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**FINAL DRAINAGE REPORT
FOR
STERLING RANCH EAST
FILING NO. 3**

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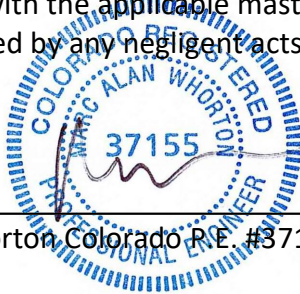
PCD Project No. SF2428



FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 3

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

1/9/2026

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 COMPANIES

By:

H. J. Palmer

Title:

VICE PRESIDENT

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.

Daniel Torres, P.E.

Digitally signed by Daniel Torres,
P.E.
Reason: Authorized signatory as
County Engineer designee
Date: 2026.05.12 09:24:43-06'00'

5/12/2026

Joshua J. Palmer, P.E.

County Engineer, / ECM Administrator

Date

Conditions:



FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 3

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FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 3

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

The Sterling Ranch East Filing No. 3 is 74.745-acre site located in portions sections 33 and 34, township 12 south, range 65 west of the sixth principal meridian. 187 urban residential lots are planned along with a 11.9 ac. Elementary School site, 5.3 ac. pond tract, 3.5 ac. tract for Sand Creek and 3.6 ac. open space/buffer tract along south boundary. The site is bounded on the north by Sterling Ranch Road and planned public ROW (Lake Tahoe Drive), to the south by existing platted 5-ac. residential lots (Bar J-B Acres Filing No. 2 and Pawnee Rancheros Filing No. 2), to the east by future Sterling Ranch East Filing No. 5 (zoned for future urban development), and to the west by existing Sand Creek. The site is split between the upper portion of the Sand Creek East Fork and Sand Creek Drainage Basin. Urban single family residential is proposed in this Filing that is consistent with the approved Sterling Ranch Sketch Plan and Sterling Ranch East Preliminary Plan No. 1. (SKP-22-004 and SP-22-004)

The average soil condition reflects Hydrologic Group "A" (Blakeland loamy sand and Columbine gravelly sandy loam) and Group "B" (Pring coarse 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).

EXISTING DRAINAGE CONDITIONS

The Sterling Ranch East Filing No. 3 property is located in the upper portion of the Sand Creek Drainage Basin with the east half of the property within the East Fork. A good portion of the site is undisturbed and covered with native grasses with no trees or other vegetation.



However, the southwest corner has been recently disturbed with the construction of the temporary detention pond (FSD-11B), a material borrow area in the central portion of the site and gravel access roads from to and from the site at the northeast corner. A gravel access road also exists along the south boundary within several public utility and access easements. Sterling Ranch Road has also recently been constructed which cuts off all historic drainage from the north. However, this site has been previously studied in the “2018 Sterling Ranch MDDP”, prepared by M&S Civil Consultants, Inc., June 2018 and most recently by “MDDP Amendment for Sterling Ranch”, prepared by JR Engineering, LLC, dated September 2022 and “Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan 1”, prepared by Classic Consulting, dated January 2023. The latter report 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-4A, EX-7, EX-7A, EX-8, EX-8A and EX-9. These are referenced in the Appendix.

The following basins are within the proposed Preliminary Plan area and also within the Sand Creek main basin boundary:

Basin EX-4A ($Q_5 = 19$ cfs, $Q_{100} = 50$ cfs) consists of the smaller portion of the property (44.2 acres) south of the Briargate Pkwy. crossing that currently sheet flows in a southwesterly direction directly into the Sand Creek main channel. These sheet flows are then conveyed downstream as channel flow towards the south property boundary. This basin differs from the MDDP as it only represents the on-site existing flows from the east side of the channel as defined by the current ownership boundary and does not include the off-site flows from the development along the west side of the channel or the significant existing off-site channel flow itself. Recent improvements within this basin include: construction of Sterling Ranch Road and its associated culvert crossing of Sand Creek (CDR-226).

Basin EX-7 ($Q_5 = 46$ cfs, $Q_{100} = 105$ cfs) consists of approximately 152.8 acres of property that sheet flows in a southerly direction. This basin is similar to the MDDP and the east basin line

defines the westerly edge of the East Fork basin. The sheet flows become more concentrated towards the south end of the basin as the topography becomes steeper and more defined south of the proposed Sterling Ranch Road crossing. The existing flows exit the property along the south Sterling Ranch boundary within the well-defined natural channel at **Design Point 4**. Given the difference in hydrologic modeling (SWMM 5.1 vs. HEC-HMS) these flows are fairly consistent with the flows determined by the MDDP at DP-4 ($Q_5 = 21.5$ cfs, $Q_{100} = 107.4$ cfs). Recent improvements within this basin include: construction of Sterling Ranch Road, along with the overlot grading of much of Sterling Ranch East Filing No. 1 (SF2235), the construction of Pond FSD-14A just north of Sterling Ranch Road and the on-site interim Pond FSD-11B. With the introduction of these improvements, nearly all of the tributary area for this existing basin is now being captured and treated, which is consistent with Sterling Ranch MDDP Amendment 2 & PDR for Sterling Ranch East Prelim. Plan Filing 1-4. Thus, the downstream natural channel corridor through the existing rural lots within the Pawnee Rancheros Filing 2 Subd. and south of Mustang Place, just east of Mustang Road will continue to handle these off-site flows adequately.

Basin EX-7A ($Q_5 = 1$ cfs, $Q_{100} = 5$ cfs) consists of a small basin of only 2.4 ac. that sheet flows in a southerly direction. The MDDP included this small basin as a part of Basin EX-7. However, a more detailed look at this area finds that the larger basin EX-7 seems to all be tributary to the defined natural channel while Basin EX-7A appears to sheet flow off-site towards the Mustang Place cul-de-sac. These minor sheet flows ultimately combine with the pre-developed flows from Basin EX-7 south of Mustang Place within the natural channel. Again, with the construction of the Pond FSD-11B, the majority of the tributary area for this existing basin will be captured and treated. Thus, the downstream natural channel corridor will continue to handle these off-site flows adequately.

Sand Creek East Fork

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**. Again, 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-8A ($Q_5 = 2$ cfs, $Q_{100} = 9$ cfs) consists of a small basin of 6.6 ac. that sheet flows in a southerly direction. The MDDP included this small basin as a part of Basin EX-8. However, a more detailed look at this area finds that the larger basin EX-8 seems to sheet flow through properties east of Cochise Road while Basin EX-8A sheet flows off-site along the south boundary at **Design Point 5A** directly down the Cochise Road corridor. These off-site flows seem to ultimately combine further south within the Cochise Road corridor.

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 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**. Again, these flows seem consistent with the flows determined by the MDDP at DP-6 ($Q_5 = 23.9$ cfs, $Q_{100} = 125.2$ cfs). Recent improvements within this basin include: construction of Sterling Ranch Road, along with the overlot grading of much of Sterling Ranch East Filing No. 1 (SF2235), the construction of Pond FSD-14A just north of Sterling Ranch Road. With the introduction of these improvements, much of the tributary area for this existing basin is now being captured and treated, which is consistent with Sterling Ranch MDDP Amendment 2 & PDR for Sterling Ranch East Prelim. Plan Filing 1-4.

PROPOSED DRAINAGE CONDITIONS

As described in the General Description of the report, this proposed Final Plat contains 74.745 acres of urban residential lots. This report remains consistent with the recently approved MDDP and Preliminary Drainage Report for Sterling Ranch East Preliminary Plan Filings 1-4. (SP-22-004)



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 existing interim Pond FSD-11B that was constructed along with the Sterling Ranch Road improvements (CDR221) will be converted to a permanent FSD facility within this development and 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.

In March of this year, an overall GEC plan was approved along with the Villages at Sterling Ranch development (PUDSP226) to cover all the various land disturbance within the Filing 5 and Filing 3 property limits. A portion of Filing 5 is tributary to the proposed Filing 3 development and is anticipated to be developed after Filing 3. Prior to Filing 5 development, this off-site tributary area, while accounted for in the ultimate storm sewer and Pond FSD-11B design, will be treated in the various SCMs as shown on this previously approved GEC plan.

This report will describe each developed basin tributary to the FSD-11B 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 northeast corner of the project and move southwest and describe how this development proposes to handle both the off-site and on-site drainage conditions. The off-site basins within Sterling Ranch Road are



also being analyzed for final design condition adjacent to the site to confirm sizing as determined in the “Final Drainage Letter for Sterling Ranch Road and Briargate Parkway Interim Plan”, prepared by JR Engineering, approved July 2023. (CDR221)

**All the existing and proposed drainage facilities discussed are public unless otherwise stated.
See Appendix for site specific SWQ treatment map for all basins.**

Design Point 1 ($Q_5 = 6$ cfs, $Q_{100} = 12$ cfs) represents the 2.6 ac. off-site basin OS-1 within the east side of Sterling Ranch Road just south of Briargate Pkwy. This flow travels as C&G flow in a southerly direction towards Design Point 1. At this location, an existing 15' Type R at-grade inlet collects (**$Q_5 = 6$ cfs, $Q_{100} = 10.3$ cfs**) with a flow-by of (**$Q_5 = 0$ cfs, $Q_{100} = 1.7$ cfs**). The collected flows are then routed to the existing public storm system along the west side of Sterling Ranch Road as accounted for within the previously mentioned JR Eng. report. The flow-by continues down the street towards Design 2.

Design Point 2 ($Q_5 = 1$ cfs, $Q_{100} = 4$ cfs) represents flow-by from DP-1 and the 0.68 ac. off-site basin OS-2 within the east side of Sterling Ranch Road. This combined flow travels as C&G flow in a southerly direction towards Design Point 2. At this location, an existing crossspan conveys these flows further downstream towards Design 27.

Design Point 3 ($Q_5 = 4$ cfs, $Q_{100} = 10$ cfs) represents the anticipated 3.7 ac. off-site basin OS-3 within the future Sterling Ranch East Filing No. 5 development. This flow travels as C&G flow in a southerly direction towards Design Point 3. At this location, a future 10' Type R at-grade inlet collects (**$Q_5 = 3.9$ cfs, $Q_{100} = 7.0$ cfs**) with a flow-by of (**$Q_5 = 0.1$ cfs, $Q_{100} = 3.0$ cfs**). The collected flow will be routed via future storm sewer towards the future Pond FSD-14B within the Sterling Ranch East Filing No. 5 development. This flow-by continues down the future street towards Design 4.

Design Point 4 ($Q_5 = 2$ cfs, $Q_{100} = 7$ cfs) represents flow-by from DP-3 and the anticipated 1.6 ac. off-site basin OS-4 within the future Sterling Ranch East Filing No. 5 development. This flow travels as C&G flow in a southwesterly direction towards Design Point 4. At this location, a proposed crossspan conveys these flows further downstream towards Design 5.

Design Point 5 ($Q_5 = 5$ cfs, $Q_{100} = 16$ cfs) represents the flows from DP-4 and the anticipated 3.3 ac. off-site basin OS-5 within the future Sterling Ranch East Filing No. 5 development. This combined flow travels as C&G flow in a southeasterly direction towards Design Point 5. At this location, a proposed 10' Type R sump inlet completely collects these flows. The collected flow will be routed via storm sewer south down Bentonville Way. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill around the corner and over the highpoint in Bentonville Way.

Design Point 6 ($Q_5 = 2$ cfs, $Q_{100} = 6$ cfs) represents developed flows from Basin A (1.4 ac.) along the south side of Lake Tahoe Dr. These developed flows travel as curb and gutter flow towards Design Point 6. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 5 and be routed via storm sewer south down Bentonville Way.

Design Point 7 ($Q_5 = 4$ cfs, $Q_{100} = 10$ cfs) represents developed flows from Basin B (3.3 ac.). These developed flows travel as curb and gutter flow south towards Design Point 7. At this location, a proposed 10' Type R sump inlet completely collects these flows. The collected flow will be routed west via the public storm sewer in Bixby Ct. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill over the highpoint to the west in Bixby Ct.

Design Point 8 ($Q_5 = 3$ cfs, $Q_{100} = 6$ cfs) represents developed flows from Basin C (1.8 ac.) along the west side of Bentonville Way. These developed flows travel as curb and gutter flow towards Design Point 8. At this location, a proposed 5' Type R sump inlet completely collects

these flows. The collected flow will combine with the collected flows from Design Point 7 and be routed via storm sewer further west in Bixby Ct.

Design Point 9 ($Q_5 = 6$ cfs, $Q_{100} = 15$ cfs) represents the developed flows from Basins D (3.4 ac.) and E (1.8 ac.). This combined flow travels as C&G flow in a southerly direction towards Design Point 9. At this location, a proposed 10' Type R at-grade inlet collects (**$Q_5 = 5.2$ cfs, $Q_{100} = 8.6$ cfs**) with a flow-by of (**$Q_5 = 0.8$ cfs, $Q_{100} = 6.4$ cfs**). The collected flow will be routed via proposed storm sewer towards the public system in Bixby Ct. This flow-by continues down the street, around the corner to the west towards Design 10.

Design Point 10 ($Q_5 = 6$ cfs, $Q_{100} = 20$ cfs) represents the flow-by from DP-9 and developed flows from Basins F (1.8 ac.) and G (2.5 ac.). These developed flows travel as curb and gutter flow south towards Bixby Ct. and then around the corner to Design Point 10. At this location, a proposed 10' Type R sump inlet completely collects these flows. The collected flow will be routed west via the public storm sewer in Bixby Ct. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill over the highpoint to the west in Bixby Ct.

Design Point 11 ($Q_5 = 0.9$ cfs, $Q_{100} = 2.1$ cfs) represents developed flows from the small Basin H (0.51 ac.) along the south side of Bixby Ct. These developed flows travel as curb and gutter flow towards Design Point 11. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 10 and be routed via public storm sewer further west in Bixby Ct.

Design Point 12 ($Q_5 = 4$ cfs, $Q_{100} = 9$ cfs) represents the developed flows from Basins I (1.8 ac.) and J (0.85 ac.). This combined flow travels as C&G flow in a southerly direction towards Design Point 12. At this location, a proposed 10' Type R at-grade inlet collects (**$Q_5 = 3.9$ cfs, $Q_{100} = 6.7$ cfs**) with a flow-by of (**$Q_5 = 0.1$ cfs, $Q_{100} = 2.3$ cfs**). The collected flow will be routed via proposed storm sewer south down Laguna Niguel Dr. The 5-yr. minimal flow-by turn the corner

towards Design Point 13. However, the 100-yr. flow-by is anticipated to not turn the corner but continue south down Laguna Niguel Dr. towards Design Point 15.

Design Point 13 ($Q_5 = 3$ cfs, $Q_{100} = 8$ cfs) represents developed flows from Basin K (2.6 ac.). These developed flows travel as curb and gutter flow west towards Design Point 13. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will be routed west via the public storm sewer. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill around the corner down Laguna Niguel Dr.

Design Point 14 ($Q_5 = 0.8$ cfs, $Q_{100} = 1.7$ cfs) represents developed flows from the small Basin L (0.36 ac.) along the south side of Amarillo Place. These developed flows travel as curb and gutter flow towards Design Point 14. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 13 and be routed via public storm sewer further south down Laguna Niguel Dr.

Design Point 15 ($Q_5 = 5$ cfs, $Q_{100} = 14$ cfs) represents the anticipated 100-yr. flow-by from DP-12 and developed flows from Basins M (2.8 ac.) and N (1.1 ac.). These developed flows travel as curb and gutter flow south towards Bixby Ct. and then around the corner to Design Point 15. At this location, a proposed 10' Type R sump inlet completely collects these flows. The collected flow will be routed west via the public storm sewer in Bixby Ct. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill over the highpoint to the west in Bixby Ct.

Design Point 16 ($Q_5 = 1$ cfs, $Q_{100} = 3$ cfs) represents developed flows from the small Basin O (0.86 ac.) along the south side of Bixby Ct. These developed flows travel as curb and gutter flow towards Design Point 16. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 15 and be routed via public storm sewer further west in Bixby Ct.

Design Point 17 ($Q_5 = 3$ cfs, $Q_{100} = 7$ cfs) represents the developed flows from Basin P (2.3 ac.). These developed flows travel as curb and gutter flow towards Design Point 17. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will be routed west via the public storm sewer in Bixby Ct. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill over the highpoint to the west in Bixby Ct.

Design Point 18 ($Q_5 = 1.2$ cfs, $Q_{100} = 2.8$ cfs) represents developed flows from the small Basin Q (0.67 ac.) along the south side of Bixby Ct. These developed flows travel as curb and gutter flow towards Design Point 18. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 17 and be routed via public storm sewer further west in Bixby Ct.

Design Point 19 ($Q_5 = 6$ cfs, $Q_{100} = 13$ cfs) represents the developed flows from Basins T (2.6 ac.) and U (1.4 ac.). This combined flow travels as C&G flow in a southerly direction towards Design Point 19. At this location, a proposed 10' Type R at-grade inlet collects (**$Q_5 = 5.3$ cfs, $Q_{100} = 8.1$ cfs**) with a flow-by of (**$Q_5 = 0.7$ cfs, $Q_{100} = 4.9$ cfs**). The collected flow will be routed via proposed storm sewer south down Lubbock Trail. The 5-yr. flow-by is expected to turn the corner and head towards Design Point 20, with the 100-yr. flow-by anticipated to not turn the corner but continue south down Lubbock Trail towards Design Point 22.

Design Point 20 ($Q_5 = 7$ cfs, $Q_{100} = 13$ cfs) represents developed flows from the 5-yr. flow-by from Design Point 19 and Basin R (3.9 ac.). These developed flows travel as curb and gutter flow towards Design Point 20. At this location, a proposed 10' Type R sump inlet completely collects these flows. The collected flow will be routed west via the public storm sewer. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill around the corner down Lubbock Trail.

Design Point 21 ($Q_5 = 3$ cfs, $Q_{100} = 6$ cfs) represents developed flows from Basin S (2.0 ac.) along the south side of Amarillo Place. These developed flows travel as curb and gutter flow towards Design Point 21. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 20 and be routed via public storm sewer further south down Lubbock Trail.

Design Point 22 ($Q_5 = 1.2$ cfs, $Q_{100} = 8.5$ cfs) represents the developed flows from the 100-yr. flow-by from Design Point 19 and Basin V (1.1 ac.). These developed flows travel as curb and gutter flow towards Design Point 22. At this location, a proposed 10' Type R sump inlet completely collects these flows. The collected flow will be routed south via the public storm sewer in Lubbock Trail. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill over the highpoint to the west and directly into Pond FSD 11-B.

Design Point 23 ($Q_5 = 3$ cfs, $Q_{100} = 8$ cfs) represents developed flows from Basin W (1.8 ac.) along the west side of Lubbock Trail. These developed flows travel as curb and gutter flow towards Design Point 23. At this location, a proposed 5' Type R sump inlet completely collects these flows. The collected flow will combine with the collected flows from Design Point 22 and be routed via public storm sewer further south in Lubbock Trail.

Design Point 24 ($Q_5 = 53$ cfs, $Q_{100} = 128$ cfs) represents the total developed flows of all the previously mentioned design points and the total pond inflow at the proposed easterly forebay/impact structure. At this 54" RCP pond inflow a Type VI Impact Stilling Basin will be installed.

Sterling Ranch Road Corridor

The following Basins and Design Points are within the Sterling Ranch Road corridor that were originally designed, approved and now constructed under the following projects: "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) and “Sterling Ranch East Filing No. 1 Construction Plans” and “Final Drainage Report for Sterling Ranch East Filing No. 1”, both prepared by CCES (PCD No. SF2235). All the Design Points below help confirm the public storm system design through this corridor.

Design Point 25 ($Q_5 = 4$ cfs, $Q_{100} = 9$ cfs) represents existing flows from Basin B1 (1.7 ac.) along the west side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southerly direction towards Design Point 25. At this location, an existing 15' Type R at-grade inlet collects (**$Q_5 = 4.0$ cfs, $Q_{100} = 8.5$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 0.5$ cfs**). The collected flow will be routed via proposed storm sewer towards the public 42" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues south down Sterling Ranch Road towards Design Point 26.

Design Point 26 ($Q_5 = 3$ cfs, $Q_{100} = 8$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 25 and Basin B3 (1.5 ac.) along the west side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southerly direction towards Design Point 26. At this location, an existing 10' Type R at-grade inlet collects (**$Q_5 = 3.0$ cfs, $Q_{100} = 6.2$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 1.8$ cfs**). The collected flow will be routed via proposed storm sewer towards the public 60" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues south down Sterling Ranch Road towards Design Point 28.

Design Point 27 ($Q_5 = 3$ cfs, $Q_{100} = 7$ cfs) represents existing flows from the flow-by from Design Point 2 and Basin B4 (0.87 ac.) along the east side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southerly direction towards Design Point 27. At this location, an existing 10' Type R at-grade inlet collects (**$Q_5 = 3.0$ cfs, $Q_{100} = 5.8$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 1.2$ cfs**). The collected flow will be routed via proposed storm sewer towards the public 60" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues south down Sterling Ranch Road towards Design Point 29.

Design Point 28 ($Q_5 = 2$ cfs, $Q_{100} = 6$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 26 and Basin B5 (0.9 ac.) along the west side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southerly direction towards Design Point 28. At this location, an existing 10' Type R at-grade inlet collects (**$Q_5 = 2.0$ cfs, $Q_{100} = 5.2$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 0.8$ cfs**). The collected flow will be routed via proposed storm sewer towards the public 60" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues southwest down Sterling Ranch Road towards Design Point 30.

Design Point 29 ($Q_5 = 2$ cfs, $Q_{100} = 5$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 27 and Basin B6 (1.0 ac.) along the east side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southwesterly direction towards Design Point 29. At this location, an existing 10' Type R at-grade inlet collects (**$Q_5 = 2.0$ cfs, $Q_{100} = 4.7$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 0.3$ cfs**). The collected flow will be routed via proposed storm sewer towards the public 60" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues southwest down Sterling Ranch Road towards Design Point 31.

Design Point 30 ($Q_5 = 3$ cfs, $Q_{100} = 7$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 28 and Basin B7 (1.6 ac.) along the west side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southerly direction towards Design Point 30. At this location, an existing 10' Type R at-grade inlet collects (**$Q_5 = 3.0$ cfs, $Q_{100} = 5.8$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 1.2$ cfs**). The collected flow will be routed via proposed storm sewer towards the public 72" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues southwest down Sterling Ranch Road towards Design Point 32.

Design Point 31 ($Q_5 = 2$ cfs, $Q_{100} = 5$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 29 and Basin B8 (1.2 ac.) along the east side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southwesterly direction towards Design Point 31. At this location, an existing 10' Type R at-grade inlet collects (**$Q_5 = 2.0$ cfs, $Q_{100} = 4.7$ cfs**) with a flow-by of (**$Q_5 = 0.0$ cfs, $Q_{100} = 0.3$ cfs**). The collected flow will be routed via proposed storm sewer

towards the public 72" RCP along the west side of Sterling Ranch Road. The 100-yr. flow-by continues southwest down Sterling Ranch Road towards Design Point 33.

Design Point 32 ($Q_5 = 3$ cfs, $Q_{100} = 9$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 30 and Basin B9 (2.0 ac.) along the west side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southerly direction towards Design Point 32. At this location, an existing 15' Type R sump inlet completely collects the developed flows. The collected flows are then routed via existing storm sewer south towards Pond FSD-11B. The emergency overflow route for this sump condition is ponding a max. of 12" and then spill over the sidewalk and directly into Sand Creek.

Design Point 33 ($Q_5 = 3$ cfs, $Q_{100} = 7$ cfs) represents existing flows from the 100-yr. flow-by from Design Point 31 and Basin B10 (2.2 ac.) along the east side of Sterling Ranch Road. These flows travel as curb and gutter flows in a southwesterly direction towards Design Point 33. At this location, an existing 15' Type R sump inlet completely collects the developed flows. The collected flow will combine with the flow from Design Point 32 and then routed via existing storm sewer towards Pond FSD-11B. **Pipe Run 35 ($Q_5 = 20$ cfs, $Q_{100} = 43$ cfs)** represents the anticipated developed flows from the future elementary school site, Basin X (9.8 ac.). These future developed flows will then combine with the upstream flows from Design Points 32 and 33 and be routed via an existing 42" RCP storm outfall directly into Pond FSD-11B as represented by **Design Point 34 ($Q_5 = 23$ cfs, $Q_{100} = 51$ cfs)**. At this location, a concrete forebay is proposed as the westerly inflow into Pond FSD-11B.

As mentioned earlier, the existing flows leaving the site at this proposed pond location, Basin EX-7 and Design Point 4, were found to be (**$Q_5 = 46$ cfs, $Q_{100} = 105$ cfs**). Upon the construction of the ultimate permanent Pond FSD-11B, developed flows collected will be routed directly to Sand Creek to the west and only Basin BB (**$Q_5 = 0.9$ cfs, $Q_{100} = 3.4$ cfs**) will continue to release sheet flows with no impervious area off-site to the south. (See Appendix for Drainage Map)

DETENTION / STORMWATER QUALITY FACILITY

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 three Ponds (FSD-11B, FSD-14A and FSD-14B) and runoff reduction RPA's (All owned and maintained by Sterling Ranch Metro District). Pond FSD-11B has final design data included in this report and will be constructed to its ultimate permanent condition with this development. Pond FSD-14A is currently constructed under (SF2235) along with Sterling Ranch East Filing No. 1. Pond FSD-14B has final design data contained in the Sterling Ranch East Filing No. 5 FDR (SF2430) and is also currently constructed. All areas within the Filing 3 development are handled by Pond FSD-11B or runoff reduction techniques along the south boundary.

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 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-11B design**:

(See MHFD-Detention Design Sheets in Appendix)

Total Tributary acreage: 66.79 Ac.

1.207 Ac.-ft. WQCV required

2.894 Ac.-ft. EURV required

2.492 Ac.-ft. 100-yr. Storage

6.594 Ac.-ft. Total

Total In-flow: $Q_5 = 73 \text{ cfs}$, $Q_{100} = 178 \text{ cfs}$

Pond Design Release: $Q_5 = 1.4 \text{ cfs}$, $Q_{100} = 42.1 \text{ cfs}$

(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.
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 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 12.15 ac. of rear yards and buffer area that is not able to be captured and routed to one of the permanent EDB's, Runoff Reduction practices are required and provided in the 75' buffer tract along the south boundary. (See Runoff Reduction Calculations below for these areas that show a 100% WQCV Reduction and meets El Paso County standards)

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

Area treated in proposed permanent Pond FSD-11B (Includes off-site basins OS-4, OS-5, OS-6, B9, B10)	66.79 ac.
Area treated in existing permanent Pond FSD-14A (Includes off-site basins OS-1, OS-2, B1 thru B8)	12.05 ac.
Area treated in existing permanent Pond FSD-14B (Includes off-site basin OS-3)	3.70 ac.
Area of runoff reduction water quality treatment (Basins AA thru FF – Rear yards thru 75' buffer tract) Reference Runoff Reduction Calculations and map in Appendix for these areas	12.15 ac.
Area qualifies for exclusion H (Stream stabilization) (Basin Z) within the Sand Creek corridor	3.4 ac.
Filing No. 3 total platted area	<u>74.745 ac.</u>

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 is submitted with this Final Plat application. 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

A portion of this site is 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). However, the portion of the site that lies within the current 100-yr. FEMA floodplain will be platted as a tract for open space/channel corridor with future channel improvements to be constructed by developer. Please reference the "Sand Creek Restoration Plans – a portion of the Sand Creek Channel Sterling Ranch", prepared by JR Engineering (CDR204).

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. 3 has a total area of 74.745 acres with the following different land uses proposed:

13.221 Ac.	Open Space/Pond/Sand Creek/Trail Tracts (Tracts A-E & G)
11.857 Ac.	Future Elementary School (Tract F)
10.885 Ac.	0.5 ac. Lots (Lots 69-87 within 0.5 Ac. zone area)
38.782 Ac.	Urban Lots (Avg. Lot Size = 7,611 SF)
74.745 Ac.	Total



The percent imperviousness for this subdivision is calculated as follows:

Fees for Open Space/Pond/Sand Creek/Trail Tracts

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

$$13.221 \text{ Ac.} \times 7\% = \mathbf{0.93 \text{ Impervious Ac.}}$$

Fees for Future School Tract (undeveloped)

(Per El Paso County Percent Impervious Chart: 0%)

$$11,857 \text{ Ac.} \times 0\% = \mathbf{0.00 \text{ Impervious Ac.}}$$

Fees for 0.5 Ac. Lots

(Per El Paso County Percent Impervious Chart: 25%)

$$10.885 \text{ Ac.} \times 25\% = \mathbf{2.72 \text{ Impervious Ac.}}$$

Fees for Urban Lots (Avg. lot size 7,611 SF)

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

$$38.782 \text{ Ac.} \times 25\% = \mathbf{18.62 \text{ Impervious Ac.}}$$

Total Impervious Acreage: **22.27 Imp. Ac.** (Drainage Fees)

Total Impervious Acreage: **22.27 Imp. Ac.** (Bridge Fees)

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

ESTIMATED FEE TOTALS:		
Bridge Fees		
\$ 10,484.00 x 22.27 Impervious Ac.	=	<u>\$ 233,478.68</u>
Drainage Fees (Credits to be used)		
\$ 25,632.00 x 22.27 Impervious Ac.	=	<u>\$ 570,824.64</u>

Credits within the basin will be used for Drainage Fees only. Please reference the "Pre-credits" table below. Bridge Fees will be paid at plat recordation.



