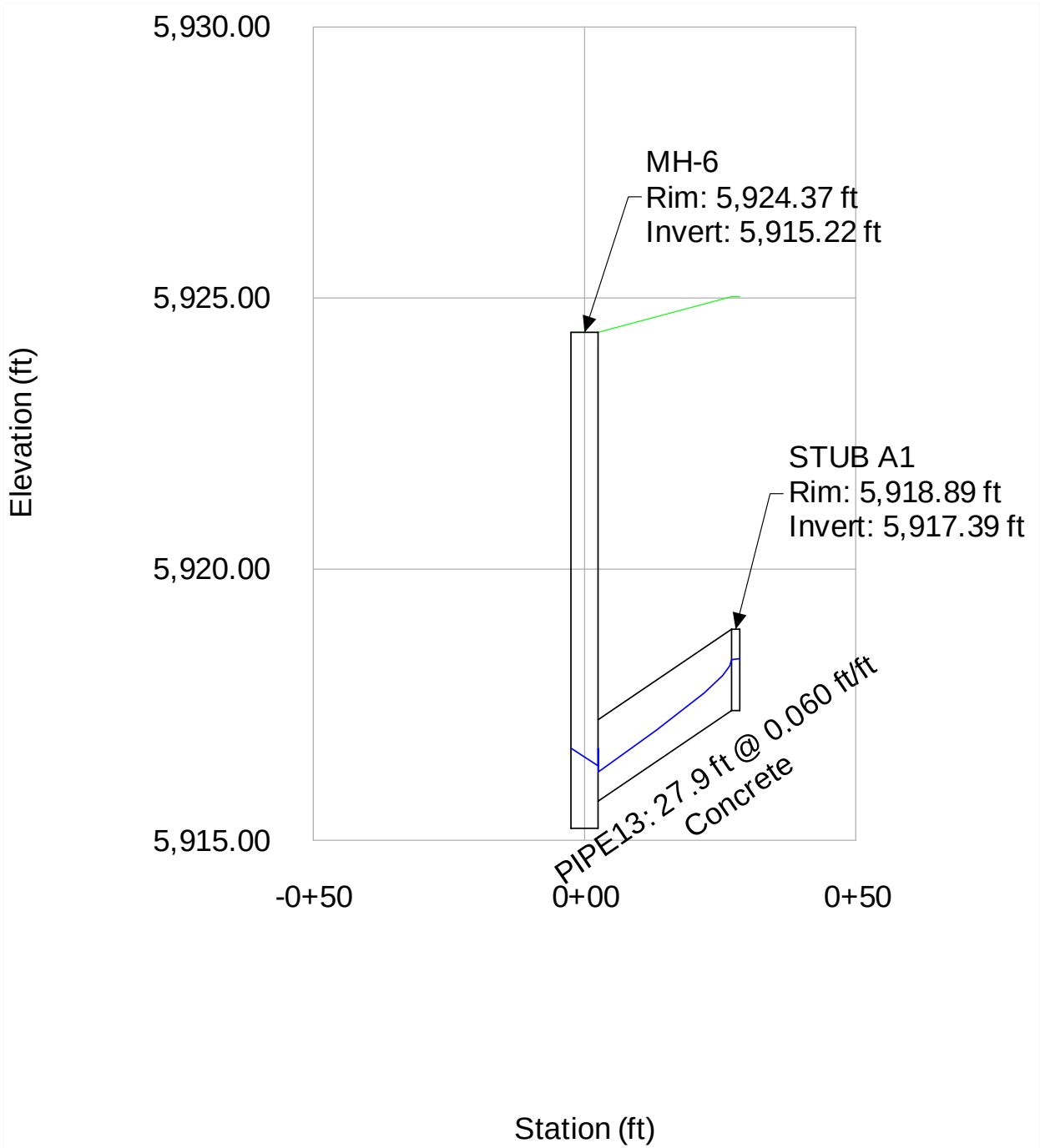
## Engineering Profile - STM South (5-year)



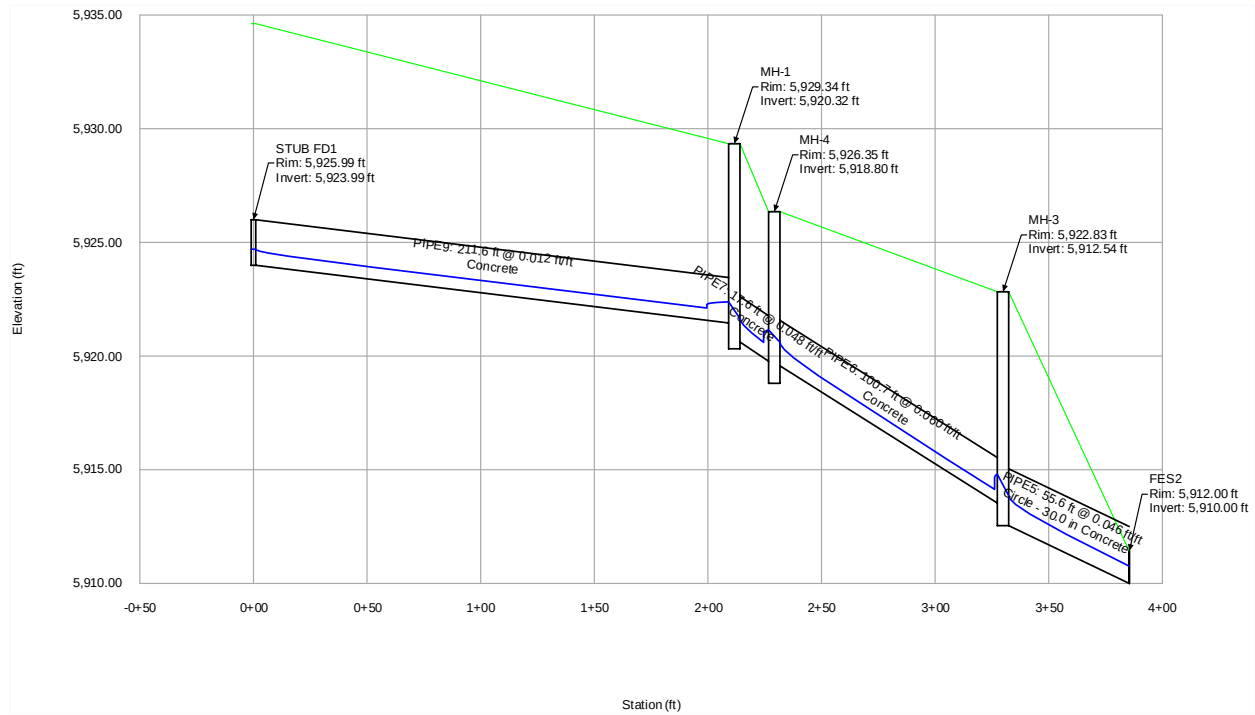
## Engineering Profile - STM NE (5-year)



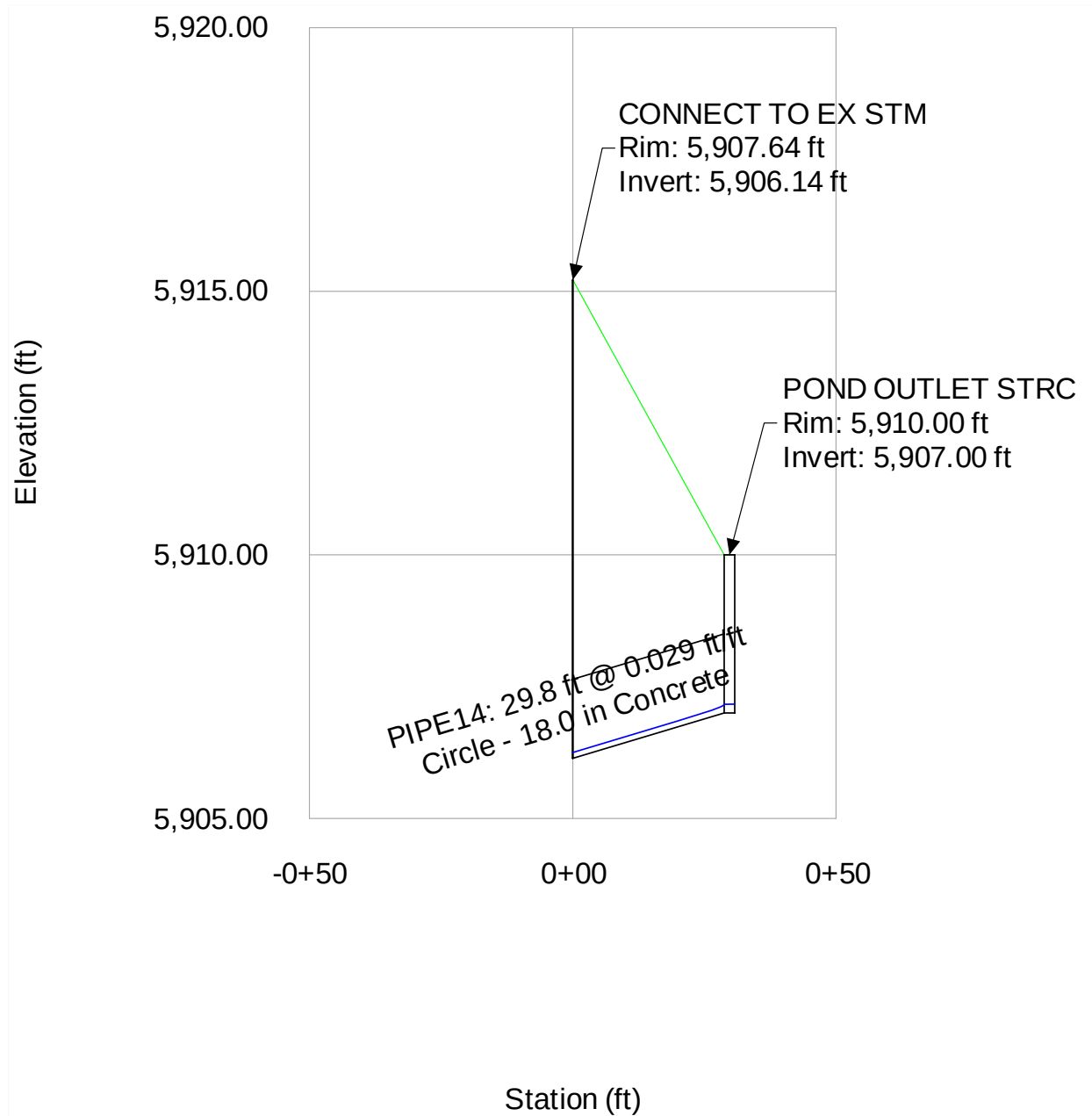
Engineering Profile - STM NE Stub (5-year)



## Engineering Profile - STM West (5-year)



## Engineering Profile - Outfall (5-year)





Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

# 100-year

Catch Basin Table - Time: 0.00 hours

| ID                                      | Label                                       | Elevation<br>(Ground)<br>(ft) | Elevation (Rim)<br>(ft) | Elevation<br>(Invert)<br>(ft) | Inlet Type   | Capture<br>Efficiency<br>(Calculated)<br>(%) |
|-----------------------------------------|---------------------------------------------|-------------------------------|-------------------------|-------------------------------|--------------|----------------------------------------------|
| 65                                      | INLET PR1                                   | 5,921.69                      | 5,921.69                | 5,916.49                      | Full Capture | 100.0                                        |
| 70                                      | INLET PR2                                   | 5,919.42                      | 5,919.42                | 5,913.49                      | Full Capture | 100.0                                        |
| 72                                      | POND OUTLET<br>STRC                         | 5,910.00                      | 5,910.00                | 5,907.00                      | Full Capture | 100.0                                        |
| 66                                      | STUB A1                                     | 5,925.03                      | 5,918.89                | 5,917.39                      | Full Capture | 100.0                                        |
| 67                                      | STUB A2                                     | 5,930.24                      | 5,923.50                | 5,922.00                      | Full Capture | 100.0                                        |
| 68                                      | STUB FD1                                    | 5,934.62                      | 5,925.99                | 5,923.99                      | Full Capture | 100.0                                        |
| 69                                      | STUB FD2                                    | 5,933.07                      | 5,926.80                | 5,924.80                      | Full Capture | 100.0                                        |
| Hydraulic<br>Grade Line<br>(In)<br>(ft) | Flow<br>(Additional<br>Subsurface)<br>(cfs) |                               |                         |                               |              |                                              |
| 5,917.91                                | 2.30                                        |                               |                         |                               |              |                                              |
| 5,914.76                                | 5.37                                        |                               |                         |                               |              |                                              |
| 5,908.30                                | 10.90                                       |                               |                         |                               |              |                                              |
| 5,918.81                                | 13.63                                       |                               |                         |                               |              |                                              |
| 5,924.03                                | 10.32                                       |                               |                         |                               |              |                                              |
| 5,925.10                                | 9.16                                        |                               |                         |                               |              |                                              |
| 5,925.69                                | 6.15                                        |                               |                         |                               |              |                                              |

