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FINAL DRAINAGE REPORT
FOR
STERLING RANCH EAST
FILING NO. 5

Prepared for:
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Job No. 1183.25

PCD Project No. SF-24xx SF2430

FINAL DRAINAGE REPORT FOR
STERLING RANCH EAST FILING NO. 5

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 Drive
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 Palmer, P.E. Date
County Engineer, / ECM Administrator

Conditions:

FINAL DRAINAGE REPORT FOR
STERLING RANCH EAST FILING NO. 5

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PURPOSE

The purpose of this Final Drainage Report is to address on-site and off-site drainage patterns and identify specific drainage improvements and facilities required to minimize impacts to the adjacent properties.

GENERAL DESCRIPTION

Sterling Ranch East Filing No. 5 is 47.168-acre site located in portions sections 33 and 34, township 12 south, range 65 west of the sixth principal meridian. 160 urban residential lots are planned. The site is bounded on the north by planned public ROW (Oak Park Drive) but still unplatted, to the south by existing platted 5-ac. residential lots (Pawnee Rancheros Filing No. 1), to the east by Sterling Ranch East property (zoned for future urban development), and to the west by existing platted public ROW (Sterling Ranch Road). The site is in the upper portion of the Sand Creek East Fork Drainage Basin. Urban single family residential is proposed in this Filing that is consistent with the approved latest Sterling Ranch Sketch Plan Amendment and the approved Sterling Ranch East Filing No. 5 Preliminary Plan.

The average soil condition reflects Hydrologic Group “A” (Blakeland loamy sand and Columbine gravelly sandy loam) as determined by the “Web Soil Survey of El Paso County Area,” prepared by the Natural Resources Conservation Service (see map in Appendix). Type A soils were used to determine the pre-development conditions however, Type B soils are utilized for developed site conditions as significant import is anticipated for this development.

EXISTING DRAINAGE CONDITIONS

The Sterling Ranch East Filing No. 5 property is located in the upper portion of the Sand Creek East Fork Drainage Basin. Nearly the entire site, other than the areas disturbed by equipment storage, gravel access roads and small stock ponds for grazing cattle, is covered with native grasses with no trees or other vegetation.

This site has been previously studied in the "2018 Sterling Ranch MDDP", prepared by M&S Civil Consultants, Inc., June 2018, "MDDP Amendment for Sterling Ranch", prepared by JR Engineering, LLC, dated September 2022, "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan 1", prepared by Classic Consulting, dated January 2023 and most recently "Preliminary Drainage Report for Sterling Ranch East Filing No. 5 Preliminary Plan", prepared by Classic Consulting, approved January 2024. The latter reports analyzed the pre-development conditions for the flows off-site to the south. The entire site currently drains as sheet flow in a southerly direction within the previously studied pre-development basins EX-8, EX-9, EX-9A, EX-10 and EX-10A. These are referenced in the Appendix.

The following descriptions represent these pre-development basins for the property:
Basin EX-8 (Q_5 = 5 cfs, Q_{100} = 23 cfs) consists of approximately 32.2 acres of property that sheet flows in a southerly direction. This basin is similar to the MDDP and the north portion of the west basin line defines the westerly edge of the East Fork basin. This basin incorporates the majority of MDDP basins EX-8. The flows seem to remain as sheet flows as they exit the property along the south boundary at **Design Point 5**. These flows seem consistent with the flows determined by the MDDP at DP-5 (Q_5 = 1.7 cfs, Q_{100} = 20.5 cfs).

Basin EX-9 (Q_5 = 59 cfs, Q_{100} = 122 cfs) consists of approximately 139.3 acres of property that sheet flows in a southerly direction. This basin is similar to the original MDDP with the northern portion of the west basin line defining the westerly edge of the East Fork basin. The flows seem to remain as sheet flows as they exit the property along the south boundary at **Design Point 6**.

Basin EX-9A (Q_5 = 7 cfs, Q_{100} = 19 cfs) consists of a smaller basin of 21.8 ac. that sheet flows in a southerly direction. The original MDDP included this basin as a part of Basin EX-10A. However, a more detailed look at this area finds that the larger basin EX-10A seems to be tributary to Oto Circle east of the high point in the road while Basin EX-9A appears to sheet flow off-site along the south boundary at **Design Point 6A** west of the high point, towards the intersection of Brule Road and Oto Circle. These sheet flows seem to ultimately combine with the pre-developed flows from Basin Ex-10A further south and east of Brule Road.

Basin EX-10 (Q_5 = 105 cfs, Q_{100} = 222 cfs) consists of approximately 265.9 acres of property at the extreme top of the Sand Creek East Fork Basin. The off-site northern portion of this basin is within the Black Forest, heavily treed area. The off-site eastern portion of the basin contains existing 5 ac. lot development (Indian Wells Subd. Filing 1). The flows from this large basin sheet flow in a southerly direction across the northern portion of the Sterling Ranch property and enter Basin EX-10A.

Basin EX-10A (Q_5 = 46 cfs, Q_{100} = 103 cfs) consists of approximately 153.5 acres of property that sheet flows in a southerly direction through the Sterling Ranch property. The combined flows from both basins EX-10 and EX-10A seem to remain as sheet flow traveling in a southerly direction towards **Design Point 7 (Q_5 = 110 cfs, Q_{100} = 249 cfs)** At this location the flows exit the property along the south boundary. Again, these flows are fairly consistent with the flows determined by the original MDDP at DP-7 (Q_5 = 57.1 cfs, Q_{100} = 277.9 cfs).

PROPOSED DRAINAGE CONDITIONS

As described in the General Description of the report, this proposed development contains 47.168 acres of urban residential lots. The recent PUD development (*Villages at Sterling Ranch East PUDSP - PCD No. PUDSP226)* currently under review, is due north of the proposed development and is anticipated to be directly tributary to the drainage facilities designed herein. Thus, this report accounts for that development and remains consistent with the recently approved MDDP and Preliminary Drainage Report for Sterling Ranch East Filing No. 5 Preliminary Plan.

Development of these urban lots proposed will consist of overlot grading and utility installation for the planned roadways and lots. Per the El Paso County ECM, Section I.7.1.B, all urban lots are required to provide Water Quality Capture Volume (WQCV). Thus, the proposed FSD facility within this development will provide WQCV along with an Excess Urban Runoff Volume (EURV) in the lower portion of the facility storage volume with an outlet control device. Frequent and infrequent inflows are released at rates approximating undeveloped conditions. This concept provides some mitigation of increased runoff volume by releasing a portion of the increased runoff at a low rate over an extended period of time, up to 72 hours. This means that frequent storms, smaller than the 2-year event, will be reduced to very low flows near or below the sediment carrying threshold value for downstream drainage ways. Also, by incorporating an outlet structure that limits the 100-year runoff to the undeveloped condition rate, the discharge hydrograph for storms between the 2 year and the 100-year event will approximate the hydrograph for the undeveloped conditions and will help effectively mitigate the effects of development. As reasonably possible, WQCV will be provided for all new roads and urban lots.

This report will describe each developed basin tributary to the proposed FSD-14B facility. This final design will include sizing of all inlets, storm systems and FSD facilities including all required appurtenances.

The following developed basin descriptions will start at the north end of the project and move south and describe how this development proposes to handle both the off-site and on-site drainage conditions both from an interim standpoint based on adjacent construction phasing and the ultimate buildout scenario:

Off-site Basin P4-B (Q_5 = 48 cfs, Q_{100} = 106 cfs) represents the total developed flows from The Villages at Sterling Ranch East development (32.2 ac.) tributary to the proposed 48" RCP public storm system stubbed into Oak Park Dr as **Pipe Run 1**. (Reference Preliminary Drainage Report for Villages at Sterling Ranch Filing No. 1, prepared by Classic Consulting – PUDSP226) The development of this property represents the ultimate developed flow condition.

Design Point 1 (Q_5 = 6 cfs, Q_{100} = 12 cfs) represents developed flows from Basin OS-1 (2.6 ac.) along the east side of the Sterling Ranch Road corridor that are tributary to an existing 15' At-Grade Type R Inlet as designed and constructed within the "Sterling Ranch Road & Briargate Parkway Segment 2 Street Plans", prepared by JR Engineering and the approved "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", also prepared by JR Engineering (both found under PCD No. CDR-221). Within that report, this facility is at Design Point 7 (Q_5 = 5.2 cfs, Q_{100} = 10.6 cfs). This facility captures (Q_5 = 6.0 cfs, Q_{100} = 10.4 cfs) with a flow-by of (Q_5 = 0.0 cfs, Q_{100} = 1.6 cfs) which is consistent with the JR Engineering design. (See Appendix for inlet calculation)

Design Point 2 (Q_5 = 1 cfs, Q_{100} = 4 cfs) represents developed flows from Basin OS-2 (0.68 ac.) and 100-yr. Flow-by from DP-1 along the east side of the Sterling Ranch Road corridor that cross the existing crosspan at Newport Beach Dr. These flows then continue further downstream as curb and gutter flows towards DP-21.

Design Point 3 (Q_5 = 4 cfs, Q_{100} = 10 cfs) represents developed flows from Basins OS-3 (025 ac.), A (0.70 ac.) and B (2.2 ac.) that are completely captured by a proposed 10' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 2). **Design Point 4 (Q_5 = 0.9 cfs, Q_{100} = 2.1 cfs)** represents developed flows from Basin C (0.61 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 3). **Pipe Run 4 (Q_5 = 5 cfs, Q_{100} = 12 cfs)** is a proposed 24" RCP that conveys the total collected developed flows from this sump condition. The emergency overflow path is a max. ponding of 12" for the major storm event and then around the corner down St. Louis St. These collected flows then combine with the upstream flows from Pipe Run 1. **Pipe Run 5 (Q_5 = 52 cfs, Q_{100} = 115 cfs)** is a proposed 48" RCP that represents these combined flows and conveys them further downstream.

Design Point 5 (Q_5 = 4 cfs, Q_{100} = 10 cfs) represents developed flows from Basin D (3.7 ac.) that are tributary to a proposed 10' At-Grade Type R Inlet. This facility captures (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). The flow-by enters Basin O. The captured developed flows are conveyed via a proposed 18" RCP (Pipe Run 6) east down Biloxi Place.

Design Point 6 (Q_5 = 5 cfs, Q_{100} = 13 cfs) represents developed flows from Basins E (0.9 ac.) and F (3.6 ac.) that are completely captured by a proposed 10' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 7). **Design Point 7 (Q_5 = 1.4 cfs, Q_{100} = 3.5 cfs)** represents developed flows from Basin G (0.99 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 8). The emergency overflow path is a max. ponding of 12" for the major storm event and then south within the open space Tract D. **Pipe Run 9 (Q_5 = 10 cfs, Q_{100} = 22 cfs)** is a proposed 30" RCP that conveys the total developed flows from this sump condition along with the collected flows from Pipe Run 6 further downstream within Tract D.

Design Point 8 (Q_5 = 5 cfs, Q_{100} = 11 cfs) represents developed flows from Basin H (3.8 ac.) that are completely captured by a proposed 10' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 10). **Design Point 9 (Q_5 = 2 cfs, Q_{100} = 5 cfs)** represents developed flows from Basin I (1.4 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 11). The emergency overflow path is a max. ponding of 12" for the major storm event and then south within the open space Tract C. **Pipe Run 12 (Q_5 = 15 cfs, Q_{100} = 35 cfs)** is a proposed 30" RCP that conveys the total developed flows from this sump condition and Pipe Run 9 further downstream within Tract C.

Design Point 10 (Q_5 = 3 cfs, Q_{100} = 8 cfs) represents developed flows from Basin J (2.3 ac.) that are completely captured by a proposed 10' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 16). **Design Point 11 (Q_5 = 1.3 cfs, Q_{100} = 3.3 cfs)** represents developed flows from Basin L (1.1 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 17). The emergency overflow path is a max. ponding of 12" for the major storm event and then south around the corner within Lake Tahoe Dr. **Pipe Run 18 (Q_5 = 55 cfs, Q_{100} = 124 cfs)** is a proposed 54" RCP that conveys the total developed flows from this sump condition and Pipe Run 5 further downstream within St. Louis St.

Design Point 12 (Q_5 = 2 cfs, Q_{100} = 6 cfs) represents developed flows from Basin M (1.8 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 19). **Design Point 13 (Q_5 = 2 cfs, Q_{100} = 4 cfs)** represents developed flows from Basin N (1.3 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 20). The emergency overflow path is a max. ponding of 12" for the major storm event and then west over the highpoint within Lake Tahoe Dr. **Pipe Run 21 (Q_5 = 4 cfs, Q_{100} = 10 cfs)** is a proposed 24" RCP that conveys the total developed flows from this sump condition. **Pipe Run 22 (Q_5 = 18 cfs, Q_{100} = 43 cfs)** is a proposed 36" RCP that conveys the total developed flows from Pipe Runs 12 and 21 further south within Tract B.

Design Point 14 (Q_5 = 2 cfs, Q_{100} = 7 cfs) represents developed flows from Basin O (1.6 ac.) and Flow-by from DP-5 that flow directly into Basin P via std. 6' crosspan. **Design Point 15 (Q_5 = 5 cfs, Q_{100} = 16 cfs)** represents developed flows from Basin P (3.3 ac.) and DP-14 that are completely captured by an existing 10' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 13). *(Reference Final Drainage Report for Sterling Ranch East Filing No. 3, as this roadway – Lake Tahoe Dr. is designed with this development. Construction of the roadway will take place with whichever subdivision develops first).* **Design Point 16 (Q_5 = 2 cfs, Q_{100} = 6 cfs)** represents developed flows from Basins OS-4 (1.4 ac.) and R (0.44 ac.) that are completely captured by an existing 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 14). The emergency overflow path is a max. ponding of 12" for the major storm event and then south around the corner down Bentonville Way. **Pipe Run 15 (Q_5 = 7 cfs, Q_{100} = 20 cfs)** is a proposed 30" RCP that conveys the total developed flows from this existing sump condition further downstream within Bentonville Way and the adjacent Sterling Ranch East Filing No. 3 subdivision. These developed flows are tributary to the planned Pond FSD 11-B and consistent with the "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1", prepared by Classic Consulting, approved June 2023. The Sterling Ranch East Filing No. 3 subdivision including Pond FSD 11-B are anticipated to be constructed prior to this development. If phasing development phasing/timing changes, The Final Drainage Report will describe and include final design of this facility.

Design Point 17 (Q_5 = 1.3 cfs, Q_{100} = 3.3 cfs) represents developed flows from Basin S (1.1 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 24). **Design Point 18 (Q_5 = 2 cfs, Q_{100} = 4 cfs)** represents developed flows from Basin T (1.4 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with an 18" RCP outfall (Pipe Run 25). The emergency overflow path is a max. ponding of 12" for the major storm event and then south directly into the proposed Pond FSD 14-B. **Pipe Run 26 (Q_5 = 3 cfs, Q_{100} = 7 cfs)** is a proposed 24" RCP that conveys the total developed flows from this sump condition. **Pipe Run 23 (Q_5 = 70 cfs, Q_{100} = 160 cfs)** is a proposed 60" RCP that conveys the total developed flows from Pipe Runs 18 and 22 further south within Tract B. **Pipe Run 27 (Q_5 = 73 cfs, Q_{100} = 166 cfs)** is a proposed 60" RCP that conveys the total developed flows from Pipe Runs 23 and 26 directly into the proposed Pond FSD 14-B at the proposed Impact Structure and concrete forebay.

Design Point 19 (Q_5 = 4 cfs, Q_{100} = 11 cfs) represents developed flows from Basins U (2.2 ac.) and V (1.4 ac.) that are completely captured by a proposed 10' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 28). **Design Point 20 (Q_5 = 0.8 cfs, Q_{100} = 1.4 cfs)** represents developed flows from Basin W (0.19 ac.) that are completely captured by a proposed 5' Type R Sump Inlet with a 24" RCP outfall (Pipe Run 29). The emergency overflow path is a max. ponding of 12" for the major storm event and then south directly into the proposed Pond FSD 14-B. **Pipe Run 29 (Q_5 = 5 cfs, Q_{100} = 12 cfs)** is a proposed 24" RCP that conveys the total developed flows from this sump condition directly into the proposed Pond FSD 14-B at the proposed concrete forebay.

Design Point 21 (Q_5 = 3 cfs, Q_{100} = 7 cfs) represents developed flows from Basin OS-5 (0.87 ac.) that are tributary to the existing 10' Type R At-Grade Inlet as designed and constructed within the "Sterling Ranch Road & Briargate Parkway Segment 2 Street Plans", prepared by JR Engineering and the approved "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", also prepared by JR Engineering (both found under PCD No. CDR-221). Within that report, this facility is at Design Point 10 (Q_5 = 3.3 cfs, Q_{100} = 6.9 cfs). This facility captures

(Q_5 = 3.0 cfs, Q_{100} = 5.8 cfs) with a flow-by of (Q_5 = 0.0 cfs, Q_{100} = 1.2 cfs) which is consistent with the JR Engineering design. Thus, the planned downstream facilities have accounted for these flows. (See Appendix for inlet calculation)

Basin AA (Q_5 = 3 cfs, Q_{100} = 8 cfs) is a 2.1 ac. basin consisting of develops flows from the rear yards of lots 1-23 that sheet flow off-site. **Basin OS-7 (Q_5 = 2 cfs, Q_{100} = 12 cfs)** is a 7.2 ac. basin consisting of undeveloped property owned by Classic SRJ Land, LLC that sheet flows in a southerly direction. Ultimately, these flows will be captured in a future downstream storm system and routed to a future permanent FSD facility within the Sterling Ranch property. In the interim, these flows will sheet flow in a southerly direction across this future development property and be captured in a temporary sediment basin at the east end of Lake Tahoe Dr.
(See Appendix for facility sizing)

Likewise, **Basin Z (Q_5 = 2 cfs, Q_{100} = 4 cfs)** is a 1.0 ac. basin consisting of develops flows from the rear yards of lots 24-34 that sheet flow off-site. **Basin OS-6 (Q_5 = 1 cfs, Q_{100} = 9 cfs)** is a 5.3 ac. basin consisting of undeveloped property owned by Classic SRJ Land, LLC that sheet flows in a southerly direction. Ultimately, these flows will be captured in a future downstream storm system and routed to a future permanent FSD facility within the Sterling Ranch property. In the interim, these flows will sheet flow in a southerly direction across this future development property and be captured in a temporary sediment basin due east of Pond FSD-14B.
(See Appendix for facility sizing)

Basin X (Q_5 = 2 cfs, Q_{100} = 11 cfs) is a 6.0 ac. basin consisting of develops flows from the south park and the actual pond area itself that sheet flow directly into the pond. This area is accounted for in the overall pond design.

Basin Y1 (Q_5 = 2 cfs, Q_{100} = 8 cfs) is a 1.9 ac. basin consisting of the back side of the pond embankment and the buffer corridor/trail/existing easements along the south boundary. This area will continue to sheet flow in a southerly direction off-site. The proposed Pond FSD-14B outlet pipe also daylights within this basin and directly into the existing Mohawk Road public ROW. As previously described in the existing conditions section, this pre-development location is **Design Point 6 (Q_5 = 59 cfs, Q_{100} = 122 cfs).** As described below, the designed pond release equals **(Q_5 = 2.4 cfs, Q_{100} = 43.4 cfs).** This flow combined with the Basin Y1 sheet flows is consistent with the previous reports and less than the pre-development flows values. **Basin Y2 (Q_5 = 0.9 cfs, Q_{100} = 5.2 cfs)** is also a 1.7 ac. basin consisting of the back side of the pond embankment and the buffer corridor/trail/existing easements along the south boundary. This area will continue to sheet flow in a southerly direction off-site. As previously described in the existing conditions section, this pre-development location is **Design Point 6A (Q_5 = 7 cfs, Q_{100} = 19 cfs).** This flow release remains consistent with the previous reports and less than the pre-development flows values. The Preliminary Drainage Report showed a concrete level spreader at the outfall of this pond. After further evaluation of the current immediate downstream corridor, existing gravel access and proposed trail along south boundary, it was determined that A more appropriate design for the pond outlet was to connect the outfall pipe directly into the Mohawk Road easterly sideroad ditch. This along with some public roadway ditch improvements including two culvert replacements will provide a better design to handle the proposed pond release.

Did not see a discussion on Basins K or R. Please provide

Remove reference to Pond FSD-11B or include statement for what project & number it is part of.

EDARP File # CDR221

DETENTION / STORMWATER QUALITY FACILITES

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. These features include but are not limited to two Ponds (FSD-11B and FSD-14B), temporary sediment basin and runoff reduction RPA's (All owned and maintained by Sterling Ranch Metro District). All of these permanent BMPs have final design data provided within. All urban areas require detention and will provide a Water Quality Capture Volume (WQCV) and Excess Urban Runoff Volume (EURV) in the lower portion of the facility storage volume that will release the more frequent storms at a slower rate to help minimize the effects of development of the property. The proposed facilities are to be private facilities with ownership and maintenance by the Sterling Ranch Metropolitan

Engineer must confirm in the Drainage Report that the existing offsite or onsite PBMPs that the site is tributary to are functioning as intended.

District. After completion of construction and upon the Board of County Commissioners acceptance, all the drainage facilities within the public Right-of-Way will be owned and maintained by El Paso County.

The following represents the proposed **Pond FSD 14-B design**:
(See MHFD-Detention Design Sheets in Appendix)

Total Tributary acreage: 68.07 Ac.

1.26 Ac.-ft. WQCV required

2.82 Ac.-ft. EURV required

2.81 Ac.-ft. 100-yr. Storage

6.89 Ac.-ft. Total

Total In-flow: **Q_5 = 78 cfs, Q_{100} = 185 cfs**

Pond Design Release: **Q_5 = 2.4 cfs, Q_{100} = 43.4 cfs**

(Ownership and maintenance by the Sterling Ranch Metro District)

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 City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014. Individual on-site developed basin design used for detention/SWQ basin sizing, inlet sizing and storm system routing was calculated using the Rational Method. Runoff Coefficients are based on the imperviousness of the particular land use and the hydrologic soil type in accordance with Table 6-6. The average rainfall intensity, by recurrence interval found in the Intensity-Duration-Frequency (IDF) curves in Figure 6-5. (See Appendix)

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.

This site adheres to this **Four Step Process** as follows:

1. **Employ Runoff Reduction Practices:** All proposed lot impervious area (roof tops, patios, etc.) will sheet flow across landscaped portions of front and rear yards and through 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.

Reference the Water Quality Treatment Plan Map in the Appendix for the following calculations:

add a note that clarifies that this pond was built with Homestead North at Sterling Ranch F1 via EDARP filing # CDR221

Area treated in proposed permanent Pond FSD-14B (Area includes 32.2 ac. from Villages site)	68.07 ac.
Area treated in proposed permanent Pond FSD-11B	10.89 ac.
Area treated in temporary sediment basin now and and future permanent FSD Pond ultimately (Basin AA and Z – Rear yards)	3.10 ac.
Area of runoff reduction water quality treatment (Basins Y1 - Buffer, Y2 – Buffer) Reference Runoff Reduction Calculations in Appendix for these areas)	3.60 ac.
Filing No. 5 anticipated total platted area	**47.17 ac.**

see my comment on the Water Quality Treatment Plan Map regarding the RPAs. If you agree, revise all mention of the RPAs throughout the report to SPAs. I have highlighted most of them for you.