CONSTRUCTION COST OPINION

Private Full-Spectrum Detention Facility (FSD-11B)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	Eastern Forebay Structure	1 EA	\$110,000.00	\$ 110,000.00
2.	Western Forebay Structure	1 EA	\$ 60,000.00	\$ 60,000.00
3.	Concrete Outlet Structure	1 EA	\$ 50,000.00	\$ 50,000.00
4.	Concrete Trickle Channel	680 LF	\$65.00/LF	\$ 44,200.00
5.	Handrail	115 LF	\$220.00/LF	\$ 25,300.00
6.	Rip-Rap Spillway	670 CY	\$80/CY	\$ 53,600.00
7.	Outlet pipe (24" RCP)	130 LF	\$98/CY	\$ 12,740.00
SUB-TOTAL				\$ 355,840.00
10% ENGINEERING				\$ 35,584.00
5% CONTINGENCY				\$ 17,792.00
TOTAL				<u>\$ 409,216.00</u>

SUMMARY

The proposed Sterling Ranch East Filing No. 3 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

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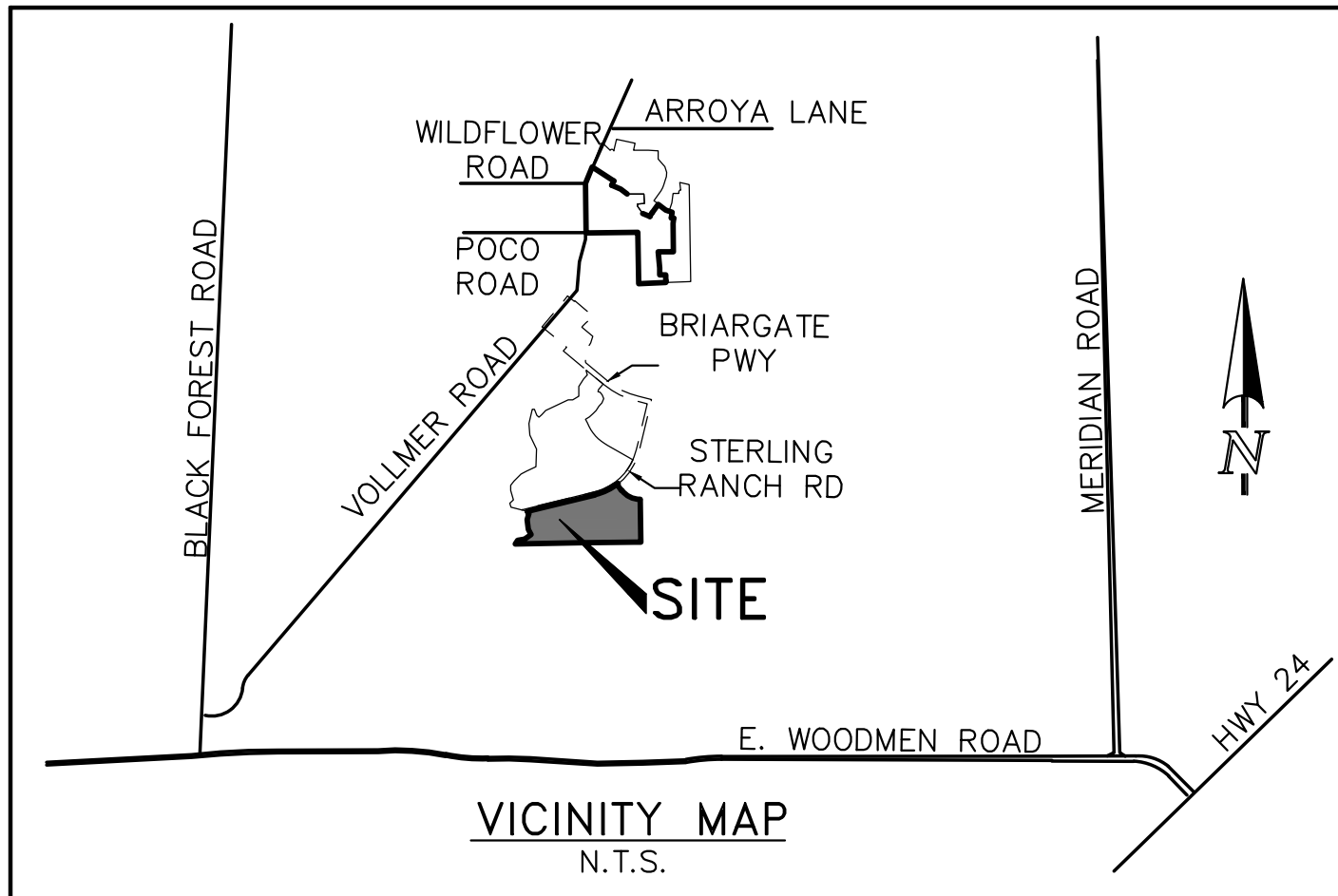


REFERENCES

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. "Final Drainage Report for Forest Gate Subdivision" Law & Mariotti Consultants, Inc. dated October 2004.
4. "Sand Creek Drainage Basin Planning Study," Kiowa Engineering Corporation, dated March 1996.
5. "2018 Sterling Ranch MDDP", M&S Civil Consultants, Inc., June 2018
6. "Final Drainage Report for Retreat at TimberRidge Filing No. 1", Classic Consulting, approved November, 2020.
7. "Final Drainage Report for Retreat at TimberRidge Filing No. 2", Classic Consulting, approved September, 2022.
8. "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1", Classic Consulting, January 2023
9. "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", JR Engineering, July 2023
10. "Preliminary Drainage Report for Sterling Ranch East Filing No. 5", Classic Consulting, January 2024.

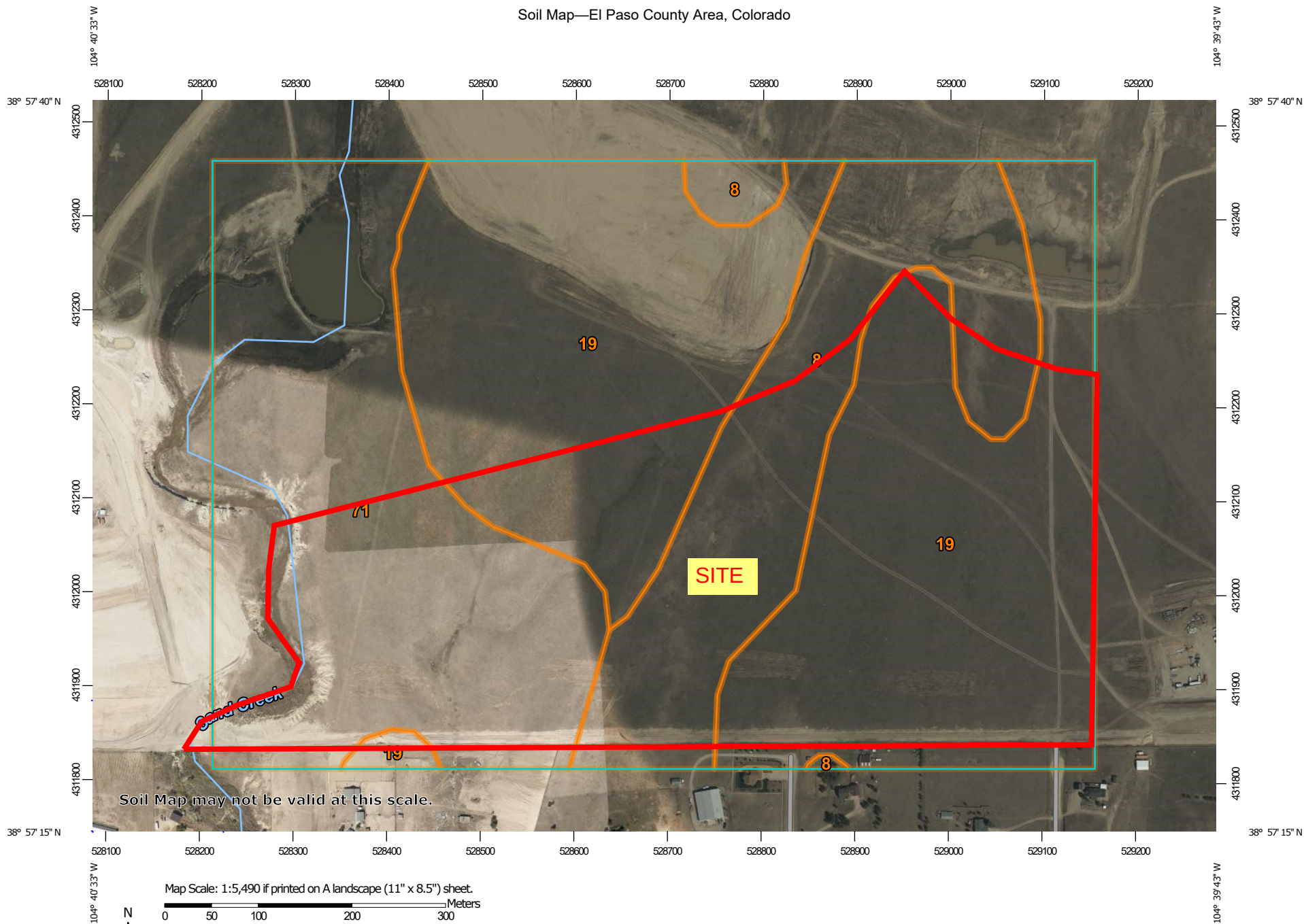
APPENDIX

VICINITY MAP



SOILS MAP (S.C.S SURVEY)

Soil Map—El Paso County Area, Colorado



Soil Map may not be valid at this scale.

Map Scale: 1:5,490 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

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



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

5/23/2024
Page 1 of 3

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 21, Aug 24, 2023

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	28.4	18.8%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	77.4	51.1%
71	Pring coarse sandy loam, 3 to 8 percent slopes	45.6	30.1%
Totals for Area of Interest		151.4	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: Hills, flats

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 21, Aug 24, 2023

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: Flood plains, fan terraces, fans

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 21, Aug 24, 2023

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k

Elevation: 6,800 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent

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

Description of Pring

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam

C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High
(2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: R048AY222CO - Loamy Park

Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 21, Aug 24, 2023

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, NIMS12
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.

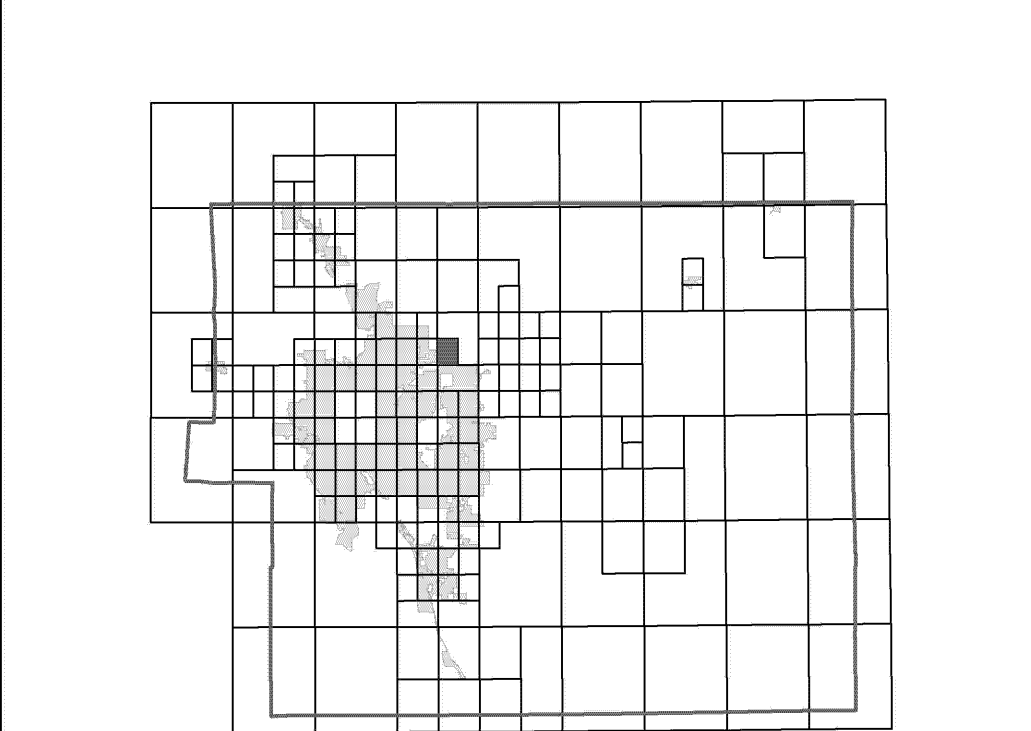
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which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

Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FIRM) 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/>.

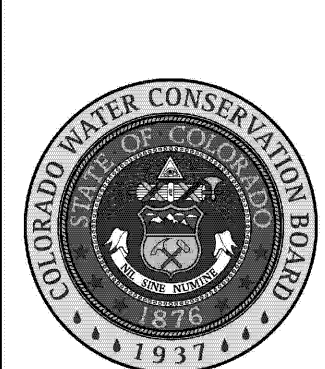
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfip>.

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	

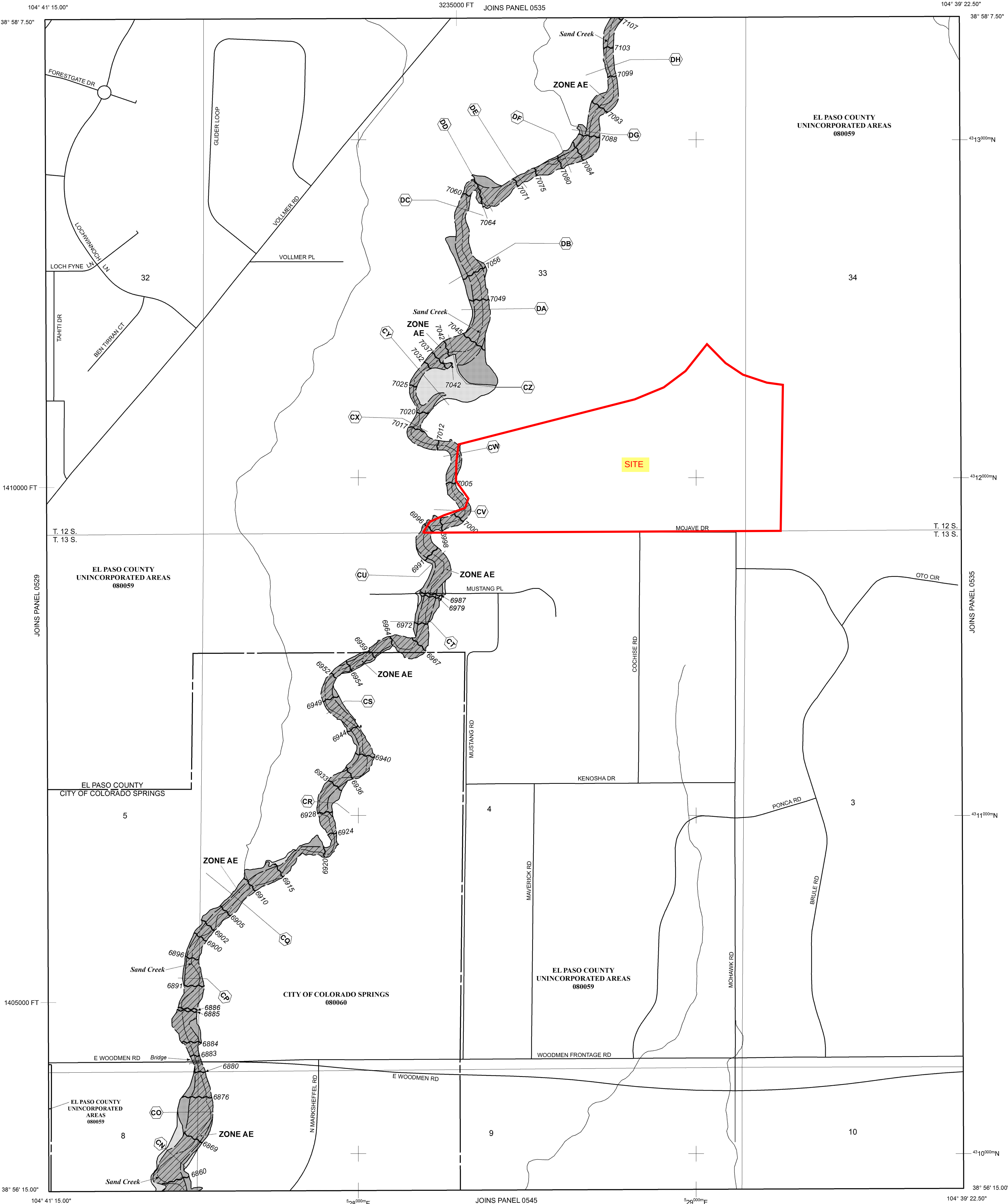
Panel Location Map



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.



HYDROLOGIC / HYDRAULIC CALCULATIONS

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 $Z = 6,840 \text{ ft}/100$

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 curves² 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

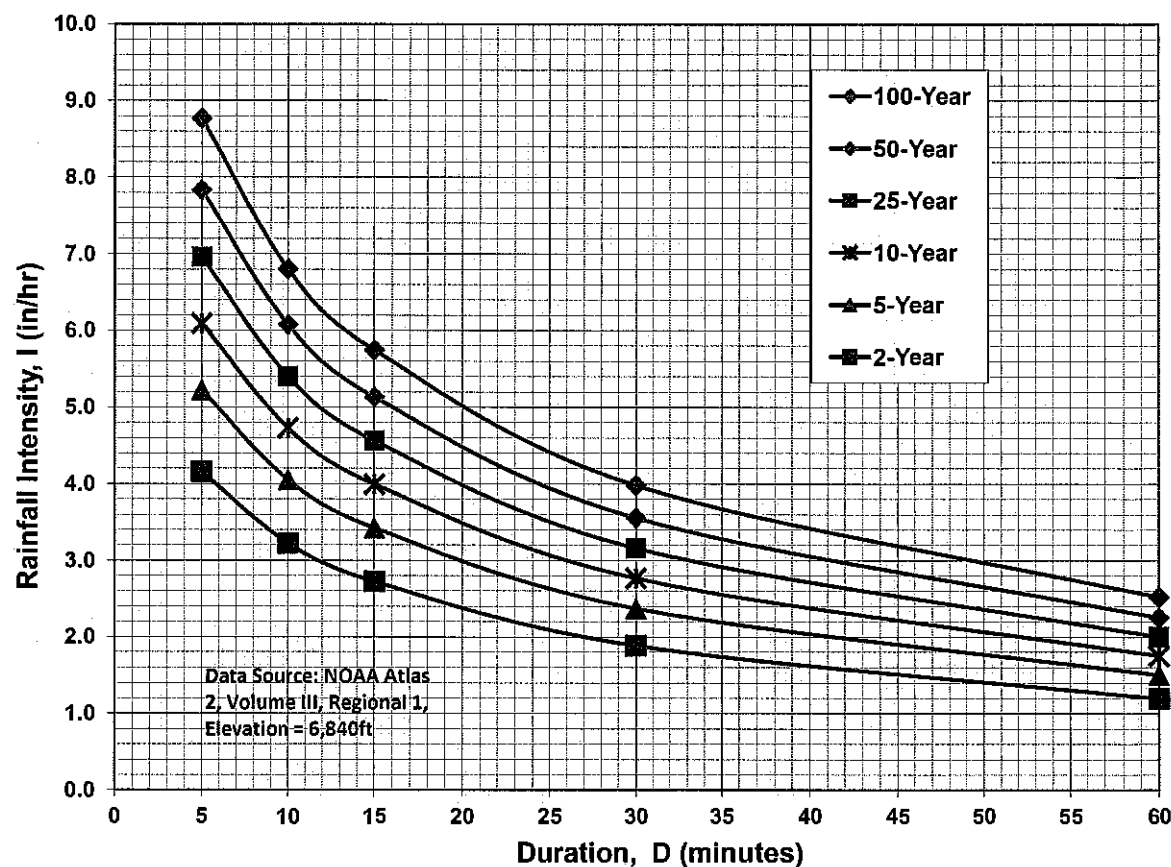
One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration 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 Areas¹	Treatment²	Hydrologic Condition³	% I	HSG A	HSG B	HSG C	HSG D
Newly graded areas (pervious areas only, no vegetation)	-----	-----	---	77	86	91	94
Cultivated Agricultural Lands¹	Treatment	Hydrologic Condition	% I	HSG A	HSG B	HSG C	HSG D
Fallow	Bare soil	-----	---	77	86	91	94
	Crop residue cover (CR)	Poor	---	76	85	90	93
	Good	---	---	74	83	88	90
Row crops	Straight row (SR)	Poor	---	72	81	88	91
		Good	---	67	78	85	89
	SR + CR	Poor	---	71	80	87	90
		Good	---	64	75	82	85
	Contoured (C)	Poor	---	70	79	84	88
		Good	---	65	75	82	86
	C + CR	Poor	---	69	78	83	87
		Good	---	64	74	81	85
	Contoured & terraced (C&T)	Poor	---	66	74	80	82
		Good	---	62	71	78	81
	C&T + CR	Poor	---	65	73	79	81
		Good	---	61	70	77	80
Small grain	SR	Poor	---	65	76	84	88
		Good	---	63	75	83	87
	SR + CR	Poor	---	64	75	83	86
		Good	---	60	72	80	84
	C	Poor	---	63	74	82	85
		Good	---	61	73	81	84
	C + CR Poor	Poor	---	62	73	81	84
		Good	---	60	72	80	83
	C&T	Poor	---	61	72	79	82
		Good	---	59	70	78	81
	C&T + CR	Poor	---	60	71	78	81
		Good	---	58	69	77	80

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

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

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

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

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

$$I_5 = -1.50 \ln(D) + 7.583$$

$$I_2 = -1.19 \ln(D) + 6.035$$

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

JOB NAME:STERLING RANCH EAST FILING NO. 3

JOB NUMBER:1183.33

DATE:09/20/24

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(2)	C(5)	C(100)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS
A	1.40	RES 1/6 AC.	52.5%	1.40	0.32	0.38	0.55			0.00	0.89	0.90	0.96	0.32	0.38	0.55	0.45	0.53	0.76	52.5%
B	3.30	RES 1/6 AC.	52.5%	3.30	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.06	1.24	1.80	52.5%
C	1.80	RES 1/6 AC.	52.5%	1.35	0.32	0.38	0.55	STREET	100.0%	0.45	0.89	0.90	0.96	0.46	0.51	0.65	0.83	0.91	1.17	64.4%
D	3.40	RES 1/6 AC.	52.5%	3.40	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.09	1.28	1.85	52.5%
E	1.80	RES 1/6 AC.	52.5%	1.80	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.58	0.68	0.98	52.5%
F	1.80	RES 1/6 AC.	52.5%	1.80	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.58	0.68	0.98	52.5%
G	2.50	RES 1/6 AC.	52.5%	2.50	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.80	0.94	1.36	52.5%
H	0.51	RES 1/2 AC.	25.0%	0.34	0.15	0.22	0.46	STREET	100.0%	0.17	0.89	0.90	0.96	0.40	0.45	0.63	0.20	0.23	0.32	50.0%
I	1.80	RES 1/6 AC.	52.5%	1.80	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.58	0.68	0.98	52.5%
J	0.85	RES 1/6 AC.	52.5%	0.45	0.32	0.38	0.55	STREET	100.0%	0.40	0.89	0.90	0.96	0.59	0.62	0.74	0.50	0.53	0.63	74.9%
K	2.60	RES 1/6 AC.	52.5%	2.60	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.83	0.98	1.42	52.5%
L	0.36	RES 1/6 AC.	52.5%	0.24	0.32	0.38	0.55	STREET	100.0%	0.12	0.89	0.90	0.96	0.51	0.55	0.68	0.18	0.20	0.25	68.3%
M	2.80	RES 1/6 AC.	52.5%	2.80	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.90	1.05	1.53	52.5%
N	1.10	RES 1/6 AC.	52.5%	1.10	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.35	0.41	0.60	52.5%
O	0.86	RES 1/2 AC.	25.0%	0.57	0.15	0.22	0.46	STREET	100.0%	0.29	0.89	0.90	0.96	0.40	0.45	0.63	0.34	0.39	0.54	50.3%
P	2.30	RES 1/6 AC.	52.5%	2.30	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.74	0.86	1.25	52.5%
Q	0.67	RES 1/2 AC.	25.0%	0.45	0.15	0.22	0.46	STREET	100.0%	0.22	0.89	0.90	0.96	0.39	0.44	0.62	0.26	0.30	0.42	49.6%
R	3.90	RES 1/8 AC.	65.0%	3.90	0.41	0.45	0.59			0.00	0.02	0.08	0.35	0.41	0.45	0.59	1.60	1.76	2.30	65.0%
S	2.00	RES 1/6 AC.	52.5%	2.00	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.64	0.75	1.09	52.5%
T	2.60	RES 1/6 AC.	52.5%	2.60	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.83	0.98	1.42	52.5%
U	1.40	RES 1/8 AC.	65.0%	0.85	0.41	0.45	0.59	STREET	100.0%	0.55	0.89	0.90	0.96	0.60	0.63	0.74	0.84	0.88	1.03	78.8%
V	1.10	RES 1/6 AC.	52.5%	0.85	0.32	0.38	0.55	STREET	100.0%	0.25	0.02	0.08	0.35	0.25	0.31	0.50	0.28	0.34	0.55	63.3%
W	1.80	RES 1/4 AC.	40.0%	1.20	0.23	0.30	0.50	STREET	100.0%	0.60	0.89	0.90	0.96	0.45	0.50	0.65	0.81	0.90	1.18	60.0%
X	9.80	SCHOOL	70%	9.80	0.45	0.49	0.62			0.00	0.02	0.08	0.35	0.45	0.49	0.62	4.41	4.80	6.08	70.0%
Y	4.80	POND	7.0%	4.80	0.05	0.12	0.39			0.00	0.02	0.08	0.35	0.05	0.12	0.39	0.24	0.58	1.87	7.0%
Z	3.40	SAND CREEK	7.0%	3.40	0.05	0.12	0.39			0.00	0.02	0.08	0.35	0.05	0.12	0.39	0.17	0.41	1.33	7.0%
AA	0.55	OPEN SPACE	2.0%	0.39	0.03	0.09	0.36	TRAIL	80.0%	0.16	0.57	0.59	0.70	0.19	0.24	0.46	0.10	0.13	0.25	24.7%
BB	1.10	OPEN SPACE	2.0%	0.88	0.03	0.09	0.36	TRAIL	80.0%	0.22	0.57	0.59	0.70	0.14	0.19	0.43	0.15	0.21	0.47	17.6%
CC	1.60	RES 1/2 AC.	25.0%	1.48	0.15	0.22	0.46	TRAIL	80.0%	0.12	0.57	0.59	0.70	0.18	0.25	0.48	0.29	0.40	0.76	29.1%
DD	2.70	RES 1/2 AC.	25.0%	2.53	0.15	0.22	0.46	TRAIL	80.0%	0.17	0.57	0.59	0.70	0.18	0.24	0.48	0.48	0.66	1.28	28.5%
EE	4.90	RES 1/2 AC.	25.0%	4.57	0.15	0.22	0.46	TRAIL	80.0%	0.33	0.57	0.59	0.70	0.18	0.24	0.48	0.87	1.20	2.33	28.7%
FF	1.30	RES 1/2 AC.	25.0%	1.22	0.15	0.22	0.46	TRAIL	80.0%	0.08	0.57	0.59	0.70	0.18	0.24	0.47	0.23	0.32	0.62	28.4%
OS-1	2.60	RES 1/8 AC.	65.0%	1.30	0.41	0.45	0.59	STREET	100.0%	1.30	0.89	0.90	0.96	0.65	0.68	0.78	1.69	1.76	2.02	82.5%
OS-2	0.68	STREET	100.0%	0.34	0.89	0.90	0.96	OPEN SPACE	7%	0.34	0.05	0.12	0.39	0.47	0.51	0.68	0.32	0.35	0.46	53.5%
OS-3	3.70	RES 1/6 AC.	52.5%	3.70	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.18	1.39	2.02	52.5%
OS-4	1.60	RES 1/6 AC.	52.5%	1.60	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	0.51	0.60	0.87	52.5%
OS-5	3.30	RES 1/6 AC.	52.5%	3.30	0.32	0.38	0.55			0.00	0.02	0.08	0.35	0.32	0.38	0.55	1.06	1.24	1.80	52.5%
OS-6	0.44	STREET	100%	0.07	0.89	0.90	0.96	PARK	7.0%	0.37	0.05	0.12	0.39	0.18	0.24	0.48	0.08	0.11	0.21	21.8%