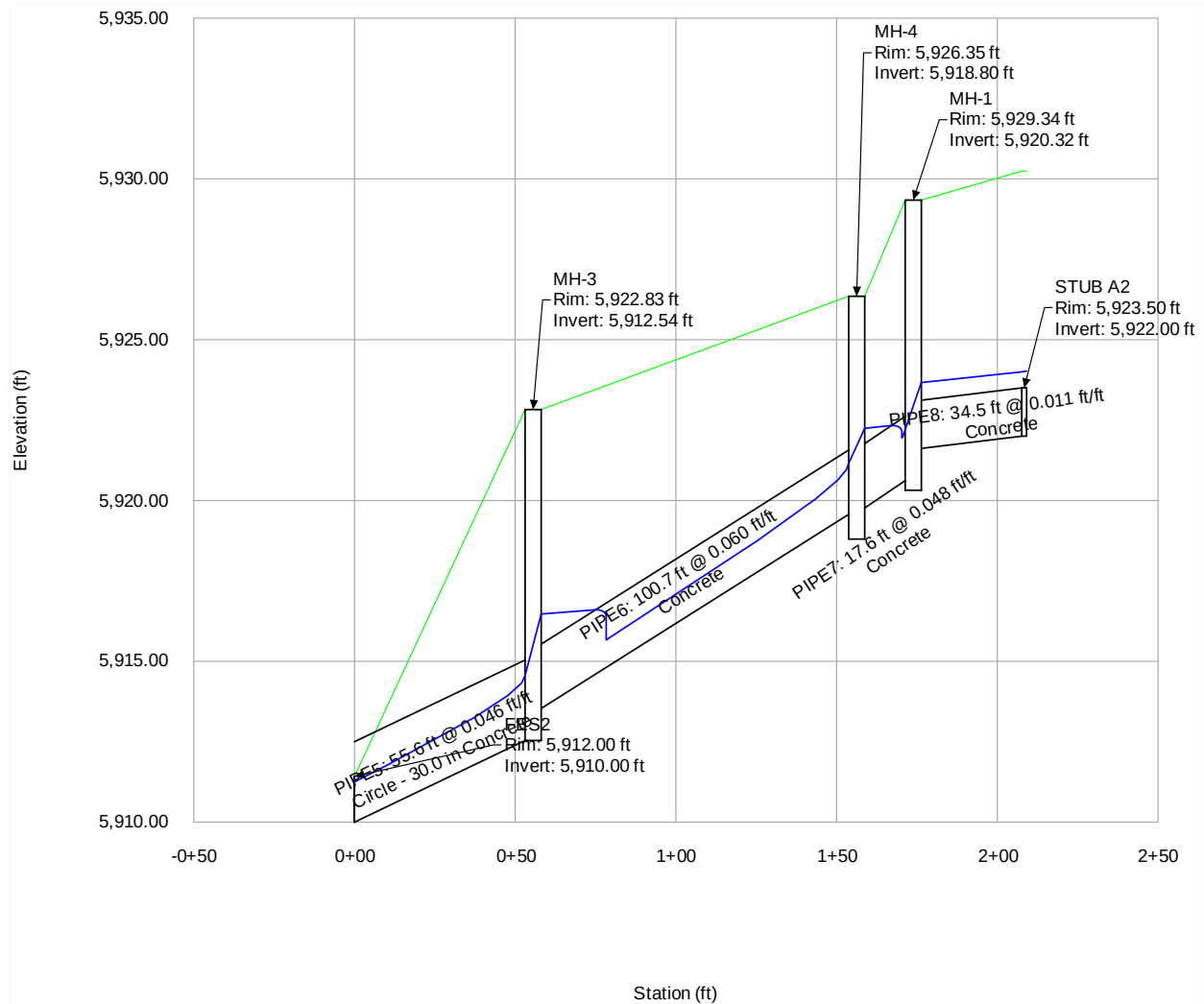
Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

# 100-year

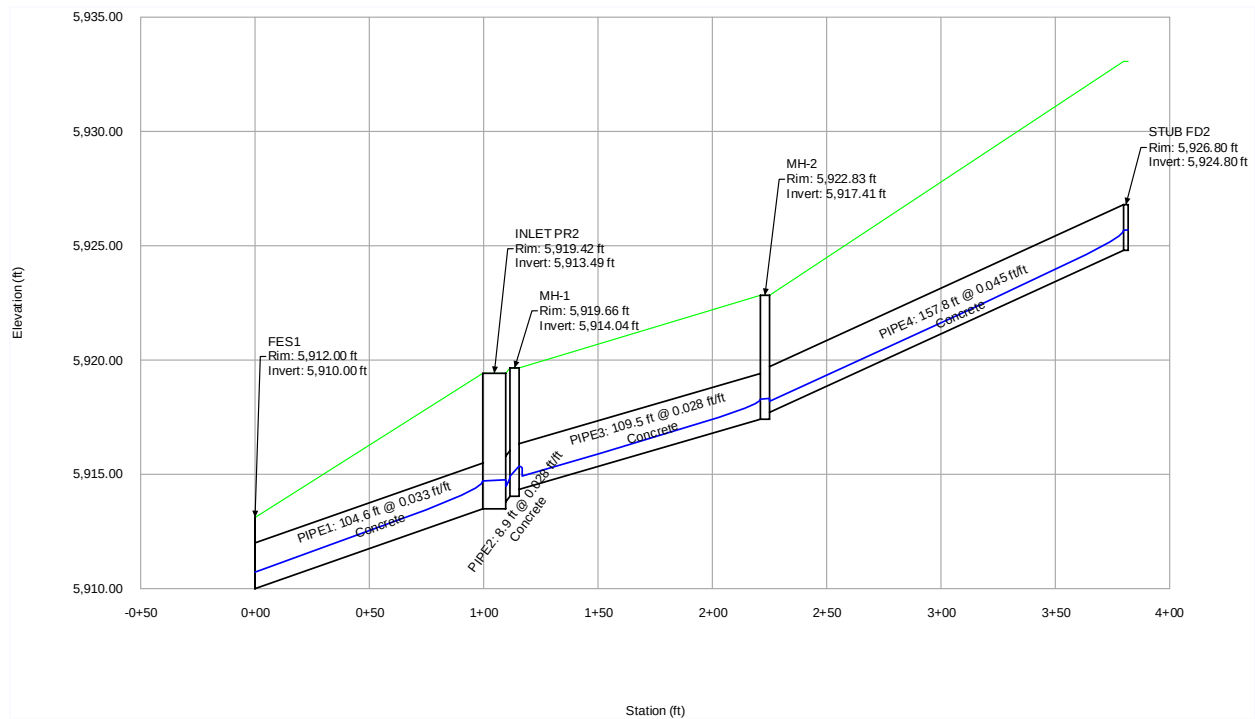
Conduit Table - Time: 0.00 hours

| Label       | Start Node       | Invert (Start) (ft) | Stop Node                    | Invert (Stop) (ft) | Length (User Defined) (ft) | Slope (Calculated) (ft/ft) | Diameter (in) |
|-------------|------------------|---------------------|------------------------------|--------------------|----------------------------|----------------------------|---------------|
| PIPE1       | INLET PR2        | 5,913.49            | FES1                         | 5,910.00           | 104.6                      | 0.033                      | 24.0          |
| PIPE2       | MH-1             | 5,914.04            | INLET PR2                    | 5,913.79           | 8.9                        | 0.028                      | 24.0          |
| PIPE3       | MH-2             | 5,917.41            | MH-1                         | 5,914.34           | 109.5                      | 0.028                      | 24.0          |
| PIPE4       | STUB FD2         | 5,924.80            | MH-2                         | 5,917.71           | 157.8                      | 0.045                      | 24.0          |
| PIPE5       | MH-3             | 5,912.54            | FES2                         | 5,910.00           | 55.6                       | 0.046                      | 30.0          |
| PIPE6       | MH-4             | 5,919.57            | MH-3                         | 5,913.53           | 100.7                      | 0.060                      | 24.0          |
| PIPE7       | MH-1             | 5,920.62            | MH-4                         | 5,919.77           | 17.6                       | 0.048                      | 24.0          |
| PIPE8       | STUB A2          | 5,922.00            | MH-1                         | 5,921.62           | 34.5                       | 0.011                      | 18.0          |
| PIPE9       | STUB FD1         | 5,923.99            | MH-1                         | 5,921.46           | 211.6                      | 0.012                      | 24.0          |
| PIPE10      | MH-5             | 5,914.94            | MH-3                         | 5,913.53           | 151.7                      | 0.009                      | 24.0          |
| PIPE11      | MH-6             | 5,915.44            | MH-5                         | 5,915.14           | 32.9                       | 0.009                      | 24.0          |
| PIPE12      | INLET PR1        | 5,916.49            | MH-6                         | 5,915.64           | 91.9                       | 0.009                      | 24.0          |
| PIPE13      | STUB A1          | 5,917.39            | MH-6                         | 5,915.72           | 27.9                       | 0.060                      | 18.0          |
| PIPE14      | POND OUTLET STRC | 5,907.00            | CONNECT TO EX STM            | 5,906.14           | 29.8                       | 0.029                      | 18.0          |
| Manning's n | Flow (cfs)       | Velocity (ft/s)     | Flow / Capacity (Design) (%) |                    |                            |                            |               |
| 0.013       | 11.52            | 11.27               | 27.9                         |                    |                            |                            |               |
| 0.013       | 6.15             | 8.88                | 16.2                         |                    |                            |                            |               |
| 0.013       | 6.15             | 8.87                | 16.2                         |                    |                            |                            |               |
| 0.013       | 6.15             | 10.49               | 12.8                         |                    |                            |                            |               |
| 0.013       | 35.41            | 16.91               | 40.4                         |                    |                            |                            |               |
| 0.013       | 19.48            | 16.09               | 35.2                         |                    |                            |                            |               |
| 0.013       | 19.48            | 14.85               | 39.2                         |                    |                            |                            |               |
| 0.013       | 10.32            | 5.84                | 93.5                         |                    |                            |                            |               |
| 0.013       | 9.16             | 7.30                | 37.0                         |                    |                            |                            |               |
| 0.013       | 15.93            | 5.07                | 73.3                         |                    |                            |                            |               |
| 0.013       | 15.93            | 5.07                | 73.3                         |                    |                            |                            |               |
| 0.013       | 2.30             | 4.50                | 10.6                         |                    |                            |                            |               |
| 0.013       | 13.63            | 14.76               | 53.0                         |                    |                            |                            |               |
| 0.013       | 10.90            | 10.61               | 61.0                         |                    |                            |                            |               |

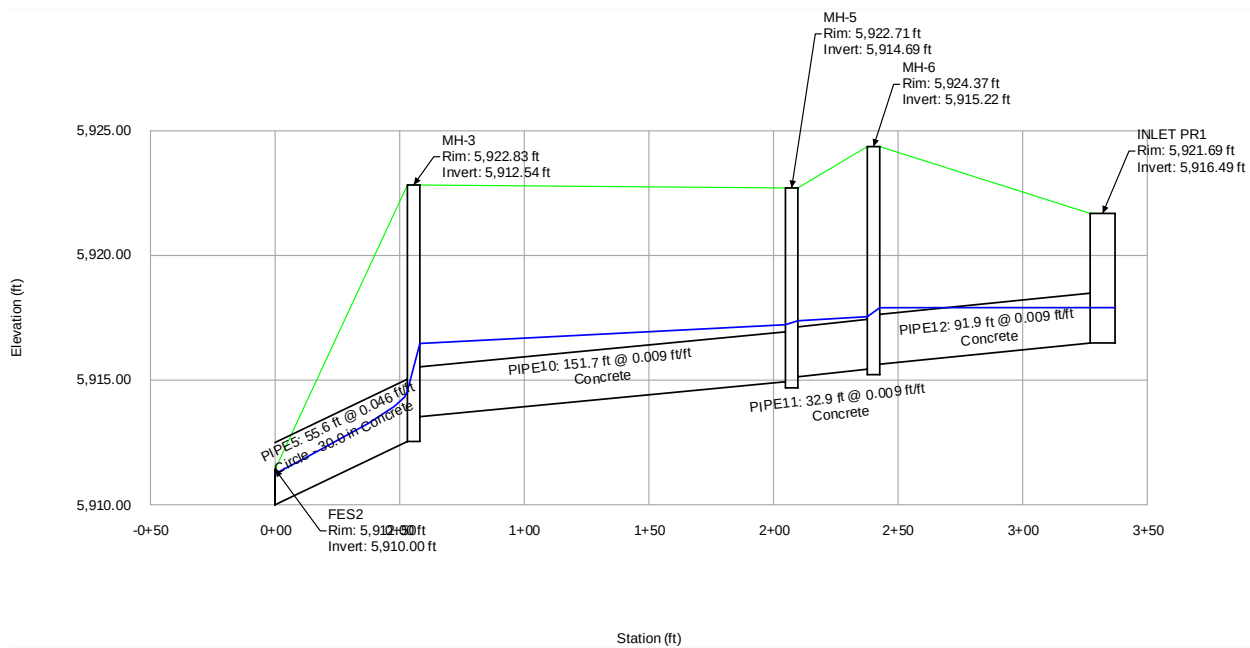
## Engineering Profile - STM NW (100-year)