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 and eventually public storm systems. These collected flows are then

CLASSIC CONSULTING ENGINEERS & SURVEYORS routed directly to the proposed extended detention basins (full-spectrum facilities). Where developed flows are not able to be routed to public street, sheet flows will travel across landscaped rear yards and then through undeveloped property prior to being released off-site.

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. For the basins that are not able to be captured and routed to one of the permanent EDB's or temporary sediment basins, Runoff Reduction practices are required and provided in the buffer area of the open space tract within these specific basins. Reference Runoff Reduction Calculations in Appendix for these areas that show a 100% WQCV Reduction and meets El Paso County standards.

4. **Consider need for Industrial and Commercial BMPs**: No industrial or commercial uses are proposed within this development. However, a site-specific storm water quality and erosion control plan and narrative along with the grading and erosion control plan will be submitted with the future Final Plat submittal. Details such as site-specific sediment and erosion control construction BMP's as well as temporary and permanent BMP's will be 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.

FLOODPLAIN STATEMENT

No portion of this site are located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C0533G with effective date of December 7, 2018 (See Appendix).

DRAINAGE AND BRIDGE FEES

This site lies entirely within the Sand Creek Drainage Basin boundaries.

The following are anticipated drainage and bridge fees using the following impervious acreage method approved by El Paso County.

Sterling Ranch East Filing No. 5 has a total area of 47.17 acres with the following different land uses proposed:

10.53 Ac.	Park/Open Space/Trail Tracts (Tracts A-I)
36.64 Ac.	Urban Lots (Avg. Lot Size = 7,533 SF)
47.17 Ac.	**Total**

The percent imperviousness for this subdivision is calculated as follows:

Fees for Park/Open Space/Trail Tracts

(Per El Paso County Percent Impervious Chart: 7**%**)

10.53 Ac. x 7% = **0.74 Impervious Ac.**

Fees for 0.17 Ac. lots (Avg. Lot Size of 7,533 SF)

(Per El Paso County Percent Impervious Chart: 48**%**)

36.64 Ac. x 48% = **17.59 Impervious Ac.**

Total Impervious Acreage: **18.33 Imp. Ac.** (Drainage Fees)

Total Impervious Acreage: **18.33 Imp. Ac.** (Bridge Fees)

However, per the ECM Appendix L 3.10.4.a, this development requests a reduction of drainage fees based on proposed construction of the on-site full-spectrum detention/stormwater quality facility (Pond FSD-11B) as shown in the MDDP and PDR. This request seems to meet all 6 criteria within the above section of the ECM (See below):

Previous paragraph stated pond FSD-11B. Clarify which pond

Per staffs understanding, Downstream improvements which were identified as part of the DBPS (Pond 3), have been completed, thereby DS regional facility is in place.

1. No downstream regional system in place yet
2. Pond FSD-14B is less than 15-ac.ft in volume
3. This facility is NOT a part of the regional plan
4. The outlet is designed to release as full spectrum
5. El Paso County approves the Pond design
6. Sterling Ranch Metro. District will own and maintain the proposed pond

This reduction is based on the Engineers Estimate found in the FAE and described below:

CONSTRUCTION COST OPINION

Private Full-Spectrum Detention Facility (FSD-14B)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	Western Forebay Structure	1 EA	$ 120,000.00	$ 120,000.00
2.	Eastern Forebay Structure	1 EA	$ 40,000.00	$ 40,000.00
3.	Concrete Outlet Structure	1 EA	$ 50,000.00	$ 50,000.00
4.	Concrete Trickle Channel	640 LF	$ 70.00/LF	$ 44,800.00
5.	Handrail	140 LF	$ 220.00/LF	$ 30,800.00
6.	Rip-Rap Spillway	550 CY	$ 76/CY	$ 41,800.00
7.	Outlet pipe (30" RCP)	236 LF	$ 123/CY	$ 29,028.00
8.	Type "S" Saddle Headwall	1 EA	$ 6,000.00	$ 6,000.00
9.	Rip-Rap Dissipater	14 CY	$ 76/CY	$ 1,064.00
SUB-TOTAL				$ 363,492.00
10% ENGINEERING				$ 36,349.20
5% CONTINGENCY				$ 18,174.60
TOTAL				**$ 418,015.80**

CLASSIC CONSULTING ENGINEERS & SURVEYORS

The following calculations are based on the 2024 Sand Creek drainage/bridge fees:

ESTIMATED FEE TOTALS:

Bridge Fees

\$ 10,484.00 x 18.33 Impervious Ac.	=	**<u>\$ 192,171.72</u>**

Drainage Fees

\$ 25,632.00 x 18.33 Impervious Ac.	=	\$ 469,834.56
(50% Reduction for FSD-14B construction costs)		\$ (209,007.90)
		<u>\$ 260,826.66</u>

If using credits for drainage and bridge fees. Please include that statement and an updated copy of "Pre-credits" table, with the list of all the projects which have currently used the credits to cover fees.

SUMMARY

The proposed Sterling Ranch East Filing No. 5 is within the Sand Creek Drainage Basin. Recommendations are made within this report concerning necessary improvements that will be required as a result of development of this property. The points of storm water release from the proposed site are required to be at or below the calculated historic flow quantities. The development of the proposed site does not significantly impact any downstream facility or property to an extent greater than that which currently exists in the pre-development conditions. All drainage facilities within this report were sized according to the Drainage Criteria Manuals and the full-spectrum storm water quality requirements.

PREPARED BY:

Classic Consulting Engineers & Surveyors, LLC

Marc A. Whorton, P.E.
Project Manager

maw/118325/FDR Fil. 5.doc

REFERENCES

1. City of Colorado Springs/County of El Paso 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 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 Drainage Basin Planning Study," Kiowa Engineering Corporation, dated March 1996.

4. "2018 Sterling Ranch MDDP", M&S Civil 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, approved September, 2022.

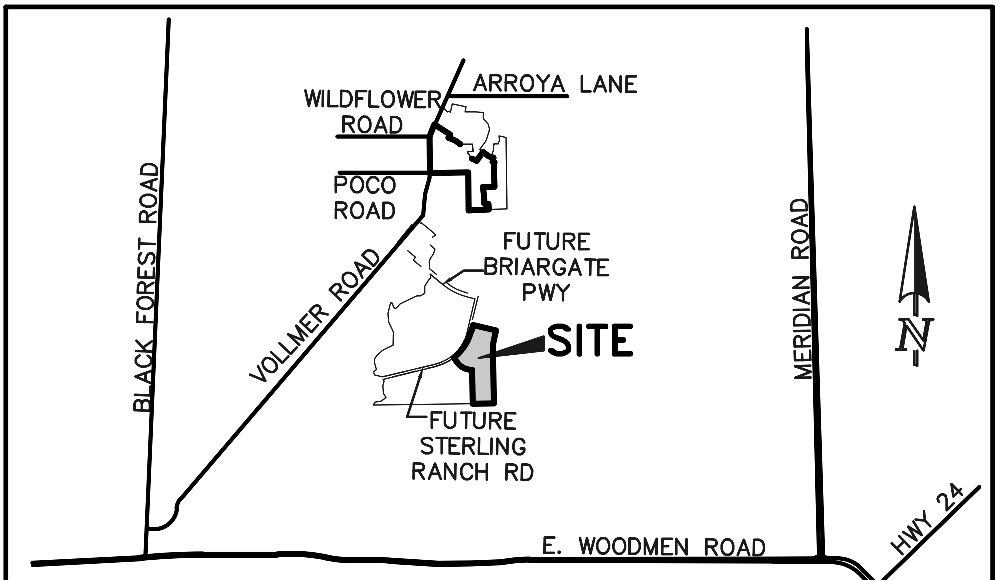
7. "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1", Classic Consulting, January 2023

8. "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", JR Engineering, July 2023

9. "Preliminary Drainage Report for Sterling Ranch East Filing No. 5", Classic Consulting, January 2024.

APPENDIX

VICINITY MAP



VICINITY MAP
N.T.S.

SOILS MAP (S.C.S SURVEY)

Soil Map—El Paso County Area, Colorado

Map Scale: 1:5,140 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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: Aug 19, 2018—May 26, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	41.3	30.0%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	92.3	67.0%
71	Pring coarse sandy loam, 3 to 8 percent slopes	4.2	3.0%
Totals for Area of Interest		**137.8**	**100.0%**

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Blakeland

Setting

Landform: Flats, hills
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

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

Properties and qualities

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

Interpretive groups

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

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

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

Data Source Information

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

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Fans, fan terraces, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

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

Data Source Information

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

F.E.M.A. MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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

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

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

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

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

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

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

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

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

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

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

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

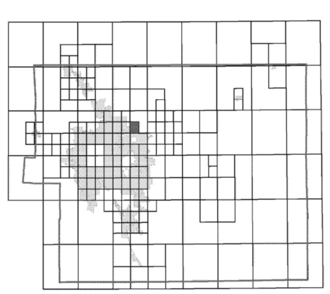
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this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

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

El Paso County Vertical Datum Offset Table

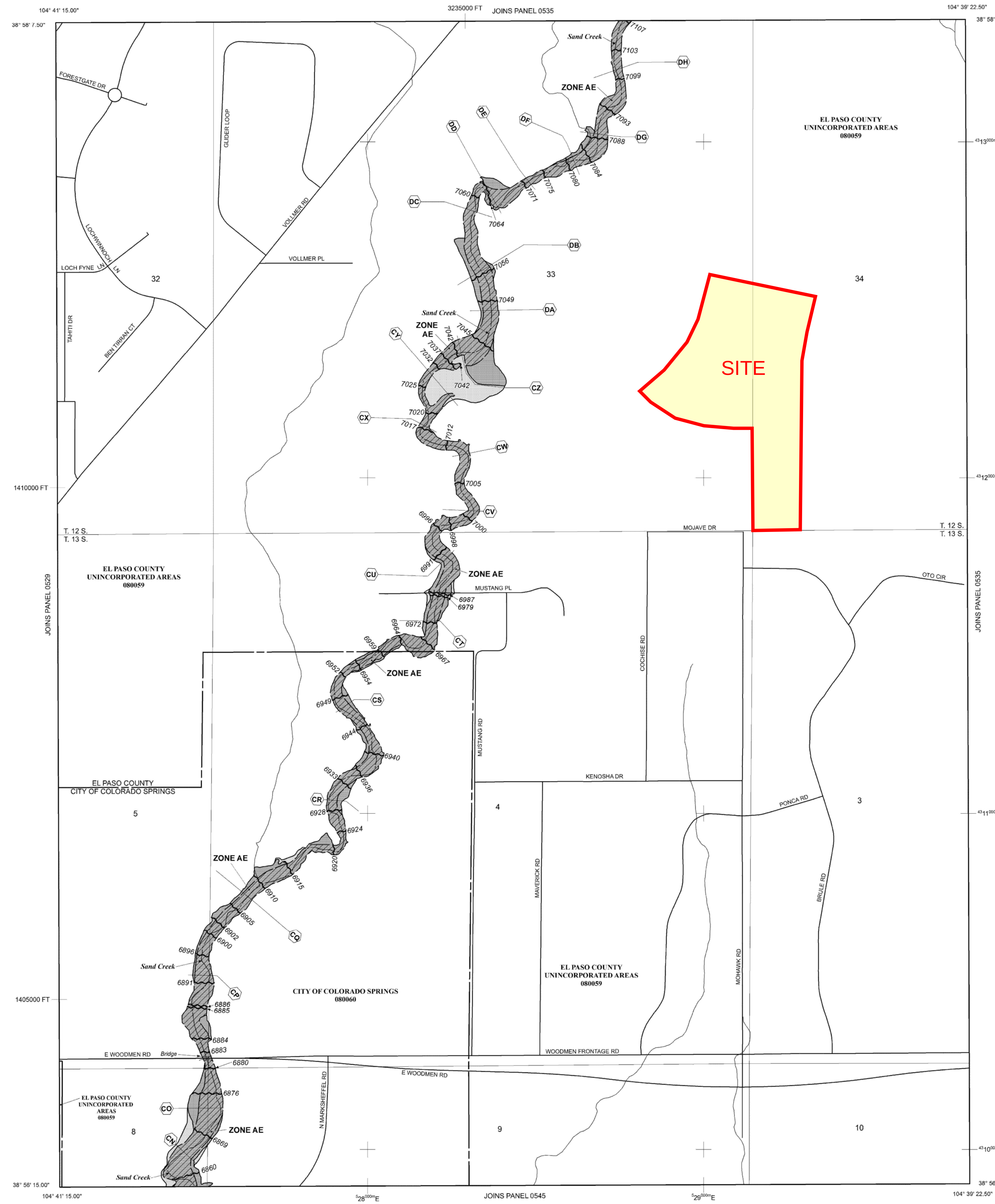
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



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

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



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST, AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

Floodplain boundary

Floodway boundary

Zone D Boundary

CBRS and OPA boundary

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

~~ 513 ~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - 23	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0533G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 533 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0533	G
EL PASO COUNTY	080059	0533	G

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

MAP NUMBER
08041C0533G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

HYDROLOGIC AND HYDRAULIC CALCULATIONS

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

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

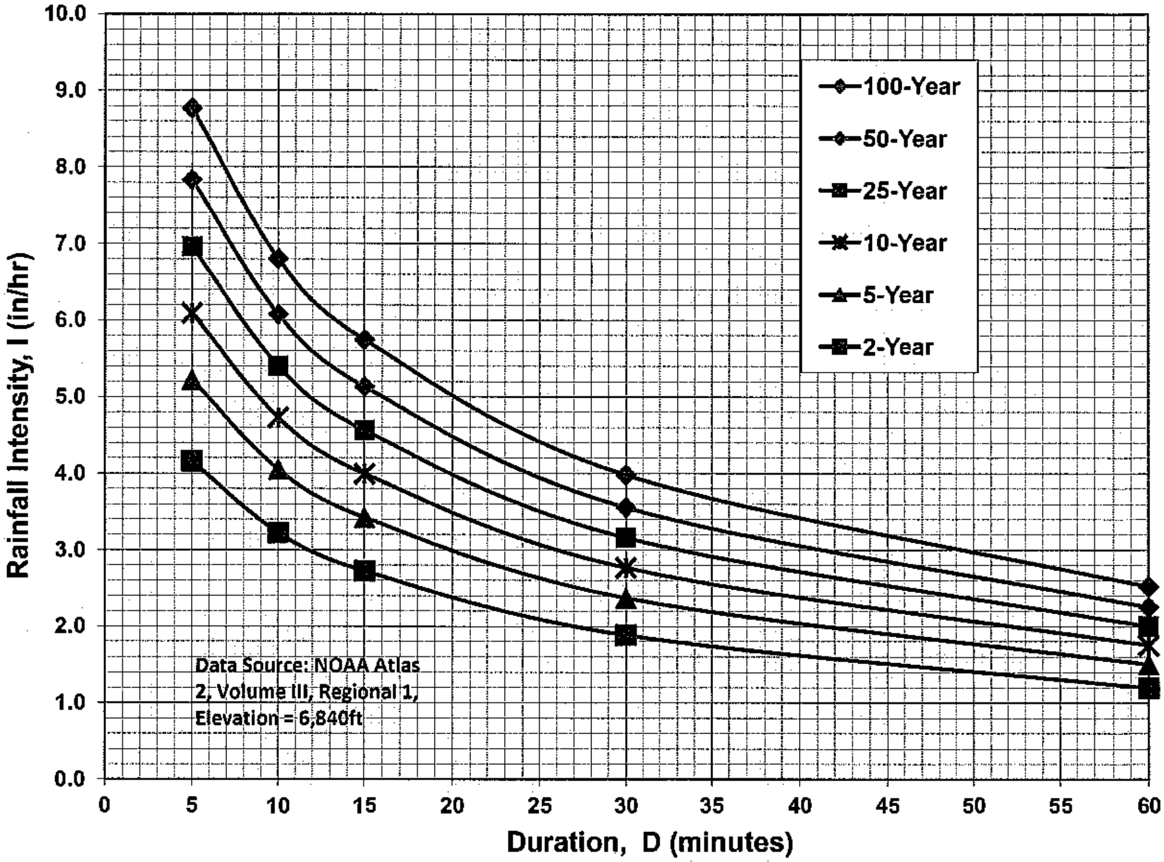
One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration 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

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

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

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

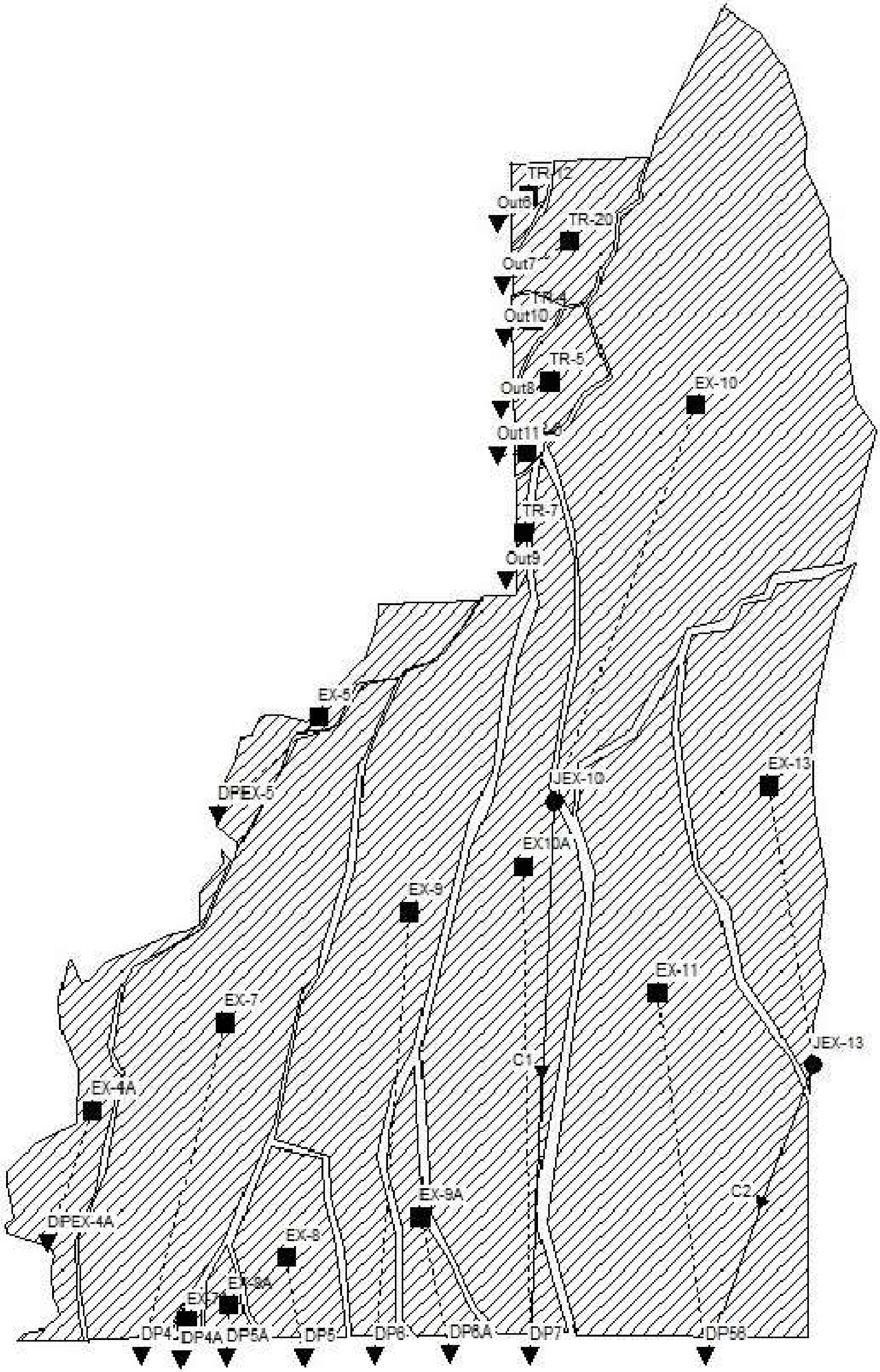
$I_{10} = -1.75 \ln(D) + 8.847$

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

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

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

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

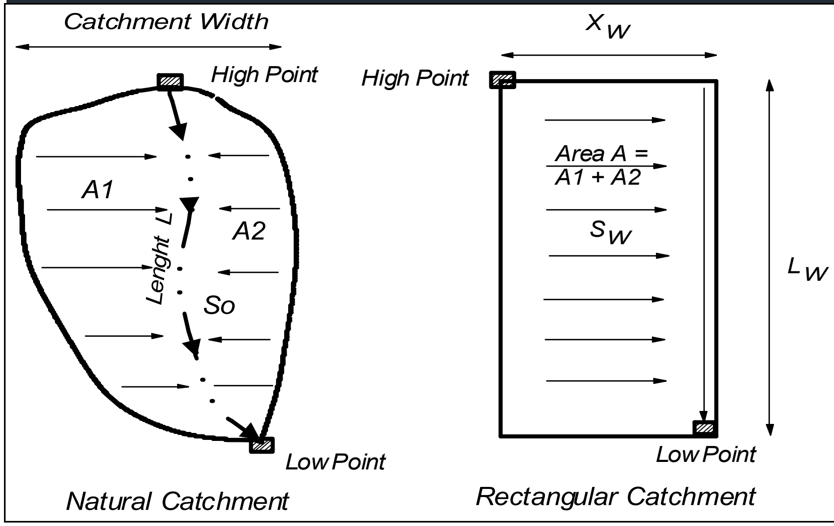
STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

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	$X=A/L^2$	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