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FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	C VALUE DCM TABLE 6-6						C VALUE DCM TABLE 6-6						WEIGHTED "C" VALUE			WEIGHTED CA			DCM TABLE 6-6
		LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	LAND USE	PERCENT IMPERVIOUS	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	CA(2)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS
B1	1.70	STREET	100%	1.10	0.89	0.90	0.96	OPEN SPACE	7.0%	0.60	0.05	0.12	0.39	0.59	0.62	0.76	1.01	1.06	1.29	67.2%
B3	1.50	STREET	100%	0.90	0.89	0.90	0.96	OPEN SPACE	7.0%	0.60	0.05	0.12	0.39	0.55	0.59	0.73	0.83	0.88	1.10	62.8%
B4	0.87	STREET	100%	0.49	0.89	0.90	0.96	OPEN SPACE	7.0%	0.38	0.05	0.12	0.39	0.52	0.56	0.71	0.46	0.49	0.62	59.4%
B5	0.90	STREET	100%	0.52	0.89	0.90	0.96	OPEN SPACE	7.0%	0.38	0.05	0.12	0.39	0.54	0.57	0.72	0.48	0.51	0.65	60.7%
B6	1.00	STREET	100%	0.60	0.89	0.90	0.96	OPEN SPACE	7.0%	0.40	0.05	0.12	0.39	0.55	0.59	0.73	0.55	0.59	0.73	62.8%
B7	1.60	STREET	100%	0.75	0.89	0.90	0.96	OPEN SPACE	7.0%	0.85	0.05	0.12	0.39	0.44	0.49	0.66	0.71	0.78	1.05	50.6%
B8	1.20	STREET	100%	0.65	0.89	0.90	0.96	OPEN SPACE	7.0%	0.55	0.05	0.12	0.39	0.51	0.54	0.70	0.61	0.65	0.84	57.4%
B9	2.00	STREET	100%	0.95	0.89	0.90	0.96	OPEN SPACE	7.0%	1.05	0.05	0.12	0.39	0.45	0.49	0.66	0.90	0.98	1.32	51.2%
B10	2.20	STREET	100%	1.05	0.89	0.90	0.96	OPEN SPACE	7.0%	1.15	0.05	0.12	0.39	0.45	0.49	0.66	0.99	1.08	1.46	51.4%
TOTAL AREA TRIBUTARY TO POND FSD-11B	66.79	53.8%																		
Tributary Area to 54" RCP Easterly Outfall	52.79	51.0%																		
Tributary Area to 42" RCP Westerly Outfall	14.00	64.4%																		
Basins tributary to Pond FSD-14A	12.05	64.6%																		
Basins tributary to Pond FSD-14B	3.70	52.5%																		
Basins using Runoff Reduction	12.15	27.5%																		

JOB NAME: **STERLING RANCH EAST FILING NO. 3**
 JOB NUMBER: **1183.33**
 DATE: **10/24/25**
 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

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

$$V = C_v S_w^{0.5} \quad T_c = L/V$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)* $t_c = \frac{L}{180} + 10$	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*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)
A	0.45	0.53	0.76	0.12	50	1	10.0	500	1.5%	2.4	3.4	13.4	2.95	3.70	6.20	1	2	5
B	1.06	1.24	1.80	0.12	100	2	14.1	730	1.8%	2.7	4.5	18.6	2.56	3.20	5.37	3	4	10
C	0.83	0.91	1.17	0.12	100	2	14.1	600	1.8%	2.7	3.7	17.8	2.61	3.26	5.48	2	3	6
D	1.09	1.28	1.85	0.12	100	2	14.1	450	1.8%	2.7	2.8	16.9	2.67	3.34	5.61	3	4	10
E	0.58	0.68	0.98	0.12	100	2	14.1	275	1.5%	2.4	1.9	15.9	2.74	3.43	5.76	2	2	6
F	0.58	0.68	0.98	0.12	100	2	14.1	400	1.5%	2.4	2.7	16.8	2.68	3.35	5.63	2	2	6
G	0.80	0.94	1.36	0.12	100	2	14.1	500	1.5%	2.4	3.4	17.5	2.63	3.29	5.53	2	3	8
H	0.20	0.23	0.32	0.12	50	1	10.0	175	1.5%	2.4	1.2	11.1	3.17	3.97	6.66	0.6	0.9	2.1
I	0.58	0.68	0.98	0.12	100	2	14.1	400	1.5%	2.4	2.7	16.8	2.68	3.35	5.63	2	2	6
J	0.50	0.53	0.63	0.12	50	1	10.0	350	1.5%	2.4	2.4	12.3	3.05	3.81	6.40	1.5	2	4
K	0.83	0.98	1.42	0.12	100	2	14.1	350	2.6%	3.2	1.8	15.9	2.74	3.43	5.77	2	3	8
L	0.18	0.20	0.25	0.12	50	1	10.0	160	2.6%	3.2	0.8	10.8	3.21	4.02	6.74	0.6	0.8	1.7
M	0.90	1.05	1.53	0.12	100	2	14.1	325	2.9%	3.4	1.6	15.7	2.76	3.46	5.80	2	4	9
N	0.35	0.41	0.60	0.12	100	2	14.1	300	2.9%	3.4	1.5	15.5	2.77	3.47	5.82	1.0	1.4	3.5

JOB NAME: **STERLING RANCH EAST FILING NO. 3**
 JOB NUMBER: **1183.33**
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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

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

$$V = C_v S_w^{0.5} \quad T_c = L/V$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)* $t_c = \frac{L}{180} + 10$	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*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)
O	0.34	0.39	0.54	0.12	50	1	10.0	350	1.5%	2.4	2.4	12.3	3.05	3.81	6.40	1	1	3
P	0.74	0.86	1.25	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.48	5.84	2	3	7
Q	0.26	0.30	0.42	0.12	50	1	10.0	200	1.5%	2.4	1.4	11.3	3.15	3.94	6.62	0.8	1.2	2.8
R	1.60	1.76	2.30	0.12	100	2	14.1	600	2.3%	3.0	3.3	17.4	2.64	3.30	5.54	4	6	13
S	0.64	0.75	1.09	0.12	100	2	14.1	350	2.3%	3.0	1.9	16.0	2.74	3.42	5.75	2	3	6
T	0.83	0.98	1.42	0.12	100	2	14.1	675	1.5%	2.4	4.6	18.7	2.55	3.19	5.36	2	3	8
U	0.84	0.88	1.03	0.12	50	1	10.0	675	1.5%	2.4	4.6	14.5	2.85	3.57	5.99	2	3	6
V	0.28	0.34	0.55	0.12	100	2	14.1	300	1.5%	2.4	2.0	16.1	2.73	3.41	5.73	1	1.2	3.2
W	0.81	0.90	1.18	0.12	50	1	10.0	300	1.5%	2.4	2.0	12.0	3.08	3.86	6.47	2	3	8
X	4.41	4.80	6.08	0.12	40	1.2	7.8	300	2.0%	2.8	1.8	9.6	3.35	4.20	7.05	15	20	43
Y	0.24	0.58	1.87	0.12	100	1	17.7	500	1.0%	2.0	4.2	21.9	2.36	2.96	4.96	0.6	1.7	9.3
Z	0.17	0.41	1.33	0.12	65	14	5.2	700	1.0%	0.7	16.7	21.8	2.36	2.96	4.96	0.4	1.2	6.6
AA	0.10	0.13	0.25	0.12	100	5.5	10.1					10.1	3.29	4.12	6.91	0.3	0.5	1.7
BB	0.15	0.21	0.47	0.12	100	8	8.9					8.9	3.43	4.30	7.22	0.5	0.9	3.4
CC	0.29	0.40	0.76	0.12	100	2.5	13.1	125	2.5%	1.6	1.3	14.4	2.86	3.58	6.01	0.8	1.4	4.6

JOB NAME: **STERLING RANCH EAST FILING NO. 3**
 JOB NUMBER: **1183.33**
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 CALC'D BY: **MAW**

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

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

$$V = C_v S_w^{0.5} \quad T_c = L/V$$

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*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)
DD	0.48	0.66	1.28	0.12	100	2.5	13.1	150	2.0%	1.4	1.8	14.8	2.82	3.54	5.94	1.3	2	8
EE	0.87	1.20	2.33	0.12	100	2.5	13.1	150	2.0%	1.4	1.8	14.8	2.82	3.54	5.94	2.5	4	14
FF	0.23	0.32	0.62	0.12	65	2	9.8	125	2.0%	1.4	1.5	11.3	3.15	3.94	6.62	0.7	1.2	4.1
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	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
OS-4	0.51	0.60	0.87	0.12	40	0.8	8.9	900	2.5%	3.2	4.7	13.6	2.93	3.66	6.15	1	2	5
OS-5	1.06	1.24	1.80	0.12	100	2	14.1	300	1.5%	2.4	2.0	16.1	2.73	3.41	5.73	3	4	10
OS-6	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

JOB NAME: **STERLING RANCH EAST FILING NO. 3**
 JOB NUMBER: **1183.33**
 DATE: **10/24/25**
 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

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

$$V = C_v S_w^{0.5} \quad T_c = L/V$$

Table 6-7. Conveyance Coefficient, C_v

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Paved areas and shallow paved swales	20

*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)
B1	1.01	1.06	1.29	0.12	10	0.3	3.9	1100	2.4%	3.1	5.9	9.8	3.32	4.16	6.98	3	4	9
B3	0.83	0.88	1.10	0.12	40	1.2	7.8	600	1.5%	2.4	4.1	11.9	3.09	3.87	6.50	3	3	7
B4	0.83	0.49	0.62	0.12	30	0.9	6.7	450	1.5%	2.4	3.1	9.8	3.32	4.16	6.98	3	2	4
B5	0.48	0.51	0.65	0.12	30	0.9	6.7	500	1.5%	2.4	3.4	10.1	3.28	4.11	6.90	2	2	4
B6	0.55	0.59	0.73	0.12	30	0.9	6.7	500	1.5%	2.4	3.4	10.1	3.28	4.11	6.90	2	2	5
B7	0.71	0.78	1.05	0.12	70	2.5	9.7	500	1.5%	2.4	3.4	13.1	2.97	3.72	6.25	2	3	7
B8	0.61	0.65	0.84	0.12	30	0.9	6.7	575	1.5%	2.4	3.9	10.7	3.22	4.03	6.77	2	3	6
B9	0.90	0.98	1.32	0.12	40	1.2	7.8	750	1.5%	2.4	5.1	12.9	2.99	3.75	6.29	3	4	8
B10	0.99	1.08	1.46	0.12	30	0.9	6.7	600	1.5%	2.4	4.1	10.8	3.20	4.01	6.73	3	4	10

JOB NAME: STERLING RANCH EAST FILING NO. 3
 JOB NUMBER: 1183.33
 DATE: 10/24/25
 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 T _c	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	0.74	16.6	3.37	5.65	1	4	Exist. Crossspan
3	OS-3	1.39	2.02	20.2	3.07	5.16	4	10	Future 10' Type R At-grade Inlet
4	OS-4, Flow-by from DP-3	0.63	1.48	21.2	3.00	5.03	2	7	Prop. 6' Crossspan
5	OS-4, OS-5 (Anticipated off-site flows from SRE Fil. 5)	1.87	3.28	22.2	2.93	4.92	5	16	Prop. 10' Type R Sump Inlet
6	A, OS-6 (Anticipated off-site flows from SRE Fil. 5)	0.63	0.97	13.4	3.70	6.20	2	6	Prop. 5' Type R Sump Inlet
7	B	1.24	1.80	18.6	3.20	5.37	4	10	Prop. 10' Type R Sump Inlet
8	C	0.91	1.17	17.8	3.26	5.48	3	6	Prop. 5' Type R Sump Inlet
9	D, E	1.95	2.83	18.8	3.18	5.35	6	15	Prop. 10' At-Grade Type R Inlet
10	DP-9 Flow-by, F, G	1.87	3.56	17.5	3.29	5.53	6	20	Prop. 10' Type R Sump Inlet
11	H	0.23	0.32	11.1	3.97	6.66	0.9	2.1	Prop. 5' Type R Sump Inlet
12	I, J	1.20	1.61	18.8	3.18	5.34	4	9	Prop. 10' At-Grade Type R Inlet
13	K, 5-yr. Flow-by from DP-12	0.99	1.42	15.9	3.43	5.77	3	8	Prop. 5' Type R Sump Inlet
14	L	0.20	0.25	10.8	4.02	6.74	0.8	1.7	Prop. 5' Type R Sump Inlet

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FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum T _c	Intensity		Flow		Facility/ Inlet Size*
					I(5)	I(100)	Q(5)	Q(100)	
15	M, N, 100-yr. Flow-by DP-12	1.46	2.54	18.8	3.18	5.34	5	14	Prop. 10' Type R Sump Inlet
16	O	0.39	0.54	12.3	3.81	6.40	1	3	Prop. 5' Type R Sump Inlet
17	P	0.86	1.25	15.4	3.48	5.84	3	7	Prop. 5' Type R Sump Inlet
18	Q	0.30	0.42	11.3	3.94	6.62	1.2	2.8	Prop. 5' Type R Sump Inlet
19	T, U	1.85	2.45	19.1	3.16	5.31	6	13	Prop. 10' At-Grade Type R Inlet
20	R, 5-yr Flow-by from DP-19	1.98	2.30	17.4	3.30	5.54	7	13	Prop. 10' Type R Sump Inlet
21	S	0.75	1.09	16.0	3.42	5.75	3	6	Prop. 5' Type R Sump Inlet
22	V, 100-yr Flow-by from DP-19	0.34	1.48	16.1	3.41	5.73	1.2	8.5	Prop. 10' Type R Sump Inlet
23	W	0.90	1.18	12.0	3.86	6.47	3	8	Prop. 5' Type R Sump Inlet
24	Pond Inflow (Easterly Forebay)	19.36	27.86	25.3	2.73	4.59	53	128	Prop. 54" RCP
25	B1	1.06	1.29	9.8	4.16	6.98	4	9	Exist. 15' Type R At-grade Inlet
26	B3, Flow-by from DP-25	0.88	1.16	11.9	3.87	6.50	3	8	Exist. 10' Type R At-grade Inlet
27	B4, Flow-by from DP-2	0.83	1.36	19.7	3.11	5.22	3	7	Exist. 10' Type R At-grade Inlet
28	B5, Flow-by from DP-26	0.51	0.90	12.9	3.75	6.30	2	6	Exist. 10' Type R At-grade Inlet

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FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins / Design Point	Equivalent CA(5)	Equivalent CA(100)	Maximum T _c	Intensity		Flow		Facility/ Inlet Size*
					I(5)	I(100)	Q(5)	Q(100)	
29	B6, Flow-by from DP-27	0.59	0.98	20.7	3.04	5.10	2	5	Exist. 10' Type R At-grade Inlet
30	B7, Flow-by from DP-28	0.78	1.17	13.9	3.64	6.11	3	7	Exist. 10' Type R At-grade Inlet
31	B8, Flow-by from DP-29	0.65	0.91	21.7	2.97	4.98	2	5	Exist. 10' Type R At-grade Inlet
32	B9, Flow-by from DP-30	0.98	1.53	15.9	3.44	5.77	3	9	Exist. 15' Type R Sump Inlet
33	B10, Flow-by from DP-31	1.08	1.52	23.7	2.83	4.76	3	7	Exist. 15' Type R Sump Inlet
34	Pond Inflow (Westerly Forebay - X, DP-32, DP-33)	6.87	9.13	16.9	3.34	5.61	23	51	Prop. 42" RCP
	Total Pond Inflow (DP-24, DP-34 and Y),	26.81	38.86	25.3	2.73	4.59	73	178	Pond FSD-11B

JOB NAME: STERLING RANCH EAST FILING NO. 3
 JOB NUMBER: 1183.33
 DATE: 10/24/25
 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)	
1	DP-5	1.87	3.28	22.2	2.93	4.92	5	16	PROP. 24" RCP
2	DP-6	0.63	0.97	13.4	3.70	6.20	2	6	PROP. 18" RCP
3	PR-1, PR-2	2.50	4.25	23.2	2.86	4.81	7	20	PROP. 30" RCP
4	DP-7	1.24	1.80	18.6	3.20	5.37	4	10	PROP. 24" RCP
5	DP-8	0.91	1.17	17.8	3.26	5.48	3	6	PROP. 18" RCP
6	PR-3, PR-4, PR-5	4.65	7.22	23.4	2.85	4.79	13	35	PROP. 36" RCP
7	DP-9 Capture	1.72	1.64	18.8	3.18	5.35	5	9	PROP. 24" RCP
8	PR-6, PR-7	6.36	8.86	23.6	2.84	4.76	18	42	PROP. 36" RCP
9	DP-10	1.87	3.56	17.5	3.29	5.53	6	20	PROP. 30" RCP
10	DP-11	0.23	0.32	11.1	3.97	6.66	0.9	2.1	PROP. 18" RCP
11	PR-8, PR-9, PR-10	8.46	12.74	24.4	2.79	4.68	24	60	PROP. 42" RCP
12	DP-12 Capture	1.19	1.21	18.8	3.18	5.34	4	6	PROP. 18" RCP
13	DP-13	0.99	1.42	15.9	3.43	5.77	3	8	PROP. 18" RCP

JOB NAME: STERLING RANCH EAST FILING NO. 3
 JOB NUMBER: 1183.33
 DATE: 10/24/25
 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)	
14	DP-14	0.20	0.25	10.8	4.02	6.74	0.8	1.7	PROP. 18" RCP
15	PR-13, PR-14	1.19	1.66	15.9	3.43	5.77	4	10	PROP. 24" RCP
16	PR-12, PR-15	2.38	2.87	19.4	3.14	5.26	7	15	PROP. 24" RCP
17	PR-11, PR-16	10.83	15.61	24.4	2.79	4.68	30	73	PROP. 42" RCP
18	DP-15	1.46	2.54	18.8	3.18	5.34	5	14	PROP. 24" RCP
19	DP-16	0.39	0.54	12.3	3.81	6.40	1	3	PROP. 18" RCP
20	PR-17, PR-18, PR-19	12.68	18.70	24.8	2.76	4.64	35	87	PROP. 48" RCP
21	DP-17	0.86	1.25	15.4	3.48	5.84	3	7	PROP. 18" RCP
22	DP-18	0.30	0.42	11.3	3.94	6.62	1.2	2.8	PROP. 18" RCP
23	PR-20, PR-21, PR-22	13.84	20.37	25.2	2.74	4.60	38	94	PROP. 48" RCP
24	DP-19 Capture	1.56	1.44	19.1	3.16	5.31	5	8	PROP. 18" RCP
25	DP-20	1.98	2.30	17.4	3.30	5.54	7	13	PROP. 24" RCP
26	DP-21	0.75	1.09	16.0	3.42	5.75	3	6	PROP. 18" RCP

JOB NAME: STERLING RANCH EAST FILING NO. 3
 JOB NUMBER: 1183.33
 DATE: 10/24/25
 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)	
27	PR-25, PR-26	2.73	3.39	17.5	3.29	5.53	9	19	PROP. 30" RCP
28	PR-24, PR-27	4.28	4.83	19.3	3.15	5.28	13	26	PROP. 30" RCP
29	DP-22	0.34	1.48	16.1	3.41	5.73	1.2	8.5	PROP. 18" RCP
30	DP-23	0.90	1.18	12.0	3.86	6.47	3	8	PROP. 18" RCP
31	PR-26, PR-27, PR-28	5.52	7.49	19.4	3.14	5.27	17	39	PROP. 36" RCP
32	TOTAL INFLOW POND FSD 11 B (EASTERLY FOREBAY)	19.36	27.86	25.3	2.73	4.59	53	128	PROP. 54" RCP
33	DP-32	0.98	1.53	15.9	3.44	5.77	3	9	PROP. 18" RCP
34	DP-33, PR-33	2.06	3.05	16.9	3.34	5.61	7	17	PROP. 24" RCP
35	X (Future Elem. School Site)	4.80	6.08	9.6	4.20	7.05	20	43	PROP. 36" RCP
36	TOTAL INFLOW POND FSD 11 B (WESTERLY FOREBAY)	6.87	9.13	16.9	3.34	5.61	23	51	PROP. 42" RCP

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-1	DP-3	DP-5	DP-6	DP-7
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	6.0	4.0	5.0	2.0	4.0
Major Q_{Known} (cfs)	12.0	10.0	16.0	6.0	10.0

Bypass (Carry-Over) Flow from Upstream

Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	6.0	4.0	5.0	2.0	4.0
Major Total Design Peak Flow, Q (cfs)	12.0	10.0	16.0	6.0	10.0
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.1	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	1.7	3.0	N/A	N/A	N/A

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-8	DP-9	DP-10	DP-11	DP-12
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	In Sump	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.0	6.0	6.0	0.9	4.0
Major Q_{Known} (cfs)	6.0	15.0	20.0	2.1	9.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	3.0	6.0	6.0	0.9	4.0
Major Total Design Peak Flow, Q (cfs)	6.0	15.0	20.0	2.1	9.0
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.8	N/A	N/A	0.1
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	6.4	N/A	N/A	2.3

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-13	DP-14	DP-15	DP-16	DP-17
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.0	0.8	5.0	1.0	3.0
Major Q_{Known} (cfs)	8.0	1.7	14.0	3.0	7.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	3.0	0.8	5.0	1.0	3.0
Major Total Design Peak Flow, Q (cfs)	8.0	1.7	14.0	3.0	7.0
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	N/A

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-18	DP-19	DP-20	DP-21	DP-22
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.2	6.0	7.0	3.0	1.2
Major Q_{Known} (cfs)	2.8	13.0	13.0	6.0	8.5

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	1.2	6.0	7.0	3.0	1.2
Major Total Design Peak Flow, Q (cfs)	2.8	13.0	13.0	6.0	8.5
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.7	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	4.9	N/A	N/A	N/A

INLET NAME	DP-23	DP-25	DP-26	DP-27	DP-28
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.0	4.0	3.0	3.0	2.0
Major Q_{Known} (cfs)	8.0	9.0	8.0	7.0	6.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	3.0	4.0	3.0	3.0	2.0
Major Total Design Peak Flow, Q (cfs)	8.0	9.0	8.0	7.0	6.0
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.0	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	0.5	1.8	1.2	0.8

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-29	DP-30	DP-31	DP-32	DP-33
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.0	3.0	2.0	3.0	3.0
Major Q_{Known} (cfs)	5.0	7.0	5.0	9.0	7.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

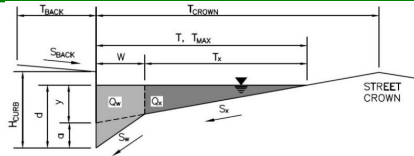
Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	2.0	3.0	2.0	3.0	3.0
Major Total Design Peak Flow, Q (cfs)	5.0	7.0	5.0	9.0	7.0
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	0.3	1.2	0.3	N/A	N/A

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. 3**Inlet ID: **DP-1****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	32.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.016	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	32.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	24.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

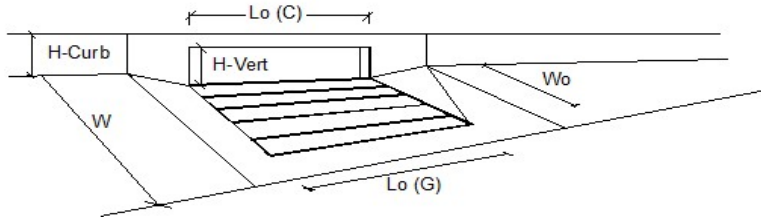
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	16.9	32.3	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

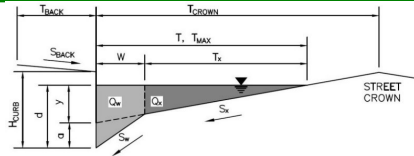
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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)		N_o	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_f (G)$	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_f (C)$	0.10	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q	6.0	10.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_b	0.0	1.7	cfs
Capture Percentage = Q_i/Q_o		$C\%$	100	86	%

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. 3**Inlet ID: **DP-3****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_o =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Spread Criterion

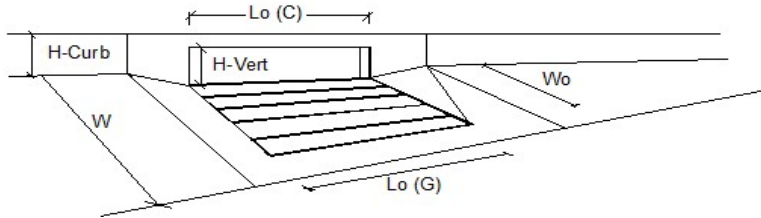
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	13.3	13.3	cfs

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

INLET ON A CONTINUOUS GRADE

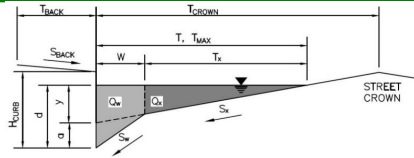
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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 - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q =	3.9	7.0	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_b =	0.1	3.0	cfs
Capture Percentage = Q_i/Q_o		$C\%$ =	98	70	%

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. 3**Inlet ID: **DP-5****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

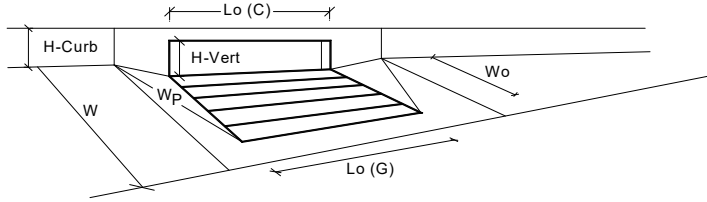
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

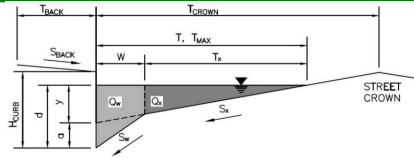
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	8.3	25.5	cfs
		Q _{PEAK REQUIRED} =	5.0	16.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-6****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

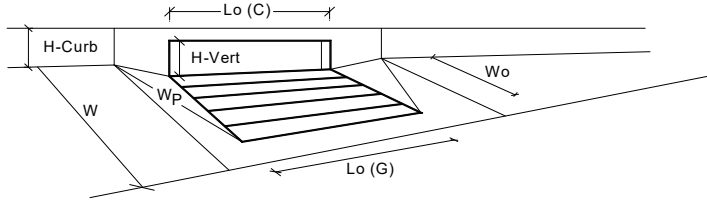
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

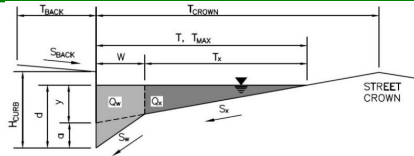
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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	
Length of a Unit Grate		L _o (G) =	N/A	N/A	feet
Width of a Unit Grate		W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information		MINOR		MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR		MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		MINOR		MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	5.4	12.3	cfs
		Q _{PEAK REQUIRED} =	2.0	6.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-7****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

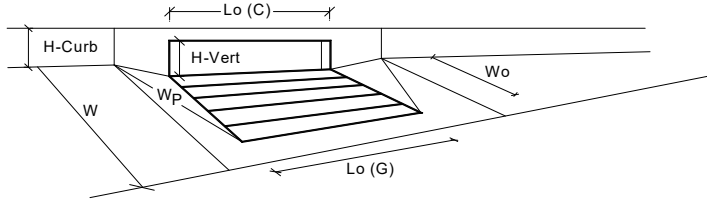
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

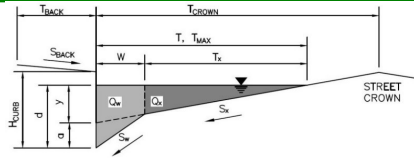
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _a =	8.3	25.5	cfs
		Q _{PEAK REQUIRED} =	4.0	10.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-8****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

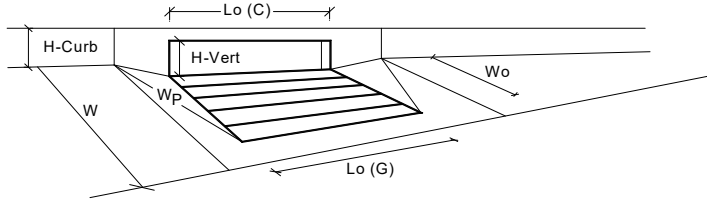
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

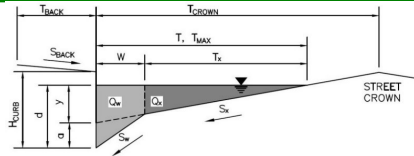
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _a =	5.4	12.3	cfs
		Q _{PEAK REQUIRED} =	3.0	6.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-9****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Spread Criterion

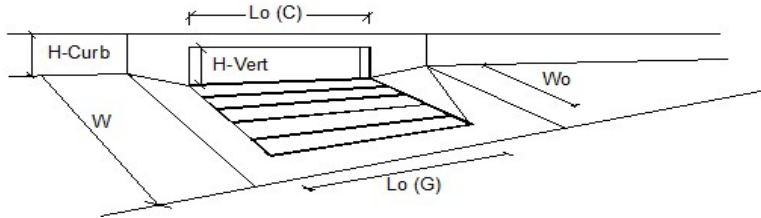
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	13.3	13.3	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.00 cfs on sheet 'Inlet Management'**WARNING: MAJOR STORM max. allowable capacity is less than the design peak flow of 15.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

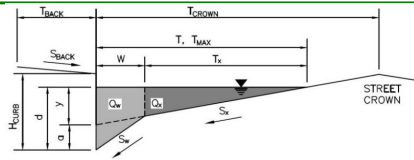
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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: WARNING: Q > ALLOWABLE Q FOR MAJOR STORM				
Total Inlet Interception Capacity		$Q = 5.2$	8.6	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		$Q_o = 0.8$	6.4	cfs
Capture Percentage = Q_i/Q_o		$C\% = 87$	57	%

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. 3**Inlet ID: **DP-10****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