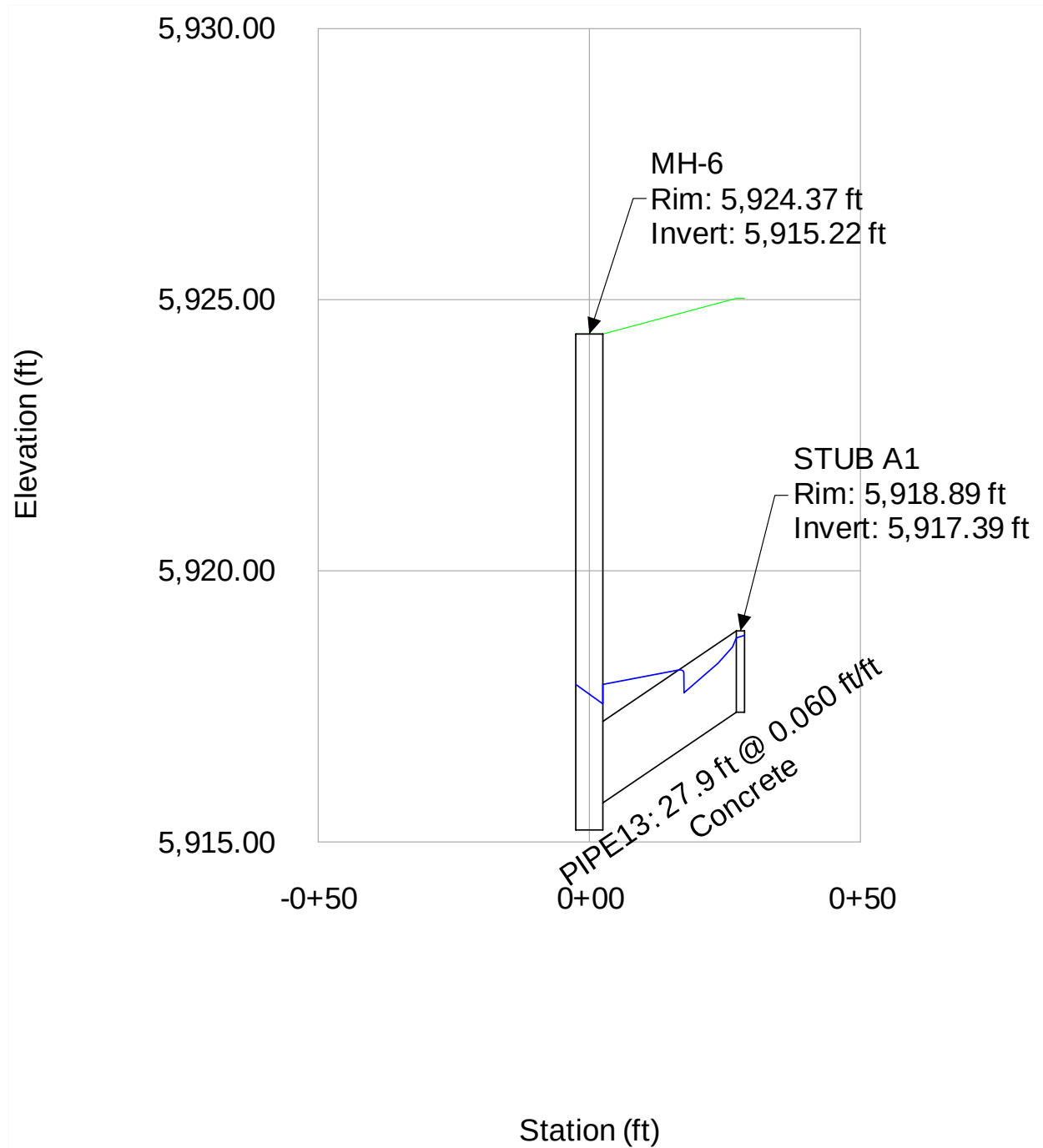
## Engineering Profile - STM South (100-year)



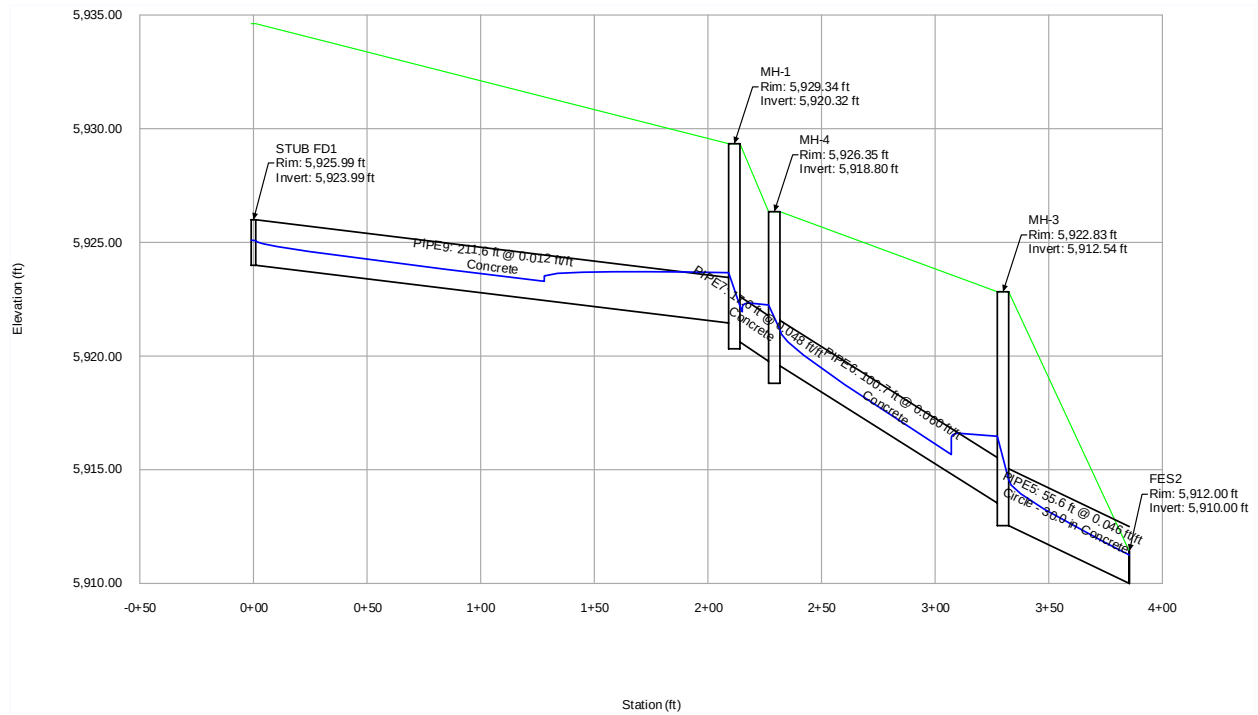
## Engineering Profile - STM NE (100-year)



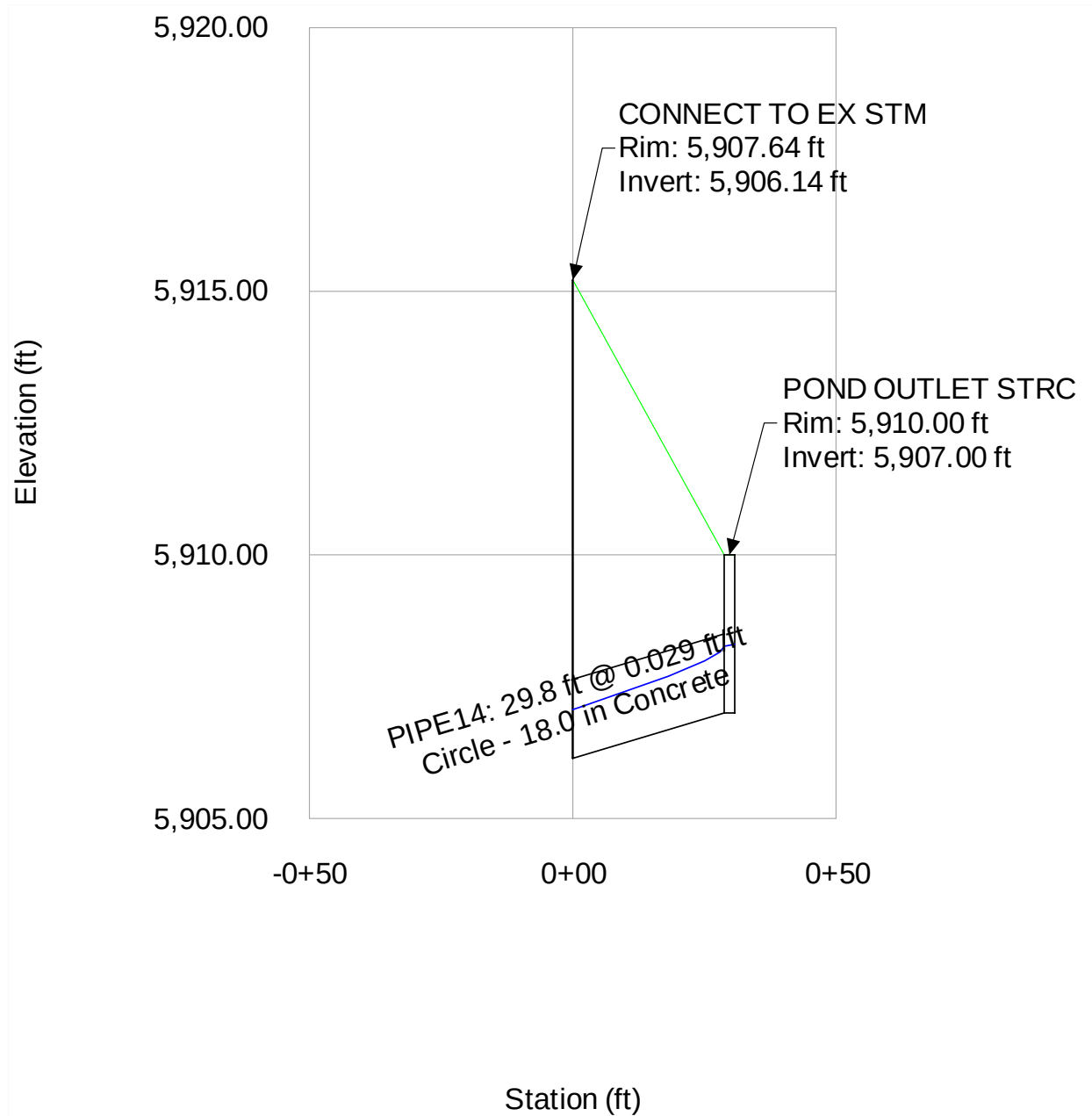
## Engineering Profile - STM NE Stub (100-year)



## Engineering Profile - STM West (100-year)



## Engineering Profile - STM West (100-year)



## Engineering Profile - STM Outfall (100-year)



**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><br><b><u>Trails at Aspen Ridge</u></b><br><b>Big Johnson Reservoir</b><br><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><br><b><u>Trails at Aspen Ridge</u></b><br><b>Big Johnson Reservoir</b><br><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<br>(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         |

| <b>Table 3.8</b><br><b>Trails at Aspen Ridge</b><br><b>West Fork - Jimmy Camp Creek</b><br><b>Proposed Design Point Flow Description</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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             |  |  |  |  |  |  |

| Sub-basin                          | Comments                                                                                                                                                                                                                                                                                                                                                                                                       | Area      |       | Rational 'C' Values                                  |      |           |                                        |      |           |                                  |      |        |                                         |      |        |           |      | Flow Lengths          |         |                 |         |              |                      | Channel Flow |             |                                                        |                    | Tc                  | Rainfall Intensity & Rational Flow Rate |       |           |               |             | SWMM Values |             |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|------------------------------------------------------|------|-----------|----------------------------------------|------|-----------|----------------------------------|------|--------|-----------------------------------------|------|--------|-----------|------|-----------------------|---------|-----------------|---------|--------------|----------------------|--------------|-------------|--------------------------------------------------------|--------------------|---------------------|-----------------------------------------|-------|-----------|---------------|-------------|-------------|-------------|
|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                | sf        | acres | Surface Type 1<br>Residential 1/8 or less (65% Imp.) |      |           | Surface Type 2<br>Pavement (100% Imp.) |      |           | Surface Type 3<br>Park (7% Imp.) |      |        | Surface Type 4<br>Undeveloped (2% Imp.) |      |        | Composite |      | Percent<br>Impervious | Initial | True<br>Initial | Channel | True Channel | Average<br>(decimal) | Initial      | Average (%) | Channel Flow<br>Type<br>(See Key above)<br>Ground Type | Velocity<br>(ft/s) | Channel<br>Tc (min) | Total<br>(min)                          | 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 | Q5<br>cfs | i100<br>in/hr | Q100<br>cfs | Q5<br>cfs   | Q100<br>cfs |
| West Fork-Jimmy Camp Creek<br>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.<br>-Development of adjacent commercial lots will require FDR and onsite detention.<br>-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        |

