Preliminary

FINAL DRAINAGE REPORT
FOR
STERLING RANCH EAST FILING NO. 2
&
STERLING RANCH EAST FILING NO. 8
(Formerly Foursquare at Sterling Ranch)

September 2025
August 2026

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FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 2 & STERLING RANCH EAST FILING NO. 8

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

_____ _____

Marc A. Whorton, Colorado P.E. #37155 Date

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

Business Name: Classic SRJ Land, LLC

By: _____

Title: _____

Address: 2138 Flying Horse Club Dr.
Colorado Springs, CO 80921

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. Date
County Engineer / ECM Administrator

Conditions:

FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 2 & STERLING RANCH EAST FILING NO. 8

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FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 2 & STERLING RANCH EAST FILING NO. 8

PURPOSE

This document is the Final Drainage Report for Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8. The Sterling Ranch East Filing No. 8 portion of the development was originally approved as "*Foursquare at Sterling Ranch East Filing No. 1*" (SF2236), then resubmitted under SF2526. **Only this portion of the report is changing based on updated Right-of-Way and lots due to a product change. (Reference the Preliminary Drainage Report for Sterling Ranch East Filing No. 6 Preliminary Plan – SP244) Also, the pond tract has been removed from Filing No. 8 and will now be platted with Filing No. 6. However, this facility (Pond FSD-16) will be constructed with whichever subdivision is developed first (Filing 2 or Filing 8).** The Filing No. 2 portion of the report remains consistent with the previously approved development and report found under EPC file number SF2237. The purpose of this report is to identify the adjusted onsite and offsite drainage patterns within the Filing No. 8 platting area, define areas tributary to the proposed full spectrum detention and water quality facility (Pond FSD-16), and to safely route developed storm water runoff via a proposed storm sewer system.

PROJECT DESCRIPTION

The Sterling Ranch East Filing No. 2 development remains as 16.841 acres and Sterling Ranch East Filing No. 8 is now 25.456 acres (without the Pond FSD-16 tract) within the Sterling Ranch East phased master planned community located in northern El Paso County, Colorado. These developments consist of public residential roadways and single-family home lots. The site is located in portion of Section 33 & 34, Township 12 South, Range 65 west of the 6th p.m. in El Paso County, Colorado. The site is located on the east side of Sand Creek. The site is bounded on the north, east and west by proposed and future Sterling Ranch East residential development, west and south by the extension of Briargate Pkwy. The site is in the upper portion of both the Sand Creek and Sand Creek East Fork Drainage Basins. These sites will likely be constructed concurrently.

PREVIOUS REPORTS

The latest and most applicable previously approved drainage studies are the following:

1. “Final Drainage Report for Sterling Ranch East Filing No. 4”, by Classic Consulting Engineers & Surveyors, LLC, EPC file number SF2615.
2. “Final Drainage Report for Sterling Ranch East Filing No. 6”, by Classic Consulting Engineers & Surveyors, LLC, EPC file number SF2610.
3. “Final Drainage Report for Sterling Ranch East Filing No. 2 & Filing No. 8”, by Classic Consulting Engineers & Surveyors, LLC dated September 2025, EPC file number SF2526.
4. “Preliminary Drainage Report for Sterling Ranch East Filing No. 6 Preliminary Plan Final Drainage Report for Early Grading”, by Classic Consulting Engineers & Surveyors, LLC dated 4/16/25, EPC file number SP244.
5. “Final Drainage Report for Sterling Ranch East Filing No. 2 and Foursquare at Sterling Ranch East Filing No. 1”, by Classic Consulting Engineers & Surveyors, LLC approved 9/17/24, EPC file number SF2236 & SF2237.
6. “Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1,” by Classic Consulting Engineers & Surveyors, LLC dated 10/10/22.
7. “Master Development Drainage Plan Amendment for Sterling Ranch,” by JR Engineering, LLC, dated September 2022.
8. “2018 Sterling Ranch MDDP,” by M&S Civil Consultants, Inc. June 2018.
9. “Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan,” by JR Engineering, LLC dated September 2022.
10. “Final Drainage Report for Sand Creek Restoration,” by JR Engineering, LLC, dated September 2022.

SOILS AND GEOLOGY

The soils within the Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 site and tributary area are Hydrologic Soil Group A, Blakeland loamy sand and Columbine gravelly sandy loam and Soil Group B Pring Coarse Sandy Loam (included for future areas) (See Appendix for Soil Map).

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the DCM as revised in May 2014. Full Spectrum Detention and Stormwater quality analysis, Extended Detention Basin (EDB) design, are per the Mile High Flood District Manual and MHFD-Detention version 4.06 and UD-BMP version 3.07 spreadsheet. The Rational Method was used to estimate stormwater runoff from the developed project and tributary to the proposed full spectrum detention/water quality pond. The UDFCD UD-Inlet excel workbook was used to verify street capacities, size sump inlets, and calculate interception and flow-by rates of at-grade inlets. The UD-Sewer computer program was used to calculate the hydraulic grade line (HGL) within the storm sewer system. An overall tributary area exhibit is included to show the various types of pervious and impervious areas established to determine the overall imperviousness of the 220.90 ultimate acres tributary to the proposed full spectrum detention/water quality facility (FSD Pond 16) and 44.02 interim acres are tributary with development of Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 only.

FLOODPLAIN STATEMENT

No portions of the Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 are located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Numbers 08041C 0533G, effective date, December 7, 2018.

EXISTING DRAINAGE CONDITIONS

The "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1," by Classic Consulting Engineers & Surveyors, LLC in full detail describes the Existing Conditions of the proposed development area. Please see this report for the full descriptions. The Pre-Developed (Existing) Conditions Maps are included in the Appendix of this Report and include the Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 boundary's.

The proposed site is located within Basins EX-5, EX-7, EX-9 & EX10A of the Preliminary Drainage Report study and drains north to south. The site has been previously disturbed with mass grading operations and vegetation is sparse and of natural grassland consistency (no trees or shrubs). See previous reports for additional details on the Existing Conditions.

The adjacent Briargate Parkway and Sterling Ranch Road drainage and roadway design was completed by JR Engineering, "Drainage Letter for Sterling Ranch Road and Briargate Parkway Interim Plan," May 2022. These roadways and storm system have now been constructed in conjunction with the proposed Filing No. 1 development. Therefore, the storm system described within this JR Engineering Letter and Construction Drawings is shown as 'Existing' with storm sewer extensions into the storm system for Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8.

PROPOSED DRAINAGE CONDITIONS

Developed runoff from Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 will be collected in a public-private storm system and piped into the Privately owned and maintained full spectrum detention/water quality facility (Pond FSD-16) that will detain and treat the developed runoff prior to releasing at or below historic rates to the downstream channel (Sand Creek Reach SC-9). As previously mentioned, the rational method was used to estimate developed runoff values. All storm sewer inlets and pipes collecting runoff within the County right-of-way will be 'Public'. All storm sewer outside of right-of-way, including the pond outfall pipe, is 'Private' as is the proposed full spectrum detention facility. Private facilities will be owned and maintained by the Sterling Ranch Metropolitan District. HGL calculations are included in the Appendix in support of the construction drawings for the proposed Public and Private storm systems.

Per the current El Paso County Drainage Criteria for stormwater capacity within street sections, the following summaries of Figures 7-7 apply: all proposed roads are Residential.

Street Type	*Allowable – Initial Storm (5 yr)*	*Allowable–Major Storm (100 yr)*
Residential w/Ramp Curb	1.5% street slope = 10 cfs 2% street slope = 12 cfs 4% street slope = 16.5 cfs 6% street slope = 19.5 cfs 8% street slope = 17.8 cfs 10% street slope = 16.5 cfs No curb overtopping.	1.5% street slope = 46 cfs 2% street slope = 44 cfs 4% street slope = 36 cfs 6% street slope = 32 cfs 8% street slope = 29 cfs 10% street slope = 27.5 cfs 12" maximum depth at flowline.
Residential w/Vertical Curb (6" Vertical Curb)	1.5% street slope = 13 cfs 2% street slope = 15 cfs 4% street slope = 20.5 cfs 6% street slope = 18 cfs 8% street slope = 16.8 cfs 10% street slope = 15.7 cfs No curb overtopping.	1.5% street slope = 45 cfs 2% street slope = 43 cfs 4% street slope = 35 cfs 6% street slope = 31 cfs 8% street slope = 28 cfs 10% street slope = 26.5 cfs 12" maximum depth at flowline.

At-grade inlets and sump (low-points) were designed in a way that street capacity is not an issue anywhere within the proposed Filings. Homes near sump inlets shall be constructed at least 1 foot above the 100-year water surface ponding elevation. Street capacity has also been verified at each design point by using the UD-Inlet Excel workbook (located in Appendix) from Urban Drainage Flood Control District (UDFCD). Inlet sizing is also per the UD-Inlet Excel workbook. Drainage from individual lots shall travel in side-lot swales to the street.

Both and interim and ultimate condition are described below. The interim condition includes development of both Sterling Ranch East Filings 2 and 8 only, with all the tributary property to the north remaining undeveloped. The ultimate condition accounts for the development of Sterling Ranch East Filings 2 and 8 along with the development of Filings 4, 6 and Basins P1-F1 and P1-F2. These two basins account for the anticipated tributary development to the north. This ultimate condition accounts for all future developed area tributary to Pond FSD-16.

POND FSD-16 PHASING

Based on the large tributary area for this facility and multiple Filings being accounted for and development at different times, this report describes he following phasing:

Interim Condition 1 Filing 2 and Filing 8 only being developed (Described in this report)

Ultimate Condition Full build-out of entire tributary area to Pond FSD-16 (Described in this report)

Future Interim Conditions Each future Final Plat within the tributary area of Pond FSD-16 will analyze and determine necessary orifice plate adjustments needed to maintain proper water quality release rates. This documentation will be contained in each individual future FDR.

The ultimate condition was provided in this report to determine the concrete pond outlet box dimensions and elevations. This outlet box sizing is the ultimate condition and remains the same for each interim condition. Only the orifice plate may require adjustment with each interim phase. Thus, any future development within the tributary area of Pond FSD-16 will be required to analyze this facility within each future FDR and determine if orifice plate adjustments are needed.

INTERIM CONDITION 1 (Development of Filing 2 and Filing 8 only)

A detailed description of the developed flows for Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 in the interim condition is as follows:

Public Storm Facilities within Filing 2

Design Point 1 (Q_5 = 7 cfs, Q_{100} = 16 cfs) consists of developed flows from Basin B. Basin B is 5.0 acres of proposed residential development with associated streets, landscaping, and homes. Flows travel south in the east curbline of Boise Court and west curbline of Boulder City Place to Design Point 1 where a proposed public 10' Type R sump inlet will intercept flows. Flow will be conveyed by a proposed 24" RCP public storm sewer (Pipe 1). The emergency overflow route for this inlet will be south to Design Point 2.

Design Point 2 (Q_5 = 5 cfs, Q_{100} = 11 cfs) consists of developed flows from Basin A. Basin A is 2.9 acres of proposed residential development with associated streets, landscaping, and homes. Flows travel south in the west curbline of Boise Court and to the south curbline of Maricopa Ct. to Design Point 2 where a proposed public 5' Type R sump inlet will intercept flows. Flow will be conveyed by a proposed 24" RCP public storm sewer (Pipe 2). The emergency overflow route for this inlet will overtop the southeast curb return at the at the intersection of Maricopa Ct. and Boulder City Place and continue south along Boulder City Place. **Pipe Run 3 (Q_5 = 10 cfs, Q_{100} = 25 cfs)** conveys the combined flows from Design Points 1 and 2 and is a proposed 36" RCP public storm that crosses Boulder City Place into Filing 8.

Design Point 3 (Q_5 = 3.7 cfs, Q_{100} = 8.4 cfs) consists of developed flows from Basin O. Basin O is 2.7 acres of proposed residential development with associated streets, landscaping, and homes. Developed flows from this basin within Filing No. 8 travel towards the intersection of Maricopa Court and Boulder City where a proposed County std. 6' crosspan will convey the flows towards Design Point 4.

Design Point 4 (Q_5 = 3.9 cfs, Q_{100} = 9.0 cfs) consists of developed flows from Basin P and DP-3. Basin P is 0.20 acres of proposed residential development with associated streets, landscaping, and homes. A proposed public 15' Type R at-grade inlet will be installed at this location (within Filing No. 2). This at-grade inlet will collect the following: (Q_5 = 3.9 cfs, Q_{100} = 8.5 cfs) with a flow-by of (Q_5 = 0.0 cfs, Q_{100} = 0.5 cfs). The combined flows at this location are well within the allowed street capacity described above. Intercepted flows will then be conveyed by a proposed 18" RCP public storm sewer (Pipe 4). These flows then combine with the upstream flows from Pipe Run 3 and are conveyed via a proposed public 36" RCP in Maricopa Ct. within Filing 8 further downstream as **Pipe Run 5 (Q_5 = 13 cfs, Q_{100} = 32 cfs).**

<u>Public Storm Facilities within Filing 8</u>

Design Point 5 (Q_5 = 2 cfs, Q_{100} = 6 cfs) consists of developed flows from Basin M. Basin M is 2.0 acres of proposed residential development with associated streets, landscaping and homes. Flows travel southeast in the north curbline of Maricopa Court to Design Point 5 where a proposed public 5' Type R sump inlet will intercept flows. Flow will be conveyed by a proposed 18" RCP public storm sewer (Pipe 6). The emergency overflow route for this inlet will be over the highpoint to the south.

Design Point 6 (Q_5 = 1 cfs, Q_{100} = 3 cfs) consists of developed flows from Basin N. Basin N is 0.8 acres of proposed residential development with associated streets, landscaping and homes. Flows travel southeast in the south curbline of Maricopa Court to Design Point 6 where a proposed public 5' Type R sump inlet will intercept flows. Flow will be conveyed by a proposed 18" RCP public storm sewer (Pipe 7). The emergency overflow route for this inlet will be over the highpoint to the south. **Pipe Run 8 (Q_5 = 16 cfs, Q_{100} = 39 cfs)** represents a proposed 36" RCP public storm sewer within Maricopa Court that conveys the combined flows from Design Points 5 and 6 along with the flows within the upstream Pipe Run 5.

Design Point 7 (Q_5 = 1 cfs, Q_{100} = 4 cfs) consists of developed flows from Basins D and F. Basin D is 0.68 acres and Basin F is 0.63 acres of proposed streets, landscaping, and undeveloped property to the north. Flows travel in a southeast direction within Idaho Falls Dr. towards Design Point 7 where a proposed 5' Type R sump inlet will completely collect these developed flows. Flows will be conveyed by a proposed 18" RCP public storm sewer (Pipe 9). The emergency overflow route for this inlet will be over the highpoint to the south.

Design Point 8 (Q_5 = 2 cfs, Q_{100} = 5 cfs) consists of developed flows from Basin H. Basin H is 1.4 acres of proposed residential development with associated streets, landscaping, and homes. Flows travel in a southeast direction within Idaho Falls Dr. towards Design Point 8 where a proposed 5' Type R sump inlet will completely collect these developed flows. Flows will be conveyed by a proposed 18" RCP public storm sewer (Pipe 10). **Pipe Run 11 (Q_5 = 3 cfs, Q_{100} = 8 cfs)** represents a proposed 24" RCP public storm sewer within Idaho Falls Dr. that conveys the combined flows from Design Points 7 and 8 further downstream.

Design Point 9 (Q_5 = 1.0 cfs, Q_{100} = 2.5 cfs) consists of developed flows from Basin G. Basin G is 0.54 acres of proposed streets, landscaping, and undeveloped property to the north. Flows travel in the north curbline of Idaho Falls Dr. towards Design Point 9 where a proposed 5' Type R sump inlet will completely collect these developed flows. Flows will be conveyed by a proposed 18" RCP public storm sewer (Pipe 12). The emergency overflow route for this inlet will be over the crown of the road to the south. **Pipe**

Run 13 (Q_5 = 4 cfs, Q_{100} = 9 cfs) represents a proposed 24" RCP public storm sewer within Rio Rancho Rd. that conveys the combined flows from Pipe Runs 11 and 12 further downstream.

Design Point 10 (Q_5 = 4 cfs, Q_{100} = 10 cfs) consists of developed flows from Basin I. Basin I is 3.4 acres of proposed residential development with associated streets, landscaping, open space and homes. Developed flows travel in a southeasterly direction towards Design Point 10 where a proposed public 10' Type R at-grade inlet will intercept the flows. This at-grade inlet will intercept (Q_5= 3.9 cfs, Q_{100}= 7.1 cfs) with a flow-by of (Q_5= 0.1 cfs, Q_{100}= 2.9 cfs) that will then travel further south towards Design Point 11. Intercepted flows will then be conveyed by a proposed 24" RCP public storm sewer (Pipe 14). These flows then combine with the upstream flows from Pipe Run 13 and are conveyed via Pipe Run 15. **Pipe Run 15 (Q_5 = 8 cfs, Q_{100} = 16 cfs)** is a proposed public 24" RCP storm that conveys these combined interim developed flows further downstream.

Design Point 11 (Q_5 = 6 cfs, Q_{100} = 17 cfs) consists of developed flows from Basin J and flow-by from DP-10. Basin J is 4.7 acres of proposed residential development with associated streets, landscaping, open space and homes. Developed flows travel in a southeasterly direction towards Design Point 11 where a proposed public 15' Type R at-grade inlet will intercept the flows. This at-grade inlet will intercept (Q_5= 6.1 cfs, Q_{100}= 12.7 cfs) with a flow-by of (Q_5= 0.0 cfs, Q_{100}= 4.2 cfs) that will then travel further south towards Design Point 12. Intercepted flows will then be conveyed by a proposed 24" RCP public storm sewer (Pipe 16). These flows then combine with the upstream flows from Pipe Run 15 and are conveyed via Pipe Run 17. **Pipe Run 17 (Q_5 = 14 cfs, Q_{100} = 28 cfs)** is a proposed public 30" RCP storm that conveys these combined interim developed flows further downstream.

Design Point 12 (Q_5 = 3 cfs, Q_{100} = 10 cfs) consists of developed flows from Basin K and flow-by from Design Point 11. Basin K is 1.9 acres of proposed residential development with associated streets, landscaping, open space and homes. Developed flows travel towards Design Point 12 where a proposed public 5' Type R sump inlet will completely intercept the flows. Intercepted flows will then be conveyed by a proposed 24" RCP public storm sewer (Pipe 18).

Design Point 13 (Q_5 = 3 cfs, Q_{100} = 8 cfs) consists of developed flows from Basin L. Basin L is 2.7 acres of proposed residential development with associated streets, landscaping, open space and homes. Developed flows travel towards Design Point 13 where a proposed public 5' Type R sump inlet will completely intercept the flows. Intercepted flows will then be conveyed by a proposed 24" RCP public storm sewer (Pipe 19). **Pipe Run 20 (Q_5 = 18 cfs, Q_{100} = 44 cfs)** is a proposed public 36" RCP storm that conveys the combined interim developed flows further downstream.

Design Point 14 (Q_5 = 1.7 cfs, Q_{100} = 4.2 cfs) consists of developed flows from Basin S. Basin S is 1.0 acres of open space tract and Sterling Ranch Road. The developed flows travel south in the west curb line of Sterling Ranch Road to a public 15' Type R at-grade inlet at Design Point 14. In the interim condition, this at-grade inlet will completely intercept all developed flows. These intercepted flows will be conveyed via a public 18" RCP storm (Pipe 22) towards Design Point 15.

Design Point 15 (Q_5 = 1.5 cfs, Q_{100} = 3.3 cfs) consists of developed flows from Basins T and OS-A. Basin T is 0.60 acres of open space tract and Sterling Ranch Road. Basin OS-A is undeveloped property to the north that is tributary to the east side of Sterling Ranch Road. Developed flows travel south in the east curb line of Sterling Ranch Road to a public 15' Type R at-grade inlet at Design Point 15. In the interim condition, this at-grade inlet will completely intercept all the developed flows. These intercepted flows along with the collected flows from Design Point 14 will be conveyed via a public 18" RCP storm (Pipe 23) further downstream.

Design Point 16 (Q_5 = 37 cfs, Q_{100} = 87 cfs) or Pipe Run 24 represents the total interim developed flows from both Sterling Ranch East Filing No. 2 and Filing No. 8 and is conveyed via a proposed public 48" RCP storm directly into Pond FSD-16.

Design Point 17 (Q_5 = 12.5 cfs, Q_{100} = 26.0 cfs) consists of developed flows from Basin C, Q, off-site Basin P1-A2 and flow-by from DP-4. Basin C is 0.72 acres and Basin T is 0.60 acres of open space tract adjacent to Briargate Parkway. Basin P1-A2 is 4.2 acres of the north half of Briargate Parkway. These basins combine flows that travel as curb and gutter flow along the north flowline of Briargate Parkway. These flows are intercepted by an existing 15' Type R at-grade inlet recently constructed in Briargate Parkway.

This at-grade inlet intercepts (Q_5= 10.5 cfs, Q_{100}= 15.5 cfs) with a flow-by of (Q_5= 2.0 cfs, Q_{100}= 10.5 cfs) that travels in the north curb line of Briargate Parkway towards Design Point 18. Intercepted flows are conveyed by a public 24" RCP storm sewer within Briargate Parkway. These flows are then routed further downstream towards the existing Pond FSD-14A recently constructed along the Sterling Ranch East Filing No. 1 (SF2235)

This basin was originally studied in the "Drainage Letter for Sterling Ranch Road and Briargate Parkway Interim Plan", prepared by JR Engineering, approved 7/25/23 (CDR221) as Basin A2 and Design Point 2 (Q_5= 10.5 cfs, Q_{100}= 21.4 cfs). These off-site flows remain fairly consistent with what was previously planned and anticipated and the downstream facilities will continue to adequately handle these flows.

Design Point 18 (Q_5 = 7.3 cfs, Q_{100} = 21.8 cfs) consists of developed flows from Basin R, off-site Basin P1-A3 and flow-by from DP-17. Basin R is 1.7 acres of open space tract adjacent to Briargate Parkway. Basin P1-A3 is 1.37 acres of the north half of Briargate Parkway. These combined flows travel as curb and gutter flow along the north flowline of Briargate Parkway. These flows are intercepted by an existing 15' Type R at-grade inlet recently constructed in Briargate Parkway just west of the intersection with Sterling Ranch Road. This at-grade inlet intercepts (Q_5= 7.2 cfs, Q_{100}= 14.3 cfs) with a flow-by of (Q_5= 0.1 cfs, Q_{100}= 7.5 cfs) that travels in the north half of Briargate Parkway towards Design Point 19. Intercepted flows are conveyed by a public 24" RCP storm sewer within Briargate Parkway. These flows are then routed further downstream towards the existing Pond FSD-14A recently constructed along the Sterling Ranch East Filing No. 1 (SF2235)

This basin was originally studied in the "Drainage Letter for Sterling Ranch Road and Briargate Parkway Interim Plan", prepared by JR Engineering, approved 7/25/23 (CDR221) as Basin A3 and Design Point 5 (Q_5= 5.1 cfs, Q_{100}= 13.2 cfs). Again, these off-site flows remain fairly consistent with what was previously planned and anticipated and the downstream facilities will continue to adequately handle these flows.

Design Point 19 (Q_5 = 6.6 cfs, Q_{100} = 21.9 cfs) consists of developed flows from Basin U and flow-by from Design Point 18. Basin U is 3.2 acres of Sterling Ranch Road, open space tract adjacent to Briargate Parkway and future Briargate Parkway extension to the east. These flows travel as curb and gutter flow

within Briargate Parkway to Design Point 19. At this location an existing 20' Type R sump inlet constructed along with the recent Briargate Parkway and Filing No. 1 improvements completely collects these proposed and anticipated future developed flows. Intercepted flows are conveyed by a public 30" RCP storm sewer within Briargate Parkway. These flows are then routed further downstream towards the existing Pond FSD-14A recently constructed along the Sterling Ranch East Filing No. 1 (SF2235)

This basin was previously studied in the "Final Drainage Report for Sterling Ranch East Filing No. 1", prepared by Classic Consulting, approved 7/2/24 (SF2235) as Basins P1-C2, P1-A5 and Design Point 6 (Q_5= 10.3 cfs, Q_{100}= 31.6 cfs). These off-site flows remain fairly consistent with what was previously planned and anticipated and the downstream facilities will continue to adequately handle these flows.

Basin V (Q_5 = 3 cfs, Q_{100} = 14 cfs) is 6.1 acres within Tract H that consists of the slopes and the base of the proposed Pond FSD-16. These flows sheet flow towards the concrete trickle channels and are then routed directly to the outlet structure.

Basin EX-9 (Q_5 = 11 cfs, Q_{100} = 78 cfs) is 59.2 acres of off-site undeveloped property to the north. This area is part of the Sterling Ranch ownership and is currently planned for residential use as Sterling Ranch East Filing No. 6 (SF2610). However, in the interim, prior to this future development, this area continues to be historical sheet flows in a southerly direction towards the proposed Pond FSD-16.

Basin OS-F4 (Q_5 = 8 cfs, Q_{100} = 57 cfs) is 45.6 acres of off-site undeveloped property to the north. This area is part of the Sterling Ranch ownership and is currently planned for residential use as Sterling Ranch East Filing No. 4 (SF2615). However, in the interim, prior to this future development, this area continues to sheet flow in a southerly direction where a proposed diversion berm will route the flows into a temporary sediment basin just north of Idaho Falls Dr. This temporary facility will remain in place until the future development of Filing 4. The temporary swale will be a 3' wide bottom with 4:1 and 12:1 side slopes and a 1.25% slope lined with erosion control matting or TRM. Total depth of swale is to be 2'. See calculations in appendix. Depth of flow 100 year is 9.9". Temporary sediment basin will release flows slowly overtime to control release of these flows with a standpipe and holes. See Grading and Erosion Control plan for details.

Design Point 20 (Q_5 = 44 cfs, Q_{100} = 152 cfs) consists of the total developed flows tributary to Pond FSD-16 in the interim condition. **The interim condition has a total tributary area of 96.8 acres** with an **effective impervious % of 18.8%**. (See Appendix for calculations) This data is utilized in the MH Detention spreadsheet for the sizing of the orifice plate for this interim condition.

Basin E (Q_5 = 4 cfs, Q_{100} = 19 cfs) is 7.8 acres of open space tract and adjacent Sand Creek (Reach SC-9) channel improvements and rear landscaped yards that are within the boundary of Sterling Ranch East Filing No. 2. This is shown as a portion of Basin SC-4 in the SKP-22-004/SP-22-004 MDDP Amendment for Sterling Ranch East and consists of the anticipated rear yards of the lots adjacent to the creek that will continue to sheet flows directly towards the Sand Creek corridor. At this time, these rear yards are not able to be captured and routed to a formal stormwater quality facility. However, given the minimal unconnected impervious area and sizeable receiving pervious are within this basin, the WQCV reduction = 100% with 0 untreated WQCV. (See Appendix for references) All channel work will be completed per the "Final Drainage Report for Sand Creek Restoration," by JR Engineering LLC, dated September 2022.

ULTIMATE CONDITION (Full build-out of all tributary area to Pond FSD-16)

A detailed description of the developed flows for Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 in the ultimate condition is as follows:

Public Storm Facilities within Filing 2

Design Points 1, 2, 3 and 4 remain the same in both conditions.

Public Storm Facilities within Filing 8

The interior Design Points 5, 6, 8, 10-13 within Filing 8 remain the same in both conditions. The only difference is in the following pipe runs:

	Interim Condition	Ultimate Condition
Pipe Run 9:	Q_5 = 1 cfs, Q_{100} = 4 cfs	Q_5 = 3 cfs, Q_{100} = 8 cfs
Pipe Run 11:	Q_5 = 3 cfs, Q_{100} = 8 cfs	Q_5 = 5 cfs, Q_{100} = 12 cfs
Pipe Run 12:	Q_5 = 1.0 cfs, Q_{100} = 2.5 cfs	Q_5 = 1.5 cfs, Q_{100} = 4.2 cfs
Pipe Run 13:	Q_5 = 4 cfs, Q_{100} = 9 cfs	Q_5 = 6 cfs, Q_{100} = 16 cfs
Pipe Run 15:	Q_5 = 8 cfs, Q_{100} = 16 cfs	Q_5 = 10 cfs, Q_{100} = 22 cfs
Pipe Run 17:	Q_5 = 14 cfs, Q_{100} = 28 cfs	Q_5 = 16 cfs, Q_{100} = 341 cfs
Pipe Run 20:	Q_5 = 18 cfs, Q_{100} = 44 cfs	Q_5 = 21 cfs, Q_{100} = 51 cfs
Pipe Run 21:	Q_5 = 34 cfs, Q_{100} = 81 cfs	Q_5 = 37 cfs, Q_{100} = 89 cfs
Pipe Run22:	Q_5 = 1.7 cfs, Q_{100} = 4.2 cfs	Q_5 = 1.7 cfs, Q_{100} = 5.1 cfs
Pipe Run23:	Q_5 = 3.6 cfs, Q_{100} = 8.3 cfs	Q_5 = 3.5 cfs, Q_{100} = 8.9 cfs
Pipe Run24:	Q_5 = 37 cfs, Q_{100} = 87 cfs	Q_5 = 40 cfs, Q_{100} = 96 cfs

Design Point 7 (Q_5 = 3 cfs, Q_{100} = 8 cfs) consists of developed flows from Basin D and F. Basin D is 0.20 acres of Idaho Falls Drive. Basin F is 2.2 acres of proposed Idaho Falls Drive and rear yards of Sterling Ranch East Filing No. 4. (Reference Sterling Ranch East Filing No. 4 FDR - SF2615) Flows travel southeast in the north curbline of Idaho Falls Drive to Design Point 7 where a proposed public 5' Type R sump inlet will intercept flows. Flow will be conveyed by a proposed 18" RCP public storm sewer (Pipe 9). The emergency overflow route for this inlet will be southeast over the highpoint to Design Point 12.

Design Point 9 (Q_5 = 1.5 cfs, Q_{100} = 4.2 cfs) consists of developed flows from Basin G. Basin G is 1.2 acres of Idaho Falls Drive and rear yards from Sterling Ranch East Filing No. 4. (Reference Sterling Ranch East Filing No. 4 FDR - SF2615) Flows travel south to the north curbline of Idaho Falls Drive to Design Point 9 where a proposed public 5' Type R sump inlet will intercept flows. Flow will be conveyed by a proposed 18" RCP public storm sewer (Pipe 10). The emergency overflow route for this inlet will be south over the crown of the road to Design Point 10.

Design Point 14A (Q_5 = 5 cfs, Q_{100} = 10 cfs) consists of developed flows from off-site Basin OS-2. This basin is 2.5 acres of future rear yards and Sterling Ranch Road extension to the north. The developed flows travel south in the west curb line of Sterling Ranch Road to a future public 15' Type R at-grade inlet

at Design Point 14A. This at-grade inlet intercepts (Q_5= 5.0 cfs, Q_{100}= 9.2 cfs) with a flow-by of (Q_5= 0.0 cfs, Q_{100}= 0.8 cfs) that travels further south towards DP-14. These intercepted flows will be conveyed via future public storm further downstream towards Pond FSD-16.

Design Point 14 (Q_5 = 1.7 cfs, Q_{100} = 5.1 cfs) consists of developed flows from off-site Basin S and flow-by from DP-14A. This basin is 1.0 acres of open space tract along Sterling Ranch Road. The developed flows travel south in the west curb line of Sterling Ranch Road to a proposed public 15' Type R at-grade inlet at Design Point 14. This at-grade inlet will completely intercept all developed flows. These intercepted flows will be conveyed via a public 18" RCP storm towards DP-15.

Design Point 15A (Q_5 = 5 cfs, Q_{100} = 9 cfs) consists of developed flows from Basin OS-3. Basin OS-3 is 2.0 acres of open space tract and Sterling Ranch Road. The developed flows travel south in the east curb line of Sterling Ranch Road to a public 15' Type R at-grade inlet at Design Point 15A. This at-grade inlet intercepts (Q_5= 5.0 cfs, Q_{100}= 8.6 cfs) with a flow-by of (Q_5= 0.0 cfs, Q_{100}= 0.4 cfs) that travels further south towards DP-15. These intercepted flows will be conveyed via future public storm further downstream towards Pond FSD-16.

Design Point 15 (Q_5 = 1.9 cfs, Q_{100} = 4.7 cfs) consists of developed flows from Basin T, OS-4 and flow-by from DP-15A. Basin T is 0.60 acres of open space tract and Sterling Ranch Road. Basin OS-4 is 0.30 acres of future rear yards that sheet flow into Sterling Ranch Road. Developed flows travel south in the east curb line of Sterling Ranch Road to a public 15' Type R at-grade inlet at Design Point 15. This at-grade inlet will completely intercept all the developed flows. These intercepted flows along with the collected flows from Design Point 14 will be conveyed via a public 18" RCP storm (Pipe 23) further downstream.

Design Point 16 (Q_5 = 40 cfs, Q_{100} = 97 cfs) or Pipe Run 24 represents the total ultimate developed flows from both Sterling Ranch East Filing No. 2 and Filing No. 8 and is conveyed via a proposed public 48" RCP storm directly into Pond FSD-16.

Design Points 17 and 18 remain the same in both conditions.

Design Point 19 (Q_5 = 11.3 cfs, Q_{100} = 30.8 cfs) consists of developed flows from Basin U, F6-K and flow-by from Design Point 18. Basin U is 4.2 acres of Sterling Ranch Road, open space tract adjacent to Briargate Parkway and future Briargate Parkway extension to the east. Basin F6-K is 1.7 acres that accounts for future development within Filing 6 that will drain into Briargate Parkway. These combined flows travel as curb and gutter flow within the north side of Briargate Parkway to Design Point 19. At this location an existing 20' Type R sump inlet constructed along with the recent Briargate Parkway and Filing No. 1 improvements completely collects these proposed and anticipated future developed flows. Intercepted flows are conveyed by a public 30" RCP storm sewer within Briargate Parkway. These flows are then routed further downstream towards the existing Pond FSD-14A recently constructed along the Sterling Ranch East Filing No. 1 (SF2235)

This basin was previously studied in the "Final Drainage Report for Sterling Ranch East Filing No. 1", prepared by Classic Consulting, approved 7/2/24 (SF2235) as Basins P1-C2, P1-A5 and Design Point 6 (Q_5= 10.3 cfs, Q_{100}= 31.6 cfs). These off-site flows remain fairly consistent with what was previously planned and anticipated and the downstream facilities will continue to adequately handle these flows.

Basin W (Q_5 = 4 cfs, Q_{100} = 10 cfs) is 2.6 acres of future rear yards from Sterling Ranch East Filing No. 6 lots that will sheet flow directly into the proposed Pond FSD-16. (Reference Sterling Ranch East Filing No. 6 FDR - SF2610) These flows sheet flow towards the concrete trickle channels and are then routed directly to the outlet structure.

Design Point 20 (Q_5 = 193 cfs, Q_{100} = 482 cfs) consists of the total developed flows tributary to Pond FSD-16 in the ultimate condition. This includes all the anticipated tributary basins from Filing 4, basins from Filing 6 and the future off-site basins to the north P1-F1 and P1-F2. All of these basins are described in the "Final Drainage Report for Sterling Ranch East Filing No. 6" (SF2610) and "Final Drainage Report for Sterling Ranch East Filing No. 4" (SF2615). **The ultimate condition has a total tributary area of 211.60 acres** with an **effective imperviousness of 48.7%**. (See Appendix for calculations) This data is utilized in the MH Detention spreadsheet for the sizing of the outlet box and orifice plate for the ultimate condition.

STORM WATER QUALITY/DETENTION

As required, storm water quality measures will be utilized in order to reduce the amount of sediment, debris and pollutants that are allowed to enter Sand Creek. Developed flows from Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 along with future flows from the upstream undeveloped Sterling Ranch property will be routed to a private Full Spectrum Detention facility, Pond FSD-16 to be located in Tract H of Sterling Ranch East Filing No. 6. The facilities will release treated developed flows to an existing 48" RCP storm within future Briargate Parkway and then south within existing Sterling Ranch Road. Again, reference the "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", prepared by JR Engineering, approved 7/25/23 (CDR221) along with the "Sterling Ranch Road and Briargate Pkwy. Storm Plans", prepared by JR Engineering, LLC, approved 7/25/23 (CDR221). These referenced design plans provide a 48" RCP outfall pipe at this location with an allowable release rate of (Q_{100} = 156.6 cfs)

The UD-Detention spreadsheet was used to calculate the required volume for the EURV and 100-year release. User input 1-hour precipitation values in the UD-Detention spreadsheet were taken from Table 6-2 Volume 1 Colorado Springs El Paso County Drainage Criteria Manual.

PRIVATE POND FSD-16

While this facility is proposed to be platted as Tract H, Sterling Ranch East Filing No. 6, it must be constructed with which ever Filing is developed first (Filing 2 or Filing 8).

As described earlier, the intent with this facility is for it to be phased with development. The grading of the entire pond area and concrete outlet box will be sized for the ultimate condition and constructed with different orifice plates to accommodate development phasing. The first phase, referred to as the interim condition 1, only assumes the development of Filings 2 and 8 with the rest of the tributary area to the north remaining undeveloped. This interim condition also includes the undeveloped sheet flows from upstream basin EX-9 that are directly tributary to Pond FSD-16. As future systems are designed and plans submitted for review, Final Drainage Reports will be submitted to update the outlet plate,

trickle channel and forebays until the ultimate condition is reached. This report will detail the interim condition as well as estimated ultimate future conditions based on tributary areas shown in the Final Drainage Report for Sterling Ranch East Filing No. 6 (SF2610), Final Drainage Report for Sterling Ranch East Filing No. 4 (SF2615), as well as the Sterling Ranch Sketch Plan Amendment No. 4 (SKP241).

Maintenance and ownership of the Private detention/stormwater quality facility and the entire proposed storm sewer is by the Sterling Ranch Metropolitan District No. 3. An El Paso County Detention Pond Maintenance Agreement will be required indicating these facilities to be ultimately owned and maintained by the Metro District.

Groundwater Mitigation

Review of the following reports prepared by Entech Engineering, Inc. indicates shallow groundwater potential within this pond area.

> "Soils and Geology Study Sterling Ranch East – Filing No. 8 El Paso County, Colorado", Entech Engineering, Inc., dated October 15, 2025
>
> "Borrow area/Pond – Foursquare at Sterling Ranch East Filing No. 1, Tract 1", Entech Engineering, Inc., dated June 26, 2024 (See Excerpts on the following pages)

This proposed facility was initially graded in conjunction with the adjacent Villages at Sterling Ranch project. With this grading, Entech has documented via various site visits and photos that groundwater does seem to be present in the western portion of the pond. Based on the current design of the pond and the Entech bore logs drilled within the pond, the following compares the proposed cuts vs. the groundwater depth:

Test Boring	Depth to groundwater (ft.)	Depth of cut (ft.)
1	11.5	24.5
2	11.0	20.0
3	11.5	16.0
4	>20.0	21.0
9	18.0	18.0
10	16.0	15.5

As seen above, many of the test boring locations show cuts into the groundwater depth. However, with the proposed installation of 6" perforated PVC underdrains adjacent to all the sanitary sewer mainline within all the streets along with the design of a possible additional underdrain along the north side of the pond, we believe the groundwater across this site will be reduced enough to allow for all lots to construct basements. Additional field testing will be required upon construction of all underdrains within this subdivision in order to further access the groundwater levels.

Interim Condition:

(Development of Sterling Ranch East Filing No. 2 & Sterling Ranch East Filing No. 8 only and undeveloped sheet flows from Basin EX-9 and OS-A)

Total tributary area = 96.8 acres

Total effective imperviousness = 18.8% (See Appendix for calculations)

Per UD-Detention spreadsheet a 0.892 ac-ft. WQVC, 0.754 ac-ft. EURV, and a 2.293 ac-ft. 100-year flow volume is provided. The interim orifice plate will have a 5-hole configuration with 5 individual holes spaced 20.4 inches apart each hole with have an area of 3.00, 3.00, 20.0, 100.0 and 100.0 square inches. The concrete outlet box will be an 20'x4' grated inlet box 8.5' tall with a 48" RCP storm sewer outlet. However, no restrictor plate will be installed in the interim phase.

The interim release per the UD-Detention spreadsheet = Q_5 = 0.9 cfs, Q_{100} = 6.6 cfs. As described earlier, the allowable release into the existing 48" RCP outfall pipe at this location is equal to (Q_{100} = 156.6 cfs). In the Interim, this facility restricts the release to well below pre-development (historic levels) per the MHFD-Detention spreadsheet and is in conformance with the previously approved reports.

Ultimate Condition:
(Development of all property within the tributary area for Pond FSD-16)

Total tributary area = 211.6 acres

Total effective imperviousness = 48.7% (See Appendix for calculations)

The Ultimate condition is an estimate only for the full assumed tributary area to Pond FSD-16 at full building out to ensure pond is adequately sized for future development. The ultimate condition will be constructed with future developments to include future forebays and trickle channels. Future Final Drainage Reports and CDs will better define these pond construction details.

Per UD-Detention spreadsheet a 3.575 ac-ft. WQVC, 8.019 ac-ft. EURV, and a 7.421 ac-ft. 100-year flow volume is provided. The outlet structure will have a 5-hole configuration with 5 individual holes spaced 20.4 inches apart each hole with have an area of 7.0, 9.0, 16.0, 16.0 and 16.0 square inches. The outlet box will be an 20'x4' grated inlet box 8.5' tall with a 48" RCP storm sewer outlet. A steel restrictor plate will be installed 27" from invert of the existing 48" RCP outlet pipe. A 170' wide 2' deep emergency overflow weir will be installed in the pond berm with Type L rip-rap (see appendix for calculation). Flows will overtop the pond in the provided weir and travel directly to the adjacent Briargate Parkway.