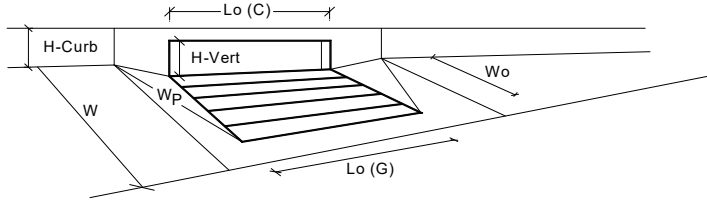
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

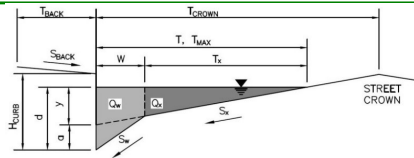
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	8.3	25.5	cfs
		Q _{PEAK REQUIRED} =	6.0	20.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-11****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

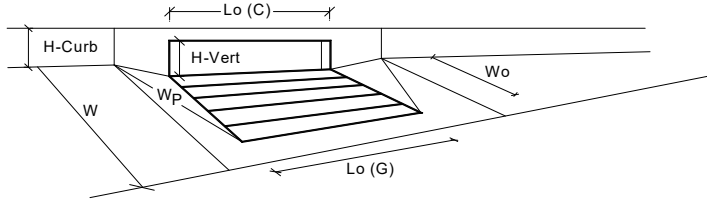
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

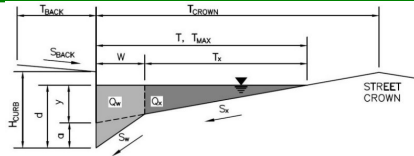
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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)		N_o =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☒ Override Depths
Length of a Unit Grate		$L_o (G)$ =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_f (G)$ =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w (G)$ =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o (G)$ =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		$L_o (C)$ =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_o =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		$C_f (C)$ =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		$C_w (C)$ =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		$C_o (C)$ =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
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

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. 3**Inlet ID: **DP-12****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.029	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

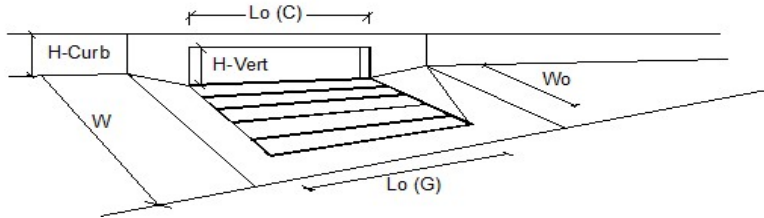
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	17.9	18.5	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

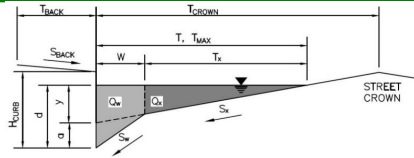
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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 - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q =	3.9	6.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_b =	0.1	2.3	cfs
Capture Percentage = Q_i/Q_o		$C\%$ =	99	74	%

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. 3**Inlet ID: **DP-13****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

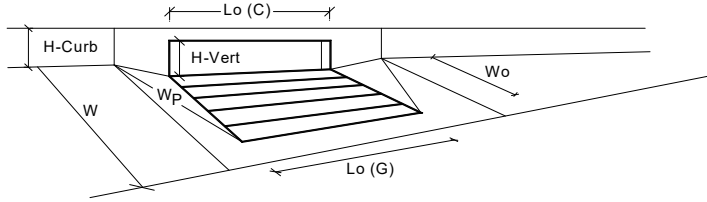
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

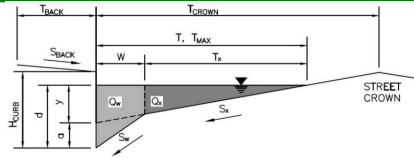
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _a =	5.4	12.3	cfs
		Q _{PEAK REQUIRED} =	3.0	8.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-14****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

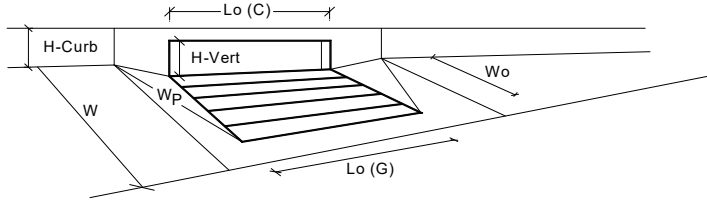
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

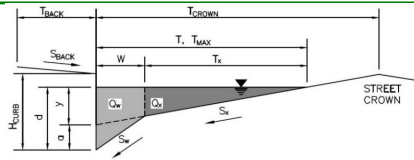
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _a =	5.4	12.3	cfs
		Q _{PEAK REQUIRED} =	0.8	1.7	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. 3**Inlet ID: **DP-15****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$$\begin{aligned} T_{\text{BACK}} &= 7.5 \text{ ft} \\ S_{\text{BACK}} &= 0.020 \text{ ft/ft} \\ n_{\text{BACK}} &= 0.012 \end{aligned}$$

$$\begin{aligned} H_{\text{CURB}} &= 6.00 \text{ inches} \\ T_{\text{CROWN}} &= 17.0 \text{ ft} \\ W &= 2.00 \text{ ft} \\ S_X &= 0.020 \text{ ft/ft} \\ S_W &= 0.083 \text{ ft/ft} \\ S_0 &= 0.000 \text{ ft/ft} \\ n_{\text{STREET}} &= 0.016 \end{aligned}$$

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
T_{MAX}	17.0	17.0	ft
d_{MAX}	6.0	12.0	inches

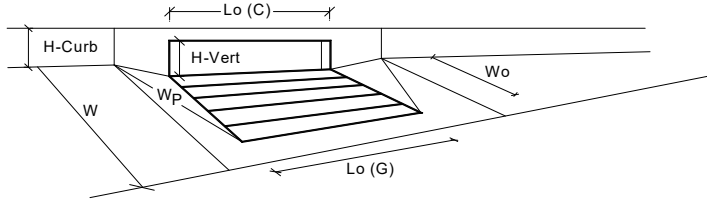
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow}	SUMP	SUMP	cfs

INLET IN A SUMP OR SAG LOCATION

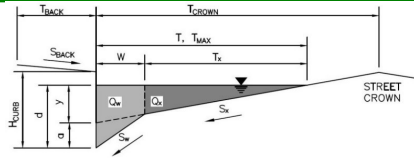
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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)		N_o =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☒ Override Depths
Length of a Unit Grate		$L_o (G)$ =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_f (G)$ =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w (G)$ =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o (G)$ =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		$L_o (C)$ =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_o =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		$C_f (C)$ =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		$C_w (C)$ =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		$C_o (C)$ =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		Q_s =	8.3	25.5	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		$Q_{PEAK REQUIRED}$ =	5.0	14.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-16****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

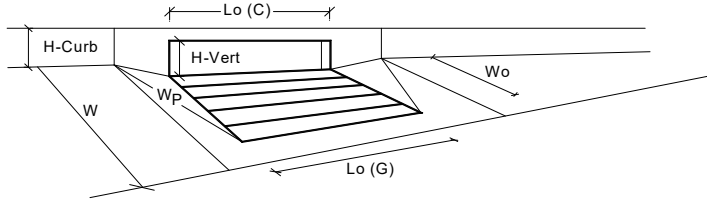
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

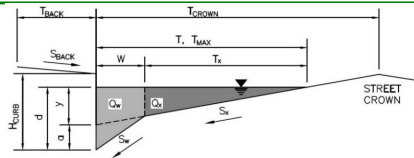
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		Q_s =	5.4	12.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q_{PEAK REQUIRED} =	1.0	3.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-17****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

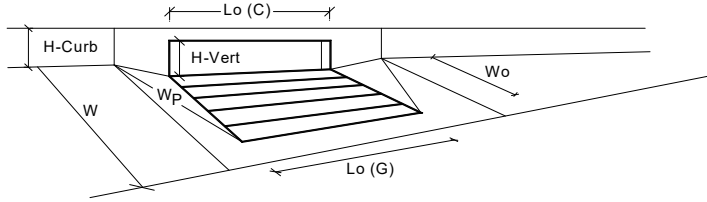
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

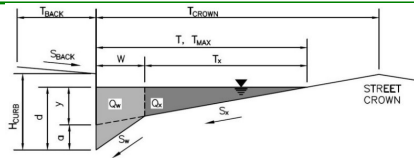
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		Q_s =	5.4	12.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q_{PEAK REQUIRED} =	3.0	7.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-18****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

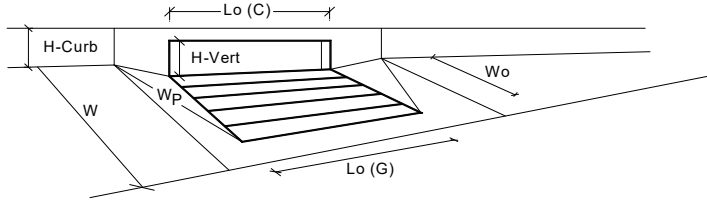
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

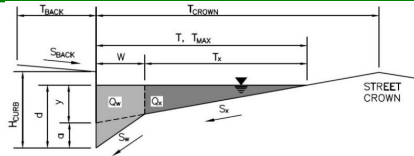
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		Q _s =	5.4	12.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _{PEAK REQUIRED} =	1.2	2.8	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. 3**Inlet ID: **DP-19****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.035	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

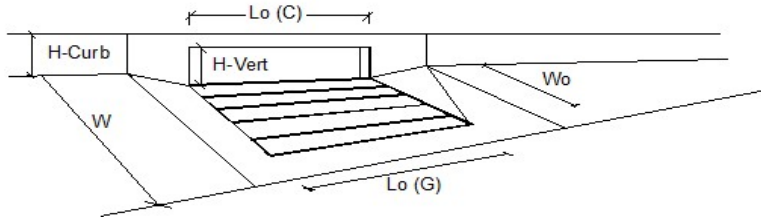
MAJOR STORM Allowable Capacity is based on Spread Criterion

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

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 13.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

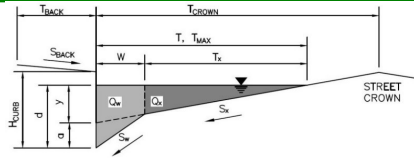
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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 - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q =	5.3	8.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_b =	0.7	4.9	cfs
Capture Percentage = Q_i/Q_o		$C\%$ =	88	62	%

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. 3**Inlet ID: **DP-20****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches

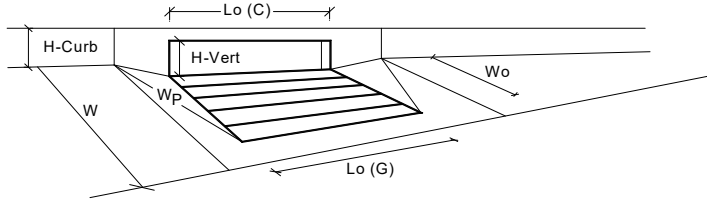
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

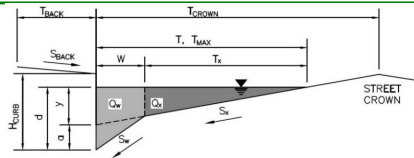
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
<u>Grate Information</u>		MINOR		MAJOR	
Length of a Unit Grate		L _o (G) =	N/A	N/A	feet
Width of a Unit Grate		W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
<u>Curb Opening Information</u>		MINOR		MAJOR	
Length of a Unit Curb Opening		L _o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>		MINOR		MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		MINOR		MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	8.3	25.5	cfs
		Q _{PEAK REQUIRED} =	7.0	13.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-21****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

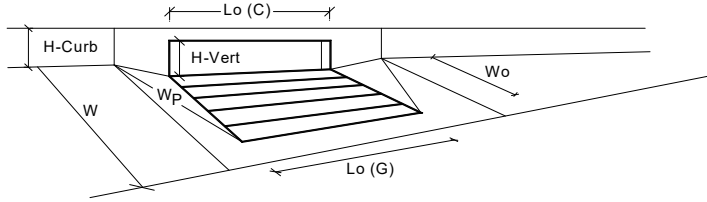
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

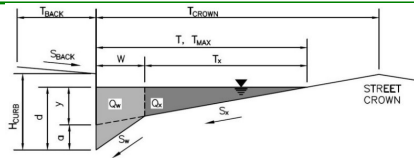
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
<u>Grate Information</u>			MINOR	MAJOR	☒ Override Depths
Length of a Unit Grate		L _o (G) =	N/A	N/A	feet
Width of a Unit Grate		W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
<u>Curb Opening Information</u>			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _a =	5.4	12.3	cfs
		Q _{PEAK REQUIRED} =	3.0	6.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-22****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

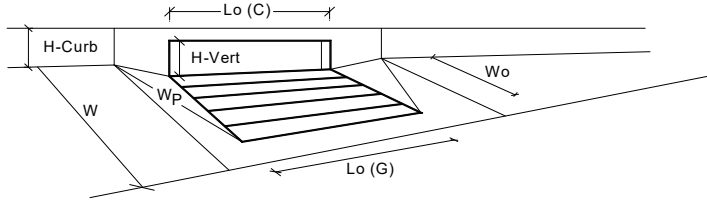
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

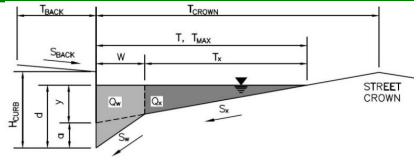
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Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
<u>Grate Information</u>			MINOR	MAJOR	☒ Override Depths
Length of a Unit Grate		L _o (G) =	N/A	N/A	feet
Width of a Unit Grate		W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
<u>Curb Opening Information</u>			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	0.93	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	8.3	25.5	cfs
		Q _{PEAK REQUIRED} =	1.2	8.5	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-23****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	7.5	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

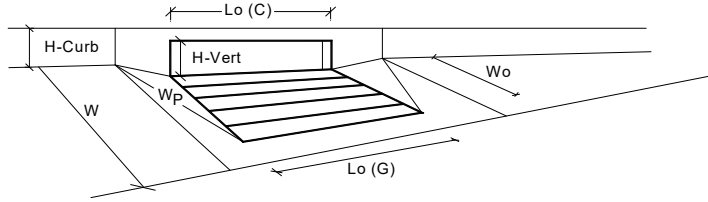
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

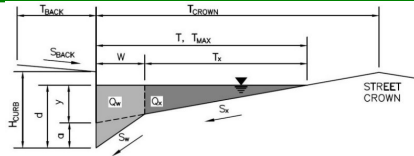
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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	
Length of a Unit Grate		L _o (G) =	N/A	N/A	feet
Width of a Unit Grate		W _o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information		MINOR		MAJOR	
Length of a Unit Curb Opening		L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR		MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		MINOR		MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	5.4	12.3	cfs
		Q _{PEAK REQUIRED} =	3.0	8.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-25****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	14.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

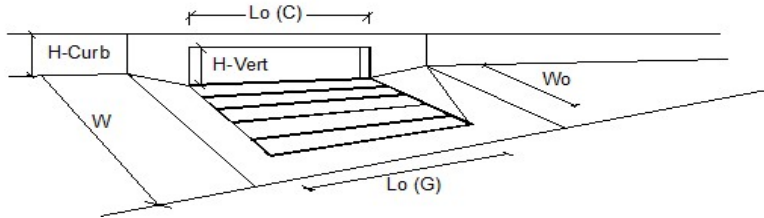
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	16.9	40.8	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

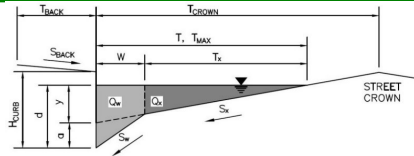
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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)		N_o	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_f (G)$	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_f (C)$	0.10	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q	4.0	8.5	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_o	0.0	0.5	cfs
Capture Percentage = Q_i/Q_o		$C\%$	100	95	%

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-26****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	32.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

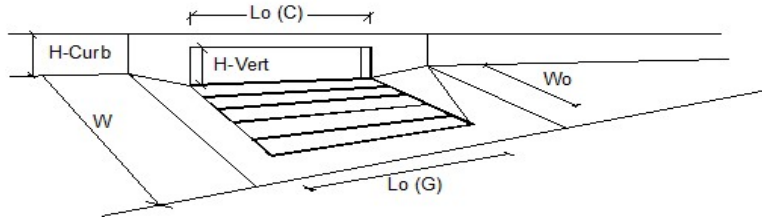
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	16.9	40.8	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 8.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

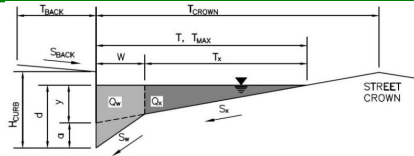
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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 - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q	3.0	6.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_b	0.0	1.8	cfs
Capture Percentage = Q_i/Q_o		$C\%$	100	78	%

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. 3**Inlet ID: **DP-27****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	32.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	24.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	24.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

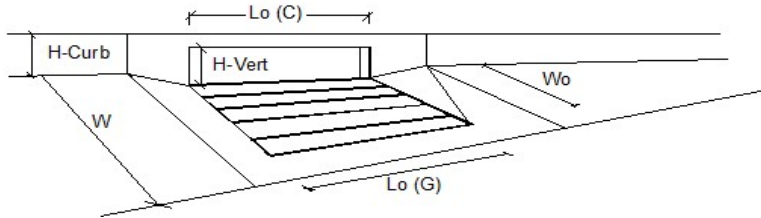
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	16.9	32.5	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

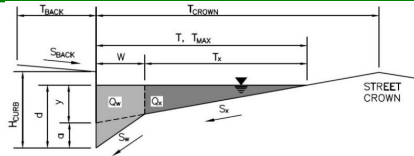
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	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)		N_o	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 - $Q < \text{Allowable Street Capacity}$					
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_i/Q_o		$C\%$	100	82	%

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. 3**Inlet ID: **DP-28****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	32.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

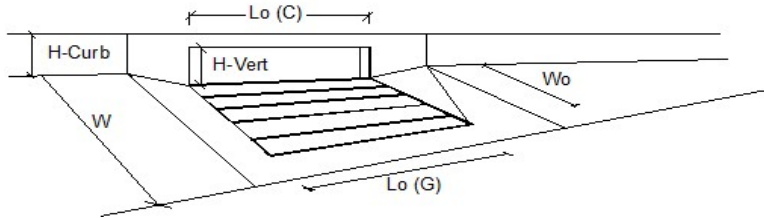
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	16.9	40.8	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 6.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

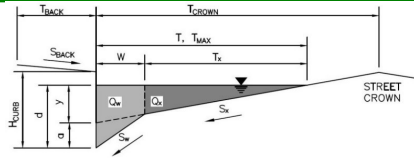
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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					
Total Inlet Interception Capacity		Q =	2.0	5.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q _b =	0.0	0.8	cfs
Capture Percentage = Q _i /Q _a		C% =	100	87	%

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. 3**Inlet ID: **DP-29****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$$\begin{aligned} T_{\text{BACK}} &= 32.0 \text{ ft} \\ S_{\text{BACK}} &= 0.020 \text{ ft/ft} \\ n_{\text{BACK}} &= 0.012 \end{aligned}$$

$$\begin{aligned} H_{\text{CURB}} &= 6.00 \text{ inches} \\ T_{\text{CROWN}} &= 24.0 \text{ ft} \\ W &= 2.00 \text{ ft} \\ S_x &= 0.020 \text{ ft/ft} \\ S_w &= 0.083 \text{ ft/ft} \\ S_o &= 0.015 \text{ ft/ft} \\ n_{\text{STREET}} &= 0.016 \end{aligned}$$

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
T_{MAX}	20.0	24.0	ft
d_{MAX}	6.0	12.0	inches

MINOR STORM Allowable Capacity is based on Depth Criterion

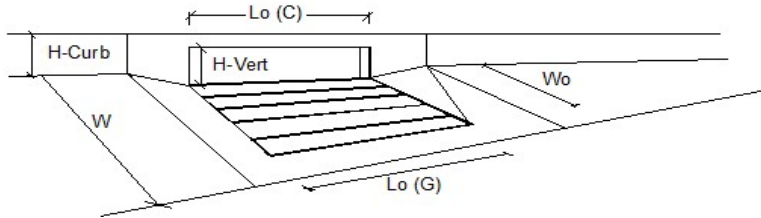
MAJOR STORM Allowable Capacity is based on Spread Criterion

$$Q_{\text{allow}} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ 16.9 & 32.5 \end{matrix} \text{ cfs}$$

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 5.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

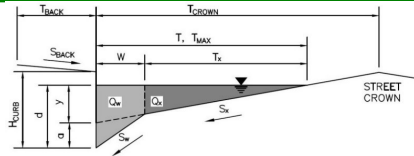
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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 - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q =	2.0	4.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_b =	0.0	0.3	cfs
Capture Percentage = Q_i/Q_o		$C\%$ =	100	93	%

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. 3**Inlet ID: **DP-30****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

T_{BACK}	=	32.0	ft
S_{BACK}	=	0.020	ft/ft
n_{BACK}	=	0.012	

H_{CURB}	=	6.00	inches
T_{CROWN}	=	26.0	ft
W	=	2.00	ft
S_x	=	0.020	ft/ft
S_o	=	0.083	ft/ft
S_o	=	0.015	ft/ft
n_{STREET}	=	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm		
T_{MAX}	=	20.0	26.0	ft
d_{MAX}	=	6.0	12.0	inches
	☐	☐		

MINOR STORM Allowable Capacity is based on Depth Criterion

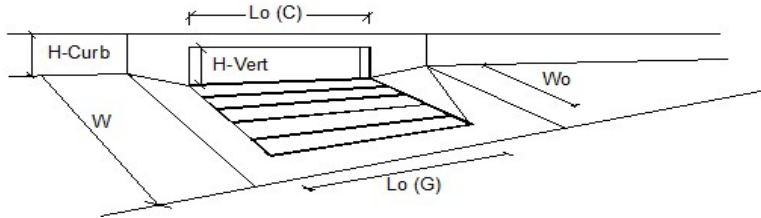
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm		
Q_{allow}	=	16.9	40.8	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

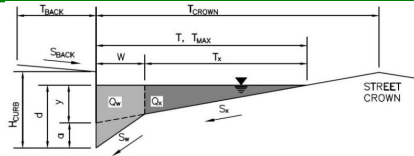
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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 - $Q < \text{Allowable Street Capacity}$					
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_i/Q_o		$C\%$ =	100	82	%

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. 3**Inlet ID: **DP-31****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	26.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	24.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.015	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	24.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

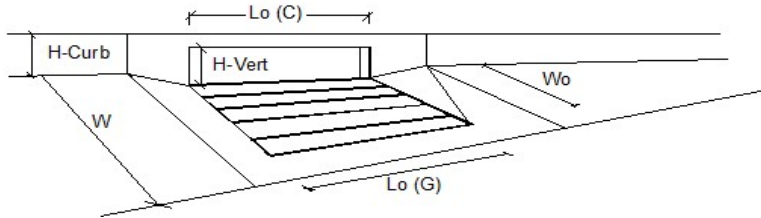
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	16.9	32.5	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.00 cfs on sheet 'Inlet Management'**Major storm max. allowable capacity GOOD - greater than the design peak flow of 5.00 cfs on sheet 'Inlet Management'**

INLET ON A CONTINUOUS GRADE

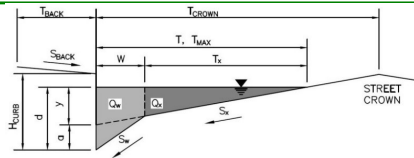
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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)		N_o =	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 - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		Q =	2.0	4.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		Q_o =	0.0	0.3	cfs
Capture Percentage = Q_o/Q_o		$C\%$ =	100	93	%

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. 3**Inlet ID: **DP-32****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	14.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

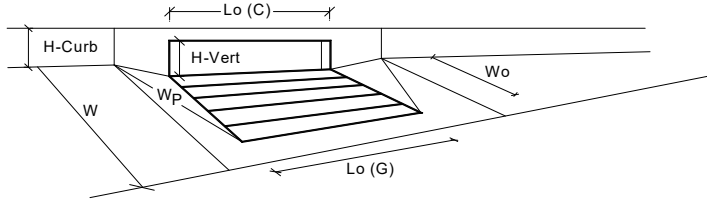
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

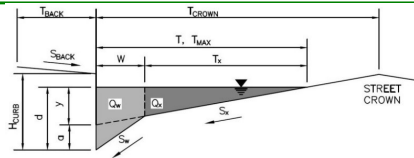
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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)		N_o =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
<u>Grate Information</u>			MINOR	MAJOR	☒ Override Depths
Length of a Unit Grate		$L_o (G)$ =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_f (G)$ =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w (G)$ =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o (G)$ =	N/A	N/A	
<u>Curb Opening Information</u>			MINOR	MAJOR	
Length of a Unit Curb Opening		$L_o (C)$ =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_o =	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	
<u>Low Head Performance Reduction (Calculated)</u>			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		Q_s =	9.7	39.1	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		$Q_{PEAK REQUIRED}$ =	3.0	9.0	cfs

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

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

Project: **STERLING RANCH EAST FILING NO. 3**Inlet ID: **DP-33****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK} =$	14.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.012	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	20.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches
	☐	☐	

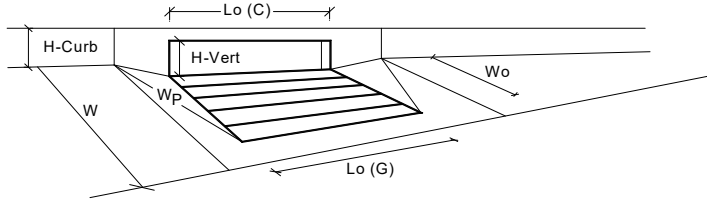
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C _f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C _o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L _o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H _{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C _f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C _o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d _{Curb} =	0.33	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF _{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF _{Curb} =	0.79	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF _{Combination} =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q _s =	9.7	39.1	cfs
		Q _{PEAK REQUIRED} =	3.0	7.0	cfs

54 in. RCP Outlet (Pipe Run 32)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	54.0 in
Discharge	130.00 cfs
Results	
Normal Depth	32.1 in
Flow Area	9.8 ft ²
Wetted Perimeter	7.9 ft
Hydraulic Radius	14.9 in
Top Width	4.42 ft
Critical Depth	40.3 in
Percent Full	59.4 %
Critical Slope	0.005 ft/ft
Velocity	13.21 ft/s
Velocity Head	2.71 ft
Specific Energy	5.38 ft
Froude Number	1.561
Maximum Discharge	211.53 cfs
Discharge Full	196.64 cfs
Slope Full	0.004 ft/ft
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
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	59.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	32.1 in
Critical Depth	40.3 in
Channel Slope	0.010 ft/ft
Critical Slope	0.005 ft/ft

54" RCP OUTFALL IMPACT STRUCTURE CALCULATIONS

Flowmaster calcs.