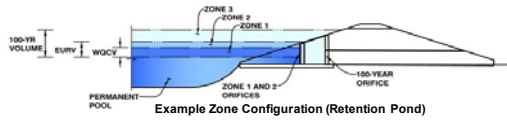
|                                           |                                                                                                                                                                                                                                                                                 | Area      |       | Rational 'C' Values                                  |      |           |                                        |      |           |                                  |      |        |                                         |      |        |           |      |                       |               |                              |               | Flow Lengths              |                               |                     |                      |                                                        |                    | Channel Flow        |                |             |           | Tc            | Rainfall Intensity & Rational Flow Rate |           |             |  | SWMM Values |  |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|------------------------------------------------------|------|-----------|----------------------------------------|------|-----------|----------------------------------|------|--------|-----------------------------------------|------|--------|-----------|------|-----------------------|---------------|------------------------------|---------------|---------------------------|-------------------------------|---------------------|----------------------|--------------------------------------------------------|--------------------|---------------------|----------------|-------------|-----------|---------------|-----------------------------------------|-----------|-------------|--|-------------|--|
| Sub-basin                                 | Comments                                                                                                                                                                                                                                                                        | sf        | acres | Surface Type 1<br>Residential 1/8 or less (65% Imp.) |      |           | Surface Type 2<br>Pavement (100% Imp.) |      |           | Surface Type 3<br>Park (7% Imp.) |      |        | Surface Type 4<br>Undeveloped (2% Imp.) |      |        | Composite |      | Percent<br>Impervious | Initial<br>ft | True<br>Initial<br>Length ft | Channel<br>ft | True Channel<br>Length ft | Average<br>(decimal)<br>Slope | Initial<br>Tc (min) | Average (%)<br>Slope | Channel Flow<br>Type<br>(See Key above)<br>Ground Type | Velocity<br>(ft/s) | Channel<br>Tc (min) | Total<br>(min) | i5<br>in/hr | Q5<br>cfs | i100<br>in/hr | Q100<br>cfs                             | Q5<br>cfs | Q100<br>cfs |  |             |  |
|                                           |                                                                                                                                                                                                                                                                                 |           |       | C5                                                   | C100 | Area (SF) | C5                                     | C100 | Area (SF) | C5                               | C100 | Area   | C5                                      | C100 | Area   | C5        | C100 |                       |               |                              |               |                           |                               |                     |                      |                                                        |                    |                     |                |             |           |               |                                         |           |             |  |             |  |
| 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 | -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                | 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                     | -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<br>-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.<br>-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>100YR</sub> ) =            | 1.22   | ft        |
| Length of Basin Floor (L <sub>100YR</sub> ) =           | 262.3  | ft        |
| Width of Basin Floor (W <sub>100YR</sub> ) =            | 135.8  | ft        |
| Area of Basin Floor (A <sub>100YR</sub> ) =             | 35,621 | ft²       |
| Volume of Basin Floor (V <sub>100YR</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          |



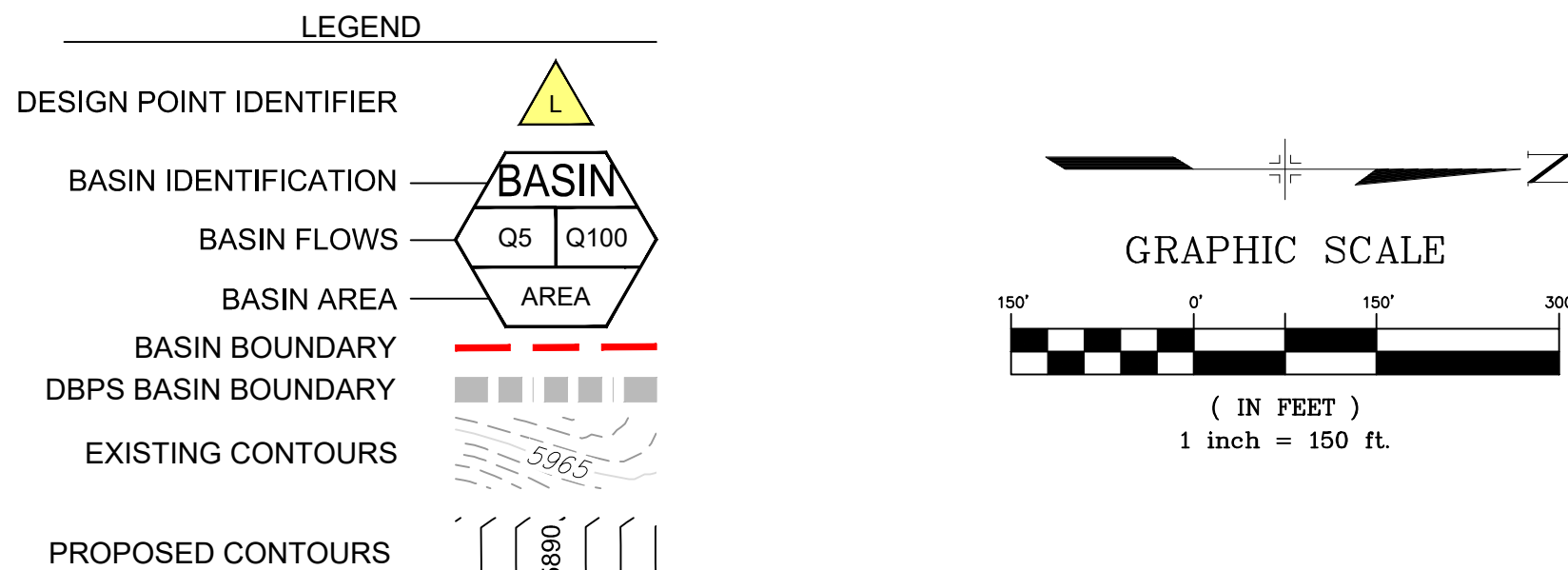
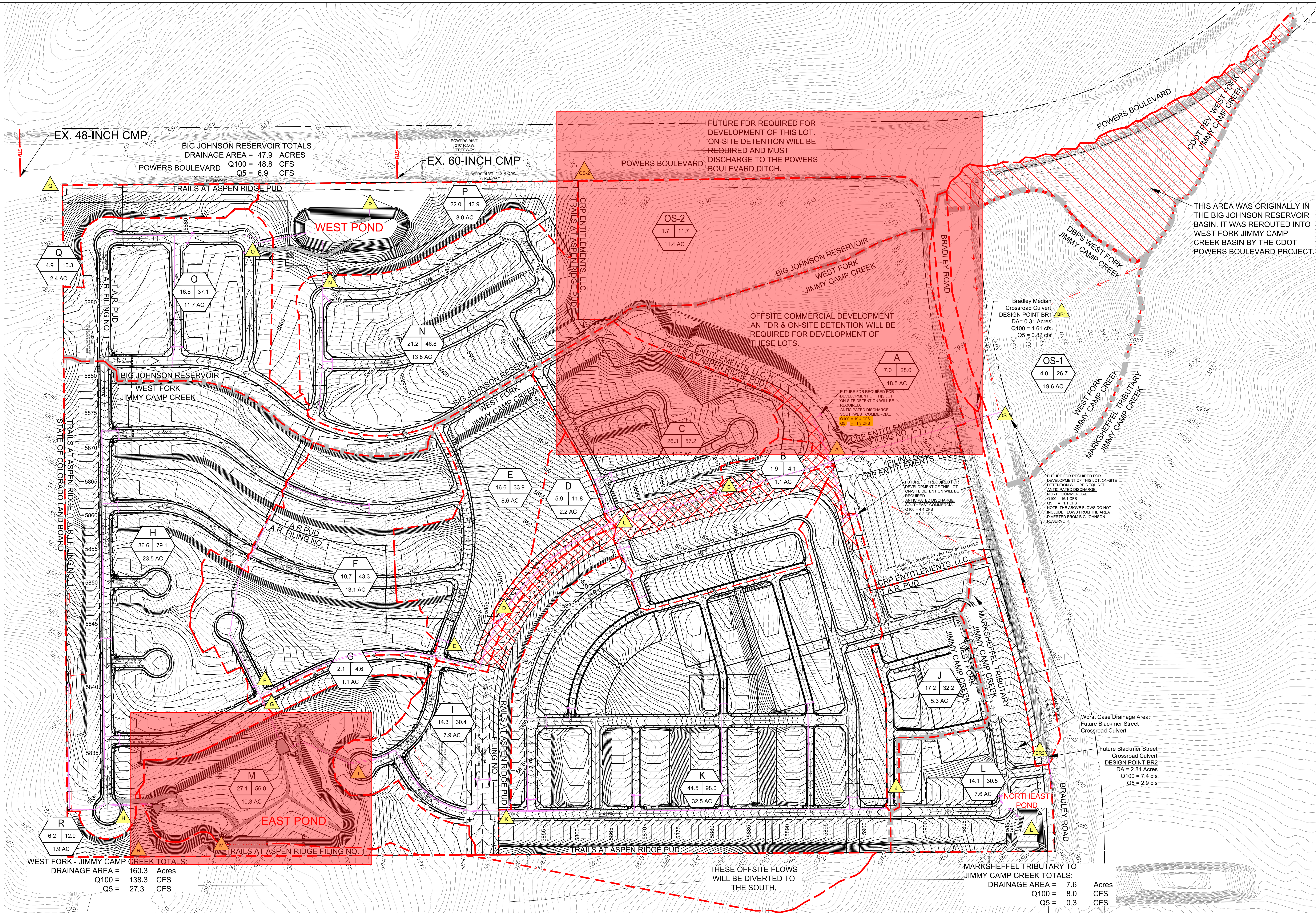


| Trails at Aspen Ridge                                   |               |           |             |
|---------------------------------------------------------|---------------|-----------|-------------|
| Proposed Conditions - Sub-basin Summary                 |               |           |             |
| Basin                                                   | Area<br>acres | Q5<br>cfs | Q100<br>cfs |
| West Fork-Jimmy Camp Creek                              |               |           |             |
| West<br>Fork-Jimmy<br>Camp Creek<br>OS-1                | 19.6          | 1.1       | 16.2        |
| A                                                       | 18.5          | 5.0       | 34.6        |
| B                                                       | 1.1           | 2.5       | 7.0         |
| C                                                       | 14.9          | 19.5      | 58.9        |
| D                                                       | 2.2           | 4.1       | 14.2        |
| E                                                       | 8.6           | 12.8      | 39.1        |
| F                                                       | 13.1          | 15.4      | 46.2        |
| G                                                       | 1.1           | 2.1       | 6.1         |
| H                                                       | 23.5          | 26.8      | 80.4        |
| I                                                       | 7.9           | 10.5      | 31.8        |
| J                                                       | 5.3           | 11.1      | 32.7        |
| K                                                       | 32.5          | 33.3      | 101.7       |
| West<br>Fork-Jimmy<br>Camp Creek<br>M                   | 10.3          | 14.2      | 61.8        |
| R                                                       | 1.9           | 1.7       | 7.8         |
| Big Johnson Reservoir                                   |               |           |             |
| Big Johnson<br>Reservoir<br>N                           | 14.10         | 21.2      | 46.8        |
| O                                                       | 11.72         | 16.8      | 37.1        |
| P                                                       | 8.52          | 22.0      | 43.9        |
| Q                                                       | 2.43          | 4.9       | 10.3        |
| OS-2                                                    | 11.44         | 1.7       | 11.7        |
| Marksheffel Tributary to Jimmy Camp Creek               |               |           |             |
| Marksheffel<br>Tributary to<br>Jimmy Camp<br>Creek<br>L | 5.3           | 17.2      | 32.2        |
| BR1                                                     | 0.3           | 0.8       | 1.6         |
| BR2                                                     | 2.8           | 2.9       | 7.4         |

| Trails at Aspen Ridge<br>Big Johnson Reservoir<br>Proposed Design Point Summary |            |                         |                  |            |              |
|---------------------------------------------------------------------------------|------------|-------------------------|------------------|------------|--------------|
| 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             | 16.8       | 37.1         |
| P                                                                               | N, O, P    | West Pond Discharge     | 34.3             | 47.1       | 100.6        |
| West Pond Discharge (UD-Detention)                                              | N, O, P    | Powers Ditch            |                  | 1.0        | 28.3         |
| Q                                                                               | Q          | Powers Ditch            | 2.4              | 4.9        | 10.3         |
| OS-2                                                                            | OS-2       | Powers Ditch            | 11.4             | 1.7        | 11.7         |

| Trails at Aspen Ridge<br>West Fork - Jimmy Camp Creek<br>Proposed Design Point Summary |                                          |                         |                  |            |              |
|----------------------------------------------------------------------------------------|------------------------------------------|-------------------------|------------------|------------|--------------|
| Design Point                                                                           | Sub-Basins                               | Downstream Design Point | Total Area (ac.) | Q(5) (cfs) | Q(100) (cfs) |
| OS-1                                                                                   | OS-1                                     | A                       | 19.6             | 4.0        | 26.7         |
| A                                                                                      | OS-1 & A                                 | B                       | 38.1             | 11.6       | 57.5         |
| B                                                                                      | OS-1, A, B                               | C                       | 39.1             | 12.4       | 58.5         |
| C                                                                                      | OS-1, A, B, C                            | D                       | 54.0             | 27.3       | 90.3         |
| D                                                                                      | OS-1, A, B, C, D                         | E                       | 56.2             | 30.2       | 95.6         |
| E                                                                                      | OS-1, A, B, C, D, E                      | F                       | 64.8             | 39.3       | 111.6        |
| F                                                                                      | F                                        | G                       | 13.1             | 19.7       | 43.3         |
| G                                                                                      | OS-1, A, B, C, D, E, F, G                | M                       | 79.0             | 46.9       | 125.9        |
| H                                                                                      | H                                        | M                       | 23.5             | 36.6       | 79.1         |
| J                                                                                      | J                                        | K                       | 5.3              | 17.2       | 32.2         |
| K                                                                                      | J, K                                     | I                       | 37.7             | 57.2       | 121.7        |
| I                                                                                      | J, K, I                                  | M                       | 45.6             | 59.7       | 127.2        |
| M (Into East Pond)                                                                     | OS-1, A, B, C, D, E, F, G, J, K, I, H, M | East Pond Discharge     | 158.4            | 122.6      | 287.5        |
| East Pond Discharge (SWMM)                                                             | OS-1, A, B, C, D, E, F, G, J, K, I, H, M | Offsite Swale           |                  | 21.1       | 127.4        |
| R                                                                                      | R                                        | Offsite Swale           | 1.9              | 6.2        | 12.9         |