JOB NAME: *STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER: *1183.25*
DATE: *10/17/24*
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(5)	C(100)	**LAND USE**	**PERCENT IMPERVIOUS**	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**	**WEIGHTED % IMPERVIOUS**
A	0.70	RES 1/6 AC.	52.5%	0.70	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.26**	**0.38**	52.5%
B	2.20	RES 1/6 AC.	52.5%	2.20	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.83**	**1.20**	52.5%
C	0.61	RES 1/6 AC.	52.5%	0.61	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.23**	**0.33**	52.5%
D	3.70	RES 1/6 AC.	52.5%	3.70	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**1.39**	**2.02**	52.5%
E	0.90	RES 1/6 AC.	52.5%	0.90	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.34**	**0.49**	52.5%
F	3.60	RES 1/6 AC.	52.5%	2.66	0.38	0.55	PARK	7.0%	0.94	0.12	0.39	0.31	0.50	**1.11**	**1.82**	40.6%
G	0.99	RES 1/6 AC.	52.5%	0.94	0.38	0.55	OPEN SPACE	7.0%	0.05	0.12	0.39	0.36	0.54	**0.36**	**0.53**	50.2%
H	3.80	RES 1/6 AC.	52.5%	3.63	0.38	0.55	OPEN SPACE	7.0%	0.17	0.12	0.39	0.36	0.54	**1.38**	**2.04**	50.5%
I	1.40	RES 1/6 AC.	52.5%	1.35	0.38	0.55	OPEN SPACE	7.0%	0.05	0.08	0.35	0.36	0.54	**0.51**	**0.75**	50.9%
J	2.30	RES 1/6 AC.	52.5%	2.30	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.86**	**1.25**	52.5%
K	Not Used															
L	1.10	RES 1/6 AC.	52.5%	1.10	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.41**	**0.60**	52.5%
M	1.80	RES 1/6 AC.	52.5%	1.63	0.38	0.55	OPEN SPACE	7.0%	0.17	0.12	0.39	0.35	0.53	**0.63**	**0.95**	48.2%
N	1.30	RES 1/6 AC.	52.5%	1.15	0.38	0.55	PARK	7.0%	0.15	0.12	0.39	0.35	0.53	**0.45**	**0.69**	47.3%
O	1.60	RES 1/6 AC.	52.5%	1.60	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.60**	**0.87**	52.5%
P	3.30	RES 1/6 AC.	52.5%	3.30	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**1.24**	**1.80**	52.5%
Q	Not Used															
R	0.44	STREET	100%	0.07	0.90	0.96	PARK	7.0%	0.37	0.12	0.39	0.24	0.48	**0.11**	**0.21**	21.8%
S	1.10	RES 1/6 AC.	52.5%	1.10	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.41**	**0.60**	52.5%
T	1.40	RES 1/6 AC.	52.5%	1.40	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.53**	**0.76**	52.5%
U	2.20	RES 1/6 AC.	52.5%	2.20	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.83**	**1.20**	52.5%
V	1.40	RES 1/6 AC.	52.5%	1.40	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.53**	**0.76**	52.5%
W	0.19	STREET	100%	0.16	0.90	0.96	OPEN SPACE	7.0%	0.03	0.12	0.39	0.78	0.87	**0.15**	**0.17**	85.3%
X	6.00	PARK	7.0%	6.00	0.12	0.39			0.00	0.08	0.35	0.12	0.39	**0.72**	**2.34**	7.0%
Y1	1.90	OS/BUFFER	7.0%	1.60	0.12	0.39	SIDEWALK	100.0%	0.30	0.90	0.96	0.24	0.48	**0.46**	**0.91**	21.7%
Y2	1.70	OS/BUFFER	7.0%	1.66	0.12	0.39	SIDEWALK	100.0%	0.04	0.08	0.35	0.12	0.39	**0.20**	**0.66**	9.2%
Z	1.00	RES 1/6 AC.	52.5%	1.00	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.38**	**0.55**	52.5%
AA	2.10	RES 1/6 AC.	52.5%	2.10	0.38	0.55			0.00	0.08	0.35	0.38	0.55	**0.79**	**1.14**	52.5%

JOB NAME: ***STERLING RANCH EAST FILING NO. 5 - FDR***
JOB NUMBER: ***1183.25***
DATE: ***10/17/24***
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(5)	C(100)	**LAND USE**	**PERCENT IMPERVIOUS**	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**	**WEIGHTED % IMPERVIOUS**
OS-1	2.60	RES 1/8 AC.	65.0%	1.30	0.45	0.59	STREET	100%	1.30	0.90	0.96	0.68	0.78	**1.76**	**2.02**	82.5%
OS-2	0.68	STREET	100%	0.34	0.90	0.96	OPEN SPACE	7.0%	0.34	0.12	0.39	0.51	0.68	**0.35**	**0.46**	53.5%
OS-3	0.25	STREET	100%	0.25	0.90	0.96			0.00	0.08	0.35	0.90	0.96	**0.23**	**0.24**	100.0%
OS-4	1.40	RES 1/6 AC.	52.5%	1.40	**0.38**	**0.55**			0.00	0.08	0.35	0.38	0.55	**0.53**	**0.76**	52.5%
OS-5	0.87	STREET	100%	0.49	0.90	0.96	OPEN SPACE	7.0%	0.38	0.12	0.39	0.56	0.71	**0.49**	**0.62**	59.4%
OS-6	530.0%	UNDEV.	2.0%	530.0%	9.0%	36.0%			0.0%	12.0%	39.0%	9.0%	36.0%	47.7%	190.8%	2.0%
OS-7	720.0%	UNDEV.	2.0%	720.0%	9.0%	36.0%			0.0%	12.0%	39.0%	9.0%	36.0%	64.8%	259.2%	2.0%
P4-B Villages at Sterling Ranch East PP	32.20	RES 1/8 AC.	67.6%	32.20	0.46	0.61			0.00	0.08	0.35	0.46	0.61	**14.94**	**19.77**	67.6%
TOTAL	**99.23**															
TOTAL TRIB. AREA TO POND FSD-14B	**68.07**															55.6%

Basins tributaty to Pond FSD-14B
Basins tributaty to Pond FSD-11B
Basin w/ Runoff Reduction Treatment
Basins treated in Temp. Sediment Pond

JOB NAME:	*STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER:	*1183.25*
DATE:	*10/17/24*
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

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}}$$

$$V = C_v S_w^{0.5}$$

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.

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED CA(2)	CA(5)	CA(100)	OVERLAND C(5)	Length (ft)	Height (ft)	Tc (min)	STREET / CHANNEL FLOW Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	Tc TOTAL (min)	INTENSITY I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	TOTAL FLOWS Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
A	0.22	0.26	0.38	0.08	100	2	14.7	135	2.0%	2.8	0.8	15.4	2.78	3.48	5.84	0.6	**0.9**	**2.2**
B	0.70	0.83	1.20	0.08	100	2	14.7	260	1.5%	2.4	1.8	16.4	2.70	3.39	5.68	2	**3**	**7**
C	0.20	0.23	0.33	0.08	50	1	10.4	260	1.5%	2.4	1.8	12.1	3.07	3.84	6.45	0.6	**0.9**	**2.1**
D	1.18	1.39	2.02	0.08	100	2	14.7	900	1.8%	2.7	5.6	20.2	2.46	3.07	5.16	3	**4**	**10**
E	0.29	0.34	0.49	0.08	50	1	10.4	470	2.5%	3.2	2.5	12.8	3.00	3.75	6.30	0.9	**1.3**	**3.1**
F	0.90	1.11	1.82	0.12	100	2	14.1	270	1.5%	2.4	1.8	15.9	2.74	3.43	5.76	2	**4**	**10**
G	0.30	0.36	0.53	0.12	50	1	10.0	270	1.5%	2.4	1.8	11.8	3.10	3.88	6.52	0.9	**1.4**	**3.5**
H	1.17	1.38	2.04	0.12	100	2	14.1	450	1.5%	2.4	3.1	17.1	2.65	3.32	5.57	3	**5**	**11**
I	0.43	0.51	0.75	0.08	50	1	10.4	450	1.5%	2.4	3.1	13.4	2.94	3.69	6.19	1	**2**	**5**
J	0.74	0.86	1.25	0.08	50	1	10.4	630	3.5%	3.7	2.8	13.2	2.97	3.72	6.24	2	**3**	**8**
K	Not Used																	
L	0.35	0.41	0.60	0.08	100	2	14.7	500	1.5%	2.4	3.4	18.1	2.59	3.24	5.44	0.9	**1.3**	**3.3**
M	0.53	0.63	0.95	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.48	5.84	1	**2**	**6**
N	0.38	0.45	0.69	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.48	5.84	1	**2**	**4**
O	0.51	0.60	0.87	0.08	100	2	14.7	300	1.5%	2.4	2.0	16.7	2.69	3.36	5.64	1	**2**	**5**
P	1.06	1.24	1.80	0.08	100	2	14.7	420	1.5%	2.4	2.9	17.5	2.63	3.29	5.52	3	**4**	**10**

JOB NAME: *STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER: *1183.25*
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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

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}}$$

$$V = C_v S_w^{0.5}$$

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.

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

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	Not Used																	
R	0.08	0.11	0.21	0.12	100	2	14.1	50	1.5%	2.4	0.3	14.4	2.86	3.58	6.01	0.2	**0.4**	**1.3**
S	0.35	0.41	0.60	0.08	100	2	14.7	500	1.5%	2.4	3.4	18.1	2.59	3.24	5.44	0.9	**1.3**	**3.3**
T	0.45	0.53	0.76	0.08	100	2	14.7	300	1.5%	2.4	2.0	16.7	2.69	3.36	5.64	1	**2**	**4**
U	0.70	0.83	1.20	0.08	100	2	14.7	500	1.5%	2.4	3.4	18.1	2.59	3.24	5.44	2	**3**	**7**
V	0.45	0.53	0.76	0.08	50	1	10.4	650	1.5%	2.4	4.4	14.8	2.83	3.54	5.95	1	**2**	**5**
W	0.14	0.15	0.17									5.0	4.12	5.17	8.68	0.6	**0.8**	**1.4**
X	0.30	0.72	2.34	0.08	100	2	14.7	500	2.0%	1.0	8.4	23.1	2.30	2.88	4.83	1	**2**	**11**
Y1	0.35	0.46	0.91	0.90	250	10	3.6					5.0	4.12	5.17	8.68	1.4	**2**	**8**
Y2	0.08	0.20	0.66	0.08	90	14	7.1					7.1	3.71	4.65	7.81	0.3	**0.9**	**5.2**
Z	0.32	0.38	0.55	0.08	65	2	10.2					10.2	3.27	4.09	6.87	1	**2**	**4**
AA	0.67	0.79	1.14	0.08	65	2	10.2					10.2	3.27	4.09	6.87	2	**3**	**8**

JOB NAME:	*STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER:	*1183.25*
DATE:	*10/17/24*
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

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}}$$

$$V = C_v S_w^{0.5}$$

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.

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

	WEIGHTED			OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS		
BASIN	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)
OS-1	1.69	1.76	2.02	0.08	40	0.8	9.3	900	2.5%	3.2	4.7	14.0	2.89	3.62	6.08	5	**6**	**12**
OS-2	0.32	0.35	0.46	0.12	50	1	10.0	400	1.6%	2.5	2.6	12.6	3.02	3.78	6.35	1.0	**1.3**	**2.9**
OS-3	0.22	0.23	0.24									5.0	4.12	5.17	8.68	0.9	**1.2**	**2.1**
OS-4	0.45	0.53	0.76	0.08	50	1	10.4	500	1.5%	2.4	3.4	13.8	2.91	3.65	6.13	1	**2**	**5**
OS-5	0.46	0.49	0.62	0.12	25	0.75	6.2	450	1.5%	2.4	3.1	9.2	3.39	4.25	7.14	2	**2**	**4**
OS-6	0.16	0.48	1.91	0.12	300	7	23.2					23.2	2.29	2.87	4.81	0.4	**1**	**9**
OS-7	0.22	0.65	2.59	0.12	300	7	23.2					23.2	2.29	2.87	4.81	0.5	**2**	**12**
P4-B Villages at Sterling Ranch East PP	13.52	14.94	19.77	0.08	100	2	14.7	600	1.5%	2.4	4.1	18.7	2.55	3.19	5.35	34	**48**	**106**

JOB NAME: ***STERLING RANCH EAST FILING NO. 5 - FDR***
JOB NUMBER: ***1183.25***
DATE: ***10/17/24***
CALCULATED BY: ***MAW***

*ALL STORM SEWER TO BE PRIVATE UNLESS OTHERWISE NOTED

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

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	OS-1	1.76	2.02	14.0	3.62	6.08	6	12	Exist. 15' Type R At-Grade Inlet
2	OS-2, Flow-By from DP-1	0.35	0.72	16.6	3.37	5.65	1	4	Exist. Crosspan
3	OS-3, A, B	1.31	1.82	16.4	3.39	5.68	4	10	Prop. 10' Type R Sump Inlet
4	C	0.23	0.33	12.1	3.84	6.45	0.9	2.1	Prop. 5' Type R Sump Inlet
5	D	1.39	2.02	20.2	3.07	5.16	4	10	Prop. 10' Type R At-Grade Inlet
6	E, F	1.45	2.31	15.9	3.43	5.76	5	13	Prop. 10' Type R Sump Inlet
7	G	0.36	0.53	11.8	3.88	6.52	1.4	3.5	Prop. 5' Type R Sump Inlet
8	H	1.38	2.04	17.1	3.32	5.57	5	11	Prop. 10' Type R Sump Inlet
9	I	0.51	0.75	13.4	3.69	6.19	2	5	Prop. 5' Type R Sump Inlet
10	J	0.86	1.25	13.2	3.72	6.24	3	8	Prop. 10' Type R Sump Inlet
11	L	0.41	0.60	18.1	3.24	5.44	1.3	3.3	Prop. 5' Type R Sump Inlet
12	M	0.63	0.95	15.4	3.48	5.84	2	6	Prop. 5' Type R Sump Inlet
13	N	0.45	0.69	15.4	3.48	5.84	2	4	Prop. 5' Type R Sump Inlet
14	O and DP-5 Flow-By	0.61	1.46	21.2	3.00	5.03	2	7	Prop. 6' Crosspan

JOB NAME: *STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER: *1183.25*
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*ALL STORM SEWER TO BE PRIVATE UNLESS OTHERWISE NOTED

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

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)	
15	P and DP-14	1.85	3.26	22.2	2.93	4.92	5	16	Exist. 10' Type R Sump Inlet
16	OS-4, R	0.63	0.97	14.4	3.58	6.01	2	6	Exist. 5' Type R Sump Inlet
17	S	0.41	0.60	18.1	3.24	5.44	1.3	3.3	Prop. 5' Type R Sump Inlet
18	T	0.53	0.76	16.7	3.36	5.64	2	4	Prop. 5' Type R Sump Inlet
19	U, V	1.35	1.96	18.1	3.24	5.44	4	11	Prop. 10' Type R Sump Inlet
20	W	0.15	0.17	5.0	5.17	8.68	0.8	1.4	Prop. 5' Type R Sump Inlet
21	OS-5, Flow-by from DP-2	0.83	1.34	19.7	3.11	5.22	3	7	Exist. 10' Type R At-Grade Inlet
	TOTAL BASINS TRIBUTARY TO POND FSD-14B	**27.06**	**38.31**	**23.1**	**2.88**	**4.83**	**78**	**185**	
	TOTAL BASINS TRIBUTARY TO POND FSD-14B (VILLAGES NOT DEV.)	**12.12**	**18.54**	**23.1**	**2.88**	**4.83**	**35**	**89**	
6 (MDDP) SOUTH BNDY.	**POND FSD-14B RELEASE AND BASIN Y1**	**REF. MHFD-DETENTION SPREADSHEET FOR CALCULATIONS**					**2.4**	**43.4**	Sheet flow from Level Spreader & Basin Y1
6A (MDDP) SOUTH BNDY.	**BASIN Y2**	**0.20**	**0.66**	**7.1**	**4.65**	**7.81**	**0.9**	**5.2**	Sheet flow

JOB NAME: *STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER: *1183.25*
DATE: *10/17/24*
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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

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

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*
1	**P4-B FUTURE VILLAGES AT STERLING RANCH PP**	**14.94**	**19.77**	**18.7**	**3.19**	**5.35**	**48**	**106**	**PROP. 48" RCP**
2	DP-3	1.31	1.82	16.4	3.39	5.68	4	10	PROP. 24" RCP
3	DP-4	0.23	0.33	12.1	3.84	6.45	0.9	2.1	PROP. 18" RCP
4	PR-2, PR-3	1.54	2.15	16.6	3.37	5.65	5	12	PROP. 24" RCP
5	**PR-1, PR-4**	**16.48**	**21.92**	**19.5**	**3.12**	**5.25**	**52**	**115**	**PROP. 48" RCP**
6	DP-5 COLLECTION	1.37	1.43	20.5	3.05	5.12	4	7	PROP. 18" RCP
7	DP-6	1.45	2.31	15.9	3.43	5.76	5	13	PROP. 24" RCP
8	PR-7, DP-7	1.81	2.84	15.9	3.43	5.76	6	16	PROP. 24" RCP
9	PR-6, PR-8	3.18	4.27	20.9	3.02	5.07	10	22	PROP. 30" RCP
10	DP-8	1.38	2.04	17.1	3.32	5.57	5	11	PROP. 24" RCP
11	PR-10, DP-9	1.89	2.80	17.1	3.32	5.57	6	16	PROP. 24" RCP

JOB NAME: *STERLING RANCH EAST FILING NO. 5 - FDR*
JOB NUMBER: *1183.25*
DATE: *10/17/24*
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

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

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)	
12	PR-9, PR-11	5.07	7.07	21.3	2.99	5.02	15	35	PROP. 30" RCP
13	**DP-15 (To Pond FSD-11B)**	**1.85**	**3.26**	**22.2**	**2.93**	**4.92**	**5**	**16**	**EXIST. 24" RCP**
14	**DP-16 (To Pond FSD-11B)**	**0.63**	**0.97**	**14.4**	**3.58**	**6.01**	**2**	**6**	**EXIST. 18" RCP**
15	**PR-13, PR-14 (To FSD-11B)**	**2.48**	**4.23**	**23.4**	**2.85**	**4.79**	**7**	**20**	**EXIST. 30" RCP**
16	DP-10	0.86	1.25	13.2	3.72	6.24	3	8	PROP. 24" RCP
17	DP-11	0.41	0.60	18.1	3.24	5.44	1.3	3.3	PROP. 18" RCP
18	**PR-5, PR-13, PR-14**	**17.76**	**23.78**	**19.7**	**3.11**	**5.22**	**55**	**124**	**PROP. 54" RCP**
19	DP-12	0.63	0.95	15.4	3.48	5.84	2	6	PROP. 18" RCP
20	DP-13	0.45	0.69	15.4	3.48	5.84	2	4	PROP. 18" RCP
21	PR-19, PR-20	1.08	1.64	15.5	3.47	5.82	4	10	PROP. 24" RCP
22	PR-12, PR-21	6.15	8.71	21.7	2.96	4.98	18	43	PROP. 36" RCP
23	**PR-18, PR-22**	**23.91**	**32.48**	**22.2**	**2.93**	**4.92**	**70**	**160**	**PROP. 60" RCP**

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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

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

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)	
24	DP-17	0.41	0.60	18.1	3.24	5.44	1.3	3.3	PROP. 18" RCP
25	DP-18	0.53	0.76	16.7	3.36	5.64	2	4	PROP. 18" RCP
26	PR-24, PR-25	0.94	1.36	18.1	3.24	5.44	3	7	PROP. 24" RCP
27	**PR-23, PR-26 (IN-FLOW ULTIMATE CONDITION)**	**24.85**	**33.85**	**22.3**	**2.92**	**4.91**	**73**	**166**	**PROP. 60" RCP**
27	**PR-20, PR-23 (IN-FLOW INTERIM CONDITION - VILLAGES NOT DEVELOPED)**	**9.91**	**14.08**	**20.3**	**3.06**	**5.14**	**30**	**72**	**PROP. 60" RCP**
28	DP-19	1.35	1.96	18.1	3.24	5.44	4	11	PROP. 24" RCP
29	**DP-20, PR-28**	**1.50**	**2.13**	**18.2**	**3.23**	**5.43**	**5**	**12**	**PROP. 24" RCP**

JOB NAME: *STERLING RANCH EAST FILING NO. 5 - FDR*
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POND FSD-14B TRIBUTARY BASINS

TRIBUTARY BASIN	BASIN AREA (AC)	WEIGHTED % IMPERVIOUS
A	0.70	52.5%
B	2.20	52.5%
C	0.61	52.5%
71% OF D	2.63	52.5%
E	0.90	52.5%
F	3.60	40.6%
G	0.99	50.2%
H	3.80	50.5%
I	1.40	50.9%
J	2.30	52.5%
L	1.10	52.5%
M	1.80	48.2%
N	1.30	47.3%
S	1.10	52.5%
T	1.40	52.5%
U	2.20	52.5%
V	1.40	52.5%
W	0.19	85.3%
X	6.00	7.0%
OS-3	0.25	100.0%
P4-B Villages at Sterling Ranch East PP	32.20	67.6%
TOTAL	68.07	**55.6%**

POND FSD-14B TOTAL EFF. IMPERVIOUS % **55.6%**

Missing inlet calculation for DP-17. Please provide

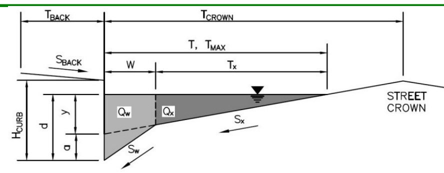
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	32.0	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} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	32.0	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 =	0.015	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} =	12.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

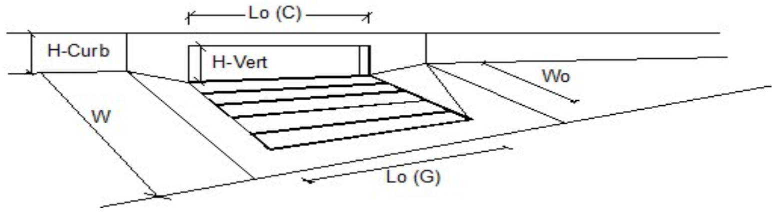
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**5.8**	**32.7**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		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: WARNING: Q > ALLOWABLE Q FOR MINOR STORM'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**6.0**	**10.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**87**	**%**

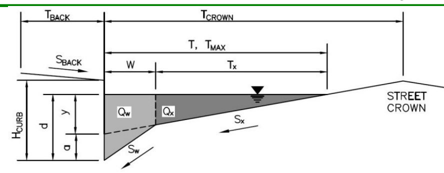
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-3



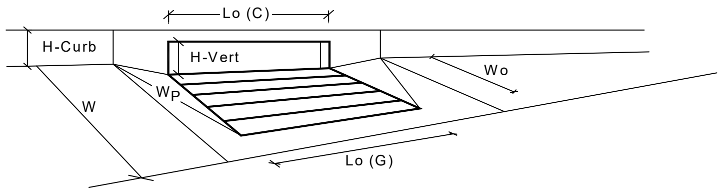
Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5		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} =	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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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)	$Q_{PEAK\ REQUIRED}$ =	4.0	10.0	cfs

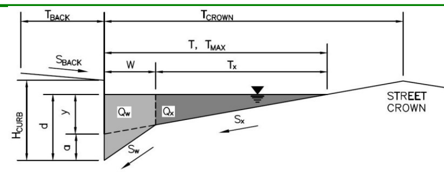
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-4

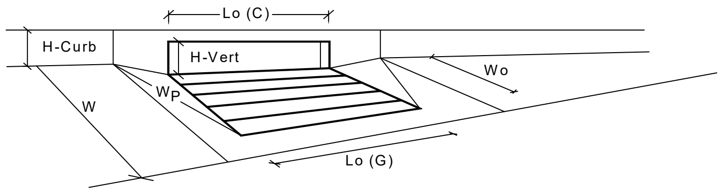


Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5		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} =	0.012		
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLEt IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	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
Area Opening 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 (see USDCM Figure ST-5)	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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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)	$Q_{PEAK\ REQUIRED}$ =	0.9	2.1	cfs

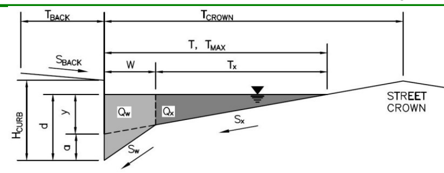
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-5



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	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} =	0.012	
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 =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

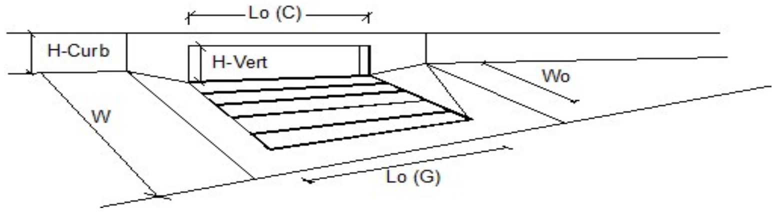
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**13.3**	**13.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	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**	**%**