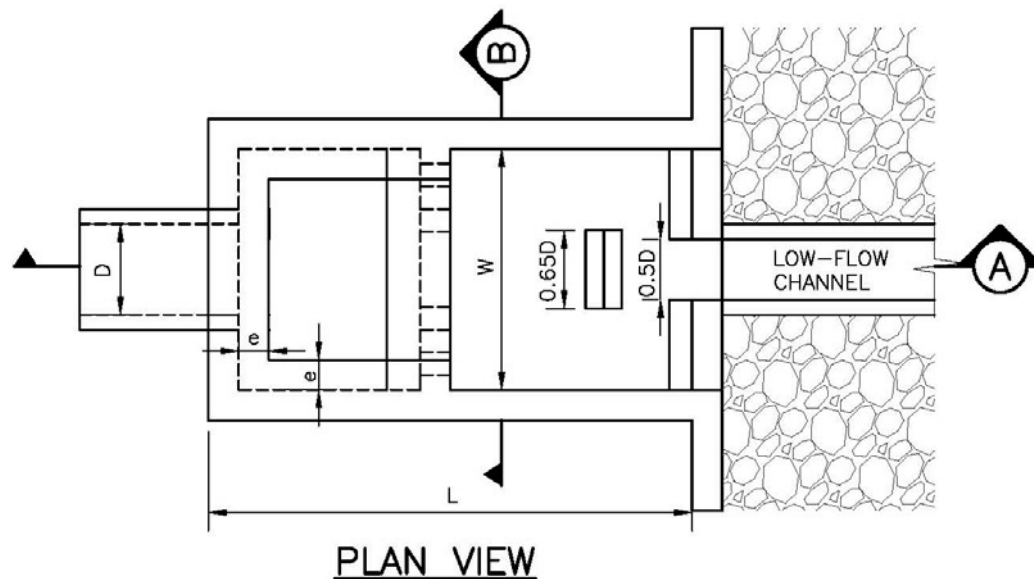
A = 9.8 sf

V = 13.2 ft/s

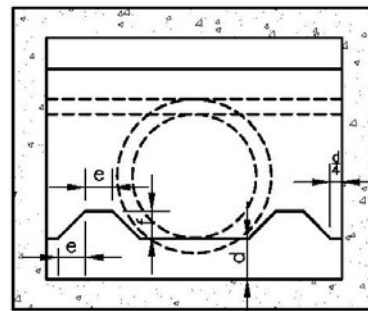
Using the above:

W = 10.71 use 11.0'

D = 3.13



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



Based on the determined

W and D above:

H = 8.25'

L = 14.67'

a = 5.5'

b = 4.13'

c = 5.5'

d = 1.83'

e = 0.92'

f = 1.38'

t = 0.92'

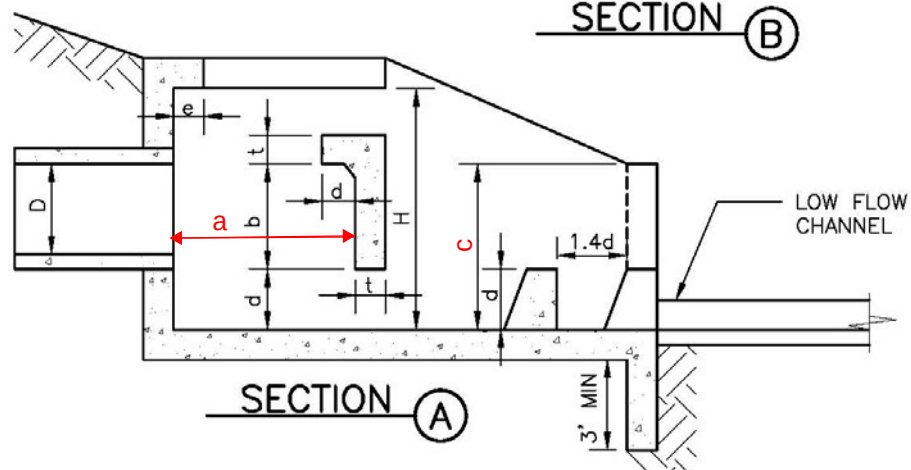


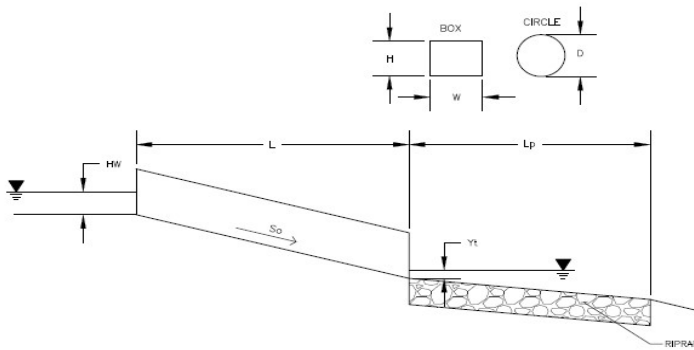
Figure 9-45. UDFCD modified USBR type VI impacts stilling basin (general design dimensions)

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: **STERLING RANCH EAST FILING NO. 3**

ID: **POND FSD 11B OUTFALL**



Soil Type:

Choose One:

☒ Sandy

☐ Non-Sandy

Design Information:

Design Discharge

Q = 42.1 cfs

Circular Culvert:

Barrel Diameter in Inches

D = 24 inches

Inlet Edge Type (Choose from pull-down list)

Grooved Edge Projecting

OR:

Box Culvert:

Barrel Height (Rise) in Feet

H (Rise) =

Barrel Width (Span) in Feet

W (Span) =

Inlet Edge Type (Choose from pull-down list)

Number of Barrels

Barrels = 1

Inlet Elevation

Elev IN = 6994.5 ft

Outlet Elevation **OR** Slope

So = 0.0231 ft/ft

Culvert Length

L = 130 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 =

Max Allowable Channel Velocity

V = 5 ft/s

Calculated Results:

Culvert Cross Sectional Area Available

A = 3.14 ft²

Culvert Normal Depth

Y_n = 2.00 ft

Culvert Critical Depth

Y_c = 1.96 ft

Froude Number

Fr = - **Pressure flow!**

Entrance Loss Coefficient

k_e = 0.20

Friction Loss Coefficient

k_f = 1.61

Sum of All Loss Coefficients

k_s = 2.81 ft

Headwater:

Inlet Control Headwater

HW_I = 7.16 ft

Outlet Control Headwater

HW_O = 6.80 ft

Design Headwater Elevation

HW = 7001.66 ft

Headwater/Diameter **OR Headwater/Rise Ratio**

HW/D = 3.58 **HW/D > 1.5!**

Outlet Protection:

Flow/(Diameter^{2.5})

Q/D^{2.5} = 7.44 ft^{0.5}/s

Tailwater Surface Height

Y_t = 0.80 ft

Tailwater/Diameter

Y_t/D = 0.40

Expansion Factor

1/(2*tan(Θ)) = 1.82

Flow Area at Max Channel Velocity

A_t = 8.42 ft²

Width of Equivalent Conduit for Multiple Barrels

W_{eq} = -

Length of Riprap Protection

L_p = 16 ft

Width of Riprap Protection at Downstream End

T = 11 ft

Adjusted Diameter for Supercritical Flow

Da = -

Minimum Theoretical Riprap Size

d₅₀ min = 12 in

Nominal Riprap Size

d₅₀ nominal = 18 in

MHFD Riprap Type

Type = H

Note:

HW/D is high as this is a pond outlet pipe per the MHFD-Detention spreadsheet, Ver. 4.06 design.

POND FSD-11B

Figure 13-12c. Emergency Spillway Protection

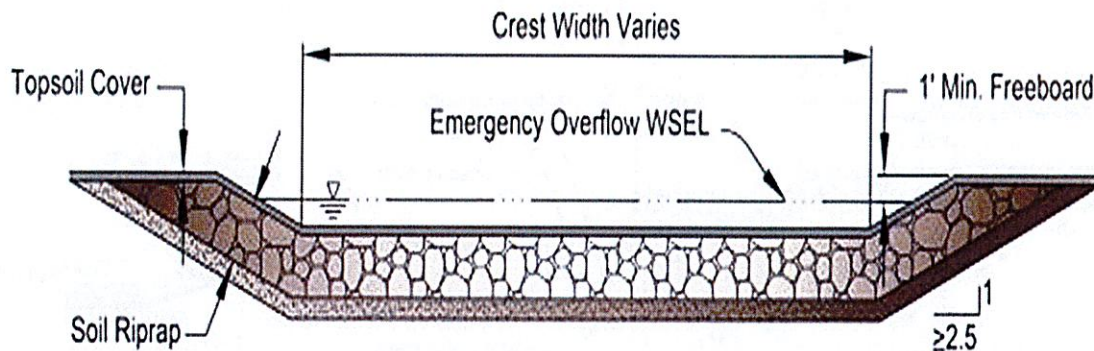
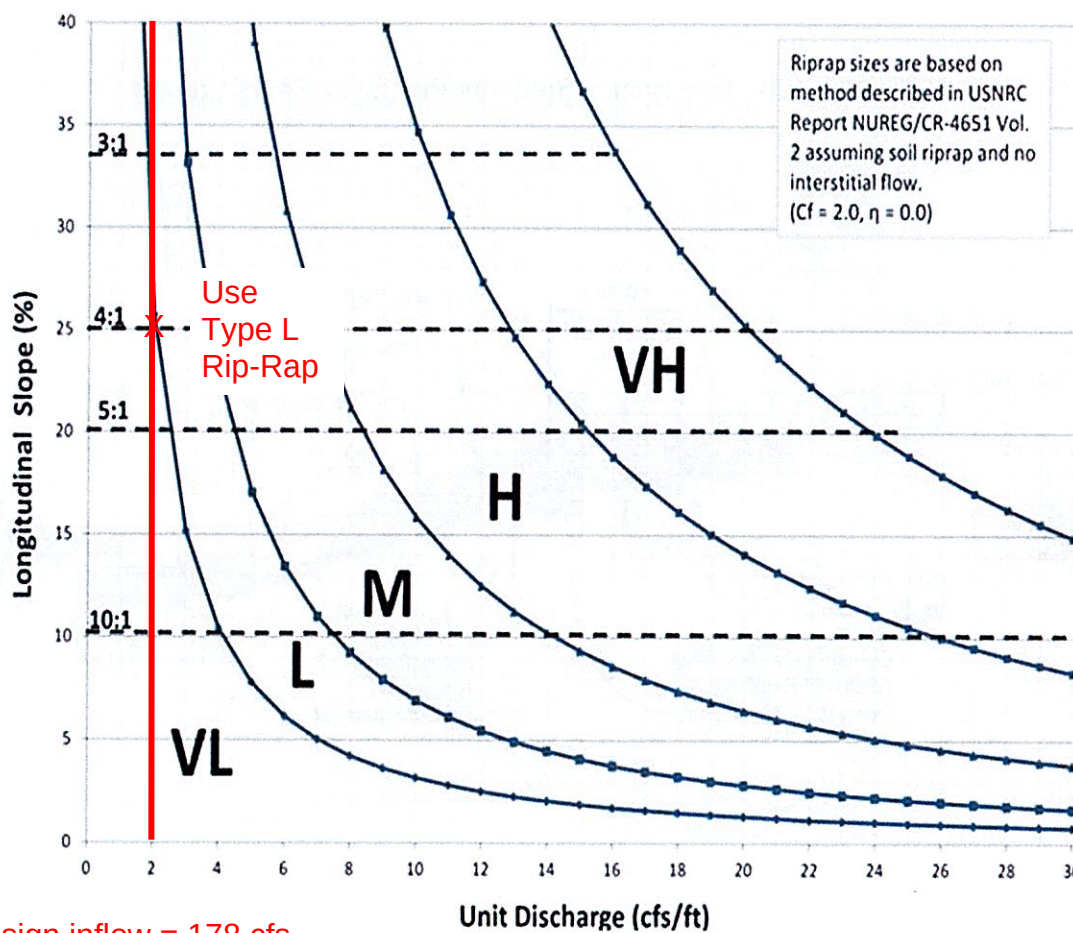


Figure 13-12d. Riprap Types for Emergency Spillway Protection



Total design inflow = 178 cfs
 Overflow width = 90'
 Unit discharge = 2.0

TRICKLE CHANNEL FROM EASTERLY FOREBAY

Project Description		
Friction Method	Manning	
	Formula	
Solve For	Discharge	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.013 ft/ft	
Normal Depth	5.0 in	
Bottom Width	3.00 ft	
Results		
Discharge	7.72 cfs	Easterly Forebay design release = 2.56 cfs per UD-BMP spreadsheet
Flow Area	1.3 ft ²	
Wetted Perimeter	3.8 ft	DCM criteria for trickle channel width requires min. of twice design release
Hydraulic Radius	3.9 in	
Top Width	3.00 ft	Thus, 5.12 cfs min. flow for trickle channel design
Critical Depth	7.1 in	
Critical Slope	0.005 ft/ft	Proposed 36" wide trickle channel, 6" depth at 1.3% slope meets criteria.
Velocity	6.17 ft/s	
Velocity Head	0.59 ft	
Specific Energy	1.01 ft	
Froude Number	1.686	
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	5.0 in	
Critical Depth	7.1 in	
Channel Slope	0.013 ft/ft	
Critical Slope	0.005 ft/ft	

TRICKLE CHANNEL FROM WESTERLY FOREBAY

Project Description		
Friction Method	Manning	
	Formula	
Solve For	Discharge	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.025 ft/ft	
Normal Depth	5.0 in	
Bottom Width	2.00 ft	
Results		
Discharge	6.66 cfs	
Flow Area	0.8 ft ²	Westerly Forebay design release = 1.02 cfs per UD-BMP spreadsheet
Wetted Perimeter	2.8 ft	
Hydraulic Radius	3.5 in	DCM criteria for trickle channel width requires min. of twice design release
Top Width	2.00 ft	
Critical Depth	8.4 in	
Critical Slope	0.006 ft/ft	Thus, 2.04 cfs min. flow for trickle channel design
Velocity	7.99 ft/s	
Velocity Head	0.99 ft	
Specific Energy	1.41 ft	Proposed 24" wide trickle channel, 6" depth at 2.5% slope meets criteria.
Froude Number	2.183	
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	5.0 in	
Critical Depth	8.4 in	
Channel Slope	0.025 ft/ft	
Critical Slope	0.006 ft/ft	

STORMWATER QUALITY CALCULATIONS

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

Designer: **Marc A. Whorton, P.E.**
 Company: **Classic Consulting**
 Date: **September 25, 2024**
 Project: **Sterling Ranch East Filing No. 3**
 Location: **Pond 11B - 42" RCP Westerly Outfall**

1. Basin Storage Volume

- A) Effective Imperviousness of Tributary Area, I_a
- B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)
- C) Contributing Watershed Area
- D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm
- E) Design Concept
(Select EURV when also designing for flood control)
- F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * \text{Area})$)
- G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV \text{ OTHER}} = (d_s * (V_{DESIGN} / 0.43))$)
- H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired)
- I) NRCS Hydrologic Soil Groups of Tributary Watershed
 i) Percentage of Watershed consisting of Type A Soils
 ii) Percentage of Watershed consisting of Type B Soils
 iii) Percentage of Watershed consisting of Type C/D Soils
- 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: $EURV_{C/D} = 1.20 * i^{1.08}$
- K) User Input of Excess Urban Runoff Volume (EURV) Design Volume
(Only if a different EURV Design Volume is desired)

$I_a = 64.4$ %

$i = 0.644$

Area = 14.000 ac

$d_s = 0.42$ in

Choose One

- ☐ Water Quality Capture Volume (WQCV)
☒ Excess Urban Runoff Volume (EURV)

$V_{DESIGN} =$ ac-ft

$V_{DESIGN \text{ OTHER}} = 0.287$ ac-ft

$V_{DESIGN \text{ USER}} =$ ac-ft

HSG A = 65 %

HSG B = 35 %

HSG C/D = 0 %

$EURV_{DESIGN} = 1.071$ ac-ft

$EURV_{DESIGN \text{ USER}} =$ ac-ft

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:

Concrete Forebay

5. Forebay

- A) Minimum Forebay Volume
($V_{FMIN} = 3\%$ of the WQCV)

$V_{FMIN} = 0.009$ ac-ft

- B) Actual Forebay Volume

$V_F = 0.009$ ac-ft

- C) Forebay Depth
($D_F = 18$ inch maximum)

$D_F = 18.0$ in

- D) Forebay Discharge

- i) Undetained 100-year Peak Discharge

$Q_{100} = 51.00$ cfs

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

$Q_F = 1.02$ 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 $W_N = 5.6$ in

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

Designer: **Marc A. Whorton, P.E.**
 Company: **Classic Consulting**
 Date: **September 25, 2024**
 Project: **Sterling Ranch East Filing No. 3**
 Location: **Pond 11B - 54" RCP Easterly Outfall**

1. Basin Storage Volume

- A) Effective Imperviousness of Tributary Area, I_a
- B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)
- C) Contributing Watershed Area
- D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm
- E) Design Concept
(Select EURV when also designing for flood control)
- F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * \text{Area})$)
- G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_s * (V_{DESIGN} / 0.43))$)
- H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired)
- I) NRCS Hydrologic Soil Groups of Tributary Watershed
 i) Percentage of Watershed consisting of Type A Soils
 ii) Percentage of Watershed consisting of Type B Soils
 iii) Percentage of Watershed consisting of Type C/D Soils
- 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: $EURV_{C/D} = 1.20 * i^{1.08}$
- K) User Input of Excess Urban Runoff Volume (EURV) Design Volume
(Only if a different EURV Design Volume is desired)

$I_a = 51.0$ %

$i = 0.510$

Area = 52.790 ac

$d_s = 0.42$ in

Choose One

☐ Water Quality Capture Volume (WQCV)

☒ Excess Urban Runoff Volume (EURV)

$V_{DESIGN} =$ ac-ft

$V_{DESIGN\ OTHER} = 0.898$ ac-ft

$V_{DESIGN\ USER} =$ ac-ft

HSG A = 65 %

HSG B = 35 %

HSG C/D = 0 %

$EURV_{DESIGN} = 3.041$ ac-ft

$EURV_{DESIGN\ USER} =$ ac-ft

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:

Concrete Forebay

5. Forebay

- A) Minimum Forebay Volume
($V_{MIN} = 3\%$ of the WQCV)

$V_{MIN} = 0.027$ ac-ft

- B) Actual Forebay Volume

$V_F = 0.027$ ac-ft

- C) Forebay Depth
($D_F = 30$ inch maximum)

$D_F = 30.0$ in

- D) Forebay Discharge

- i) Undetained 100-year Peak Discharge

$Q_{100} = 128.00$ cfs

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

$Q_F = 2.56$ 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 $W_N = 8.3$ in

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: Marc A. Whorton, P.E.
Company: Classic Consulting
Date: January 9, 2026
Project: Sterling Ranch East Filling No. 3
Location: El Paso County, Colorado

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	SPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	SPA		
Area ID	Basin AA	Basin BB	Basin CC	Basin DD1	Basin DD2	Basin EE1	Basin EE2	Basin EE3	Basin FF	Slope in F5		
Downstream Design Point ID	Off-site	Off-site	Off-site	Off-site	Off-site	Off-site	Off-site	Off-site	Off-site	Off-site		
Downstream BMP Type	None	None	None	None	None	None	None	None	None	None		
DCIA (ft ²)	--	--	--	--	--	--	--	--	--	--		
UIA (ft ²)	--	12,786	46,741	41,293	41,293	50,141	50,141	50,141	33,452	--		
RPA (ft ²)	--	35,130	23,633	21,241	21,241	20,635	20,635	20,635	10,359	--		
SPA (ft ²)	23,958	--	--	--	--	--	--	--	--	25,692		
HSG A (%)	0%	30%	100%	100%	100%	100%	100%	100%	100%	0%		
HSG B (%)	100%	70%	0%	0%	0%	0%	0%	0%	0%	100%		
HSG C/D (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Average Slope of RPA (ft/ft)	--	0.030	0.028	0.020	0.020	0.028	0.028	0.028	0.029	--		
UIA:RPA Interface Width (ft)	--	90.00	280.00	260.00	260.00	250.00	250.00	250.00	140.00	--		

CALCULATED RUNOFF RESULTS

Area ID	Basin AA	Basin BB	Basin CC	Basin DD1	Basin DD2	Basin EE1	Basin EE2	Basin EE3	Basin FF	Slope in F5		
UIA:RPA Area (ft ²)	--	47,916	70,374	62,534	62,534	70,776	70,776	70,776	43,811	--		
L / W Ratio	--	5.92	0.90	0.93	0.93	1.13	1.13	1.13	2.24	--		
UIA / Area	--	0.2668	0.6642	0.6603	0.6603	0.7084	0.7084	0.7084	0.7636	--		
Runoff (in)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Runoff (ft ³)	0	0	0	0	0	0	0	0	0	0		
Runoff Reduction (ft ³)	1058	458	1675	1480	1480	1797	1797	1797	1199	1135		

CALCULATED WQCV RESULTS

Area ID	Basin AA	Basin BB	Basin CC	Basin DD1	Basin DD2	Basin EE1	Basin EE2	Basin EE3	Basin FF	Slope in F5		
WQCV (ft ³)	0	520	1902	1681	1681	2041	2041	2041	1361	0		
WQCV Reduction (ft ³)	0	520	1902	1681	1681	2041	2041	2041	1361	0		
WQCV Reduction (%)	0%	100%	100%	100%	100%	100%	100%	100%	100%	0%		
Untreated WQCV (ft ³)	0	0	0	0	0	0	0	0	0	0		

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

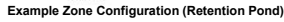
Downstream Design Point ID	Off-site											
DCIA (ft ²)	0											
UIA (ft ²)	325,988											
RPA (ft ²)	173,509											
SPA (ft ²)	49,650											
Total Area (ft ²)	549,147											
Total Impervious Area (ft ²)	325,988											
WQCV (ft ³)	13,267											
WQCV Reduction (ft ³)	13,267											
WQCV Reduction (%)	100%											
Untreated WQCV (ft ³)	0											

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

Total Area (ft ²)	549,147
Total Impervious Area (ft ²)	325,988
WQCV (ft ³)	13,267
WQCV Reduction (ft ³)	13,267
WQCV Reduction (%)	100%
Untreated WQCV (ft ³)	0

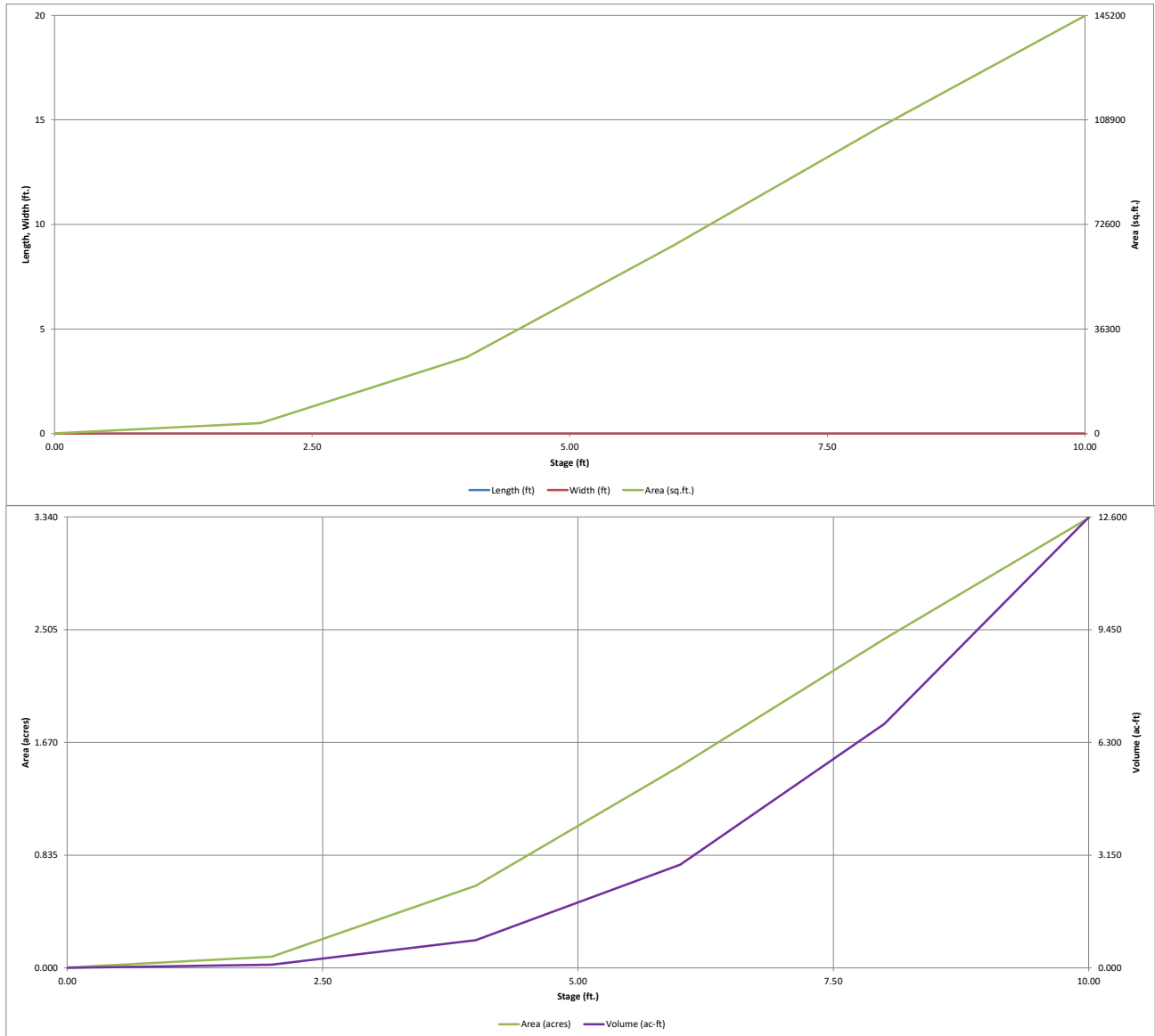
MHFD-Detention, Version 4.06 (July 2022)

Basin ID: POND FSD-11B



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

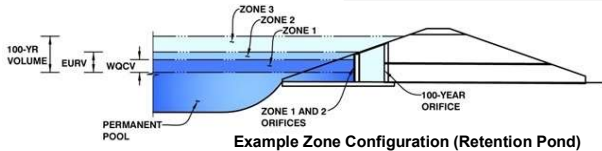


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **STERLING RANCH EAST FILING NO. 3**

Basin ID: **POND FSD-11B**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.59	1.207	Orifice Plate
Zone 2 (EURV)	6.73	2.894	Orifice Plate
Zone 3 (100-year)	7.91	2.492	Weir&Pipe (Restrict)
Total (all zones)		6.594	

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 = ft²
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 = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = inches
Orifice Plate: Orifice Area per Row = sq. inches

Calculated Parameters for Plate
WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

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	2.30	4.60					
Orifice Area (sq. inches)	3.14	4.91	15.90					

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

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

Overflow Weir Front Edge Height, H_o = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Grate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Grate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
Height of Grate Upper Edge, H_u = feet
Overflow Weir Slope Length = feet
Grate Open Area / 100-yr Orifice Area =
Overflow Grate Open Area w/o Debris = ft²
Overflow Grate Open Area w/ Debris = ft²

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

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

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

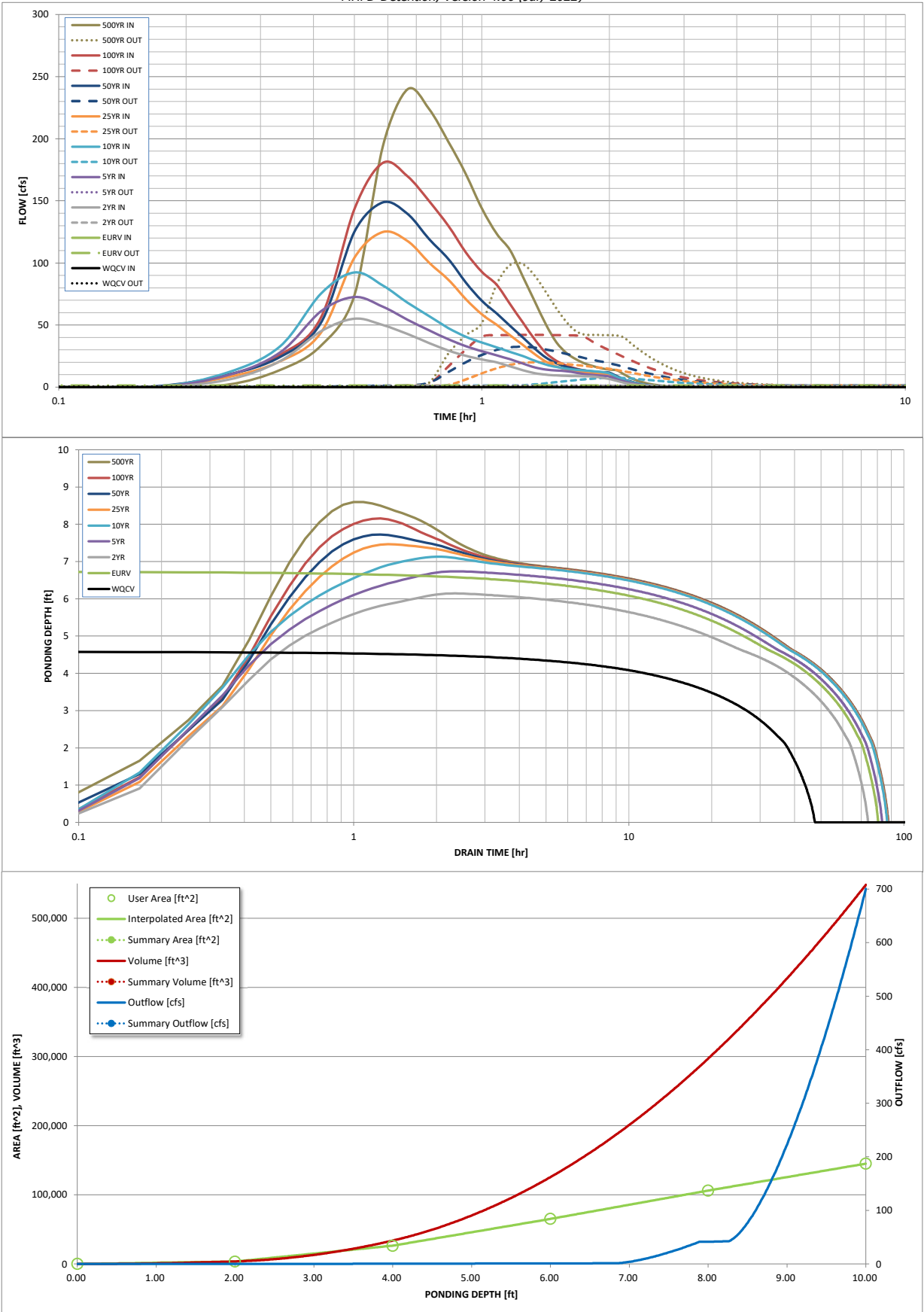
Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.10
One-Hour Rainfall Depth (in) =	1.207	4.101	3.296	4.338	5.433	7.032	8.315	10.065	13.312
CUHP Runoff Volume (acre-ft) =	N/A	N/A	3.296	4.338	5.433	7.032	8.315	10.065	13.312
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.9	1.5	11.4	33.1	46.6	67.2	102.9
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.17	0.50	0.70	1.01	1.54
Peak Inflow Q (cfs) =	N/A	N/A	55.1	72.6	92.4	124.8	148.7	180.5	239.7
Peak Outflow Q (cfs) =	0.5	1.4	1.2	1.4	7.6	20.1	32.5	42.1	99.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.9	0.7	0.6	0.7	0.6	1.0
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.3	0.8	1.4	1.8	1.9
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) =	42	68	64	70	72	70	69	67	64
Time to Drain 99% of Inflow Volume (hours) =	45	75	69	78	80	79	78	77	75
Maximum Ponding Depth (ft) =	4.59	6.73	6.14	6.74	7.13	7.47	7.72	8.15	8.60
Area at Maximum Ponding Depth (acres) =	0.87	1.84	1.56	1.84	2.03	2.18	2.31	2.50	2.70
Maximum Volume Stored (acre-ft) =	1.215	4.102	3.098	4.102	4.876	5.571	6.154	7.189	8.334