| Trails at Aspen Ridge<br>Marksheffel Tributary to Jimmy Camp Creek<br>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          |



| REFERENCE DRAWINGS                                                                                                                                                                    | NO. | DATE | DESCRIPTION | BY |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-------------|----|
| X-886-PR SITE #1<br>X-886-PR SITE<br>10415-Storm Base-2017<br>X-886-PR STORM<br>X-7100-Drainage<br>X-886-PR STORM_F1<br>886-PR Legacy Drive                                           |     |      |             |    |
| REVISIONS                                                                                                                                                                             |     |      |             |    |
| BENCHMARK DATA (ELEV.)<br>(DATUM)                                                                                                                                                     |     |      |             |    |
| (DESCRIPTION/LOCATION)                                                                                                                                                                |     |      |             |    |
| NAME: \\Eros\Projects\19.886.008 Trails at Aspen Ridge\200 Drainage\201 Drainage Reports\MDDP\202-MDDP Basins_1_8325_2357.vwg<br>PCP: Matrix.cib<br>PLT DATE: Mon Sep 23, 2019 9:57am |     |      |             |    |

|                     |  |
|---------------------|--|
| VERTICAL BENCHMARK: |  |
| BASIS OF BEARING:   |  |

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

|                        |  |
|------------------------|--|
| Matrix<br>DESIGN GROUP |  |
|------------------------|--|

|                                                                                                          |  |
|----------------------------------------------------------------------------------------------------------|--|
| 2435 Research Parkway, Suite 300<br>Colorado Springs, CO 80920<br>Phone 719-575-0100<br>Fax 719-575-0208 |  |
|----------------------------------------------------------------------------------------------------------|--|

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



**APPENDIX F – DRAINAGE EXHIBITS**



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







# V2\_Drainage Report - Final.pdf Markup Summary

7/24/2026 1:41:37 PM (1)

**Appendix B**

nage basin, and the eastern t  
drainage basin. The watersh  
fer to **Appendix A** for the Fl  
ate December 7, 2018. Th

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Appendix B

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ge basin, and the ea  
rainage basin. The v  
r to **Appendix A** for  
e, December 7, 201  
nson basin in Febru

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Johnson drainage basin, and the eastern half  
Sand Creek drainage basin. The watershed  
County. Refer to **Appendix A** for the Flood  
effective date, December 7, 2018. There  
of the Big Johnson basin in February 1992.  
Sand Creek basin. Please see reference in  
**Project not located within Sand  
Creek basin. Please revise.**

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Project not located within Sand Creek basin.  
Please revise.

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insurance have in  
was a Drainage E  
however, there ha  
the **Appendix**.

**MASTER DRAIN**

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ix. [Appendix E](#)

**DRAINAGE REPO.**

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## Appendix E

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Drainage Plan Amendment for "V  
Ridge" Prepared by: Matrix Des  
Plan, the "East Pond" was sized  
Bradley Road and West of Lega  
of the Site represented in this FI  
existing storm sewer stub in the  
are 1.3 cfs and 19.4 cfs in the 5-  
and 100-year release rate from  
respectively.

As noted in the Master Drainage

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existing storm sewer stub

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/s overland  
adside ditch  
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**Author:** Laura Besler  
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60" CMP

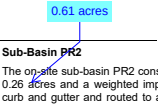
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age flows over  
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existing

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0.61 acres

Sub-Basin PR2

The on-site sub-basin PR2 contains 0.26 acres and a weighted impervious area of 0.26 acres. The sub-basin is located on the east side of the road and is routed to the stormwater management system.

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0.61 acres

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~~Sub-Basin PR2~~

The on-site sub-basin contains 0.26 acres and a weighted impervious area of 0.26 acres. The sub-basin is located on the east side of the road and is routed to the stormwater management system.

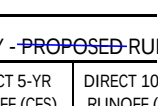
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0.61 acres

Sub-Basin PR2

The on-site sub-basin PR2 contains 0.26 acres and a weighted impervious area of 0.26 acres. The sub-basin is located on the east side of the road and is routed to the stormwater management system.

**Subject:** Line  
**Page Label:** 29  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:03:37 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**



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7/24/2026 4:03:48 PM (1)

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 **Existing** | **PROPOSED** |

**Subject:** Callout  
**Page Label:** 29  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:03:48 PM  
**Status:**  
**Color:**   
**Layer:**  
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Existing

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7/24/2026 4:04:04 PM (1)

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 **0.55** | **0.00** | **0.58**

**Subject:** Highlight  
**Page Label:** 29  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:04:04 PM  
**Status:**  
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0.00

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7/24/2026 4:04:05 PM (1)

---

 **3.53** | **0.00** | **3.73**

**Subject:** Highlight  
**Page Label:** 29  
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0.00

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7/24/2026 4:28:17 PM (1)

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 **Subject:** Line  
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**Date:** 7/24/2026 4:28:17 PM  
**Status:**  
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7/24/2026 4:28:22 PM (1)

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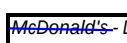
 **Subject:** Callout  
**Page Label:** 31  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:28:22 PM  
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**Layer:**  
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Waterview East Commercial Final Plat 1

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7/24/2026 4:28:31 PM (1)

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 **Subject:** Line  
**Page Label:** 28  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:28:31 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

7/24/2026 4:28:54 PM (1)

McDonald's - L  
Proposed Runoff  
(Rational Method

Subject: Line  
Page Label: 28  
Author: Laura Besler  
Date: 7/24/2026 4:28:54 PM  
Status:  
Color:   
Layer:  
Space:

7/24/2026 4:28:57 PM (1)

Existing

Subject: Callout  
Page Label: 28  
Author: Laura Besler  
Date: 7/24/2026 4:28:57 PM  
Status:  
Color:   
Layer:  
Space:

Existing

7/24/2026 4:29:04 PM (1)

Waterview East Commercial Final Plat 1

|                                 |            |           |            |           |            |           |            |           |            |
|---------------------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| McDonald's - Landscaping Report |            |           |            |           |            |           |            |           |            |
| Proposed Runoff Calculations    |            |           |            |           |            |           |            |           |            |
| Rational Method (Rational)      |            |           |            |           |            |           |            |           |            |
| Area                            | Impervious | Permeable | Impervious | Permeable | Impervious | Permeable | Impervious | Permeable | Impervious |
| 1000                            | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       |
| 1000                            | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       |

Subject: Callout  
Page Label: 28  
Author: Laura Besler  
Date: 7/24/2026 4:29:04 PM  
Status:  
Color:   
Layer:  
Space:

Waterview East Commercial Final Plat 1

7/24/2026 4:29:22 PM (1)

Existing

Subject: Callout  
Page Label: 27  
Author: Laura Besler  
Date: 7/24/2026 4:29:22 PM  
Status:  
Color:   
Layer:  
Space:

Existing

7/24/2026 4:29:29 PM (1)

Waterview East Commercial Final Plat 1

|                                 |            |           |            |           |            |           |            |           |            |
|---------------------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| McDonald's - Landscaping Report |            |           |            |           |            |           |            |           |            |
| Proposed Runoff Calculations    |            |           |            |           |            |           |            |           |            |
| Rational Method (Rational)      |            |           |            |           |            |           |            |           |            |
| Area                            | Impervious | Permeable | Impervious | Permeable | Impervious | Permeable | Impervious | Permeable | Impervious |
| 1000                            | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       |
| 1000                            | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       | 1000      | 1000       |

Subject: Callout  
Page Label: 27  
Author: Laura Besler  
Date: 7/24/2026 4:29:29 PM  
Status:  
Color:   
Layer:  
Space:

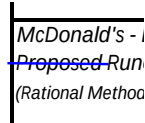
Waterview East Commercial Final Plat 1

7/24/2026 4:29:34 PM (1)

McDonald's - Dra  
Proposed Runoff  
(Rational Method Prc

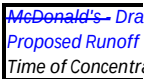
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Page Label: 27  
Author: Laura Besler  
Date: 7/24/2026 4:29:34 PM  
Status:  
Color:   
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7/24/2026 4:29:39 PM (1)



**Subject:** Line  
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7/24/2026 4:29:45 PM (1)



**Subject:** Line  
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**Status:**  
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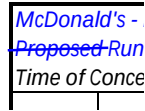
7/24/2026 4:29:51 PM (1)



**Subject:** Callout  
**Page Label:** 26  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:29:51 PM  
**Status:**  
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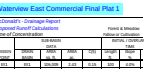
Existing

7/24/2026 4:29:54 PM (1)



**Subject:** Line  
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7/24/2026 4:30:02 PM (1)



**Subject:** Callout  
**Page Label:** 26  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:30:02 PM  
**Status:**  
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**Space:**

Waterview East Commercial Final Plat 1

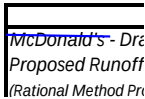
7/24/2026 4:30:23 PM (1)



**Subject:** Callout  
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**Date:** 7/24/2026 4:30:23 PM  
**Status:**  
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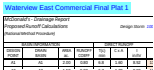
Waterview East Commercial Final Plat 1

7/24/2026 4:30:31 PM (1)



**Subject:** Line  
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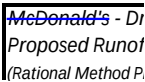
7/24/2026 4:30:35 PM (1)



**Subject:** Callout  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:30:35 PM  
**Status:**  
**Color:**   
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**Space:**

Waterview East Commercial Final Plat 1

7/24/2026 4:30:40 PM (1)



**Subject:** Line  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 7/24/2026 4:30:40 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

7/27/2026 9:00:05 AM (1)



**Subject:** Cloud+  
**Page Label:** 25  
**Author:** Laura Besler  
**Date:** 7/27/2026 9:00:05 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

For Paved and HSG A&B:  
  
C10=0.92  
C100=0.96  
  
(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

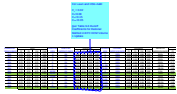
7/27/2026 9:00:46 AM (1)



**Subject:** Cloud+  
**Page Label:** 25  
**Author:** Laura Besler  
**Date:** 7/27/2026 9:00:46 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

For Lawn and HSG A&B:  
  
C2 = 0.02  
C5=0.08  
C10=0.15  
C100=0.35  
  
(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

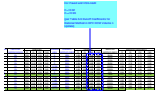
7/27/2026 9:06:02 AM (1)



**Subject:** Cloud+  
**Page Label:** 30  
**Author:** Laura Besler  
**Date:** 7/27/2026 9:06:02 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

For Lawn and HSG A&B:  
  
C2 = 0.02  
C5=0.08  
C10=0.15  
C100=0.35  
  
(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

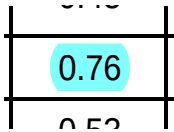
7/27/2026 9:06:34 AM (1)



**Subject:** Cloud+  
**Page Label:** 30  
**Author:** Laura Besler  
**Date:** 7/27/2026 9:06:34 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

For Paved and HSG A&B:  
  
C10=0.92  
C100=0.96  
  
(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

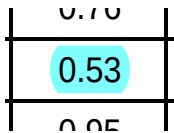
7/27/2026 10:30:33 AM (1)



**Subject:** Highlight  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 7/27/2026 10:30:33 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

0.76

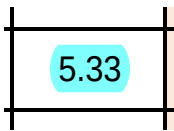
7/27/2026 10:33:25 AM (1)



**Subject:** Highlight  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 7/27/2026 10:33:25 AM  
**Status:**  
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**Layer:**  
**Space:**

0.53

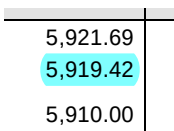
7/27/2026 10:36:51 AM (1)



**Subject:** Highlight  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 7/27/2026 10:36:51 AM  
**Status:**  
**Color:**   
**Layer:**  
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5.33

7/27/2026 11:00:05 AM (1)



**Subject:** Highlight  
**Page Label:** 49  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:00:05 AM  
**Status:**  
**Color:**   
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5,919.42



7/27/2026 11:03:28 AM (1)