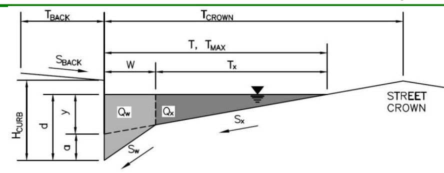
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-6



Gutter Geometry (Enter data in the blue cells)

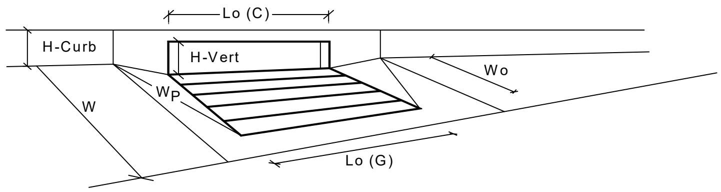
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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	13.0	cfs

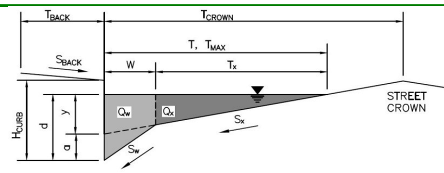
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-7



Gutter Geometry (Enter data in the blue cells)

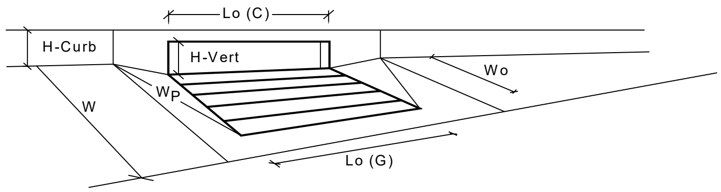
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening	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
Area Opening 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 (see USDCM Figure ST-5)	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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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)	$Q_{PEAK\ REQUIRED}$ =	1.4	3.5	cfs

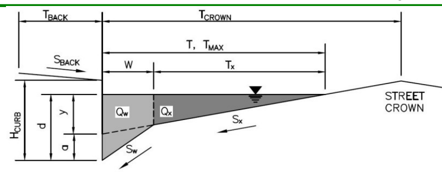
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-8



Gutter Geometry (Enter data in the blue cells)

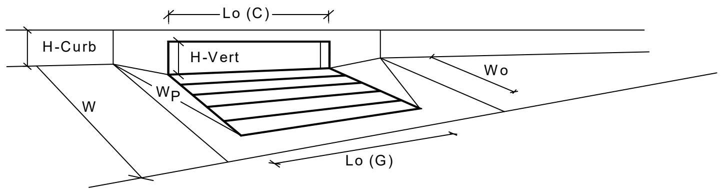
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input) CDOT Type R Curb Opening		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
Area Opening 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 (see USDCM Figure ST-5)	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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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

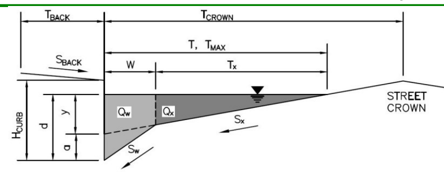
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-9



Gutter Geometry (Enter data in the blue cells)

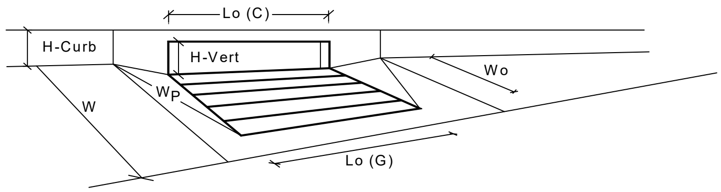
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	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
Area Opening 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 (see USDCM Figure ST-5)	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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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

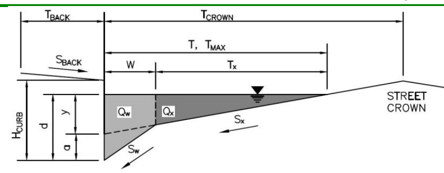
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-10



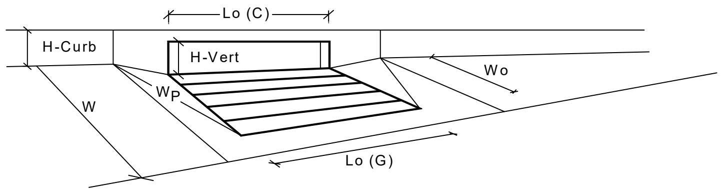
Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5		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} =	0.012		
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening		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
Area Opening 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 (see USDCM Figure ST-5)	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	

		MINOR	MAJOR	
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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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	8.0	cfs

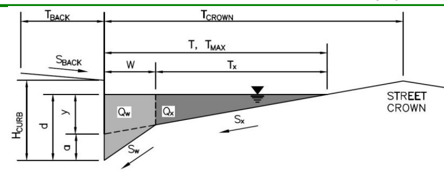
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-11 and DP-17

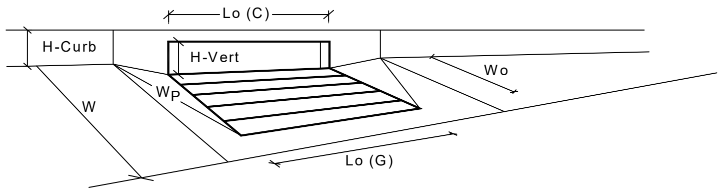


Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5		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} =	0.012		
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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)	$Q_{PEAK\ REQUIRED}$ =	1.3	3.3	cfs

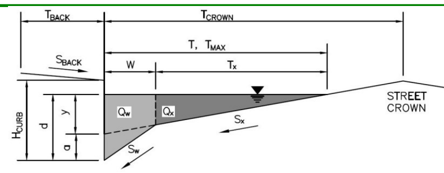
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-12



Gutter Geometry (Enter data in the blue cells)

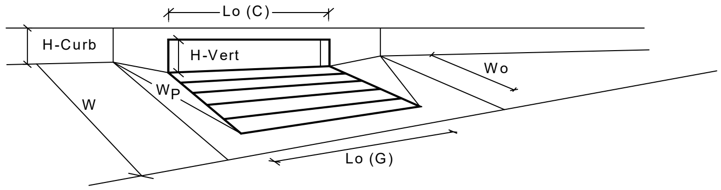
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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

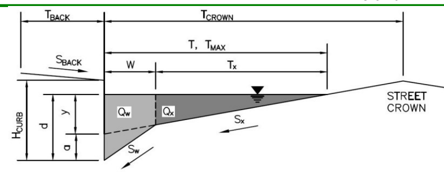
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-13 and DP-18

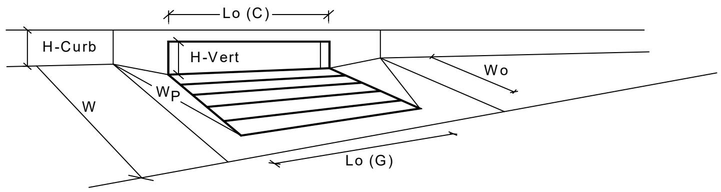


Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5		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} =	0.012		
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
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
Area Opening 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 (see USDCM Figure ST-5)	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	

		MINOR	MAJOR	
Low Head Performance Reduction (Calculated)				
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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	4.0	cfs

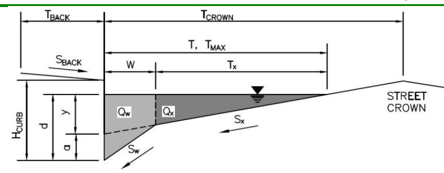
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-15



Gutter Geometry (Enter data in the blue cells)

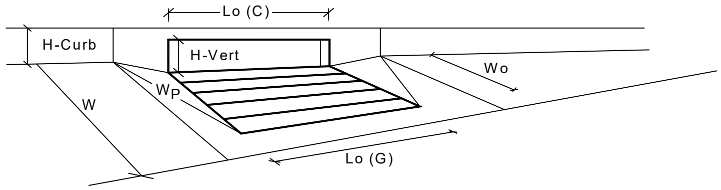
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening		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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	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	16.0	cfs

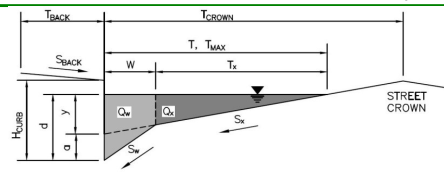
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-16



Gutter Geometry (Enter data in the blue cells)

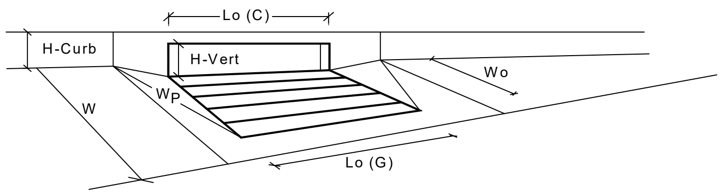
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	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
Area Opening 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 (see USDCM Figure ST-5)	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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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

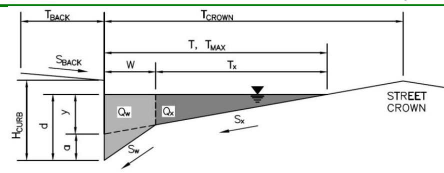
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-19



Gutter Geometry (Enter data in the blue cells)

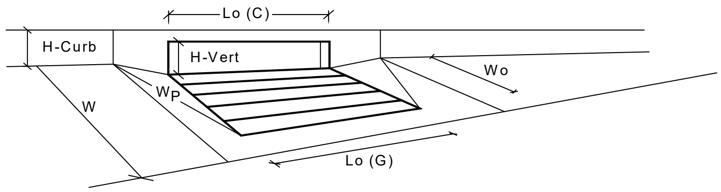
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	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)	$Q_{PEAK\ REQUIRED}$ =	4.0	11.0	cfs

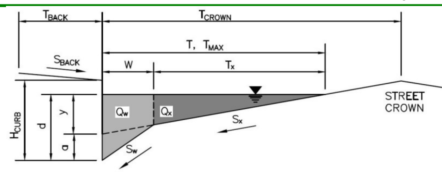
Version 4.05 Released March 2017

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. 5 - FDR

Inlet ID: DP-20



Gutter Geometry (Enter data in the blue cells)

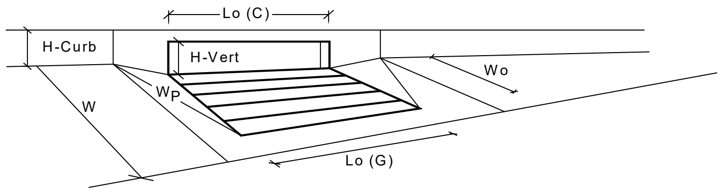
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



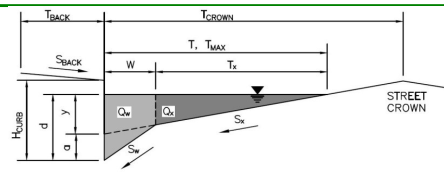
Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (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
Area Opening 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 (see USDCM Figure ST-5)		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
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	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)		$Q_{PEAK\ REQUIRED}$ =	0.8	1.4	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. 5 - FDR

Inlet ID: DP-21



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	38.5	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} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

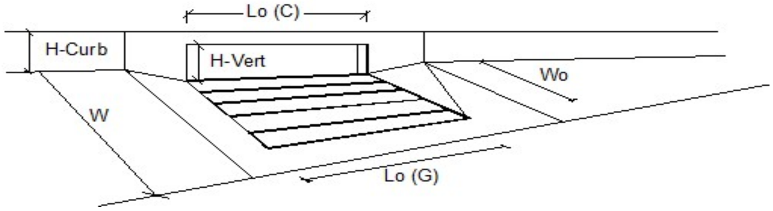
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**13.4**	**13.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	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 =**	**3.0**	**5.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**83**	**%**

24" WIDE CONC. TRICKLE CHANNEL

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.007 ft/ft
Normal Depth	4.0 in
Bottom Width	2.00 ft

Results

Discharge	2.60 cfs
Flow Area	0.7 ft²
Wetted Perimeter	2.7 ft
Hydraulic Radius	3.0 in
Top Width	2.00 ft
Critical Depth	4.5 in
Critical Slope	0.005 ft/ft
Velocity	3.90 ft/s
Velocity Head	0.24 ft
Specific Energy	0.57 ft
Froude Number	1.192
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	4.0 in
Critical Depth	4.5 in
Channel Slope	0.007 ft/ft
Critical Slope	0.005 ft/ft

48" WIDE CONC. TRICKLE CHANNEL

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	5.5 in
Bottom Width	4.00 ft

Results

Discharge	7.98 cfs
Flow Area	1.8 ft^2
Wetted Perimeter	4.9 ft
Hydraulic Radius	4.5 in
Top Width	4.00 ft
Critical Depth	6.0 in
Critical Slope	0.004 ft/ft
Velocity	4.35 ft/s
Velocity Head	0.29 ft
Specific Energy	0.75 ft
Froude Number	1.133
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	5.5 in
Critical Depth	6.0 in
Channel Slope	0.005 ft/ft
Critical Slope	0.004 ft/ft

Please provide a calcs page like this for the 24" pond inflow pipe.

60 in. RCP Outlet (Pipe Run 27)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Diameter	60.0 in
Discharge	166.00 cfs

Results

Normal Depth	44.6 in
Flow Area	15.6 ft²
Wetted Perimeter	10.4 ft
Hydraulic Radius	18.1 in
Top Width	4.37 ft
Critical Depth	44.3 in
Percent Full	74.3 %
Critical Slope	0.005 ft/ft
Velocity	10.62 ft/s
Velocity Head	1.75 ft
Specific Energy	5.46 ft
Froude Number	0.990
Maximum Discharge	198.09 cfs
Discharge Full	184.15 cfs
Slope Full	0.004 ft/ft
Flow Type	Subcritical

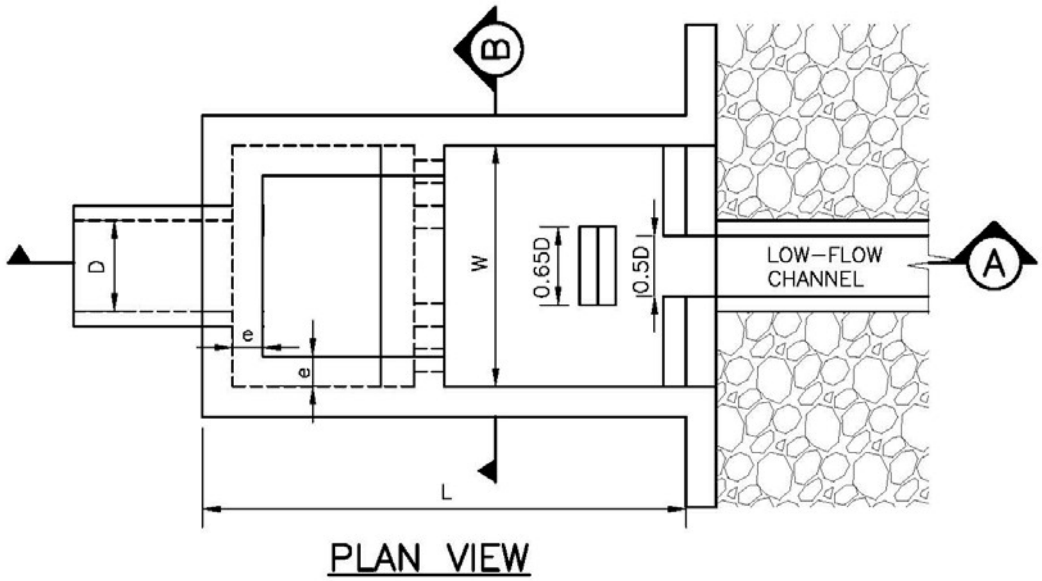
GVF Input Data

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
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	44.6 in
Critical Depth	44.3 in
Channel Slope	0.005 ft/ft
Critical Slope	0.005 ft/ft

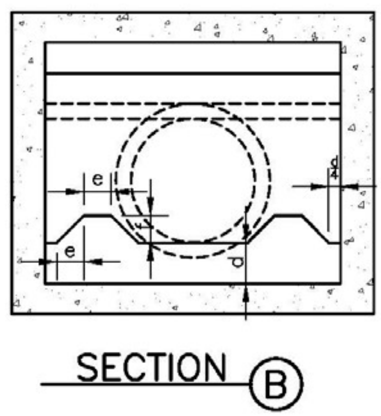
60 " RCP OUTFALL
IMPACT STRUCTURE CALCULATIONS



Flowmaster calcs.
A = 15.6 sf
V = 10.62 ft/s

Using the above:
W = 11.23 use 12.0'
D = 3.95

$W=2.94D\left[\frac{V}{(gD)^{0.5}}\right]^{0.556}$	H=3/4 W	c=1/2 W
V=VELOCITY, [FT/S]	L=4/3 W	d=1/6 W
$D=(A)^{0.5}$	a=1/2 W	e=1/12 W
	b=3/8 W	f=1/8 W
A=AREA OF FLOW [SF]	t=1/12 W (SUGGESTED MIN)	



Based on the determined
W and D above:
H = 9.0'
L = 16.0'
a = 6.0'
b = 4.5'
c = 6.0'
d = 2.0'
e = 1.0'
f = 1.5'
t = 1.0'

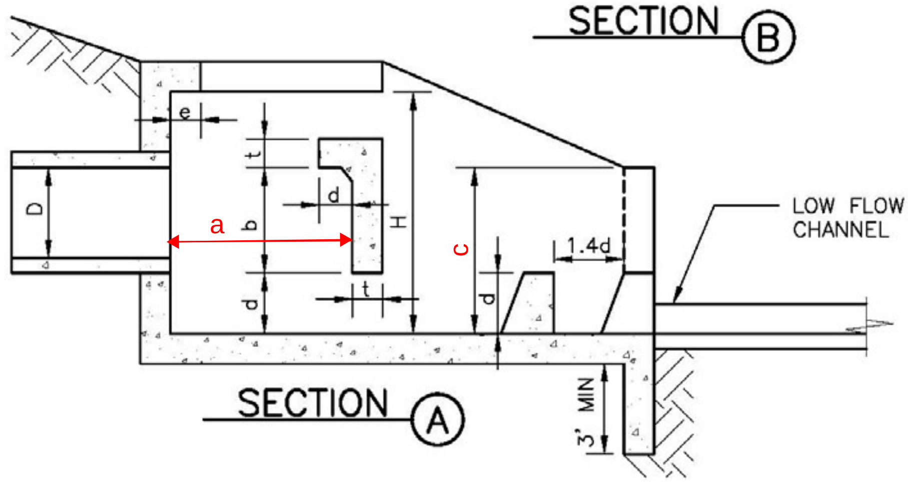


Figure 9-45. UDFCD modified USBR type VI impacts stilling basin (general design dimensions)

30" POND OUTFALL

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.016 ft/ft
Left Side Slope	5.000 H:V
Right Side Slope	3.000 H:V
Discharge	43.30 cfs

Results

Normal Depth	18.7 in
Flow Area	9.7 ft²
Wetted Perimeter	12.9 ft
Hydraulic Radius	9.1 in
Top Width	12.47 ft
Critical Depth	17.9 in
Critical Slope	0.021 ft/ft
Velocity	4.45 ft/s
Velocity Head	0.31 ft
Specific Energy	1.87 ft
Froude Number	0.889
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

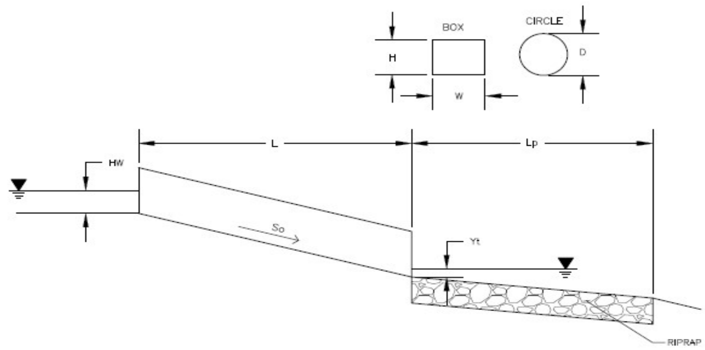
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	18.7 in
Critical Depth	17.9 in
Channel Slope	0.016 ft/ft
Critical Slope	0.021 ft/ft

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: **Sterling Ranch East Filing No. 5**

ID: **Pond FSD-14B 30" RCP Outfall Pipe**



Soil Type:
Choose One:
(●) Sandy
( ) Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	43.3	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	30	inches
Inlet Edge Type (Choose from pull-down list)	Square Edge with Headwall		
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7026	ft
Outlet Elevation **OR** Slope	So =	0.016	ft/ft
Culvert Length	L =	12	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t,\ Elevation}$ =		ft
Max Allowable Channel Velocity	V =	5	ft/s

Calculated Results:

Culvert Cross Sectional Area Available	A =	4.91	ft^2
Culvert Normal Depth	Y_n =	1.74	ft
Culvert Critical Depth	Y_c =	2.20	ft
Froude Number	Fr =	1.66	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.11	
Sum of All Loss Coefficients	k_s =	1.61	ft
Headwater:			
Inlet Control Headwater	HW_I =	4.72	ft
Outlet Control Headwater	HW_O =	4.10	ft
Design Headwater Elevation	**HW =**	**7030.72**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.89**	**HW/D > 1.5!**
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	4.38	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.00	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	3.09	
Flow Area at Max Channel Velocity	A_t =	8.66	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	$\mathbf{L_p}$ **=**	**20**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**9**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	2.12	ft
Minimum Theoretical Riprap Size	d_{50} min=	10	in
Nominal Riprap Size	d_{50} nominal=	12	in
MHFD Riprap Type	**Type =**	**M**	

Add note here stating HW/D is greater than 1.5 due to pond water surface elevations.

STORMWATER QUALITY / BMP CALCULATIONS

From what I can tell, these basins do not treat any impervious (UIA) surfaces, so RPAs are not necessary. You can reclassify them as SPAs in all FDR text, maps, and calcs. That way they are not official PCMs that have to have a DMA, O&M Manual, and be entered into our Post-Construction system.

But note that SPAs still need to be in no-build drainage easements or tracts.

If you agree with my suggestion on the previous page, revise these calcs just to show SPAs

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: October 16, 2024
Project: Sterling Ranch East Filing No. 5 - FDR
Location: Sand Creek East Fork Basin

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										
Area ID	Basin Y1	Basin Y2										
Downstream Design Point ID	SC	SC										
Downstream BMP Type	None	None										
DCIA (ft^2)	--	--										
UIA (ft^2)	13,068	10,120										
RPA (ft^2)	56,696	63,932										
SPA (ft^2)	--	--										
HSG A (%)	0%	0%										
HSG B (%)	100%	100%										
HSG C/D (%)	0%	0%										
Average Slope of RPA (ft/ft)	0.030	0.030										
UIA:RPA Interface Width (ft)	450.00	620.00										

CALCULATED RUNOFF RESULTS

Area ID	Basin Y1	Basin Y2										
UIA:RPA Area (ft^2)	69,764	74,052										
L / W Ratio	0.34	0.19										
UIA / Area	0.1873	0.1367										
Runoff (in)	0.00	0.00										
Runoff (ft^3)	0	0										
Runoff Reduction (ft^3)	468	363										

CALCULATED WQCV RESULTS

Area ID	Basin Y1	Basin Y2										
WQCV (ft^3)	532	412										
WQCV Reduction (ft^3)	532	412										
WQCV Reduction (%)	100%	100%										
Untreated WQCV (ft^3)	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)	23,188											
RPA (ft^2)	120,628											
SPA (ft^2)	0											
Total Area (ft^2)	143,816											
Total Impervious Area (ft^2)	23,188											
WQCV (ft^3)	944											
WQCV Reduction (ft^3)	944											
WQCV Reduction (%)	100%											
Untreated WQCV (ft^3)	0											

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

Total Area (ft^2)	143,816
Total Impervious Area (ft^2)	23,188
WQCV (ft^3)	944
WQCV Reduction (ft^3)	944
WQCV Reduction (%)	100%
Untreated WQCV (ft^3)	0

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: October 14, 2024
Project: STERLING RANCH EAST FILING NO. 5 - FDR
Location: POND FSD-14B

Shouldn't this input be 68.07 - 3.79 = 64.28 since the 3.79 is shown on the UD-BMP calcs below for the 24" outfall forebay. That would leave 64ac of the total for the 60" inflow point.