The ultimate release per the UD-Detention spreadsheet = Q_5= 3.9 cfs, Q_{100}= 118.5 cfs

Again, as described earlier, the allowable release into the existing 48" RCP outfall pipe at this location is equal to (Q_{100} = 156.6 cfs). In this ultimate condition, this facility restricts the release to below pre-development (historic levels) per the MHFD-Detention spreadsheet and is in conformance with the previously approved reports.

STORMWATER QUALITY (FOUR STEP PROCESS)

The City of Colorado Springs/El Paso County DCM requires the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways, and implementing long-term source controls. The Four Step Process pertains

to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control infrastructure are sized. Implementation of these four steps helps to achieve storm water permit requirements.

1. **Employ Runoff Reduction Practices:** Proposed urban lot impervious area (roof tops, patios, etc.) will sheet flow across landscape areas (yards) and open space areas to slow runoff and increase time of concentration prior to being conveyed to the proposed public streets or detention facilities. This will minimize directly connected impervious areas within the project site. Water quality reduction will be employed for specific areas that are anticipated not able to be captured and routed to SWQ facilities.

2. **Stabilize Drainageways:** After developed flows utilize the runoff reduction practices through the front and rear yards, developed flows will travel via curb and gutter within the public streets of the development and eventually public storm systems. These collected flows are then routed directly to multiple extended detention basins (full-spectrum facilities). Sand Creek improvements and restoration plans are being proposed for this entire reach as described in "Final Design Report for Sand Creek Restoration", prepared by JR Engineering, LLC, dated September 2022.

3. **Provide Water Quality Capture Volume (WQCV):** Runoff from this development will be treated through capture and slow release of the WQCV and excess urban runoff volume (EURV) in the proposed Full-Spectrum permanent Extended Detention Basins designed per current El Paso County drainage criteria. Exclusions are Basin E. Basin E is 7.82 acres and consists of the anticipated rear yards of the lots adjacent to the Sand Creek as well as Sand Creek Improvements that will continue to sheet flows directly towards the Sand Creek corridor per the approved Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan Np. 1. At this time, these rear yards are not able to be captured and routed to a formal stormwater quality facility. However, given the minimal unconnected impervious area and sizeable receiving pervious are within this basin, the WQCV reduction = 100% with 0

We have found that allowing RPAs in backyards is a disaster post-construction. Homeowners understandably do whatever they want with their yards: concentrate flows, reroute them, install xeriscaping, patios, etc. Additionally, if an RPA spans 10 yards, we would have to send out 10 inspection reports and then coordinate with and enforce on 10 different owners just for 1 PCM. So we really can't be allowing the backyard RPAs anymore. Is it possible to make a tract outside of the lots just for the RPA? That way we'll have one parcel that is owned/maintained by the Metro District for this 1 PCM.

untreated WQCV. (See previously approved report and appendix reference materials for water quality treatment map)

4. **Consider need for Industrial and Commercial BMPs**: No industrial uses are proposed within this development. A site-specific storm water quality and erosion control plan and narrative will be submitted along with the grading and erosion control plan. Details such as site-specific sediment and erosion control construction BMP's as well as temporary and permanent BMP's were detailed in this plan and narrative to protect receiving waters. BMP's will be constructed and maintained as the development has been graded and erosion control methods employed.

DRAINAGE AND BRIDGE FEES Fees and estimate will be reviewed with final drainage report.

Both of these sites lie entirely within the Sand Creek Drainage Basin boundaries.

The fees are calculated using the following impervious acreage method approved by El Paso County. **The Sterling Ranch East Filing No. 2 has a total area of 16.84 acres** with the following different land uses proposed:

STERLING RANCH EAST FILING NO. 2

6.85 Ac.	Sand Creek Corridor/Open Space (Tracts A, B and C)
9.99 Ac.	1/6 Ac. avg. lot size including adj. ROW
16.84 Ac.	**Total**

The percent imperviousness for this subdivision is calculated as follows:

Fees for Sand Creek Drainage Corridor/Open Space

(Per El Paso County Percent Impervious Chart: 2**%**)

6.85 Ac. x 2% = **0.14 Impervious Ac.**

Fees for 1/6 Ac. lots (Avg. lot size of 7,600 SF)

(Per El Paso County Percent Impervious Chart: 52**%**)

9.99 Ac. x 52% = **5.19 Impervious Ac.**

Total Impervious Acreage: 5.33 Imp. Ac.

Sterling Ranch East Filing No. 2 (SF2236) was originally approved based on the 2023 Sand Creek drainage/bridge fees. The following represent the fee calculations:

STERLING RANCH EAST FILING NO. 2

2023 DRAINAGE FEE:

$23,821/acre x 5.33 acres $ 126,965.93 (Credits may be used)

2023 BRIDGE FEE:

$9,743/acre x 5.33 acres $ 51,930.19

The Sterling Ranch East Filing No. 8 has a total area of 25.46 acres with the following different land uses proposed:

STERLING RANCH EAST FILING NO. 8

5.93 Ac.	Open Space/Parks (Tracts A-G)
19.53 Ac.	1/8 Ac. avg. lot size including adj. ROW
25.46 Ac.	**Total**

The percent imperviousness for this subdivision is calculated as follows:

Fees for Open Space Tracts

(Per El Paso County Percent Impervious Chart: 2**%**)

5.93 Ac. x 2% = **0.12 Impervious Ac.**

Fees for 1/8 Ac. lots

(Per El Paso County Percent Impervious Chart: 65**%**)

19.53 Ac. x 65% = **12.69 Impervious Ac**

Total Impervious Acreage: 12.81 Imp. Ac.

The following calculations are based on the 2026 Sand Creek drainage/bridge fees for

STERLING RANCH EAST FILING NO. 8

2026 DRAINAGE FEE:

$28,160/acre x 12.81 acres $ 360,729.60 (Credits may be used)

2026 BRIDGE FEE:

$11,518/acre x 12.81 acres $ 147,545.58

CONSTRUCTION COST OPINION

STERLING RANCH EAST FILING NO. 2 & STERLING RANCH EAST FILING NO. 8

See submitted FAE for individual cost opinions for storm sewer related items.

Private Full-Spectrum Detention Facility - FSD-16 (Interim Condition)

While this facility is proposed to be platted as Tract H, Sterling Ranch East Filing No. 6, it must be constructed with which ever Filing is developed first (Filing 2 or Filing 8).

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	Western Forebay Structure	1 EA	$ 100,000.00	$ 100,000.00
2.	Concrete Outlet Structure	1 EA	$ 70,000.00	$ 70,000.00
3.	Concrete Trickle Channel	185 LF	$ 70.00/LF	$ 12,950.00
4.	Handrail	100 LF	$ 220.00/LF	$ 22,000.00
5.	Rip-Rap Spillway	370 CY	$ 76/CY	$ 28,120.00
SUB-TOTAL				$ 233,070.00
10% ENGINEERING				$ 23,307.00
5% CONTINGENCY				$ 11,653.50
TOTAL				**$ 268,030.50**

SUMMARY

Developed runoff from the proposed Sterling Ranch East Filing No. 2 and Sterling Ranch East Filing No. 8 development is proposed to outfall to one proposed private Full Spectrum Detention (EDB) and Storm Water Quality Facility (owned and maintained by the Sterling Ranch Metropolitan District) prior to discharging to downstream facilities. The proposed Full Spectrum detention & water quality pond was sized using the current and applicable drainage criteria and provides release rates below existing allowable release rates. Therefore, the developed site runoff and proposed storm sewer facilities will not adversely affect the downstream facilities or surrounding developments.

PREPARED BY:



Marc A. Whorton, P.E.
Project Manager

maw/118328/FDR-SRE 2 and SRE 8.docx

REFERENCES

1. City of Colorado Springs/County of El Paso Drainage Criteria Manual Volume 1, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

2. "Urban Storm Drainage Criteria Manual Volume 1, 2 & 3," Urban Drainage and Flood Control District, dated January 2016.

3. "Sand Creek DBPS," by Kiowa Engineering Corporation, dated March 1996.

4. "2018 Sterling Ranch MDDP," by M&S Consultants, Inc., June 2018.

5. "Final Drainage Report for Retreat at TimberRidge Filing No. 1", Classic Consulting, approved November, 2020.

6. "Final Drainage Report for Retreat at TimberRidge Filing No. 2", Classic Consulting, dated 3/2022

7. "Final Design Report for Sand Creek Restoration", JR Engineering, LLC, dated September 2022

8. "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", prepared by JR Engineering, LLC, dated September 2022

9. "Master Development Drainage Plan Amendment for Sterling Ranch", prepared by JR Engineering, LLC, dated September 2022

10. "Preliminary Drainage Report for Sterling Ranch East Filing No. 6 Preliminary Plan Final Drainage Report for Early Grading", by Classic Consulting dated 4/16/25, EPC file number SP244

11. "Final Drainage Report for Sterling Ranch East Filing No. 2 and Foursquare at Sterling Ranch East Filing No. 1", by Classic Consulting approved 9/17/24, EPC file number SF2236 & SF2237.

12. "Final Drainage Report for Sterling Ranch East Filing No. 6", by Classic Consulting (SF2610).

13. "Final Drainage Report for Sterling Ranch East Filing No. 4", by Classic Consulting (SF2615).

APPENDIX

VICINITY MAP

CLASSIC SM
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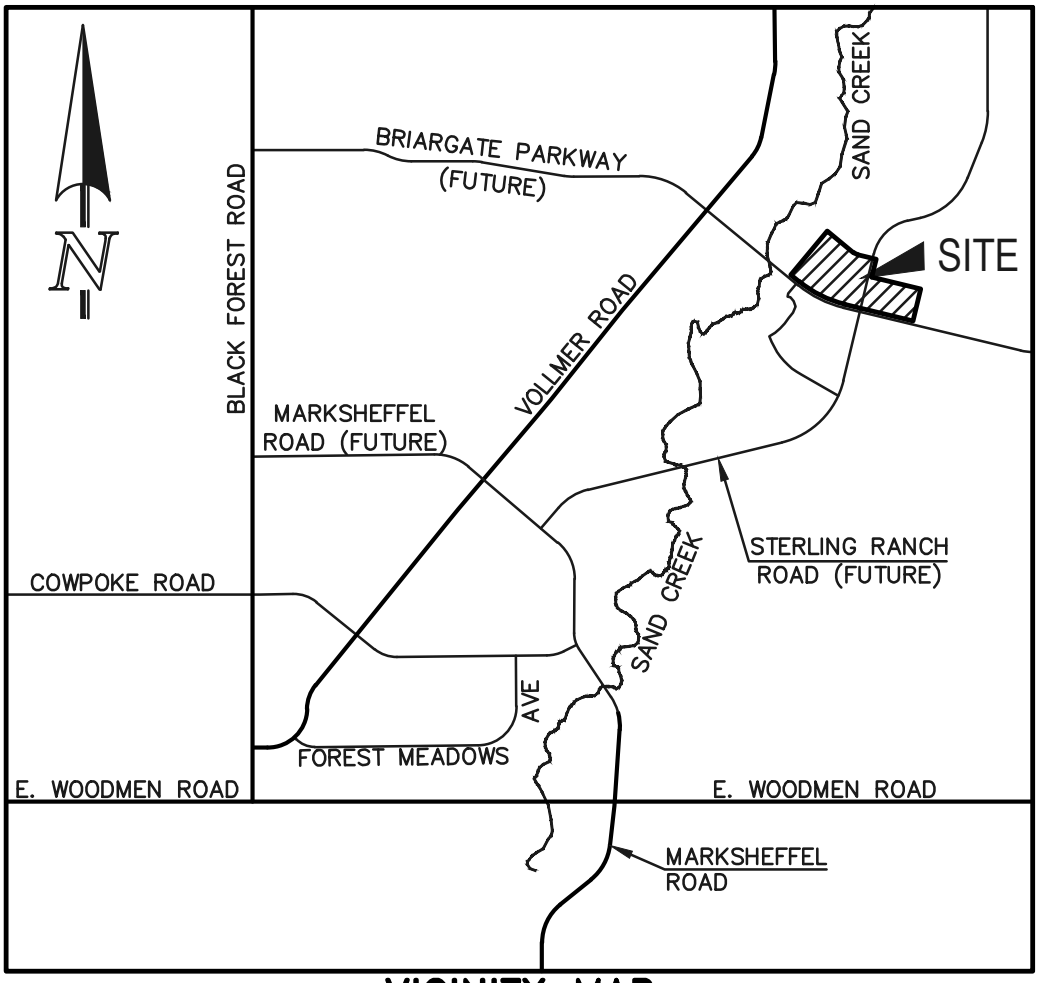
ENGINEERS & SURVEYORS

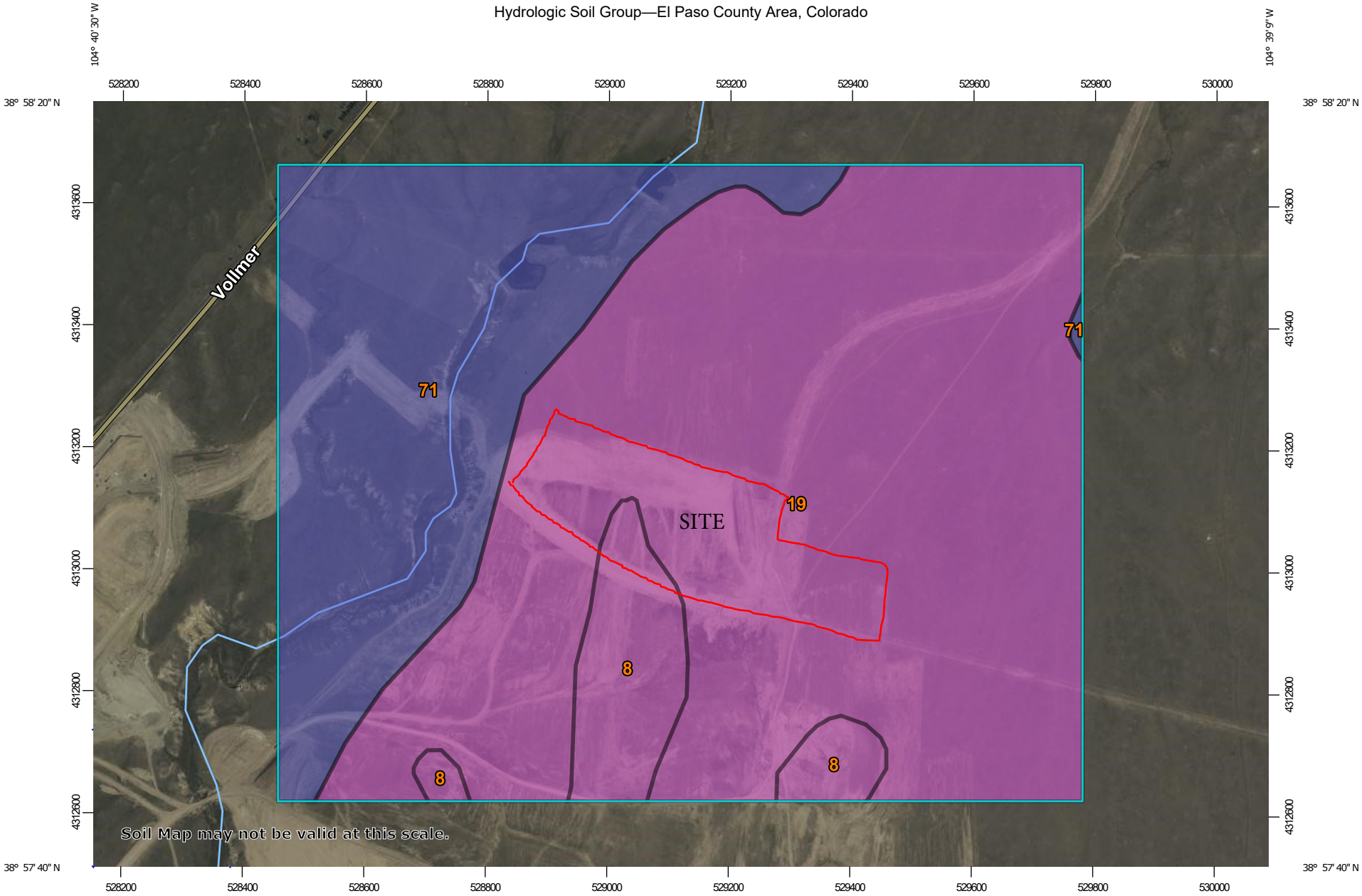


VICINITY MAP

NOT TO SCALE

SOILS MAP (S.C.S. SURVEY)

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS



Map Scale: 1:8,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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

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	23.0	6.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	219.5	64.0%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	100.4	29.3%
Totals for Area of Interest			**342.9**	**100.0%**

Description

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

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

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

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

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

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

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

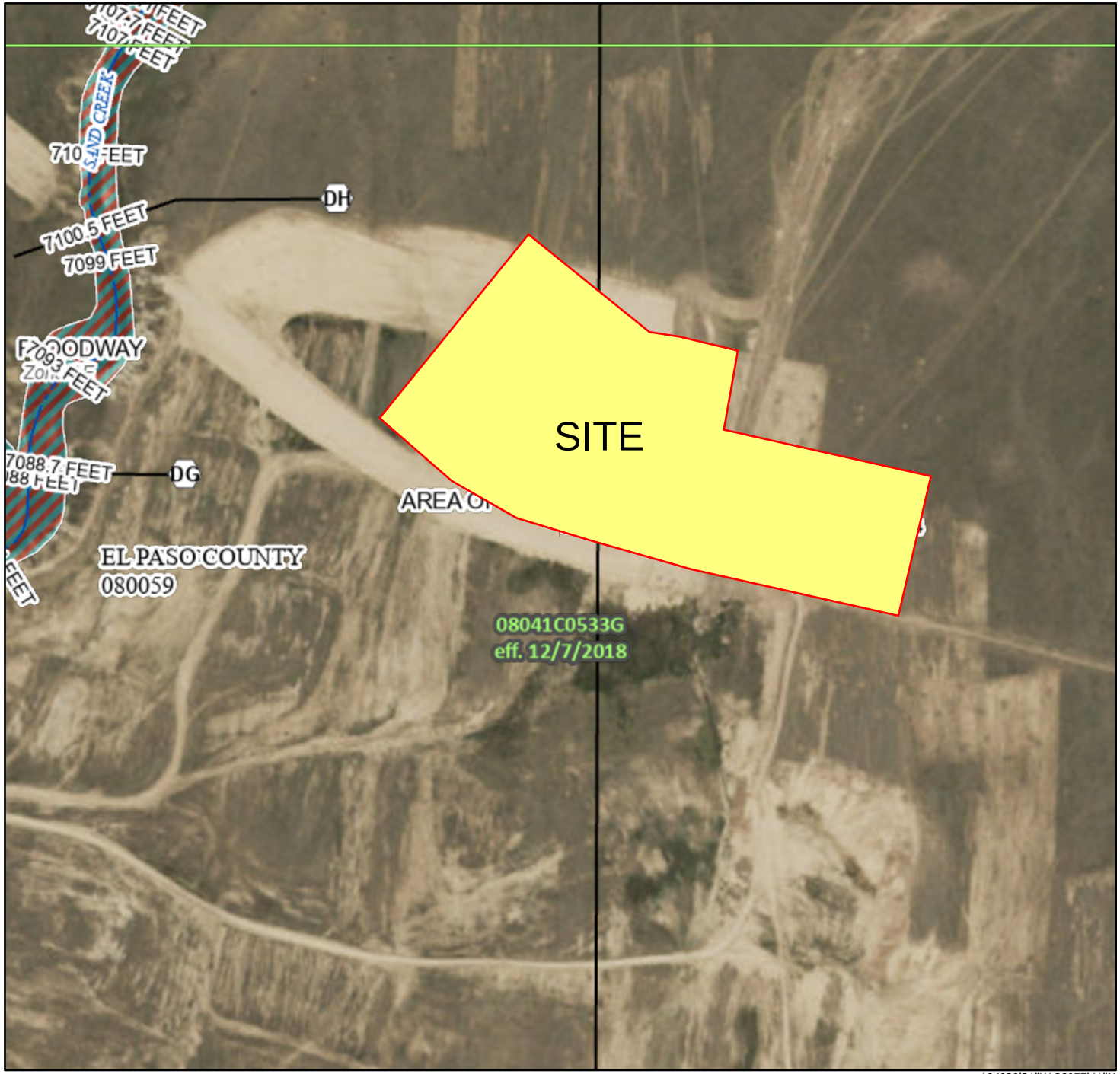
F.E.M.A. MAP

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

National Flood Hazard Layer FIRMette

FEMA

104°40'9"W 38°58'9"N



104°39'31"W 38°57'41"N

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

1:6,000

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

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/22/2022 at 4:39 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.

DEVELOPED CONDITIONS CALCULATIONS

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For Colorado Springs and much of the Fountain Creek watershed, the 1-hour depths are fairly uniform and are summarized in Table 6-2. Depending on the location of the project, rainfall depths may be calculated using the described method and the NOAA Atlas maps shown in Figures 6-6 through 6-17.

Table 6-2. Rainfall Depths for Colorado Springs

Return Period	1-Hour Depth	6-Hour Depth	24-Hour Depth
2	1.19	1.70	2.10
5	1.50	2.10	2.70
10	1.75	2.40	3.20
25	2.00	2.90	3.60
50	2.25	3.20	4.20
100	2.52	3.50	4.60

Where Z= 6,840 ft/100

These depths can be applied to the design storms or converted to intensities (inches/hour) for the Rational Method as described below. However, as the basin area increases, it is unlikely that the reported point rainfalls will occur uniformly over the entire basin. To account for this characteristic of rain storms an adjustment factor, the Depth Area Reduction Factor (DARF) is applied. This adjustment to rainfall depth and its effect on design storms is also described below. The UDFCD UD-Rain spreadsheet, available on UDFCD's website, also provides tools to calculate point rainfall depths and Intensity-Duration-Frequency curves[2] and should produce similar depth calculation results.

2.2 Design Storms

Design storms are used as input into rainfall/runoff models and provide a representation of the typical temporal distribution of rainfall events when the creation or routing of runoff hydrographs is required. It has long been observed that rainstorms in the Front Range of Colorado tend to occur as either short-duration, high-intensity, localized, convective thunderstorms (cloud bursts) or longer-duration, lower-intensity, broader, frontal (general) storms. The significance of these two types of events is primarily determined by the size of the drainage basin being studied. Thunderstorms can create high rates of runoff within a relatively small area, quickly, but their influence may not be significant very far downstream. Frontal storms may not create high rates of runoff within smaller drainage basins due to their lower intensity, but tend to produce larger flood flows that can be hazardous over a broader area and extend further downstream.

- **Thunderstorms**: Based on the extensive evaluation of rain storms completed in the Carlton study (Carlton 2011), it was determined that typical thunderstorms have a duration of about 2 hours. The study evaluated over 300,000 storm cells using gage-adjusted NEXRAD data, collected over a 14-year period (1994 to 2008). Storms lasting longer than 3 hours were rarely found. Therefore, the results of the Carlton study have been used to define the shorter duration design storms.

  To determine the temporal distribution of thunderstorms, 22 gage-adjusted NEXRAD storm cells were studied in detail. Through a process described in a technical memorandum prepared by the City of Colorado Springs (City of Colorado Springs 2012), the results of this analysis were interpreted and normalized to the 1-hour rainfall depth to create the distribution shown in Table 6-3 with a 5 minute time interval for drainage basins up to 1 square mile in size. This distribution represents the rainfall

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

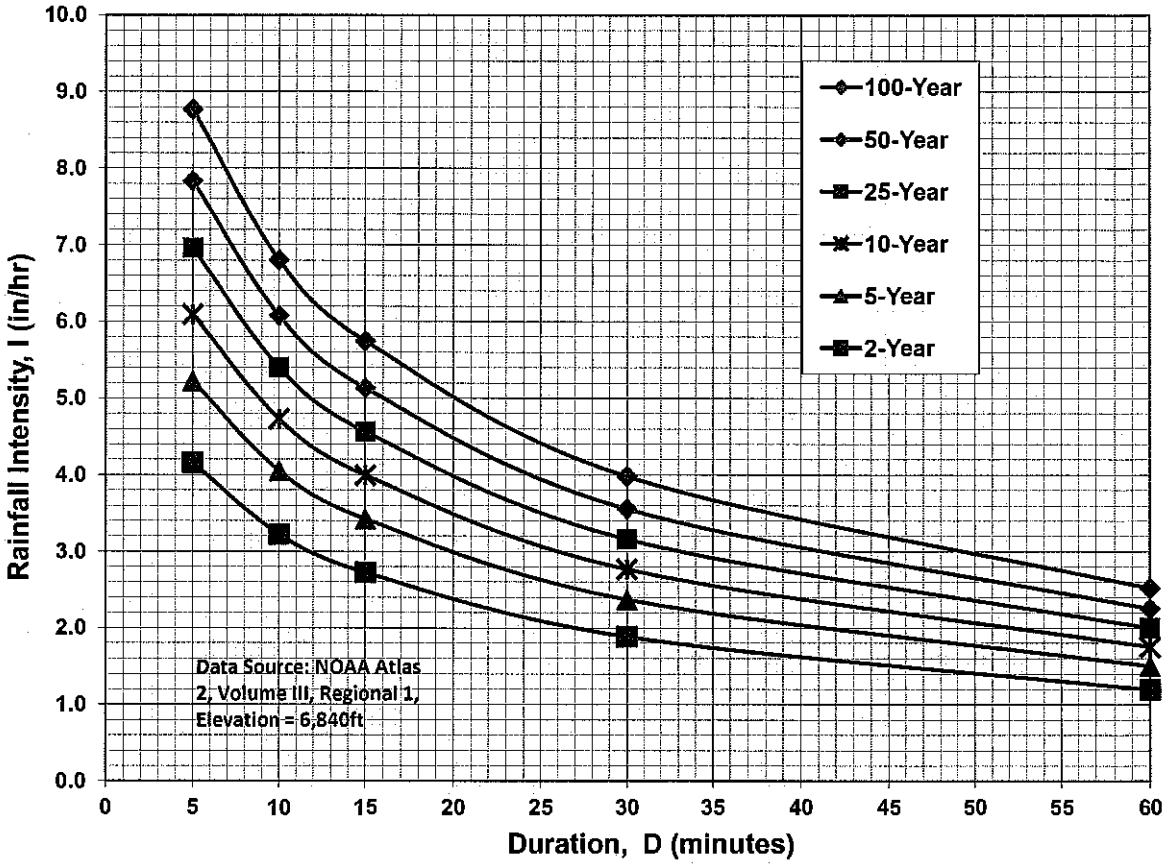
One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

Table 6-10. NRCS Curve Numbers for Frontal Storms & Thunderstorms for Developed Conditions (ARCII)

Fully Developed Urban Areas (vegetation established)[1]	Treatment	Hydrologic Condition	% I	Pre-Development CN			
				HSG A	HSG B	HSG C	HSG D
Open space (lawns, parks, golf courses, cemeteries, etc.):							
Poor condition (grass cover < 50%)	-----	-----	---	68	79	86	89
Fair condition (grass cover 50% to 75%)	-----	-----	---	49	69	79	84
Good condition (grass cover > 75%)	-----	-----	---	39	61	74	80
Impervious areas:							
Paved parking lots, roofs, driveways, etc. (excluding right-of-way	-----	-----	---	98	98	98	98
Streets and roads:							
Paved; curbs and storm sewers (excluding right-of-way)	-----	-----	---	98	98	98	98
Paved; open ditches (including right-of-way)	-----	-----	---	83	89	92	93
Gravel (including right-of-way)	-----	-----	---	76	85	89	91
Dirt (including right-of-way)	-----	-----	---	72	82	87	89
Western desert urban areas:							
Natural desert landscaping (pervious areas only)	-----	-----	---	63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)	-----	-----	---	96	96	96	96
Urban districts:							
Commercial and business	-----	-----	85	89	92	94	95
Industrial	-----	-----	72	81	88	91	93
Residential districts by average lot size:							
1/8 acre or less (town houses)	-----	-----	65	77	85	90	92
1/4 acre	-----	-----	38	61	75	83	87
1/3 acre	-----	-----	30	57	72	81	86
1/2 acre	-----	-----	25	54	70	80	85
1 acre	-----	-----	20	51	68	79	84
2 acres	-----	-----	12	46	65	77	82
Developing Urban Areas[1]	**Treatment[2]**	**Hydrologic Condition[3]**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Newly graded areas (pervious areas only, no vegetation)	-----	-----	---	77	86	91	94
Cultivated Agricultural Lands[1]	**Treatment**	**Hydrologic Condition**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Fallow	Bare soil	-----	---	77	86	91	94
	Crop residue cover (CR)	Poor	---	76	85	90	93
		Good	---	74	83	88	90
Row crops	Straight row (SR)	Poor	---	72	81	88	91
		Good	---	67	78	85	89
	SR + CR	Poor	---	71	80	87	90
		Good	---	64	75	82	85
	Contoured (C)	Poor	---	70	79	84	88
		Good	---	65	75	82	86
	C + CR	Poor	---	69	78	83	87
		Good	---	64	74	81	85
	Contoured & terraced (C&T)	Poor	---	66	74	80	82
		Good	---	62	71	78	81
	C&T+ CR	Poor	---	65	73	79	81
		Good	---	61	70	77	80
Small grain	SR	Poor	---	65	76	84	88
		Good	---	63	75	83	87
	SR + CR	Poor	---	64	75	83	86
		Good	---	60	72	80	84
	C	Poor	---	63	74	82	85
		Good	---	61	73	81	84
	C + CR Poor	Poor	---	62	73	81	84
		Good	---	60	72	80	83
	C&T	Poor	---	61	72	79	82
		Good	---	59	70	78	81
	C&T+ CR	Poor	---	60	71	78	81
		Good	---	58	69	77	80

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

$I_{100} = -2.52 \ln(D) + 12.735$

$I_{50} = -2.25 \ln(D) + 11.375$

$I_{25} = -2.00 \ln(D) + 10.111$

$I_{10} = -1.75 \ln(D) + 8.847$

$I_{5} = -1.50 \ln(D) + 7.583$

$I_{2} = -1.19 \ln(D) + 6.035$

Note: Values calculated by equations may not precisely duplicate values read from figure.

JOB NAME: *STERLING RANCH EAST FILING NO. 8*
JOB NUMBER: *1183.28*
DATE: *09/01/26*
CALCULATED BY: *MAW*

DEVELOPED BASIN RUNOFF COEFFICIENT SUMMARY (INTERIM)

		C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			WEIGHTED IMP.
BASIN	TOTAL AREA (AC)	LAND USE	PERCENT IMP.	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMP.	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	PERCENT
A	2.90	RES. 1/6 AC.	52.0%	2.90	0.32	0.38	0.55	LANDSCAPE	7.0%	0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.93	1.10	1.60	52.0%
B	5.00	RES. 1/6 AC.	52.0%	5.00	0.32	0.38	0.55	LANDSCAPE	7.0%	0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.60	1.90	2.75	52.0%
C	0.72	PAVEMENT	100.0%	0.19	0.89	0.90	0.96	LANDSCAPE	7.0%	0.53	0.05	0.12	0.39	0.27	0.33	0.54	0.20	0.23	0.39	31.5%
D	0.68	PAVEMENT	100.0%	0.20	0.89	0.90	0.96	UNDEVELOPED	2.0%	0.48	0.02	0.08	0.35	0.28	0.32	0.53	0.19	0.22	0.36	30.8%
E	7.80	RES. 1/6 AC.	52.0%	1.22	0.32	0.38	0.55	LANDSCAPE	7.0%	6.58	0.02	0.08	0.35	0.07	0.13	0.38	0.52	0.99	2.97	14.0%
F	0.63	PAVEMENT	100.0%	0.25	0.89	0.90	0.96	UNDEVELOPED	2.0%	0.38	0.02	0.08	0.35	0.37	0.41	0.59	0.23	0.26	0.37	40.9%
G	0.54	PAVEMENT	100.0%	0.19	0.89	0.90	0.96	UNDEVELOPED	7.0%	0.35	0.02	0.08	0.35	0.33	0.37	0.56	0.18	0.20	0.30	39.7%
H	1.40	RES. 1/8 AC.	65.0%	1.40	0.41	0.45	0.59	LANDSCAPE	7.0%	0.00	0.05	0.12	0.39	0.41	0.45	0.59	0.57	0.63	0.83	65.0%
I	3.40	RES. 1/8 AC.	65.0%	2.60	0.41	0.45	0.59	LANDSCAPE	7.0%	0.80	0.05	0.12	0.39	0.33	0.37	0.54	1.11	1.27	1.85	51.4%
J	4.70	RES. 1/8 AC.	65.0%	4.20	0.41	0.45	0.59	LANDSCAPE	7.0%	0.50	0.05	0.12	0.39	0.37	0.41	0.57	1.75	1.95	2.67	58.8%
K	1.90	RES. 1/8 AC.	65.0%	1.75	0.41	0.45	0.59	LANDSCAPE	7.0%	0.15	0.05	0.12	0.39	0.38	0.42	0.57	0.73	0.81	1.09	60.4%
L	2.70	RES. 1/8 AC.	65.0%	1.58	0.41	0.45	0.59	LANDSCAPE	7.0%	1.12	0.05	0.12	0.39	0.26	0.31	0.51	0.70	0.85	1.37	40.9%
M	2.00	RES. 1/8 AC.	65.0%	1.35	0.41	0.45	0.59	LANDSCAPE	7.0%	0.65	0.05	0.12	0.39	0.29	0.34	0.53	0.59	0.69	1.05	46.2%
N	0.80	RES. 1/8 AC.	65.0%	0.75	0.41	0.45	0.59	LANDSCAPE	7.0%	0.05	0.05	0.12	0.39	0.39	0.43	0.58	0.31	0.34	0.46	61.4%
O	2.70	RES. 1/8 AC.	65.0%	2.40	0.41	0.45	0.59	LANDSCAPE	7.0%	0.30	0.05	0.12	0.39	0.37	0.41	0.57	1.00	1.12	1.53	58.6%
P	0.20	RES. 1/8 AC.	65.0%	0.15	0.41	0.45	0.59	LANDSCAPE	7.0%	0.05	0.05	0.12	0.39	0.32	0.37	0.54	0.06	0.07	0.11	50.5%
Q	1.40	RES. 1/8 AC.	65.0%	0.72	0.41	0.45	0.59	LANDSCAPE	7.0%	0.68	0.05	0.12	0.39	0.24	0.29	0.49	0.33	0.41	0.69	36.8%
R	1.70	RES. 1/8 AC.	65.0%	1.09	0.41	0.45	0.59	LANDSCAPE	7.0%	0.61	0.05	0.12	0.39	0.28	0.33	0.52	0.48	0.56	0.88	44.2%
S	1.00	PAVEMENT	100.0%	0.40	0.89	0.90	0.96	LANDSCAPE	7.0%	0.60	0.05	0.12	0.39	0.39	0.43	0.62	0.39	0.43	0.62	44.2%
T	0.60	PAVEMENT	100.0%	0.45	0.89	0.90	0.96	LANDSCAPE	7.0%	0.15	0.05	0.12	0.39	0.68	0.71	0.82	0.41	0.42	0.49	76.8%
U	3.20	PAVEMENT	100.0%	1.60	0.89	0.90	0.96	LANDSCAPE	7.0%	1.60	0.05	0.12	0.39	0.47	0.51	0.68	1.50	1.63	2.16	53.5%
V	6.10	CONCRETE	100.0%	0.15	0.89	0.90	0.96	LANDSCAPE	7.0%	5.95	0.05	0.12	0.39	0.07	0.14	0.40	0.43	0.85	2.46	9.3%
P1-A2	4.20	PAVEMENT	100.0%	3.50	0.89	0.90	0.96	LANDSCAPE	7.0%	0.70	0.05	0.12	0.39	0.75	0.77	0.87	3.15	3.23	3.63	84.5%
P1-A3	1.37	PAVEMENT	100.0%	1.20	0.89	0.90	0.96	LANDSCAPE	7.0%	0.17	0.05	0.12	0.39	0.79	0.80	0.89	1.08	1.10	1.22	88.5%
OS-F4	45.60	RES 1/5	46.0%	0.00	0.28	0.34	0.52	UNDEVELOPED	2.0%	45.60	0.02	0.08	0.35	0.02	0.08	0.35	0.91	3.65	15.96	2.0%
EX-9	59.20	RES 1/5	46.0%	0.00	0.28	0.34	0.52	UNDEVELOPED	2.0%	59.20	0.02	0.08	0.35	0.02	0.08	0.35	1.18	4.74	20.72	2.0%
OS-A	0.32	FUT. RES 1/4	40.0%	0.00	0.23	0.30	0.55	UNDEVELOPED	2.0%	0.32	0.02	0.08	0.35	0.02	0.08	0.35	0.01	0.03	0.11	2.0%

TOTAL AREA TRIBUTARY TO POND FSD-16 **96.8 AC**

Basins tributaty to proposed Pond FSD-16
Basins tributaty to existing Pond FSD-14A
Basin w/ Runoff Reduction

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
DATE:	*09/01/26*
CALC'D BY:	*MAW*

Return Period	1-Hour Depth
2	1.19
5	1.50
10	1.75
25	2.00
50	2.25
100	2.52

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5} \qquad \text{Tc=L/V}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

$t_c = \frac{L}{180} + 10$

*For buried riprap, select C_v value based on type of vegetative cover.

DEVELOPED BASIN RUNOFF SUMMARY (INTERIM)

BASIN	WEIGHTED			OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS		
	CA(2)	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
A	0.93	1.10	1.60	0.08	50	2	8.2	300	2.0%	2.8	1.8	10.0	3.29	4.13	6.93	3	**5**	**11**
B	1.60	1.90	2.75	0.08	100	2.5	13.6	300	2.0%	2.8	1.8	15.4	2.78	3.48	5.85	4	**7**	**16**
C	0.20	0.23	0.39	0.12	50	1	10.0					10.0	3.30	4.14	6.94	0.6	**1.0**	**2.7**
D	0.19	0.22	0.36	0.08	150	3	17.9	300	1.5%	2.4	2.0	20.0	2.47	3.09	5.19	0.5	**0.7**	**1.9**
E	0.52	0.99	2.97	0.08	100	3	12.8					12.8	3.00	3.76	6.31	2	**4**	**19**
F	0.23	0.26	0.37	0.08	25	3	4.1	300	1.5%	2.4	2.0	6.1	3.88	4.87	8.18	0.9	**1.2**	**3.1**
G	0.18	0.20	0.30	0.08	25	2	4.6	160	1.5%	2.4	1.1	5.7	3.96	4.97	8.34	0.7	**1.0**	**2.5**
H	0.57	0.63	0.83	0.12	100	2	14.1	300	1.5%	2.4	2.0	16.1	2.73	3.41	5.73	2	**2**	**5**
I	1.11	1.27	1.85	0.12	100	2	14.1	600	1.5%	2.4	4.1	18.2	2.59	3.23	5.43	2.9	**4**	**10**
J	1.75	1.95	2.67	0.12	100	2	14.1	800	1.5%	2.4	5.4	19.5	2.50	3.13	5.25	4	**6**	**14**
K	0.73	0.81	1.09	0.12	100	2	14.1	450	1.5%	2.4	3.1	17.1	2.65	3.32	5.57	1.9	**3**	**6**
L	0.70	0.85	1.37	0.12	100	2	14.1	600	3.6%	3.8	2.6	16.7	2.68	3.36	5.64	1.9	**3**	**8**
M	0.59	0.69	1.05	0.12	100	2	14.1	320	1.5%	2.4	2.2	16.3	2.72	3.40	5.71	2	**2**	**6**
N	0.31	0.34	0.46	0.12	50	1	10.0	320	1.5%	2.4	2.2	12.1	3.07	3.84	6.45	1.0	**1.3**	**3.0**
O	1.00	1.12	1.53	0.12	100	2	14.1	650	2.3%	3.0	3.6	17.6	2.62	3.28	5.50	2.6	**4**	**8**
P	0.06	0.07	0.11	0.12	50	1	10.0	120	1.5%	2.4	0.8	10.8	3.21	4.02	6.75	0.2	**0.3**	**0.7**

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Return Period	1-Hour Depth
2	1.19
5	1.50
10	1.75
25	2.00
50	2.25
100	2.52

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5} \qquad \text{Tc=L/V}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

$t_c = \frac{L}{180} + 10$

*For buried riprap, select C_v value based on type of vegetative cover.