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| 5,919.42 |  | <b>Subject:</b> Highlight          | 5,910.00 |
| 5,910.00 |  | <b>Page Label:</b> 49              |          |
| 5,918.89 |  | <b>Author:</b> Laura Besler        |          |
|          |  | <b>Date:</b> 7/27/2026 11:03:28 AM |          |
|          |  | <b>Status:</b>                     |          |
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7/27/2026 11:10:38 AM (1)

|          |    |                                    |          |
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| 5,921.99 | FL | <b>Subject:</b> Highlight          | 5,923.99 |
| 5,922.00 | FL | <b>Page Label:</b> 49              |          |
| 5,923.99 | FL | <b>Author:</b> Laura Besler        |          |
| 5,924.80 | FL | <b>Date:</b> 7/27/2026 11:10:38 AM |          |
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7/27/2026 11:26:11 AM (1)

|          |  |                                    |          |
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| (ft)     |  | <b>Subject:</b> Highlight          | 5,910.00 |
| 5,910.00 |  | <b>Page Label:</b> 50              |          |
| 5,913.79 |  | <b>Author:</b> Laura Besler        |          |
| 5,914.24 |  | <b>Date:</b> 7/27/2026 11:26:11 AM |          |
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7/27/2026 11:26:13 AM (1)

|       |  |                                    |       |
|-------|--|------------------------------------|-------|
| (ft)  |  | <b>Subject:</b> Highlight          | 104.6 |
| 104.6 |  | <b>Page Label:</b> 50              |       |
| 8.9   |  | <b>Author:</b> Laura Besler        |       |
|       |  | <b>Date:</b> 7/27/2026 11:26:13 AM |       |
|       |  | <b>Status:</b>                     |       |
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|       |  | <b>Layer:</b>                      |       |
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7/27/2026 11:26:15 AM (1)

|         |  |                                    |       |
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| (ft/ft) |  | <b>Subject:</b> Highlight          | 0.033 |
| 0.033   |  | <b>Page Label:</b> 50              |       |
| 0.028   |  | <b>Author:</b> Laura Besler        |       |
|         |  | <b>Date:</b> 7/27/2026 11:26:15 AM |       |
|         |  | <b>Status:</b>                     |       |
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7/27/2026 11:27:36 AM (1)

|          |  |                                    |          |
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| 5,919.79 |  | <b>Subject:</b> Highlight          | 5,917.71 |
| 5,914.34 |  | <b>Page Label:</b> 50              |          |
| 5,917.71 |  | <b>Author:</b> Laura Besler        |          |
| 5,910.00 |  | <b>Date:</b> 7/27/2026 11:27:36 AM |          |
| 5,912.52 |  | <b>Status:</b>                     |          |
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7/27/2026 11:27:40 AM (1)

|       |                                                                                                 |       |
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| 0.046 | <b>Author:</b> Laura Besler                                                                     |       |
|       | <b>Date:</b> 7/27/2026 11:27:40 AM                                                              |       |
|       | <b>Status:</b>                                                                                  |       |
|       | <b>Color:</b>  |       |
|       | <b>Layer:</b>                                                                                   |       |
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7/27/2026 11:31:22 AM (1)

|          |                                                                                                 |          |
|----------|-------------------------------------------------------------------------------------------------|----------|
| 5,917.71 | <b>Subject:</b> Highlight                                                                       | 5,910.00 |
| 5,910.00 | <b>Page Label:</b> 50                                                                           |          |
| 5,913.53 | <b>Author:</b> Laura Besler                                                                     |          |
| 5,910.77 | <b>Date:</b> 7/27/2026 11:31:22 AM                                                              |          |
|          | <b>Status:</b>                                                                                  |          |
|          | <b>Color:</b>  |          |
|          | <b>Layer:</b>                                                                                   |          |
|          | <b>Space:</b>                                                                                   |          |

7/27/2026 11:31:26 AM (1)

|       |                                                                                                 |      |
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| 157.8 | <b>Subject:</b> Highlight                                                                       | 55.6 |
| 55.6  | <b>Page Label:</b> 50                                                                           |      |
| 100.7 | <b>Author:</b> Laura Besler                                                                     |      |
|       | <b>Date:</b> 7/27/2026 11:31:26 AM                                                              |      |
|       | <b>Status:</b>                                                                                  |      |
|       | <b>Color:</b>  |      |
|       | <b>Layer:</b>                                                                                   |      |
|       | <b>Space:</b>                                                                                   |      |

7/27/2026 11:31:29 AM (1)

|       |                                                                                                   |       |
|-------|---------------------------------------------------------------------------------------------------|-------|
| 0.045 | <b>Subject:</b> Highlight                                                                         | 0.046 |
| 0.046 | <b>Page Label:</b> 50                                                                             |       |
| 0.060 | <b>Author:</b> Laura Besler                                                                       |       |
|       | <b>Date:</b> 7/27/2026 11:31:29 AM                                                                |       |
|       | <b>Status:</b>                                                                                    |       |
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7/27/2026 11:32:23 AM (1)

|       |                                                                                                   |      |
|-------|---------------------------------------------------------------------------------------------------|------|
| 100.7 | <b>Subject:</b> Highlight                                                                         | 17.6 |
| 17.6  | <b>Page Label:</b> 50                                                                             |      |
| 34.5  | <b>Author:</b> Laura Besler                                                                       |      |
|       | <b>Date:</b> 7/27/2026 11:32:23 AM                                                                |      |
|       | <b>Status:</b>                                                                                    |      |
|       | <b>Color:</b>  |      |
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7/27/2026 11:32:25 AM (1)

|       |                                                                                                   |       |
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| 0.048 | <b>Page Label:</b> 50                                                                             |       |
| 0.011 | <b>Author:</b> Laura Besler                                                                       |       |
|       | <b>Date:</b> 7/27/2026 11:32:25 AM                                                                |       |
|       | <b>Status:</b>                                                                                    |       |
|       | <b>Color:</b>  |       |
|       | <b>Layer:</b>                                                                                     |       |
|       | <b>Space:</b>                                                                                     |       |

7/27/2026 11:33:03 AM (1)

17.6  
34.5  
211.6

Subject: Highlight  
Page Label: 50  
Author: Laura Besler  
Date: 7/27/2026 11:33:03 AM  
Status:  
Color:   
Layer:  
Space: 34.5

7/27/2026 11:33:07 AM (1)

0.048  
0.011  
0.012

Subject: Highlight  
Page Label: 50  
Author: Laura Besler  
Date: 7/27/2026 11:33:07 AM  
Status:  
Color:   
Layer:  
Space: 0.011

7/27/2026 11:34:06 AM (1)

5,922.00  
5,923.99  
5,914.94  
5,915.44

Subject: Highlight  
Page Label: 50  
Author: Laura Besler  
Date: 7/27/2026 11:34:06 AM  
Status:  
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7/27/2026 11:39:01 AM (1)

29.8

Subject: Highlight  
Page Label: 50  
Author: Laura Besler  
Date: 7/27/2026 11:39:01 AM  
Status:  
Color:   
Layer:  
Space: 29.8

7/27/2026 11:39:03 AM (1)

0.029

Subject: Highlight  
Page Label: 50  
Author: Laura Besler  
Date: 7/27/2026 11:39:03 AM  
Status:  
Color:   
Layer:  
Space: 0.029

7/27/2026 11:41:13 AM (1)

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

17 Year

| Station  | Flow  | Depth | Velocity | Time  |
|----------|-------|-------|----------|-------|
| 1+00.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+01.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+02.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+03.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+04.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+05.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+06.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+07.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+08.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+09.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+10.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+11.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+12.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+13.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+14.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+15.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+16.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+17.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+18.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+19.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+20.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+21.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+22.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+23.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+24.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+25.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+26.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+27.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+28.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+29.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+30.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+31.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+32.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+33.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+34.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+35.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+36.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+37.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+38.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+39.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+40.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+41.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+42.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+43.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+44.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+45.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+46.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+47.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+48.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+49.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+50.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+51.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+52.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+53.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+54.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+55.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+56.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+57.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+58.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+59.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+60.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+61.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+62.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+63.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+64.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+65.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+66.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+67.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+68.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+69.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+70.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+71.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+72.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+73.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+74.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+75.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+76.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+77.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+78.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+79.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+80.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+81.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+82.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+83.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+84.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+85.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+86.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+87.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+88.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+89.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+90.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+91.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+92.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+93.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+94.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+95.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+96.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+97.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+98.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+99.00  | 1.000 | 1.000 | 1.000    | 1.000 |
| 1+100.00 | 1.000 | 1.000 | 1.000    | 1.000 |

Subject: Callout  
Page Label: 49  
Author: Laura Besler  
Date: 7/27/2026 11:41:13 AM  
Status:  
Color:   
Layer:  
Space:

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

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7/27/2026 11:41:17 AM (1)

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Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

5 Page

| Contract Table - Time & Discharge |          |           |      |           |
|-----------------------------------|----------|-----------|------|-----------|
| Station                           | Time     | Discharge | Time | Discharge |
| 5+00                              | 11:41:17 | 5,921.69  | 5+00 | 5,921.69  |
| 5+10                              | 11:41:17 | 5,919.42  | 5+10 | 5,919.42  |
| 5+20                              | 11:41:17 | 5,910.00  | 5+20 | 5,910.00  |

**Subject:** Callout  
**Page Label:** 50  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:41:17 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

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7/27/2026 11:44:47 AM (1)

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|          |
|----------|
| 5,921.69 |
| 5,919.42 |
| 5,910.00 |

**Subject:** Highlight  
**Page Label:** 57  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:44:47 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

5,919.42

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7/27/2026 11:44:57 AM (1)

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|          |
|----------|
| 5,921.69 |
| 5,919.42 |
| 5,910.00 |

**Subject:** Highlight  
**Page Label:** 57  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:44:57 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

5,919.42

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7/27/2026 11:45:00 AM (1)

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|          |
|----------|
| 5,919.42 |
| 5,910.00 |
| 5,925.03 |

**Subject:** Highlight  
**Page Label:** 57  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:45:00 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

5,910.00

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7/27/2026 11:45:02 AM (1)

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|          |
|----------|
| 5,919.42 |
| 5,910.00 |
| 5,918.89 |

**Subject:** Highlight  
**Page Label:** 57  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:45:02 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

5,910.00

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7/27/2026 11:45:06 AM (1)

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|          |
|----------|
| 5,910.00 |
| 5,925.03 |
| 5,930.24 |
| 5,924.62 |

**Subject:** Highlight  
**Page Label:** 57  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:45:06 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

5,925.03

|                           |                                                                                                 |          |
|---------------------------|-------------------------------------------------------------------------------------------------|----------|
| 7/27/2026 11:45:10 AM (1) |                                                                                                 |          |
| 5,923.50                  | <b>Subject:</b> Highlight                                                                       | 5,925.99 |
| 5,925.99                  | <b>Page Label:</b> 57                                                                           |          |
| 5,926.80                  | <b>Author:</b> Laura Besler                                                                     |          |
|                           | <b>Date:</b> 7/27/2026 11:45:10 AM                                                              |          |
|                           | <b>Status:</b>                                                                                  |          |
|                           | <b>Color:</b>  |          |
|                           | <b>Layer:</b>                                                                                   |          |
|                           | <b>Space:</b>                                                                                   |          |

|                           |                                                                                                 |          |
|---------------------------|-------------------------------------------------------------------------------------------------|----------|
| 7/27/2026 11:45:13 AM (1) |                                                                                                 |          |
| 5,934.62                  | <b>Subject:</b> Highlight                                                                       | 5,933.07 |
| 5,933.07                  | <b>Page Label:</b> 57                                                                           |          |
|                           | <b>Author:</b> Laura Besler                                                                     |          |
|                           | <b>Date:</b> 7/27/2026 11:45:13 AM                                                              |          |
|                           | <b>Status:</b>                                                                                  |          |
|                           | <b>Color:</b>  |          |
|                           | <b>Layer:</b>                                                                                   |          |
|                           | <b>Space:</b>                                                                                   |          |

|                           |                                                                                                 |          |
|---------------------------|-------------------------------------------------------------------------------------------------|----------|
| 7/27/2026 11:47:09 AM (1) |                                                                                                 |          |
| (ft)                      | <b>Subject:</b> Highlight                                                                       | 5,910.00 |
| 5,910.00                  | <b>Page Label:</b> 58                                                                           |          |
| 5,913.79                  | <b>Author:</b> Laura Besler                                                                     |          |
| 5,914.24                  | <b>Date:</b> 7/27/2026 11:47:09 AM                                                              |          |
|                           | <b>Status:</b>                                                                                  |          |
|                           | <b>Color:</b>  |          |
|                           | <b>Layer:</b>                                                                                   |          |
|                           | <b>Space:</b>                                                                                   |          |

|                           |                                                                                                   |       |
|---------------------------|---------------------------------------------------------------------------------------------------|-------|
| 7/27/2026 11:47:12 AM (1) |                                                                                                   |       |
| (ft)                      | <b>Subject:</b> Highlight                                                                         | 104.6 |
| 104.6                     | <b>Page Label:</b> 58                                                                             |       |
| 8.9                       | <b>Author:</b> Laura Besler                                                                       |       |
|                           | <b>Date:</b> 7/27/2026 11:47:12 AM                                                                |       |
|                           | <b>Status:</b>                                                                                    |       |
|                           | <b>Color:</b>  |       |
|                           | <b>Layer:</b>                                                                                     |       |
|                           | <b>Space:</b>                                                                                     |       |

|                           |                                                                                                   |       |
|---------------------------|---------------------------------------------------------------------------------------------------|-------|
| 7/27/2026 11:47:14 AM (1) |                                                                                                   |       |
| ft/ft)                    | <b>Subject:</b> Highlight                                                                         | 0.033 |
| 0.033                     | <b>Page Label:</b> 58                                                                             |       |
| 0.028                     | <b>Author:</b> Laura Besler                                                                       |       |
|                           | <b>Date:</b> 7/27/2026 11:47:14 AM                                                                |       |
|                           | <b>Status:</b>                                                                                    |       |
|                           | <b>Color:</b>  |       |
|                           | <b>Layer:</b>                                                                                     |       |
|                           | <b>Space:</b>                                                                                     |       |