1. Basin Storage Volume		
A) Effective Imperviousness of Tributary Area, I_a	I_a =	55.6 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i =	0.556
C) Contributing Watershed Area	Area =	68.070 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 =	0.42 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 ($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$ =	1.231 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 =	0 %
ii) Percentage of Watershed consisting of Type B Soils	HSG_B =	100 %
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: $EURV_{C/D} = 1.20 * i^{1.08}$	$EURV_{DESIGN}$ =	4.093 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} =	0.037 ac-ft
B) Actual Forebay Volume	V_F =	0.037 ac-ft
C) Forebay Depth (D_F = 30 inch maximum)	D_F =	30.0 in
D) Forebay Discharge		
i) Undetained 100-year Peak Discharge	Q_{100} =	166.00 cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F =	3.32 cfs
E) Forebay Discharge Design	Choose One: ◯ Berm With Pipe ◉ Wall with Rect. Notch ◯ Wall with V-Notch Weir	
F) Discharge Pipe Size (minimum 8-inches)	Calculated D_P =	in
G) Rectangular Notch Width	Calculated W_N =	9.0 in

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: October 14, 2024
Project: STERLING RANCH EAST FILING NO. 5 - FDR
Location: POND FSD-14B

6. Trickle Channel

A) Type of Trickle Channel — Choose One: (●) Concrete ( ) Soft Bottom

F) Slope of Trickle Channel — S = 0.0080 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 = 393 sq ft

C) Outlet Type — Choose One: (●) Orifice Plate ( ) Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) — $D_{orifice}$ = 2.50 inches

E) Total Outlet Area — A_{ot} = 34.85 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} = 161 cu ft

C) Initial Surcharge Provided Above Micropool — V_s= 196.5 cu ft

9. Trash Rack

A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$ — A_t = 1,058 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} = 1490 sq. in.

E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E) — H= 6.25 feet

F) Height of Water Quality Screen (H_{TR}) — H_{TR}= 103 inches

G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended) — $W_{opening}$ = 14.5 inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	**Marc A. Whorton, P.E.**
Company:	**Classic Consulting**
Date:	**October 14, 2024**
Project:	**STERLING RANCH EAST FILING NO. 5 - FDR**
Location:	**POND FSD-14B**

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	

Notes:

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: October 14, 2024
Project: STERLING RANCH EAST FILING NO. 5 - FDR
Location: POND FSD-14B - 24" Outfall

list trib basins here or in a table elsewhere more appropriate.

1. Basin Storage Volume

need the aforementioned table to confirm this value.

The table/list requested above will help clarify how this acreage was obtained for both forebays.

A) Effective Imperviousness of Tributary Area, I_a	I_a = 54.1	%
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.541	
C) Contributing Watershed Area	Area = 3.790	ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42	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 ($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$ = 0.067	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 = 0	%
ii) Percentage of Watershed consisting of Type B Soils	HSG_B = 100	%
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: $EURV_{C/D} = 1.20 * i^{1.08}$	$EURV_{DESIGN}$ = 0.221	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

I will need to verify this once a calcs page is provide for this inflow pipe.

A) Minimum Forebay Volume (V_{FMIN} = 2% of the WQCV)	V_{FMIN} = 0.001	ac-ft
B) Actual Forebay Volume	V_F = 0.001	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} = 12.00	cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F = 0.24	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 = 4.1	in

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: October 11, 2024
Project: STERLING RANCH EAST FILING NO. 5 - FDR
Location: POND FSD-14B - 60" Outfall

list trib basins here or in a table elsewhere more appropriate.

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 60.8 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.608
C) Contributing Watershed Area	Area = 58.300 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 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 ($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$= 1.134 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 = 0 %
ii) Percentage of Watershed consisting of Type B Soils	HSG_B = 100 %
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: $EURV_{C/D} = 1.20 * i^{1.08}$	$EURV_{DESIGN}$ = 3.860 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} = 0.034 ac-ft
B) Actual Forebay Volume	V_F = 0.034 ac-ft
C) Forebay Depth (D_F = 30 inch maximum)	D_F = 30.0 in
D) Forebay Discharge	
i) Undetained 100-year Peak Discharge	Q_{100} = 166.00 cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F = 3.32 cfs
E) Forebay Discharge Design	Choose One: ○ Berm With Pipe ● Wall with Rect. Notch ○ Wall with V-Notch Weir
F) Discharge Pipe Size (minimum 8-inches)	Calculated D_P = in
G) Rectangular Notch Width	Calculated W_N = 9.0 in

need the aforementioned table to confirm this value.

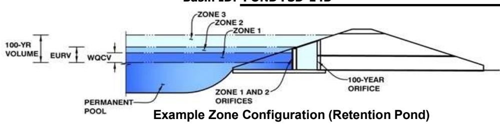
68.07 - 3.79 (for eastern forebay) = 64.28. So does the remaining 5.98ac just sheetflow into the pond? The table requested above would clear this up. Thanks.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: STERLING RANCH EAST FILING NO. 5 - FDR

Basin ID: POND FSD-14B



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	68.07	acres
Watershed Length =	3,200	ft
Watershed Length to Centroid =	1,600	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	55.60%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
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) =	1.261	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.081	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.833	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	5.369	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	6.703	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	8.433	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	9.867	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	11.660	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.48 in.) =	17.390	acre-feet	3.48	inches
Approximate 2-yr Detention Volume =	3.113	acre-feet		
Approximate 5-yr Detention Volume =	4.229	acre-feet		
Approximate 10-yr Detention Volume =	5.511	acre-feet		
Approximate 25-yr Detention Volume =	5.987	acre-feet		
Approximate 50-yr Detention Volume =	6.248	acre-feet		
Approximate 100-yr Detention Volume =	6.885	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.261	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.820	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.805	acre-feet
Total Detention Basin Volume =	6.885	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	372	0.009		
7032	--	0.50	--	--	--	372	0.009	186	0.004
7034	--	2.50	--	--	--	18,682	0.429	19,240	0.442
7036	--	4.50	--	--	--	53,436	1.227	91,358	2.097
7038	--	6.50	--	--	--	86,379	1.983	231,173	5.307
7040	--	8.50	--	--	--	98,212	2.255	415,764	9.545
7042	--	10.50	--	--	--	110,196	2.530	624,172	14.329
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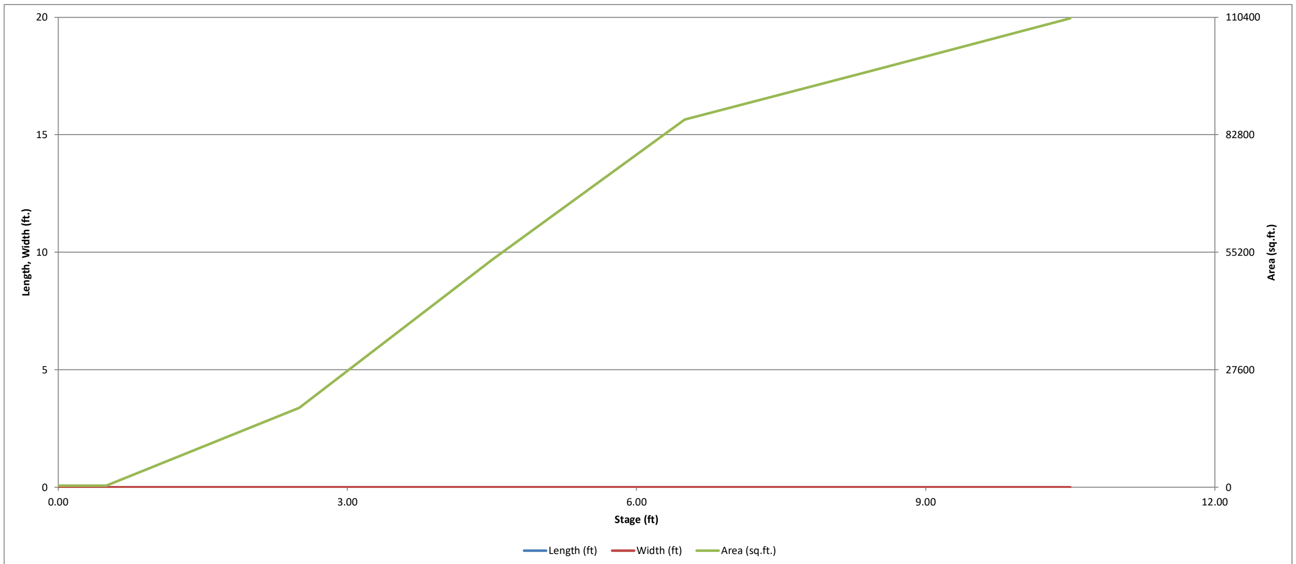
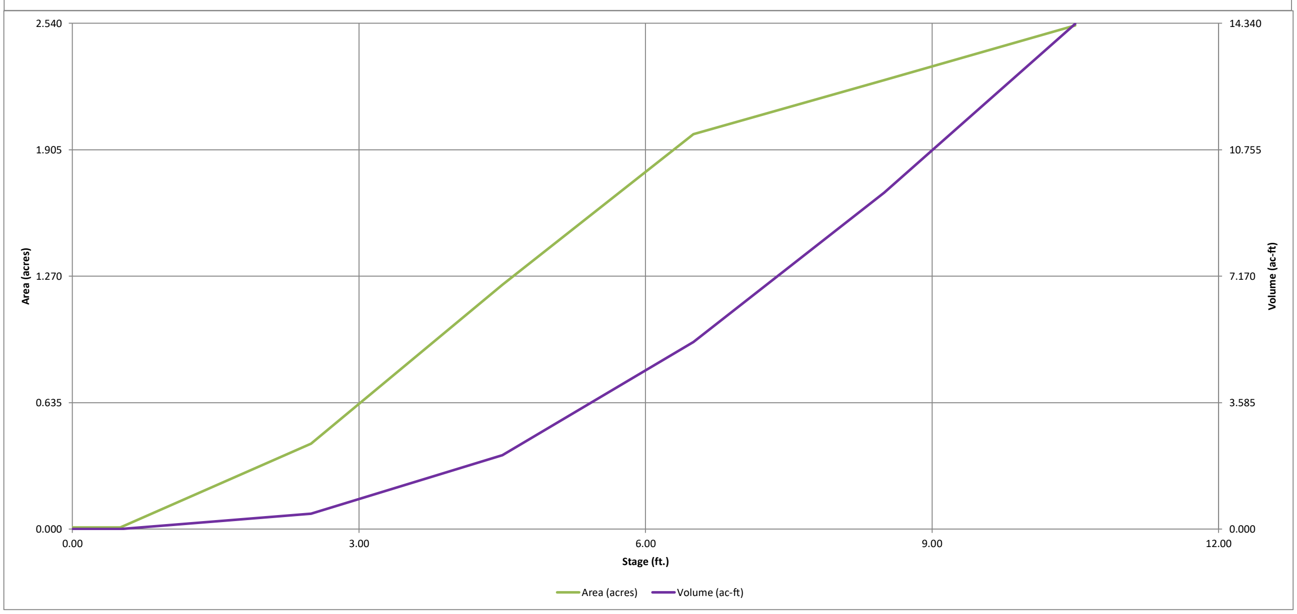
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)





✓ = calcs match details in plans

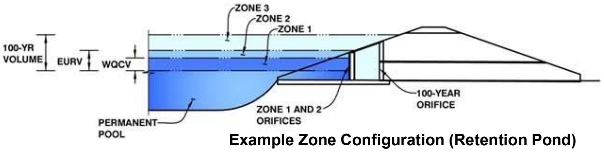
X = calcs do not match details in plans

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: STERLING RANCH EAST FILING NO. 5 - FDR

Basin ID: POND FSD-14B



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.72	1.261	Orifice Plate
Zone 2 (EURV)	5.84	2.820	Orifice Plate
Zone 3 (100-year)	7.28	2.805	Weir&Pipe (Restrict)
Total (all zones)		6.885	

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area =		ft^2
Underdrain Orifice Centroid =		feet

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	6.25	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	25.00	inches
Orifice Plate: Orifice Area per Row =	N/A	sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
✓ Stage of Orifice Centroid (ft)	0.00	2.10	4.20					
✓ Orifice Area (sq. inches)	4.91	5.94	24.00					

	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	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

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

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

	Zone 3 Weir	Not Selected	
✓ Overflow Weir Front Edge Height, Ho =	6.25	N/A	ft (relative to basin bottom at Stage = 0 ft)
✓ Overflow Weir Front Edge Length =	8.00	N/A	feet
✓ Overflow Weir Grate Slope =	4.00	N/A	H:V
✓ Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Type =	Close Mesh Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	7.25	N/A	feet
Overflow Weir Slope Length =	4.12	N/A	feet
Grate Open Area / 100-yr Orifice Area =	5.32	N/A	
Overflow Grate Open Area w/o Debris =	26.09	N/A	ft^2
Overflow Grate Open Area w/ Debris =	13.05	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
✓ Depth to Invert of Outlet Pipe =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
✓ Outlet Pipe Diameter =	30.00	N/A	inch
✓ Restrictor Plate Height Above Pipe Invert =	30.00		inch

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	4.91	N/A	ft^2
d =	1.25	N/A	feet
e =	3.14	N/A	radians

CDs shows spillway width as 60 ft and 3:1 end slopes. Please reconcile report and plans to show same information

User Input: Emergency Spillway (Rectangular or Trapezoidal)

✓ Spillway Invert Stage=	8.50	ft (relative to basin bottom at Stage = 0 ft)
X Spillway Crest Length =	50.00	feet
X Spillway End Slopes =	4.00	H:V
X Freeboard above Max Water Surface =	1.10	feet

Provide calculation for sizing of riprap at spillway

Calculated Parameters for Spillway

Spillway Design Flow Depth=	1.08	feet
Stage at Top of Freeboard =	10.68	feet
Basin Area at Top of Freeboard =	2.53	acres
Basin Volume at Top of Freeboard =	14.33	acre-ft

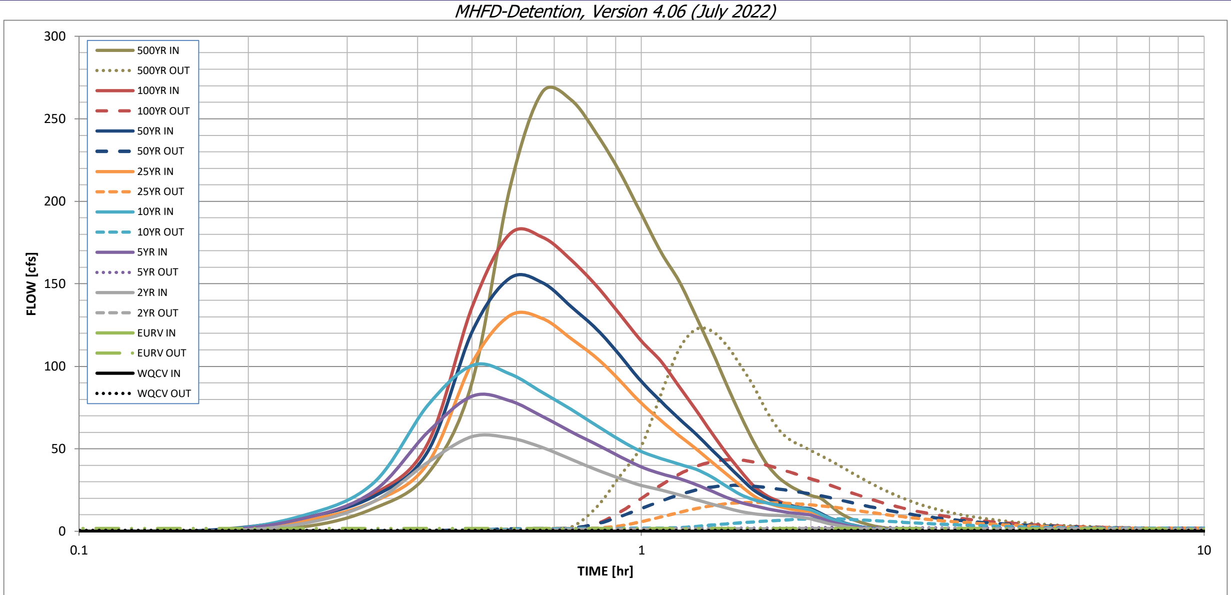
Routed Hydrograph Results

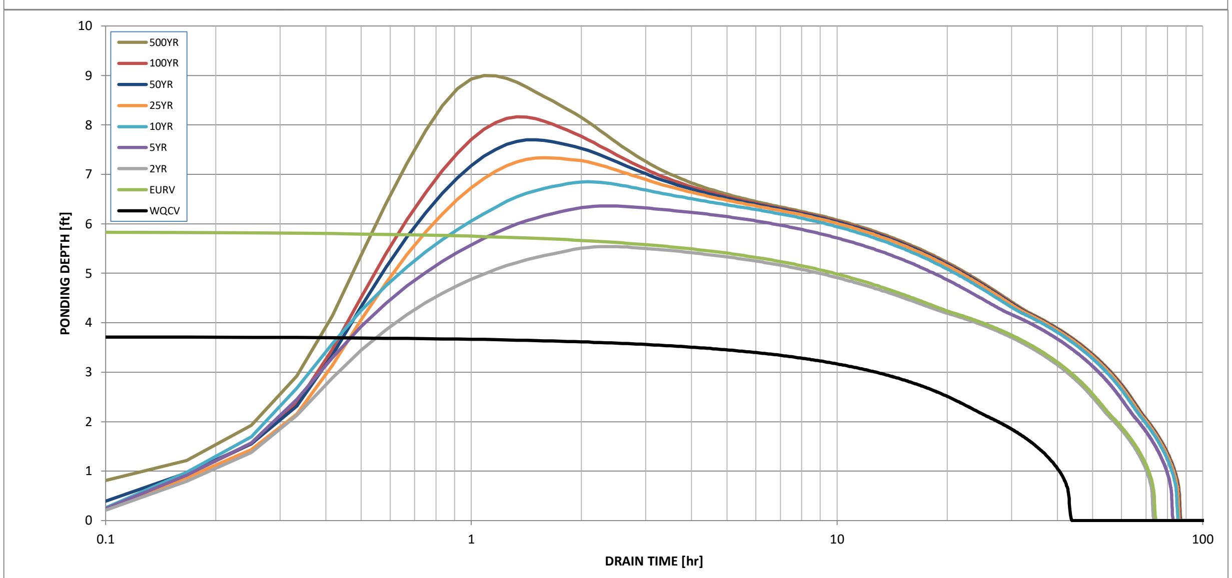
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

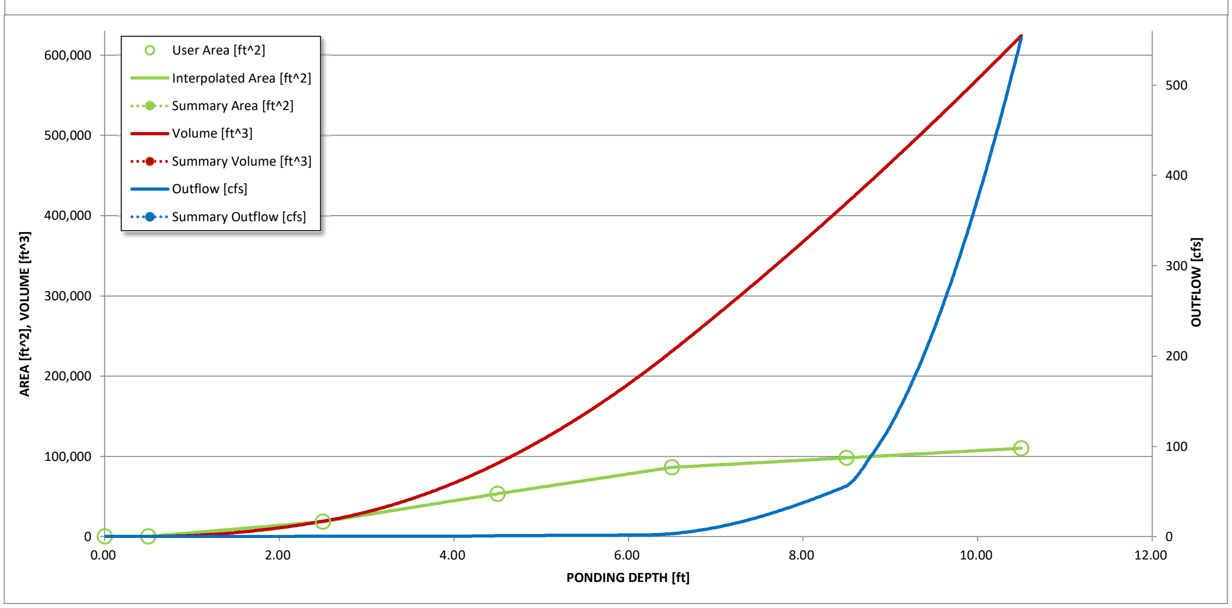
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.48
CUHP Runoff Volume (acre-ft) =	1.261	4.081	3.833	5.369	6.703	8.433	9.867	11.660	17.390
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.833	5.369	6.703	8.433	9.867	11.660	17.390
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	6.6	18.7	28.4	50.9	63.9	81.9	132.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.27	0.42	0.75	0.94	1.20	1.95
Peak Inflow Q (cfs) =	N/A	N/A	57.4	81.9	100.5	130.6	153.4	180.2	266.3
Peak Outflow Q (cfs) =	0.6	1.8	1.7	2.4	7.6	17.5	27.8	43.3	122.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.3	0.3	0.4	0.5	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.0	0.2	0.6	1.0	1.6	2.5
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	65	72	72	70	68	66	61
Time to Drain 99% of Inflow Volume (hours) =	**42**	71	70	78	80	80	79	78	75
Maximum Ponding Depth (ft) =	3.72	5.85	5.54	6.36	6.85	7.33	7.70	8.16	9.00
Area at Maximum Ponding Depth (acres) =	0.92	1.74	1.62	1.93	2.03	2.10	2.15	2.21	2.32
Maximum Volume Stored (acre-ft) =	1.262	4.098	3.561	5.033	6.009	7.000	7.784	8.786	10.666