DEVELOPED BASIN RUNOFF SUMMARY (INTERIM)

BASIN	WEIGHTED			OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS		
	CA(2)	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
Q	0.33	0.41	0.69	0.12	85	6	8.6	400	1.0%	2.0	3.3	11.9	3.09	3.87	6.50	1.0	**1.6**	**4.5**
R	0.48	0.56	0.88	0.12	85	7	8.1	625	1.0%	2.0	5.2	13.3	2.95	3.70	6.21	1.4	**2.1**	**5.5**
S	0.39	0.43	0.62	0.12	40	1	8.3	540	3.6%	3.8	2.4	10.6	3.22	4.04	6.78	1.2	**1.7**	**4.2**
T	0.41	0.42	0.49	0.12	15	0.5	4.6	540	3.6%	3.8	2.4	7.0	3.72	4.67	7.84	1.5	**2.0**	**3.8**
U	1.50	1.63	2.16	0.12	40	3	5.8	650	1.0%	2.0	5.4	11.2	3.16	3.96	6.65	5	**6**	**14**
V	0.43	0.85	2.46	0.12	100	2	14.1	300	1.0%	2.0	2.5	16.6	2.69	3.37	5.66	1	**3**	**14**
P1-A2	3.15	3.23	3.63	0.12	20	0.5	5.8	1500	1.0%	2.0	12.5	18.3	2.57	3.22	5.40	8.1	**10.4**	**19.6**
P1-A3	1.08	1.10	1.22	0.12	20	0.5	5.8	780	1.0%	2.0	3.9	9.7	3.33	4.17	7.00	3.6	**4.6**	**8.5**
OS-F4	0.91	3.65	15.96	0.12	300	8	22.2	1500	2.5%	1.6	15.8	38.0	1.71	2.13	3.57	2	**8**	**57**
EX-9	1.18	4.74	20.72	0.12	300	9	21.3	1200	2.0%	1.4	14.1	35.5	1.79	2.23	3.74	2	**11**	**78**
OS-A	0.01	0.03	0.11	0.08	200	6	18.1					18.1	2.59	3.24	5.43	0.02	**0.1**	**0.6**

Missing Basins OS-2, OS-3, & F6-K in table. Please include.

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DEVELOPED SURFACE ROUTING SUMMARY (INTERIM)

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Facility/ Inlet Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	Basin B	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 10' TYPE R SUMP INLET
2	Basin A	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 10' TYPE R SUMP INLET
3	Basin O	1.12	1.53	17.6	3.28	5.50	3.7	8.4	COUNTY STD. 6' CROSSPAN
4	DP-3, Basin P	1.19	1.64	17.6	3.28	5.50	3.9	9.0	PROP. 15' TYPE R AT-GRADE INLET
5	Basin M	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 5' TYPE R SUMP INLET
6	Basin N	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 5' TYPE R SUMP INLET
7	Basin D, F	0.47	0.73	20.0	3.09	5.19	1	4	PROP. 5' TYPE R SUMP INLET
8	Basin H	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 5' TYPE R SUMP INLET
9	Basin G	0.20	0.30	5.7	4.97	8.34	1.0	2.5	PROP. 5' TYPE R SUMP INLET
10	Basin I	1.27	1.85	18.2	3.23	5.43	4	10	PROP. 10' TYPE R AT-GRADE INLET
11	Basin J, Flow-by from DP-10	1.96	3.21	19.5	3.13	5.25	6	17	PROP. 15' TYPE R AT-GRADE INLET
12	Basin K, Flow-by from DP-11	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 10' TYPE R SUMP INLET

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DEVELOPED SURFACE ROUTING SUMMARY (INTERIM)

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Facility/ Inlet Size*
					I(5)	I(100)	Q(5)	Q(100)	
13	Basin L	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 5' TYPE R SUMP INLET
14	Basin S	0.43	0.62	10.6	4.04	6.78	1.7	4.2	PROP. 15' TYPE R AT-GRADE INLET
15	Basin T, OS-A	0.45	0.60	18.1	3.24	5.43	1.5	3.3	PROP. 15' TYPE R AT-GRADE INLET
16	**TOTAL PIPE INFLOW (Pipe Run 24)**	**12.27**	**17.48**	**21.6**	**2.98**	**4.99**	**37**	**87**	**POND FSD-16**
17	Basin C, Q, P1-A2, Flow-by from DP-4	3.87	4.81	18.3	3.22	5.40	12.5	26.0	EXIST. 15' TYPE R AT-GRADE INLET
18	Basin R, P1-A3, Flow-by from DP-17	2.28	4.07	18.6	3.19	5.36	7.3	21.8	EXIST. 15' TYPE R AT-GRADE INLET
19	Basin U, Flow-by from DP-18 (No Flow-by from DP-14, 15)	1.65	3.29	11.2	3.96	6.65	6.6	21.9	EXIST. 20' TYPE R SUMP INLET
20	**TOTAL POND INFLOW (Incl. Basins V, EX-9)**	**17.86**	**40.66**	**35.5**	**2.23**	**3.74**	**44**	**152**	**POND FSD-16**

JOB NAME: ***STERLING RANCH EAST FILING NO. 8***
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* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM SLOPE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.
PIPES ARE TO BE PRIVATE UNLESS OTHERWISE NOTED.
PRIVATE STORM MATERIALS TO BE RCP OR DOUBLE WALL POLYPROPYLENE (DWPP) TO BE SELECTED BY CONTRACTOR

DEVELOPED PIPE ROUTING SUMMARY (INTERIM)

Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	DP-1	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 24" RCP (PUBLIC)
2	DP-2	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 24" RCP (PUBLIC)
3	PR-1, PR-2	3.00	4.35	15.6	3.46	5.82	10	25	PROP. 36" RCP (PUBLIC)
4	DP-4 Capture	1.19	1.56	17.6	3.28	5.50	4	9	PROP. 18" RCP (PUBLIC)
5	PR-3, PR-4	4.19	5.90	18.4	3.21	5.39	13	32	PROP. 36" RCP (PUBLIC)
6	DP-5	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 18" RCP (PUBLIC)
7	DP-6	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 18" RCP (PUBLIC)
8	PR-5, PR-6, PR-7	5.22	7.42	19.6	3.12	5.23	16	39	PROP. 36" RCP (PUBLIC)
9	DP-7	0.47	0.73	20.0	3.09	5.19	1	4	PROP. 18" RCP (PUBLIC)
10	DP-8	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 18" RCP (PUBLIC)
11	PR-9, PR-10	1.10	1.56	20.8	3.03	5.09	3	8	PROP. 24" RCP (PUBLIC)
12	DP-9	0.20	0.30	5.7	4.97	8.34	1.0	2.5	PROP. 18" RCP (PUBLIC)

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
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CALCULATED BY:	*MAW*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM SLOPE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.
PIPES ARE TO BE PRIVATE UNLESS OTHERWISE NOTED.
PRIVATE STORM MATERIALS TO BE RCP OR DOUBLE WALL POLYPROPYLENE (DWPP) TO BE SELECTED BY CONTRACTOR

DEVELOPED PIPE ROUTING SUMMARY (INTERIM)

Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
13	PR-11, PR-12	1.30	1.86	21.1	3.01	5.05	4	9	PROP. 24" RCP (PUBLIC)
14	DP-10 Capture	1.25	1.31	18.2	3.23	5.43	4	7	PROP. 18" RCP (PUBLIC)
15	PR-13, PR-14	2.56	3.17	21.3	3.00	5.03	8	16	PROP. 24" RCP (PUBLIC)
16	DP-11 Capture	1.96	2.41	19.5	3.13	5.25	6	13	PROP. 24" RCP (PUBLIC)
17	PR-15, PR-16	4.52	5.58	21.4	2.99	5.02	14	28	PROP. 30" RCP (PUBLIC)
18	DP-12	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 24" RCP (PUBLIC)
19	DP-13	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 24" RCP (PUBLIC)
20	PR-17, PR-18, PR-19	6.17	8.84	21.4	2.99	5.02	18	44	PROP. 36" RCP (PUBLIC)
21	PR-8, PR-20	11.39	16.26	21.6	2.98	4.99	34	81	PROP. 42" RCP (PUBLIC)
22	DP-14 Capture	0.43	0.62	10.6	4.04	6.78	1.7	4.2	PROP. 18" RCP (PUBLIC)
23	PR-22, DP-15 Capture	0.88	1.22	10.6	4.04	6.78	3.6	8.3	PROP. 18" RCP (PUBLIC)
24	**PR-21, PR-23**	**12.27**	**17.48**	**21.6**	**2.98**	**4.99**	**37**	**87**	**PROP. 48" RCP (PUBLIC)**

JOB NAME: *STERLING RANCH EAST FILING NO. 8*
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DEVELOPED BASIN RUNOFF COEFFICIENT SUMMARY (ULTIMATE)

		C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			WEIGHTED IMP.
BASIN	TOTAL AREA (AC)	LAND USE	PERCENT IMP.	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMP.	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	PERCENT
A	2.90	RES. 1/6 AC.	52.0%	2.90	0.32	0.38	0.55	LANDSCAPE	7.0%	0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.93	1.10	1.60	52.0%
B	5.00	RES. 1/6 AC.	52.0%	5.00	0.32	0.38	0.55	LANDSCAPE	7.0%	0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.60	1.90	2.75	52.0%
C	0.72	PAVEMENT	100.0%	0.19	0.89	0.90	0.96	LANDSCAPE	7.0%	0.53	0.05	0.12	0.39	0.27	0.33	0.54	0.20	0.23	0.39	31.5%
D	0.20	PAVEMENT	100.0%	0.20	0.89	0.90	0.96	UNDEVELOPED	0.0%	0.00	0.02	0.08	0.35	0.89	0.90	0.96	0.18	0.18	0.19	100.0%
E	7.80	RES. 1/6 AC.	52.0%	1.22	0.32	0.38	0.55	LANDSCAPE	7.0%	6.58	0.02	0.08	0.35	0.07	0.13	0.38	0.52	0.99	2.97	14.0%
F	2.20	RES. 1/6 AC.	52.5%	2.00	0.32	0.38	0.55	LANDSCAPE	7.0%	0.20	0.05	0.12	0.39	0.30	0.36	0.54	0.65	0.78	1.18	48.4%
G	1.20	RES. 1/6 AC.	52.5%	0.85	0.32	0.38	0.55	LANDSCAPE	7.0%	0.35	0.05	0.12	0.39	0.24	0.30	0.50	0.29	0.37	0.60	39.2%
H	1.40	RES. 1/8 AC.	65.0%	1.40	0.41	0.45	0.59	LANDSCAPE	7.0%	0.00	0.05	0.12	0.39	0.41	0.45	0.59	0.57	0.63	0.83	65.0%
I	3.40	RES. 1/8 AC.	65.0%	2.60	0.41	0.45	0.59	LANDSCAPE	7.0%	0.80	0.05	0.12	0.39	0.33	0.37	0.54	1.11	1.27	1.85	51.4%
J	4.70	RES. 1/8 AC.	65.0%	4.20	0.41	0.45	0.59	LANDSCAPE	7.0%	0.50	0.05	0.12	0.39	0.37	0.41	0.57	1.75	1.95	2.67	58.8%
K	1.90	RES. 1/8 AC.	65.0%	1.75	0.41	0.45	0.59	LANDSCAPE	7.0%	0.15	0.05	0.12	0.39	0.38	0.42	0.57	0.73	0.81	1.09	60.4%
L	2.70	RES. 1/8 AC.	65.0%	1.58	0.41	0.45	0.59	LANDSCAPE	7.0%	1.12	0.05	0.12	0.39	0.26	0.31	0.51	0.70	0.85	1.37	40.9%
M	2.00	RES. 1/8 AC.	65.0%	1.35	0.41	0.45	0.59	LANDSCAPE	7.0%	0.65	0.05	0.12	0.39	0.29	0.34	0.53	0.59	0.69	1.05	46.2%
N	0.80	RES. 1/8 AC.	65.0%	0.75	0.41	0.45	0.59	LANDSCAPE	7.0%	0.05	0.05	0.12	0.39	0.39	0.43	0.58	0.31	0.34	0.46	61.4%
O	2.70	RES. 1/8 AC.	65.0%	2.40	0.41	0.45	0.59	LANDSCAPE	7.0%	0.30	0.05	0.12	0.39	0.37	0.41	0.57	1.00	1.12	1.53	58.6%
P	0.20	RES. 1/8 AC.	65.0%	0.15	0.41	0.45	0.59	LANDSCAPE	7.0%	0.05	0.05	0.12	0.39	0.32	0.37	0.54	0.06	0.07	0.11	50.5%
Q	1.40	RES. 1/8 AC.	65.0%	0.72	0.41	0.45	0.59	LANDSCAPE	7.0%	0.68	0.05	0.12	0.39	0.24	0.29	0.49	0.33	0.41	0.69	36.8%
R	1.70	RES. 1/8 AC.	65.0%	1.09	0.41	0.45	0.59	LANDSCAPE	7.0%	0.61	0.05	0.12	0.39	0.28	0.33	0.52	0.48	0.56	0.88	44.2%
S	1.00	PAVEMENT	100.0%	0.40	0.89	0.90	0.96	LANDSCAPE	7.0%	0.60	0.05	0.12	0.39	0.39	0.43	0.62	0.39	0.43	0.62	44.2%
T	0.60	PAVEMENT	100.0%	0.45	0.89	0.90	0.96	LANDSCAPE	7.0%	0.15	0.05	0.12	0.39	0.68	0.71	0.82	0.41	0.42	0.49	76.8%
U	4.20	PAVEMENT	100.0%	3.00	0.89	0.90	0.96	OPEN SPACE	7.0%	1.20	0.05	0.12	0.39	0.65	0.68	0.80	2.73	2.84	3.35	73.4%
V	6.10	CONCRETE	100.0%	0.15	0.89	0.90	0.96	LANDSCAPE	7.0%	5.95	0.05	0.12	0.39	0.07	0.14	0.40	0.43	0.85	2.46	9.3%
W	2.60	RES. 1/5 AC.	46.0%	2.35	0.28	0.34	0.52	LANDSCAPE	7.0%	0.25	0.05	0.12	0.39	0.26	0.32	0.51	0.67	0.83	1.32	42.3%
P1-A2	4.20	PAVEMENT	100.0%	3.50	0.89	0.90	0.96	LANDSCAPE	7.0%	0.70	0.05	0.12	0.39	0.75	0.77	0.87	3.15	3.23	3.63	84.5%
P1-A3	1.37	PAVEMENT	100.0%	1.20	0.89	0.90	0.96	LANDSCAPE	7.0%	0.17	0.05	0.12	0.39	0.79	0.80	0.89	1.08	1.10	1.22	88.5%
OS-F4	45.60	RES 1/5	46.0%	0.00	0.28	0.34	0.52	UNDEVELOPED	0.0%	45.60	0.02	0.08	0.35	0.02	0.08	0.35	0.91	3.65	15.96	0.0%
EX-9	59.20	RES 1/5	46.0%	0.00	0.28	0.34	0.52	UNDEVELOPED	0.0%	59.20	0.02	0.08	0.35	0.02	0.08	0.35	1.18	4.74	20.72	0.0%
OS-2	2.50	RES. 1/6 AC.	52.5%	1.90	0.32	0.38	0.55	STREET	100.0%	0.60	0.89	0.90	0.96	0.46	0.50	0.65	1.14	1.26	1.62	63.9%
OS-3	2.00	RES. 1/6 AC.	52.5%	1.00	0.32	0.38	0.55	STREET	100.0%	1.00	0.89	0.90	0.96	0.61	0.64	0.76	1.21	1.28	1.51	76.3%
OS-4	0.30	RES. 1/5 AC.	46.0%	0.15	0.28	0.34	0.52	OPEN SPACE	7.0%	0.15	0.05	0.12	0.39	0.17	0.23	0.46	0.05	0.07	0.14	26.5%
F6-K	1.70	RES. 1/6 AC.	52.5%	1.37	0.32	0.38	0.55	LANDSCAPE	7.0%	0.33	0.05	0.12	0.39	0.27	0.33	0.52	0.45	0.56	0.88	43.7%

SRE FIL. 2 & 8 SW'LY OUTFALL BASINS	**33.20 AC**	**53.0%**
SRE FILING 6 E'LY OUTFALL BASINS	**33.40 AC**	**51.1%**
TRIBUTARY AREA TO NW'LY OUTFALL	**136.30 AC**	**48.9%**
TOTAL AREA TRIBUTARY TO POND FSD-16 (INCL. V & W)	**211.60 AC**	**48.7%**

Basins tributaty to proposed Pond FSD-16
Basins tributaty to existing Pond FSD-14A
Basin w/ Runoff Reduction

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
DATE:	*09/01/26*
CALC'D BY:	*MAW*

Return Period	1-Hour Depth
2	1.19
5	1.50
10	1.75
25	2.00
50	2.25
100	2.52

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5} \qquad \text{Tc=L/V}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

$t_c = \frac{L}{180} + 10$

*For buried riprap, select C_v value based on type of vegetative cover.

DEVELOPED BASIN RUNOFF SUMMARY (ULTIMATE)

BASIN	WEIGHTED			OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS		
	CA(2)	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
A	0.93	1.10	1.60	0.08	50	2	8.2	300	2.0%	2.8	1.8	10.0	3.29	4.13	6.93	3	**5**	**11**
B	1.60	1.90	2.75	0.08	100	2.5	13.6	300	2.0%	2.8	1.8	15.4	2.78	3.48	5.85	4	**7**	**16**
C	0.20	0.23	0.39	0.12	50	1	10.0					10.0	3.30	4.14	6.94	0.6	**1.0**	**2.7**
D	0.18	0.18	0.19	0.08	10	0.2	4.6	300	1.5%	2.4	2.0	6.7	3.78	4.74	7.95	0.7	**0.9**	**1.5**
E	0.52	0.99	2.97	0.08	100	3	12.8					12.8	3.00	3.76	6.31	2	**4**	**19**
F	0.65	0.78	1.18	0.12	90	2.5	12.0	350	1.5%	2.4	2.4	14.4	2.86	3.59	6.02	2	**3**	**7**
G	0.29	0.37	0.60	0.12	80	4.5	9.0	150	1.5%	2.4	1.0	10.0	3.30	4.13	6.94	1	**2**	**4**
H	0.57	0.63	0.83	0.12	100	2	14.1	300	1.5%	2.4	2.0	16.1	2.73	3.41	5.73	2	**2**	**5**
I	1.11	1.27	1.85	0.12	100	2	14.1	600	1.5%	2.4	4.1	18.2	2.59	3.23	5.43	2.9	**4**	**10**
J	1.75	1.95	2.67	0.12	100	2	14.1	800	1.5%	2.4	5.4	19.5	2.50	3.13	5.25	4	**6**	**14**
K	0.73	0.81	1.09	0.12	100	2	14.1	450	1.5%	2.4	3.1	17.1	2.65	3.32	5.57	1.9	**3**	**6**
L	0.70	0.85	1.37	0.12	100	2	14.1	600	3.6%	3.8	2.6	16.7	2.68	3.36	5.64	1.9	**3**	**8**
M	0.59	0.69	1.05	0.12	100	2	14.1	320	1.5%	2.4	2.2	16.3	2.72	3.40	5.71	2	**2**	**6**
N	0.31	0.34	0.46	0.12	50	1	10.0	320	1.5%	2.4	2.2	12.1	3.07	3.84	6.45	1.0	**1.3**	**3.0**
O	1.00	1.12	1.53	0.12	100	2	14.1	650	2.3%	3.0	3.6	17.6	2.62	3.28	5.50	2.6	**4**	**8**
P	0.06	0.07	0.11	0.12	50	1	10.0	120	1.5%	2.4	0.8	10.8	3.21	4.02	6.75	0.2	**0.3**	**0.7**

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
DATE:	*09/01/26*
CALC'D BY:	*MAW*

Return Period	1-Hour Depth
2	1.19
5	1.50
10	1.75
25	2.00
50	2.25
100	2.52

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5} \qquad \text{Tc=L/V}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
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Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

$t_c = \frac{L}{180} + 10$

*For buried riprap, select C_v value based on type of vegetative cover.

DEVELOPED BASIN RUNOFF SUMMARY (ULTIMATE)

BASIN	WEIGHTED			OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS		
	CA(2)	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
Q	0.33	0.41	0.69	0.12	85	6	8.6	400	1.0%	2.0	3.3	11.9	3.09	3.87	6.50	1.0	**1.6**	**4.5**
R	0.48	0.56	0.88	0.12	85	7	8.1	625	1.0%	2.0	5.2	13.3	2.95	3.70	6.21	1.4	**2.1**	**5.5**
S	0.39	0.43	0.62	0.12	40	1	8.3	540	3.6%	3.8	2.4	10.6	3.22	4.04	6.78	1.2	**1.7**	**4.2**
T	0.41	0.42	0.49	0.12	15	0.5	4.6	540	3.6%	3.8	2.4	7.0	3.72	4.67	7.84	1.5	**2.0**	**3.8**
U	2.73	2.84	3.35	0.12	80	2	11.7	700	1.0%	2.0	5.8	17.5	2.63	3.29	5.52	7	**9**	**18**
V	0.43	0.85	2.46	0.12	100	2	14.1	300	1.0%	2.0	2.5	16.6	2.69	3.37	5.66	1	**3**	**14**
W	0.67	0.83	1.32	0.12	10	0.2	4.5	650	3.5%	3.7	2.9	7.3	3.66	4.59	7.71	2	**4**	**10**
P1-A2	3.15	3.23	3.63	0.12	20	0.5	5.8	1500	1.0%	2.0	12.5	18.3	2.57	3.22	5.40	8.1	**10.4**	**19.6**
P1-A3	1.08	1.10	1.22	0.12	20	0.5	5.8	780	1.0%	2.0	3.9	9.7	3.33	4.17	7.00	3.6	**4.6**	**8.5**
OS-F4	0.91	3.65	15.96	0.12	300	8	22.2	1500	2.5%	1.6	15.8	38.0	1.71	2.13	3.57	2	**8**	**57**
EX-9	1.18	4.74	20.72	0.12	300	9	21.3	1200	2.0%	1.4	14.1	35.5	1.79	2.23	3.74	2	**11**	**78**

JOB NAME: ***STERLING RANCH EAST FILING NO. 8***
JOB NUMBER: ***1183.28***
DATE: ***09/01/26***
CALCULATED BY: ***MAW***

*ALL STORM SEWER TO BE PRIVATE UNLESS OTHERWISE NOTED

DEVELOPED SURFACE ROUTING SUMMARY (ULTIMATE)

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Facility/ Inlet Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	Basin B	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 10' TYPE R SUMP INLET
2	Basin A	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 10' TYPE R SUMP INLET
3	Basin O	1.12	1.53	17.6	3.28	5.50	3.7	8.4	COUNTY STD. 6' CROSSPAN
4	DP-3, Basin P	1.19	1.64	17.6	3.28	5.50	3.9	9.0	PROP. 15' TYPE R AT-GRADE INLET
5	Basin M	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 5' TYPE R SUMP INLET
6	Basin N	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 5' TYPE R SUMP INLET
7	Basin D, F	0.96	1.37	14.4	3.59	6.02	3	8	PROP. 5' TYPE R SUMP INLET
8	Basin H	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 5' TYPE R SUMP INLET
9	Basin G	0.37	0.60	10.0	4.13	6.94	1.5	4.2	PROP. 5' TYPE R SUMP INLET
10	Basin I	1.27	1.85	18.2	3.23	5.43	4	10	PROP. 10' TYPE R AT-GRADE INLET
11	Basin J, Flow-by from DP-10	1.96	3.21	19.5	3.13	5.25	6	17	PROP. 15' TYPE R AT-GRADE INLET
12	Basin K, Flow-by from DP-11	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 10' TYPE R SUMP INLET

JOB NAME: *STERLING RANCH EAST FILING NO. 8*
JOB NUMBER: *1183.28*
DATE: *09/01/26*
CALCULATED BY: *MAW*

*ALL STORM SEWER TO BE PRIVATE UNLESS OTHERWISE NOTED

DEVELOPED SURFACE ROUTING SUMMARY (ULTIMATE)

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Facility/ Inlet Size*
					I(5)	I(100)	Q(5)	Q(100)	
13	Basin L	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 5' TYPE R SUMP INLET
14	Basin S, Flow-by from DP-14A	0.43	0.75	10.6	4.04	6.78	1.7	5.1	PROP. 15' TYPE R AT-GRADE INLET
15	Basin T, Z, Flow-by from DP-15A	0.49	0.70	11.3	3.95	6.63	1.9	4.7	PROP. 15' TYPE R AT-GRADE INLET
14A	OS-2	1.26	1.62	12.7	3.78	6.34	5	10	Future. 15' TYPE R AT-GRADE INLET
15A	OS-3	1.28	1.51	14.2	3.60	6.04	5	9	Future 15' TYPE R AT-GRADE INLET
16	**TOTAL PIPE INFLOW (Pipe Run 24)**	**12.97**	**18.65**	**19.9**	**3.10**	**5.20**	**40**	**97**	**POND FSD-16**
17	Basin C, Q, P1-A2, Flow-by from DP-4	3.87	4.81	18.3	3.22	5.40	12.5	26.0	EXIST. 15' TYPE R AT-GRADE INLET
18	Basin R, P1-A3, Flow-by from DP-17	2.28	4.07	18.6	3.19	5.36	7.3	21.8	EXIST. 15' TYPE R AT-GRADE INLET
19	Basin U, F6-K, Flow-by from DP-18 (No Flow-by from DP-14, 15)	3.43	5.57	17.5	3.29	5.52	11.3	30.8	EXIST. 20' TYPE R SUMP INLET
20	**TOTAL POND INFLOW (Incl. Basins V, W and Pipe Inflows from SF2615)**	**78.25**	**116.56**	**30.3**	**2.47**	**4.14**	**193**	**482**	**POND FSD-16**

JOB NAME: ***STERLING RANCH EAST FILING NO. 8***
JOB NUMBER: ***1183.28***
DATE: ***09/01/26***
CALCULATED BY: ***MAW***

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM SLOPE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.
PIPES ARE TO BE PRIVATE UNLESS OTHERWISE NOTED.
PRIVATE STORM MATERIALS TO BE RCP OR DOUBLE WALL POLYPROPYLENE (DWPP) TO BE SELECTED BY CONTRACTOR

DEVELOPED PIPE ROUTING SUMMARY (ULTIMATE)

Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	DP-1	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 24" RCP (PUBLIC)
2	DP-2	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 24" RCP (PUBLIC)
3	PR-1, PR-2	3.00	4.35	15.6	3.46	5.82	10	25	PROP. 36" RCP (PUBLIC)
4	DP-4 Capture	1.19	1.56	17.6	3.28	5.50	4	9	PROP. 18" RCP (PUBLIC)
5	PR-3, PR-4	4.19	5.90	18.4	3.21	5.39	13	32	PROP. 36" RCP (PUBLIC)
6	DP-5	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 18" RCP (PUBLIC)
7	DP-6	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 18" RCP (PUBLIC)
8	PR-5, PR-6, PR-7	5.22	7.42	19.6	3.12	5.23	16	39	PROP. 36" RCP (PUBLIC)
9	DP-7	0.96	1.37	14.4	3.59	6.02	3	8	PROP. 18" RCP (PUBLIC)
10	DP-8	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 18" RCP (PUBLIC)
11	PR-9, PR-10	1.59	2.20	16.9	3.34	5.61	5	12	PROP. 24" RCP (PUBLIC)
12	DP-9	0.37	0.60	10.0	4.13	6.94	1.5	4.2	PROP. 18" RCP (PUBLIC)

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
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* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM SLOPE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.
PIPES ARE TO BE PRIVATE UNLESS OTHERWISE NOTED.
PRIVATE STORM MATERIALS TO BE RCP OR DOUBLE WALL POLYPROPYLENE (DWPP) TO BE SELECTED BY CONTRACTOR

DEVELOPED PIPE ROUTING SUMMARY (ULTIMATE)

Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
13	PR-11, PR-12	1.96	2.80	17.2	3.31	5.56	6	16	PROP. 24" RCP (PUBLIC)
14	DP-10 Capture	1.25	1.31	18.2	3.23	5.43	4	7	PROP. 18" RCP (PUBLIC)
15	PR-13, PR-14	3.21	4.11	18.4	3.22	5.40	10	22	PROP. 24" RCP (PUBLIC)
16	DP-11 Capture	1.96	2.41	19.5	3.13	5.25	6	13	PROP. 24" RCP (PUBLIC)
17	PR-15, PR-16	5.18	6.52	19.6	3.12	5.23	16	34	PROP. 30" RCP (PUBLIC)
18	DP-12	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 24" RCP (PUBLIC)
19	DP-13	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 24" RCP (PUBLIC)
20	PR-17, PR-18, PR-19	6.83	9.78	19.7	3.11	5.22	21	51	PROP. 36" RCP (PUBLIC)
21	PR-8, PR-20	12.05	17.19	19.9	3.10	5.20	37	89	PROP. 42" RCP (PUBLIC)
22	DP-14 Capture	0.43	0.75	10.6	4.04	6.78	1.7	5.1	PROP. 18" RCP (PUBLIC)
23	PR-22, DP-15 Capture	0.92	1.45	10.6	4.04	6.78	3.7	9.8	PROP. 18" RCP (PUBLIC)
24	**PR-22, PR-24**	**12.97**	**18.65**	**19.9**	**3.10**	**5.20**	**40**	**97**	**PROP. 48" RCP (PUBLIC)**

Inlet sizes will be verified with Final Drainage Report during Final Plat submittal

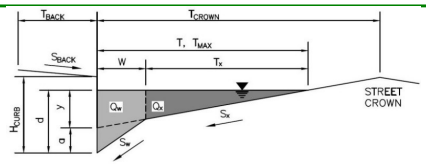
MHFD-Inlet, Version 5.03 (August 2023)

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

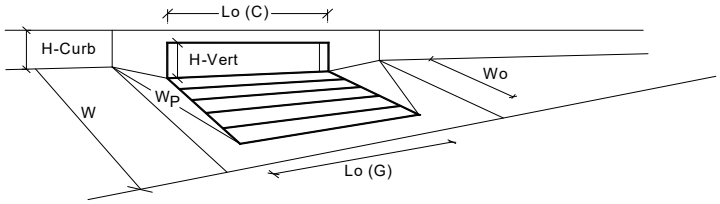
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



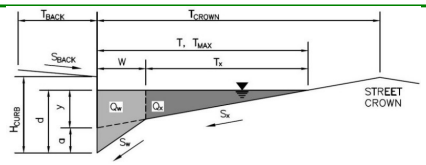
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.3**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	7.0	16.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

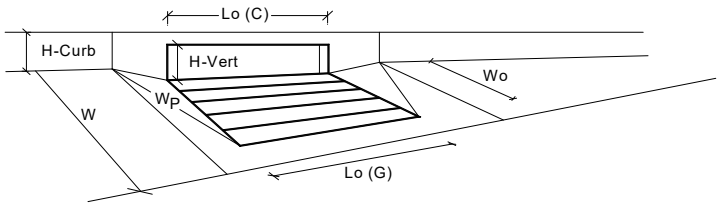
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

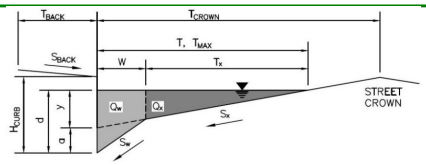


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.3**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	5.0	11.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-4**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.022	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

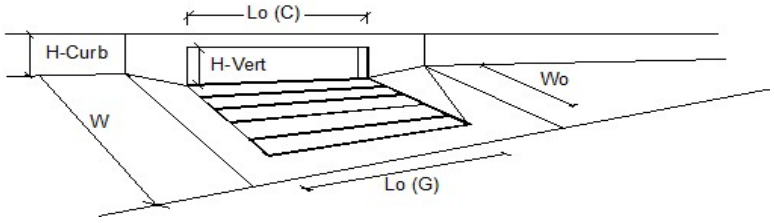
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**16.1**	**16.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.90 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

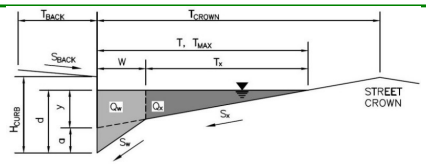
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.9**	**8.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.5**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**95**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

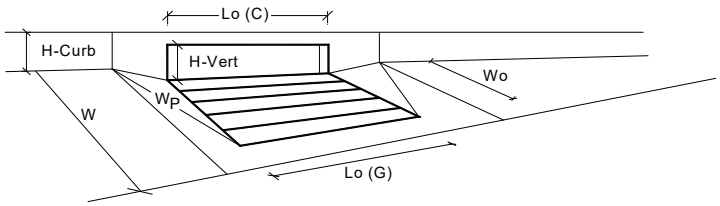
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

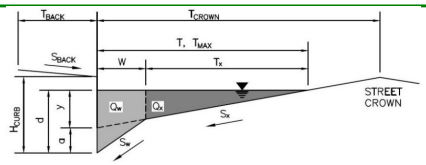


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.0	6.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-6**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

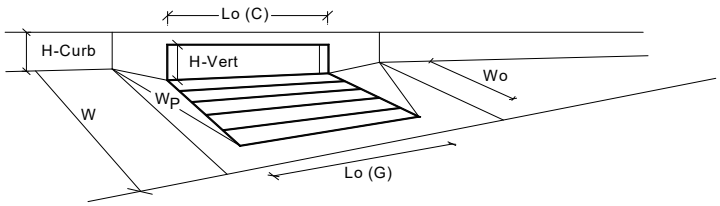
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

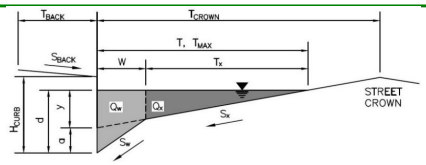


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	3.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-7 Interim**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

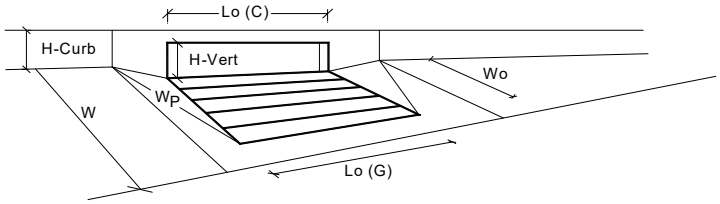
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



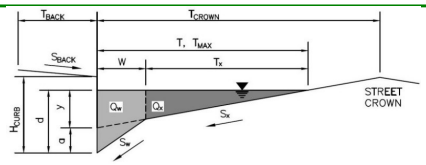
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.91	0.91	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.9**	**6.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	4.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-7 Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

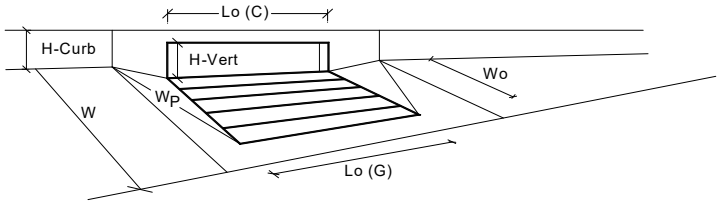
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

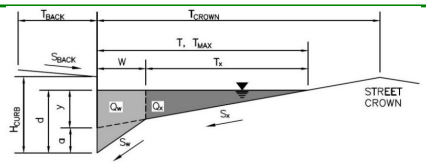


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	3.0	8.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

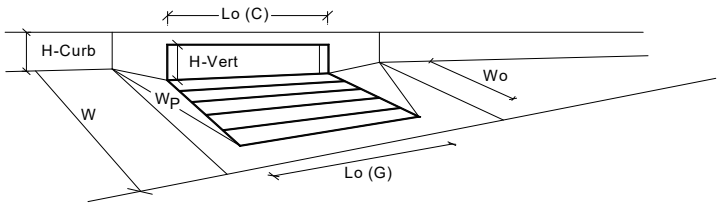
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



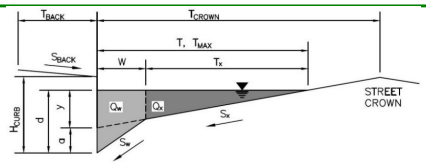
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.0	5.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-9 Interim**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	5.6	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

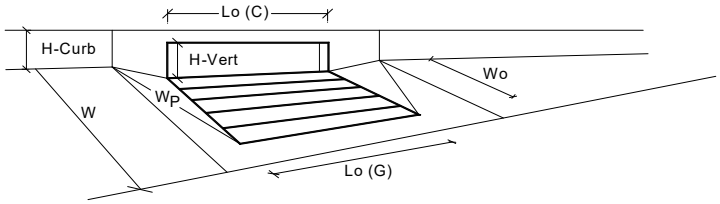
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

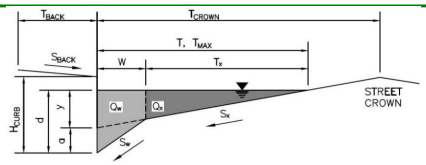


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.6**	**4.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	2.5	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-9 Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

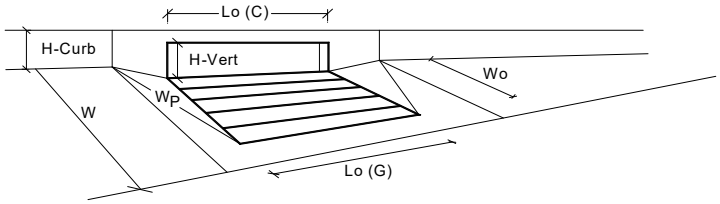
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	5.6	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

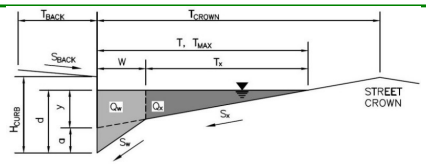


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.6**	**4.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.5	4.2	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-10**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

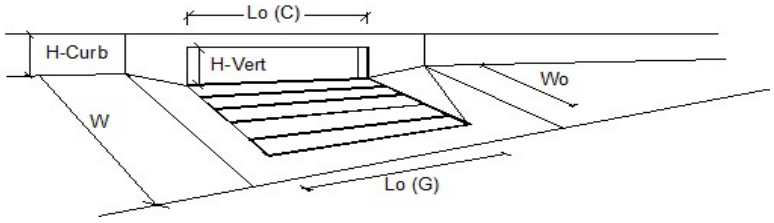
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**16.9**	**20.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



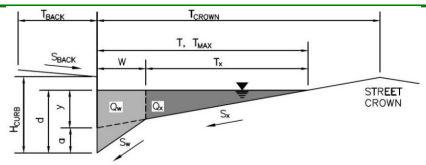
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.9**	**7.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**2.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**99**	**71**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-11**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

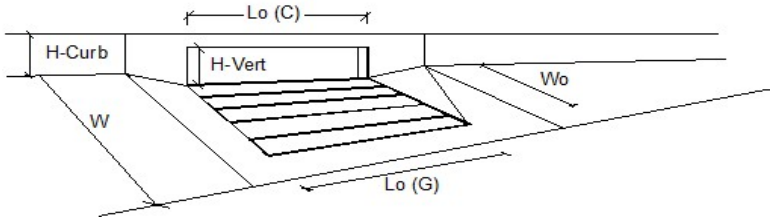
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**16.9**	**20.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.05 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 16.92 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



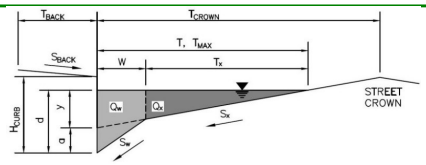
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.1**	**12.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**4.2**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**75**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-12**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

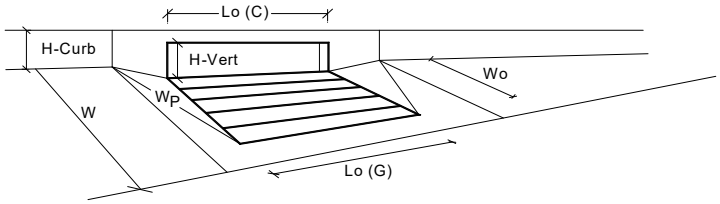
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

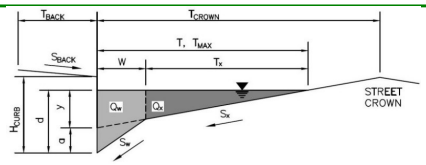


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.3**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	3.0	10.2	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-13**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

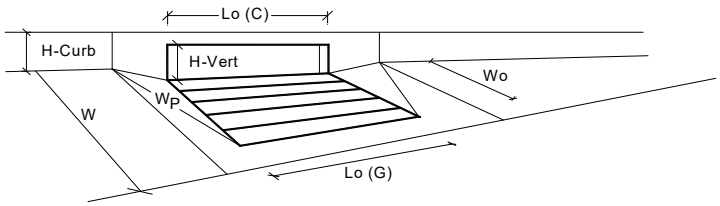
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	3.0	8.0	cfs

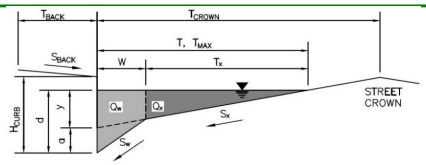
MHFD-Inlet, Version 5.03 (August 2023)

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-14 Interim**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

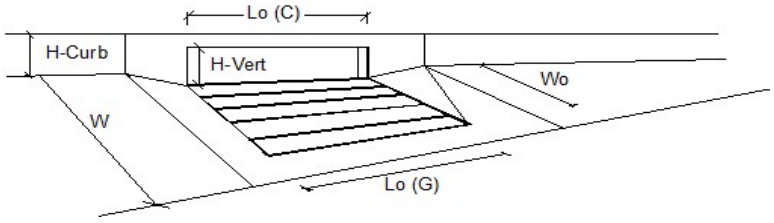
	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.70 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

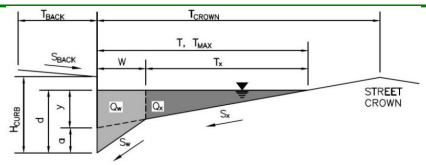
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.7**	**4.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-14 Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

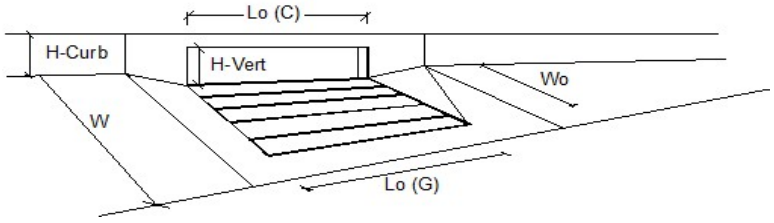
	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.70 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.97 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