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	0.66	0.07	1.99
	0:15:00	0.00	0.00	5.75	9.45	11.73	7.89	9.91	9.64	13.75
	0:20:00	0.00	0.00	20.95	27.87	32.86	20.78	24.24	25.95	33.31
	0:25:00	0.00	0.00	44.93	61.06	75.33	43.86	51.82	56.04	73.80
	0:30:00	0.00	0.00	55.12	72.62	92.39	104.10	125.01	143.41	193.70
	0:35:00	0.00	0.00	50.01	64.71	81.84	124.83	148.67	180.50	239.73
	0:40:00	0.00	0.00	42.81	54.39	68.08	117.66	139.56	169.81	223.91
	0:45:00	0.00	0.00	35.57	45.69	57.30	100.29	119.31	149.82	197.56
	0:50:00	0.00	0.00	29.54	38.66	47.58	86.50	103.20	129.84	171.50
	0:55:00	0.00	0.00	25.20	32.95	40.47	70.78	84.19	108.46	143.66
	1:00:00	0.00	0.00	22.29	28.93	35.85	58.58	69.47	92.79	123.55
	1:05:00	0.00	0.00	19.91	25.61	32.05	50.21	59.35	82.44	110.18
	1:10:00	0.00	0.00	16.67	22.43	28.33	41.68	49.18	66.62	88.91
	1:15:00	0.00	0.00	13.61	18.98	25.05	33.99	40.01	51.92	69.06
	1:20:00	0.00	0.00	11.30	15.87	21.24	26.54	31.00	38.33	50.57
	1:25:00	0.00	0.00	10.04	14.22	18.13	20.62	23.90	27.59	36.14
	1:30:00	0.00	0.00	9.43	13.39	16.21	16.73	19.29	21.19	27.58
	1:35:00	0.00	0.00	9.08	12.84	14.90	14.28	16.37	17.44	22.49
	1:40:00	0.00	0.00	8.89	11.63	13.97	12.78	14.55	14.98	19.10
	1:45:00	0.00	0.00	8.74	10.55	13.32	11.76	13.33	13.33	16.81
	1:50:00	0.00	0.00	8.62	9.80	12.86	11.12	12.57	12.20	15.22
	1:55:00	0.00	0.00	7.59	9.25	12.21	10.66	12.03	11.42	14.14
	2:00:00	0.00	0.00	6.61	8.58	11.08	10.36	11.67	10.99	13.55
	2:05:00	0.00	0.00	4.99	6.48	8.27	7.89	8.87	8.37	10.29
	2:10:00	0.00	0.00	3.57	4.59	5.83	5.55	6.23	5.90	7.24
	2:15:00	0.00	0.00	2.53	3.25	4.13	3.94	4.42	4.21	5.16
	2:20:00	0.00	0.00	1.78	2.26	2.90	2.77	3.11	2.97	3.64
	2:25:00	0.00	0.00	1.22	1.51	1.99	1.90	2.12	2.03	2.48
	2:30:00	0.00	0.00	0.81	1.01	1.34	1.30	1.45	1.38	1.69
	2:35:00	0.00	0.00	0.50	0.66	0.86	0.85	0.95	0.91	1.11
	2:40:00	0.00	0.00	0.27	0.39	0.49	0.50	0.56	0.53	0.64
	2:45:00	0.00	0.00	0.12	0.19	0.22	0.24	0.27	0.26	0.31
	2:50:00	0.00	0.00	0.04	0.06	0.06	0.08	0.08	0.08	0.09
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

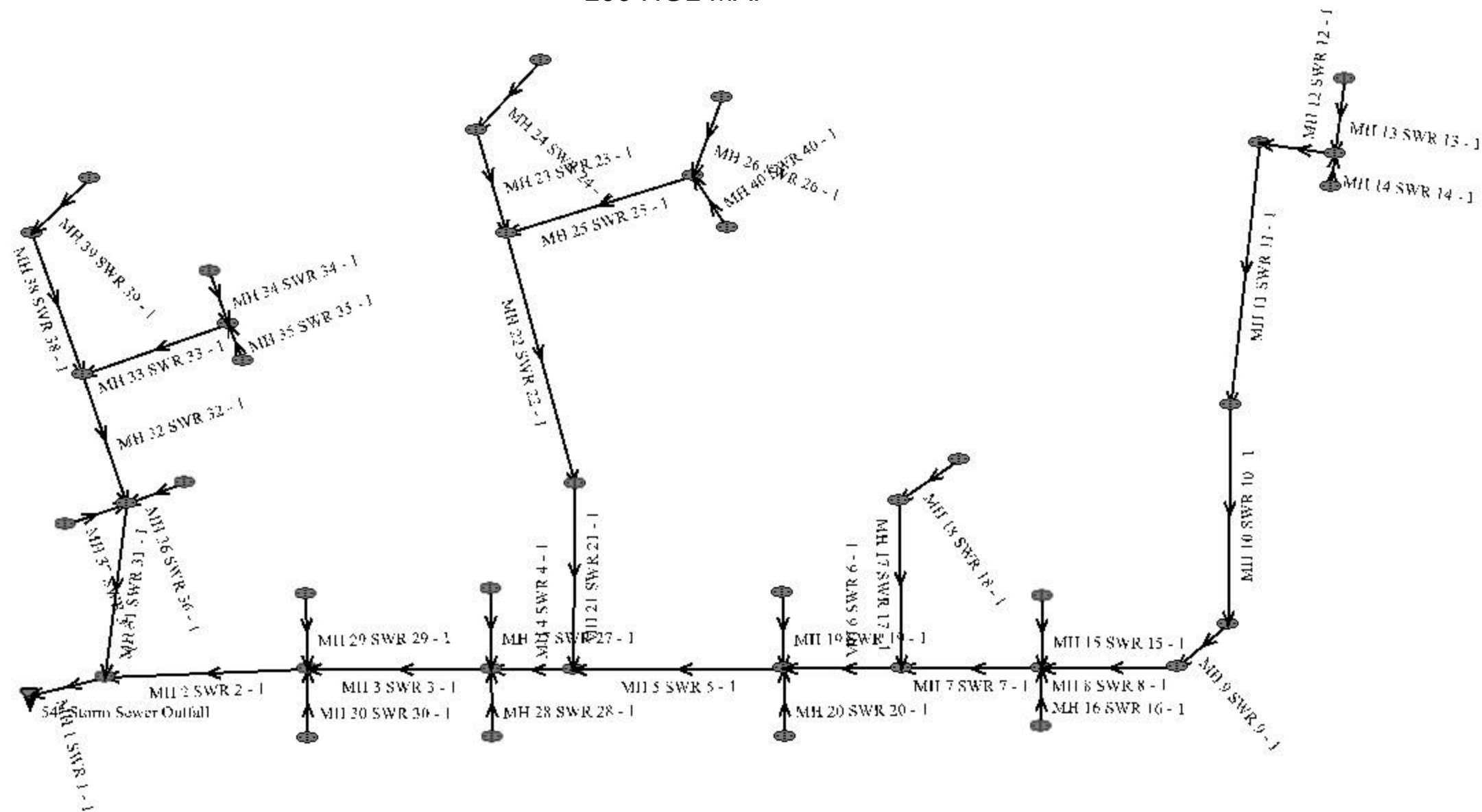
The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

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.

[illegible]

HGL CALCULATIONS

54" STORM OUTFALL 100 HGL MAP



Sterling Ranch East Filing No. 3

100-yr. HGL Calculations

System Input Summary

Rainfall Parameters

Rainfall Return Period: 100

Rainfall Calculation Method: Table

Time	Intensity
5	8.68
10	6.93
20	5.19
30	4.16
40	3.44
60	2.42
120	0.67

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): 7008.15

Manhole Input Summary:

[illegible]

[illegible]

[illegible]

[illegible]

MH 23 SWR 23 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	
MH 24 SWR 24 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	
MH 30 SWR 30 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.80	
MH 29 SWR 29 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	

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	90.00	7010.83	1.0	7011.73	0.013	0.03	1.00	CIRCULAR	54.00 in	54.00 in
MH 31 SWR 31 - 1	116.61	7013.23	1.1	7014.51	0.013	0.63	0.00	CIRCULAR	36.00 in	36.00 in
MH 37 SWR 37 - 1	5.67	7016.01	2.0	7016.12	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 32 SWR 32 - 1	170.14	7015.01	1.0	7016.71	0.013	0.20	0.00	CIRCULAR	30.00 in	30.00 in
MH 33 SWR 33 - 1	105.50	7017.21	1.0	7018.26	0.013	1.32	0.00	CIRCULAR	30.00 in	30.00 in
MH 34 SWR 34 - 1	24.67	7018.76	3.0	7019.50	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 35 SWR 35 - 1	5.66	7019.26	3.0	7019.43	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 38 SWR 38 - 1	41.98	7018.21	6.1	7020.77	0.013	0.05	0.00	CIRCULAR	18.00 in	18.00 in
MH 39 SWR 39 - 1	29.37	7021.27	6.0	7023.03	0.013	0.38	0.00	CIRCULAR	18.00 in	18.00 in
MH 36 SWR 36 - 1	24.66	7015.51	3.0	7016.25	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 2 SWR 2 - 1	406.93	7013.18	1.3	7018.47	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in

MH 3 SWR 3 - 1	367.09	7018.97	0.7	7021.54	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
MH 27 SWR 27 - 1	24.42	7023.04	4.0	7024.02	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 28 SWR 28 - 1	5.66	7023.04	4.0	7023.27	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 4 SWR 4 - 1	48.70	7022.04	1.0	7022.53	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
MH 5 SWR 5 - 1	432.40	7023.02	0.7	7026.05	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
MH 20 SWR 20 - 1	5.66	7027.55	5.0	7027.83	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 6 SWR 6 - 1	154.74	7026.55	0.6	7027.48	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
MH 17 SWR 17 - 1	79.98	7028.98	2.5	7030.98	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 18 SWR 18 - 1	29.37	7031.48	2.0	7032.07	0.013	0.38	0.00	CIRCULAR	18.00 in	18.00 in
MH 7 SWR 7 - 1	137.26	7027.98	0.9	7029.22	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
MH 16 SWR 16 - 1	5.66	7030.72	1.0	7030.78	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 8 SWR 8 - 1	121.71	7029.71	1.0	7030.93	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
MH 9 SWR 9 - 1	55.44	7031.44	1.0	7031.99	0.013	0.38	1.00	CIRCULAR	30.00 in	30.00 in
MH 10 SWR 10 - 1	363.47	7032.49	1.8	7039.03	0.013	0.38	1.00	CIRCULAR	30.00 in	30.00 in
MH 11 SWR 11 - 1	333.45	7039.37	0.7	7041.70	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
MH 12 SWR 12 - 1	37.46	7042.20	1.5	7042.76	0.013	1.32	1.00	CIRCULAR	30.00 in	30.00 in
MH 13 SWR 13 - 1	24.69	7043.26	1.0	7043.51	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 14 SWR 14 - 1	5.66	7043.45	1.0	7043.51	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 15 SWR 15 - 1	24.67	7030.22	1.0	7030.47	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 19 SWR 19 - 1	24.67	7027.05	2.5	7027.67	0.013	1.32	0.00	CIRCULAR	30.00 in	30.00 in
MH 21 SWR 21 - 1	225.45	7024.02	1.8	7028.08	0.013	1.32	1.00	CIRCULAR	24.00 in	24.00 in
MH 22 SWR 22 - 1	198.09	7028.50	1.2	7030.88	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
MH 25 SWR 25 - 1	100.91	7031.88	0.6	7032.49	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
MH 40 SWR 40 - 1	7.43	7032.99	5.0	7033.36	0.013	0.38	0.00	CIRCULAR	18.00 in	18.00 in
MH 26 SWR 26 - 1	27.36	7032.99	1.0	7033.26	0.013	0.63	0.00	CIRCULAR	18.00 in	18.00 in

MH 23 SWR 23 - 1	42.48	7032.38	5.0	7034.50	0.013	0.05	1.00	CIRCULAR	18.00 in	18.00 in
MH 24 SWR 24 - 1	29.37	7035.00	3.0	7035.88	0.013	0.38	1.00	CIRCULAR	18.00 in	18.00 in
MH 30 SWR 30 - 1	5.42	7019.97	5.0	7020.24	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
MH 29 SWR 29 - 1	24.42	7019.97	5.0	7021.19	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	197.18	12.40	40.26	10.22	32.01	13.24	1.57	Supercritical	130.00	0.00	
MH 31 SWR 31 - 1	70.14	9.92	24.71	7.73	19.48	10.25	1.58	Supercritical Jump	40.00	39.94	
MH 37 SWR 37 - 1	14.90	8.43	13.15	5.78	9.39	8.58	1.92	Supercritical	8.00	0.00	
MH 32 SWR 32 - 1	41.13	8.38	20.85	7.14	17.31	8.86	1.43	Supercritical	26.00	0.00	
MH 33 SWR 33 - 1	41.13	8.38	17.73	6.29	14.32	8.21	1.50	Supercritical	19.00	0.00	
MH 34 SWR 34 - 1	39.29	12.51	15.56	6.03	9.50	11.23	2.57	Supercritical	13.00	0.00	
MH 35 SWR 35 - 1	18.24	10.32	11.35	5.11	7.11	9.25	2.45	Supercritical	6.00	0.00	
MH 38 SWR 38 - 1	26.01	14.72	13.15	5.78	6.85	12.96	3.51	Supercritical	8.00	0.00	
MH 39 SWR 39 - 1	25.80	14.60	13.15	5.78	6.88	12.88	3.48	Supercritical	8.00	0.00	
MH 36 SWR 36 - 1	39.29	12.51	12.77	5.24	7.77	10.11	2.60	Supercritical	8.90	0.00	
MH 2 SWR 2 - 1	164.22	13.07	35.64	9.60	26.37	13.58	1.79	Supercritical	96.00	0.00	
MH 3 SWR 3 - 1	120.50	9.59	34.32	9.26	30.69	10.49	1.24	Supercritical	89.00	0.00	
MH 27 SWR 27 - 1	45.37	14.44	16.17	6.22	9.15	12.72	2.98	Supercritical	14.00	0.00	

MH 28 SWR 28 - 1	21.07	11.92	7.90	4.02	4.59	8.45	2.86	Pressurized	3.00	5.66	
MH 4 SWR 4 - 1	100.88	10.49	32.53	9.38	26.97	11.49	1.45	Supercritical	75.00	0.00	
MH 5 SWR 5 - 1	84.40	8.77	29.61	8.55	26.75	9.59	1.22	Supercritical	62.00	0.00	
MH 20 SWR 20 - 1	23.55	13.33	6.56	3.60	3.63	8.24	3.16	Pressurized	2.10	5.66	
MH 6 SWR 6 - 1	51.80	7.33	26.22	8.16	25.94	8.25	1.02	Supercritical	45.00	0.00	
MH 17 SWR 17 - 1	16.65	9.42	13.93	6.13	9.43	9.61	2.14	Supercritical Jump	9.00	19.61	
MH 18 SWR 18 - 1	14.90	8.43	13.93	6.13	10.09	8.82	1.88	Supercritical	9.00	0.00	
MH 7 SWR 7 - 1	63.45	8.98	23.74	7.48	19.75	9.32	1.42	Supercritical	37.00	0.00	
MH 16 SWR 16 - 1	22.68	7.22	13.58	5.46	11.15	6.99	1.46	Supercritical	10.00	0.00	
MH 8 SWR 8 - 1	41.13	8.38	19.58	6.78	16.04	8.61	1.47	Supercritical	23.00	0.00	
MH 9 SWR 9 - 1	41.13	8.38	19.58	6.78	16.04	8.61	1.47	Supercritical	23.00	0.00	
MH 10 SWR 10 - 1	55.18	11.24	19.58	6.78	13.51	10.73	2.04	Supercritical	23.00	0.00	
MH 11 SWR 11 - 1	34.41	7.01	19.58	6.78	17.94	7.51	1.18	Supercritical	23.00	0.00	
MH 12 SWR 12 - 1	50.37	10.26	19.58	6.78	14.23	10.03	1.84	Supercritical	23.00	0.00	
MH 13 SWR 13 - 1	22.68	7.22	18.82	7.19	16.81	8.09	1.26	Supercritical Jump	19.00	7.92	
MH 14 SWR 14 - 1	10.53	5.96	11.35	5.11	9.73	6.15	1.34	Pressurized	6.00	5.66	
MH 15 SWR 15 - 1	10.53	5.96	11.35	5.11	9.73	6.15	1.34	Pressurized	6.00	24.67	
MH 19 SWR 19 - 1	65.03	13.25	18.21	6.41	11.42	11.66	2.44	Supercritical	20.00	0.00	
MH 21 SWR 21 - 1	30.43	9.69	16.75	6.41	11.90	9.65	1.93	Supercritical Jump	15.00	94.52	
MH 22 SWR 22 - 1	24.85	7.91	16.75	6.41	13.45	8.28	1.53	Supercritical	15.00	0.00	
MH 25 SWR 25 - 1	17.57	5.59	13.58	5.46	12.97	5.77	1.09	Supercritical	10.00	0.00	
MH 40 SWR 40 - 1	23.55	13.33	5.88	3.39	3.27	7.74	3.13	Supercritical	1.70	0.00	
MH 26 SWR 26 - 1	10.53	5.96	13.15	5.78	11.73	6.56	1.25	Supercritical	8.00	0.00	

MH 23 SWR 23 - 1	23.55	13.33	11.35	5.11	6.20	11.14	3.19	Supercritical	6.00	0.00	
MH 24 SWR 24 - 1	18.24	10.32	11.35	5.11	7.11	9.25	2.45	Supercritical	6.00	0.00	
MH 30 SWR 30 - 1	23.55	13.33	7.62	3.93	4.19	8.96	3.18	Pressurized	2.80	5.42	
MH 29 SWR 29 - 1	23.55	13.33	12.29	5.45	6.73	11.62	3.18	Pressurized	7.00	24.42	

- 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			Comment
Element Name	Peak Flow (cfs)	Cross Section	Rise	Span	Rise	Span	Rise	Span	Area (ft ²)	
MH 1 SWR 1 - 1	130.00	CIRCULAR	54.00 in	54.00 in	48.00 in	48.00 in	54.00 in	54.00 in	15.90	
MH 31 SWR 31 - 1	40.00	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
MH 37 SWR 37 - 1	8.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 32 SWR 32 - 1	26.00	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
MH 33 SWR 33 - 1	19.00	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
MH 34 SWR 34 - 1	13.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
MH 35 SWR 35 - 1	6.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 38 SWR 38 - 1	8.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 39 SWR 39 - 1	8.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 36 SWR 36 - 1	8.90	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	

[illegible]

MH 26 SWR 26 - 1	8.00	CIRCULAR	18.00 in	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	6.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 24 SWR 24 - 1	6.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 30 SWR 30 - 1	2.80	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
MH 29 SWR 29 - 1	7.00	CIRCULAR	18.00 in	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): 7008.15

	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	7010.83	7011.73	0.00	0.00	7013.50	7015.09	7016.22	0.49	7016.71
MH 31 SWR 31 - 1	7013.23	7014.51	0.31	0.00	7016.52	7016.57	7017.02	0.48	7017.50
MH 37 SWR 37 - 1	7016.01	7016.12	0.42	0.00	7016.99	7017.61	7017.93	0.00	7017.93
MH 32 SWR 32 - 1	7015.01	7016.71	0.09	0.00	7016.66	7018.45	7017.67	1.57	7019.24
MH 33 SWR 33 - 1	7017.21	7018.26	0.31	0.00	7019.24	7019.74	7019.55	0.81	7020.35
MH 34 SWR 34 - 1	7018.76	7019.50	0.35	0.00	7020.09	7021.18	7021.51	0.00	7021.51

MH 35 SWR 35 - 1	7019.26	7019.43	0.24	0.00	7019.97	7021.00	7021.18	0.00	7021.18
MH 38 SWR 38 - 1	7018.21	7020.77	0.02	0.00	7018.78	7021.87	7021.39	1.00	7022.39
MH 39 SWR 39 - 1	7021.27	7023.03	0.12	0.00	7021.99	7024.13	7024.42	0.23	7024.65
MH 36 SWR 36 - 1	7015.51	7016.25	0.16	0.00	7016.73	7017.37	7017.75	0.00	7017.75
MH 2 SWR 2 - 1	7013.18	7018.47	0.05	0.13	7015.38	7021.44	7018.24	4.63	7022.87
MH 3 SWR 3 - 1	7018.97	7021.54	0.04	0.13	7021.61	7024.40	7023.24	2.49	7025.73
MH 27 SWR 27 - 1	7023.04	7024.02	0.41	0.00	7024.81	7026.01	7026.32	0.00	7026.32
MH 28 SWR 28 - 1	7023.04	7023.27	0.06	0.00	7025.75	7025.75	7025.79	0.00	7025.79
MH 4 SWR 4 - 1	7022.04	7022.53	0.05	0.00	7024.45	7025.24	7026.34	0.27	7026.61
MH 5 SWR 5 - 1	7023.02	7026.05	0.03	0.30	7026.24	7028.52	7026.94	2.72	7029.65
MH 20 SWR 20 - 1	7027.55	7027.83	0.03	0.00	7029.66	7029.66	7029.68	0.00	7029.68
MH 6 SWR 6 - 1	7026.55	7027.48	0.03	0.02	7028.71	7029.67	7029.77	0.93	7030.70
MH 17 SWR 17 - 1	7028.98	7030.98	0.53	0.00	7030.83	7032.14	7031.23	1.49	7032.72
MH 18 SWR 18 - 1	7031.48	7032.07	0.15	0.00	7032.32	7033.23	7033.53	0.28	7033.81
MH 7 SWR 7 - 1	7027.98	7029.22	0.02	0.20	7029.89	7031.20	7030.98	1.09	7032.07
MH 16 SWR 16 - 1	7030.72	7030.78	0.21	0.00	7031.75	7031.91	7032.34	0.04	7032.37
MH 8 SWR 8 - 1	7029.71	7030.93	0.02	0.08	7031.30	7032.56	7032.20	1.07	7033.27
MH 9 SWR 9 - 1	7031.44	7031.99	0.13	0.00	7032.77	7033.62	7033.92	0.41	7034.33
MH 10 SWR 10 - 1	7032.49	7039.03	0.13	0.00	7033.75	7040.66	7035.40	5.97	7041.37
MH 11 SWR 11 - 1	7039.37	7041.70	0.02	0.00	7040.86	7043.33	7041.74	2.31	7044.04
MH 12 SWR 12 - 1	7042.20	7042.76	0.45	0.00	7043.78	7044.39	7044.95	0.16	7045.10
MH 13 SWR 13 - 1	7043.26	7043.51	0.75	0.00	7045.29	7045.29	7045.85	0.08	7045.93
MH 14 SWR 14 - 1	7043.45	7043.51	0.24	0.00	7045.16	7045.18	7045.34	0.02	7045.36
MH 15 SWR 15 - 1	7030.22	7030.47	0.24	0.00	7032.13	7032.21	7032.30	0.08	7032.38
MH 19 SWR 19 - 1	7027.05	7027.67	0.34	0.00	7028.86	7029.80	7030.12	0.00	7030.12

MH 21 SWR 21 - 1	7024.02	7028.08	0.47	0.59	7027.31	7029.48	7027.66	2.45	7030.11
MH 22 SWR 22 - 1	7028.50	7030.88	0.02	0.00	7029.62	7032.28	7030.69	2.23	7032.91
MH 25 SWR 25 - 1	7031.88	7032.49	0.21	0.00	7032.97	7033.62	7033.48	0.60	7034.08
MH 40 SWR 40 - 1	7032.99	7033.36	0.01	0.00	7033.63	7034.14	7034.19	0.00	7034.19
MH 26 SWR 26 - 1	7032.99	7033.26	0.20	0.00	7033.96	7034.36	7034.63	0.24	7034.88
MH 23 SWR 23 - 1	7032.38	7034.50	0.01	0.17	7032.89	7035.45	7034.82	1.03	7035.85
MH 24 SWR 24 - 1	7035.00	7035.88	0.07	0.00	7035.59	7036.83	7036.92	0.31	7037.23
MH 30 SWR 30 - 1	7019.97	7020.24	0.05	0.00	7022.88	7022.89	7022.92	0.00	7022.92
MH 29 SWR 29 - 1	7019.97	7021.19	0.32	0.00	7022.95	7023.06	7023.19	0.11	7023.30

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

REFERENCE DOCUMENTS

**DRAINAGE LETTER
FOR
STERLING RANCH ROAD AND
BRIARGATE PARKWAY INTERIM PLAN**

Prepared For:

**SR Land, LLC
20 Boulder Crescent, Suite 200
Colorado Springs, CO 80903
(719) 491-3024**

**July 2023
Project No. 25188.03
PCD Filing No: CDR221**

**Prepared By:
JR Engineering, LLC
5475 Tech Center Drive, Suite 235
Colorado Springs, CO 80919
719-593-2593**

DRAINAGE LETTER FOR STERLING RANCH ROAD
& BRIARGATE PARKWAY

July 2023

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 El Paso County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

Mike Bramlett

Mike Bramlett, Colorado P.E. 32314
For and On Behalf of JR Engineering, LLC



DEVELOPER'S STATEMENT:

I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: SR Land, LLC

By:

Janet Wiley
MANAGER

Title:

Address: 20 Boulder Crescent, Suite 200
Colorado Springs, CO 80903

El Paso County:

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

Joshua Palmer, P.E.
County Engineer/ ECM Administrator

Approved

By: Gilbert LaForce, P.E.

Date: 07/25/2023 5:31:51 PM

El Paso County Department of Public Works



Conditions:

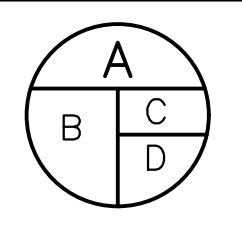


JR ENGINEERING



LEGEND

BASIN ID
A: BASIN LABEL
B: AREA
C: C - 100 YR
D: C - 5 YR



DESIGN POINT
PROPOSED FLOW DIRECTION



BASIN DRAINAGE AREA



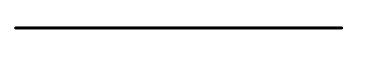
EXISTING STORM SEWER



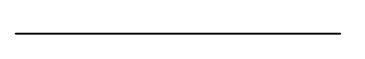
STORM SEWER PROPOSED



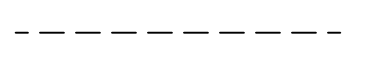
PROPOSED R.O.W



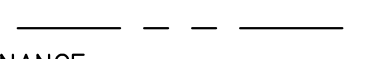
PROPOSED PROPERTY LINES



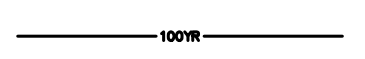
PROPOSED SIDEWALK



EXISTING PROPERTY LINE



ROW EXISTING



FL EXISTING



SIDEWALK EXISTING



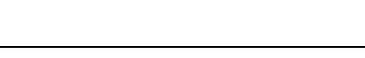
SECTION LINE



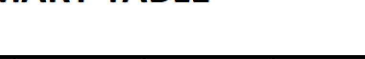
DRAINAGE ACCESS & MAINTENANCE



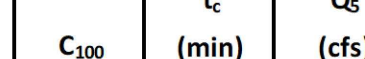
EASEMENT



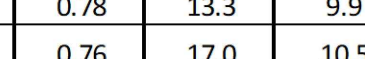
100 YEAR FLOODPLAIN



EXISTING



PROPOSED



BASIN SUMMARY TABLE

Tributary	Area	Percent	C _s	C ₁₀₀	t _c	Q _s	Q ₁₀₀
Sub-basin	(acres)	Impervious			(min)	(cfs)	(cfs)
A1	4.09	70%	0.65	0.78	13.3	9.9	19.7
A2	5.05	67%	0.62	0.76	17.0	10.5	21.4
A3	1.94	64%	0.60	0.74	8.6	5.1	10.5
A4	1.52	70%	0.65	0.78	9.6	4.9	8.3
A5	0.63	88%	0.80	0.88	5.0	2.6	4.9
B1	1.82	68%	0.64	0.77	7.6	5.3	10.6
B2	1.90	64%	0.61	0.74	7.9	5.2	10.6
B3	1.27	64%	0.60	0.74	8.6	3.3	6.9
B4	1.33	61%	0.58	0.72	9.0	3.3	6.9
B5	0.89	61%	0.58	0.72	7.6	2.4	4.9
B6	0.91	63%	0.60	0.74	7.1	2.5	5.2
B7	1.08	52%	0.50	0.67	8.0	2.4	5.4
B8	1.16	58%	0.55	0.70	7.6	2.9	6.2
B9	1.98	51%	0.49	0.66	7.9	4.4	9.8
B10	2.19	53%	0.51	0.67	7.8	5.0	11.1
B11	3.53	26%	0.29	0.51	13.5	3.8	11.1
OS1	176.86	2%	0.09	0.35	29.2	40.1	261.9
OS2	39.27	2%	0.09	0.35	16.6	11.9	77.7

DESIGN POINT

DP	Q _s	Q ₁₀₀
Total	Total	Total
1	2.6	4.9
2	10.5	21.4
4	4.9	8.6
5	5.1	13.2
6	24.3	44.9
7	5.2	10.6
8	5.3	10.6
10	3.3	6.9
11	3.3	6.9
14	2.5	5.5
15	2.4	5.3
18	2.9	6.2
19	2.4	5.4
21	9.9	19.7
22	4.4	9.8
23	5.0	11.1
24	30.0	55.0
1A	19.7	34.1
OS1	40.1	261.9
OS2	42.7	314.2

Values in RED are from the
Sterling Ranch MDP
Amendment No. 2.8
Preliminary Drainage Report
for Sterling Ranch East
Preliminary Plan No. 1" by
Classic Consulting.