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|---------------------------|---------------------------------------------------------------------------------------------------|----------|
| 7/27/2026 11:47:19 AM (1) |                                                                                                   |          |
| 5,914.34                  | <b>Subject:</b> Highlight                                                                         | 5,917.71 |
| 5,917.71                  | <b>Page Label:</b> 58                                                                             |          |
| 5,910.00                  | <b>Author:</b> Laura Besler                                                                       |          |
| 5,912.52                  | <b>Date:</b> 7/27/2026 11:47:19 AM                                                                |          |
|                           | <b>Status:</b>                                                                                    |          |
|                           | <b>Color:</b>  |          |
|                           | <b>Layer:</b>                                                                                     |          |
|                           | <b>Space:</b>                                                                                     |          |



|                           |                                                                                                                                                                                                                                                                                |       |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 7/27/2026 11:47:29 AM (1) |                                                                                                                                                                                                                                                                                |       |
| 0.028                     | <b>Subject:</b> Highlight<br><b>Page Label:</b> 58<br><b>Author:</b> Laura Besler<br><b>Date:</b> 7/27/2026 11:47:29 AM<br><b>Status:</b><br><b>Color:</b> <br><b>Layer:</b><br><b>Space:</b> | 0.045 |
| 0.045                     |                                                                                                                                                                                                                                                                                |       |
| 0.046                     |                                                                                                                                                                                                                                                                                |       |
|                           |                                                                                                                                                                                                                                                                                |       |

|                           |                                                                                                                                                                                                                                                                                |       |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 7/27/2026 11:47:32 AM (1) |                                                                                                                                                                                                                                                                                |       |
| 0.045                     | <b>Subject:</b> Highlight<br><b>Page Label:</b> 58<br><b>Author:</b> Laura Besler<br><b>Date:</b> 7/27/2026 11:47:32 AM<br><b>Status:</b><br><b>Color:</b> <br><b>Layer:</b><br><b>Space:</b> | 0.046 |
| 0.046                     |                                                                                                                                                                                                                                                                                |       |
| 0.060                     |                                                                                                                                                                                                                                                                                |       |
|                           |                                                                                                                                                                                                                                                                                |       |

|                           |                                                                                                                                                                                                                                                                                |      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7/27/2026 11:47:36 AM (1) |                                                                                                                                                                                                                                                                                |      |
| 157.8                     | <b>Subject:</b> Highlight<br><b>Page Label:</b> 58<br><b>Author:</b> Laura Besler<br><b>Date:</b> 7/27/2026 11:47:36 AM<br><b>Status:</b><br><b>Color:</b> <br><b>Layer:</b><br><b>Space:</b> | 55.6 |
| 55.6                      |                                                                                                                                                                                                                                                                                |      |
| 100.7                     |                                                                                                                                                                                                                                                                                |      |
|                           |                                                                                                                                                                                                                                                                                |      |

|                           |                                                                                                                                                                                                                                                                                  |          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 7/27/2026 11:47:38 AM (1) |                                                                                                                                                                                                                                                                                  |          |
| 5,917.71                  | <b>Subject:</b> Highlight<br><b>Page Label:</b> 58<br><b>Author:</b> Laura Besler<br><b>Date:</b> 7/27/2026 11:47:38 AM<br><b>Status:</b><br><b>Color:</b> <br><b>Layer:</b><br><b>Space:</b> | 5,910.00 |
| 5,910.00                  |                                                                                                                                                                                                                                                                                  |          |
| 5,913.53                  |                                                                                                                                                                                                                                                                                  |          |
| 5,910.77                  |                                                                                                                                                                                                                                                                                  |          |

|                           |                                                                                                                                                                                                                                                                                  |      |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7/27/2026 11:47:43 AM (1) |                                                                                                                                                                                                                                                                                  |      |
| 100.7                     | <b>Subject:</b> Highlight<br><b>Page Label:</b> 58<br><b>Author:</b> Laura Besler<br><b>Date:</b> 7/27/2026 11:47:43 AM<br><b>Status:</b><br><b>Color:</b> <br><b>Layer:</b><br><b>Space:</b> | 17.6 |
| 17.6                      |                                                                                                                                                                                                                                                                                  |      |
| 34.5                      |                                                                                                                                                                                                                                                                                  |      |
|                           |                                                                                                                                                                                                                                                                                  |      |

|                           |                                                                                                                                                                                                                                                                                  |      |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7/27/2026 11:47:45 AM (1) |                                                                                                                                                                                                                                                                                  |      |
| 17.6                      | <b>Subject:</b> Highlight<br><b>Page Label:</b> 58<br><b>Author:</b> Laura Besler<br><b>Date:</b> 7/27/2026 11:47:45 AM<br><b>Status:</b><br><b>Color:</b> <br><b>Layer:</b><br><b>Space:</b> | 34.5 |
| 34.5                      |                                                                                                                                                                                                                                                                                  |      |
| 211.6                     |                                                                                                                                                                                                                                                                                  |      |
|                           |                                                                                                                                                                                                                                                                                  |      |

7/27/2026 11:47:52 AM (1)

0.060  
0.048  
0.011

Subject: Highlight  
Page Label: 58  
Author: Laura Besler  
Date: 7/27/2026 11:47:52 AM  
Status:  
Color:   
Layer:  
Space:

0.04

7/27/2026 11:47:58 AM (1)

0.048  
0.011  
0.012

Subject: Highlight  
Page Label: 58  
Author: Laura Besler  
Date: 7/27/2026 11:47:58 AM  
Status:  
Color:   
Layer:  
Space:

0.011

7/27/2026 11:48:46 AM (1)

29.8

Subject: Highlight  
Page Label: 58  
Author: Laura Besler  
Date: 7/27/2026 11:48:46 AM  
Status:  
Color:   
Layer:  
Space:

29.8

7/27/2026 11:48:51 AM (1)

0.029

Subject: Highlight  
Page Label: 58  
Author: Laura Besler  
Date: 7/27/2026 11:48:51 AM  
Status:  
Color:   
Layer:  
Space:

0.029

7/27/2026 11:49:51 AM (1)

5,920.62  
5,922.00  
5,923.99  
5,914.94  
5,915.44  
5,916.40

MH-3  
MH-4  
MH-1  
MH-3  
MH-5  
MH-6

Subject: Highlight  
Page Label: 58  
Author: Laura Besler  
Date: 7/27/2026 11:49:51 AM  
Status:  
Color:   
Layer:  
Space:

MH-1  
5,923.99

7/27/2026 11:51:31 AM (1)

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

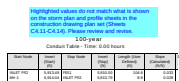
Check Basin Totals - Total 0.00 hours

| Basin   | Volume | Area | Perimeter | Length | Width | Depth | Volume | Area | Perimeter | Length | Width | Depth |
|---------|--------|------|-----------|--------|-------|-------|--------|------|-----------|--------|-------|-------|
| Basin 1 | 1000   | 1000 | 1000      | 1000   | 1000  | 1000  | 1000   | 1000 | 1000      | 1000   | 1000  | 1000  |

Subject: Callout  
Page Label: 57  
Author: Laura Besler  
Date: 7/27/2026 11:51:31 AM  
Status:  
Color:   
Layer:  
Space:

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

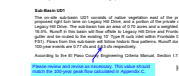
7/27/2026 11:51:35 AM (1)



**Subject:** Callout  
**Page Label:** 58  
**Author:** Laura Besler  
**Date:** 7/27/2026 11:51:35 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Highlighted values do not match what is shown on the storm plan and profile sheets in the construction drawing plan set (Sheets C4.11-C4.14). Please review and revise.

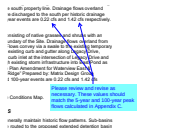
7/27/2026 1:15:34 PM (1)



**Subject:** Callout  
**Page Label:** 9  
**Author:** Laura Besler  
**Date:** 7/27/2026 1:15:34 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please review and revise as necessary. This value should match the 100-year peak flow calculated in Appendix C.

7/27/2026 1:16:15 PM (1)



**Subject:** Callout  
**Page Label:** 7  
**Author:** Laura Besler  
**Date:** 7/27/2026 1:16:15 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please review and revise as necessary. These values should match the 5-year and 100-year peak flows calculated in Appendix C.

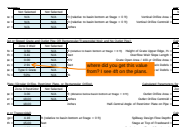
7/27/2026 1:16:40 PM (1)



**Subject:** Callout  
**Page Label:** 6  
**Author:** Laura Besler  
**Date:** 7/27/2026 1:16:40 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Please specify whether storm pipes referenced in each sub-basin description are private or public.

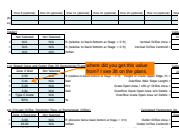
8/5/2026 10:07:43 AM (1)



**Subject:** SW - Textbox with Arrow  
**Page Label:** 38  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/5/2026 10:07:43 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

where did you get this value from? I see 4ft on the plans.

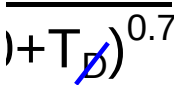
8/5/2026 10:07:48 AM (1)



**Subject:** SW - Textbox with Arrow  
**Page Label:** 38  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/5/2026 10:07:48 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

where did you get this value from? I see 3ft on the plans.

8/5/2026 10:17:10 AM (1)



**Subject:** Line  
**Page Label:** 24  
**Author:** Laura Besler  
**Date:** 8/5/2026 10:17:10 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

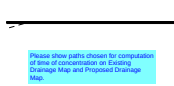
8/5/2026 10:17:20 AM (1)



**Subject:** Callout  
**Page Label:** 24  
**Author:** Laura Besler  
**Date:** 8/5/2026 10:17:20 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

C

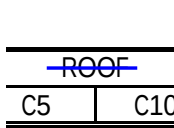
8/5/2026 10:52:16 AM (1)



**Subject:** Callout  
**Page Label:** [1] DR-EX  
**Author:** Laura Besler  
**Date:** 8/5/2026 10:52:16 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

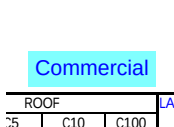
Please show paths chosen for computation of time of concentration on Existing Drainage Map and Proposed Drainage Map.

8/5/2026 2:48:18 PM (1)



**Subject:** Line  
**Page Label:** 30  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:48:18 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

8/5/2026 2:50:20 PM (1)



**Subject:** Callout  
**Page Label:** 30  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:50:20 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Commercial

8/5/2026 2:50:41 PM (1)



**Subject:** Cloud+  
**Page Label:** 30  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:50:41 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

For Commercial and HSG A&B:

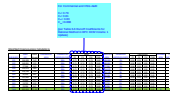
C2= 0.79  
C5= 0.81  
C10= 0.83  
C100=0.888

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

---

8/5/2026 2:51:40 PM (1)

---



**Subject:** Cloud+  
**Page Label:** 25  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:51:40 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

For Commercial and HSG A&B:

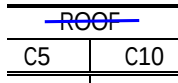
C2= 0.79  
C5= 0.81  
C10= 0.83  
C100=0.888

(per Table 6-6 Runoff Coefficients for Rational Method in EPC DCM Volume 1 Update)

---

8/5/2026 2:51:48 PM (1)

---



**Subject:** Line  
**Page Label:** 25  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:51:48 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

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8/5/2026 2:52:00 PM (1)

---



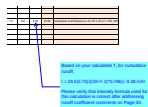
**Subject:** Callout  
**Page Label:** 25  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:52:00 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Commercial

---

8/5/2026 2:55:15 PM (1)

---



**Subject:** Callout  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:55:15 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Based on your calculated TC for cumulative runoff,

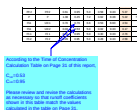
$$I = 28.5(2.75)/((10+7.2)^{0.786}) = 8.38 \text{ in/hr}$$

Please verify that intensity formula used for this calculation is correct after addressing runoff coefficient comments on Page 30.

---

8/5/2026 2:55:31 PM (1)

---



**Subject:** Callout  
**Page Label:** 33  
**Author:** Laura Besler  
**Date:** 8/5/2026 2:55:31 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

According to the Time of Concentration Calculation Table on Page 31 of this report,

C100=0.53  
C100=0.95

Please review and revise the calculations as necessary so that runoff coefficients shown in this table match the values calculated in the table on Page 31.

8/5/2026 3:00:48 PM (1)

eloped consisting of overlot graded conditions comprising the northeast portion of the existing swale at slopes of 2-8%. Flow in and eventually discharge to the curb or to an existing 10' Type R curb inlet at the lows are then carried through existing stormwater Development Drainage Plan Amendment Plan for Trails at Aspen Ridge' Prepa off during the 5-year and 100-year events.

**Subject:** Highlight  
**Page Label:** 6  
**Author:** CDurham  
**Date:** 8/5/2026 3:00:48 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

existing 10' Type R curb inlet

8/5/2026 3:00:57 PM (1)

Label inlet on map

at graded conditions and existing  
portion of the property. Drainage  
s of 2-8%. Flows are collected in  
e to the curb and gutter within  
urb inlet at the intersection of  
igh existing storm infrastructure

**Subject:** Callout  
**Page Label:** 6  
**Author:** CDurham  
**Date:** 8/5/2026 3:00:57 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Label inlet on map

8/5/2026 3:03:38 PM (1)

**Forecasting Stock Price** - Using the  
 Histograms and Normal Distribution

Downloaded by Statistics Group September 2016. During that year the year and 100-year returns are 10% and 40% respectively.