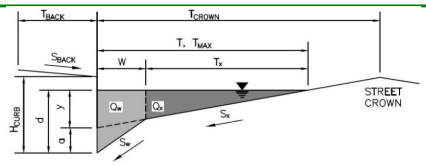
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.7**	**5.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-14A Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

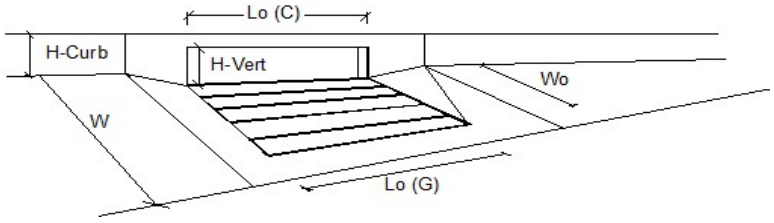
	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.00 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



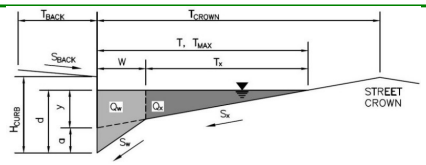
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.0**	**9.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**92**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-14A**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

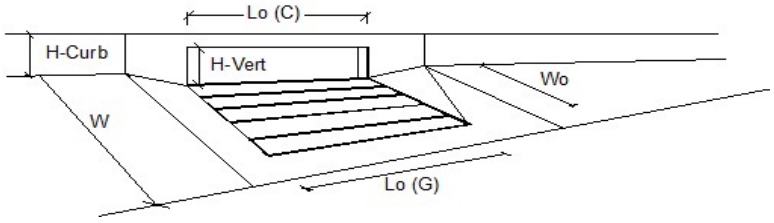
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.00 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



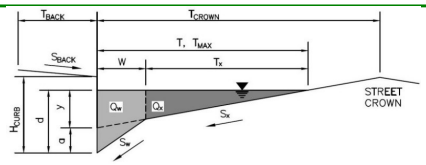
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.0**	**9.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**92**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-15 Interim**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

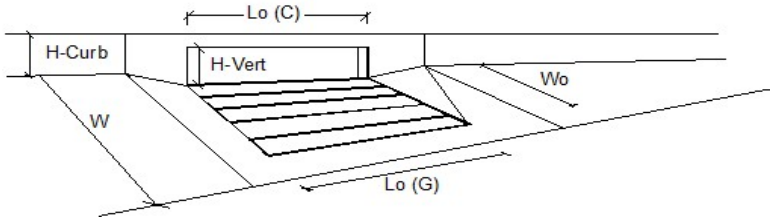
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 3.30 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



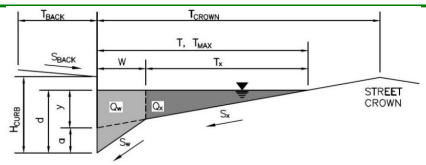
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**3.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-15 Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

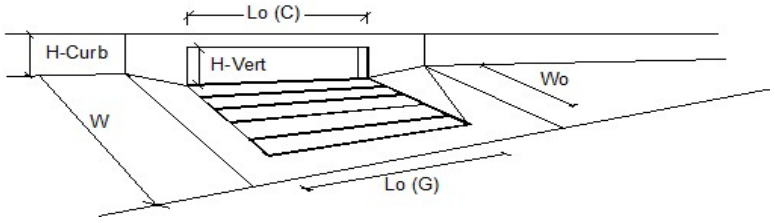
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.90 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.64 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



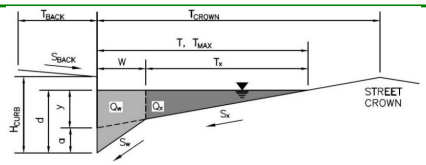
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.9**	**4.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-15A Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.035	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

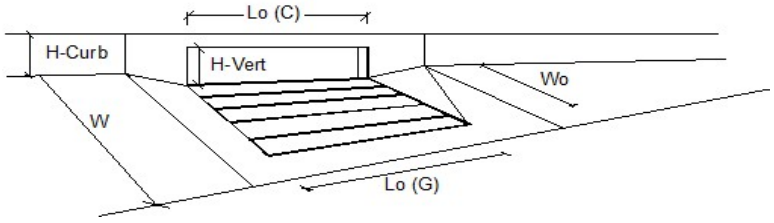
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.0**	**30.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.00 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



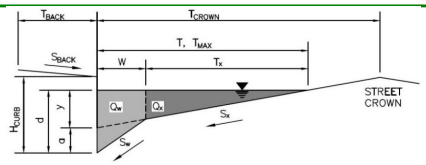
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.0**	**8.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**95**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-17**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	51.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

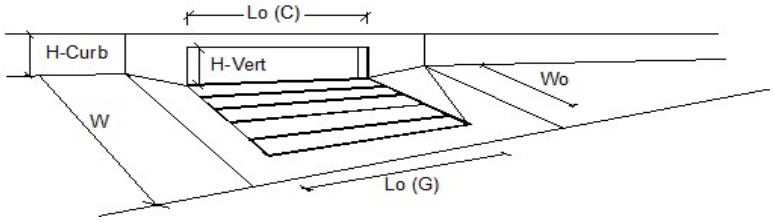
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.8**	**50.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 12.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 25.97 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



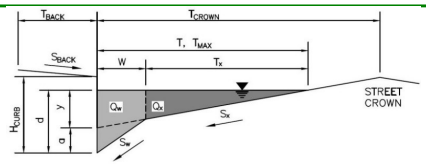
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**10.5**	**15.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.0**	**10.5**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**84**	**60**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**
Inlet ID: **DP-18**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	51.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

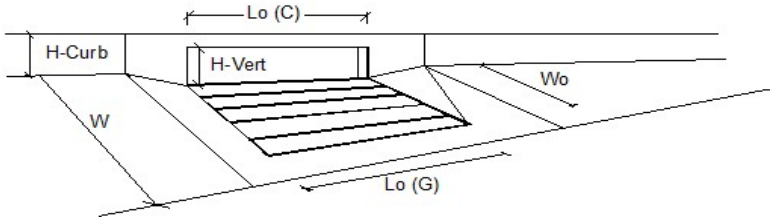
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.8**	**50.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.26 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 21.80 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

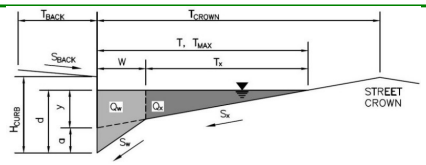
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.2**	**14.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**7.5**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**99**	**65**	**%**

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-19 Interim**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	62.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	33.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

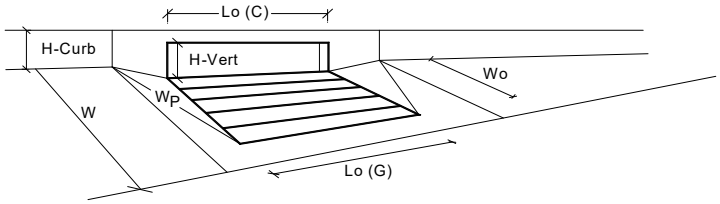
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



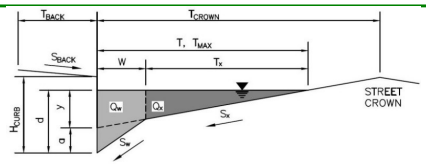
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.50	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.89	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**12.5**	**26.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	6.6	21.9	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 8**

Inlet ID: **DP-19 Ultimate**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	56.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

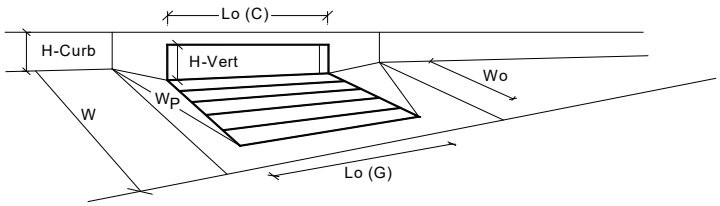
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

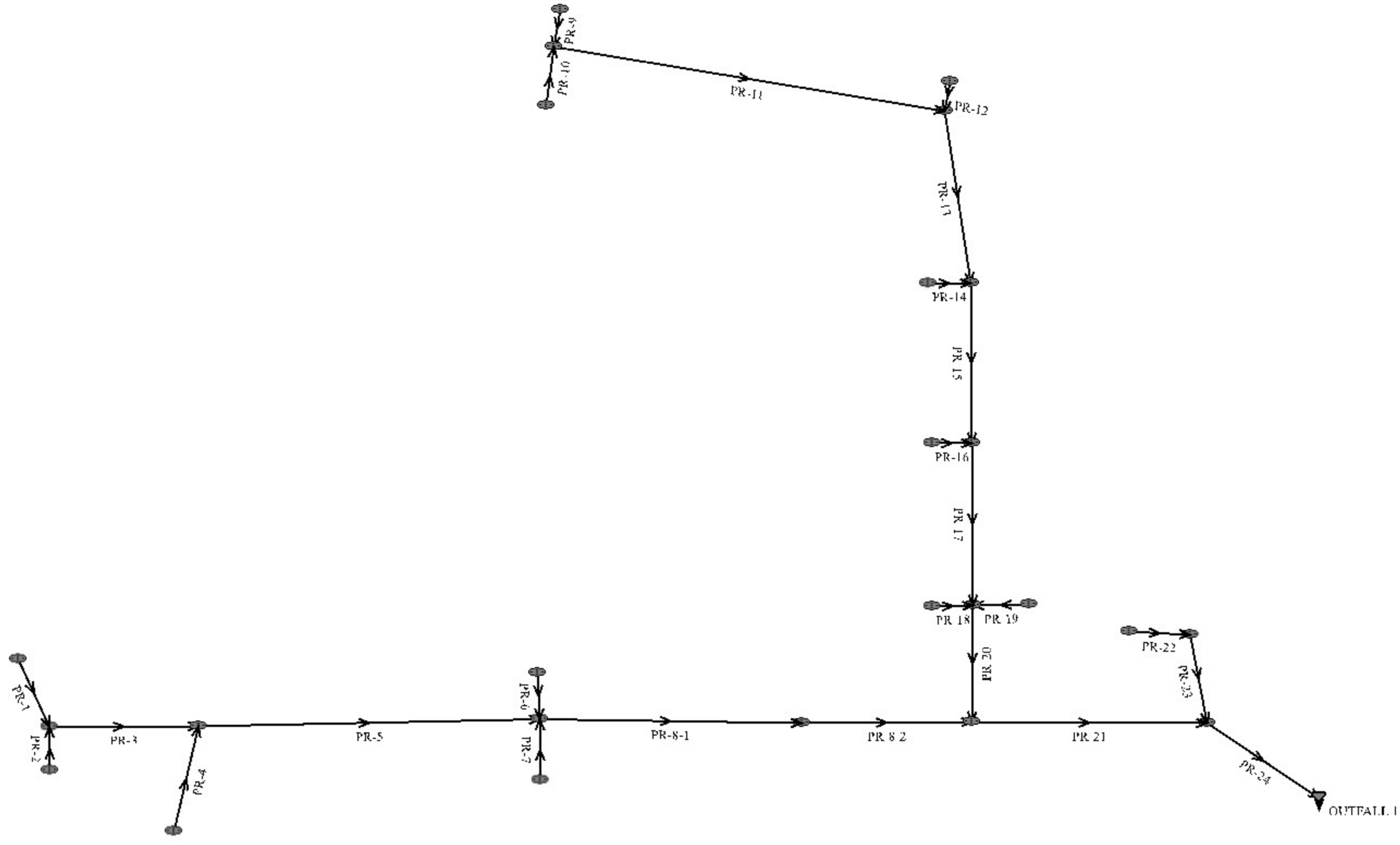
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**12.5**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	11.3	30.8	cfs

Storm Design & HGL's will be verified with Final Drainage Report during Final Plat submittal

100-yr. HGL MAP



System Input Summary (100-yr HGLs)

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in): 2.52
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 500
Maximum Urban Overland Len. (ft): 300
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 7097.08

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	**Ground Elevation (ft)**	**Total Known Flow (cfs)**	**Local Contribution (cfs)**	**Drainage Area (Ac.)**	**Runoff Coefficient**	**5yr Coefficient**	**Overland Length (ft)**	**Overland Slope (%)**	**Gutter Length (ft)**	**Gutter Velocity (fps)**
OUTFALL 1	7102.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-24	7107.04	96.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-21	7109.68	89.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-8-2	7112.39	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-8-1	7118.54	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-7	7118.84	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-6	7118.84	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-5	7118.42	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-3	7117.53	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-2	7117.80	11.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-1	7118.07	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-4	7118.03	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-20	7109.38	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-19	7109.90	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-17	7111.83	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-15	7120.63	22.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-13	7127.05	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-11	7128.64	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PR-9	7129.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-10	7129.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-12	7127.50	4.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-14	7121.13	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-16	7112.33	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-18	7109.90	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-23	7107.94	8.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-22	7107.94	5.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	8.28	11.60	0.17	96.00	
PR-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.00	
PR-21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	89.00	
PR-8-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.00	
PR-8-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.00	
PR-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	
PR-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	
PR-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	
PR-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	
PR-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	

PR-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	
PR-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	
PR-20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	
PR-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	
PR-17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.00	
PR-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.00	
PR-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	
PR-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	
PR-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	
PR-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	
PR-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.20	
PR-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
PR-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00	
PR-18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	
PR-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.90	
PR-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	**Sewer Length (ft)**	**Downstream Invert (ft)**	**Slope (%)**	**Upstream Invert (ft)**	**Mannings n**	**Bend Loss**	**Lateral Loss**	**Cross Section**	**Rise (ft or in)**	**Span (ft or in)**
PR-24	79.03	7094.50	0.8	7095.13	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
PR-21	227.69	7099.81	0.8	7101.63	0.013	0.10	0.25	CIRCULAR	42.00 in	42.00 in

PR-8-2	228.22	7102.08	0.7	7103.68	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PR-8-1	348.61	7104.05	0.7	7106.49	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PR-7	5.56	7113.40	8.0	7113.84	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PR-6	25.58	7112.82	4.0	7113.84	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PR-5	500.80	7106.99	0.5	7109.49	0.013	0.05	0.25	CIRCULAR	36.00 in	36.00 in
PR-3	125.71	7109.56	1.0	7110.82	0.013	0.05	0.25	CIRCULAR	36.00 in	36.00 in
PR-2	5.68	7112.86	0.5	7112.89	0.013	1.01	0.00	CIRCULAR	24.00 in	24.00 in
PR-1	26.95	7112.86	1.0	7113.13	0.013	0.48	0.00	CIRCULAR	24.00 in	24.00 in
PR-4	29.86	7112.73	1.0	7113.03	0.013	0.05	0.00	CIRCULAR	18.00 in	18.00 in
PR-20	65.20	7103.13	1.0	7103.78	0.013	1.32	0.00	CIRCULAR	36.00 in	36.00 in
PR-19	28.00	7104.78	1.0	7105.06	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PR-17	140.21	7104.29	1.0	7105.69	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PR-15	247.92	7106.26	3.5	7114.94	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PR-13	234.46	7115.44	1.0	7117.78	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PR-11	356.04	7119.28	1.0	7122.84	0.013	1.06	1.00	CIRCULAR	24.00 in	24.00 in
PR-9	4.67	7119.78	3.0	7119.92	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PR-10	26.67	7119.78	1.0	7120.05	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PR-12	4.17	7121.28	5.0	7121.49	0.013	0.11	0.00	CIRCULAR	18.00 in	18.00 in
PR-14	4.67	7115.44	3.0	7115.58	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PR-16	4.17	7106.19	3.0	7106.32	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PR-18	4.17	7104.77	3.0	7104.90	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PR-23	16.81	7101.80	2.0	7102.14	0.013	0.29	0.00	CIRCULAR	18.00 in	18.00 in
PR-22	59.63	7102.46	1.7	7103.47	0.013	1.00	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	**Flow (cfs)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Froude Number**	**Flow Condition**	**Flow (cfs)**	**Surcharged Length (ft)**	**Comment**
PR-24	128.82	10.25	35.64	9.60	30.88	11.24	1.33	Supercritical	96.00	0.00	
PR-21	90.23	9.38	35.15	10.35	33.92	10.69	1.08	Supercritical	89.00	0.00	
PR-8-2	55.95	7.92	24.39	7.65	22.13	8.56	1.21	Pressurized	39.00	228.22	
PR-8-1	55.95	7.92	24.39	7.65	22.13	8.56	1.21	Supercritical Jump	39.00	105.41	
PR-7	29.79	16.86	7.90	4.02	3.86	10.80	4.01	Supercritical	3.00	0.00	
PR-6	21.07	11.92	11.35	5.11	6.57	10.27	2.85	Supercritical	6.00	0.00	
PR-5	47.29	6.69	22.02	7.06	21.70	7.19	1.03	Supercritical	32.00	0.00	
PR-3	66.88	9.46	19.35	6.46	15.25	8.78	1.58	Supercritical	25.00	0.00	
PR-2	16.04	5.11	14.27	5.65	14.60	5.50	0.96	Subcritical	11.00	0.00	
PR-1	22.68	7.22	17.30	6.60	14.87	7.82	1.34	Supercritical	16.00	0.00	
PR-4	10.53	5.96	13.93	6.13	12.80	6.70	1.19	Supercritical	9.00	0.00	
PR-20	66.88	9.46	27.88	8.68	23.53	10.42	1.40	Pressurized	51.00	65.20	
PR-19	22.68	7.22	12.08	5.05	9.84	6.59	1.48	Pressurized	8.00	28.00	
PR-17	41.13	8.38	23.79	8.15	20.80	9.36	1.31	Supercritical Jump	34.00	74.64	
PR-15	42.44	13.51	20.10	7.83	12.26	13.63	2.67	Supercritical	22.00	0.00	
PR-13	22.68	7.22	17.30	6.60	14.87	7.82	1.34	Supercritical Jump	16.00	21.42	
PR-11	22.68	7.22	14.93	5.84	12.41	7.32	1.43	Supercritical	12.00	0.00	

PR-9	18.24	10.32	13.15	5.78	8.34	9.98	2.40	Pressurized	8.00	4.67	
PR-10	10.53	5.96	10.32	4.77	8.73	5.88	1.38	Pressurized	5.00	26.67	
PR-12	23.55	13.33	9.42	4.49	5.15	10.07	3.20	Supercritical	4.20	0.00	
PR-14	18.24	10.32	12.29	5.45	7.74	9.64	2.43	Pressurized	7.00	4.67	
PR-16	39.29	12.51	15.56	6.03	9.50	11.23	2.57	Pressurized	13.00	4.17	
PR-18	39.29	12.51	13.58	5.46	8.26	10.45	2.59	Pressurized	10.00	4.17	
PR-23	14.90	8.43	13.85	6.10	10.02	8.80	1.88	Supercritical	8.90	0.00	
PR-22	13.73	7.77	10.43	4.80	7.60	7.20	1.83	Supercritical	5.10	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PR-24	96.00	CIRCULAR	48.00 in	48.00 in	48.00 in	48.00 in	48.00 in	48.00 in	12.57	
PR-21	89.00	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PR-8-2	39.00	CIRCULAR	36.00 in	36.00 in	33.00 in	33.00 in	36.00 in	36.00 in	7.07	
PR-8-1	39.00	CIRCULAR	36.00 in	36.00 in	33.00 in	33.00 in	36.00 in	36.00 in	7.07	
PR-7	3.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-6	6.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

PR-5	32.00	CIRCULAR	36.00 in	36.00 in	33.00 in	33.00 in	36.00 in	36.00 in	7.07	
PR-3	25.00	CIRCULAR	36.00 in	36.00 in	27.00 in	27.00 in	36.00 in	36.00 in	7.07	
PR-2	11.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PR-1	16.00	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PR-4	9.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-20	51.00	CIRCULAR	36.00 in	36.00 in	33.00 in	33.00 in	36.00 in	36.00 in	7.07	
PR-19	8.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PR-17	34.00	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	
PR-15	22.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PR-13	16.00	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PR-11	12.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PR-9	8.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-10	5.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-12	4.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-14	7.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-16	13.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PR-18	10.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PR-23	8.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PR-22	5.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 7097.08

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
PR-24	7094.50	7095.13	0.00	0.00	7097.08	7098.10	7099.03	0.50	7099.53
PR-21	7099.81	7101.63	0.13	0.57	7102.63	7104.56	7104.41	1.81	7106.22
PR-8-2	7102.08	7103.68	0.02	0.86	7106.63	7107.41	7107.10	0.78	7107.88
PR-8-1	7104.05	7106.49	0.02	0.00	7107.43	7108.52	7107.90	1.53	7109.43
PR-7	7113.40	7113.84	0.06	0.00	7113.82	7114.50	7114.65	0.10	7114.75
PR-6	7112.82	7113.84	0.24	0.00	7113.36	7114.79	7115.00	0.19	7115.19
PR-5	7106.99	7109.49	0.02	0.39	7109.42	7111.32	7109.84	2.26	7112.10
PR-3	7109.56	7110.82	0.01	0.27	7112.15	7112.43	7112.38	0.70	7113.08
PR-2	7112.86	7112.89	0.19	0.00	7114.05	7114.11	7114.55	0.03	7114.58
PR-1	7112.86	7113.13	0.19	0.00	7114.10	7114.57	7115.05	0.20	7115.25
PR-4	7112.73	7113.03	0.02	0.00	7113.80	7114.19	7114.49	0.28	7114.77
PR-20	7103.13	7103.78	1.07	0.00	7106.48	7106.86	7107.29	0.38	7107.67
PR-19	7104.78	7105.06	0.13	0.00	7107.70	7107.74	7107.80	0.03	7107.84
PR-17	7104.29	7105.69	0.04	0.06	7107.02	7107.67	7107.77	0.93	7108.70
PR-15	7106.26	7114.94	0.04	0.00	7107.71	7116.61	7110.17	7.40	7117.57
PR-13	7115.44	7117.78	0.02	0.36	7117.54	7119.22	7117.95	1.95	7119.90
PR-11	7119.28	7122.84	0.24	0.18	7120.31	7124.08	7121.15	3.47	7124.61

PR-9	7119.78	7119.92	0.42	0.00	7124.72	7124.74	7125.03	0.03	7125.06
PR-10	7119.78	7120.05	0.16	0.00	7124.65	7124.71	7124.78	0.06	7124.84
PR-12	7121.28	7121.49	0.01	0.00	7121.71	7123.20	7123.29	0.00	7123.29
PR-14	7115.44	7115.58	0.32	0.00	7117.64	7117.67	7117.89	0.02	7117.91
PR-16	7106.19	7106.32	0.35	0.00	7108.79	7108.80	7109.05	0.01	7109.07
PR-18	7104.77	7104.90	0.21	0.00	7107.72	7107.73	7107.88	0.01	7107.88
PR-23	7101.80	7102.14	0.11	0.00	7102.64	7103.29	7103.84	0.03	7103.87
PR-22	7102.46	7103.47	0.13	0.00	7103.87	7104.34	7104.00	0.70	7104.70

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

DETENTION & STORMWATER

QUALITY POND

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
DATE:	*08/28/26*
CALCULATED BY:	*MAW*

POND FSD-16 TRIBUTARY BASINS (Interim)

TRIBUTARY BASIN	BASIN AREA (AC)	WEIGHTED % IMPERVIOUS
A	2.90	**52.0%**
B	5.00	**52.0%**
D	0.68	**30.8%**
F	0.63	**40.9%**
G	0.54	**39.7%**
H	1.40	**65.0%**
I	3.40	**51.4%**
J	4.70	**58.8%**
K	1.90	**60.4%**
L	2.70	**40.9%**
M	2.00	**46.2%**
N	0.80	**61.4%**
O	2.70	**58.6%**
P	0.20	**50.5%**
S	1.00	**44.2%**
T	0.60	**76.8%**
V	6.10	**9.3%**
EX-9	59.20	**2.0%**
OS-A	0.32	**2.0%**
TOTAL	**96.8**	**18.8%**

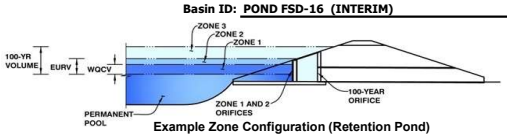
POND FSD-16 EFF. IMPERVIOUS % (Interim) **18.8%**

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: STERLING RANCH EAST FILING NO. 8

Basin ID: POND FSD-16 (INTERIM)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	96.80	acres
Watershed Length =	3,000	ft
Watershed Length to Centroid =	1,500	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	18.80%	percent
Percentage Hydrologic Soil Group A =	75.0%	percent
Percentage Hydrologic Soil Group B =	25.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.892	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.646	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.150	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.692	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.582	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.738	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	6.286	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	8.713	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3 in.) =	12.372	acre-feet	3.00	inches
Approximate 2-yr Detention Volume =	1.044	acre-feet		
Approximate 5-yr Detention Volume =	1.451	acre-feet		
Approximate 10-yr Detention Volume =	2.023	acre-feet		
Approximate 25-yr Detention Volume =	2.595	acre-feet		
Approximate 50-yr Detention Volume =	3.001	acre-feet		
Approximate 100-yr Detention Volume =	3.939	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.892	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.754	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.293	acre-feet
Total Detention Basin Volume =	3.939	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

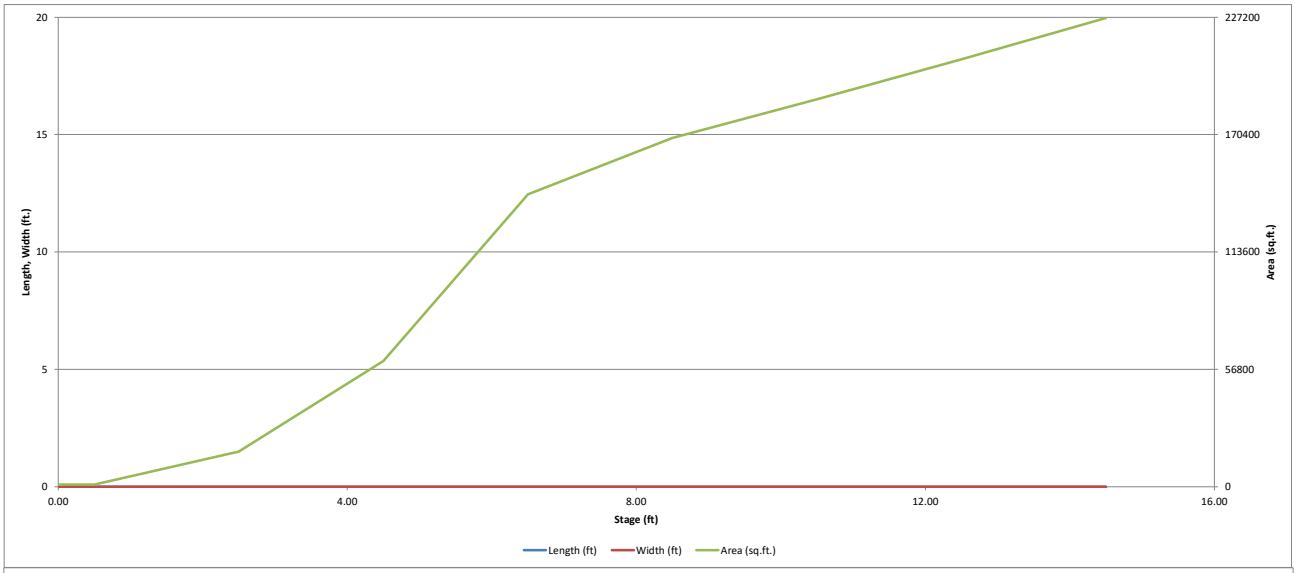
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

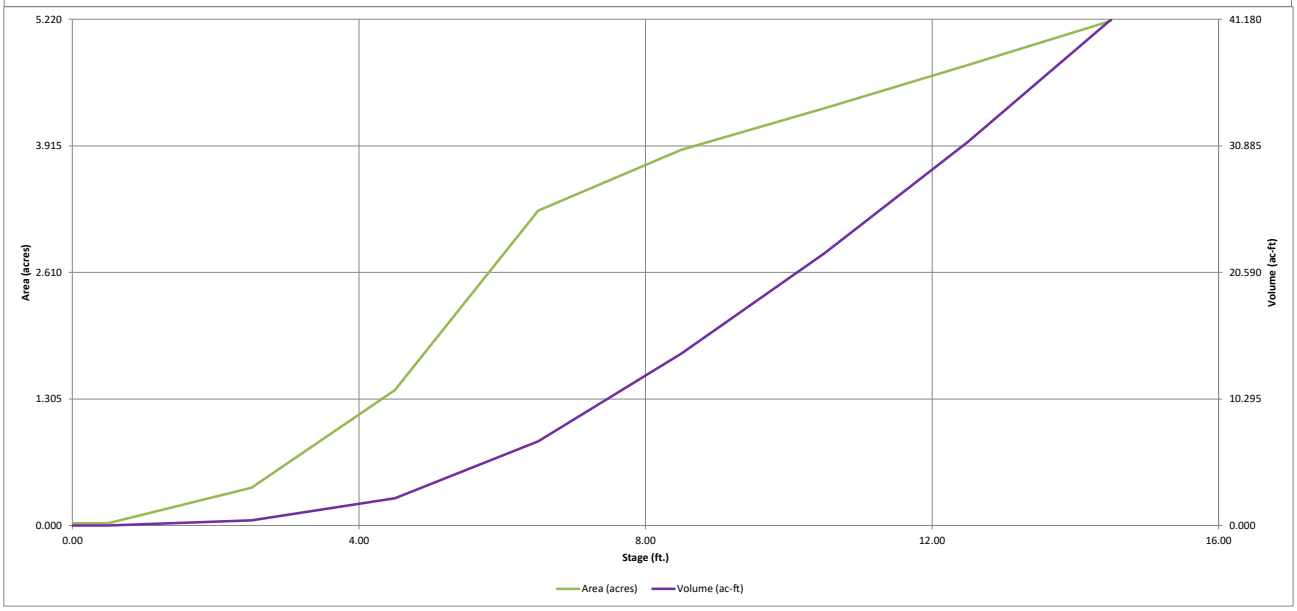
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	1,027	0.024		
7092	--	0.50	--	--	--	1,027	0.024	514	0.012
7094	--	2.50	--	--	--	17,010	0.390	18,550	0.426
7096	--	4.50	--	--	--	60,913	1.398	96,473	2.215
7098	--	6.50	--	--	--	141,508	3.249	298,894	6.862
7100	--	8.50	--	--	--	168,799	3.875	609,201	13.985
7102	--	10.50	--	--	--	187,503	4.304	965,503	22.165
7104	--	12.50	--	--	--	206,914	4.750	1,359,920	31.219
7106	--	14.50	--	--	--	226,802	5.207	1,793,636	41.176

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



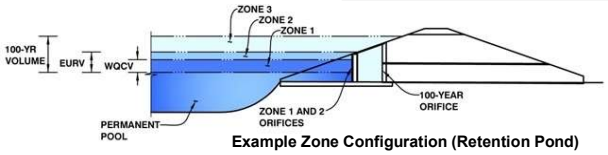


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **STERLING RANCH EAST FILING NO. 8**

Basin ID: **POND FSD-16 (INTERIM)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.30	0.892	Orifice Plate
Zone 2 (EURV)	4.06	0.754	Orifice Plate
Zone 3 (100-year)	5.45	2.293	Weir&Pipe (Restrict)
Total (all zones)		3.939	

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

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

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	8.50	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	20.40	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.70	3.40	5.10	6.80			
Orifice Area (sq. inches)	3.00	3.00	20.00	100.00	100.00			

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	8.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	8.50	N/A	feet
Overflow Weir Front Edge Length =	20.00	N/A	feet	Overflow Weir Slope Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	4.43	N/A	
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	55.68	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	27.84	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	12.57	N/A	ft^2
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	2.00	N/A	feet
Restrictor Plate Height Above Pipe Invert =	48.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	12.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.38	feet
Spillway Crest Length =	170.00	feet	Stage at Top of Freeboard =	13.88	feet
Spillway End Slopes =	6.00	H:V	Basin Area at Top of Freeboard =	5.07	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	37.99	acre-ft

Calculated Parameters for Spillway

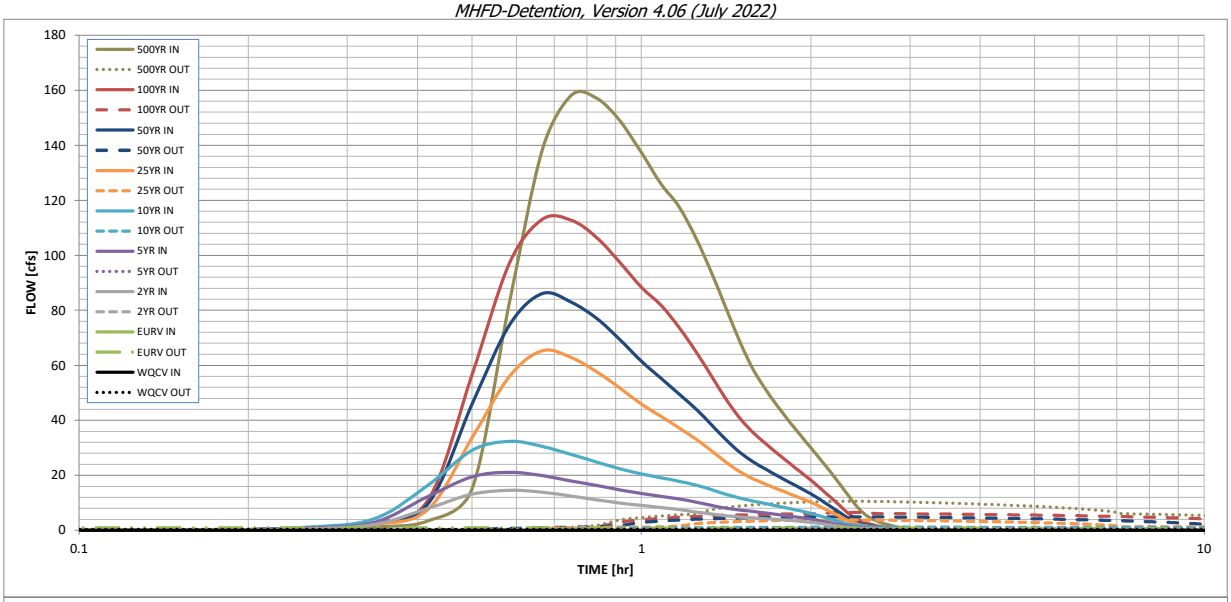
Routed Hydrograph Results

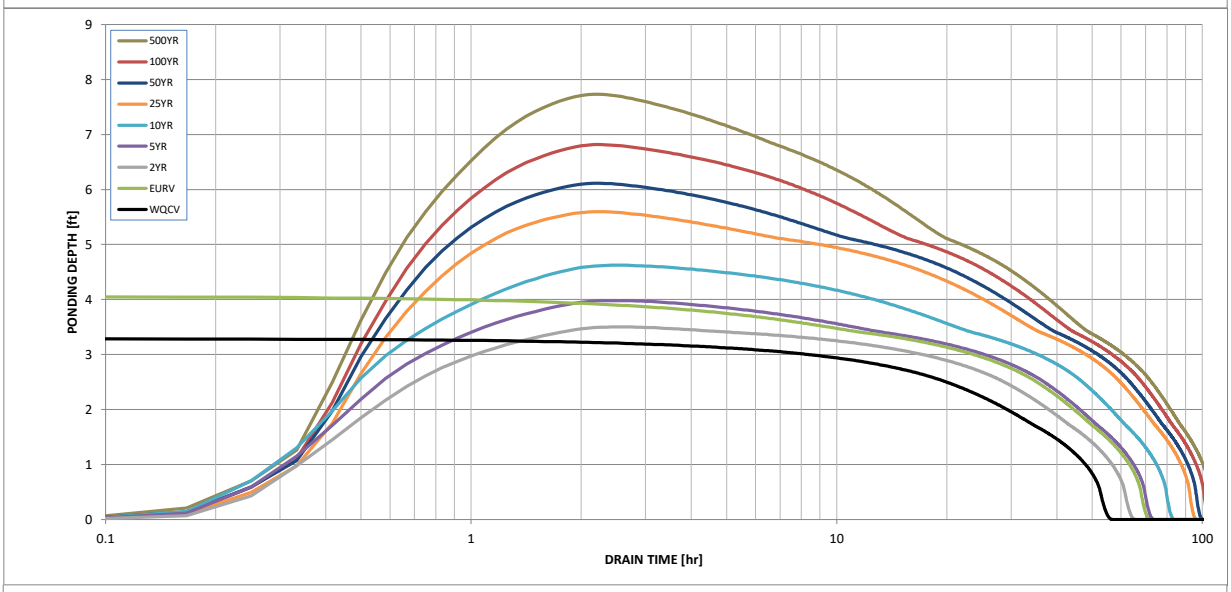
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

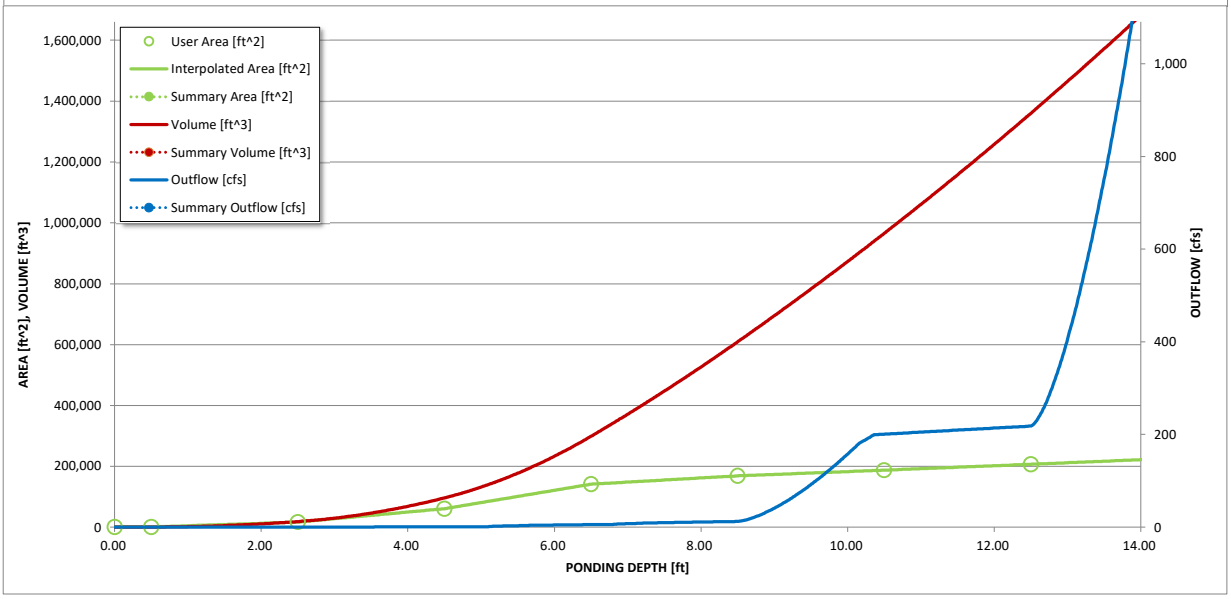
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.00
CUHP Runoff Volume (acre-ft) =	0.892	1.646	1.150	1.692	2.582	4.738	6.286	8.713	12.372
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.150	1.692	2.582	4.738	6.286	8.713	12.372
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	1.2	2.0	10.2	41.4	60.9	89.1	132.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.11	0.43	0.63	0.92	1.37
Peak Inflow Q (cfs) =	N/A	N/A	14.5	21.1	32.3	65.3	86.1	113.1	158.1
Peak Outflow Q (cfs) =	0.3	0.9	0.5	0.9	1.1	3.8	4.9	6.6	10.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.1	0.1	0.1	0.1	0.1
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Plate	Plate	Plate
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	51	63	58	64	72	78	77	77	75
Time to Drain 99% of Inflow Volume (hours) =	**53**	67	62	69	78	88	90	92	92
Maximum Ponding Depth (ft) =	3.30	4.06	3.50	3.98	4.62	5.60	6.12	6.82	7.73
Area at Maximum Ponding Depth (acres) =	0.79	1.18	0.89	1.14	1.51	2.41	2.89	3.35	3.63
Maximum Volume Stored (acre-ft) =	0.900	1.648	1.068	1.556	2.389	4.289	5.665	7.884	11.094