100 50 0 100 200
ORIGINAL SCALE: 1" = 100'



Know what's below.
Call before you dig.

UNTIL SUCH TIME AS THESE
DRAWINGS ARE APPROVED BY THE
APPROPRIATE REVIEWING AGENCIES,
JR ENGINEERING APPROVES THEIR
USE ONLY FOR THE PURPOSES
DESIGNATED BY WRITTEN
AUTHORIZATION.

PREPARED FOR
SR LAND, LLC
20 BOULDER CRESCENT
SUITE 201
COLORADO SPRINGS, CO 80903
JAMES F. MORLEY
(719) 471-1742

JR ENGINEERING
A Western Company
Central 303-740-3888 • Colorado Springs 719-595-2588
Fort Collins 970-491-8888 • www.jrengineering.com

BY	DATE	REVISION	No.	1" = 100'	H-SCALE	V-SCALE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY
				N/A			06/29/23	RAB	CGV	

STERLING RANCH ROAD & BRIARGATE
DRAINAGE MAPS

PROPOSED DRAINAGE MAP

SHEET 5 OF 6

JOB NO. 25188.03



INNOVATIVE DESIGN. CLASSIC RESULTS.

**PRELIMINARY DRAINAGE REPORT
FOR
STERLING RANCH EAST FILING NO. 5
PRELIMINARY PLAN**

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

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

Job No. 1183.25

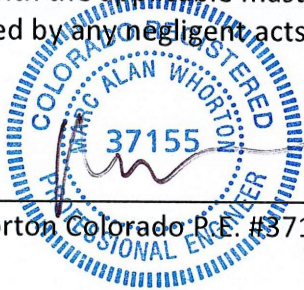
PCD Project No. SP235



PRELIMINARY 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

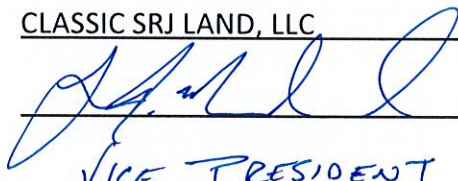
1/8/2024

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: VICE PRESIDENT

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.
County Engineer, / ECM Administrator

By: **Gilbert LaForce, P.E.**
Engineering Manager
On behalf of the
ECM Administrator

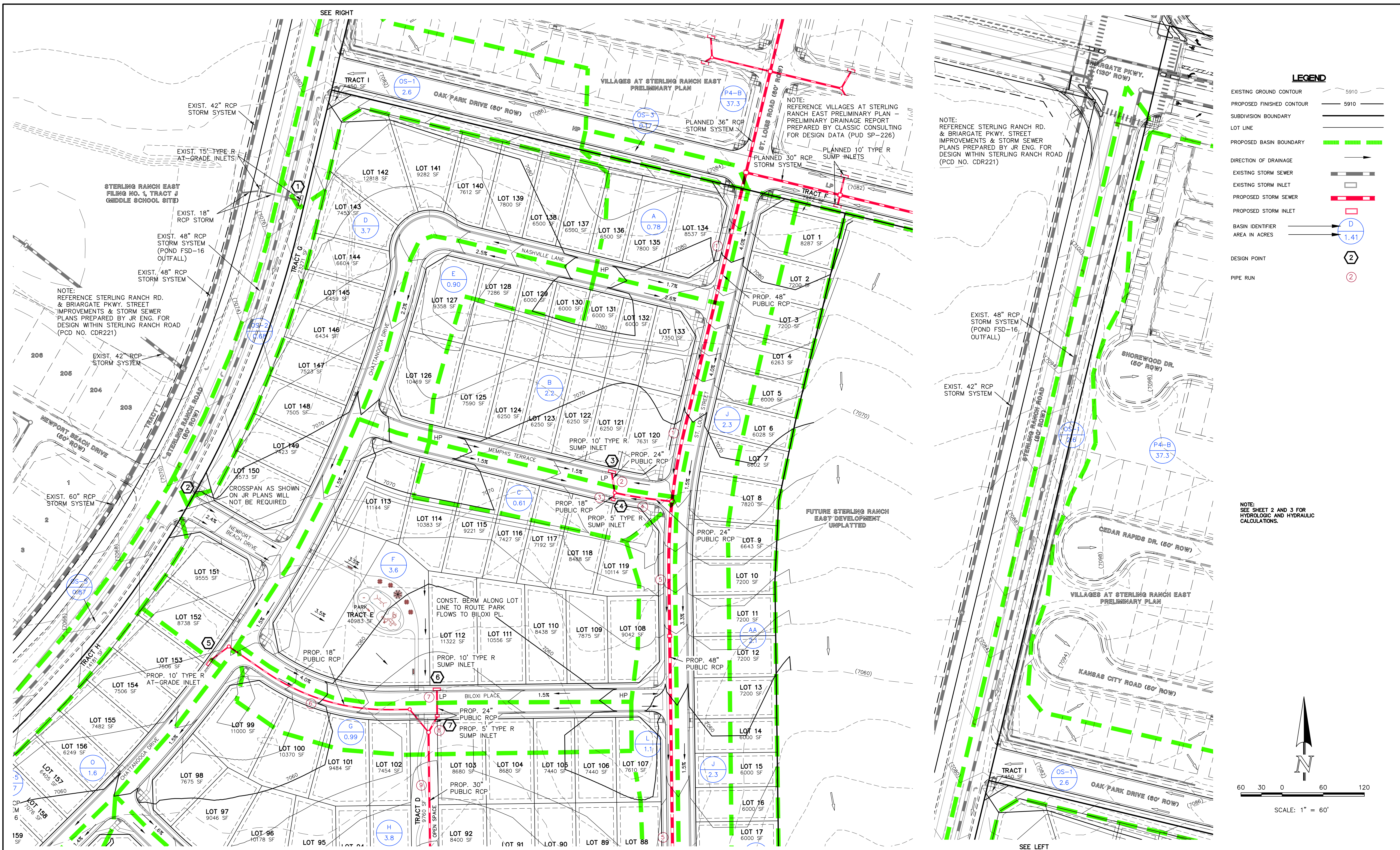
Date: **01/18/2024 9:29:37 AM**

El Paso County Department of Public Works



Conditions:





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
1	REVISED PER COUNTY COMMENTS	11/22/23

REVIEW:

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

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

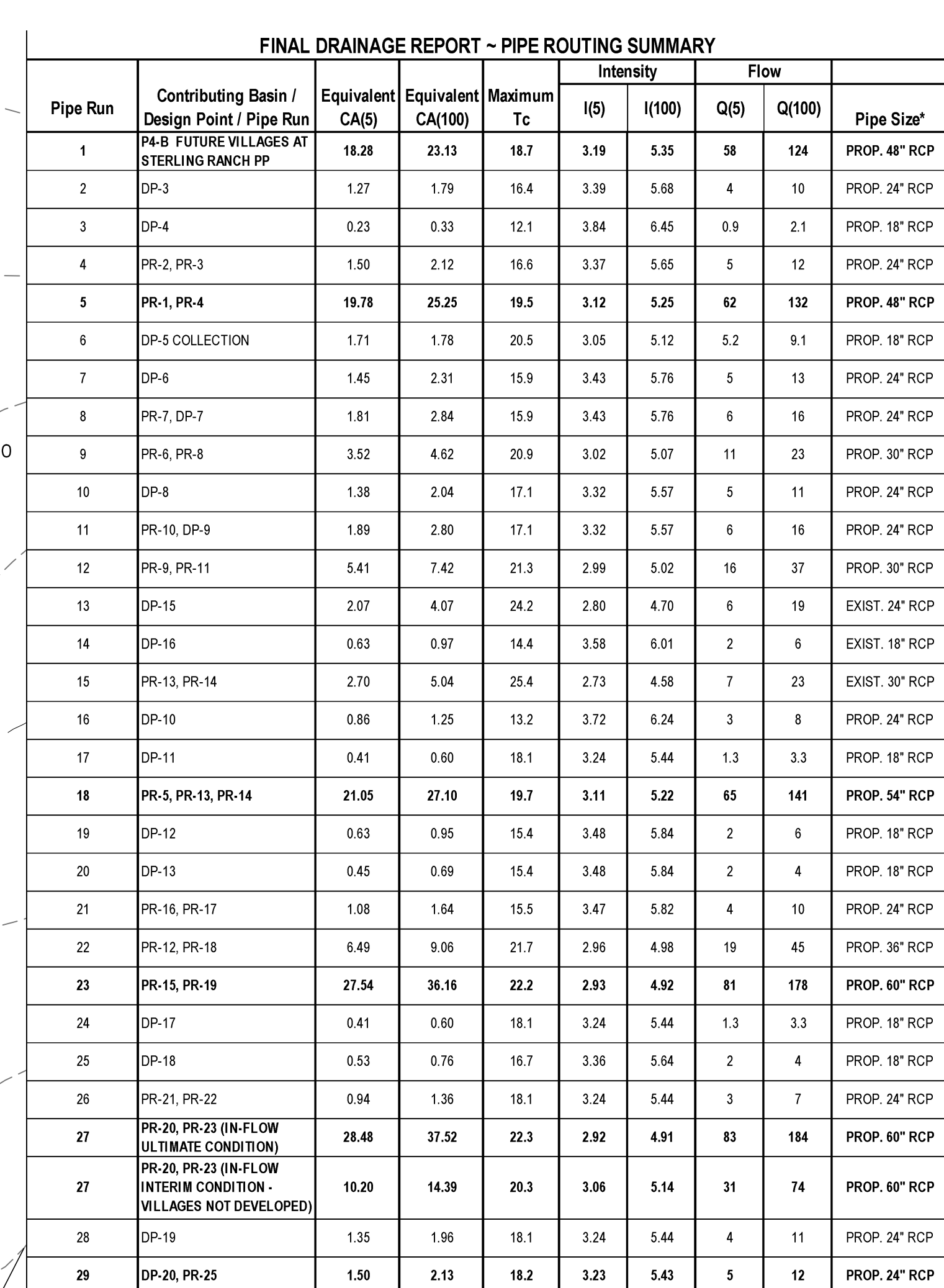
CLASSIC CONSULTING

619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903

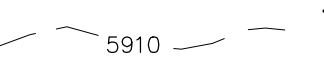
(719) 785-0790
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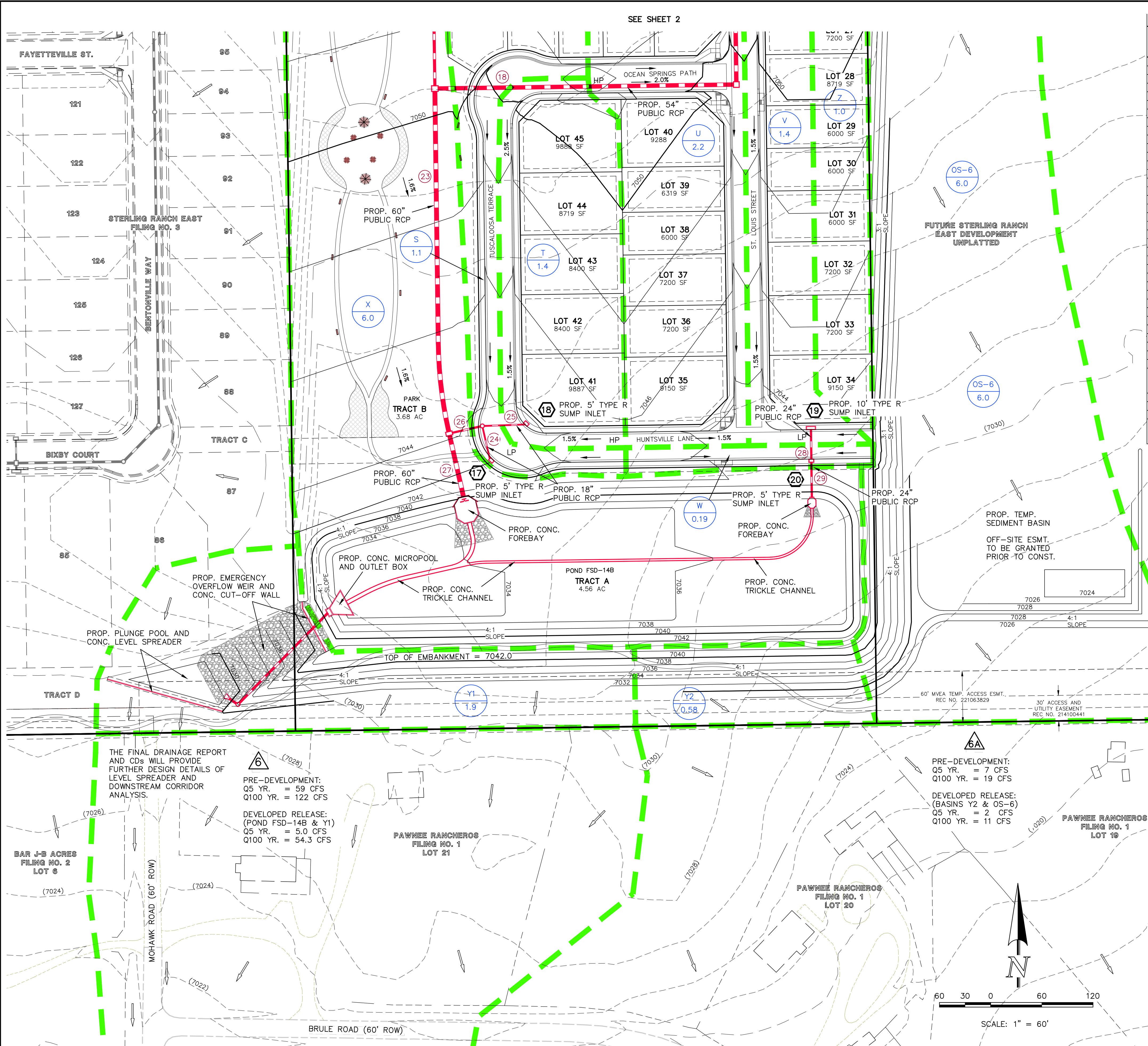
STERLING RANCH EAST FILING NO. 5
PRELIMINARY PLAN
PRELIMINARY DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

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



FINAL DRAINAGE REPORT – SURFACE ROUTING SUMMARY										
Design Point	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 AI-Grade Inlet	
2	OS-2 and OS-1 Flow-By	0.56	1.16	16.6	3.37	5.85	2	7		
3	OS-3, A, B	1.27	1.79	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 and DP-2 Flow On-Site	1.94	3.18	20.2	3.07	5.16	6	16	Prop. 10" Type R AI-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	0.83	2.27	22.2	2.93	4.92	2	11	Prop. 6" Crosspoin	
15	P and DP-14	2.07	4.07	24.2	2.80	4.70	6	19	Prop. 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	0.58	0.69	9.2	4.25	7.14	2	5	Exist. 10" Type R AI-Grade Inlet	
	TOTAL BASINS TRIBUTARY TO POND FSD-14B	30.70	41.99	23.1	2.88	4.83	88	203		
	TOTAL BASINS TRIBUTARY TO POND FSD-14B (WILLAGES NOT DEV.)	12.42	18.86	23.1	2.88	4.83	36	91		
6 (MDPP) SOUTH BNDY.	POND FSD-14B RELEASE AND BASIN Y1	REF. MMFD-DETENTION SPREADSHEET FOR CALCULATIONS					5.0	52.2	Sheet flow from Level Provider	
8A (MDPP) SOUTH BNDY.	BASINS Y2 AND OS-6	0.61	2.38	23.2	2.87	4.81	2	11	Sheet flow	

EXISTING GROUND CONTOUR PROPOSED FINISHED CONTOUR SUBDIVISION BOUNDARY LOT LINE PROPOSED BASIN BOUNDARY DIRECTION OF DRAINAGE EXISTING STORM SEWER	 LEGEND	EXISTING STORM INLET PROPOSED STORM SEWER PROPOSED STORM INLET BASIN IDENTIFIER AREA IN ACRES DESIGN POINT PIPE RUN		SEE SHEET 3 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.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">NO. REVISION</th> <th>DATE</th> </tr> <tr> <td style="width: 5%;">1</td> <td style="width: 85%;">REVISED PER COUNTY COMMENTS</td> <td style="width: 10%;">11/22/23</td> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>	NO. REVISION		DATE	1	REVISED PER COUNTY COMMENTS	11/22/23																			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 PRELIMINARY PLAN PRELIMINARY DRAINAGE REPORT DEVELOPED DRAINAGE MAP <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DESIGNED BY</td> <td>MAW</td> <td>SCALE</td> <td>DATE</td> </tr> <tr> <td>DRAWN BY</td> <td>MAW</td> <td>(H) 1"= 60'</td> <td>SHEET 2 OF 3</td> </tr> <tr> <td>CHECKED BY</td> <td> </td> <td>(V) 1"= N/A</td> <td>JOB NO. 1183.25</td> </tr> </table>	DESIGNED BY	MAW	SCALE	DATE	DRAWN BY	MAW	(H) 1"= 60'	SHEET 2 OF 3	CHECKED BY		(V) 1"= N/A	JOB NO. 1183.25	CLASSIC
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FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY																	
BASIN	TOTAL AREA (AC)	C VALUE DCM TABLE 6-6					LAND USE	PERCENT IMPERVIOUS	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)			AREA (AC)	C(5)	C(100)	C(5)	C(100)	CA(5)	CA(100)	WEIGHTED % IMPERVIOUS	
A	0.78	RES 16 AC.	52.5%	0.78	0.38	0.55			0.00	0.08	0.35	0.38	0.55	0.29	0.43	52.5%	
B	2.20	RES 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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 16 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	0.58	OS/BUFFER	7.0%	0.54	0.12	0.39	SIDEWALK	100.0%	0.04	0.08	0.35	0.12	0.39	0.07	0.22	13.4%	
Z	1.00	RES 16 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 16 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 16 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	0.17	STREET	100%	0.17	0.90	0.96			0.00	0.08	0.35	0.90	0.96	0.15	0.16	100.0%	
OS-4	1.40	RES 16 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%	0.61	0.90	0.96	OPEN SPACE	7.0%	0.26	0.12	0.39	0.67	0.79	0.58	0.69	72.2%	
OS-6	6.00	UNDEV.	2%	6.00	0.09	0.36			0.00	0.12	0.39	0.09	0.36	0.54	2.16	2.0%	
P4-B Villages at Sterling Ranch East/PP	37.30	RES 16 AC.	70.0%	37.30	0.49	0.62			0.00	0.08	0.35	0.49	0.62	18.28	23.13	70.0%	
TOTAL	96.71																
TOTAL TRIB. AREA TO POND FSD-14B	74.65																

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY														
BASIN	WEIGHTED			OVERLAND	STREET / CHANNEL FLOW				INTENSITY	TOTAL FLOWS				
	CA(2)	CA(5)	CA(100)		Length (ft)	Slope (%)	Velocity (fps)	Tc (min)		Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)	Q(2) (cfs)	Q(5) (cfs)
A	0.25	0.29	0.43	0.08	100	2	14.7	135	2.0%	2.8	0.8	15.4	2.76	3.46
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
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
D	1.18	1.39	2.02	0.08	100	2	14.7	900	1.8%	2.7	5.9	20.2	2.46	3.07
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
F	0.90	1.11	1.82	0.12	100	2	14.7	270	1.5%	2.4	1.8	15.9	2.74	3.43
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
H	1.17	1.38	2.04	0.12	100	2	14.1	450	1.5%	2.4	3.1	17.1	2.85	3.32
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
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
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
M	0.53	0.63	0.95	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.46
N	0.38	0.45	0.69	0.12	100	2	14.1	200	1.5%	2.4	1.4	15.4	2.78	3.46
O	0.51	0.60	0.87	0.08	100	2	14.7	300	1.5%	2.4	2.0	16.7	2.89	3.36
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
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
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
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
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
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
W	0.14	0.15	0.17											
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
Y1	0.35	0.46	0.91	0.90	250	10	3.6							
Y2	0.03	0.07	0.22	0.08	90	14	7.1							
Z	0.32	0.38	0.55	0.08	65	2	10.2							
AA	0.67	0.79	1.14	0.08	65	2	10.2							
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
OS-2	0.32	0.35	0.46	0.12	50	1	10.0	400	1.6%	2.5	2.8	12.6	3.02	3.78
OS-3	0.15	0.15	0.16											
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
OS-5	0.56	0.58	0.69	0.12	25	0.75	6.2	450	1.5%	2.4	3.1	9.2	3.39	4.25
OS-6	0.18	0.54	2.16	0.12	300	7	23.2							
P4-B Villages at Sterling Ranch East PP	16.79	18.28	23.13	0.08	100	2	14.7	600	1.5%	2.4	4.1	18.7	2.55	3.19

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

DESIGN POINT

PIPE RUN

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

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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
PRELIMINARY PLAN
PRELIMINARY DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

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

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DRAINAGE MAPS

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	89 10.0
AREA IN ACRES	10.0
EXISTING DIRECTION OF FLOW	→
EXISTING STORM SEWER	---

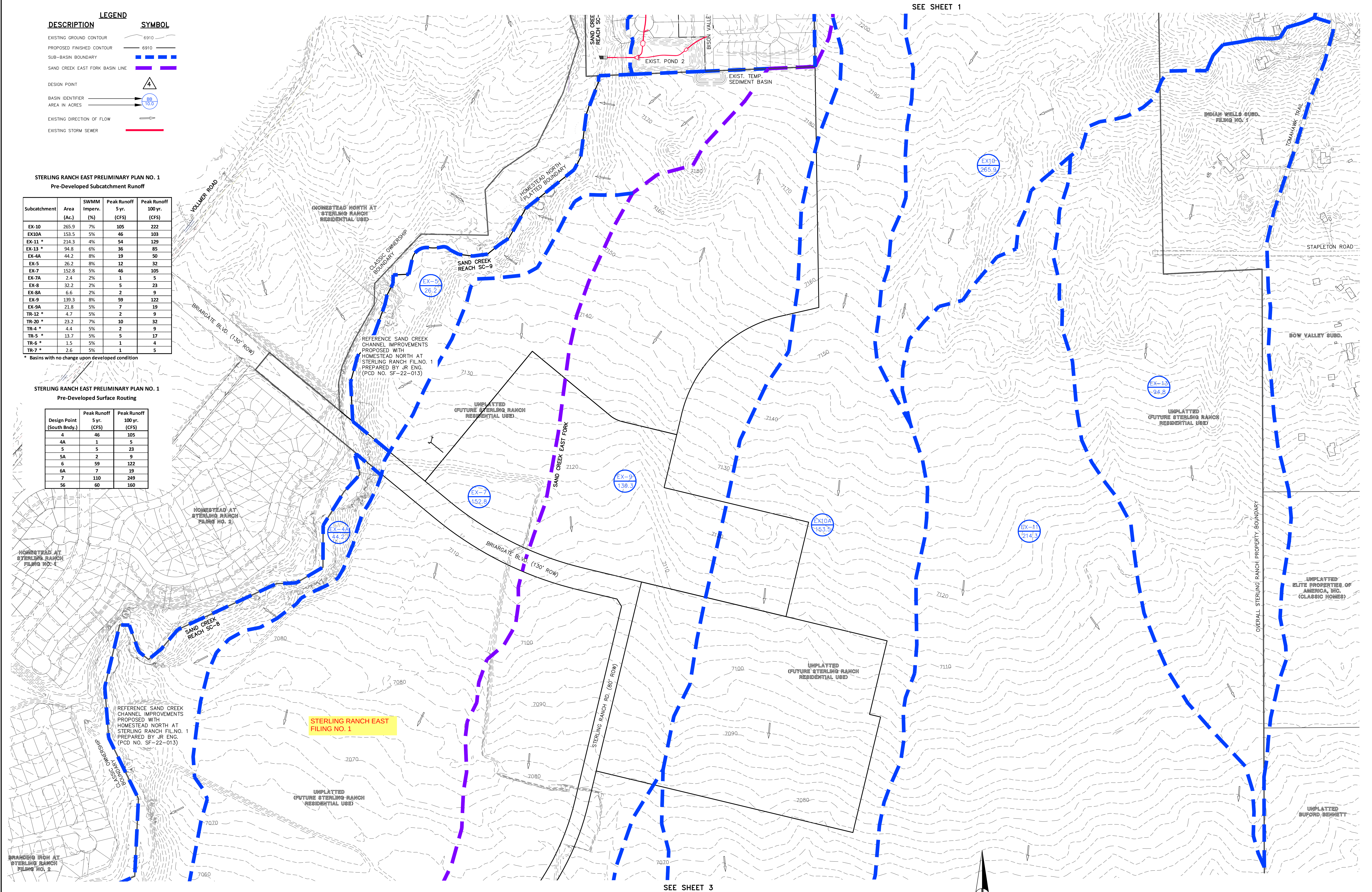
STERLING RANCH EAST PRELIMINARY PLAN NO. 1
Pre-Developed Subcatchment Runoff

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

* Basins with no change upon developed condition

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

Design Point (South Bdy.)	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



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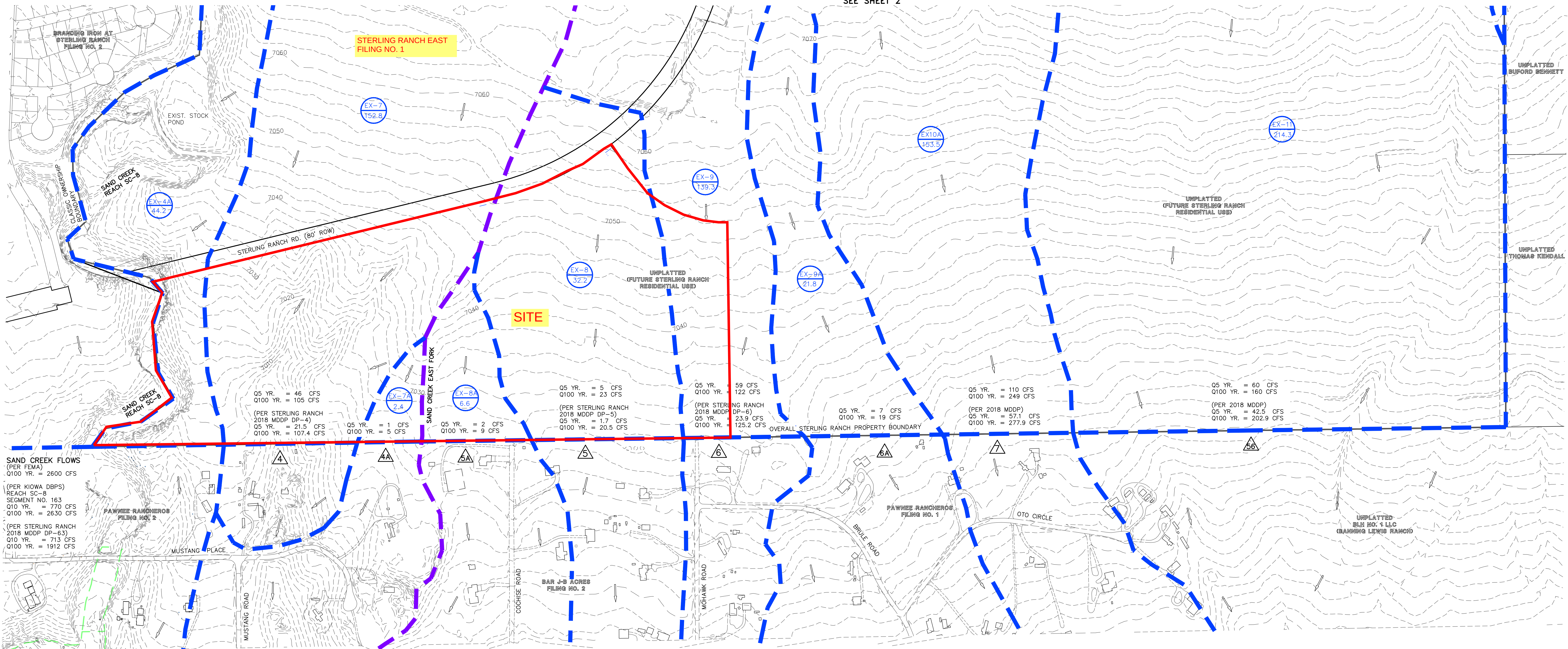
STERLING RANCH EAST PRELIMINARY PLAN NO. 1
PRELIMINARY DRAINAGE REPORT
PRE-DEVELOPMENT DRAINAGE MAP