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	0.53	0.05	2.63
	0:15:00	0.00	0.00	4.70	7.69	9.53	6.40	8.12	7.82	13.74
	0:20:00	0.00	0.00	17.91	23.96	29.10	17.94	21.01	22.34	34.78
	0:25:00	0.00	0.00	41.77	59.94	76.12	40.96	48.16	52.93	90.20
	0:30:00	0.00	0.00	57.35	81.94	100.54	102.08	120.79	135.81	207.63
	0:35:00	0.00	0.00	56.57	79.11	95.49	130.62	153.39	180.21	266.28
	0:40:00	0.00	0.00	50.73	69.58	84.08	129.02	150.63	178.31	261.48
	0:45:00	0.00	0.00	43.64	60.33	73.83	116.71	136.08	164.40	240.61
	0:50:00	0.00	0.00	37.24	52.62	64.00	105.00	122.44	148.47	217.34
	0:55:00	0.00	0.00	31.99	45.25	55.20	91.13	106.40	131.22	192.11
	1:00:00	0.00	0.00	27.83	39.04	48.36	77.54	90.68	115.29	169.06
	1:05:00	0.00	0.00	25.03	34.97	44.05	67.12	78.69	102.98	151.65
	1:10:00	0.00	0.00	22.08	31.93	40.72	58.04	68.20	87.87	130.27
	1:15:00	0.00	0.00	19.18	28.40	37.53	50.06	58.92	73.47	109.79
	1:20:00	0.00	0.00	16.55	24.39	32.92	42.11	49.53	59.70	89.24
	1:25:00	0.00	0.00	14.10	20.64	27.29	34.72	40.77	47.29	70.46
	1:30:00	0.00	0.00	12.03	17.53	22.31	27.68	32.36	36.58	54.32
	1:35:00	0.00	0.00	10.64	15.51	19.11	21.50	24.99	27.57	41.15
	1:40:00	0.00	0.00	9.94	13.74	17.23	17.55	20.34	21.80	32.82
	1:45:00	0.00	0.00	9.61	12.33	15.97	15.17	17.51	18.33	27.69
	1:50:00	0.00	0.00	9.41	11.34	15.08	13.63	15.66	15.96	24.16
	1:55:00	0.00	0.00	8.49	10.60	14.20	12.58	14.38	14.31	21.69
	2:00:00	0.00	0.00	7.49	9.83	12.95	11.89	13.53	13.13	19.90
	2:05:00	0.00	0.00	5.96	7.86	10.28	9.54	10.83	10.27	15.55
	2:10:00	0.00	0.00	4.50	5.89	7.68	7.08	8.01	7.46	11.28
	2:15:00	0.00	0.00	3.41	4.43	5.71	5.29	5.97	5.55	8.36
	2:20:00	0.00	0.00	2.56	3.30	4.22	3.93	4.43	4.14	6.21
	2:25:00	0.00	0.00	1.90	2.43	3.09	2.90	3.26	3.08	4.61
	2:30:00	0.00	0.00	1.39	1.74	2.25	2.10	2.35	2.24	3.36
	2:35:00	0.00	0.00	0.99	1.23	1.63	1.52	1.70	1.63	2.43
	2:40:00	0.00	0.00	0.69	0.87	1.16	1.10	1.23	1.18	1.76
	2:45:00	0.00	0.00	0.45	0.59	0.77	0.75	0.84	0.80	1.19
	2:50:00	0.00	0.00	0.26	0.36	0.46	0.47	0.52	0.50	0.73
	2:55:00	0.00	0.00	0.13	0.19	0.24	0.25	0.28	0.26	0.38
	3:00:00	0.00	0.00	0.05	0.08	0.09	0.10	0.11	0.10	0.14
	3:05:00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

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

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

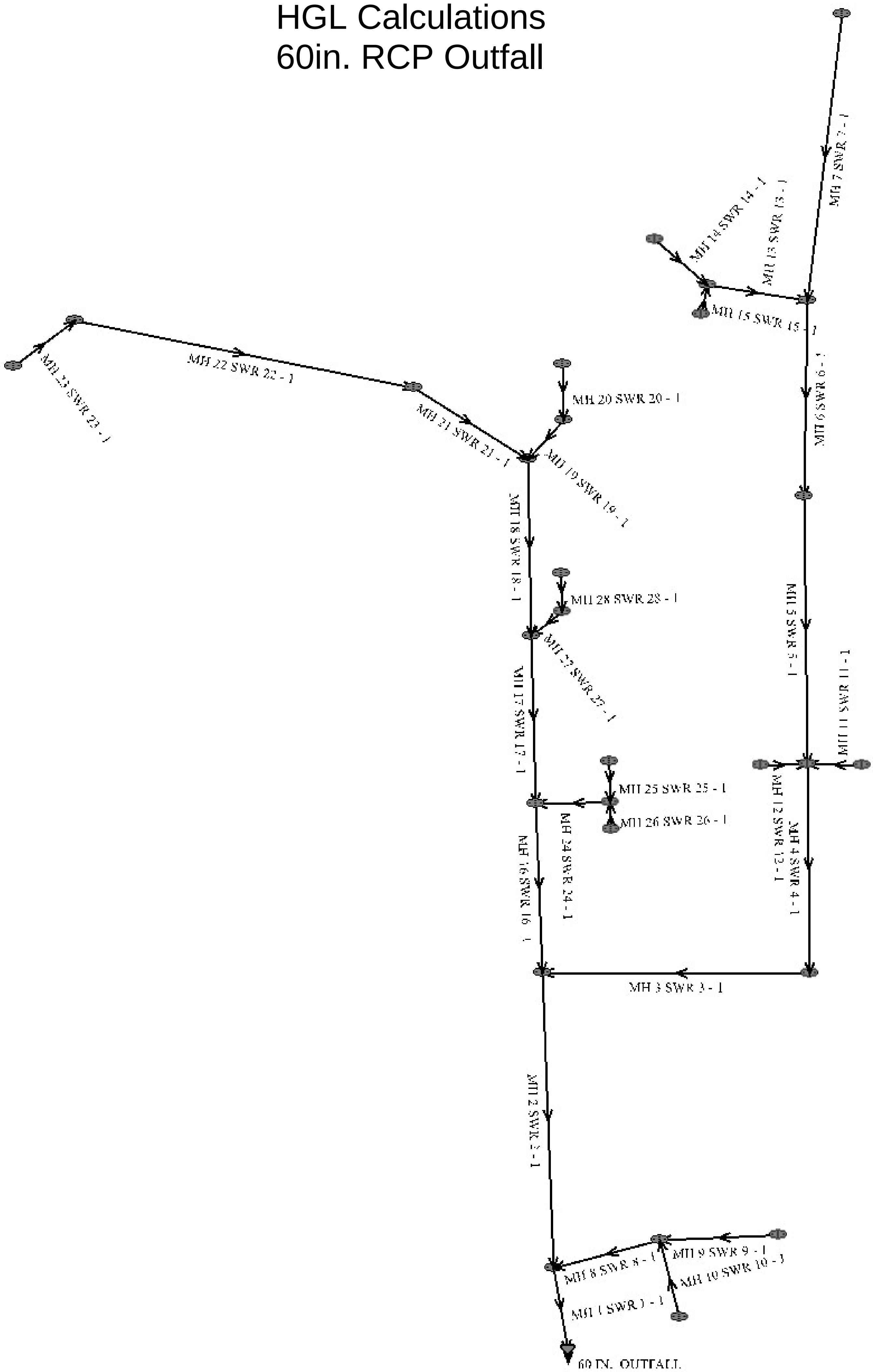
Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

HGL CALCULATIONS

HGL Calculations
60in. RCP Outfall



100-yr HGL Calculations – 60in. RCP Outfall

System Input Summary

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in): 0.42
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): 7039.66

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)**
60 IN. OUTFALL	7041.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 1 SWR 1 - 1	7044.20	166.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 8 SWR 8 - 1	7043.34	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 9 SWR 9 - 1	7043.76	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 10 SWR 10 - 1	7043.33	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 2 SWR 2 - 1	7050.70	160.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 3 SWR 3 - 1	7049.41	124.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 4 SWR 4 - 1	7052.80	124.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 12 SWR 12 - 1	7053.01	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 11 SWR 11 - 1	7053.01	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 5 SWR 5 - 1	7061.65	115.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 6 SWR 6 - 1	7067.96	115.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 13 SWR 13 - 1	7066.97	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 14 SWR 14 - 1	7067.33	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 15 SWR 15 - 1	7067.28	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 7 SWR 7 - 1	7081.62	106.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MH 16 SWR 16 - 1	7050.67	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 17 SWR 17 - 1	7052.79	35.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 18 SWR 18 - 1	7057.28	22.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 19 SWR 19 - 1	7056.87	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 20 SWR 20 - 1	7056.87	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 21 SWR 21 - 1	7056.90	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 22 SWR 22 - 1	7063.97	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 23 SWR 23 - 1	7063.76	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 27 SWR 27 - 1	7052.70	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 28 SWR 28 - 1	7052.70	11.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 24 SWR 24 - 1	7049.76	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 26 SWR 26 - 1	7050.07	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 25 SWR 25 - 1	7050.07	6.00	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**
60 IN. OUTFALL	0.00	0.00	0.00	0.00	0.00	85.51	1.94	0.12	166.00	
MH 1 SWR 1 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	166.00	
MH 8 SWR 8 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
MH 9 SWR 9 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	
MH 10 SWR 10 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30	

MH 2 SWR 2 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	160.00	
MH 3 SWR 3 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.00	
MH 4 SWR 4 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.00	
MH 12 SWR 12 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30	
MH 11 SWR 11 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	
MH 5 SWR 5 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.00	
MH 6 SWR 6 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.00	
MH 13 SWR 13 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	
MH 14 SWR 14 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	
MH 15 SWR 15 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	
MH 7 SWR 7 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106.00	
MH 16 SWR 16 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.00	
MH 17 SWR 17 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.00	
MH 18 SWR 18 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.00	
MH 19 SWR 19 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	
MH 20 SWR 20 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00	
MH 21 SWR 21 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
MH 22 SWR 22 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
MH 23 SWR 23 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
MH 27 SWR 27 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	
MH 28 SWR 28 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	
MH 24 SWR 24 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	
MH 26 SWR 26 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	
MH 25 SWR 25 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	

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)
MH 1 SWR 1 - 1	60.00	7035.50	0.6	7035.86	0.013	0.03	1.00	CIRCULAR	60.00 in	60.00 in
MH 8 SWR 8 - 1	34.39	7038.38	0.8	7038.66	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 9 SWR 9 - 1	48.55	7039.16	0.8	7039.55	0.013	0.05	0.00	CIRCULAR	18.00 in	18.00 in
MH 10 SWR 10 - 1	37.60	7039.16	0.7	7039.42	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 2 SWR 2 - 1	400.64	7036.38	0.6	7038.78	0.013	0.05	0.92	CIRCULAR	60.00 in	60.00 in
MH 3 SWR 3 - 1	347.00	7039.28	0.6	7041.36	0.013	1.32	1.00	CIRCULAR	54.00 in	54.00 in
MH 4 SWR 4 - 1	391.92	7041.86	0.8	7045.00	0.013	1.32	1.00	CIRCULAR	54.00 in	54.00 in
MH 12 SWR 12 - 1	5.17	7047.00	4.0	7047.21	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 11 SWR 11 - 1	24.17	7047.00	4.0	7047.97	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 5 SWR 5 - 1	585.00	7045.53	1.4	7053.72	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
MH 6 SWR 6 - 1	192.17	7054.32	1.6	7057.39	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
MH 13 SWR 13 - 1	80.02	7059.41	3.0	7061.81	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 14 SWR 14 - 1	27.22	7062.31	1.0	7062.58	0.013	0.63	0.00	CIRCULAR	24.00 in	24.00 in
MH 15 SWR 15 - 1	6.16	7062.81	4.2	7063.07	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 7 SWR 7 - 1	484.19	7057.98	2.0	7067.66	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
MH 16 SWR 16 - 1	295.00	7040.19	1.1	7043.43	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
MH 17 SWR 17 - 1	273.50	7043.93	0.8	7046.12	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
MH 18 SWR 18 - 1	267.31	7046.52	1.5	7050.53	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
MH 19 SWR 19 - 1	23.50	7051.03	2.3	7051.57	0.013	0.25	1.00	CIRCULAR	24.00 in	24.00 in
MH 20 SWR 20 - 1	35.34	7051.77	1.0	7052.12	0.013	0.38	1.00	CIRCULAR	24.00 in	24.00 in

MH 21 SWR 21 - 1	38.67	7051.53	1.5	7052.11	0.013	0.38	0.00	CIRCULAR	18.00 in	18.00 in
MH 22 SWR 22 - 1	282.48	7052.61	2.0	7058.26	0.013	0.38	1.00	CIRCULAR	18.00 in	18.00 in
MH 23 SWR 23 - 1	29.62	7058.76	1.7	7059.26	0.013	0.38	1.00	CIRCULAR	18.00 in	18.00 in
MH 27 SWR 27 - 1	8.26	7047.00	1.0	7047.08	0.013	0.83	0.00	CIRCULAR	24.00 in	24.00 in
MH 28 SWR 28 - 1	35.34	7047.25	1.0	7047.60	0.013	0.94	0.00	CIRCULAR	24.00 in	24.00 in
MH 24 SWR 24 - 1	74.48	7044.45	0.9	7045.12	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 26 SWR 26 - 1	6.17	7045.62	4.1	7045.87	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 25 SWR 25 - 1	25.17	7045.62	1.0	7045.87	0.013	1.32	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**
MH 1 SWR 1 - 1	202.28	10.30	44.32	10.68	41.37	11.50	1.15	Supercritical	166.00	0.00	
MH 8 SWR 8 - 1	20.29	6.46	11.26	4.83	9.72	5.86	1.33	Pressurized	7.00	34.39	
MH 9 SWR 9 - 1	9.42	5.33	9.18	4.41	8.19	5.11	1.25	Pressurized	4.00	48.55	
MH 10 SWR 10 - 1	8.81	4.99	8.30	4.14	7.63	4.63	1.18	Pressurized	3.30	37.60	
MH 2 SWR 2 - 1	202.28	10.30	43.52	10.49	40.26	11.42	1.17	Supercritical	160.00	0.00	
MH 3 SWR 3 - 1	152.73	9.60	39.33	9.99	36.93	10.70	1.13	Pressurized	124.00	347.00	
MH 4 SWR 4 - 1	176.36	11.09	39.33	9.99	33.39	12.01	1.38	Supercritical Jump	124.00	187.39	
MH 12 SWR 12 - 1	21.07	11.92	8.30	4.14	4.82	8.68	2.86	Pressurized	3.30	5.17	

MH 11 SWR 11 - 1	45.37	14.44	12.08	5.05	6.82	10.88	3.00	Supercritical Jump	8.00	22.11	
MH 5 SWR 5 - 1	170.42	13.56	38.83	10.56	28.88	14.56	1.81	Supercritical	115.00	0.00	
MH 6 SWR 6 - 1	182.19	14.50	38.83	10.56	27.67	15.33	1.96	Supercritical	115.00	0.00	
MH 13 SWR 13 - 1	39.29	12.51	14.93	5.84	9.10	10.99	2.58	Supercritical Jump	12.00	37.51	
MH 14 SWR 14 - 1	22.68	7.22	13.58	5.46	11.15	6.99	1.46	Supercritical	10.00	0.00	
MH 15 SWR 15 - 1	21.59	12.21	6.56	3.60	3.79	7.75	2.90	Supercritical	2.10	0.00	
MH 7 SWR 7 - 1	203.69	16.21	37.39	10.09	24.58	16.37	2.27	Supercritical	106.00	0.00	
MH 16 SWR 16 - 1	70.14	9.92	25.63	7.99	20.37	10.42	1.56	Supercritical Jump	43.00	122.44	
MH 17 SWR 17 - 1	36.79	7.49	24.11	8.28	23.38	8.53	1.07	Supercritical	35.00	0.00	
MH 18 SWR 18 - 1	50.37	10.26	19.14	6.66	13.87	9.91	1.85	Supercritical Jump	22.00	29.17	
MH 19 SWR 19 - 1	34.40	10.95	17.30	6.60	11.50	10.75	2.20	Supercritical	16.00	0.00	
MH 20 SWR 20 - 1	22.68	7.22	15.56	6.03	13.02	7.47	1.41	Supercritical	13.00	0.00	
MH 21 SWR 21 - 1	12.90	7.30	12.29	5.45	9.45	7.45	1.66	Supercritical	7.00	0.00	
MH 22 SWR 22 - 1	14.90	8.43	12.29	5.45	8.68	8.30	1.95	Supercritical	7.00	0.00	
MH 23 SWR 23 - 1	13.73	7.77	12.29	5.45	9.10	7.81	1.78	Supercritical	7.00	0.00	
MH 27 SWR 27 - 1	22.68	7.22	17.30	6.60	14.87	7.82	1.34	Pressurized	16.00	8.26	
MH 28 SWR 28 - 1	22.68	7.22	14.27	5.65	11.79	7.17	1.44	Pressurized	11.00	35.34	
MH 24 SWR 24 - 1	21.52	6.85	13.58	5.46	11.50	6.72	1.37	Supercritical Jump	10.00	22.30	
MH 26 SWR 26 - 1	21.33	12.07	9.18	4.41	5.28	9.25	2.90	Supercritical	4.00	0.00	
MH 25 SWR 25 - 1	10.53	5.96	11.35	5.11	9.73	6.15	1.34	Supercritical	6.00	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
MH 1 SWR 1 - 1	166.00	CIRCULAR	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	19.63	
MH 8 SWR 8 - 1	7.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
MH 9 SWR 9 - 1	4.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 10 SWR 10 - 1	3.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 2 SWR 2 - 1	160.00	CIRCULAR	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	19.63	
MH 3 SWR 3 - 1	124.00	CIRCULAR	54.00 in	54.00 in	54.00 in	54.00 in	54.00 in	54.00 in	15.90	
MH 4 SWR 4 - 1	124.00	CIRCULAR	54.00 in	54.00 in	48.00 in	48.00 in	54.00 in	54.00 in	15.90	
MH 12 SWR 12 - 1	3.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 11 SWR 11 - 1	8.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
MH 5 SWR 5 - 1	115.00	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	
MH 6 SWR 6 - 1	115.00	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	
MH 13 SWR 13 - 1	12.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
MH 14 SWR 14 - 1	10.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
MH 15 SWR 15 - 1	2.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 7 SWR 7 - 1	106.00	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	

MH 16 SWR 16 - 1	43.00	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
MH 17 SWR 17 - 1	35.00	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	
MH 18 SWR 18 - 1	22.00	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
MH 19 SWR 19 - 1	16.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
MH 20 SWR 20 - 1	13.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
MH 21 SWR 21 - 1	7.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 22 SWR 22 - 1	7.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 23 SWR 23 - 1	7.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 27 SWR 27 - 1	16.00	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
MH 28 SWR 28 - 1	11.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
MH 24 SWR 24 - 1	10.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
MH 26 SWR 26 - 1	4.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 25 SWR 25 - 1	6.00	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:

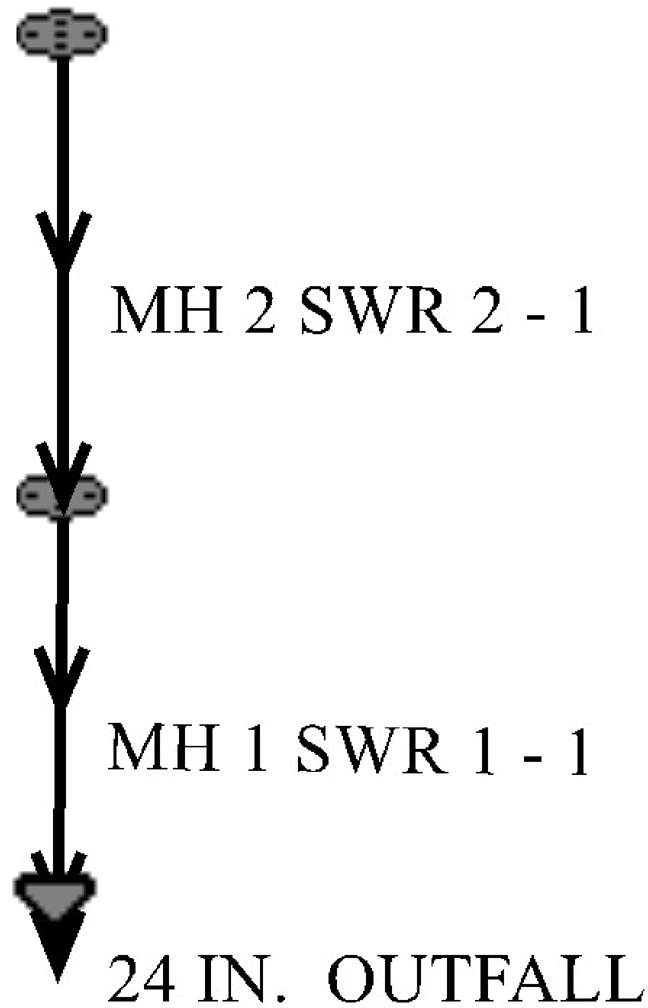
Tailwater Elevation (ft): 7039.66

	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)**
MH 1 SWR 1 - 1	7035.50	7035.86	0.00	0.00	7039.66	7039.66	7041.00	0.33	7041.33
MH 8 SWR 8 - 1	7038.38	7038.66	0.10	0.00	7041.35	7041.39	7041.43	0.03	7041.46
MH 9 SWR 9 - 1	7039.16	7039.55	0.00	0.00	7041.39	7041.46	7041.47	0.07	7041.54
MH 10 SWR 10 - 1	7039.16	7039.42	0.07	0.00	7041.48	7041.52	7041.54	0.04	7041.57
MH 2 SWR 2 - 1	7036.38	7038.78	0.05	0.16	7039.87	7042.41	7041.76	2.36	7044.12
MH 3 SWR 3 - 1	7039.28	7041.36	1.25	0.09	7044.50	7045.88	7045.45	1.37	7046.82
MH 4 SWR 4 - 1	7041.86	7045.00	1.25	0.00	7047.12	7048.28	7048.07	1.76	7049.83
MH 12 SWR 12 - 1	7047.00	7047.21	0.07	0.00	7049.85	7049.85	7049.90	0.01	7049.90
MH 11 SWR 11 - 1	7047.00	7047.97	0.13	0.00	7049.86	7049.88	7049.96	0.03	7049.99
MH 5 SWR 5 - 1	7045.53	7053.72	0.07	0.00	7048.34	7056.96	7051.23	7.46	7058.69
MH 6 SWR 6 - 1	7054.32	7057.39	0.07	0.00	7057.02	7060.63	7060.27	2.09	7062.36
MH 13 SWR 13 - 1	7059.41	7061.81	0.30	0.00	7062.43	7063.05	7062.66	0.93	7063.58
MH 14 SWR 14 - 1	7062.31	7062.58	0.10	0.00	7063.24	7063.71	7064.00	0.18	7064.17
MH 15 SWR 15 - 1	7062.81	7063.07	0.03	0.00	7063.13	7064.01	7064.06	0.00	7064.06
MH 7 SWR 7 - 1	7057.98	7067.66	0.06	0.20	7060.88	7070.78	7064.19	8.17	7072.36
MH 16 SWR 16 - 1	7040.19	7043.43	0.03	0.46	7044.03	7045.57	7044.60	1.96	7046.56
MH 17 SWR 17 - 1	7043.93	7046.12	0.04	0.00	7045.88	7048.13	7047.01	2.18	7049.19

MH 18 SWR 18 - 1	7046.52	7050.53	0.02	0.48	7049.37	7052.12	7049.69	3.13	7052.81
MH 19 SWR 19 - 1	7051.03	7051.57	0.10	0.00	7052.23	7053.31	7053.78	0.00	7053.78
MH 20 SWR 20 - 1	7051.77	7052.12	0.10	0.14	7053.75	7053.75	7054.02	0.08	7054.10
MH 21 SWR 21 - 1	7051.53	7052.11	0.09	0.00	7052.32	7053.13	7053.18	0.42	7053.59
MH 22 SWR 22 - 1	7052.61	7058.26	0.09	0.00	7053.33	7059.28	7054.40	5.34	7059.74
MH 23 SWR 23 - 1	7058.76	7059.26	0.09	0.00	7059.52	7060.28	7060.46	0.28	7060.74
MH 27 SWR 27 - 1	7047.00	7047.08	0.33	0.00	7049.12	7049.17	7049.53	0.04	7049.57
MH 28 SWR 28 - 1	7047.25	7047.60	0.18	0.00	7049.56	7049.64	7049.75	0.08	7049.83
MH 24 SWR 24 - 1	7044.45	7045.12	0.21	0.00	7046.61	7046.61	7046.76	0.09	7046.85
MH 26 SWR 26 - 1	7045.62	7045.87	0.11	0.00	7046.71	7047.30	7047.39	0.00	7047.39
MH 25 SWR 25 - 1	7045.62	7045.87	0.24	0.00	7046.86	7046.86	7047.09	0.13	7047.23

- 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.