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.15
	0:15:00	0.00	0.00	0.51	0.83	1.04	0.70	0.90	0.86	1.22
	0:20:00	0.00	0.00	2.05	2.78	4.02	2.11	2.49	2.63	3.40
	0:25:00	0.00	0.00	7.96	12.27	16.30	7.41	9.47	10.72	15.03
	0:30:00	0.00	0.00	13.16	19.47	29.12	33.59	45.89	56.60	83.49
	0:35:00	0.00	0.00	14.51	21.08	32.34	56.13	74.79	97.42	138.41
	0:40:00	0.00	0.00	13.81	19.88	30.47	65.30	86.05	113.06	158.11
	0:45:00	0.00	0.00	12.42	17.97	27.55	62.80	82.96	112.80	157.06
	0:50:00	0.00	0.00	11.10	16.33	24.80	57.64	76.98	106.40	148.78
	0:55:00	0.00	0.00	9.93	14.68	22.37	51.65	69.23	97.30	137.25
	1:00:00	0.00	0.00	9.04	13.42	20.53	45.90	61.43	88.36	125.86
	1:05:00	0.00	0.00	8.31	12.38	19.14	41.43	55.31	81.86	117.70
	1:10:00	0.00	0.00	7.52	11.41	17.79	37.21	49.59	73.76	106.29
	1:15:00	0.00	0.00	6.69	10.26	16.44	33.15	44.11	64.97	93.55
	1:20:00	0.00	0.00	5.90	9.04	14.77	28.83	38.33	55.97	80.43
	1:25:00	0.00	0.00	5.26	8.04	13.04	24.63	32.76	47.44	68.03
	1:30:00	0.00	0.00	4.83	7.36	11.69	21.16	28.17	40.51	58.16
	1:35:00	0.00	0.00	4.51	6.83	10.62	18.65	24.78	35.40	50.81
	1:40:00	0.00	0.00	4.22	6.27	9.66	16.69	22.08	31.32	44.84
	1:45:00	0.00	0.00	3.94	5.70	8.76	14.94	19.68	27.70	39.50
	1:50:00	0.00	0.00	3.66	5.15	7.91	13.31	17.46	24.39	34.62
	1:55:00	0.00	0.00	3.29	4.62	7.06	11.74	15.34	21.24	30.01
	2:00:00	0.00	0.00	2.90	4.08	6.16	10.21	13.27	18.23	25.64
	2:05:00	0.00	0.00	2.42	3.41	5.11	8.51	11.01	15.15	21.25
	2:10:00	0.00	0.00	1.93	2.71	4.03	6.76	8.72	12.07	16.90
	2:15:00	0.00	0.00	1.48	2.05	3.05	5.07	6.48	9.06	12.63
	2:20:00	0.00	0.00	1.10	1.53	2.27	3.49	4.41	6.21	8.61
	2:25:00	0.00	0.00	0.86	1.21	1.78	2.29	2.87	4.06	5.70
	2:30:00	0.00	0.00	0.71	0.99	1.47	1.59	1.99	2.77	3.94
	2:35:00	0.00	0.00	0.59	0.82	1.21	1.19	1.47	1.96	2.77
	2:40:00	0.00	0.00	0.49	0.67	0.99	0.92	1.11	1.39	1.93
	2:45:00	0.00	0.00	0.40	0.55	0.79	0.71	0.85	0.98	1.33
	2:50:00	0.00	0.00	0.33	0.44	0.63	0.55	0.65	0.68	0.88
	2:55:00	0.00	0.00	0.27	0.35	0.49	0.42	0.50	0.47	0.57
	3:00:00	0.00	0.00	0.22	0.28	0.38	0.33	0.38	0.34	0.41
	3:05:00	0.00	0.00	0.18	0.22	0.29	0.26	0.30	0.27	0.32
	3:10:00	0.00	0.00	0.14	0.18	0.23	0.21	0.23	0.22	0.25
	3:15:00	0.00	0.00	0.11	0.14	0.17	0.16	0.18	0.17	0.20
	3:20:00	0.00	0.00	0.08	0.10	0.13	0.12	0.14	0.13	0.15
	3:25:00	0.00	0.00	0.06	0.07	0.10	0.09	0.10	0.10	0.11
	3:30:00	0.00	0.00	0.04	0.05	0.07	0.06	0.07	0.07	0.08
	3:35:00	0.00	0.00	0.02	0.03	0.04	0.04	0.04	0.04	0.05
	3:40:00	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03
	3:45:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	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

JOB NAME:	*STERLING RANCH EAST FILING NO. 8*
JOB NUMBER:	*1183.28*
DATE:	*08/31/26*
CALCULATED BY:	*MAW*

POND FSD-16 SW'LY OUTFALL TRIBUTARY BASINS (Ultimate)

TRIBUTARY BASIN	BASIN AREA (AC)	WEIGHTED % IMPERVIOUS
A	2.90	**52.0%**
B	5.00	**52.0%**
D	0.20	**100.0%**
F	2.20	**48.4%**
G	1.20	**39.2%**
H	1.40	**65.0%**
I	3.40	**51.4%**
J	4.70	**58.8%**
K	1.90	**60.4%**
L	2.70	**40.9%**
M	2.00	**46.2%**
N	0.80	**61.4%**
O	2.70	**58.6%**
P	0.20	**50.5%**
S	1.00	**44.2%**
T	0.60	**76.8%**
OS-4	0.30	**26.5%**
TOTAL	**33.20**	**53.0%**

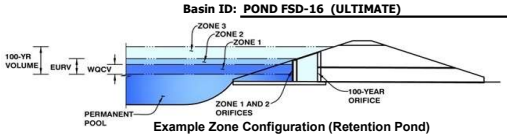
POND FSD-16 EFF. IMPERVIOUS % (Interim) **53.0%**

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **STERLING RANCH EAST FILING NO. 8**

Basin ID: **POND FSD-16 (ULTIMATE)**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	211.60	acres
Watershed Length =	4,000	ft
Watershed Length to Centroid =	2,000	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	48.70%	percent
Percentage Hydrologic Soil Group A =	75.0%	percent
Percentage Hydrologic Soil Group B =	25.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	3.575	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	11.594	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	9.169	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	12.132	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	15.008	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	19.917	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	23.860	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	29.162	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3 in.) =	37.558	acre-feet	3.00	inches
Approximate 2-yr Detention Volume =	7.750	acre-feet		
Approximate 5-yr Detention Volume =	10.326	acre-feet		
Approximate 10-yr Detention Volume =	12.924	acre-feet		
Approximate 25-yr Detention Volume =	15.352	acre-feet		
Approximate 50-yr Detention Volume =	16.861	acre-feet		
Approximate 100-yr Detention Volume =	19.015	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	3.575	acre-feet
Zone 2 Volume (EURV - Zone 1) =	8.019	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	7.421	acre-feet
Total Detention Basin Volume =	19.015	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

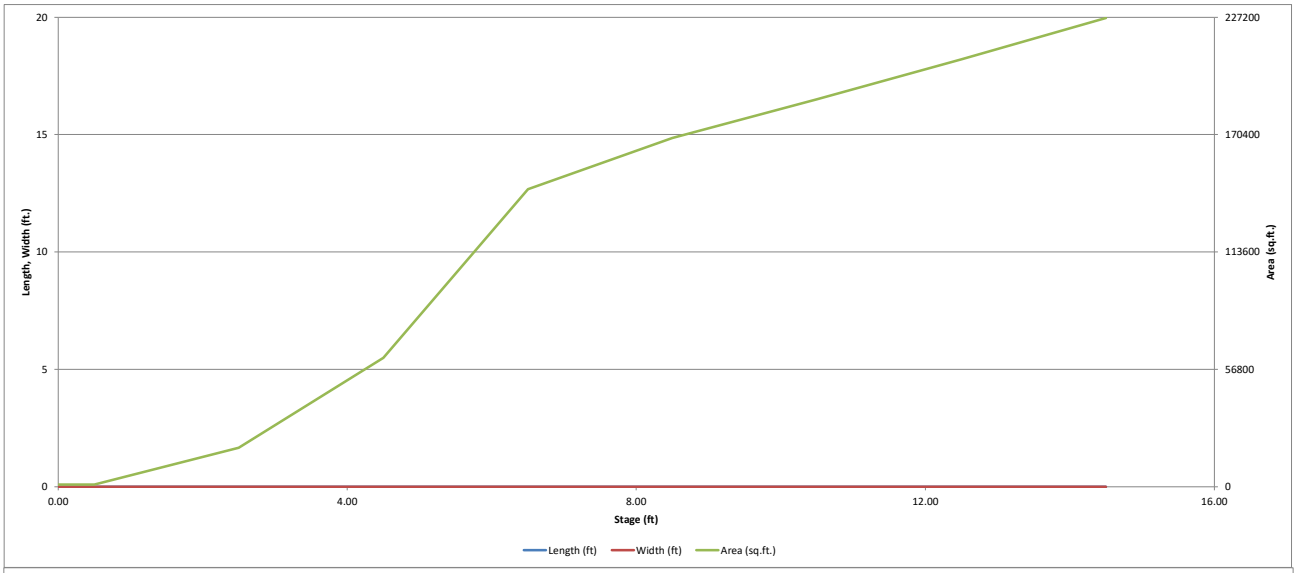
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

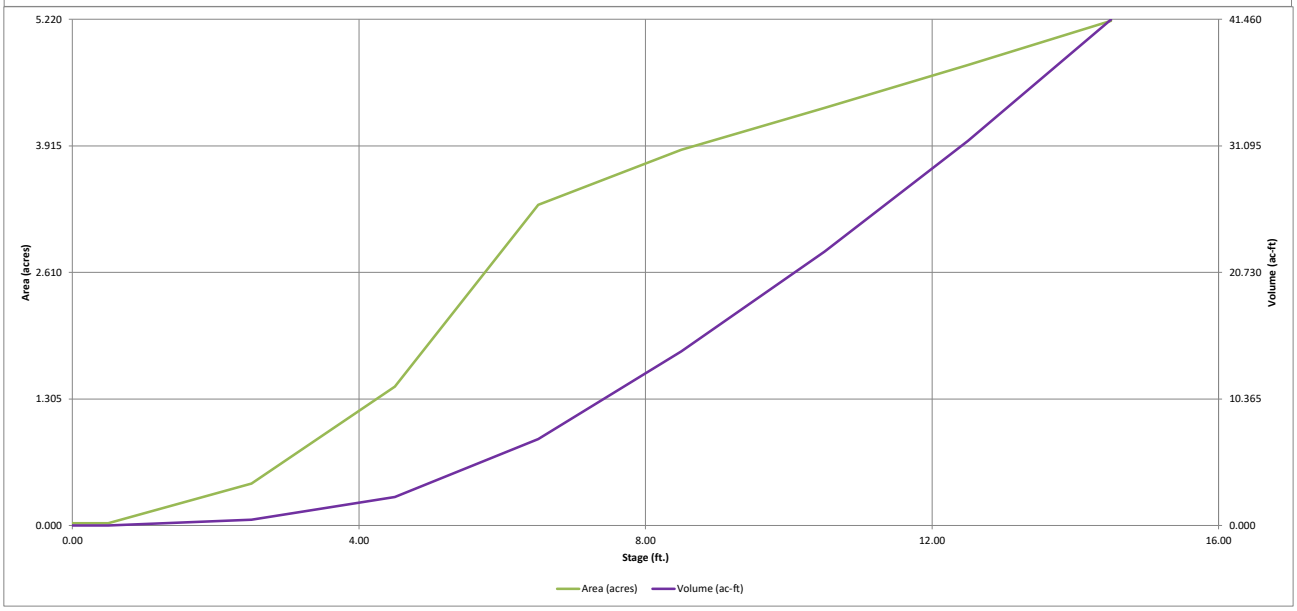
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	1,027	0.024		
7092	--	0.50	--	--	--	1,027	0.024	514	0.012
7094	--	2.50	--	--	--	18,862	0.433	20,402	0.468
7096	--	4.50	--	--	--	62,431	1.433	101,695	2.335
7098	--	6.50	--	--	--	144,050	3.307	308,176	7.075
7100	--	8.50	--	--	--	168,845	3.876	621,071	14.258
7102	--	10.50	--	--	--	187,607	4.307	977,523	22.441
7104	--	12.50	--	--	--	206,914	4.750	1,372,044	31.498
7106	--	14.50	--	--	--	226,802	5.207	1,805,760	41.455

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



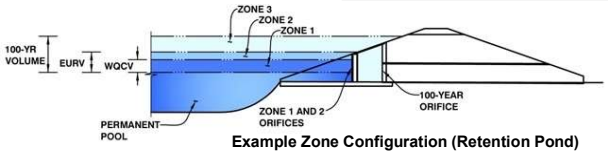


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: STERLING RANCH EAST FILING NO. 8

Basin ID: POND FSD-16 (ULTIMATE)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	5.21	3.575	Orifice Plate
Zone 2 (EURV)	7.80	8.019	Orifice Plate
Zone 3 (100-year)	9.69	7.421	Weir&Pipe (Restrict)
Total (all zones)		19.015	

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

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

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	8.50	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	20.40	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.70	3.40	5.10	6.80			
Orifice Area (sq. inches)	7.00	9.00	16.00	16.00	16.00			

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	8.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	8.50	N/A	feet
Overflow Weir Front Edge Length =	20.00	N/A	feet	Overflow Weir Slope Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	7.65	N/A	
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	55.68	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	27.84	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	7.28	N/A	ft^2
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	1.28	N/A	feet
Restrictor Plate Height Above Pipe Invert =	27.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.70	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	12.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.00	feet
Spillway Crest Length =	170.00	feet	Stage at Top of Freeboard =	14.50	feet
Spillway End Slopes =	6.00	H:V	Basin Area at Top of Freeboard =	5.21	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	41.45	acre-ft

Calculated Parameters for Spillway

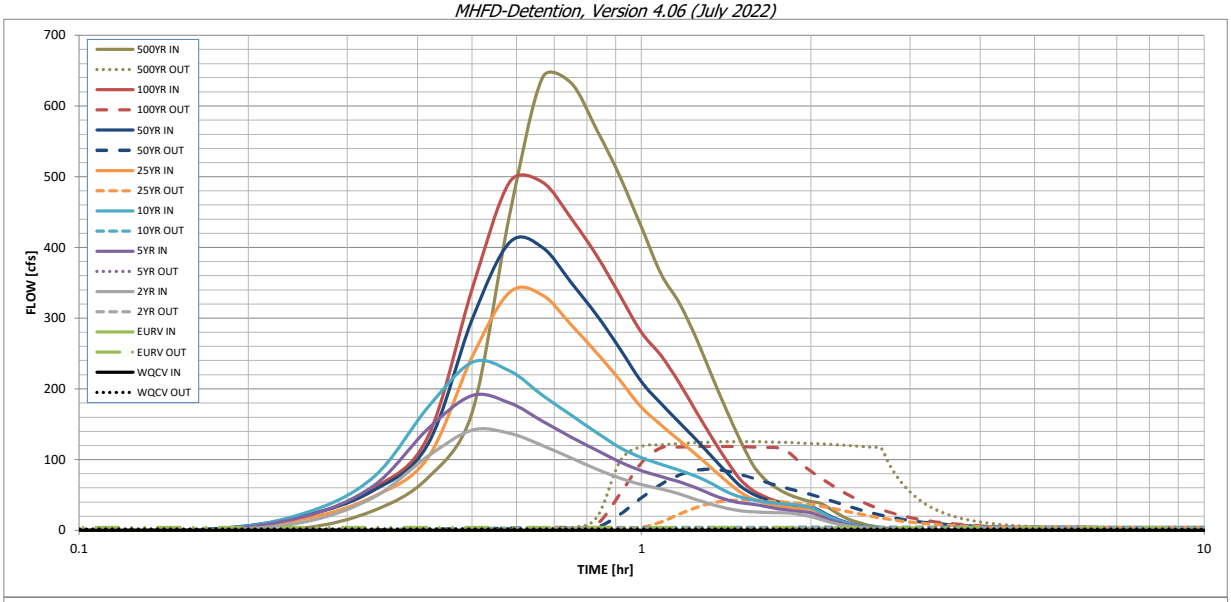
Routed Hydrograph Results

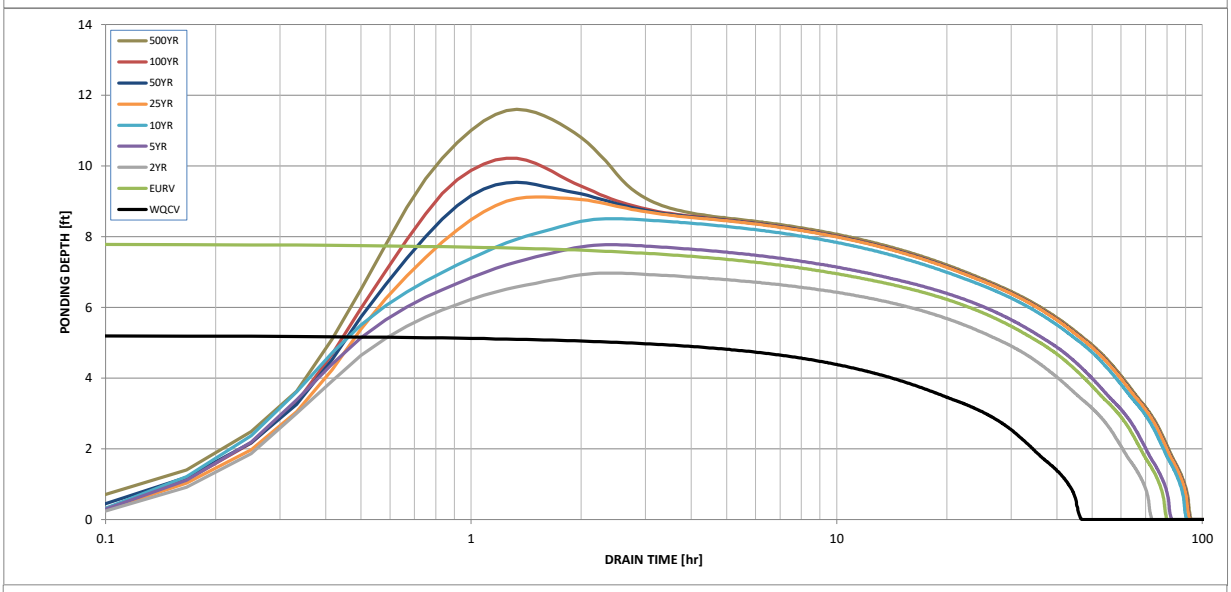
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

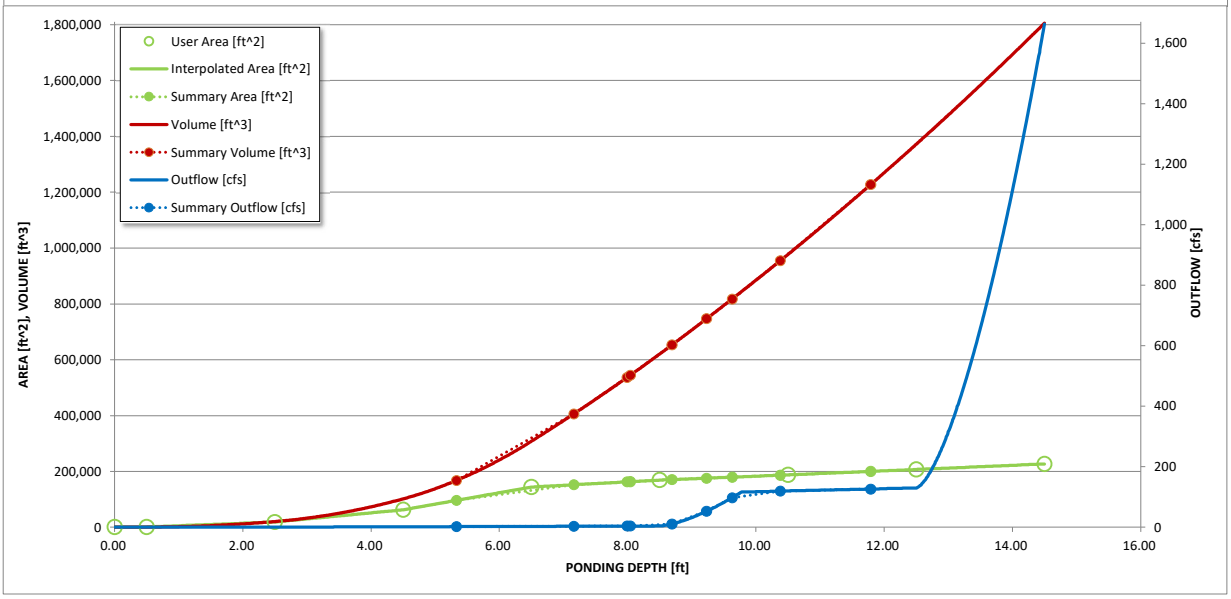
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.00
CUHP Runoff Volume (acre-ft) =	3.575	11.594	9.169	12.132	15.008	19.917	23.860	29.162	37.558
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	9.169	12.132	15.008	19.917	23.860	29.162	37.558
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	2.5	4.3	22.1	90.6	133.3	193.2	288.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.10	0.43	0.63	0.91	1.36
Peak Inflow Q (cfs) =	N/A	N/A	141.7	190.6	237.3	336.8	407.3	492.6	640.0
Peak Outflow Q (cfs) =	2.0	3.9	3.3	3.9	4.4	42.9	86.4	118.5	125.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.9	0.2	0.5	0.6	0.6	0.4
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.7	1.5	2.0	2.1
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	40	66	61	68	75	74	72	69	66
Time to Drain 99% of Inflow Volume (hours) =	**44**	73	67	75	82	82	81	80	79
Maximum Ponding Depth (ft) =	5.21	7.80	6.97	7.77	8.51	9.12	9.54	10.22	11.60
Area at Maximum Ponding Depth (acres) =	2.10	3.68	3.44	3.67	3.88	4.01	4.10	4.25	4.55
Maximum Volume Stored (acre-ft) =	3.588	11.614	8.626	11.504	14.258	16.702	18.365	21.243	27.312

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.13	3.33
	0:15:00	0.00	0.00	11.43	18.80	23.40	15.77	20.33	19.37	27.41
	0:20:00	0.00	0.00	46.02	62.65	74.50	47.56	55.88	59.23	73.90
	0:25:00	0.00	0.00	104.36	142.78	173.11	101.98	120.97	131.30	165.88
	0:30:00	0.00	0.00	141.69	190.56	237.33	244.86	297.83	340.84	446.93
	0:35:00	0.00	0.00	137.24	180.15	225.23	336.79	407.29	492.60	640.01
	0:40:00	0.00	0.00	119.79	154.35	191.10	332.48	400.01	492.11	632.43
	0:45:00	0.00	0.00	102.28	131.85	162.87	290.68	350.25	441.07	566.24
	0:50:00	0.00	0.00	86.29	113.19	138.22	250.81	303.87	388.11	499.69
	0:55:00	0.00	0.00	73.54	96.45	116.72	211.64	256.32	331.49	428.30
	1:00:00	0.00	0.00	64.67	84.38	102.65	173.93	209.81	279.64	362.57
	1:05:00	0.00	0.00	58.55	75.97	93.26	149.09	179.37	246.91	322.06
	1:10:00	0.00	0.00	51.35	68.56	84.89	127.50	152.94	208.88	272.44
	1:15:00	0.00	0.00	43.61	60.02	76.52	107.36	128.44	168.42	219.01
	1:20:00	0.00	0.00	36.75	50.85	66.27	87.71	104.37	131.71	170.27
	1:25:00	0.00	0.00	31.21	43.20	54.77	69.75	82.28	98.92	126.66
	1:30:00	0.00	0.00	27.74	38.86	47.09	53.62	62.57	71.70	90.96
	1:35:00	0.00	0.00	26.03	36.70	42.86	43.67	50.61	55.62	70.19
	1:40:00	0.00	0.00	25.17	33.68	39.99	37.95	43.62	46.58	58.26
	1:45:00	0.00	0.00	24.66	30.53	37.91	34.49	39.36	40.51	50.08
	1:50:00	0.00	0.00	24.29	28.26	36.49	32.09	36.42	36.47	44.57
	1:55:00	0.00	0.00	22.09	26.59	34.87	30.56	34.59	33.69	40.72
	2:00:00	0.00	0.00	19.30	24.81	32.10	29.47	33.29	31.69	37.98
	2:05:00	0.00	0.00	15.39	20.02	25.60	24.12	27.18	25.51	30.41
	2:10:00	0.00	0.00	11.35	14.61	18.56	17.47	19.68	18.48	21.96
	2:15:00	0.00	0.00	8.34	10.67	13.45	12.69	14.28	13.45	15.93
	2:20:00	0.00	0.00	6.07	7.74	9.74	9.23	10.39	9.85	11.66
	2:25:00	0.00	0.00	4.37	5.46	6.95	6.56	7.38	7.03	8.31
	2:30:00	0.00	0.00	3.06	3.75	4.87	4.58	5.16	4.91	5.78
	2:35:00	0.00	0.00	2.09	2.59	3.40	3.24	3.65	3.47	4.09
	2:40:00	0.00	0.00	1.35	1.74	2.23	2.17	2.45	2.32	2.72
	2:45:00	0.00	0.00	0.77	1.06	1.31	1.31	1.48	1.39	1.63
	2:50:00	0.00	0.00	0.37	0.55	0.64	0.67	0.75	0.70	0.81
	2:55:00	0.00	0.00	0.14	0.21	0.21	0.23	0.26	0.23	0.26
	3:00:00	0.00	0.00	0.03	0.03	0.02	0.01	0.01	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

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: September 1, 2026
Project: Sterling Ranch East Filing No. 8
Location: Pond FSD-16 SW Forebay (Ultimate Condition)

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a — I_a = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 33.200 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — d_6 = 0.43 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area$) — V_{DESIGN} = ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$) — $V_{DESIGN\ OTHER}$ = 0.594 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = ac-ft

I) NRCS Hydrologic Soil Groups of Tributary Watershed
- i) Percentage of Watershed consisting of Type A Soils — HSG_A = 75 %
- ii) Percentage of Watershed consisting of Type B Soils — HSG_B = 25 %
- iii) Percentage of Watershed consisting of Type C/D Soils — $HSG_{C/D}$ = 0 %

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = 1.68 * i^{1.28}$
For HSG B: $EURV_B = 1.36 * i^{1.08}$
For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$
— $EURV_{DESIGN}$ = 2.021 ac-f t

K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired) — $EURV_{DESIGN\ USER}$ = ac-f t

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

5. Forebay

A) Minimum Forebay Volume
(V_{FMIN} = 3% of the WQCV) — V_{FMIN} = 0.018 ac-ft

B) Actual Forebay Volume — V_F = 0.018 ac-ft

C) Forebay Depth
(D_F = 18 inch maximum) — D_F = 18.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 97.00 cfs

ii) Forebay Discharge Design Flow
($Q_F = 0.02 * Q_{100}$) — Q_F = 1.94 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

Flow too small for berm w/ pipe

F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = in

G) Rectangular Notch Width — Calculated W_N = 7.4 in

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: September 1, 2026
Project: Sterling Ranch East Filing No. 8
Location: Pond FSD-16 SW Forebay (Ultimate Condition)

6. Trickle Channel	
A) Type of Trickle Channel	Choose One: (●) Concrete ( ) Soft Bottom
F) Slope of Trickle Channel	S = 0.0050 ft / ft
7. Micropool and Outlet Structure	
A) Depth of Micropool (2.5-feet minimum)	D_M = 2.5 ft
B) Surface Area of Micropool (10 ft^2 minimum)	A_M = 1027 sq ft
C) Outlet Type	Choose One: ( ) Orifice Plate ( ) Other (Describe):
D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)	$D_{orifice}$ = 3.00 inches
E) Total Outlet Area	A_{ot} = 64.00 square inches
8. Initial Surcharge Volume	
A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)	D_{IS} = 6 in
B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)	V_{IS} = 78 cu ft
C) Initial Surcharge Provided Above Micropool	V_s = 513.5 cu ft
9. Trash Rack	
A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$	A_t = 1,853 square inches
B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open are to the total screen are for the material specified.)	*Aluminum Amico-Klemp SR Series with Cross Rods 2" O.C.*
Other (Y/N): N	
C) Ratio of Total Open Area to Total Area (only for type 'Other')	User Ratio =
D) Total Water Quality Screen Area (based on screen type)	A_{total} = 2610 sq. in.
E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)	H= 8.5 feet
F) Height of Water Quality Screen (H_{TR})	H_{TR}= 130 inches
G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended)	$W_{opening}$ = 20.1 inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: September 1, 2026
Project: Sterling Ranch East Filing No. 8
Location: Pond FSD-16 SW Forebay (Ultimate Condition)

10. Overflow Embankment

A) Describe embankment protection for 100-year and greater overtopping:

B) Slope of Overflow Embankment
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Ze = 4.00 ft / ft

11. Vegetation

Choose One
- ○ Irrigated
- ◉ Not Irrigated

12. Access

A) Describe Sediment Removal Procedures

Per IM Plan

Notes:

Figure 13-12c. Emergency Spillway Protection

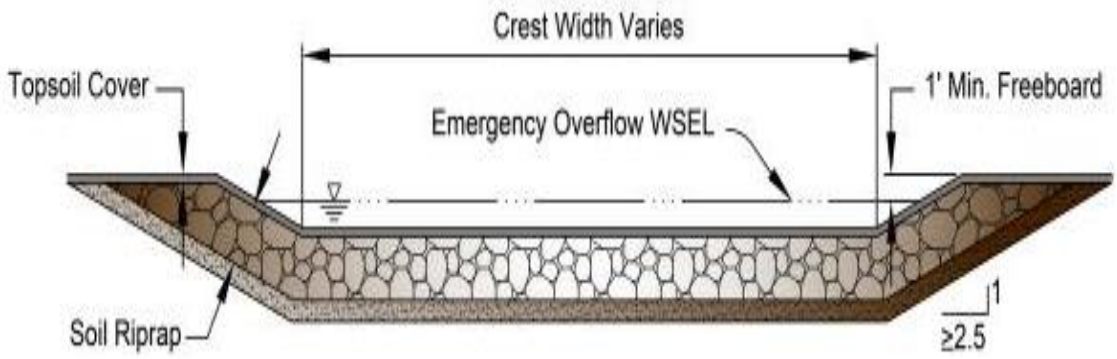
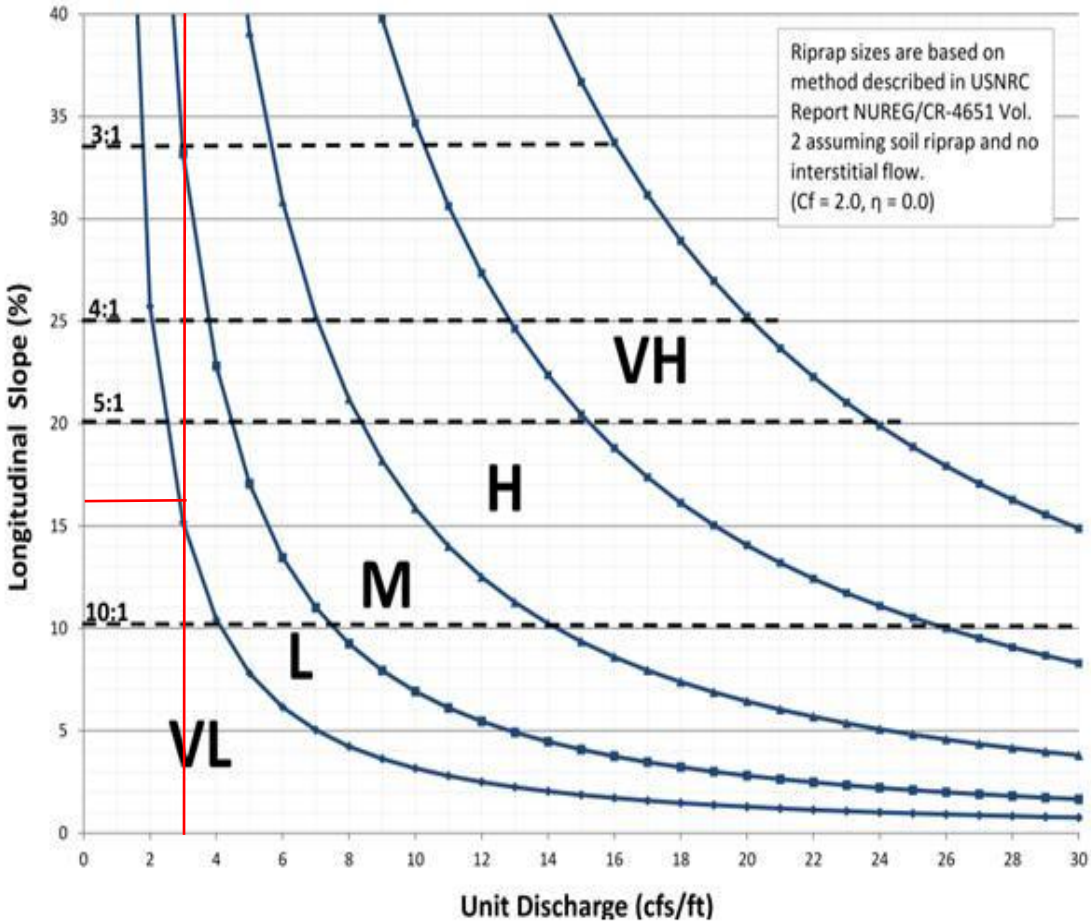


Figure 13-12d. Riprap Types for Emergency Spillway Protection



ULTIMATE &
INTERIM
CONDITION

Worksheet for TEMP SWALE 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.020
Channel Slope	0.013 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	12.000 H:V
Bottom Width	3.00 ft
Discharge	41.00 cfs

Results	
Normal Depth	9.9 in
Flow Area	8.0 ft²
Wetted Perimeter	16.4 ft
Hydraulic Radius	5.8 in
Top Width	16.26 ft
Critical Depth	11.2 in
Critical Slope	0.007 ft/ft
Velocity	5.14 ft/s
Velocity Head	0.41 ft
Specific Energy	1.24 ft
Froude Number	1.293
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	9.9 in
Critical Depth	11.2 in
Channel Slope	0.013 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for TRICKLE CHANNEL

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Bottom Width	4.00 ft
Discharge	4.86 cfs

Results	
Normal Depth	4.1 in
Flow Area	1.4 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	3.5 in
Top Width	4.00 ft
Critical Depth	4.3 in
Critical Slope	0.004 ft/ft
Velocity	3.55 ft/s
Velocity Head	0.20 ft
Specific Energy	0.54 ft
Froude Number	1.071
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	4.1 in
Critical Depth	4.3 in
Channel Slope	0.005 ft/ft
Critical Slope	0.004 ft/ft

REFERENCE MATERIALS FROM PREVIOUS REPORTS

EPA- 600/R-14/413b
Revisied September 2015

Storm Water Management Model User's Manual Version 5.1

by

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Office of Research and Development
U.S. Environmental Protection Agency
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September 2015

SWMM MODEL RAIN GAGE INPUT PARAMETERS (PER DCM CPT. 6)

Table 6-2. Rainfall Depths for Colorado Springs

Return Period	1-Hour Depth	6-Hour Depth	24-Hour Depth
2	1.19	1.70	2.10
5	1.50	2.10	2.70
10	1.75	2.40	3.20
25	2.00	2.90	3.60
50	2.25	3.20	4.20
100	2.52	3.50	4.60

Where Z= 6,840 ft/100

City of Colorado Springs DCM

5-year, 2-hour Storm (Cumulative)

Time Min.	Drainage Basin Area (square miles)						
	0-1	>1-5	>5-10	>10-15	>15-20	>20-40	>40-60
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.021	0.021	0.021	0.021	0.023	0.023	0.026
10	0.069	0.066	0.062	0.062	0.063	0.063	0.060
15	0.119	0.114	0.111	0.111	0.110	0.105	0.102
20	0.180	0.174	0.164	0.164	0.159	0.153	0.143
25	0.269	0.264	0.254	0.252	0.245	0.236	0.221
30	0.387	0.374	0.359	0.354	0.341	0.324	0.297
35	0.632	0.594	0.531	0.491	0.461	0.414	0.363
40	1.068	0.983	0.839	0.743	0.672	0.572	0.473
45	1.236	1.134	0.956	0.840	0.759	0.633	0.518
50	1.338	1.236	1.050	0.929	0.849	0.719	0.594
55	1.403	1.299	1.110	0.987	0.902	0.768	0.642
60	1.458	1.352	1.161	1.035	0.951	0.815	0.684
65	1.506	1.401	1.209	1.076	0.992	0.855	0.723
70	1.527	1.422	1.232	1.098	1.017	0.884	0.752
75	1.545	1.443	1.253	1.119	1.038	0.905	0.773
80	1.562	1.460	1.274	1.140	1.059	0.926	0.794
85	1.578	1.476	1.295	1.161	1.080	0.947	0.815
90	1.595	1.493	1.313	1.182	1.101	0.968	0.836
95	1.608	1.509	1.329	1.203	1.122	0.989	0.857
100	1.623	1.526	1.344	1.220	1.143	1.010	0.878
105	1.637	1.539	1.361	1.236	1.160	1.031	0.899
110	1.650	1.554	1.377	1.253	1.175	1.047	0.917
115	1.664	1.568	1.394	1.269	1.191	1.064	0.933
120	1.679	1.581	1.407	1.286	1.208	1.080	0.950

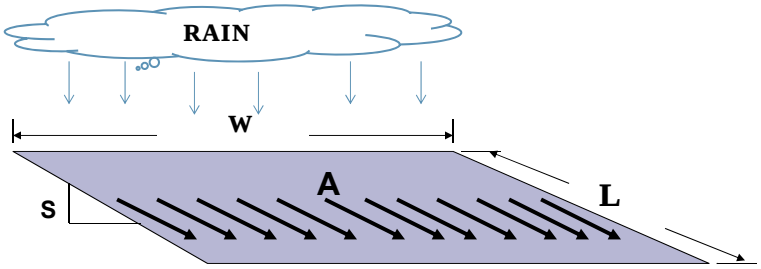
City of Colorado Springs DCM

100-year, 2-hour Storm (Cumulative)

Time Min.	Drainage Basin Area (square miles)						
	0-1	>1-5	>5-10	>10-15	>15-20	>20-40	>40-60
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.035	0.035	0.035	0.035	0.038	0.038	0.043
10	0.116	0.111	0.103	0.103	0.106	0.106	0.101
15	0.199	0.192	0.186	0.186	0.184	0.176	0.171
20	0.302	0.292	0.275	0.275	0.267	0.257	0.239
25	0.451	0.444	0.426	0.423	0.411	0.396	0.370
30	0.650	0.627	0.602	0.595	0.572	0.544	0.499
35	1.061	0.998	0.892	0.824	0.774	0.696	0.610
40	1.794	1.651	1.409	1.247	1.129	0.960	0.794
45	2.076	1.905	1.605	1.411	1.275	1.063	0.869
50	2.248	2.076	1.764	1.560	1.426	1.207	0.998
55	2.356	2.182	1.865	1.658	1.515	1.290	1.079
60	2.449	2.271	1.950	1.739	1.598	1.368	1.149
65	2.530	2.354	2.031	1.807	1.666	1.436	1.215
70	2.565	2.389	2.069	1.845	1.709	1.484	1.263
75	2.596	2.424	2.104	1.880	1.744	1.520	1.298
80	2.623	2.452	2.139	1.915	1.779	1.555	1.333
85	2.651	2.480	2.175	1.950	1.814	1.590	1.368
90	2.679	2.507	2.205	1.986	1.850	1.625	1.404
95	2.701	2.535	2.233	2.021	1.885	1.661	1.439
100	2.727	2.563	2.258	2.049	1.920	1.696	1.474
105	2.749	2.586	2.286	2.076	1.948	1.731	1.509
110	2.772	2.611	2.313	2.104	1.973	1.759	1.540
115	2.795	2.633	2.341	2.132	2.001	1.787	1.567
120	2.820	2.656	2.364	2.160	2.029	1.814	1.595

SWMM MODEL SUBCATCHMENT INPUT PARAMETERS

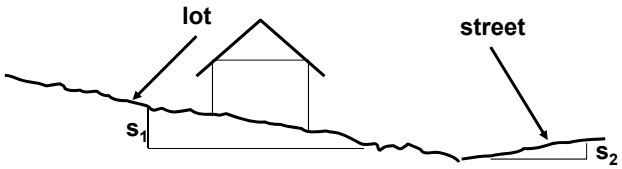
Subcatchment Conceptual Model



Subcatchment represented as a sloped, rectangular plane

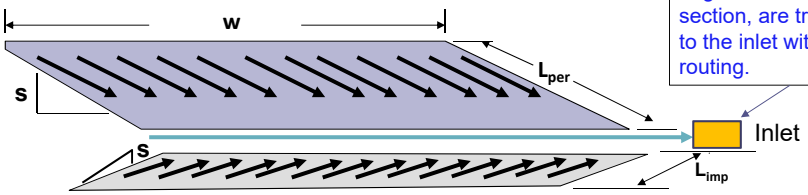
W = width
L = length
S = slope
A = area

Subcatchment Conceptual Model



Pervious and Impervious areas are processed independently and are then combined.
Both have the same tributary width (W).

Flows calculated at edge for rectangular section, are transferred to the inlet without flow routing.



You can set them up as separate subcatchments.