**Stock Mean 0.1%**  
 The stock mean return  $\mu$  is an unweighted average of a single period's returns and assuming the probability of a stock price increase is 50%, the 100-year return is 40% and the 1-year return is 10%, the stock mean return averages between 10% and 40%. If there is a 50% chance of an upward trajectory without price volatility, the average return is calculated as follows:

$$\mu = 0.50(10\%) + 0.50(40\%) = 25\%$$

**Stock Mean 0.1%**  
 The stock mean return  $\mu$  is an unweighted average of a single period's returns and assuming the probability of a stock price increase is 50%, the 100-year return is 40% and the 1-year return is 10%, the stock mean return averages between 10% and 40%. If there is a 50% chance of an upward trajectory without price volatility, the average return is calculated as follows:

$$\mu = 0.50(10\%) + 0.50(40\%) = 25\%$$

**Stock Mean 0.1%**  
 The stock mean return  $\mu$  is an unweighted average of a single period's returns and assuming the probability of a stock price increase is 50%, the 100-year return is 40% and the 1-year return is 10%, the stock mean return averages between 10% and 40%. If there is a 50% chance of an upward trajectory without price volatility, the average return is calculated as follows:

$$\mu = 0.50(10\%) + 0.50(40\%) = 25\%$$

**Subject:** Highlight  
**Page Label:** 7  
**Author:** CDurham  
**Date:** 8/5/2026 3:03:38 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

historic drainage  
conditions

8/5/2026 3:05:19 PM (1)

site sub-basin EX-8 is undeveloped cons on with an area of 1.17 acres within the : erland from east to west at slopes rangir ist per **historic drainage conditions**. Runo : and 3.73 cfs respectively.

**sin EX-9**  
site sub-basin EX-9 is undeveloped cons  
ion with an area of 0.32 acres along the s

**Subject:** Highlight  
**Page Label:** 7  
**Author:** CDurham  
**Date:** 8/5/2026 3:05:19 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

historic drainage conditions

8/5/2026 3:05:39 PM (1)

[illegible]

**Subject:** Callout  
**Page Label:** 7  
**Author:** CDurham  
**Date:** 8/5/2026 3:05:39 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

as overland, thru swale, inlet, c&g? Tell us where and what happens with flow

8/5/2026 3:05:44 PM (1)

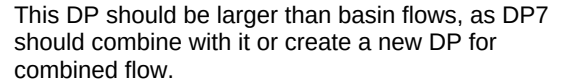
[illegible]

**Subject:** Highlight  
**Page Label:** 7  
**Author:** CDurham  
**Date:** 8/5/2026 3:05:44 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

historic drainage  
conditions



8/5/2026 3:07:31 PM (1)



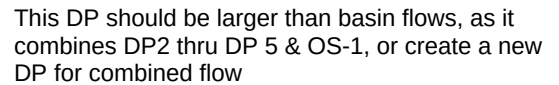
8/5/2026 3:08:08 PM (1)



8/5/2026 3:08:21 PM (1)



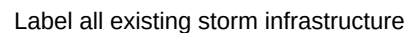
8/5/2026 3:09:09 PM (1)



8/5/2026 3:13:55 PM (1)



8/5/2026 3:24:32 PM (1)



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8/5/2026 3:25:40 PM (1)

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**Subject:** Callout  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:25:40 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Label outlet pipe

---

8/5/2026 3:26:42 PM (1)

---



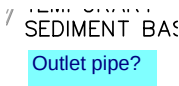
**Subject:** Callout  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:26:42 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

What is this? Label or turn off

---

8/5/2026 3:26:59 PM (1)

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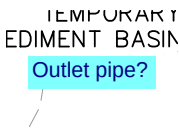
**Subject:** Text Box  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:26:59 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Outlet pipe?

---

8/5/2026 3:27:09 PM (1)

---



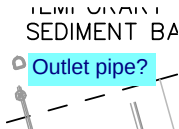
**Subject:** Text Box  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:27:09 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Outlet pipe?

---

8/5/2026 3:27:36 PM (1)

---



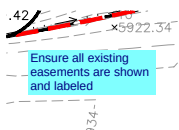
**Subject:** Text Box  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:27:36 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Outlet pipe?

---

8/5/2026 3:29:12 PM (1)

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**Subject:** Text Box  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:29:12 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Ensure all existing easements are shown and labeled

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8/5/2026 3:30:48 PM (1)

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**Subject:** Text Box  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:30:48 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Include all of Tract C - Proposed drainage map needs to include entire area covered by plat

---

8/5/2026 3:32:45 PM (1)

---



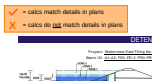
**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:32:45 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Provide slopes, anything steeper than 4:1

---

8/5/2026 3:37:32 PM (1)

---



**Subject:** MHFD Calcs  
**Page Label:** 38  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/5/2026 3:37:32 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

---

8/5/2026 3:37:42 PM (1)

---

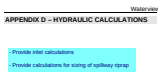


**Subject:** Checkmark  
**Page Label:** 38  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/5/2026 3:37:42 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

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8/5/2026 3:38:38 PM (1)

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**Subject:** Text Box  
**Page Label:** 35  
**Author:** CDurham  
**Date:** 8/5/2026 3:38:38 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

- Provide inlet calculations  
- Provide calculations for sizing of spillway riprap

---

8/5/2026 3:39:38 PM (1)

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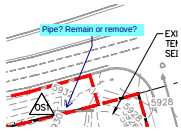
**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:39:38 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

What is this line? Label or turn off

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8/5/2026 3:40:27 PM (1)

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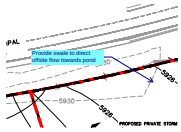
**Subject:** Callout  
**Page Label:** [1] DR-EX  
**Author:** CDurham  
**Date:** 8/5/2026 3:40:27 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Pipe? Remain or remove?

---

8/5/2026 3:41:21 PM (1)

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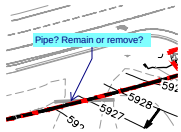
**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:41:21 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Provide swale to direct offsite flow towards pond

---

8/5/2026 3:41:27 PM (1)

---



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:41:27 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Pipe? Remain or remove?

---

8/5/2026 3:42:38 PM (1)

---



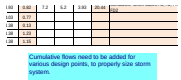
**Subject:** Cloud+  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:42:38 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Missing storm or leader needs to be moved

---

8/5/2026 3:43:56 PM (1)

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**Subject:** Text Box  
**Page Label:** 32  
**Author:** CDurham  
**Date:** 8/5/2026 3:43:56 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Cumulative flows need to be added for various design points, to properly size storm system.

---

8/5/2026 3:46:56 PM (1)

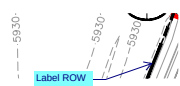
---



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:46:56 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

What is this line? Please label or turn off.

8/5/2026 3:53:51 PM (1)



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:53:51 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Label ROW

8/5/2026 3:54:31 PM (1)



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:54:31 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Label cross pan

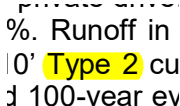
8/5/2026 3:55:25 PM (1)



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 3:55:25 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Ensure flows haven't increased to existing inlets, or if they have, inlets are able to handle increase

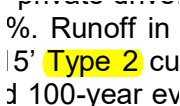
8/5/2026 3:58:32 PM (1)



**Subject:** Highlight  
**Page Label:** 8  
**Author:** CDurham  
**Date:** 8/5/2026 3:58:32 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Type 2

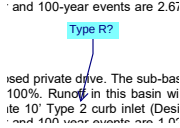
8/5/2026 3:59:07 PM (1)



**Subject:** Highlight  
**Page Label:** 9  
**Author:** CDurham  
**Date:** 8/5/2026 3:59:07 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Type 2

8/5/2026 3:59:14 PM (1)



**Subject:** Callout  
**Page Label:** 8  
**Author:** CDurham  
**Date:** 8/5/2026 3:59:14 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Type R?

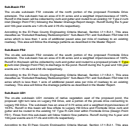
8/5/2026 3:59:52 PM (1)

... of 100%  
10' Type 2 cur  
... the 5-yea

**Subject:** Highlight  
**Page Label:** 9  
**Author:** CDurham  
**Date:** 8/5/2026 3:59:52 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Type 2

8/5/2026 4:01:17 PM (1)



**Subject:** Highlight  
**Page Label:** 9  
**Author:** CDurham  
**Date:** 8/5/2026 4:01:17 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Type 2

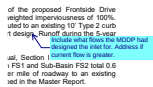
8/5/2026 4:01:23 PM (1)



**Subject:** Callout  
**Page Label:** 9  
**Author:** CDurham  
**Date:** 8/5/2026 4:01:23 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Type R?

8/5/2026 4:02:11 PM (1)



**Subject:** Callout  
**Page Label:** 9  
**Author:** CDurham  
**Date:** 8/5/2026 4:02:11 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Include what flows the MDDP had designed the inlet for. Address if current flow is greater.

8/5/2026 4:02:35 PM (1)

to Legal Hill  
phy. Accordi

**Subject:** Highlight  
**Page Label:** 10  
**Author:** CDurham  
**Date:** 8/5/2026 4:02:35 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Legal

8/5/2026 4:21:58 PM (1)

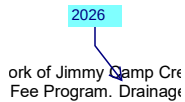


**Subject:** SW - Textbox with Arrow  
**Page Label:** 36  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/5/2026 4:21:58 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

So the intent of "Basin ID" here is actually the name of the pond. So input "Pond P" here. You can leave the trib drainage basins in parenthesis next to "Pond P" though if you want to.



8/5/2026 4:22:33 PM (1)



**Subject:** Callout  
**Page Label:** 12  
**Author:** CDurham  
**Date:** 8/5/2026 4:22:33 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

2026

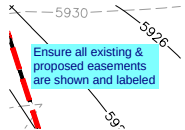
8/5/2026 4:23:35 PM (1)



**Subject:** Text Box  
**Page Label:** 13  
**Author:** CDurham  
**Date:** 8/5/2026 4:23:35 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Provide comparison of what previous reports had as flows entering storm system from this site to what this report has.

8/5/2026 4:30:54 PM (1)



**Subject:** Text Box  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 4:30:54 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Ensure all existing & proposed easements are shown and labeled

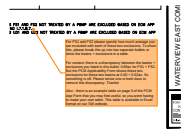
8/5/2026 4:31:14 PM (1)



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/5/2026 4:31:14 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Include road names

8/6/2026 8:37:51 AM (1)



**Subject:** SW - Textbox with Arrow  
**Page Label:** [1] DR-1  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/6/2026 8:37:51 AM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

For FS1 and FS2 please specify how much acreage you are excluded with each of these two exclusions. To show this, please break this up into two separate bullets or show the basins + exclusions in a table.

For context: there is a discrepancy between the basins + exclusions you listed in this bullet: 0.99ac for FS1 + FS2. But the PCM Applicability Form shows these two exclusions for these two basins at 0.60 + 0.62ac. So something is off. Please revise one or both docs to remove this discrepancy. Thanks!

Also - there is an example table on page 5 of the PCM App Form that you may find useful, so you arent having to make your own table. This table is available in Excel format on our SW website.

8/6/2026 8:37:55 AM (1)



**Subject:** SW - Textbox with Arrow  
**Page Label:** [1] DR-1  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/6/2026 8:37:55 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Similarly there is a discrepancy between this bullet and what is shown in the Notes on page 3 of the PCM Form. The PCM Form states that only 0.06ac from these basins utilizes this exclusion, but this bullet here implies that the entire basins are using this exclusion (so 0.73ac). Please rectify this discrepancy.

8/6/2026 9:15:15 AM (1)

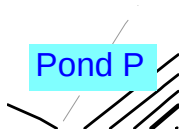


**Subject:** SW - Textbox with Arrow  
**Page Label:** [1] DR-1  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 8/6/2026 9:15:15 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

The MS4 states that this exclusion is only applicable when it has been: "determined that it is not practicable to capture runoff from portions of the site that will not drain towards control measures." But it appears that all or most of UD 1 could be conveyed to the pond relatively easily with a small swale near the bottom of that hill.

However, it appears that the pervious area of that basin would qualify for Exclusion G on the PCM App Form. So I recommend just using that exclusion so you can save the "up to 1ac" exclusion for something later (sometimes more of that exclusion is needed at the as-built phase if the contractor doesn't convey parts of the site to the pond that were originally designed to go to the pond).

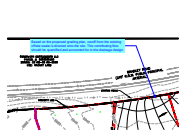
8/18/2026 4:09:12 PM (1)



**Subject:** Text Box  
**Page Label:** [1] DR-1  
**Author:** CDurham  
**Date:** 8/18/2026 4:09:12 PM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Pond P

8/19/2026 10:00:08 AM (1)



**Subject:** Callout  
**Page Label:** [1] DR-1  
**Author:** Laura Besler  
**Date:** 8/19/2026 10:00:08 AM  
**Status:**  
**Color:**   
**Layer:**  
**Space:**

Based on the proposed grading plan, runoff from the existing offsite swale is directed onto the site. This contributing flow should be quantified and accounted for in the drainage design.