100-yr. HGL Calculations
24in. RCP Outfall



100-yr. HGL Calculations – 24in. RCP Outfall

System Input Summary

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in): 0.42
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): 7039.66

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)
24 IN. OUTFALL	7041.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 1 SWR 1 - 1	7042.50	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH 2 SWR 2 - 1	7050.70	11.00	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

24 IN. OUTFALL	0.00	0.00	0.00	0.00	0.00	6.21	1.93	0.18	12.00	
MH 1 SWR 1 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	
MH 2 SWR 2 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	

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)**
MH 1 SWR 1 - 1	42.00	7037.00	1.0	7037.42	0.013	0.03	1.00	CIRCULAR	24.00 in	24.00 in
MH 2 SWR 2 - 1	35.34	7037.62	1.0	7037.97	0.013	0.05	0.92	CIRCULAR	24.00 in	24.00 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**

MH 1 SWR 1 - 1	22.68	7.22	14.93	5.84	12.41	7.32	1.43	Pressurized	12.00	42.00	
MH 2 SWR 2 - 1	22.68	7.22	14.27	5.65	11.79	7.17	1.44	Supercritical Jump	11.00	33.74	

- 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**
MH 1 SWR 1 - 1	12.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
MH 2 SWR 2 - 1	11.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	

- 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.

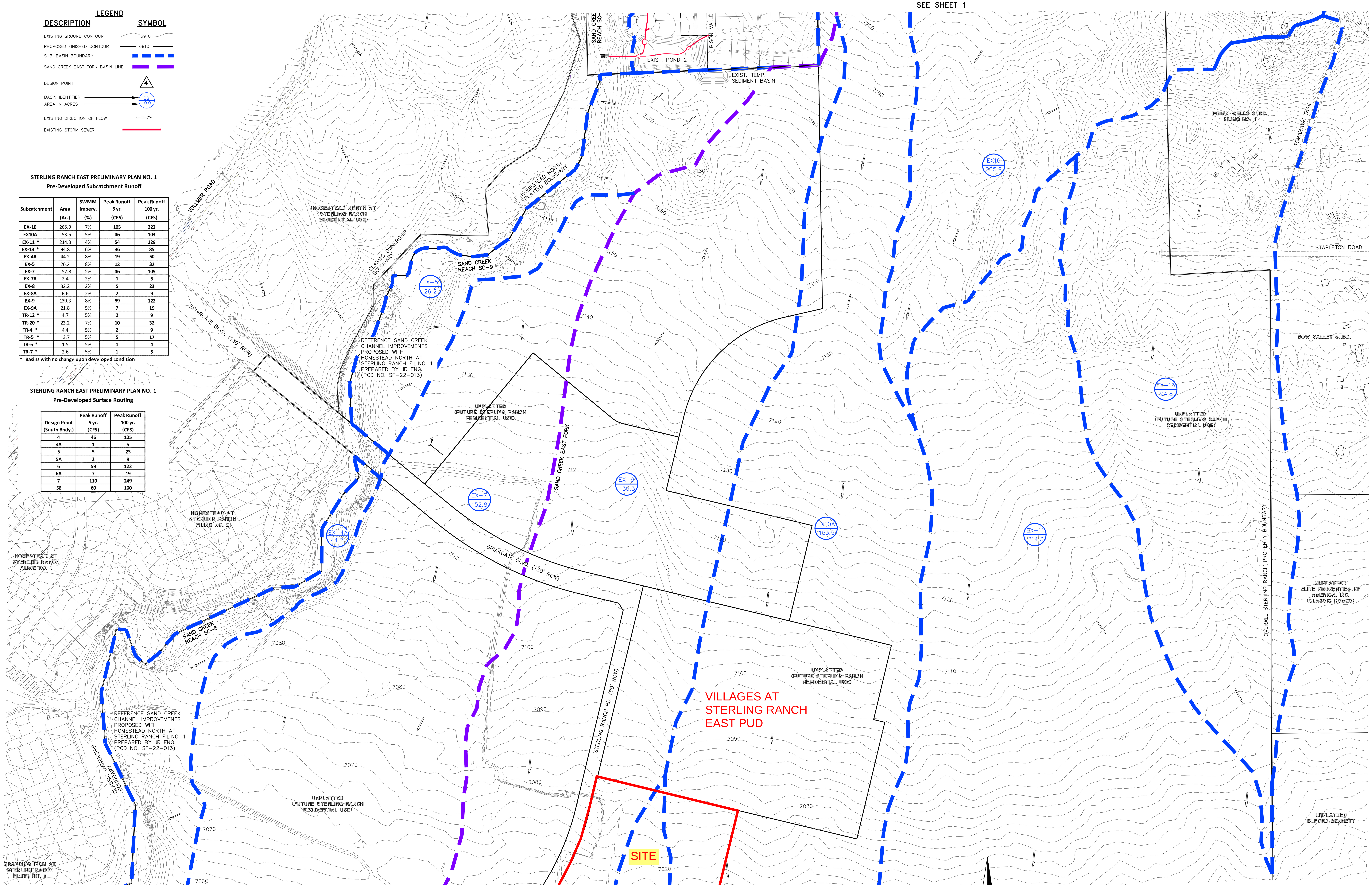
Grade Line Summary:

Tailwater Elevation (ft): 7039.66

	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)**
MH 1 SWR 1 - 1	7037.00	7037.42	0.00	0.00	7039.66	7039.78	7039.89	0.12	7040.00
MH 2 SWR 2 - 1	7037.62	7037.97	0.01	0.05	7039.87	7039.95	7040.07	0.08	7040.14

- 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.

DRAINAGE MAPS



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

* Basins with no change upon developed condition

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

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 2 OF 6
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.22

NOTE:

THE FOLLOWING LABELS AS SHOWN ALONG THE SOUTH BOUNDARY REPRESENT PRE-DEVELOPED FLOWS AS PRESENTED IN THE 2018 STERLING RANCH MDDP. SEE REFERENCE MATERIAL IN APPENDIX FOR ORIGINAL MAP.

(PER STERLING RANCH 2018 MDDP DP-5)
Q5 YR. = 1.7 CFS
Q100 YR. = 20.5 CFS

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

* Basins with no change upon developed condition

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

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

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 3 OF 6
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.22

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS

811

UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

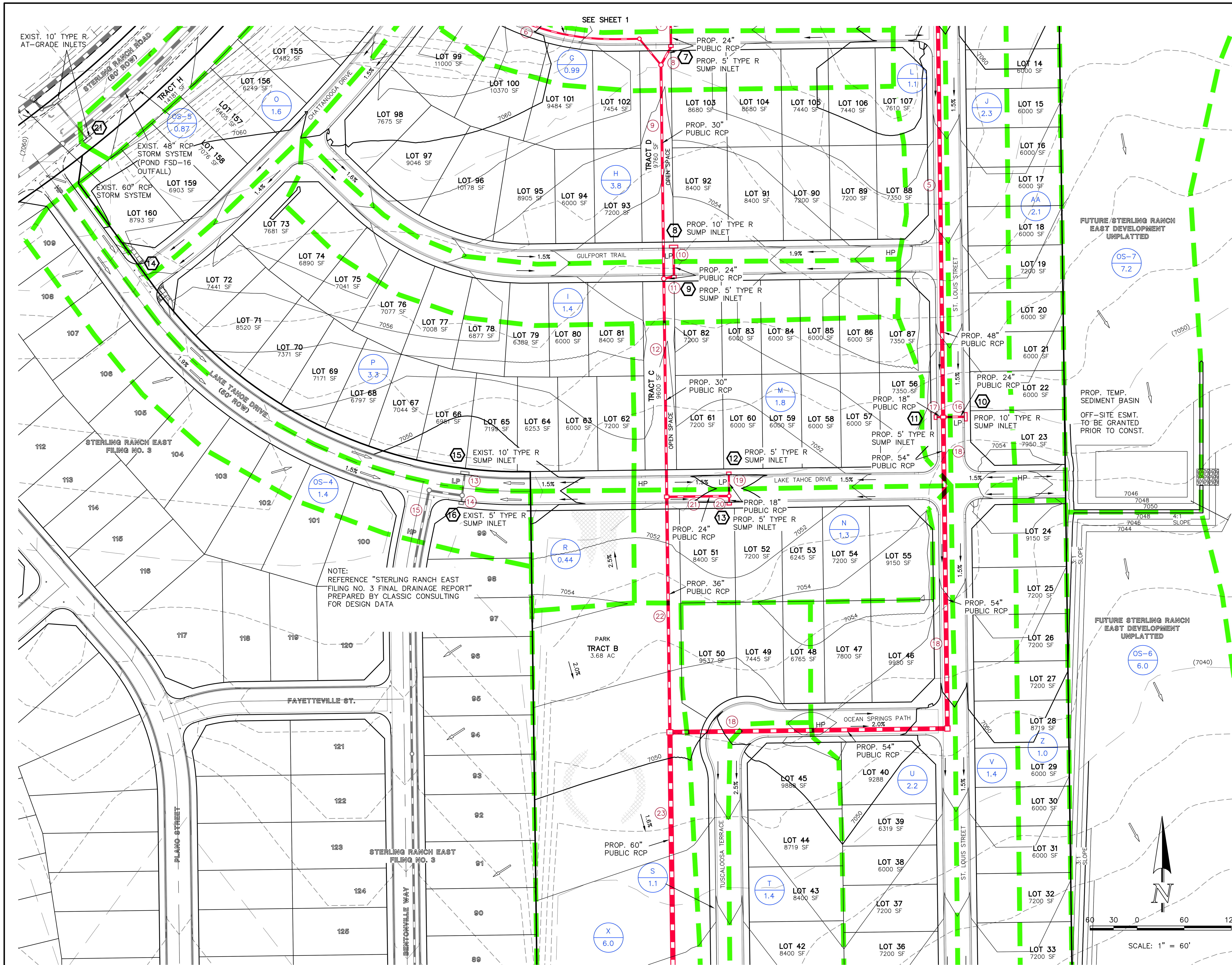
MARC A. WHORTON, COLORADO P.E. #37155 DATE

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

STERLING RANCH EAST FILING NO. 5
FINAL PLAT
FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE		DATE	7/22/24
DRAWN BY	MAW	(H) 1"= 60'		SHEET 1	OF 3
CHECKED BY		(V) 1"= N/A		JOB NO.	1183.25

SEE SHEET 1



SEE SHEET 3

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

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	OS-1	1.76	2.02	14.0	3.62	6.08	6	12	Exist. 15' Type R At-Grade Inlet
2	OS-2, Flow-By from DP-1	0.35	0.72	16.6	3.37	5.65	1	4	Exist. Crosspan
3	OS-3, A, B	1.31	1.82	16.4	3.39	5.68	4	10	Prop. 10' Type R Sump Inlet
4	C	0.23	0.33	12.1	3.84	6.45	0.9	2.1	Prop. 5' Type R Sump Inlet
5	D	1.39	2.02	20.2	3.07	5.16	4	10	Prop. 10' Type R At-Grade Inlet
6	E, F	1.45	2.31	15.9	3.43	5.76	5	13	Prop. 10' Type R Sump Inlet
7	G	0.36	0.53	11.8	3.88	6.52	1.4	3.5	Prop. 5' Type R Sump Inlet
8	H	1.38	2.04	17.1	3.32	5.57	5	11	Prop. 10' Type R Sump Inlet
9	I	0.51	0.75	13.4	3.69	6.19	2	5	Prop. 5' Type R Sump Inlet
10	J	0.86	1.25	13.2	3.72	6.24	3	8	Prop. 10' Type R Sump Inlet
11	L	0.41	0.60	18.1	3.24	5.44	1.3	3.3	Prop. 5' Type R Sump Inlet
12	M	0.63	0.95	15.4	3.48	5.84	2	6	Prop. 5' Type R Sump Inlet
13	N	0.45	0.69	15.4	3.48	5.84	2	4	Prop. 5' Type R Sump Inlet
14	O and DP-5 Flow-By	0.61	1.46	21.2	3.00	5.03	2	7	Prop. 6' Crosspan
15	P and DP-14	1.85	3.26	22.2	2.93	4.92	5	16	Exist. 10' Type R Sump Inlet
16	OS-4, R	0.63	0.97	14.4	3.58	6.01	2	6	Exist. 5' Type R Sump Inlet
17	S	0.41	0.60	18.1	3.24	5.44	1.3	3.3	Prop. 5' Type R Sump Inlet
18	T	0.53	0.76	16.7	3.36	5.64	2	4	Prop. 5' Type R Sump Inlet
19	U, V	1.35	1.96	18.1	3.24	5.44	4	11	Prop. 10' Type R Sump Inlet
20	W	0.15	0.17	5.0	5.17	8.68	0.8	1.4	Prop. 5' Type R Sump Inlet
21	OS-5, Flow-by from DP-2	0.83	1.34	19.7	3.11	5.22	3	7	Exist. 10' Type R At-Grade Inlet
	TOTAL BASINS TRIBUTARY TO POND FSD-14B	**27.06**	**38.31**	**23.1**	**2.88**	**4.83**	**78**	**185**	
	TOTAL BASINS TRIBUTARY TO POND FSD-14B (VILLAGES NOT DEV.)	**12.12**	**18.54**	**23.1**	**2.88**	**4.83**	**35**	**89**	
6 (MDDP) SOUTH BNDY.	**POND FSD-14B RELEASE AND BASIN Y1**	**REF. MHFD-DETENTION SPREADSHEET FOR CALCULATIONS**					**2.4**	**43.4**	Sheet flow from Level Spreader & Basin Y1
6A (MDDP) SOUTH BNDY.	**BASIN Y2**	**0.20**	**0.66**	**7.1**	**4.65**	**7.81**	**0.9**	**5.2**	Sheet flow

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

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	**P4-B FUTURE VILLAGES AT STERLING RANCH PP**	**14.94**	**19.77**	**18.7**	**3.19**	**5.35**	**48**	**106**	**PROP. 48" RCP**
2	DP-3	1.31	1.82	16.4	3.39	5.68	4	10	PROP. 24" RCP
3	DP-4	0.23	0.33	12.1	3.84	6.45	0.9	2.1	PROP. 18" RCP
4	PR-2, PR-3	1.54	2.15	16.6	3.37	5.65	5	12	PROP. 24" RCP
5	**PR-1, PR-4**	**16.48**	**21.92**	**19.5**	**3.12**	**5.25**	**52**	**115**	**PROP. 48" RCP**
6	DP-5 COLLECTION	1.37	1.43	20.5	3.05	5.12	4	7	PROP. 18" RCP
7	DP-6	1.45	2.31	15.9	3.43	5.76	5	13	PROP. 24" RCP
8	PR-7, DP-7	1.81	2.84	15.9	3.43	5.76	6	16	PROP. 24" RCP
9	PR-6, PR-8	3.18	4.27	20.9	3.02	5.07	10	22	PROP. 30" RCP
10	DP-8	1.38	2.04	17.1	3.32	5.57	5	11	PROP. 24" RCP
11	PR-10, DP-9	1.89	2.80	17.1	3.32	5.57	6	16	PROP. 24" RCP
12	PR-9, PR-11	5.07	7.07	21.3	2.99	5.02	15	35	PROP. 30" RCP
13	**DP-15 (To Pond FSD-11B)**	**1.85**	**3.26**	**22.2**	**2.93**	**4.92**	**5**	**16**	**EXIST. 24" RCP**
14	**DP-16 (To Pond FSD-11B)**	**0.63**	**0.97**	**14.4**	**3.58**	**6.01**	**2**	**6**	**EXIST. 18" RCP**
15	**PR-13, PR-14 (To FSD-11B)**	**2.48**	**4.23**	**23.4**	**2.85**	**4.79**	**7**	**20**	**EXIST. 30" RCP**
16	DP-10	0.86	1.25	13.2	3.72	6.24	3	8	PROP. 24" RCP
17	DP-11	0.41	0.60	18.1	3.24	5.44	1.3	3.3	PROP. 18" RCP
18	**PR-5, PR-13, PR-14**	**17.76**	**23.78**	**19.7**	**3.11**	**5.22**	**55**	**124**	**PROP. 54" RCP**
19	DP-12	0.63	0.95	15.4	3.48	5.84	2	6	PROP. 18" RCP
20	DP-13	0.45	0.69	15.4	3.48	5.84	2	4	PROP. 18" RCP
21	PR-19, PR-20	1.08	1.64	15.5	3.47	5.82	4	10	PROP. 24" RCP
22	PR-12, PR-21	6.15	8.71	21.7	2.96	4.98	18	43	PROP. 36" RCP
23	**PR-18, PR-22**	**23.91**	**32.48**	**22.2**	**2.93**	**4.92**	**70**	**160**	**PROP. 60" RCP**
24	DP-17	0.41	0.60	18.1	3.24	5.44	1.3	3.3	PROP. 18" RCP
25	DP-18	0.53	0.76	16.7	3.36	5.64	2	4	PROP. 18" RCP
26	PR-24, PR-25	0.94	1.36	18.1	3.24	5.44	3	7	PROP. 24" RCP
27	**PR-23, PR-26 (IN-FLOW ULTIMATE CONDITION)**	**24.85**	**33.85**	**22.3**	**2.92**	**4.91**	**73**	**166**	**PROP. 60" RCP**
27	**PR-20, PR-23 (IN-FLOW INTERIM CONDITION - VILLAGES NOT DEVELOPED)**	**9.91**	**14.08**	**20.3**	**3.06**	**5.14**	**30**	**72**	**PROP. 60" RCP**
28	DP-19	1.35	1.96	18.1	3.24	5.44	4	11	PROP. 24" RCP
29	**DP-20, PR-28**	**1.50**	**2.13**	**18.2**	**3.23**	**5.43**	**5**	**12**	**PROP. 24" RCP**

LEGEND

EXISTING GROUND CONTOUR 5910
PROPOSED FINISHED CONTOUR 5910
SUBDIVISION BOUNDARY
LOT LINE
PROPOSED 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

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS
811
UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

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NO.	REVISION	DATE

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MARC A. WHORTON, COLORADO P.E. #37155 DATE

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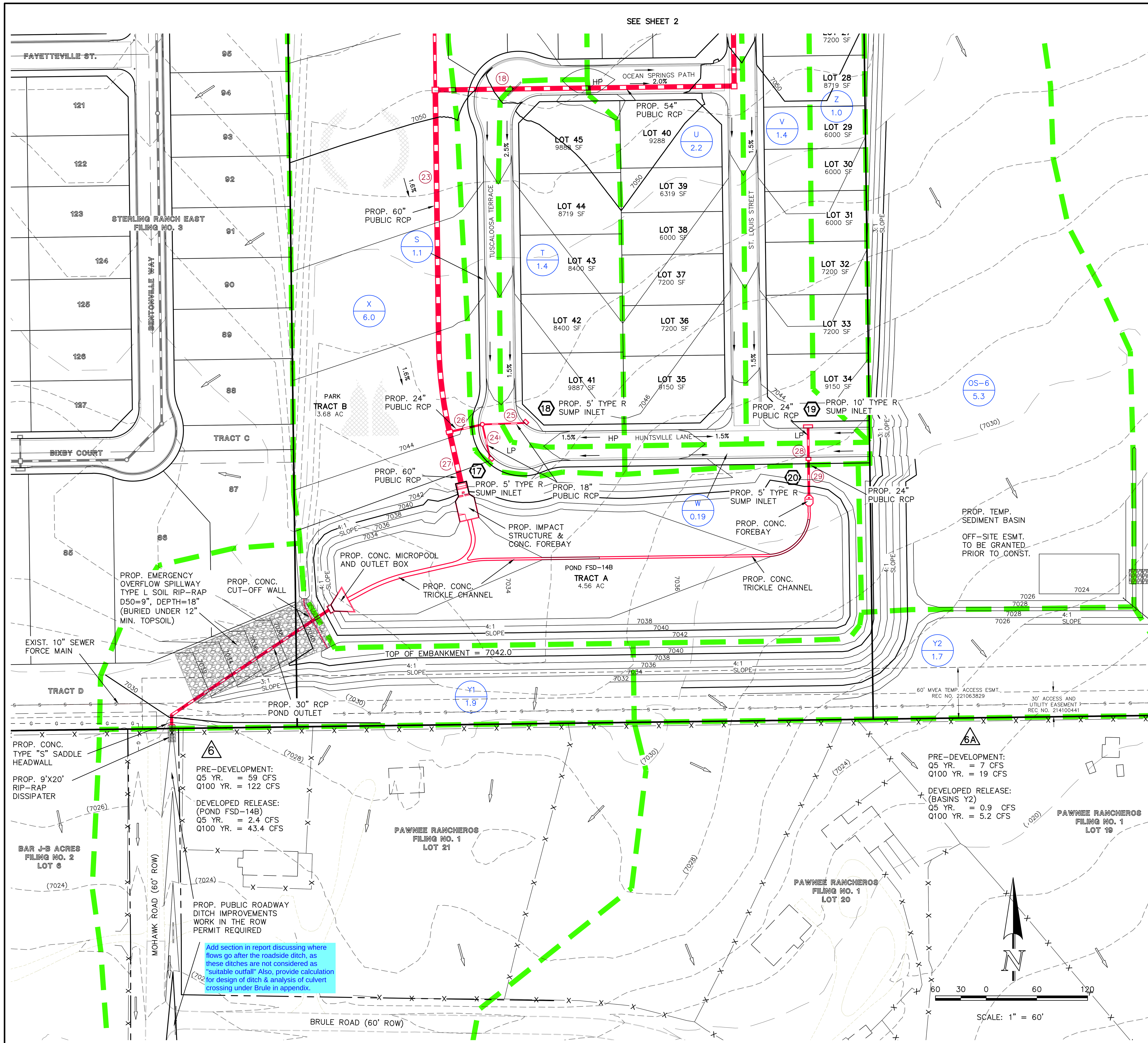
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