Width Parameter

NEVER use default value

Approx. Width = (Area) ÷ (Length)

Length = average overland sheet flow length of runoff

Suggested Rules of Thumb:

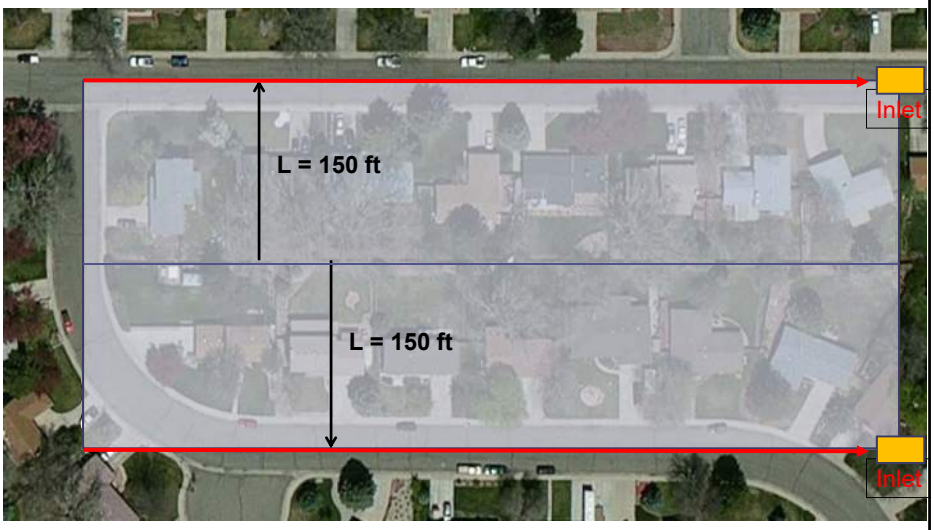
Undeveloped:

- **Maximum length = 100- to 500-feet**

Residential Catchments:

- **Maximum length = 100 to 300 feet**
- **back of lot to street gutter (100-175 ft)**

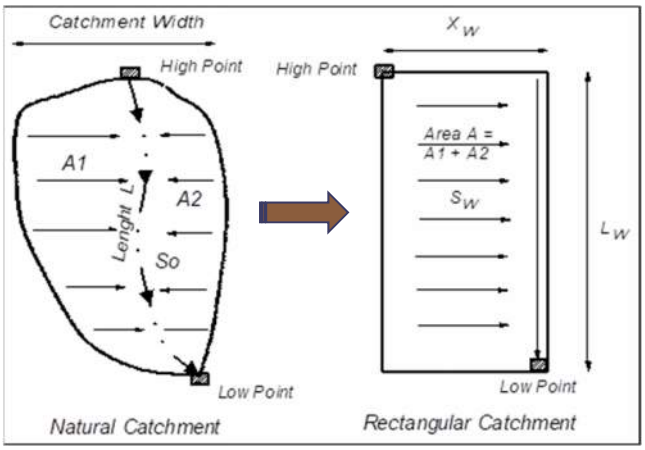
Width Parameter



11

Transforming Subcatchment Shape to a Rectangle

Equations Suggested by Guo and Urbonas, 2009



Dimensionless Variables:

$X = A/L^2$

$Y = L_w/L$

Skewness:

$Z = max(A1, A2)/A$

$0.5 \le Z \le 1.0$

$$Y = \frac{Lw}{L} = (1.5 - Z)(2.286X - 0.286X^2) \Rightarrow L_w/L = (1.5 - Z)\left\{2.286\left(A/L^2\right) - 0.286\left(A/L^2\right)^2\right\}$$

$$S_o/S_w = (X/Y + Y) \Rightarrow S_o/S_w = A/LL_w + L_w/L$$

12

Percent Impervious

Estimating/Measuring Percent Impervious:

- **If site-specific information is not available, use land use classification**
- **Sometimes, site-specific impervious GIS layers are available**

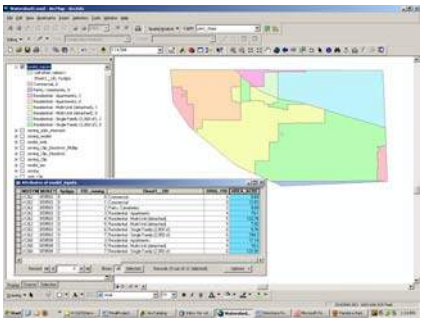


Table RO-3—Recommended Percentage Imperviousness Values

Land Use or Surface Characteristics	Percentage Imperviousness
Business:	
Commercial areas	95
Neighborhood areas	85
Residential:	
Single-family	*
Multi-unit (detached)	60
Multi-unit (attached)	75
Half-acre lot or larger	*
Apartments	80
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	5
Playgrounds	10
Schools	50
Railroad yard areas	15
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	0
Lawns, clayey soil	0

* See Figures RO-3 through RO-5 for percentage imperviousness.

Source: UDFCD Storm Drainage Criteria Manual

City of Colorado Springs DCM - Manning's n

Table 6-11. Roughness Coefficients (Manning's n) for NRCS Overland Flow

Surface description	n[1]
Smooth surfaces (concrete, asphalt, gravel, bare soil, etc.)	0.011
Fallow (no residue)	0.05
Cultivated Soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2]	0.24
Bermuda grass	0.41
Range (natural)	0.13
Woods [3]	
Light underbrush	0.40
Dense underbrush	0.80

Table 3-1 Impervious area as a percentage of land use.

Land Use	Percent Impervious Area
Commercial	56
Industrial	76
High density residential	51
Medium density residential	38
Low density residential	19
Institutional	34
Agricultural	2
Forest	1.9
Open Urban Land	11

As mentioned earlier, impervious areas in SWMM are hydraulically (directly) connected to the drainage system – called directly connected impervious areas (DCIA). For instance, if rooftops drain onto adjacent pervious lawn areas, they should not be treated as a hydraulically effective impervious area. Such areas are non-effective impervious areas (Doyle and Miller, 1980). On the other hand, if a driveway drains to a street and then to a stormwater inlet, the driveway would be considered hydraulically connected. Rooftops with downspouts connected directly to a sewer are clearly hydraulically connected. An example of careful measurements and statistics on imperviousness may be found in Field et al. (2000), Lee (2003), and Roy and Shuster (2007). Lee and Heaney (2003) provide detailed comparisons of imperviousness computations and their implications for modeling.

Should rooftops be treated as "pervious," the real surrounding pervious area is subject to more incoming water than rainfall alone and thus might produce runoff sooner than if rainfall alone were considered. In the possible event that this effect is important (a judgment based on infiltration parameters) it can be modeled using the overland flow re-routing option discussed earlier in Section 3.7. For example, if disconnected rooftops comprised 25 percent of the total impervious area of a subcatchment (as opposed to the total DCIA) then one could tell SWMM that this percentage of impervious area should be internally routed onto the pervious sub-area of the subcatchment.

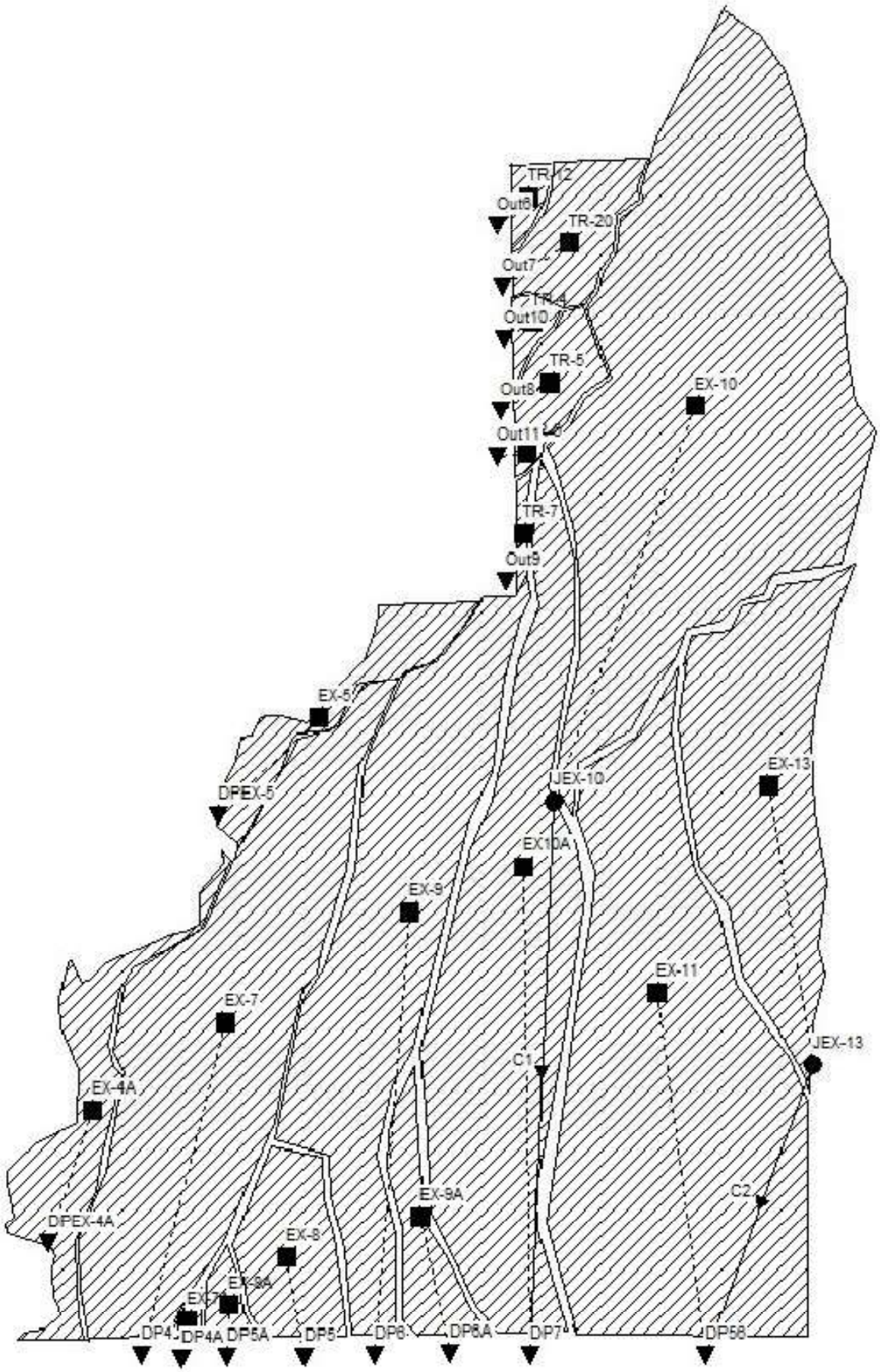
Another method of estimating the effective impervious area given measured data is to plot the runoff (in. or mm) vs. rainfall (in. or mm) for small storms. The slope of the regression line is a good estimate of the effective impervious area (Doyle and Miller, 1980).

Table 3-5 Estimates of Manning's roughness coefficient for overland flow

Source	Ground Cover	n	Range
Crawford and Linsley (1966)[a]	Smooth asphalt	0.01	
	Asphalt of concrete paving	0.014	
	Packed clay	0.03	
	Light turf	0.20	
	Dense turf	0.35	
	Dense shrubbery and forest litter	0.4	
Engman (1986)[b]	Concrete or asphalt	0.011	0.010-0.013
	Bare sand	0.010	0.01-0.016
	Graveled surface	0.02	0.012-0.03
	Bare clay-loam (eroded)	0.02	0.012-0.033
	Range (natural)	0.13	0.01-0.32
	Bluegrass sod	0.45	0.39-0.63
	Short grass prairie	0.15	0.10-0.20
	Bermuda grass	0.41	0.30-0.48
Yen (2001)[c]	Smooth asphalt pavement	0.012	0.010-0.015
	Smooth impervious surface	0.013	0.011-0.015
	Tar and sand pavement	0.014	0.012-0.016
	Concrete pavement	0.017	0.014-0.020
	Rough impervious surface	0.019	0.015-0.023
	Smooth bare packed soil	0.021	0.017-0.025
	Moderate bare packed soil	0.030	0.025-0.035
	Rough bare packed soil	0.038	0.032-0.045
	Gravel soil	0.032	0.025-0.045
	Mowed poor grass	0.038	0.030-0.045
	Average grass, closely clipped sod	0.050	0.040-0.060
	Pasture	0.055	0.040-0.070
	Timberland	0.090	0.060-0.120
	Dense grass	0.090	0.060-0.120
	Shrubs and bushes	0.120	0.080-0.180
	Business land use	0.022	0.014-0.035
	Semi-business land use	0.035	0.022-0.050
	Industrial land use	0.035	0.020-0.050
	Dense residential land use	0.040	0.025-0.060
	Suburban residential land use	0.055	0.030-0.080
	Parks and lawns	0.075	0.040-0.120

[a]Obtained by calibration of Stanford Watershed Model.
[b]Computed by Engman (1986) by kinematic wave and storage analysis of measured rainfall-runoff data.
[c]Computed on basis of kinematic wave analysis.

EXISTING CONDITIONS SWMM MODEL MAP



STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Surface Routing

Design Point (South Bndy.)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
4	46	105
4A	1	5
5	5	23
5A	2	9
6	59	122
6A	7	19
7	110	249
56	60	160

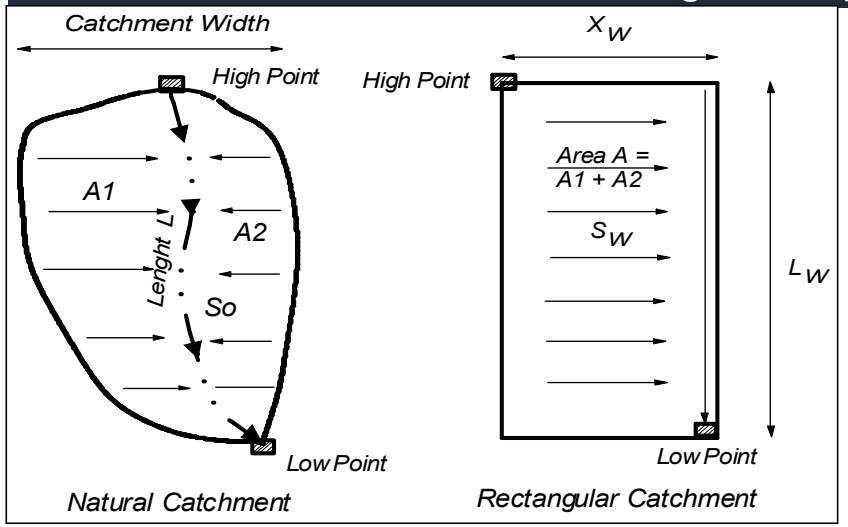
STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWMM Imperv. (%)	*SWMM Width (Lw) (ft.)	*SWMM Slope (Sw) (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EX-10	265.9	7%	3365	3.41%	105	222
EX10A	153.5	5%	1857	4.05%	46	103
EX-11 +	214.3	4%	3255	3.01%	54	129
EX-13 +	94.8	6%	1877	3.97%	36	85
EX-4A	44.2	8%	3355	1.09%	19	50
EX-5	26.2	8%	1959	1.65%	12	32
EX-7	152.8	5%	2234	3.13%	46	105
EX-7A	2.4	2%	416	2.70%	1	5
EX-8	32.2	2%	1679	1.47%	5	23
EX-8A	6.6	2%	698	1.80%	2	9
EX-9	139.3	8%	1837	3.19%	59	122
EX-9A	21.8	5%	786	3.01%	7	19
TR-12 +	4.7	5%	544	4.13%	2	9
TR-20 +	23.2	7%	1388	3.21%	10	32
TR-4 +	4.4	5%	645	2.76%	2	9
TR-5 +	13.7	5%	990	2.70%	5	17
TR-6 +	1.5	5%	519	1.55%	1	4
TR-7 +	2.6	5%	233	5.84%	1	5

* Reference SWMM Catchment Shape Parameter Finder for calculations

CATCHMENT SHAPE PARAMETER FINDER

Convert Natural Catchment to a Rectangular Shape



Subcatchment Center	Z=0.5
Side Collector	Z=1
Skewed Location	0.5<Z<1

Dimensionless Variables

$$Y = \frac{L}{L_w}; \qquad X = \frac{A}{L^2}$$

$$Y = (1.5 - Z)(2.286X - 0.286X^2)$$

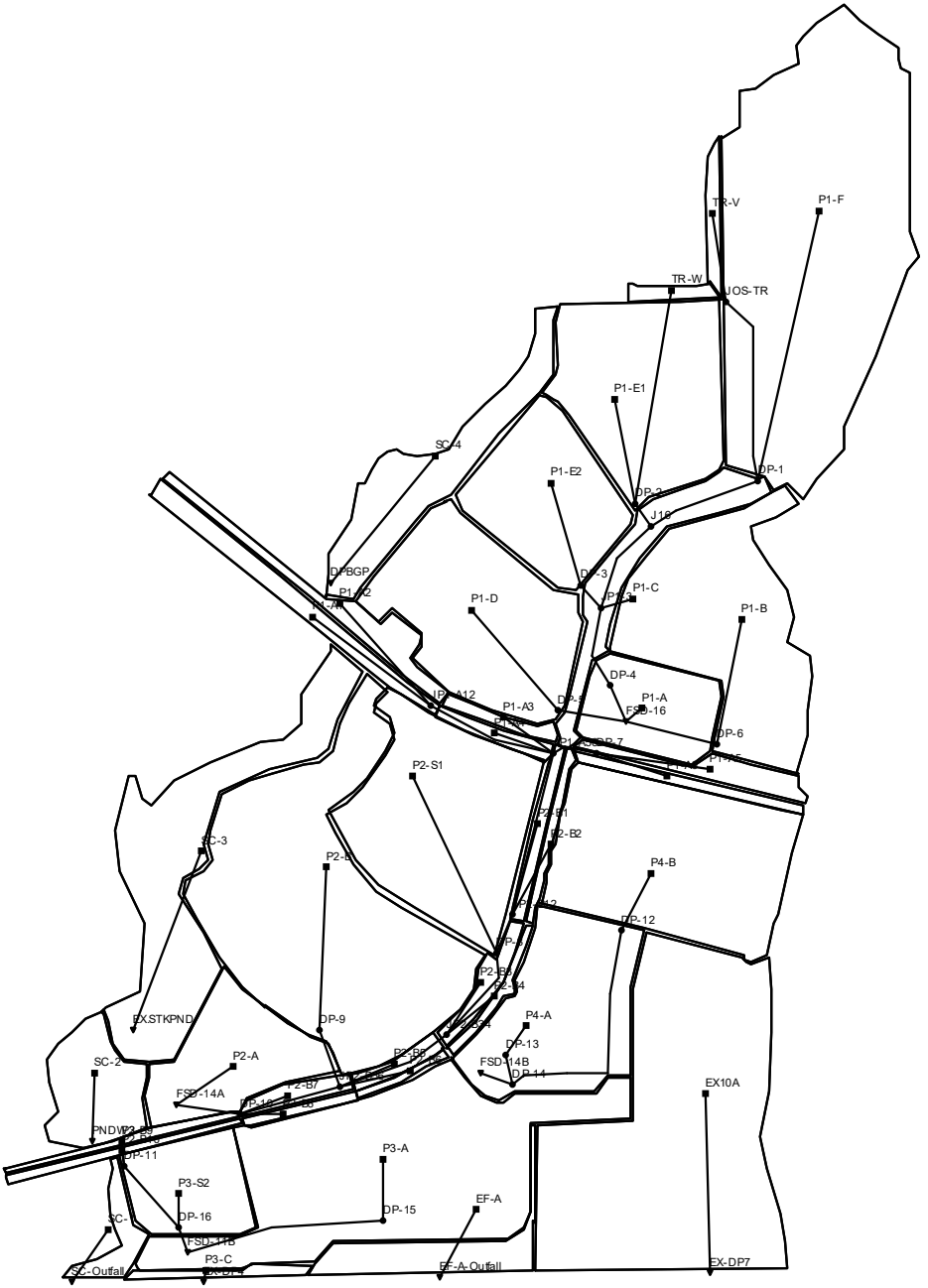
$$\frac{Lw}{L} = (1.5 - Z)[2.286(\frac{A}{L^2}) - 0.286(\frac{A}{L^2})^2]$$

$$S_o/S_w = A/(LL_w) + L_w/L$$

$$X_w = A/L_w$$

Subarea ID	Area acre	A1 acre	A2 acre	L ft	High Pt Elev. ft	Low Pt Elev. ft	Z=Am/A	X=A/L²	Y=Lw/L	Lw ft	Xw ft	So %	So/Sw	Sw %
EX-7	152.80	82.00	70.80	6,430	7160.0	6997.0	0.54	0.16	0.35	2,234	2,980	2.53	0.81	3.13
EX-9	139.30	65.00	74.30	7,190	7190.0	7026.0	0.53	0.12	0.26	1,837	3,302	2.28	0.71	3.19
EX10A	153.50	75.00	78.50	8,030	7,236	7,015	0.51	0.10	0.23	1,857	3,600	2.75	0.68	4.05
EX10	265.90	120.00	145.90	7,280	7,380	7,148	0.55	0.22	0.46	3,365	3,442	3.19	0.94	3.41
EX-11	214.30	100.00	114.30	6,140	7,192	7,008	0.53	0.25	0.53	3,255	2,867	3.00	1.00	3.01
EX-13	94.80	47.00	47.80	4,900	7,232	7,070	0.50	0.17	0.38	1,877	2,200	3.31	0.83	3.97
TR-4	4.40	2.20	2.20	640	7,270	7,244	0.50	0.47	1.01	645	297	4.06	1.47	2.76
TR-5	13.70	7.50	6.20	1,250	7,273	7,230	0.55	0.38	0.79	990	603	3.44	1.27	2.70
TR-6	1.50	0.75	0.75	250	7,238	7,228	0.50	1.05	2.08	519	126	4.00	2.58	1.55
TR-7	2.60	1.30	1.30	1,100	7,234	7,192	0.50	0.09	0.21	233	487	3.82	0.65	5.84
TR-12	4.70	2.50	2.20	800	7,300	7,262	0.53	0.32	0.68	544	377	4.75	1.15	4.13
TR-20	23.20	12.00	11.20	1,550	7,314	7,246	0.52	0.42	0.90	1,388	728	4.39	1.37	3.21
EX-4A	44.20	22.10	22.10	750	7,044	7,001	0.50	3.42	4.47	3,355	574	5.73	5.24	1.09
EX-5	26.20	13.10	13.10	1,200	7,186	7,144	0.50	0.79	1.63	1,959	583	3.50	2.12	1.65
EX-7A	2.40	1.20	1.20	550	7,039	7,021	0.50	0.35	0.76	416	251	3.27	1.21	2.70
EX-8A	6.60	3.30	3.30	900	7,045	7,025	0.50	0.35	0.78	698	412	2.22	1.23	1.80
EX-8A	32.20	17.00	15.20	1,750	7,062	7,025	0.53	0.46	0.96	1,679	835	2.11	1.44	1.47
EX-9A	21.80	11.80	10.00	2,600	7,082	7,022	0.54	0.14	0.30	786	1,208	2.31	0.77	3.01

DEVELOPED CONDITIONS SWMM MODEL MAP



STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWWM Imperv. (%)	*SWMM Width (Lw) (ft.)	*SWMM Slope (Sw) (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EF-A	8.2	15%	1064	1.57%	7	20
EX10A +	60.4	5%	2452	1.79%	18	50
EX-9 +	6.0	5%	578	1.70%	2	8
EX-9A +	12.7	5%	1080	1.94%	4	16
P1-A	12.7	8%	1276	1.29%	6	19
P1-A1	5.0	45%	258	1.66%	11	21
P1-A2	6.4	45%	258	0.77%	12	23
P1-A3	1.8	50%	196	1.17%	5	9
P1-A4	2.0	50%	208	1.12%	5	10
P1-A5	5.7	45%	417	1.38%	13	25
P1-A6	2.8	50%	205	1.75%	7	14
P1-B (Dev.)	35.5	38%	873	1.36%	55	108
P1-B (Un-dev.)	35.5	5%	873	1.36%	10	23
P1-C	8.9	50%	581	3.69%	23	46
P1-D	31.4	38%	1033	1.27%	53	102
P1-E1	30.4	35%	1148	1.56%	50	97
P1-E2	21.8	40%	1048	1.23%	41	80
P1-F (Dev.)	76.7	30%	2322	2.18%	111	215
P1-F (Un-dev.)	76.7	5%	2322	2.18%	22	59
P2-A	24.4	10%	2164	2.11%	15	43
P2-B	57.8	38%	1215	1.64%	88	173
P2-B1	2.5	50%	201	3.37%	7	13
P2-B10	1.7	50%	187	3.43%	5	10
P2-B2	1.9	50%	148	3.54%	5	10
P2-B3	2.8	45%	245	2.15%	7	13
P2-B4	1.6	50%	138	2.49%	4	8
P2-B5	1.9	45%	230	1.86%	5	9
P2-B6	1.1	50%	141	2.28%	3	6
P2-B7	2.5	45%	272	1.78%	6	12
P2-B8	1.2	50%	141	2.34%	3	7
P2-B9	2.0	50%	226	3.27%	5	11
P2-S1	35.6	40%	1756	1.44%	68	133
P3-A	52.6	40%	1290	1.37%	85	166
P3-C	1.7	11%	446	1.31%	1	5
P3-S2	11.9	40%	1103	1.27%	25	50
P4-A	25.8	35%	920	1.21%	41	80
P4-B	37.3	35%	1773	1.34%	63	123
SC-1 +	3.6	8%	306	2.20%	2	6
SC-2 +	10.8	8%	1211	2.44%	6	20
SC-3 +	27.2	8%	616	2.68%	12	26
SC-4 +	16.4	8%	1918	1.48%	8	27
TR-V	2.1	19%	162	4.13%	2	6
TR-W	1.4	38%	90	1.30%	3	5

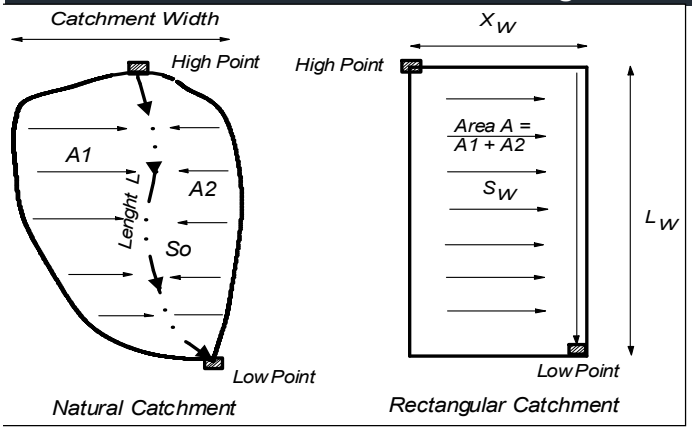
*** Reference SWMM Catchment Shape Parameter Finder for calculations**

+ Basin not changed from pre-development conditions

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Developed Surface Routing

Design Point (On-Site)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
DP-1	112	219
DP-2	53	103
DP-3	41	80
DP-4	218	379
DP-5	53	102
DP-6	55	108
DP-7	20	39
DP-8	68	133
DP-9	88	173
DP-10	223	441
DP-11	10	21
DP-12	63	123
DP-13	41	80
DP-14	97	189
DP-15	85	166
DP-16	34	69
Pond FSD-11B	115	227
Pond FSD-14A	234	486
Pond FSD-14B	97	189
Pond FSD-16 (Ultimate)	323	499
Pond FSD-16 (Interim)	197	410
Design Point (South Bndy.)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
4	0.5	3.5
4A	0.5	3.5
5	4	10
5A	2	7
6	2.0	48.9
6A	4	16
7	18	50

Convert Natural Catchment to a Rectangular Shape



Subcatchment Center	Z=0.5
Side Collector	Z=1
Skewed Location	0.5<Z<1

Dimensionless Variables

$$Y = \frac{L}{L_w}; \qquad X = \frac{A}{L^2}$$

$$Y = (1.5 - Z)(2.286X - 0.286X^2)$$

$$\frac{Lw}{L} = (1.5 - Z)[2.286(\frac{A}{L^2}) - 0.286(\frac{A}{L^2})^2]$$

$$S_o/S_w = A/(LL_w) + L_w/L$$

$$X_w = A/L_w$$

Subarea ID	Area acre	A1 acre	A2 acre	L ft	High Pt Elev. ft	Low Pt Elev. ft	Z=Am/A	X=A/L²	Y=Lw/L	Lw ft	Xw ft	So %	So/Sw	Sw %
EF-A	8.20	4.10	4.10	260	7050.0	7028.0	0.50	5.28	4.09	1,064	336	8.46	5.38	1.57
P3-C	1.70	0.50	1.20	260	7027.0	7019.0	0.71	1.10	1.72	446	166	3.08	2.35	1.31
P1-A	12.70	7.00	5.70	850	7,124	7,102	0.55	0.77	1.50	1,276	433	2.59	2.01	1.29
P1-B	35.50	10.00	25.50	3,100	7,160	7,124	0.72	0.16	0.28	873	1,770	1.16	0.85	1.36
P1-C	8.90	4.50	4.40	1,700	7,158	7,122	0.51	0.13	0.30	510	761	2.12	0.75	2.83
P1-D	31.40	14.00	17.40	2,800	7,136	7,106	0.55	0.17	0.37	1,033	1,324	1.07	0.84	1.27
P1-E1	30.40	16.00	14.40	2,500	7,188	7,152	0.53	0.21	0.46	1,148	1,154	1.44	0.92	1.56
P1-E2	21.80	11.00	10.80	2,000	7,158	7,134	0.50	0.24	0.52	1,048	906	1.20	0.98	1.23
P1-F	76.70	35.00	41.70	3,000	7,240	7,158	0.54	0.37	0.77	2,322	1,439	2.73	1.25	2.18
TR-W	1.40	0.70	0.70	90	7,192	7,182	0.50	7.53	1.00	90	678	11.11	8.53	1.30
TR-V	2.10	1.50	0.60	1,000	7,220	7,190	0.71	0.09	0.16	162	563	3.00	0.73	4.13
P1-A1	5.00	3.10	1.90	2,400	7,134	7,112	0.62	0.04	0.08	182	1,199	0.92	0.58	1.59
P1-A2	6.40	3.20	3.20	2,400	7,134	7,110	0.50	0.05	0.11	264	1,056	1.00	0.55	1.82
P1-A3	1.80	0.70	1.10	800	7,110	7,103	0.61	0.12	0.25	196	400	0.88	0.74	1.17
P1-A4	2.00	1.30	0.70	800	7,112	7,105	0.65	0.14	0.26	208	419	0.88	0.78	1.12
P1-A5	5.70	3.00	2.70	1,300	7,114	7,100	0.53	0.15	0.32	417	595	1.08	0.78	1.38
P1-A6	2.80	1.30	1.50	1,300	7,114	7,100	0.54	0.07	0.16	205	595	1.08	0.62	1.75
P2-A	24.40	13.20	11.20	900	7,056	7,000	0.54	1.31	2.40	2,164	491	6.22	2.95	2.11
P2-B	57.80	18.50	39.30	3,800	7,106	7,052	0.68	0.17	0.32	1,215	2,072	1.42	0.87	1.64
P2-S1	35.60	18.00	17.60	1,900	7,110	7,072	0.51	0.43	0.92	1,756	883	2.00	1.39	1.44
P2-B1	2.50	1.50	1.00	1,100	7,102	7,077	0.60	0.09	0.18	201	541	2.27	0.67	3.37
P2-B2	1.90	1.20	0.70	1,100	7,102	7,077	0.63	0.07	0.13	148	559	2.27	0.64	3.54
P2-B3	2.80	1.70	1.10	1,000	7,077	7,061	0.61	0.12	0.25	245	498	1.60	0.74	2.15
P2-B4	1.60	1.00	0.60	1,000	7,077	7,061	0.63	0.07	0.14	138	504	1.60	0.64	2.49
P2-B5	1.90	1.20	0.70	700	7,061	7,050	0.63	0.17	0.33	230	360	1.57	0.84	1.86
P2-B6	1.10	0.65	0.45	700	7,061	7,050	0.59	0.10	0.20	141	341	1.57	0.69	2.28
P2-B7	2.50	1.60	0.90	770	7,050	7,038	0.64	0.18	0.35	272	401	1.56	0.87	1.78
P2-B8	1.20	0.70	0.50	770	7,050	7,038	0.58	0.09	0.18	141	372	1.56	0.67	2.34
P2-B9	2.00	1.00	1.00	870	7,038	7,018	0.50	0.12	0.26	226	386	2.30	0.70	3.27
P2-B10	1.70	0.90	0.80	870	7,038	7,018	0.53	0.10	0.21	187	397	2.30	0.67	3.43
P3-A	1.70	0.90	0.80	870	7,038	7,018	0.53	0.10	0.21	187	397	2.30	0.67	3.43
P3-S2	11.90	6.00	5.90	1,000	7,036	7,016	0.50	0.52	1.10	1,103	470	2.00	1.57	1.27
P4-A	25.80	20.00	5.80	1,950	7,078	7,052	0.78	0.30	0.47	920	1,222	1.33	1.10	1.21
P4-B	37.30	25.00	12.30	1,600	7,116	7,080	0.67	0.63	1.11	1,773	916	2.25	1.68	1.34
SC-1	3.60	1.80	1.80	150	7,014	6,996	0.50	6.97	2.04	306	512	12.00	5.46	2.20
SC-2	10.80	5.00	5.80	770	7040.0	7001.0	0.54	0.79	1.57	1,211	388	5.06	2.08	2.44
SC-3	27.20	14.00	13.20	4,300	7100.0	7032.0	0.51	0.06	0.14	616	1,925	1.58	0.59	2.68
SC-4	16.40	8.20	8.20	420	7,136	7,102	0.50	4.05	4.57	1,918	372	8.10	5.45	1.48
EX-9	6.00	3.00	3.00	1,000	7,050	7,030	0.50	0.26	0.58	578	452	2.00	1.03	1.94
EX-9A	12.70	6.30	6.40	1,100	7,049	7,022	0.50	0.46	0.98	1,080	512	2.45	1.45	1.70

PROPOSED PONDS
EFFECTIVE IMPERVIOUS AREA CALCULATIONS

STERLING RANCH EAST PRELIMINARY PLAN NO. 1

Pond FSD-16 Tributary Area

(Full Build Out)

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P1-A	12.7	N/A	15%
P1-B	35.5	7,500	55%
P1-C	8.9	N/A	70%
P1-D	31.4	6,500	60%
P1-E1	30.4	8,500	50%
P1-E2	21.8	7,500	55%
P1-F	76.7	12,500	35%
TR-V	2.1	17,500	27%
TR-W	1.4	13,500	32%
TOTAL	**220.9**		**46%**

STERLING RANCH EAST PRELIMINARY PLAN NO. 1

Pond FSD-16 Tributary Area

(Prelim. Plan 1 & Foursquare PUD Only)

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P1-A	12.7	N/A	15%
P1-B	35.5	Un dev.	2%
P1-C	8.9	N/A	70%
P1-D	31.4	6,500	60%
P1-E1	30.4	8,500	50%
P1-E2	21.8	7,500	55%
P1-F	76.7	Un dev.	2%
TR-V	2.1	17,500	27%
TR-W	1.4	13,500	32%
TOTAL	**220.9**		**26%**

STERLING RANCH EAST PRELIMINARY PLAN NO. 1

Pond FSD-14A Tributary Area

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P1-A1	5.0	N/A	70%
P1-A2	6.4	N/A	70%
P1-A3	1.8	N/A	70%
P1-A4	2.0	N/A	70%
P1-A5	5.7	N/A	70%
P1-A6	2.8	N/A	70%
P2-S1	35.6	School	50%
P2-A	24.4	Park	7%
P2-B	57.8	7,000	57%
P2-B1	2.5	N/A	50%
P2-B2	1.9	N/A	70%
P2-B3	2.8	N/A	50%
P2-B4	1.6	N/A	70%
P2-B5	1.9	N/A	50%
P2-B6	1.1	N/A	70%
P2-B7	2.5	N/A	25%
P2-B8	1.2	N/A	70%
TOTAL	**157.0**		**49%**

STERLING RANCH EAST PRELIMINARY PLAN NO. 1

Pond FSD-14B Tributary Area

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P4-A	25.8	6,500	60%
P4-B	37.3	6,500	60%
TOTAL	**63.1**		**60%**

STERLING RANCH EAST PRELIMINARY PLAN NO. 1

Pond FSD-11B Tributary Area

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P2-B9	2.0	N/A	70%
P2-B10	1.7	N/A	70%
P3-S2	11.9	School	65%
P3-A	52.6	7,000	57%
TOTAL	**68.2**		**59%**

STERLING RANCH EAST PRELIMINARY PLAN NO. 1

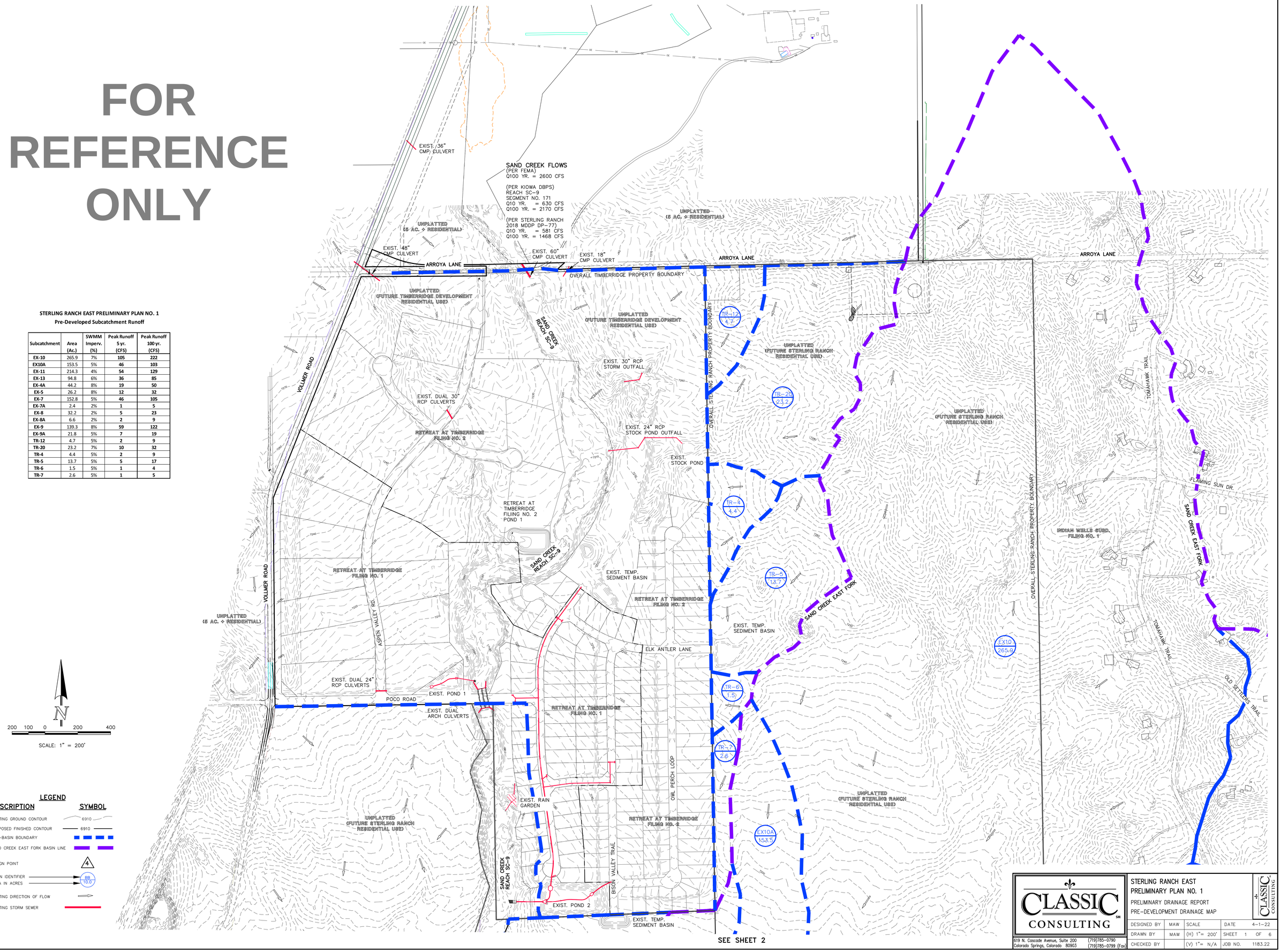
Flow Comparison along South Boundary

	This Report (SWMM 5.1) Pre-Dev. Conditions		This Report (SWMM 5.1) Developed Conditions		2018 SR MDDP (HEC-HMS) Pre-Dev. Conditions	
Design Point (South Bndy.)	**Peak Runoff 5 yr. (CFS)**	**Peak Runoff 100 yr. (CFS)**	**Peak Runoff 5 yr. (CFS)**	**Peak Runoff 100 yr. (CFS)**	**Peak Runoff 5 yr. (CFS)**	**Peak Runoff 100 yr. (CFS)**
4	**46**	**105**	**0.5**	**3.5**	**21.5**	**107.4**
4A	**1**	**5**	**0.5**	**3.5**		
5	**5**	**23**	**4**	**10**	**1.7**	**20.5**
5A	**2**	**9**	**2**	**7**		
6	**59**	**122**	**2.0**	**48.9**	**23.9**	**125.2**
6A	**7**	**19**	**4**	**11**		
7	**110**	**249**	**18**	**50**	**57.1**	**277.9**
56	**60**	**160**	**60**	**160**	**42.5**	**202.9**

FOR REFERENCE ONLY

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWMM Imperv. (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EX-10	265.9	7%	105	222
EX10A	153.5	5%	46	103
EX-11	214.3	4%	54	129
EX-13	94.8	6%	36	85
EX-4A	44.2	8%	19	50
EX-5	26.2	8%	12	32
EX-7	152.8	5%	46	105
EX-7A	2.4	2%	1	5
EX-8	32.2	2%	5	23
EX-8A	6.6	2%	2	9
EX-9	139.3	8%	59	122
EX-9A	21.8	5%	7	19
TR-12	4.7	5%	2	9
TR-20	23.2	7%	10	32
TR-4	4.4	5%	2	9
TR-5	13.7	5%	5	17
TR-6	1.5	5%	1	4
TR-7	2.6	5%	1	5



N

200 100 0 200 400

SCALE: 1" = 200'

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
SUB-BASIN BOUNDARY	
SAND CREEK EAST FORK BASIN LINE	
DESIGN POINT	4
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
EXISTING STORM SEWER	

CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

STERLING RANCH EAST
PRELIMINARY PLAN NO. 1
PRELIMINARY DRAINAGE REPORT
PRE-DEVELOPMENT DRAINAGE MAP

DESIGNED BY	MAW	SCALE		DATE	4-1-22
DRAWN BY	MAW	(H) 1"= 200'		SHEET	1 OF 6
CHECKED BY		(V) 1"= N/A		JOB NO.	1183.22

SEE SHEET 1

FOR REFERENCE ONLY

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
SUB-BASIN BOUNDARY	
SAND CREEK EAST FORK BASIN LINE	
DESIGN POINT	4
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
EXISTING STORM SEWER	