STERLING RANCH EAST FILING NO. 5
FINAL PLAT
FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY MAW	SCALE	DATE 7/22/24	
DRAWN BY MAW	(H) 1"= 60'	SHEET 2 OF 3	
CHECKED BY	(V) 1"= N/A	JOB NO. 1183.25	



FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	C VALUE DCM TABLE 6-6 LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(5)	C(100)	C VALUE DCM TABLE 6-6 LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(5)	C(100)	WEIGHTED "C" VALUE C(5)	C(100)	WEIGHTED CA CA(5)	CA(100)	DCM TABLE 6-6 WEIGHTED % IMPERVIOUS
A	0.70	RES 1/6 AC.	52.5%	0.70	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.26	0.38	52.5%
B	2.20	RES 1/6 AC.	52.5%	2.20	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.83	1.20	52.5%
C	0.61	RES 1/6 AC.	52.5%	0.61	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.23	0.33	52.5%
D	3.70	RES 1/6 AC.	52.5%	3.70	0.38	0.55			0.00	0.08	0.35	0.38	0.55	1.39	2.02	52.5%
E	0.90	RES 1/6 AC.	52.5%	0.90	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.34	0.49	52.5%
F	3.60	RES 1/6 AC.	52.5%	2.66	0.38	0.55	PARK	7.0%	0.94	0.12	0.39	0.31	0.50	1.11	1.82	40.6%
G	0.99	RES 1/6 AC.	52.5%	0.94	0.38	0.55	OPEN SPACE	7.0%	0.05	0.12	0.39	0.36	0.54	0.36	0.53	50.2%
H	3.80	RES 1/6 AC.	52.5%	3.63	0.38	0.55	OPEN SPACE	7.0%	0.17	0.12	0.39	0.36	0.54	1.38	2.04	50.5%
I	1.40	RES 1/6 AC.	52.5%	1.35	0.38	0.55	OPEN SPACE	7.0%	0.05	0.08	0.35	0.36	0.54	0.51	0.75	50.9%
J	2.30	RES 1/6 AC.	52.5%	2.30	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.86	1.25	52.5%
K	Not Used															
L	1.10	RES 1/6 AC.	52.5%	1.10	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.41	0.60	52.5%
M	1.80	RES 1/6 AC.	52.5%	1.63	0.38	0.55	OPEN SPACE	7.0%	0.17	0.12	0.39	0.35	0.53	0.63	0.95	48.2%
N	1.30	RES 1/6 AC.	52.5%	1.15	0.38	0.55	PARK	7.0%	0.15	0.12	0.39	0.35	0.53	0.45	0.69	47.3%
O	1.60	RES 1/6 AC.	52.5%	1.60	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.60	0.87	52.5%
P	3.30	RES 1/6 AC.	52.5%	3.30	0.38	0.55			0.00	0.08	0.35	0.38	0.55	1.24	1.80	52.5%
Q	Not Used															
R	0.44	STREET	100%	0.07	0.90	0.96	PARK	7.0%	0.37	0.12	0.39	0.24	0.48	0.11	0.21	21.8%
S	1.10	RES 1/6 AC.	52.5%	1.10	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.41	0.60	52.5%
T	1.40	RES 1/6 AC.	52.5%	1.40	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.53	0.76	52.5%
U	2.20	RES 1/6 AC.	52.5%	2.20	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.83	1.20	52.5%
V	1.40	RES 1/6 AC.	52.5%	1.40	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.53	0.76	52.5%
W	0.19	STREET	100%	0.16	0.90	0.96	OPEN SPACE	7.0%	0.03	0.12	0.39	0.78	0.87	0.15	0.17	85.3%
X	6.00	PARK	7.0%	6.00	0.12	0.39			0.00	0.08	0.35	0.12	0.39	0.72	2.34	7.0%
Y1	1.90	OS/BUFFER	7.0%	1.60	0.12	0.39	SIDEWALK	100.0%	0.30	0.90	0.96	0.24	0.48	0.46	0.91	21.7%
Y2	1.70	OS/BUFFER	7.0%	1.66	0.12	0.39	SIDEWALK	100.0%	0.04	0.08	0.35	0.12	0.39	0.20	0.66	9.2%
Z	1.00	RES 1/6 AC.	52.5%	1.00	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.38	0.55	52.5%
AA	2.10	RES 1/6 AC.	52.5%	2.10	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.79	1.14	52.5%
OS-1	2.60	RES 1/8 AC.	65.0%	1.30	0.45	0.59	STREET	100%	1.30	0.90	0.96	0.68	0.78	1.76	2.02	82.5%
OS-2	0.68	STREET	100%	0.34	0.90	0.96	OPEN SPACE	7.0%	0.34	0.12	0.39	0.51	0.68	0.35	0.46	53.5%
OS-3	0.25	STREET	100%	0.25	0.90	0.96			0.00	0.08	0.35	0.90	0.96	0.23	0.24	100.0%
OS-4	1.40	RES 1/6 AC.	52.5%	1.40	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.53	0.76	52.5%
OS-5	0.87	STREET	100%	0.49	0.90	0.96	OPEN SPACE	7.0%	0.38	0.12	0.39	0.56	0.71	0.49	0.62	59.4%
OS-6	530.0%	UNDEV.	2.0%	530.0%	9.0%	36.0%			0.0%	12.0%	39.0%	9.0%	36.0%	47.7%	190.8%	2.0%
OS-7	720.0%	UNDEV.	2.0%	720.0%	9.0%	36.0%			0.0%	12.0%	39.0%	9.0%	36.0%	64.8%	259.2%	2.0%
P4-B Villages at Sterling Ranch East PP	32.20	RES 1/8 AC.	67.6%	32.20	0.46	0.61			0.00	0.08	0.35	0.46	0.61	14.94	19.77	67.6%
TOTAL	99.23															
TOTAL TRIB. AREA TO POND FSD-14B	68.07															55.6%

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED CA(2)	CA(5)	CA(100)	OVERLAND C(5)	Length (ft)	Height (ft)	Tc (min)	STREET / CHANNEL FLOW Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	Tc TOTAL (min)	INTENSITY I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	TOTAL FLOWS Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
A	0.22	0.26	0.38	0.08	100	2	14.7	135	2.0%	2.8	0.8	15.4	2.78	3.48	5.84	0.6	0.9	2.2
B	0.70	0.83	1.20	0.08	100	2	14.7	260	1.5%	2.4	1.8	16.4	2.70	3.39	5.68	2	3	7
C	0.20	0.23	0.33	0.08	50	1	10.4	260	1.5%	2.4	1.8	12.1	3.07	3.84	6.45	0.6	0.9	2.1
D	1.18	1.39	2.02	0.08	100	2	14.7	900	1.8%	2.7	5.6	20.2	2.46	3.07	5.16	3	4	10
E	0.29	0.34	0.49	0.08	50	1	10.4	470	2.5%	3.2	2.5	12.8	3.00	3.75	6.30	0.9	1.3	3.1
F	0.90	1.11	1.82	0.12	100	2	14.1	270	1.5%	2.4	1.8	15.9	2.74	3.43	5.76	2	4	10
G	0.30	0.36	0.53	0.12	50	1	10.0	270	1.5%	2.4	1.8	11.8	3.10	3.88	6.52	0.9	1.4	3.5
H	1.17	1.38	2.04	0.12	100	2	14.1	450	1.5%	2.4	3.1	17.1	2.65	3.32	5.57	3	5	11
I	0.43	0.51	0.75	0.08	50	1	10.4	450	1.5%	2.4	3.1	13.4	2.94	3.69	6.19	1	2	5
J	0.74	0.86	1.25	0.08	50	1	10.4	630	3.5%	3.7	2.8	13.2	2.97	3.72	6.24	2	3	8
K	Not Used																	
L	0.35	0.41	0.60	0.08	100	2	14.7	500	1.5%	2.4	3.4	18.1	2.59	3.24	5.44	0.9	1.3	3.3
M	0.53	0.63	0.95	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.48	5.84	1	2	6
N	0.38	0.45	0.69	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.48	5.84	1	2	4
O	0.51	0.60	0.87	0.08	100	2	14.7	300	1.5%	2.4	2.0	16.7	2.69	3.36	5.64	1	2	5
P	1.06	1.24	1.80	0.08	100	2	14.7	420	1.5%	2.4	2.9	17.5	2.63	3.29	5.52	3	4	10
Q	Not Used																	
R	0.08	0.11	0.21	0.12	100	2	14.1	50	1.5%	2.4	0.3	14.4	2.86	3.58	6.01	0.2	0.4	1.3
S	0.35	0.41	0.60	0.08	100	2	14.7	500	1.5%	2.4	3.4	18.1	2.59	3.24	5.44	0.9	1.3	3.3
T	0.45	0.53	0.76	0.08	100	2	14.7	300	1.5%	2.4	2.0	16.7	2.69	3.36	5.64	1	2	4
U	0.70	0.83	1.20	0.08	100	2	14.7	500	1.5%	2.4	3.4	18.1	2.59	3.24	5.44	2	3	7
V	0.45	0.53	0.76	0.08	50	1	10.4	650	1.5%	2.4	4.4	14.8	2.83	3.54	5.95	1	2	5
W	0.14	0.15	0.17									5.0	4.12	5.17	8.68	0.6	0.8	1.4
X	0.30	0.72	2.34	0.08	100	2	14.7	500	2.0%	1.0	8.4	23.1	2.30	2.88	4.83	1	2	11
Y1	0.35	0.46	0.91	0.90	250	10	3.6					5.0	4.12	5.17	8.68	1.4	2	8
Y2	0.08	0.20	0.66	0.08	90	14	7.1					7.1	3.71	4.65	7.81	0.3	0.9	5.2
Z	0.32	0.38	0.55	0.08	65	2	10.2					10.2	3.27	4.09	6.87	1	2	4
AA	0.67	0.79	1.14	0.08	65	2	10.2					10.2	3.27	4.09	6.87	2	3	8
OS-1	1.69	1.76	2.02	0.08	40	0.8	9.3	900	2.5%	3.2	4.7	14.0	2.89	3.62	6.08	5	6	12
OS-2	0.32	0.35	0.46	0.12	50	1	10.0	400	1.6%	2.5	2.6	12.6	3.02	3.78	6.35	1.0	1.3	2.9
OS-3	0.22	0.23	0.24									5.0	4.12	5.17	8.68	0.9	1.2	2.1
OS-4	0.45	0.53	0.76	0.08	50	1	10.4	500	1.5%	2.4	3.4	13.8	2.91	3.65	6.13	1	2	5
OS-5	0.46	0.49	0.62	0.12	25	0.75	6.2	450	1.5%	2.4	3.1	9.2	3.39	4.25	7.14	2	2	4
OS-6	0.16	0.48	1.91	0.12	300	7	23.2					23.2	2.29	2.87	4.81	0.4	1	9
OS-7	0.22	0.65	2.59	0.12	300	7	23.2					23.2	2.29	2.87	4.81	0.5	2	12
P4-B Villages at Sterling Ranch East PP	13.52	14.94	19.77	0.08	100	2	14.7	600	1.5%	2.4	4.1	18.7	2.55	3.19	5.35	34	48	106

LEGEND

EXISTING GROUND CONTOUR	5910
PROPOSED FINISHED CONTOUR	5910
SUBDIVISION BOUNDARY	
LOT LINE	
PROPOSED 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

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS
811
UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

MARC A. WHORTON, COLORADO P.E. #37155 DATE

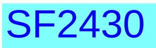
CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799(Fax)

STERLING RANCH EAST FILING NO. 5
FINAL PLAT
FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE		DATE	7/22/24
DRAWN BY	MAW	(H) 1"= 60'		SHEET	3 OF 3
CHECKED BY		(V) 1"= N/A		JOB NO.	1183.25

V1_Drainage Report - Final.pdf Markup Summary

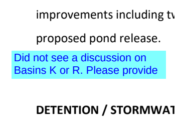
Bret (1)



Subject: Engineer
Page Label: 1
Author: Bret
Date: 11/22/2024 11:53:51 AM
Status:
Color:
Layer:
Space:

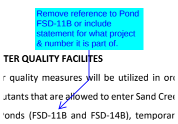
SF2430

CDurham (10)



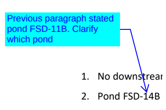
Subject: Text Box
Page Label: 13
Author: CDurham
Date: 11/25/2024 5:00:41 PM
Status:
Color:
Layer:
Space:

Did not see a discussion on Basins K or R. Please provide



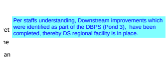
Subject: Callout
Page Label: 13
Author: CDurham
Date: 11/25/2024 5:36:38 PM
Status:
Color:
Layer:
Space:

Remove reference to Pond FSD-11B or include statement for what project & number it is part of.



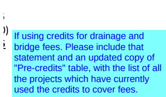
Subject: Callout
Page Label: 18
Author: CDurham
Date: 11/25/2024 5:14:58 PM
Status:
Color:
Layer:
Space:

Previous paragraph stated pond FSD-11B. Clarify which pond



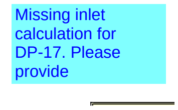
Subject: Text Box
Page Label: 18
Author: CDurham
Date: 11/25/2024 5:25:42 PM
Status:
Color:
Layer:
Space:

Per staffs understanding, Downstream improvements which were identified as part of the DBPS (Pond 3), have been completed, thereby DS regional facility is in place.



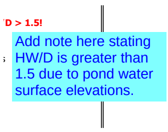
Subject: Text Box
Page Label: 19
Author: CDurham
Date: 11/25/2024 5:30:21 PM
Status:
Color:
Layer:
Space:

If using credits for drainage and bridge fees. Please include that statement and an updated copy of "Pre-credits" table, with the list of all the projects which have currently used the credits to cover fees.



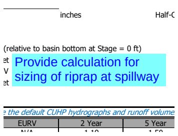
Subject: Text Box
Page Label: 53
Author: CDurham
Date: 11/25/2024 5:08:44 PM
Status:
Color:
Layer:
Space:

Missing inlet calculation for DP-17. Please provide



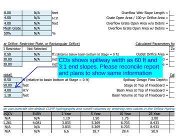
Subject: Text Box
Page Label: 92
Author: CDurham
Date: 11/25/2024 5:10:49 PM
Status:
Color:
Layer:
Space:

Add note here stating HW/D is greater than 1.5 due to pond water surface elevations.



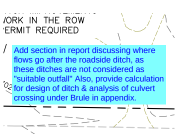
Subject: Text Box
Page Label: 89
Author: CDurham
Date: 11/25/2024 5:33:29 PM
Status:
Color:
Layer:
Space:

Provide calculation for sizing of riprap at spillway



Subject: Callout
Page Label: 89
Author: CDurham
Date: 11/25/2024 6:07:42 PM
Status:
Color:
Layer:
Space:

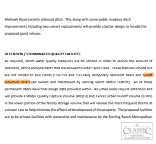
CDs shows spillway width as 60 ft and 3:1 end slopes. Please reconcile report and plans to show same information



Subject: Text Box
Page Label: [1] SHEET 3
Author: CDurham
Date: 11/25/2024 5:44:22 PM
Status:
Color:
Layer:
Space:

Add section in report discussing where flows go after the roadside ditch, as these ditches are not considered as "suitable outfall" Also, provide calculation for design of ditch & analysis of culvert crossing under Brule in appendix.

Glenn Reese - EPC Stormwater (45)



Subject: SW - Highlight
Page Label: 13
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 1:58:28 PM
Status:
Color:
Layer:
Space:

unoff
reduction RPA’s

Subject: SW - Textbox with Arrow
Page Label: 13
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 3:26:51 PM
Status:
Color:
Layer:
Space:

EDARP File # CDR221

Subject: SW - Textbox with Arrow
Page Label: 13
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 3:27:07 PM
Status:
Color:
Layer:
Space:

Engineer must confirm in the Drainage Report that the existing offsite or onsite PBMPs that the site is tributary to are functioning as intended.

Subject: SW - Highlight
Page Label: 15
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 12:01:23 PM
Status:
Color:
Layer:
Space:

proposed

Subject: SW - Textbox with Arrow
Page Label: 15
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 12:02:10 PM
Status:
Color:
Layer:
Space:

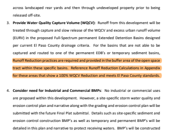
add a note that clarifies that this pond was built with Homestead North at Sterling Ranch F1 via EDARP filing # CDR221

Subject: SW - Highlight
Page Label: 15
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 1:58:37 PM
Status:
Color:
Layer:
Space:

runoff reduction

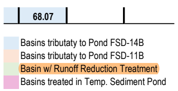
Subject: SW - Textbox with Arrow
Page Label: 15
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:01:27 PM
Status:
Color:
Layer:
Space:

see my comment on the Water Quality Treatment Plan Map regarding the RPAs. If you agree, revise all mention of the RPAs throughout the report to SPAs. I have highlighted most of them for you.



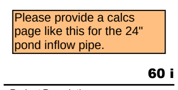
Subject: SW - Highlight
Page Label: 16
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 1:59:01 PM
Status:
Color:
Layer:
Space:

Runoff Reduction practices are required and provided in the buffer area of the open space tract within these specific basins. Reference Runoff Reduction Calculations in Appendix for these areas that show a 100% WQCV Reduction and meets El Paso County standards.



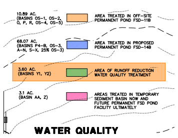
Subject: SW - Highlight
Page Label: 43
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 1:59:10 PM
Status:
Color:
Layer:
Space:

Basin w/ Runoff Reduction Treatment

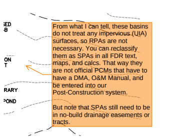


Subject: SW - Textbox
Page Label: 89
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:32:47 PM
Status:
Color:
Layer:
Space:

Please provide a calcs page like this for the 24" pond inflow pipe.



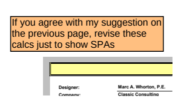
Subject: SW - Rectangle
Page Label: [1] Model
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 1:59:20 PM
Status:
Color:
Layer:
Space:



Subject: SW - Textbox with Arrow
Page Label: [1] Model
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 3:30:47 PM
Status:
Color:
Layer:
Space:

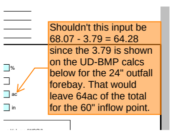
From what I can tell, these basins do not treat any impervious (UIA) surfaces, so RPAs are not necessary. You can reclassify them as SPAs in all FDR text, maps, and calcs. That way they are not official PCMs that have to have a DMA, O&M Manual, and be entered into our Post-Construction system.

But note that SPAs still need to be in no-build drainage easements or tracts.



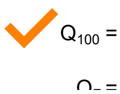
Subject: SW - Textbox
Page Label: 81
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:01:05 PM
Status:
Color:
Layer:
Space:

If you agree with my suggestion on the previous page, revise these calcs just to show SPAs

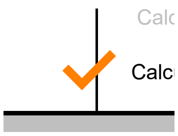


Subject: SW - Textbox with Arrow
Page Label: 82
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:25:56 PM
Status:
Color:
Layer:
Space:

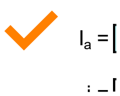
Shouldn't this input be 68.07 - 3.79 = 64.28 since the 3.79 is shown on the UD-BMP calcs below for the 24" outfall forebay. That would leave 64ac of the total for the 60" inflow point.



Subject: Checkmark
Page Label: 82
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:26:57 PM
Status:
Color:
Layer:
Space:



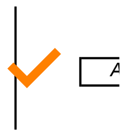
Subject: Checkmark
Page Label: 82
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:27:04 PM
Status:
Color:
Layer:
Space:



Subject: Checkmark
Page Label: 82
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:27:09 PM
Status:
Color:
Layer:
Space:

Subject: Checkmark
Page Label: 82
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:27:18 PM
Status:
Color:
Layer:
Space:

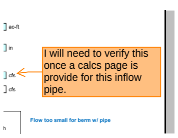
Subject: Checkmark
Page Label: 82
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:33:37 PM
Status:
Color:
Layer:
Space:



Subject: Checkmark
Page Label: 83
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:44:28 PM
Status:
Color:
Layer:
Space:

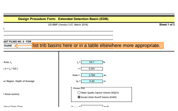
Subject: Checkmark
Page Label: 83
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:44:46 PM
Status:
Color:
Layer:
Space:

Subject: Checkmark
Page Label: 83
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:44:56 PM
Status:
Color:
Layer:
Space:



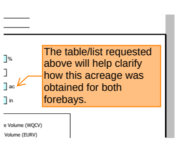
Subject: SW - Textbox with Arrow
Page Label: 85
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:33:26 PM
Status:
Color:
Layer:
Space:

I will need to verify this once a calcs page is provide for this inflow pipe.



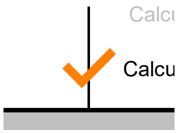
Subject: SW - Textbox with Arrow
Page Label: 85
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:41:40 PM
Status:
Color:
Layer:
Space:

list trib basins here or in a table elsewhere more appropriate.

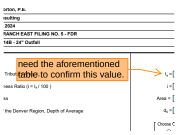


Subject: SW - Textbox with Arrow
Page Label: 85
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:39:04 PM
Status:
Color:
Layer:
Space:

The table/list requested above will help clarify how this acreage was obtained for both forebays.

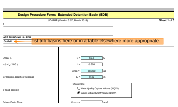


Subject: Checkmark
Page Label: 85
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:39:34 PM
Status:
Color:
Layer:
Space:



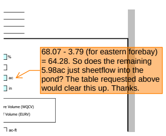
Subject: SW - Textbox with Arrow
Page Label: 85
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:48:05 PM
Status:
Color:
Layer:
Space:

need the aforementioned table to confirm this value.



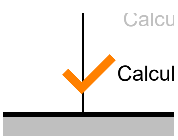
Subject: SW - Textbox with Arrow
Page Label: 86
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:41:43 PM
Status:
Color:
Layer:
Space:

list trib basins here or in a table elsewhere more appropriate.

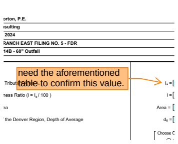


Subject: SW - Textbox with Arrow
Page Label: 86
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:43:09 PM
Status:
Color:
Layer:
Space:

68.07 - 3.79 (for eastern forebay) = 64.28. So does the remaining 5.98ac just sheetflow into the pond? The table requested above would clear this up. Thanks.



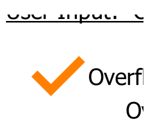
Subject: Checkmark
Page Label: 86
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:47:16 PM
Status:
Color:
Layer:
Space:



Subject: SW - Textbox with Arrow
Page Label: 86
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:48:06 PM
Status:
Color:
Layer:
Space:

need the aforementioned table to confirm this value.

Subject: Checkmark
Page Label: 89
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:52:22 PM
Status:
Color:
Layer:
Space:



Subject: Checkmark
Page Label: 89
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:53:29 PM
Status:
Color:
Layer:
Space:

Subject: Checkmark
Page Label: 89
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:53:31 PM
Status:
Color:
Layer:
Space:

Subject: Checkmark
Page Label: 89
Author: Glenn Reese - EPC Stormwater
Date: 11/26/2024 2:53:42 PM
Status:
Color:
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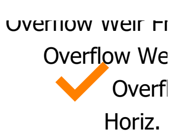

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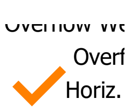

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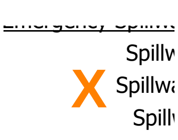

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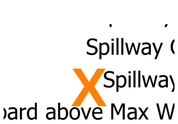

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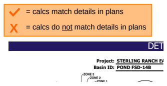

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