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWMM Imperv. (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EX-10	265.9	7%	105	222
EX10A	153.5	5%	46	103
EX-11	214.3	4%	54	129
EX-13	94.8	6%	36	85
EX-4A	44.2	8%	19	50
EX-5	26.2	8%	12	32
EX-7	152.8	5%	46	105
EX-7A	2.4	2%	1	5
EX-8	32.2	2%	5	23
EX-8A	6.6	2%	2	9
EX-9	139.3	8%	59	122
EX-9A	21.8	5%	7	19
TR-12	4.7	5%	2	9
TR-20	23.2	7%	10	32
TR-4	4.4	5%	2	9
TR-5	13.7	5%	5	17
TR-6	1.5	5%	1	4
TR-7	2.6	5%	1	5

SAND CREEK REACH SC-10
BISON VALLEY
EXIST. POND 2
EXIST. TEMP. SEDIMENT BASIN
VOLLMER ROAD
(HOMESTEAD NORTH AT STERLING RANCH RESIDENTIAL USE)
HOMESTEAD NORTH PLATTED BOUNDARY
CLASSIC OWNERSHIP BOUNDARY
SAND CREEK REACH SC-9
EX-5 26.2
REFERENCE SAND CREEK CHANNEL IMPROVEMENTS PROPOSED WITH HOMESTEAD NORTH AT STERLING RANCH FIL.NO. 1 PREPARED BY JR ENG. (PCD NO. SF-22-013)
BRIARGATE BLVD. (130' ROW)
UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)
SAND CREEK EAST FORK
EX-7 152.8
EX-9 139.3
EX10A 153.5
EX-11 214.3
EX10 265.9
EX-13 94.8
INDIAN WELLS SUBD. FILING NO. 1
TOMAHAWK TRAIL
STAPLETON ROAD
BOW VALLEY SUBD.
UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)
OVERALL STERLING RANCH PROPERTY BOUNDARY
UNPLATTED ELITE PROPERTIES OF AMERICA, INC. (CLASSIC HOMES)
UNPLATTED BUFORD/BENNETT
HOMESTEAD AT STERLING RANCH FILING NO. 2
EX-4A 44.2
HOMESTEAD AT STERLING RANCH FILING NO. 1
SAND CREEK REACH SC-8
REFERENCE SAND CREEK CHANNEL IMPROVEMENTS PROPOSED WITH HOMESTEAD NORTH AT STERLING RANCH FIL.NO. 1 PREPARED BY JR ENG. (PCD NO. SF-22-013)
CLASSIC OWNERSHIP BOUNDARY
PROPOSED STERLING RANCH EAST FILING NO. 1
UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)
STERLING RANCH RD. (80' ROW)
UNPLATTED (FUTURE STERLING RANCH RESIDENTIAL USE)
BRANDING IRON AT STERLING RANCH FILING NO. 2

SEE SHEET 3

N

200 100 0 200 400

SCALE: 1" = 200'

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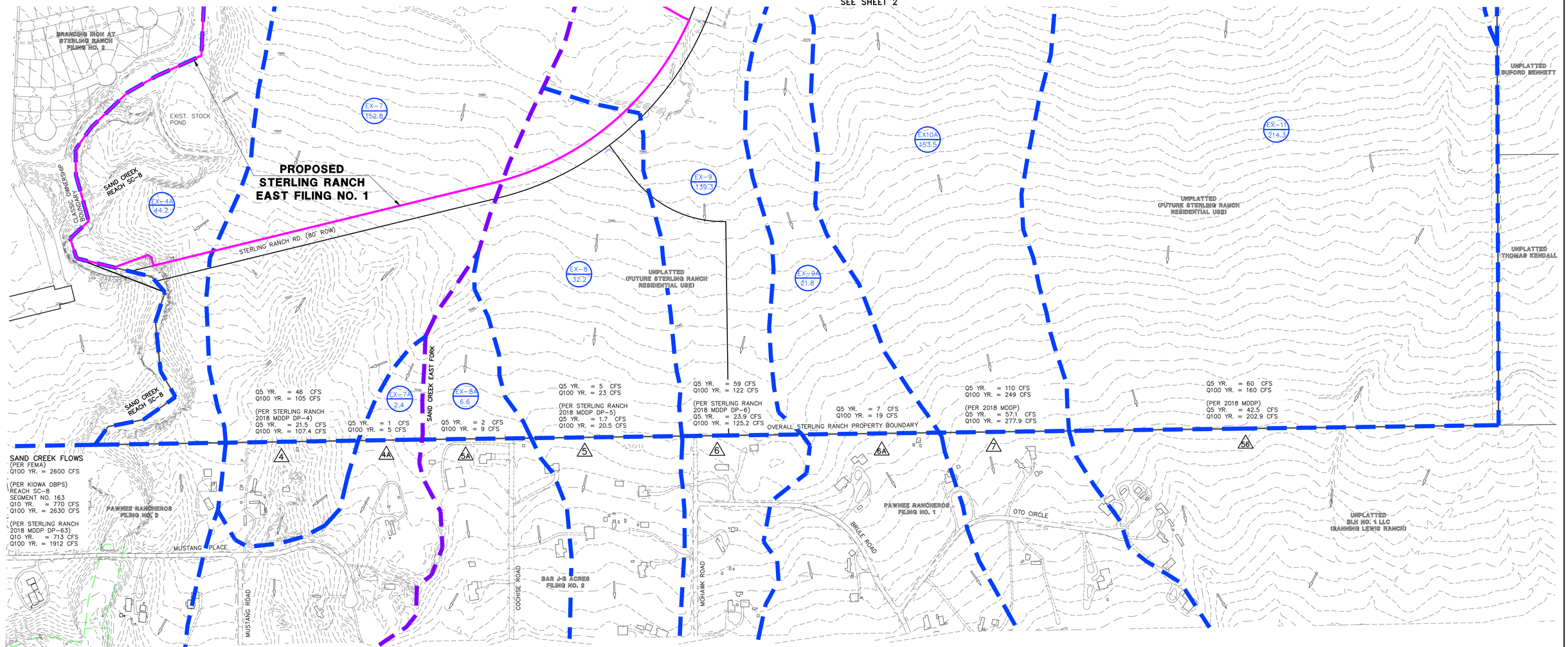
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

STERLING RANCH EAST
PRELIMINARY PLAN NO. 1
PRELIMINARY DRAINAGE REPORT
PRE-DEVELOPMENT DRAINAGE MAP

DESIGNED BY	MAW	SCALE	DATE 4-1-22
DRAWN BY	MAW	(H) 1"= 200'	SHEET 2 OF 6
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.22

SEE SHEET 2



FOR REFERENCE ONLY

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWMM Imperv. (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EX-10	265.9	7%	105	222
EX10A	153.5	5%	46	103
EX-11	214.3	4%	54	129
EX-13	94.8	6%	36	85
EX-4A	44.2	8%	19	50
EX-5	26.2	8%	12	32
EX-7	152.8	5%	46	105
EX-7A	2.4	2%	1	5
EX-8	32.2	2%	5	23
EX-8A	6.6	2%	2	9
EX-9	139.3	8%	59	122
EX-9A	21.8	5%	7	19
TR-12	4.7	5%	2	9
TR-20	23.2	7%	10	32
TR-4	4.4	5%	2	9
TR-5	13.7	5%	5	17
TR-6	1.5	5%	1	4
TR-7	2.6	5%	1	5

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Surface Routing

Design Point	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
DP4	46	105
DP4A	1	5
DP5	5	23
DP5A	2	9
DP6	59	122
DP6A	7	19
DP7	110	249
DP56	60	160
DPEX-4A	19	50
DPEX-5	12	32

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
SUB-BASIN BOUNDARY	
SAND CREEK EAST FORK BASIN LINE	
DESIGN POINT	4
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
EXISTING STORM SEWER	

N

200 100 0 200 400

SCALE: 1" = 200'

CLASSIC CONSULTING SM
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Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

STERLING RANCH EAST
PRELIMINARY PLAN NO. 1
PRELIMINARY DRAINAGE REPORT
PRE-DEVELOPMENT DRAINAGE MAP

DESIGNED BY	MAW	SCALE		DATE	4-1-22
DRAWN BY	MAW	(H) 1"= 200'		SHEET	3 OF 6
CHECKED BY		(V) 1"= N/A		JOB NO.	1183.22

SEE SHEET 4

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWWM Imperv. (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EF-A	8.2	15%	7	20
EX10A ++	60.4	5%	18	50
EX-9 ++	6.0	5%	2	8
EX-9A ++	12.7	5%	4	16
P1-A	12.7	8%	6	19
P1-A1	5.0	70%	15	29
P1-A2	6.4	70%	16	32
P1-A3	1.8	70%	6	12
P1-A4	2.0	70%	7	13
P1-A5	5.7	70%	18	35
P1-A6	2.8	70%	9	18
P1-B (Dev.)	35.5	55%	71	140
P1-B (Un-dev.)	35.5	5%	10	23
P1-C	8.9	70%	31	59
P1-D	31.4	60%	72	142
P1-E1	30.4	50%	66	128
P1-E2	21.8	55%	53	102
P1-F (Dev.)	76.7	35%	125	243
P1-F (Un-dev.)	76.7	5%	22	59
P2-A	24.4	7%	11	37
P2-B	57.8	57%	114	229
P2-B1	2.5	50%	7	13
P2-B10	1.7	70%	6	12
P2-B2	1.9	70%	7	13
P2-B3	2.8	50%	7	14
P2-B4	1.6	70%	6	11
P2-B5	1.9	50%	5	10
P2-B6	1.1	70%	4	8
P2-B7	2.5	25%	3	8
P2-B8	1.2	70%	4	8
P2-B9	2.0	70%	7	14
P2-S1	35.6	50%	82	158
P3-A	52.6	57%	107	213
P3-C	1.7	11%	1	5
P3-S2	11.9	50%	30	59
P4-A	25.8	57%	59	115
P4-B	37.3	60%	97	188
SC-1 +	3.6	8%	2	6
SC-2 +	10.8	8%	6	20
SC-3 +	27.2	8%	12	26
SC-4 +	16.4	8%	8	27
TR-V	2.1	27%	3	7
TR-W	1.4	32%	2	5

+ Basin not changed from pre-development conditions
++ Remaining undeveloped portion of the pre-development Basin

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Developed Surface Routing

Design Point (On-Site)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
DP-1	127	248
DP-2	69	133
DP-3	53	102
DP-4	167	376
DP-5	72	142
DP-6	71	140
DP-7	28	53
DP-8	82	158
DP-9	114	229
DP-10	282	456
DP-11	14	26
DP-12	97	188
DP-13	59	115
DP-14	101	193
DP-15	107	213
DP-16	43	84

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

Subcatchment	Area (Ac.)	SWMM Imperv. (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EX-10	265.9	7%	105	222
EX10A	153.5	5%	46	103
EX-11	214.3	4%	54	129
EX-13	94.8	6%	36	85
EX-4A	44.2	8%	19	50
EX-5	26.2	8%	12	32
EX-7	152.8	5%	46	105
EX-7A	2.4	2%	1	5
EX-8	32.2	2%	5	23
EX-8A	6.6	2%	2	9
EX-9	139.3	8%	59	122
EX-9A	21.8	5%	7	19
TR-12	4.7	5%	2	9
TR-20	23.2	7%	10	32
TR-4	4.4	5%	2	9
TR-5	13.7	5%	5	17
TR-6	1.5	5%	1	4
TR-7	2.6	5%	1	5

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pond FSD-16 Tributary Area
(Prelim. Plan 1 & Foursquare PUD Only)

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P1-A	12.7	N/A	8%
P1-B	35.5	Un dev.	2%
P1-C	8.9	N/A	70%
P1-D	31.4	6,500	60%
P1-E1	30.4	8,500	50%
P1-E2	21.8	7,500	55%
P1-F	76.7	Un dev.	2%
TR-V	2.1	17,500	27%
TR-W	1.4	13,500	32%
TOTAL	220.9		26%

STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pond FSD-16 Tributary Area
(Full Build Out)

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P1-A	12.7	N/A	8%
P1-B	35.5	7,500	55%
P1-C	8.9	N/A	70%
P1-D	31.4	6,500	60%
P1-E1	30.4	8,500	50%
P1-E2	21.8	7,500	55%
P1-F	76.7	12,500	35%
TR-V	2.1	17,500	27%
TR-W	1.4	13,500	32%
TOTAL	220.9		46%

POND FSD-16 (EDB)
(FULL BUILD-OUT)

TRIB. AREA = 220.9 AC.
WQCV = 3.60 AC.-FT.
EURV = 7.70 AC.-FT.
100 YR. = 10.26 AC.-FT.
TOTAL = 21.56 AC.-FT.

INFLOW: (SWWM MODEL)
Q5 = 307 CFS
Q100 = 496 CFS

OUTFLOW: (MHFD-DETENTION)
Q5 = 3.6 CFS
Q100 = 117.4 CFS

POND FSD-16 (EDB)
(PRELIM. PLAN 1 & FOURSQUARE PUD)

TRIB. AREA = 220.9 AC.
WQCV = 2.55 AC.-FT.
EURV = 3.04 AC.-FT.
100 YR. = 5.92 AC.-FT.
TOTAL = 11.51 AC.-FT.

INFLOW: (SWWM MODEL)
Q5 = 197 CFS
Q100 = 410 CFS

OUTFLOW: (MHFD-DETENTION)
Q5 = 2.5 CFS
Q100 = 66.0 CFS

REFERENCE ONLY

FOURSQUARE AT STERLING RANCH PRELIMINARY PLAN AREA

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY	
HISTORIC EAST FORK BASIN BOUNDARY (NOT USED IN BASIN SIZING)	
DESIGN POINT	15
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
PROPOSED DIRECTION OF FLOW	
PROPOSED STORM SEWER	
PROPOSED STORM SEWER PER JR ENG. PLANS	
PROPOSED POND OUTFALL PER JR ENG. PLANS	

SCALE: 1" = 100'

SEE SHEET 6

CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

FOURSQUARE AT STERLING RANCH
PRELIMINARY PLAN / PUD
PRELIMINARY DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE		DATE	9-30-22
DRAWN BY	MAW	(H) 1"= 100'		SHEET	7 OF 7
CHECKED BY		(V) 1"= N/A		JOB NO.	1183.20

N:\1183\07\REPORTS\PRELIMINARY DRAINAGE REPORT\1830 FOR DM SITE.dwg, 3/9/2023 5:06:30 PM, 1:1

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: May 31, 2022
Project: Sterling Ranch East Preliminary Plan No. 1
Location: BASINS NOT TRIBUTARY TO PERMANENT SWQ FACILITY

REFERENCE ONLY

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.53 inches
Depth of Average Runoff Producing Storm, d_6 = 0.42 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA							
Area ID	EF-A	SC-3-1	SC-3-2	SC-4-1	SC-4-2							
Downstream Design Point ID	SC	SC	SC	SC	SC							
Downstream BMP Type	None	None	None	None	None							
DCIA (ft^2)	--	--	--	--	--							
UIA (ft^2)	40,000	26,790	19,924	30,053	48,697							
RPA (ft^2)	37,188	17,918	12,924	21,985	28,692							
SPA (ft^2)	--	--	--	--	--							
HSG A (%)	0%	0%	0%	0%	0%							
HSG B (%)	100%	100%	100%	100%	100%							
HSG C/D (%)	0%	0%	0%	0%	0%							
Average Slope of RPA (ft/ft)	0.020	0.040	0.030	0.040	0.040							
UIA:RPA Interface Width (ft)	800.00	700.00	400.00	800.00	1000.00							

CALCULATED RUNOFF RESULTS

Area ID	EF-A	SC-3-1	SC-3-2	SC-4-1	SC-4-2							
UIA:RPA Area (ft^2)	77,188	44,708	32,848	52,038	77,389							
L / W Ratio	0.12	0.09	0.21	0.08	0.08							
UIA / Area	0.5182	0.5992	0.6066	0.5775	0.6292							
Runoff (in)	0.00	0.00	0.00	0.00	0.00							
Runoff (ft^3)	0	0	0	0	0							
Runoff Reduction (ft^3)	1433	960	714	1077	1745							

CALCULATED WQCV RESULTS

Area ID	EF-A	SC-3-1	SC-3-2	SC-4-1	SC-4-2							
WQCV (ft^3)	1628	1090	811	1223	1982							
WQCV Reduction (ft^3)	1628	1090	811	1223	1982							
WQCV Reduction (%)	100%	100%	100%	100%	100%							
Untreated WQCV (ft^3)	0	0	0	0	0							

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	SC											
DCIA (ft^2)	0											
UIA (ft^2)	165,464											
RPA (ft^2)	118,707											
SPA (ft^2)	0											
Total Area (ft^2)	284,171											
Total Impervious Area (ft^2)	165,464											
WQCV (ft^3)	6,734											
WQCV Reduction (ft^3)	6,734											
WQCV Reduction (%)	100%											
Untreated WQCV (ft^3)	0											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	284,171
Total Impervious Area (ft^2)	165,464
WQCV (ft^3)	6,734
WQCV Reduction (ft^3)	6,734
WQCV Reduction (%)	100%
Untreated WQCV (ft^3)	0

FINAL DRAINAGE REPORT
FOR
STERLING RANCH EAST FILING NO. 6

REFERENCE ONLY

Prepared for:
CLASSIC SRJ LAND, LLC
2138 FLYING HORSE CLUB DRIVE
COLORADO SPRINGS CO 80921
(719) 592-9333

Prepared by:
CLASSIC CONSULTING
619 N. CASCADE AVE SUITE 200
COLORADO SPRINGS CO 80903
(719) 785-0790

Job No. 1183.60

PCD Project No. SF2610

JOB NAME: *STERLING RANCH EAST FILING NO. 6 - FINAL PLAT*
JOB NUMBER: *1183.60*
DATE: *07/30/26*
CALCULATED BY: *MAW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED)

		C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			DCM TABLE 6-6
BASIN	TOTAL AREA (AC)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS
A	3.60	RES 1/6 AC.	52.5%	3.60	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.15	1.35	1.96	52.5%
B	1.20	RES 1/6 AC.	52.5%	1.20	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.38	0.45	0.65	52.5%
C	4.50	RES 1/6 AC.	52.5%	3.90	0.32	0.38	0.55	OPEN SPACE	7.0%	0.60	0.05	0.12	0.39	0.28	0.34	0.52	1.28	1.53	2.36	46.4%
D	1.50	RES 1/6 AC.	52.5%	1.50	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.48	0.56	0.82	52.5%
E	1.60	RES 1/6 AC.	52.5%	1.60	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.51	0.60	0.87	52.5%
F	3.50	RES 1/6 AC.	52.5%	3.50	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.12	1.31	1.91	52.5%
G	1.10	RES 1/6 AC.	52.5%	1.10	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.35	0.41	0.60	52.5%
H	1.70	RES 1/6 AC.	52.5%	1.70	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.54	0.64	0.93	52.5%
I	0.22	RES 1/6 AC.	52.5%	0.22	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.07	0.08	0.12	52.5%
J	1.90	RES 1/6 AC.	52.5%	1.90	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.61	0.71	1.04	52.5%
K	0.73	RES 1/6 AC.	52.5%	0.73	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.23	0.27	0.40	52.5%
L	2.20	RES 1/5 AC.	46.0%	2.20	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.62	0.75	1.14	46.0%
M	0.57	RES 1/5 AC.	46.0%	0.57	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.16	0.19	0.30	46.0%
N	1.70	RES 1/6 AC.	52.5%	1.70	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.54	0.64	0.93	52.5%
O	0.49	RES 1/6 AC.	52.5%	0.49	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.16	0.18	0.27	52.5%
P	0.40	RES 1/6 AC.	52.5%	0.40	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.13	0.15	0.22	52.5%
Q	1.70	RES 1/6 AC.	52.5%	1.70	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.54	0.64	0.93	52.5%
R	2.70	RES 1/6 AC.	52.5%	2.70	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.86	1.01	1.47	52.5%
S	1.60	RES 1/6 AC.	52.5%	1.60	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.51	0.60	0.87	52.5%
T	0.49	RES 1/6 AC.	52.5%	0.49	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.16	0.18	0.27	52.5%
U	1.70	RES 1/6 AC.	52.5%	1.37	0.32	0.38	0.55	OPEN SPACE	7.0%	0.33	0.05	0.12	0.39	0.27	0.33	0.51	0.45	0.55	0.88	43.7%
V	2.70	RES 1/5 AC.	46.0%	1.93	0.28	0.34	0.52	POCKET PARK	7.0%	0.77	0.05	0.12	0.39	0.21	0.28	0.48	0.58	0.75	1.30	34.9%
W	0.79	RES 1/6 AC.	52.5%	0.79	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.25	0.30	0.43	52.5%
X	2.00	RES 1/6 AC.	52.5%	2.00	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.64	0.75	1.09	52.5%
Y	3.20	RES 1/5 AC.	46.0%	3.20	0.28	0.34	0.52			0.00	0.89	0.90	0.96	0.28	0.34	0.52	0.90	1.09	1.66	46.0%
Z	0.30	RES 1/5 AC.	46.0%	0.15	0.28	0.34	0.52	OPEN SPACE	7.0%	0.15	0.05	0.12	0.39	0.17	0.23	0.46	0.05	0.07	0.14	26.5%
AA	2.60	RES 1/5 AC.	46.0%	2.35	0.28	0.34	0.52	OPEN SPACE	7.0%	0.25	0.05	0.12	0.39	0.26	0.32	0.51	0.67	0.83	1.32	42.3%
BB	6.20	RES 1/5 AC.	46.0%	0.00	0.28	0.34	0.52	OPEN SPACE	7.0%	6.20	0.05	0.12	0.39	0.05	0.12	0.39	0.31	0.74	2.42	7.0%
CC	5.80	RES 1/5 AC.	46.0%	3.60	0.28	0.34	0.52	OPEN SPACE	7.0%	2.20	0.05	0.12	0.39	0.19	0.26	0.47	1.12	1.49	2.73	31.2%
DD	4.40	RES 1/6 AC.	52.5%	4.00	0.32	0.38	0.55	OPEN SPACE	7.0%	0.40	0.05	0.12	0.39	0.30	0.35	0.53	1.30	1.55	2.34	48.4%
EE	1.30	STREET	100.0%	0.60	0.89	0.90	0.96	OPEN SPACE	7.0%	0.80	0.05	0.12	0.39	0.44	0.49	0.68	0.57	0.64	0.89	50.5%
FF	0.62	STREET	100.0%	0.60	0.89	0.90	0.96			0.00	0.05	0.12	0.39	0.86	0.87	0.93	0.53	0.54	0.58	96.8%
GG	2.50	RES 1/6 AC.	52.5%	1.90	0.32	0.38	0.55	STREET	100.0%	0.60	0.89	0.90	0.96	0.46	0.50	0.64	1.14	1.25	1.61	63.9%
HH	2.00	RES 1/6 AC.	52.5%	1.00	0.32	0.38	0.55	STREET	100.0%	1.00	0.89	0.90	0.96	0.61	0.64	0.75	1.21	1.28	1.51	76.3%
F4-1	9.00	RES 1/5 AC.	46.0%	9.00	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	2.52	3.06	4.68	46.0%
F4-2	2.20	RES 1/5 AC.	46.0%	2.20	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.62	0.75	1.14	46.0%
F4-3	3.20	RES 1/5 AC.	46.0%	3.20	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.90	1.09	1.66	46.0%
F4-4	9.80	RES 1/5 AC.	46.0%	6.10	0.28	0.34	0.52	OPEN SPACE	7.0%	3.70	0.05	0.12	0.39	0.19	0.26	0.47	1.89	2.52	4.62	31.3%
F4-5	1.70	RES 1/6 AC.	52.5%	1.70	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.54	0.64	0.93	52.5%
F4-6	3.50	RES 1/5 AC.	46.0%	3.50	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.98	1.19	1.82	46.0%
F4-7	6.90	RES 1/6 AC.	52.5%	6.90	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	2.21	2.59	3.76	52.5%
F4-8	1.10	RES 1/6 AC.	52.5%	1.10	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.35	0.41	0.60	52.5%
F4-9	4.90	RES 1/6 AC.	52.5%	4.90	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.57	1.84	2.67	52.5%
F4-10	8.50	RES 1/6 AC.	52.5%	8.50	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	2.72	3.19	4.63	52.5%
F2-A	2.90	RES 1/6 AC.	52.5%	2.90	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.93	1.09	1.58	52.5%
F2-B	5.00	RES 1/6 AC.	52.5%	5.00	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.60	1.88	2.73	52.5%
F2-C	0.72	STREET	100.0%	0.19	0.89	0.90	0.96	OPEN SPACE	7.0%	0.53	0.05	0.12	0.39	0.27	0.33	0.54	0.20	0.23	0.39	31.5%
F8-1	3.30	RES 1/6 AC.	52.5%	3.10	0.32	0.38	0.55	OPEN SPACE	7.0%	0.20	0.05	0.12	0.39	0.30	0.36	0.54	1.00	1.19	1.77	49.7%
F8-2	1.00	RES 1/5 AC.	46.0%	0.88	0.28	0.34	0.52	OPEN SPACE	7.0%	0.12	0.05	0.12	0.39	0.25	0.31	0.50	0.25	0.31	0.50	41.3%
F8-3	3.00	RES 1/8 AC.	65.0%	2.75	0.41	0.45	0.59	OPEN SPACE	7.0%	0.25	0.05	0.12	0.39	0.38	0.42	0.57	1.14	1.27	1.72	60.2%

REFERENCE ONLY

JOB NAME: *STERLING RANCH EAST FILING NO. 6 - FINAL PLAT*
JOB NUMBER: *1183.60*
DATE: *07/30/26*
CALCULATED BY: *MAW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED)

		C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			DCM TABLE 6-6
BASIN	TOTAL AREA (AC)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS
F8-4	5.00	RES 1/8 AC.	65.0%	4.75	0.41	0.45	0.59	OPEN SPACE	7.0%	0.25	0.05	0.12	0.39	0.39	0.43	0.58	1.96	2.17	2.90	62.1%
F8-5	2.50	RES 1/8 AC.	65.0%	2.01	0.41	0.45	0.59	OPEN SPACE	7.0%	0.49	0.05	0.12	0.39	0.34	0.39	0.55	0.85	0.96	1.38	53.6%
F8-6	3.50	RES 1/8 AC.	65.0%	2.30	0.41	0.45	0.59	OPEN SPACE	7.0%	1.20	0.05	0.12	0.39	0.29	0.34	0.52	1.00	1.18	1.83	45.1%
F8-7	4.90	RES 1/8 AC.	65.0%	4.75	0.41	0.45	0.59	OPEN SPACE	7.0%	0.15	0.05	0.12	0.39	0.40	0.44	0.58	1.96	2.16	2.86	63.2%
F8-8	1.30	RES 1/8 AC.	65.0%	0.50	0.41	0.45	0.59	OPEN SPACE	7.0%	0.80	0.05	0.12	0.39	0.19	0.25	0.47	0.25	0.32	0.61	29.3%
F8-9	1.60	RES 1/8 AC.	65.0%	0.80	0.41	0.45	0.59	OPEN SPACE	7.0%	0.80	0.05	0.12	0.39	0.23	0.29	0.49	0.37	0.46	0.78	36.0%
P1-A2	4.20	STREET	100.0%	3.50	0.89	0.90	0.96	OPEN SPACE	7.0%	0.70	0.05	0.12	0.39	0.75	0.77	0.87	3.15	3.23	3.63	84.5%
P1-A3	1.20	STREET	100.0%	1.03	0.89	0.90	0.96	OPEN SPACE	7.0%	0.17	0.05	0.12	0.39	0.77	0.79	0.88	0.93	0.95	1.06	86.8%
SR-1	1.20	STREET	100.0%	0.75	0.89	0.90	0.96	OPEN SPACE	7.0%	0.45	0.05	0.12	0.39	0.58	0.61	0.75	0.69	0.73	0.90	65.1%
SR-2	0.65	STREET	100.0%	0.48	0.89	0.90	0.96	OPEN SPACE	7.0%	0.17	0.05	0.12	0.39	0.67	0.70	0.81	0.44	0.45	0.53	75.7%
BG-1	4.20	STREET	100.0%	3.00	0.89	0.90	0.96	OPEN SPACE	7.0%	1.20	0.05	0.12	0.39	0.65	0.68	0.80	2.73	2.84	3.35	73.4%
BG-2	3.00	STREET	100.0%	2.25	0.89	0.90	0.96	OPEN SPACE	7.0%	0.75	0.05	0.12	0.39	0.68	0.71	0.82	2.04	2.12	2.45	76.8%
P1-INT	33.40	UNDEV.	2.0%	33.40	0.03	0.09	0.36			0.00	0.89	0.90	0.96	0.03	0.09	0.36	1.00	3.01	12.02	2.0%
P1-F1	60.60	RES 1/6 AC.	52.5%	60.60	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	19.39	22.73	33.03	52.5%
TOTAL AREA TRIBUTARY TO POND FSD-16	**211.5**	**49.1%**																		
Tributary Area to NWesterly Outfall	**136.1**	**49.1%**																		
Tributary Area to Easterly Outfall	**33.4**	**51.1%**																		
Tributary Area to SWesterly Outfall	**33.0**	**52.0%**																		
Basins tributary to Pond FSD-14A	**17.9**	**66.4%**																		
Basin tributary to future SWQ pond	**0.62**	**96.8%**																		

REFERENCE ONLY

FINAL DRAINAGE REPORT
FOR
STERLING RANCH EAST FILING NO. 4

REFERENCE ONLY

Prepared for:
CLASSIC SRJ LAND, LLC
2138 FLYING HORSE CLUB DRIVE
COLORADO SPRINGS CO 80921
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Prepared by:
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(719) 785-0790

Job No. 1183.41

PCD Project No. SF26xx

JOB NAME: *STERLING RANCH EAST FILING NO. 4 - FINAL PLAT*
JOB NUMBER: *1183.41*
DATE: *06/18/26*
CALCULATED BY: *MAW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

		C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			DCM TABLE 6-6
BASIN	TOTAL AREA (AC)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS
OS-1	1.30	RES 1/3 AC.	35.0%	1.30	0.18	0.25	0.47			0.00	0.02	0.08	0.35	0.18	0.25	0.47	0.23	0.33	0.61	35.0%
OS-2	0.14	RES 1/3 AC.	35.0%	0.14	0.18	0.25	0.47			0.00	0.02	0.08	0.35	0.18	0.25	0.47	0.03	0.04	0.07	35.0%
OS-3	0.13	STREET	100.0%	0.08	0.89	0.90	0.96	OPEN SPACE	7.0%	0.60	0.05	0.12	0.39	0.74	1.07	2.35	0.10	0.14	0.31	90.0%
OS-4	4.90	RES 1/5 AC.	46.0%	3.10	0.28	0.34	0.52	OPEN SPACE	7.0%	1.80	0.05	0.12	0.39	0.20	0.26	0.47	0.96	1.27	2.31	31.7%
OS-5	3.40	RES 1/6 AC.	52.5%	3.05	0.32	0.38	0.55	OPEN SPACE	7.0%	0.35	0.05	0.12	0.39	0.29	0.35	0.53	0.99	1.19	1.80	47.8%
A	1.80	RES 1/5 AC.	46.0%	1.80	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.50	0.61	0.94	46.0%
B	3.10	RES 1/5 AC.	46.0%	3.10	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.87	1.05	1.61	46.0%
C	2.70	RES 1/5 AC.	46.0%	2.70	0.28	0.34	0.52			0.00	0.89	0.90	0.96	0.28	0.34	0.52	0.76	0.92	1.40	46.0%
D	2.20	RES 1/5 AC.	46.0%	2.20	0.28	0.34	0.52			0.00	0.89	0.90	0.96	0.28	0.34	0.52	0.62	0.75	1.14	46.0%
E	3.10	RES 1/5 AC.	46.0%	3.10	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.87	1.05	1.61	46.0%
F	1.00	RES 1/6 AC.	52.5%	1.00	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.32	0.38	0.55	52.5%
G	9.50	RES 1/5 AC.	46.0%	5.80	0.28	0.34	0.52	OPEN SPACE	7.0%	3.70	0.05	0.12	0.39	0.19	0.25	0.47	1.81	2.42	4.46	30.8%
H	0.24	STREET	100.0%	0.08	0.89	0.90	0.96	RES 1/6 AC.	52.5%	0.14	0.32	0.38	0.55	0.46	0.50	0.62	0.11	0.12	0.15	61.9%
I	2.80	RES 1/6 AC.	52.5%	2.80	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.90	1.05	1.53	52.5%
J	1.60	RES 1/6 AC.	52.5%	1.60	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.51	0.60	0.87	52.5%
K	0.11	STREET	100.0%	0.05	0.89	0.90	0.96	RES 1/6 AC.	52.5%	0.06	0.32	0.38	0.55	0.58	0.61	0.73	0.06	0.07	0.08	74.1%
L	1.70	RES 1/6 AC.	52.5%	1.70	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.54	0.64	0.93	52.5%
M	1.80	RES 1/5 AC.	46.0%	1.80	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.50	0.61	0.94	46.0%
N	4.20	RES 1/6 AC.	52.5%	4.20	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.34	1.58	2.29	52.5%
O	2.90	RES 1/6 AC.	52.5%	2.90	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.93	1.09	1.58	52.5%
P	0.33	STREET	100.0%	0.11	0.89	0.90	0.96	RES 1/6 AC.	52.5%	0.22	0.32	0.38	0.55	0.51	0.55	0.68	0.17	0.18	0.23	68.3%
Q	0.65	STREET	100.0%	0.20	0.89	0.90	0.96	RES 1/6 AC.	52.5%	0.45	0.32	0.38	0.55	0.50	0.54	0.67	0.32	0.35	0.44	67.1%
R	3.50	RES 1/6 AC.	52.5%	3.50	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.12	1.31	1.91	52.5%
S	0.44	STREET	100.0%	0.14	0.89	0.90	0.96	RES 1/6 AC.	52.5%	0.30	0.32	0.38	0.55	0.50	0.54	0.68	0.22	0.24	0.30	67.6%
T	3.30	RES 1/5 AC.	46.0%	3.30	0.28	0.34	0.52			0.00	0.89	0.90	0.96	0.28	0.34	0.52	0.92	1.12	1.72	46.0%
U	2.50	RES 1/5 AC.	46.0%	2.35	0.28	0.34	0.52	OPEN SPACE	7.0%	0.15	0.05	0.12	0.39	0.27	0.33	0.51	0.67	0.82	1.28	43.7%
V	0.93	RES 1/6 AC.	52.5%	0.30	0.32	0.38	0.55	OPEN SPACE	7.0%	0.63	0.05	0.12	0.39	0.14	0.20	0.44	0.13	0.19	0.41	21.7%
W	0.94	RES 1/5 AC.	46.0%	0.84	0.28	0.34	0.52	OPEN SPACE	7.0%	0.10	0.05	0.12	0.39	0.26	0.32	0.51	0.24	0.30	0.48	41.9%
F6-EE	1.30	STREET	100.0%	0.60	0.89	0.90	0.96	OPEN SPACE	7.0%	0.70	0.05	0.12	0.39	0.44	0.48	0.65	0.57	0.62	0.85	49.9%
F6-GG	2.50	RES 1/6 AC.	52.5%	1.90	0.32	0.38	0.55	STREET	100.0%	0.60	0.89	0.90	0.96	0.46	0.50	0.64	1.14	1.25	1.61	63.9%
F6-HH	2.00	RES 1/6 AC.	52.5%	1.00	0.32	0.38	0.55	STREET	100.0%	1.00	0.89	0.90	0.96	0.61	0.64	0.75	1.21	1.28	1.51	76.3%
F6-V	2.70	RES 1/5 AC.	46.0%	1.93	0.28	0.34	0.52	POCKET PARK	7.0%	0.77	0.05	0.12	0.39	0.21	0.28	0.48	0.58	0.75	1.30	34.9%
F6-W	0.79	RES 1/6 AC.	52.5%	0.79	0.32	0.38	0.55			0.00	0.05	0.12	0.39	0.32	0.38	0.55	0.25	0.30	0.43	52.5%
F6-X	2.00	RES 1/6 AC.	52.5%	2.00	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.64	0.75	1.09	52.5%
F6-Y	3.20	RES 1/5 AC.	46.0%	3.20	0.28	0.34	0.52			0.00	0.02	0.08	0.35	0.28	0.34	0.52	0.90	1.09	1.66	46.0%
SR-1	1.20	STREET	100.0%	0.75	0.89	0.90	0.96	OPEN SPACE	7.0%	0.45	0.05	0.12	0.39	0.58	0.61	0.75	0.69	0.73	0.90	65.1%
SR-2	0.65	STREET	100.0%	0.48	0.89	0.90	0.96	OPEN SPACE	7.0%	0.17	0.05	0.12	0.39	0.67	0.70	0.81	0.44	0.45	0.53	75.7%
Z	0.30	RES 1/5 AC.	46.0%	0.15	0.28	0.34	0.52	OPEN SPACE	7.0%	0.15	0.05	0.12	0.39	0.17	0.23	0.46	0.05	0.07	0.14	26.5%
AA	2.60	RES 1/5 AC.	46.0%	2.35	0.28	0.34	0.52	OPEN SPACE	7.0%	0.25	0.05	0.12	0.39	0.26	0.32	0.51	0.67	0.83	1.32	42.3%
BB	6.20	RES 1/5 AC.	46.0%	0.00	0.28	0.34	0.52	OPEN SPACE	7.0%	6.20	0.05	0.12	0.39	0.05	0.12	0.39	0.31	0.74	2.42	7.0%
SC	9.90	RES 1/5 AC.	46.0%	2.80	0.28	0.34	0.52	OPEN SPACE	7.0%	7.10	0.05	0.12	0.39	0.12	0.18	0.43	1.14	1.80	4.23	18.0%

PRELIMINARY NOT FOR RECORDING

JOB NAME: *STERLING RANCH EAST FILING NO. 4 - FINAL PLAT*
JOB NUMBER: *1183.41*
DATE: *06/18/26*
CALCULATED BY: *MAW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			DCM TABLE 6-6
		LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS
F2-A	2.90	RES 1/6 AC.	52.5%	2.90	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.93	1.09	1.58	52.5%
F2-B	5.00	RES 1/6 AC.	52.5%	5.00	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.60	1.88	2.73	52.5%
F8-1	3.70	RES 1/6 AC.	52.5%	3.50	0.32	0.38	0.55	OPEN SPACE	7.0%	0.20	0.05	0.12	0.39	0.31	0.36	0.54	1.13	1.34	1.99	50.0%
F8-2	1.00	RES 1/5 AC.	46.0%	0.88	0.28	0.34	0.52	OPEN SPACE	7.0%	0.12	0.05	0.12	0.39	0.25	0.31	0.50	0.25	0.31	0.50	41.3%
F8-3	3.50	RES 1/8 AC.	65.0%	2.50	0.41	0.45	0.59	OPEN SPACE	7.0%	1.00	0.05	0.12	0.39	0.31	0.36	0.53	1.08	1.25	1.87	48.4%
F8-4	4.40	RES 1/8 AC.	65.0%	4.00	0.41	0.45	0.59	OPEN SPACE	7.0%	0.40	0.05	0.12	0.39	0.38	0.42	0.57	1.66	1.85	2.52	59.7%
F8-5	3.40	RES 1/8 AC.	65.0%	3.10	0.41	0.45	0.59	OPEN SPACE	7.0%	0.30	0.05	0.12	0.39	0.38	0.42	0.57	1.29	1.43	1.95	59.9%
F8-6A	1.80	RES 1/8 AC.	65.0%	1.55	0.41	0.45	0.59	OPEN SPACE	7.0%	0.25	0.05	0.12	0.39	0.36	0.40	0.56	0.65	0.73	1.01	56.9%
F8-6B	0.86	RES 1/8 AC.	65.0%	0.86	0.41	0.45	0.59	OPEN SPACE	7.0%	0.00	0.05	0.12	0.39	0.41	0.45	0.59	0.35	0.39	0.51	65.0%
F8-7A	1.90	RES 1/8 AC.	65.0%	1.80	0.41	0.45	0.59	OPEN SPACE	7.0%	0.10	0.05	0.12	0.39	0.39	0.43	0.58	0.74	0.82	1.10	61.9%
F8-7B	2.70	RES 1/8 AC.	65.0%	2.60	0.41	0.45	0.59	OPEN SPACE	7.0%	0.10	0.05	0.12	0.39	0.40	0.44	0.58	1.07	1.18	1.57	62.9%
P1-F1	60.60	RES 1/6 AC.	52.5%	60.60	0.32	0.38	0.55							0.32	0.38	0.55	19.39	22.73	33.03	52.5%
P-INT	34.10	UNDEVLOPED	2.0%	34.10	0.03	0.09	0.36							0.03	0.09	0.36	1.02	3.07	12.28	2.0%
SRE FILING 6 E'LY OUTFALL BASINS	**33.40**	**51.1%**																		
SRE FILING 8 SW'LY OUTFALL BASINS	**33.31**	**55.8%**																		
TRIBUTARY AREA TO NW'LY OUTFALL	**136.3**	**48.9%**																		
TOTAL AREA TRIBUTARY TO POND FSD-16	**211.8**	**49.0%**																		

REFERENCE ONLY

DRAINAGE MAPS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

DEVELOPED PIPE ROUTING SUMMARY (INTERIM)

Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Pipe Size*
1	DP-1	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 24" RCP (PUBLIC)
2	DP-2	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 24" RCP (PUBLIC)
3	PR-1, PR-2	3.00	4.35	15.6	3.46	5.82	10	25	PROP. 30" RCP (PUBLIC)
4	DP-4 Capture	1.19	1.56	17.6	3.28	5.50	4	9	PROP. 18" RCP (PUBLIC)
5	PR-3, PR-4	4.19	5.90	18.4	3.21	5.39	13	32	PROP. 36" RCP (PUBLIC)
6	DP-5	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 18" RCP (PUBLIC)
7	DP-6	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 18" RCP (PUBLIC)
8	PR-5, PR-6, PR-7	5.22	7.42	19.6	3.12	5.23	16	39	PROP. 30" RCP (PUBLIC)
9	DP-7	0.47	0.73	20.0	3.09	5.19	1	4	PROP. 18" RCP (PUBLIC)
10	DP-8	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 18" RCP (PUBLIC)
11	PR-9, PR-10	1.10	1.56	20.8	3.03	5.09	3	8	PROP. 24" RCP (PUBLIC)
12	DP-9	0.20	0.30	5.7	4.97	8.34	1.0	2.5	PROP. 18" RCP (PUBLIC)
13	PR-11, PR-12	1.30	1.86	21.1	3.01	5.05	4	9	PROP. 24" RCP (PUBLIC)
14	DP-10 Capture	1.25	1.31	18.2	3.23	5.43	4	7	PROP. 18" RCP (PUBLIC)
15	PR-13, PR-14	2.56	3.17	21.3	3.00	5.03	8	16	PROP. 24" RCP (PUBLIC)
16	DP-11 Capture	1.96	2.41	19.5	3.13	5.25	6	13	PROP. 24" RCP (PUBLIC)
17	PR-15, PR-16	4.52	5.58	21.4	2.99	5.02	14	28	PROP. 30" RCP (PUBLIC)
18	DP-12	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 24" RCP (PUBLIC)
19	DP-13	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 24" RCP (PUBLIC)
20	PR-17, PR-18, PR-19	6.17	8.84	21.4	2.99	5.02	18	44	PROP. 36" RCP (PUBLIC)
21	PR-8, PR-20	11.39	16.26	21.6	2.98	4.99	34	81	PROP. 42" RCP (PUBLIC)
22	DP-14 Capture	0.43	0.62	10.6	4.04	6.78	1.7	4.2	PROP. 18" RCP (PUBLIC)
23	PR-22, DP-15 Capture	0.88	1.22	10.6	4.04	6.78	3.6	8.3	PROP. 18" RCP (PUBLIC)
24	**PR-21, PR-23**	**12.27**	**17.48**	**21.6**	**2.98**	**4.99**	**37**	**87**	**PROP. 42" RCP (PUBLIC)**

DEVELOPED SURFACE ROUTING SUMMARY (INTERIM)

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Facility/ Inlet Size*
1	Basin B	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 10' TYPE R SUMP INLET
2	Basin A	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 10' TYPE R SUMP INLET
3	Basin O	1.12	1.53	17.6	3.28	5.50	3.7	8.4	COUNTY STD. 6' CROSSPAN
4	DP-3, Basin P	1.19	1.64	17.6	3.28	5.50	3.9	9.0	PROP. 15' TYPE R AT-GRADE INLET
5	Basin M	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 5' TYPE R SUMP INLET
6	Basin N	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 5' TYPE R SUMP INLET
7	Basin D, F	0.47	0.73	20.0	3.09	5.19	1	4	PROP. 5' TYPE R SUMP INLET
8	Basin H	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 5' TYPE R SUMP INLET
9	Basin G	0.20	0.30	5.7	4.97	8.34	1.0	2.5	PROP. 5' TYPE R SUMP INLET
10	Basin I	1.27	1.85	18.2	3.23	5.43	4	10	PROP. 10' TYPE R AT-GRADE INLET
11	Basin J, Flow-by from DP-10	1.96	3.21	19.5	3.13	5.25	6	17	PROP. 15' TYPE R AT-GRADE INLET
12	Basin K, Flow-by from DP-11	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 10' TYPE R SUMP INLET
13	Basin L	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 5' TYPE R SUMP INLET
14	Basin S	0.43	0.62	10.6	4.04	6.78	1.7	4.2	PROP. 15' TYPE R AT-GRADE INLET
15	Basin T, OS-A	0.45	0.60	18.1	3.24	5.43	1.5	3.3	PROP. 15' TYPE R AT-GRADE INLET
16	**TOTAL PIPE INFLOW (Pipe Run 24)**	**12.27**	**17.48**	**21.6**	**2.98**	**4.99**	**37**	**87**	**POND FSD-16**
17	Basin C, Q, P1-A2, Flow-by from DP-4	3.87	4.81	18.3	3.22	5.40	12.5	26.0	EXIST. 15' TYPE R AT-GRADE INLET
18	Basin R, P1-A3, Flow-by from DP-17	2.28	4.07	18.6	3.19	5.36	7.3	21.8	EXIST. 15' TYPE R AT-GRADE INLET
19	Basin U, Flow-by from DP-18 (No Flow-by from DP-14, 15)	1.65	3.29	11.2	3.96	6.65	6.6	21.9	EXIST. 20' TYPE R SUMP INLET
20	**TOTAL POND INFLOW (Incl. Basins V, EX-9)**	**17.86**	**40.66**	**35.5**	**2.23**	**3.74**	**44**	**152**	**POND FSD-16**

FUTURE STERLING RANCH EAST DEVELOPMENT

THIS BASIN SHOWN ACCOUNTS FOR THE TRIBUTARY UPSTREAM UNDEVELOPED AREA THAT WILL ROUTED TO TEMPORARY SEDIMENT POND IN THE INTERIM CONDITION PRIOR TO DEVELOPMENT OF FILING 4

OS–F4 45.6

FUTURE STERLING RANCH EAST DEVELOPMENT

THIS BASIN SHOWN ACCOUNTS FOR THE TRIBUTARY UPSTREAM UNDEVELOPED AREA THAT WILL CONTRIBUTE SHEET FLOWS TO POND FSD–16 IN THE INTERIM CONDITION PRIOR TO DEVELOPMENT OF FILING 6

EX–9 59.2

FUTURE CHANNEL IMPROVEMENTS SEE CDR–20–004 BY OTHERS. TO BE INSTALLED ONCE COUNTY APPROVAL AND ASSOCIATED PERMITS ARE OBTAINED. TIMING TBD BY 404 PERMIT APPROVAL AND COUNTY APPROVAL.

EROSION CONTROL MATTING OR TRM TO BE INSTALLED FOR SUPERCRITICAL FLOWS

TEMPORARY SEDIMENT BASIN AND DIVERSION SWALES WILL BE USED PRIOR TO DEVELOPMENT IN THIS AREA TO PREVENT EXISTING FLOWS FROM ENTERING THE SITE. SEE GRADING AND EROSION CONTROL PLAN FOR DETAILS

Verify all inlet sizes prior to final plat.

Label cross pans

Verify all inlet sizes prior to final plat

TRACT H
PROPOSED PRIVATE EXTENDED DETENTION BASIN FACILITY "POND FSD–16"
FULL SPECTRUM DETENTION

THIS FACILITY TO BE PLATTED AS TRACT H, STERLING RANCH EAST FILING NO. 8 AND CONSTRUCTED WITH WHICHEVER SUBDIVISION IS DEVELOPED FIRST (FILING 2, FILING 6 OR FILING 8)

PROP. 68" RCP STORM SEWER TO BE CONSTRUCTED WITH STERLING RANCH ROAD CONSTRUCTION.
(REF. STERLING RANCH EAST FILING 4 FDR – SF2615)

LEGEND

- EXISTING GROUND CONTOUR 5910
- PROPOSED FINISHED CONTOUR 5910
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- FUTURE/OFFSITE BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- BASIN IDENTIFIER / AREA IN ACRES (D / 1.41)
- DESIGN POINT (2)
- PIPE RUN (2)

SCALE: 1" = 60'

STERLING RANCH EAST FILING NO. 8
DEVELOPED DRAINAGE MAP (INTERIM CONDITION)

CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785–0790
(719)785–0799 (Fax)

...\FINAL DRAINAGE REPORT\FASR_TM – interim Aug. 9/7/2024 8:44:13 AM 1:1.02960

RETREAT AT TIMBERRIDGE FILING 2

EXIST. NATURAL SWALE TO DETAINE SOUTH OFF-SITE BASIN P1-P1 UPON FUTURE DEVELOPMENT

EXIST. TEMP. SEDIMENT BASIN TO BE REMOVED UPON DEVELOPMENT OF STERLING RANCH EAST FILING NO. 4

EXIST. NATURAL SWALE TO BE REMOVED IN THE DEVELOPMENT OF STERLING RANCH EAST FILING NO. 4

FUTURE STERLING RANCH DEVELOPMENT

FUTURE STERLING RANCH EAST DEVELOPMENT

THIS BASIN SHOWN ACCOUNTS FOR THE THIRD-WAY OFFSITE UNDEVELOPED AREA THAT WILL CONTRIBUTE SHEET FLOW TO SEDIMENT POND 05 ON INTERIM CONDITION PRIOR TO DEVELOPMENT OF FILING 4

05-F4
45.6

BIJOU CREEK

EXISTING CONTOUR

EXISTING SPOT ELEVATION

EXISTING STORM SEWER

EXISTING STORM INLET

PROPOSED CONTOUR

PROPOSED SPOT ELEVATION

PROPOSED STORM SEWER

PROPOSED STORM INLET

PROPOSED SWALE

PROPOSED CULVERT

PROPOSED RIP-RAP

EROSION CONTROL MATTING OR TRM TO BE INSTALLED ON ALL SUPERCRITICAL FLOWS

TEMPORARY SEDIMENT BASIN AND DIVERSION SWALES WILL BE USED PRIOR TO DEVELOPMENT IN THIS AREA TO CONTROL OFFSITE FLOWS FROM ENTERING THE SITE. SEE GRADING AND EROSION CONTROL PLAN FOR DETAILS

PROP. 5' TYPE R SUMP INLET (PUBLIC)

PROP. 10' TYPE R SUMP INLET (PUBLIC)

PROP. 10' TYPE R SUMP INLET (PUBLIC)

PROP. 10

Did not find basins F6-K & EX-9. Please ensure they are shown and labeled.

Basins are missing from table. Please include

Turn off basins which are not discussed within this report or scale them back and have them listed in legend as future basins or such.

FUTURE CHANNEL IMPROVEMENTS SEE CDR-20-004 BY OTHERS. TO BE INSTALLED ONCE COUNTY APPROVAL AND ASSOCIATED PERMITS ARE OBTAINED. TIMING TBD BY 404 PERMIT APPROVAL AND COUNTY APPROVAL.

100 YR FLOODPLAIN

SAND CREEK

STERLING RANCH EAST FILING NO. 2

STERLING RANCH EAST FILING 4 (SP224)

STERLING RANCH EAST FILING 1 (SF2235)

VILLAGES AT STERLING RANCH (SF2439)

FUTURE STERLING RANCH EAST FILING 6 (SF2610)

BASINS OS-2 & OS-3 REPRESENT THE ANTICIPATED FUTURE DEVELOPED FLOWS FROM THE REAR YARDS AND STERLING RANCH ROAD EXTENSION. (REFERENCE FDR FOR STERLING RANCH EAST FILING NO. 4 UNDER SF2615)

BASINS SHOWN IN THIS AREA ARE FOR FUTURE DEVELOPMENT THAT WILL CONTRIBUTE FLOWS TO POND FSD 16 AND WERE USED TO SIZE ULTIMATE CONDITION SHOWN IN THIS REPORT

TOTAL PIPE INFLOW AT DP-29 (REFERENCE FDR FOR STERLING RANCH EAST FILING NO. 4 UNDER SF2615)

TOTAL PIPE INFLOW AT DP-33 (REFERENCE FDR FOR STERLING RANCH EAST FILING NO. 4 UNDER SF2615)

TRACT H
PROPOSED PRIVATE EXTENDED DETENTION BASIN FACILITY
'POND FSD-16'
FULL SPECTRUM DETENTION

THIS FACILITY TO BE PLATTED AS TRACT H, STERLING RANCH EAST FILING NO. 6 AND CONSTRUCTED WITH WHICHEVER SUBDIVISION IS DEVELOPED FIRST (FILING 2, FILING 6 OR FILING 8)

FUTURE SUMP CONDITION TYPE R SUMP INLETS SIZED WITH FUTURE FDR

PROP. 66" RCP STORM SEWER TO BE CONSTRUCTED WITH STERLING RANCH ROAD CONSTRUCTION. (REF. STERLING RANCH EAST FILING 4 FDR - SF2615)

PROP. 48" RCP STORM OUTFALL

PROP. FOREBAY

PROP. TRICKLE CHANNEL

PROP. MICRO POOL & OUTFALL CONTROL STRUCTURE

EMERGENCY OVERFLOW SPILLWAY 170' WIDE BOTTOM, 194' WIDE TYPE L RIP RAP

FUTURE TRICKLE CHANNEL NOT PART OF THIS PLAN

FUTURE FOREBAY NOT PART OF THIS PLAN

PROP. MAINTENANCE ACCESS ROAD 6" OF CDOT CLASS 2 ROAD BASE

BOISE COURT
BOULDER CITY PLACE
MARICOPA COURT
IDAHO FALLS DRIVE
ESTES PARK PATH
SALT LAKE WAY
TRACT A
TRACT B
TRACT C
TRACT D
TRACT E
TRACT F
TRACT G
TRACT H
TRACT J
RIO RANCHO ROAD
STERLING RANCH ROAD
EXISTING BRIARGATE PARKWAY
FUTURE BRIARGATE PARKWAY
EXISTING STERLING RANCH ROAD

DEVELOPED PIPE ROUTING SUMMARY (ULTIMATE)

Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Pipe Size*
1	DP-1	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 24" RCP (PUBLIC)
2	DP-2	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 24" RCP (PUBLIC)
3	PR-1, PR-2	3.00	4.35	15.6	3.46	5.82	10	25	PROP. 36" RCP (PUBLIC)
4	DP-4 Capture	1.19	1.56	17.6	3.28	5.50	4	9	PROP. 18" RCP (PUBLIC)
5	PR-3, PR-4	4.19	5.90	18.4	3.21	5.39	13	32	PROP. 36" RCP (PUBLIC)
6	DP-5	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 18" RCP (PUBLIC)
7	DP-6	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 18" RCP (PUBLIC)
8	PR-5, PR-6, PR-7	5.22	7.42	19.6	3.12	5.23	16	39	PROP. 36" RCP (PUBLIC)
9	DP-7	0.96	1.37	14.4	3.59	6.02	3	8	PROP. 18" RCP (PUBLIC)
10	DP-8	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 18" RCP (PUBLIC)
11	PR-9, PR-10	1.59	2.20	16.9	3.34	5.61	5	12	PROP. 24" RCP (PUBLIC)
12	DP-9	0.37	0.60	10.0	4.13	6.94	1.5	4.2	PROP. 18" RCP (PUBLIC)
13	PR-11, PR-12	1.96	2.80	17.2	3.31	5.56	6	16	PROP. 24" RCP (PUBLIC)
14	DP-10 Capture	1.25	1.31	18.2	3.23	5.43	4	7	PROP. 18" RCP (PUBLIC)
15	PR-13, PR-14	3.21	4.11	18.4	3.22	5.40	10	22	PROP. 24" RCP (PUBLIC)
16	DP-11 Capture	1.96	2.41	19.5	3.13	5.25	6	13	PROP. 24" RCP (PUBLIC)
17	PR-15, PR-16	5.18	6.52	19.6	3.12	5.23	16	34	PROP. 30" RCP (PUBLIC)
18	DP-12	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 24" RCP (PUBLIC)
19	DP-13	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 24" RCP (PUBLIC)
20	PR-17, PR-18, PR-19	6.83	9.78	19.7	3.11	5.22	21	51	PROP. 36" RCP (PUBLIC)
21	PR-8, PR-20	12.05	17.19	19.9	3.10	5.20	37	89	PROP. 42" RCP (PUBLIC)
22	DP-14 Capture	0.43	0.75	10.6	4.04	6.78	1.7	5.1	PROP. 18" RCP (PUBLIC)
23	PR-22, DP-15 Capture	0.92	1.45	10.6	4.04	6.78	3.7	9.8	PROP. 18" RCP (PUBLIC)
24	**PR-22, PR-24**	**12.97**	**18.65**	**19.9**	**3.10**	**5.20**	**40**	**97**	**PROP. 48" RCP (PUBLIC)**

DEVELOPED SURFACE ROUTING SUMMARY (ULTIMATE)

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Facility/ Inlet Size*
1	Basin B	1.90	2.75	15.4	3.48	5.85	7	16	PROP. 10' TYPE R SUMP INLET
2	Basin A	1.10	1.60	10.0	4.13	6.93	5	11	PROP. 10' TYPE R SUMP INLET
3	Basin O	1.12	1.53	17.6	3.28	5.50	3.7	8.4	COUNTY STD. 6' CROSSPAN
4	DP-3, Basin P	1.19	1.64	17.6	3.28	5.50	3.9	9.0	PROP. 15' TYPE R AT-GRADE INLET
5	Basin M	0.69	1.05	16.3	3.40	5.71	2	6	PROP. 5' TYPE R SUMP INLET
6	Basin N	0.34	0.46	12.1	3.84	6.45	1	3	PROP. 5' TYPE R SUMP INLET
7	Basin D, F	0.96	1.37	14.4	3.59	6.02	3	8	PROP. 5' TYPE R SUMP INLET
8	Basin H	0.63	0.83	16.1	3.41	5.73	2	5	PROP. 5' TYPE R SUMP INLET
9	Basin G	0.37	0.60	10.0	4.13	6.94	1.5	4.2	PROP. 5' TYPE R SUMP INLET
10	Basin I	1.27	1.85	18.2	3.23	5.43	4	10	PROP. 10' TYPE R AT-GRADE INLET
11	Basin J, Flow-by from DP-10	1.96	3.21	19.5	3.13	5.25	6	17	PROP. 15' TYPE R AT-GRADE INLET
12	Basin K, Flow-by from DP-11	0.81	1.89	19.7	3.11	5.22	3	10	PROP. 10' TYPE R SUMP INLET
13	Basin L	0.85	1.37	16.7	3.36	5.64	3	8	PROP. 5' TYPE R SUMP INLET
14	Basin S, Flow-by from DP-14A	0.43	0.75	10.6	4.04	6.78	1.7	5.1	PROP. 5' TYPE R AT-GRADE INLET
15	Basin T, Z, Flow-by from DP-15A	0.49	0.70	11.3	3.95	6.63	1.9	4.7	PROP. 15' TYPE R AT-GRADE INLET
14A	OS-2	1.26	1.62	12.7	3.78	6.34	5	10	Future 15' TYPE R AT-GRADE INLET
15A	OS-3	1.28	1.51	14.2	3.60	6.04	5	9	Future 15' TYPE R AT-GRADE INLET
16	**TOTAL PIPE INFLOW (Pipe Run 24)**	**12.97**	**18.65**	**19.9**	**3.10**	**5.20**	**40**	**97**	**POND FSD-16**
17	Basin C, Q, P1-A2, Flow-by from DP-4	3.87	4.81	18.3	3.22	5.40	12.5	26.0	EXIST. 15' TYPE R AT-GRADE INLET
18	Basin R, P1-A3, Flow-by from DP-17	2.28	4.07	18.6	3.19	5.36	7.3	21.8	EXIST. 15' TYPE R AT-GRADE INLET
19	Basin U, F6-K, Flow-by from DP-18 (No Flow-by from DP-14, 15)	3.43	5.57	17.5	3.29	5.52	11.3	30.8	EXIST. 20' TYPE R SUMP INLET
20	**TOTAL POND INFLOW (Incl. Basins V, W and Pipe Inflows from SF2615)**	**78.25**	**116.56**	**30.3**	**2.47**	**4.14**	**193**	**482**	**POND FSD-16**

LEGEND

- EXISTING GROUND CONTOUR 5910
- PROPOSED FINISHED CONTOUR 5910
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- FUTURE/OFFSITE BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- BASIN IDENTIFIER / AREA IN ACRES (D / 1.41)
- DESIGN POINT (2)
- PIPE RUN (2)

SCALE: 1" = 60'

STERLING RANCH EAST
FILING NO. 8
DEVELOPED DRAINAGE MAP
(ULTIMATE CONDITION - FULL BUILD-OUT)

CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

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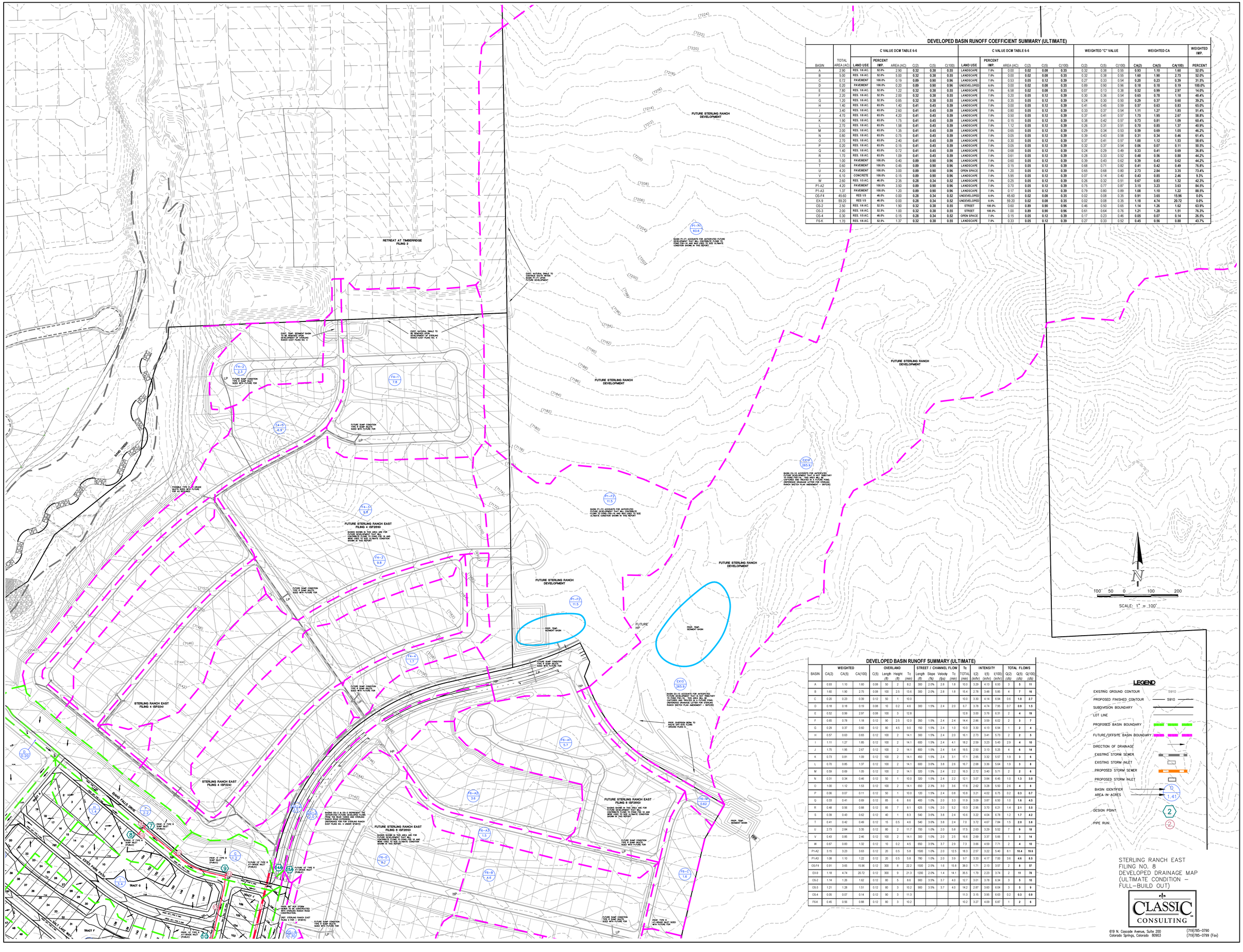
DEVELOPED BASIN RUNOFF COEFFICIENT SUMMARY (ULTIMATE)

BASIN	TOTAL AREA (AC)	C VALUE DCM TABLE 6-6 LAND USE	PERCENT IMP.	AREA (AC)	C(2)	C(5)	C(100)	C VALUE DCM TABLE 6-6 LAND USE	PERCENT IMP.	AREA (AC)	C(2)	C(5)	C(100)	WEIGHTED "C" VALUE C(2)	C(5)	C(100)	WEIGHTED CA CA(2)	CA(5)	CA(100)	WEIGHTED IMP. PERCENT
A	2.90	RES. 1/8 AC.	52.0%	2.90	0.32	0.38	0.55	LANDSCAPE	7.0%	0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.93	1.10	1.60	52.0%
B	5.00	RES. 1/8 AC.	52.0%	5.00	0.32	0.38	0.55	LANDSCAPE	7.0%	0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.60	1.90	2.75	52.0%
C	0.72	PAVEMENT	100.0%	0.19	0.89	0.90	0.96	LANDSCAPE	7.0%	0.53	0.05	0.12	0.39	0.27	0.33	0.54	0.20	0.23	0.39	31.5%
D	0.20	PAVEMENT	100.0%	0.20	0.89	0.90	0.96	UNDEVELOPED	0.0%	0.00	0.02	0.08	0.35	0.89	0.90	0.96	0.18	0.18	0.19	100.0%
E	7.80	RES. 1/8 AC.	52.0%	1.22	0.32	0.38	0.55	LANDSCAPE	7.0%	6.58	0.02	0.08	0.35	0.07	0.13	0.38	0.52	0.99	2.97	14.0%
F	2.20	RES. 1/8 AC.	52.0%	2.00	0.32	0.38	0.55	LANDSCAPE	7.0%	0.20	0.05	0.12	0.39	0.30	0.36	0.54	0.65	0.78	1.18	48.4%
G	1.20	RES. 1/8 AC.	52.0%	0.85	0.32	0.38	0.55	LANDSCAPE	7.0%	0.35	0.05	0.12	0.39	0.24	0.30	0.50	0.29	0.37	0.60	39.2%
H	1.40	RES. 1/8 AC.	65.0%	1.40	0.41	0.45	0.59	LANDSCAPE	7.0%	0.00	0.05	0.12	0.39	0.41	0.45	0.59	0.57	0.63	0.83	65.0%
I	3.40	RES. 1/8 AC.	65.0%	2.60	0.41	0.45	0.59	LANDSCAPE	7.0%	0.80	0.05	0.12	0.39	0.33	0.37	0.54	1.11	1.27	1.85	51.4%
J	4.70	RES. 1/8 AC.	65.0%	4.20	0.41	0.45	0.59	LANDSCAPE	7.0%	0.50	0.05	0.12	0.39	0.37	0.41	0.57	1.75	1.95	2.67	58.8%
K	1.90	RES. 1/8 AC.	65.0%	1.75	0.41	0.45	0.59	LANDSCAPE	7.0%	0.15	0.05	0.12	0.39	0.38	0.42	0.57	0.73	0.81	1.09	60.4%
L	2.70	RES. 1/8 AC.	65.0%	1.58	0.41	0.45	0.59	LANDSCAPE	7.0%	1.12	0.05	0.12	0.39	0.26	0.31	0.51	0.70	0.85	1.37	40.9%
M	2.00	RES. 1/8 AC.	65.0%	1.35	0.41	0.45	0.59	LANDSCAPE	7.0%	0.65	0.05	0.12	0.39	0.29	0.34	0.53	0.59	0.69	1.05	46.2%
N	0.80	RES. 1/8 AC.	65.0%	0.75	0.41	0.45	0.59	LANDSCAPE	7.0%	0.05	0.05	0.12	0.39	0.39	0.43	0.58	0.31	0.34	0.46	61.4%
O	2.70	RES. 1/8 AC.	65.0%	2.40	0.41	0.45	0.59	LANDSCAPE	7.0%	0.30	0.05	0.12	0.39	0.37	0.41	0.57	1.00	1.12	1.53	58.6%
P	0.20	RES. 1/8 AC.	65.0%	0.15	0.41	0.45	0.59	LANDSCAPE	7.0%	0.05	0.05	0.12	0.39	0.32	0.37	0.54	0.06	0.07	0.11	50.5%
Q	1.40	RES. 1/8 AC.	65.0%	0.72	0.41	0.45	0.59	LANDSCAPE	7.0%	0.68	0.05	0.12	0.39	0.24	0.29	0.49	0.33	0.41	0.69	36.8%
R	1.70	RES. 1/8 AC.	65.0%	1.09	0.41	0.45	0.59	LANDSCAPE	7.0%	0.61	0.05	0.12	0.39	0.28	0.33	0.52	0.48	0.56	0.88	44.2%
S	1.00	PAVEMENT	100.0%	0.40	0.89	0.90	0.96	LANDSCAPE	7.0%	0.60	0.05	0.12	0.39	0.39	0.43	0.62	0.39	0.43	0.62	44.2%
T	0.60	PAVEMENT	100.0%	0.45	0.89	0.90	0.96	LANDSCAPE	7.0%	0.15	0.05	0.12	0.39	0.68	0.71	0.82	0.41	0.42	0.49	76.0%
U	4.20	PAVEMENT	100.0%	3.00	0.89	0.90	0.96	OPEN SPACE	7.0%	1.20	0.05	0.12	0.39	0.65	0.68	0.80	2.73	2.84	3.35	73.4%
V	6.10	CONCRETE	100.0%	0.15	0.89	0.90	0.96	LANDSCAPE	7.0%	5.95	0.05	0.12	0.39	0.07	0.14	0.40	0.43	0.85	2.46	9.3%
W	2.60	RES. 1/3 AC.	46.0%	2.35	0.28	0.34	0.52	LANDSCAPE	7.0%	0.25	0.05	0.12	0.39	0.26	0.32	0.51	0.67	0.83	1.32	42.3%
P1-A2	4.20	PAVEMENT	100.0%	3.50	0.89	0.90	0.96	LANDSCAPE	7.0%	0.70	0.05	0.12	0.39	0.75	0.77	0.87	3.15	3.23	3.63	84.5%
P1-A3	1.37	PAVEMENT	100.0%	1.20	0.89	0.90	0.96	LANDSCAPE	7.0%	0.17	0.05	0.12	0.39	0.79	0.80	0.89	1.08	1.10	1.22	88.5%
OS-F4	45.60	RES 1/3	46.0%	0.00	0.28	0.34	0.52	UNDEVELOPED	0.0%	45.60	0.02	0.08	0.35	0.02	0.08	0.35	0.91	3.65	15.96	0.0%
EX-9	59.20	RES 1/3	46.0%	0.00	0.28	0.34	0.52	UNDEVELOPED	0.0%	59.20	0.02	0.08	0.35	0.02	0.08	0.35	1.18	4.74	20.72	0.0%
OS-2	2.50	RES. 1/8 AC.	52.0%	1.90	0.32	0.38	0.55	STREET	100.0%	0.60	0.89	0.90	0.96	0.46	0.50	0.65	1.14	1.26	1.62	63.9%
OS-3	2.00	RES. 1/8 AC.	52.0%	1.00	0.32	0.38	0.55	STREET	100.0%	1.00	0.89	0.90	0.96	0.61	0.64	0.76	1.21	1.28	1.51	76.3%
OS-4	0.30	RES. 1/8 AC.	46.0%	0.15	0.28	0.34	0.52	OPEN SPACE	7.0%	0.15	0.05	0.12	0.39	0.17	0.23	0.46	0.05	0.07	0.14	26.5%
F-5-K	1.70	RES. 1/8 AC.	52.0%	1.37	0.32	0.38	0.55	LANDSCAPE	7.0%	0.33	0.05	0.12	0.39	0.27	0.33	0.52	0.45	0.56	0.88	43.7%

DEVELOPED BASIN RUNOFF SUMMARY (ULTIMATE)

BASIN	WEIGHTED CA(2)	WEIGHTED CA(5)	WEIGHTED CA(100)	OVERLAND C(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW Length (ft)	STREET / CHANNEL FLOW Slope (%)	STREET / CHANNEL FLOW Velocity (fps)	STREET / CHANNEL FLOW Tc (min)	Tc TOTAL (min)	INTENSITY I(2) (in/hr)	INTENSITY I(5) (in/hr)	INTENSITY I(100) (in/hr)	TOTAL FLOWS Q(2) (cfs)	TOTAL FLOWS Q(5) (cfs)	TOTAL FLOWS Q(100) (cfs)
A	0.93	1.10	1.60	0.08	50	2	8.2	300	2.0%	2.8	1.8	10.0	3.26	4.13	6.03	3	5	11
B	1.60	1.90	2.75	0.08	100	2.5	13.6	300	2.0%	2.8	1.8	15.4	2.76	3.48	5.85	4	7	16
C	0.20	0.23	0.39	0.12	50	1	10.0					10.0	3.30	4.14	6.04	0.6	1.0	2.7
D	0.18	0.18	0.19	0.08	10	0.2	4.6	300	1.5%	2.4	2.0	6.7	3.76	4.74	7.95	0.7	0.9	1.5
E	0.52	0.99	2.97	0.08	100	3	12.8					12.8	3.00	3.76	6.31	2	4	19
F	0.65	0.78	1.18	0.12	50	2.5	12.0	350	1.5%	2.4	2.4	14.4	2.86	3.59	6.02	2	3	7
G	0.29	0.37	0.60	0.12	80	4.5	9.0	150	1.5%	2.4	1.0	10.0	3.30	4.13	6.94	1	2	4
H	0.57	0.63	0.83	0.12	100	2	14.1	300	1.5%	2.4	2.0	16.1	2.73	3.41	5.73	2	2	5
I	1.11	1.27	1.85	0.12	100	2	14.1	600	1.5%	2.4	4.1	18.2	2.59	3.23	5.43	2.9	4	10
J	1.75	1.95	2.67	0.12	100	2	14.1	800	1.5%	2.4	5.4	19.5	2.50	3.13	5.25	4	6	14
K	0.73	0.81	1.09	0.12	100	2	14.1	450	1.5%	2.4	3.1	17.1	2.65	3.32	5.57	1.9	3	6
L	0.70	0.85	1.37	0.12	100	2	14.1	600	3.6%	3.8	2.6	16.7	2.68	3.36	5.64	1.9	3	8
M	0.59	0.69	1.05	0.12	100	2	14.1	320	1.5%	2.4	2.2	16.3	2.72	3.40	5.71	2	2	6
N	0.31	0.34	0.46	0.12	50	1	10.0	320	1.5%	2.4	2.2	12.1	3.07	3.84	6.46	1.0	1.3	3.0
O	1.00	1.12	1.53	0.12	100	2	14.1	650	2.3%	3.0	3.6	17.6	2.62	3.28	5.50	2.6	4	8
P	0.06	0.07	0.11	0.12	50	1	10.0	120	1.5%	2.4	0.8	10.8	3.21	4.02	6.75	0.2	0.3	0.7
Q	0.33	0.41	0.69	0.12	85	6	8.6	400	1.0%	2.0	3.3	11.9	3.09	3.87	6.50	1.0	1.6	4.5
R	0.48	0.56	0.88	0.12	85	7	8.1	625	1.0%	2.0	5.2	13.3	2.95	3.70	6.21	1.4	2.1	5.5
S	0.39	0.43	0.62	0.12	40	1	8.3	540	3.6%	3.8	2.4	10.6	3.22	4.04	6.78	1.2	1.7	4.2
T	0.41	0.42	0.49	0.12	15	0.5	4.6	540	3.6%	3.8	2.4	7.0	3.72	4.67	7.84	1.5	2.0	3.8
U	2.73	2.84	3.35	0.12	80	2	11.7	700	1.0%	2.0	5.8	17.5	2.63	3.29	5.52	7	9	18
V	0.43	0.85	2.46	0.12	100	2	14.1	300	1.0%	2.0	2.5	16.6	2.69	3.37	5.66	1	3	14
W	0.67	0.83	1.32	0.12	10	0.2	4.5	650	3.5%	3.7	2.9	7.3	3.66	4.59	7.71	2	4	10
P1-A2	3.15	3.23	3.63	0.12	20	0.5	5.8	1500	1.0%	2.0	12.5	18.3	2.57	3.22	5.40	8.1	10.4	19.6
P1-A3	1.08	1.10	1.22	0.12	20	0.5	5.8	780	1.0%	2.0	3.9	9.7	3.31	4.17	7.00	3.6	4.6	8.5
OS-F4	0.91	3.65	15.96	0.12	300	9	22.2	1500	2.5%	1.6	15.8	38.0	1.71	2.13	3.57	2	8	57
EX-9	1.18	4.74	20.72	0.12	300	9	21.0	1200	2.5%	1.4	14.1	35.5	1.79	2.23	3.74	2	11	78
OS-2	1.14	1.26	1.62	0.12	80	5	8.6	900	3.5%	3.7	4.0	12.7	3.01	3.78	6.34	3	5	10
OS-3	1.21	1.28	1.51	0.12	80	3	10.2	900	3.5%	3.7	4.0	14.2	2.87	3.60	6.04	3	5	9
OS-4	0.05	0.07	0.14	0.12	90	3	11.3					11.3	3.15	3.95	6.63	0.2	0.3	0.9
F-5-K	0.45	0.56	0.88	0.12	80	3	10.2					10.2	3.27	4.09	6.87	1	2	6



LEGEND

- EXISTING GROUND CONTOUR — 5910
- PROPOSED FINISHED CONTOUR — 5910
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- FUTURE/OFFSITE BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- BASIN IDENTIFIER / AREA- IN- ACRES — D / 1.41
- DESIGN POINT — 2
- PIPE RUN — 2

STERLING RANCH EAST FILING NO. 8 DEVELOPED DRAINAGE MAP (ULTIMATE CONDITION – FULL-BUILD OUT)

CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

N:\1193\26\REPORTS\FINAL DRAINAGE REPORT\1193R Fig - Ultimate.dwg, 9/7/2026 8:54:38 AM, 1:10249

V1_Drainage Report - Preliminary.pdf Markup Summary

CDurham (17)



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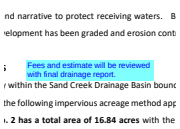
Preliminary



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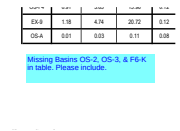
Fees and estimate will be reviewed with final drainage report.



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Missing Basins OS-2, OS-3, & F6-K in table. Please include.



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Page Label: 58
Author: CDurham
Date: 11/19/2026 11:04:38 AM
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Inlet sizes will be verified with Final Drainage Report during Final Plat submittal

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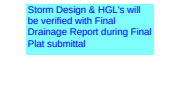

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Author: CDurham
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Storm Design & HGL's will be verified with Final Drainage Report during Final Plat submittal

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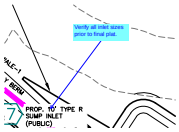
Label cross pans



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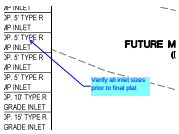
Verify all inlet sizes prior to final plat.



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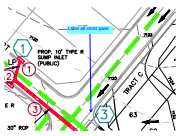
Verify all inlet sizes prior to final plat



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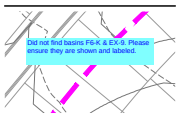
Label all cross pans



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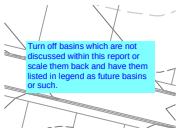
Did not find basins F6-K & EX-9. Please ensure they are shown and labeled.



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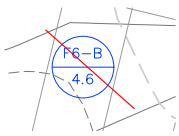
Turn off basins which are not discussed within this report or scale them back and have them listed in legend as future basins or such.



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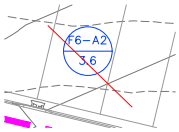

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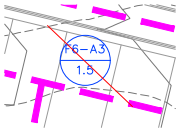

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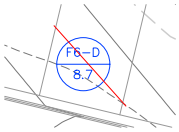

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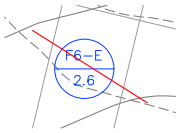

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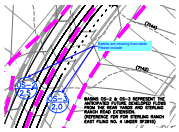

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Basins are missing from table. Please include

Glenn Reese - EPC Stormwater (3)



Subject: SW - Highlight
Page Label: 24
Author: Glenn Reese - EPC Stormwater
Date: 11/17/2026 8:38:22 AM
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Basin E is 7.82 acres and consists of the anticipated rear yards of the lots adjacent to the Sand Creek as well as Sand Creek Improvements that will continue to sheet flows directly towards the Sand Creek corridor per the approved Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East
Preliminary Plan Np. 1. At this time, these rear yards are not able to be captured and routed to a formal stormwater quality facility. However, given the minimal unconnected impervious area and sizeable receiving pervious are within this basin, the WQCV reduction = 100%



Subject: SW - Textbox with Arrow
Page Label: 24
Author: Glenn Reese - EPC Stormwater
Date: 11/17/2026 8:42:14 AM
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We have found that allowing RPAs in backyards is a disaster post-construction. Homeowners understandably do whatever they want with their yards: concentrate flows, reroute them, install xeriscaping, patios, etc. Additionally, if an RPA spans 10 yards, we would have to send out 10 inspection reports and then coordinate with and enforce on 10 different owners just for 1 PCM. So we really can't be allowing the backyard RPAs anymore. Is it possible to make a tract outside of the lots just for the RPA? That way we'll have one parcel that is owned/maintained by the Metro District for this 1 PCM.



Subject: SW - Textbox with Arrow
Page Label: 161
Author: Glenn Reese - EPC Stormwater
Date: 11/17/2026 8:42:50 AM
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See my comment on PDF page 24 above about RPAs in backyards.