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

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SEE SHEET 2



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

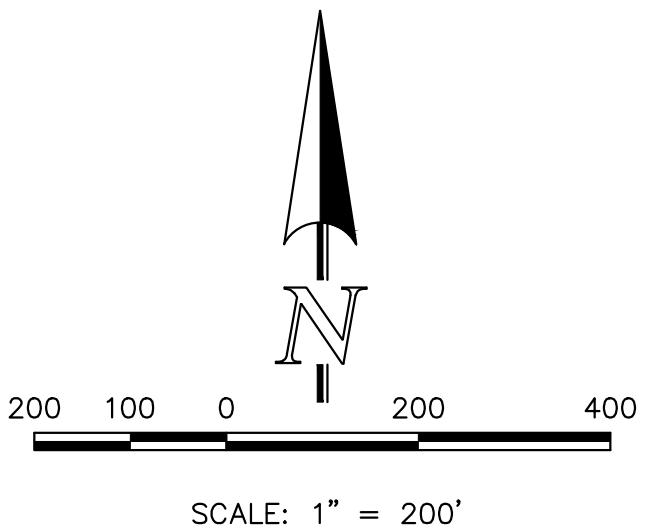
Subcatchment	Area (Ac.)	SWMM Imperv. (%)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)
EX-10	265.9	7%	105	222
EX10A	153.5	5%	46	103
EX-11 *	214.3	4%	54	129
EX-13 *	94.8	6%	36	85
EX-4A	44.2	8%	19	50
EX-5	26.2	8%	12	32
EX-7	152.8	5%	46	105
EX-7A	2.4	2%	1	5
EX-8	32.2	2%	5	23
EX-8A	6.6	2%	2	9
EX-9	139.3	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	
BASIN IDENTIFIER	
AREA IN ACRES	
EXISTING DIRECTION OF FLOW	
EXISTING STORM SEWER	



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	

619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903

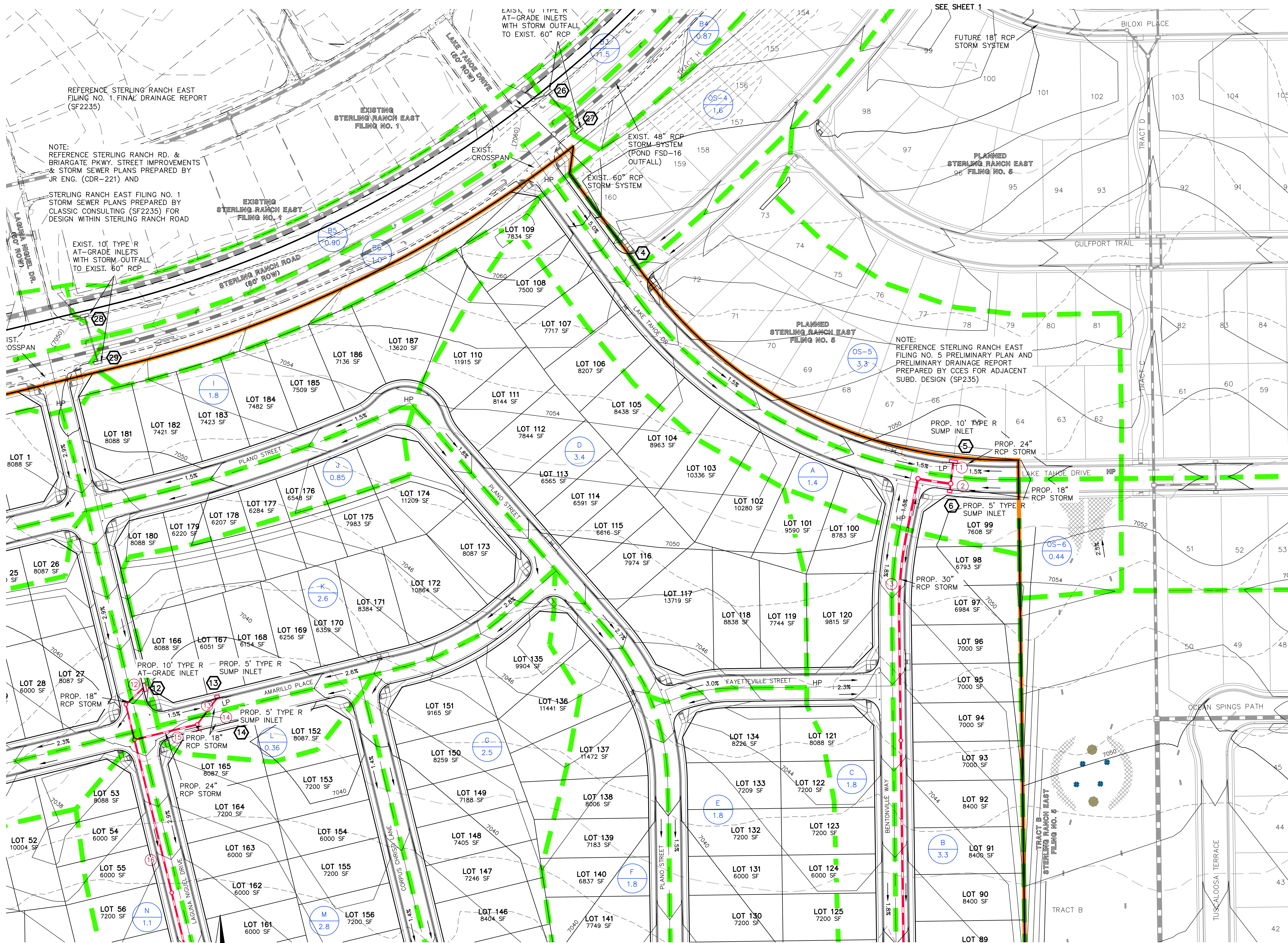
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(719)785-0799 (Fax)

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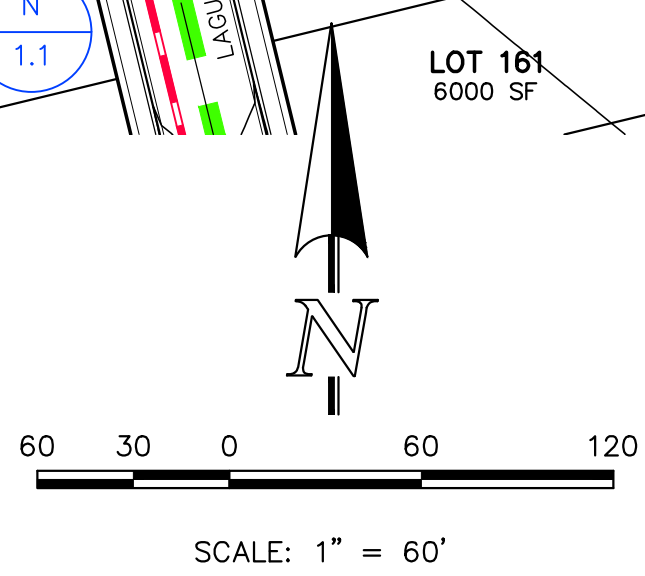
FINAL DRAINAGE REPORT - PIPE ROUTING SUMMARY												
Pipe Run	Contributing Basin / Design Point / Pipe Run	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*			
					I(5)	I(100)	Q(5)	Q(100)				
1	DP-5	1.85	3.26	22.2	2.93	4.92	5	16	PROP. 24" RCP			
2	DP-6	0.63	0.97	13.4	3.70	6.20	2	6	PROP. 18" RCP			
3	PR-1, PR-2	2.48	4.23	23.2	2.86	4.81	7	20	PROP. 30" RCP			
4	DP-7	1.24	1.80	18.6	3.20	5.37	4	10	PROP. 24" RCP			
5	DP-8	0.91	1.17	17.8	3.26	5.48	3	6	PROP. 18" RCP			
6	PR-3, PR-4, PR-5	4.63	7.20	23.4	2.86	4.79	13	34	PROP. 36" RCP			
7	DP-9 Capture	1.72	1.64	18.8	3.18	5.35	5	9	PROP. 24" RCP			
8	PR-6, PR-7	6.35	8.84	23.6	2.84	4.76	18	42	PROP. 36" RCP			
9	DP-10	1.85	3.53	17.5	3.29	5.53	6	20	PROP. 30" RCP			
10	DP-11	0.23	0.32	11.1	3.97	6.66	0.9	2.1	PROP. 18" RCP			
11	PR-8, PR-9, PR-10	8.42	12.69	24.4	2.79	4.68	23	59	PROP. 42" RCP			
12	DP-12 Capture	1.19	1.21	18.8	3.18	5.34	4	6	PROP. 18" RCP			
13	DP-13	0.99	1.42	15.9	3.43	5.77	3	8	PROP. 18" RCP			
14	DP-14	0.20	0.25	10.8	4.02	6.74	0.8	1.7	PROP. 18" RCP			
15	PR-13, PR-14	1.19	1.66	15.9	3.43	5.77	4	10	PROP. 24" RCP			
16	PR-12, PR-15	2.38	2.87	19.4	3.14	5.26	7	15	PROP. 24" RCP			
17	PR-11, PR-16	10.80	15.56	24.4	2.79	4.68	30	73	PROP. 42" RCP			
18	DP-15	1.46	2.53	18.8	3.18	5.34	5	14	PROP. 24" RCP			
19	DP-16	0.39	0.54	12.3	3.81	6.40	1	3	PROP. 18" RCP			
20	PR-17, PR-18, PR-19	12.55	18.63	24.8	2.76	4.64	35	86	PROP. 48" RCP			
21	DP-17	0.86	1.25	15.4	3.46	5.84	3	7	PROP. 18" RCP			
22	DP-18	0.30	0.42	11.3	3.94	6.62	1.2	2.8	PROP. 18" RCP			
23	PR-20, PR-21, PR-22	13.81	20.30	25.2	2.74	4.60	38	93	PROP. 48" RCP			
24	DP-19 Capture	1.56	1.44	19.1	3.16	5.31	5	8	PROP. 18" RCP			
25	DP-20	2.05	2.30	17.4	3.30	5.54	7	13	PROP. 24" RCP			
26	DP-21	0.75	1.09	16.0	3.42	5.75	3	6	PROP. 18" RCP			
27	PR-25, PR-26	2.80	3.39	17.5	3.29	5.53	9	19	PROP. 30" RCP			
28	PR-24, PR-27	4.36	4.83	19.3	3.15	5.28	14	26	PROP. 30" RCP			
29	DP-22	0.34	1.55	16.1	3.41	5.73	1.2	8.9	PROP. 18" RCP			
30	DP-23	0.90	1.18	12.0	3.86	6.47	3	8	PROP. 18" RCP			
31	PR-26, PR-27, PR-28	5.60	7.56	19.4	3.14	5.27	18	40	PROP. 36" RCP			
32	TOTAL INFLOW POND FSD 11-B (EASTERLY FOREBAY)	19.40	27.87	25.3	2.73	4.59	53	128	PROP. 54" RCP			
33	DP-32	0.98	1.52	15.9	3.44	5.77	3	9	PROP. 18" RCP			
34	DP-33, PR-33	2.06	2.98	16.9	3.34	5.61	7	17	PROP. 24" RCP			
35	X (Future Elem. School Site)	4.80	6.08	9.6	4.20	7.05	20	43	PROP. 36" RCP			
36	TOTAL INFLOW POND FSD 11-B (WESTERLY FOREBAY)	6.87	9.06	16.9	3.34	5.61	23	51	PROP. 42" RCP			

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				
3	OS-3	1.39	2.02	20.2	3.07	5.16	4	10	Future 10" Type R At-grade Inlet			
4	OS-4, Flow-by from DP-3	0.61	1.46	21.2	3.00	5.03	2	7	Prop. 6" Crossover			
5	OS-4, OS-5 (Anticipated off-site flows from SRE F.E. 3)	1.85	3.26	22.2	2.93	4.92	5	16	Prop. 10" Type R Sump Inlet			
6	A, OS-6 (Anticipated off-site flows from SRE F.E. 5)	0.63	0.97	13.4	3.70	6.20	2	6	Prop. 5" Type R Sump Inlet			
7	B	1.24	1.80	18.6	3.20	5.37	4	10	Prop. 10" Type R Sump Inlet			
8	C	0.91	1.17	17.8	3.26	5.48	3	6	Prop. 5" Type R Sump Inlet			
9	D, E	1.95	2.83	18.8	3.18	5.35	6	15	Prop. 10" At-Grade Type R Inlet			
10	DP-9 Flow-by, F, G	1.85	3.53	17.5	3.29	5.53	6	20	Prop. 10" Type R Sump Inlet			
11	H	0.23	0.32	11.1	3.97	6.66	0.9	2.1	Prop. 5" Type R Sump Inlet			
12	I, J	1.20	1.61	18.8	3.18	5.34	4	9	Prop. 10" At-Grade Type R Inlet			
13	K, 5-yr. Flow-by from DP-12	0.99	1.42	15.9	3.43	5.77	3	8	Prop. 5" Type R Sump Inlet			
14	L	0.20	0.25	10.8	4.02	6.74	0.8	1.7	Prop. 5" Type R Sump Inlet			
15	M, N, 100-yr. Flow-by DP-12	1.46	2.53	18.8	3.18	5.34	5	14	Prop. 10" Type R Sump Inlet			
16	O	0.39	0.54	12.3	3.81	6.40	1	3	Prop. 5" Type R Sump Inlet			
17	P	0.86	1.25	15.4	3.46	5.84	3	7	Prop. 5" Type R Sump Inlet			
18	Q	0.30	0.42	11.3	3.94	6.62	1.2	2.8	Prop. 5" Type R Sump Inlet			
19	T, U	1.85	2.45	19.1	3.16	5.31	6	13	Prop. 10" At-Grade Type R Inlet			
20	R, 5-yr. Flow-by from DP-19	2.05	2.30	17.4	3.30	5.54	7	13	Prop. 10" Type R Sump Inlet			
21	S	0.75	1.09	16.0	3.42	5.75	3	6	Prop. 5" Type R Sump Inlet			
22	V, 100-yr. Flow-by from DP-19	0.34	1.55	16.1	3.41	5.73	1.2	8.9	Prop. 10" Type R Sump Inlet			
23	W	0.90	1.18	12.0	3.86	6.47	3	8	Prop. 5" Type R Sump Inlet			
24	Pond Inflow (Easterly Forebay)	19.40	27.87	25.3	2.73	4.59	53	128	Prop. 54" RCP			
25	B1	1.06	1.29	9.8	4.16	6.98	4	9	Exist. 15" Type R At-grade Inlet			
26	B3, Flow-by from DP-25	0.88	1.16	11.9	3.87	6.50	3	8	Exist. 10" Type R At-grade Inlet			
27	B4, Flow-by from DP-2	0.83	1.34	19.7	3.11	5.22	3	7	Exist. 10" Type R At-grade Inlet			
28	B5, Flow-by from DP-26	0.51	0.89	12.9	3.75	6.30	2	6	Exist. 10" Type R At-grade Inlet			
29	B6, Flow-by from DP-27	0.59	0.96	20.7	3.04	5.10	2	5	Exist. 10" Type R At-grade Inlet			
30	B7, Flow-by from DP-28	0.78	1.16	13.9	3.64	6.11	3	7	Exist. 10" Type R At-grade Inlet			
31	B8, Flow-by from DP-29	0.65	0.90	21.7	2.97	4.98	2	4	Exist. 10" Type R At-grade Inlet			
32	B9, Flow-by from DP-30	0.98	1.52	15.9	3.44	5.77	3	9	Exist. 15" Type R Sump Inlet			
33	B10, Flow-by from DP-31	1.08	1.47	23.7	2.83	4.76	3	7	Exist. 15" Type R Sump Inlet			
34	Pond Inflow (Westerly Forebay - X, DP-32, DP-33)	6.87	9.06	16.9	3.34	5.61	23	51	Prop. 42" RCP			
Total Pond Inflow (DP-24, DP-34 and Y)		26.85	38.80	25.3	2.73	4.59	73	178	Pond FSD-11B			

FINAL DRAINAGE REPORT - BASIN RUNOFF SUMMARY																	
BASIN	WEIGHTED			OVERLAND		STREET / CHANNEL FLOW				Σ	INTENSITY			TOTAL FLOWS			
	CA(2)	CA(5)	CA(100)	C(5)	Length (ft) Height (ft)	Length (ft) Slope (ft/ft)	Velocity (ft/s)	Time (min)	TOTAL (cfs)		I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(100) (cfs)		
A	0.46	0.83	0.76	0.12	55	1	10.0	500	1.9%	2.4	3.4	13.4	2.95	3.70	6.20	1	5
B	1.06	1.24	1.80	0.12	100	2	14.1	730	1.8%	2.4	4.5	16.6	2.56	3.20	5.37	3	4
C	0.80	0.91	1.17	0.12	100	2	14.1	600	1.8%	2.7	3.7	17.8	2.61	3.26	5.48	2	3
D	1.09	1.28	1.86	0.12	100	2	14.1	460	1.8%	2.7	2.8	16.9	2.67	3.34	5.61	3	4
E	0.58	0.68	0.98	0.12	100	2	14.1	275	1.9%	2.4	1.9	15.9	2.74	3.43	5.76	2	6
F	0.58	0.68	0.98	0.12	100	2	14.1	400	1.9%	2.4	2.7	16.8	2.68	3.35	5.63	2	6
G	0.80	0.94	1.36	0.12	100	2	14.1	500	1.9%	2.4	3.4	17.5	2.63	3.29	5.53	2	3
H	0.20	0.23	0.32	0.12	50	1	10.0	175	1.9%	2.4	1.2	11.1	0.37	3.97	6.06	0.8	8.9
I	0.58	0.68	0.98	0.12	100	2	14.1	400	1.9%	2.4	2.7	16.8	2.68	3.35	5.63	2	6
J	0.50	0.53	0.63	0.12	50	1	10.0	300	1.9%	2.4	2.4	12.3	3.05	3.81	6.40	1.5	2
K	0.80	0.89	1.42	0.12	100	2	14.1	350	2.0%	3.2	1.8	15.9	2.74	3.43	5.77	2	3
L	0.18	0.20	0.25	0.12	50	1	10.0	160	2.0%	3.2	0.8	10.8	3.21	4.02	6.74	0.6	8.8
M	0.90	1.05	1.53	0.12	100	2	14.1	325	2.0%	3.4	1.6	15.7	2.76	3.46	5.80	2	4
N	0.35	0.41	0.60	0.12	100	2	14.1	300	2.0%	3.4	1.5	15.5	2.77	3.47	5.82	1.0	14.3
O	0.34	0.39	0.54	0.12	50	1	10.0	300	1.9%	2.4	2.4	13.2	3.05	3.81	6.40	1	3
P	0.74	0.86	1.25	0.12	100	2	14.1	200	1.9%	2.4	1.4	15.4	2.78	3.48	5.84	2	3
Q	0.26	0.30	0.42	0.12	50	1	10.0	200	1.9%	2.4	1.4	11.3	3.15	3.94	6.02	0.8	12.8
R	1.60	1.76	2.30	0.12	100	2	14.1	800	2.0%	3.0	3.3	17.4	2.64	3.30	5.54	1	6
S	0.64	0.75	1.09	0.12	100	2	14.1	350	2.3%	3.0	1.9	16.0	2.74	3.42	5.75	2	3
T	0.80	0.89	1.42	0.12	100	2	14.1	675	2.0%	3.4	4.6	18.7	2.55	3.19	5.36	2	3
U	0.84	0.88	1.03	0.12	50	1	10.0	675	2.0%	3.4	4.6	14.5	2.66	3.57	5.99	2	3
V	0.28	0.34	0.55	0.12	100	2	14.1	300	1.9%	2.4	2.0	15.1	2.73	3.41	5.73	1	12
W	0.80	0.90	1.18	0.12	100	2	14.1	300	2.0%	3.4	2.0	12.0	3.08	3.86	6.47	2	3
X	4.41	4.60	6.88	0.12	40	1	12.0	7.8	3.00	2.8	1.8	8.6	3.35	4.20	7.05	15	20
Y	0.24	0.58	1.87	0.12	100	1	17.7	500	1.0%	2.0	4.2	21.9	2.38	2.96	4.96	0.6	17.3
Z	0.77	0.41	1.33	0.12	65	1	5.2	700	1.0%	0.7	16.7	21.9	2.38	2.96	4.96	0.4	12.6
AA	0.10	0.13	0.25	0.12	100	5.5	16.1				10.1	3.29	4.12	6.91	0.3	8.5	
BB	0.15	0.21	0.47	0.12	100	8	8.9				8.9	3.43	4.33	7.22	0.5	6.9	
CC	0.29	0.40	0.76	0.12	100	2.5	13.1	125	2.3%	1.6	1.3	14.8	2.68	3.58	6.01	0.8	14.6
DD	0.48	0.66	1.28	0.12	100	2.5	13.1	150	2.0%	1.4	1.8	14.8	2.62	3.54	5.94	1.3	2
EE	0.87	1.20	2.33	0.12	100	2.5	13.1	150	2.0%	1.4	1.8	14.8	2.62	3.54	5.94	2.5	14
FF	0.23	0.32	0.62	0.12	65	2	9.8	125	2.0%	1.4	1.5	11.3	3.15	3.94	6.02	0.7	12.4
OS1	1.69	1.76	2.02	0.08	40	0.8	9.3	200	3.2%	2.5	2.6	14.0	2.89	3.62	6.08	5	6
OS2	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	5.35	1.0	13
OS3	1.18	1.39	2.02	0.08	100	2	14.7	800	1.8%	2.7	5.6	20.2	2.46	3.07	5.16	3	4
OS4	0.51	0.68	0.87	0.12	40	0.8	9.9	800	2.9%	3.2	4.7	13.6	2.93	3.66	5.15	1	5
OS5	1.06	1.24	1.80	0.12	100	2	14.1	300	1.9%	2.4	2.0	15.1	2.73	3.41	5.73	3	4
OS6	0.08	0.11	0.21	0.12	100	2	14.1	50	1.9%	2.4	0.3	14.4	2.86	3.58	6.01	0.2	6.4
B1	1.01	1.06	1.29	0.12	10	0.3	3.9	1100	2.4%	3.1	5.9	8.8	3.32	4.16	6.98	3	4
B3	0.80	0.88	1.10	0.12	40	1.2	7.8	600	2.4%	3.1	4.1	11.9	3.09	3.87	6.50	3	7
B4	0.80	0.89	0.92	0.12	30	0.9	6.7	500	1.9%	2.4	3.1	9.8	3.32	4.16	6.98	3	2
B5	0.48	0.51	0.65	0.12	30	0.9	6.7	500	1.9%	2.4	3.1	9.8	3.32	4.11	6.90	2	4
B6	0.55	0.59	0.73	0.12	30	0.8	6.7	500	1.9%	2.4	3.4	15.1	3.28	4.11	6.90	2	3
B7	0.71	0.78	1.05	0.12	30	0.5	9.7	500	1.9%	2.4	3.4	15.1	3.29	3.72	6.25	3	7
B8	0.61	0.65	0.84	0.12	30	0.9	6.7	575	1.9%	2.4	3.9	10.7	3.22	4.03	6.77	2	6
B9	0.90	0.88	1.32	0.12	40	1.2	7.8	750	2.4%	3.4	5.1	12.9	3.29	3.75	6.29	3	4
B10	0.99	1.08	1.46	0.12	30	0.9	6.7	600	1.9%	2.4	4.1	10.8	3.20	4.01	6.73	3	4



- 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
 - DESIGN POINT
 - PIPE RUN
 - FILING NO. 3 BOUNDARY



48 HOURS BEFORE YOU DIG,
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NO.	REVISION	DATE
1	REVISED PER COUNTY COMMENTS	10/23/25
2	REVISED PER COUNTY COMMENTS	1/9/26

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

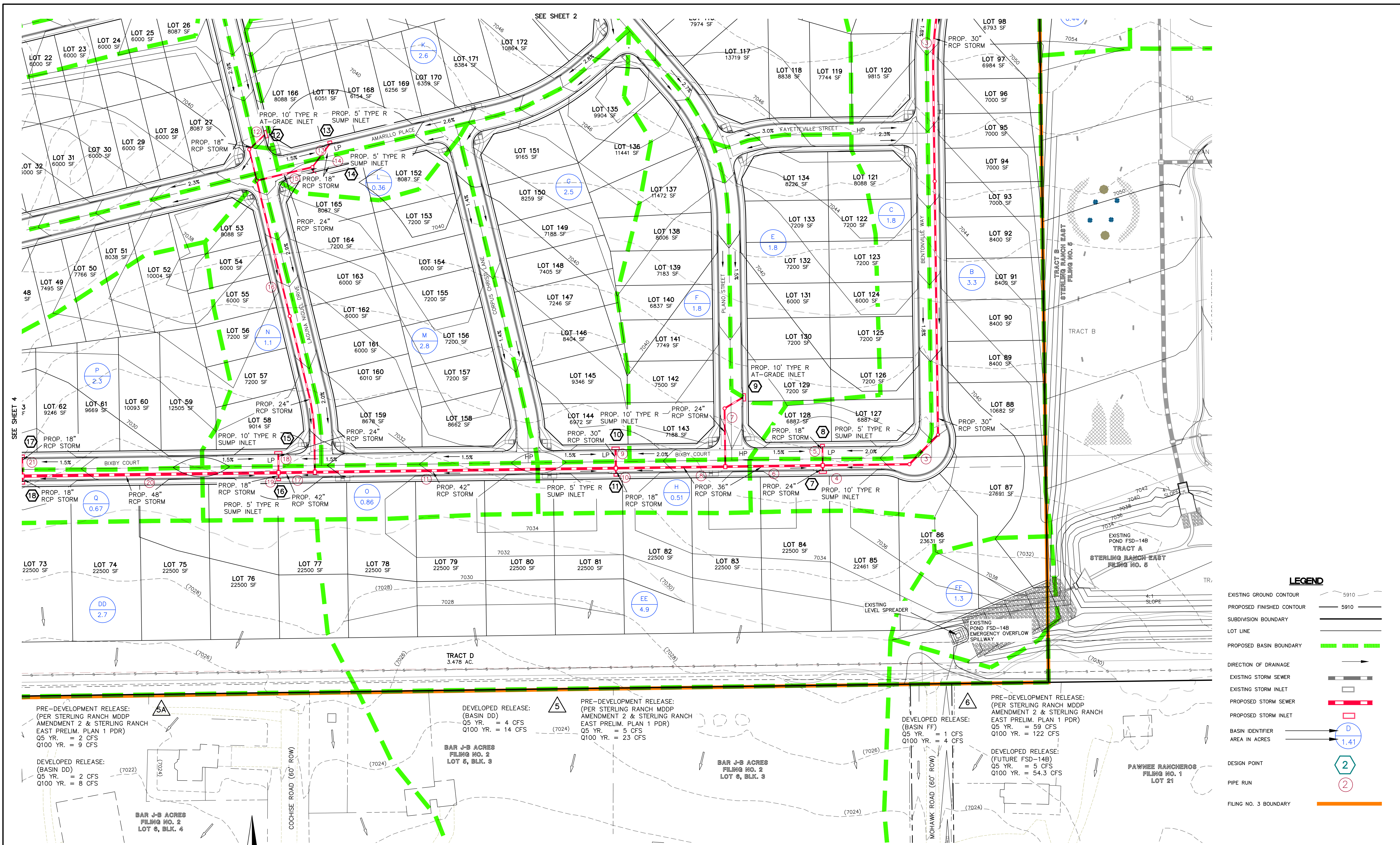


619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903

(719) 785-0790
(719) 785-0799 (Fax)

STERLING RANCH EAST FILING NO. 3			
FINAL DRAINAGE REPORT DEVELOPED DRAINAGE MAP			
DESIGNED BY	MAW	SCALE	DATE 6/1/23
DRAWN BY	MAW	(H) 1"= 60'	SHEET 2 OF 5
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.33





PRE-DEVELOPMENT RELEASE:
(PER STERLING RANCH MDDP
AMENDMENT 2 & STERLING RANCH
EAST PRELIM. PLAN 1 PDR)
Q5 YR. = 2 CFS
Q100 YR. = 9 CFS

DEVELOPED RELEASE:
(BASIN DD)
Q5 YR. = 2 CFS
Q100 YR. = 8 CFS

DEVELOPED RELEASE:
(BASIN DD)
Q5 YR. = 4 CFS
Q100 YR. = 14 CFS

BAR J-B ACRES
FILING NO. 2
LOT 6, BLK. 3

PRE-DEVELOPMENT RELEASE:
(PER STERLING RANCH MDDP
AMENDMENT 2 & STERLING RANCH
EAST PRELIM. PLAN 1 PDR)
Q5 YR. = 5 CFS
Q100 YR. = 23 CFS

BAR J-B ACRES
FILING NO. 2
LOT 6, BLK. 3

DEVELOPED RELEASE:
(BASIN FF)
Q5 YR. = 1 CFS
Q100 YR. = 4 CFS

DEVELOPED RELEASE:
(FUTURE FSD-14B)
Q5 YR. = 5 CFS
Q100 YR. = 54.3 CFS

PRE-DEVELOPMENT RELEASE:
(PER STERLING RANCH MDDP
AMENDMENT 2 & STERLING RANCH
EAST PRELIM. PLAN 1 PDR)
Q5 YR. = 59 CFS
Q100 YR. = 122 CFS

PAWNEE RANCHEROS
FILING NO. 1
LOT 21

- 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
 - DESIGN POINT
 - PIPE RUN
 - FILING NO. 3 BOUNDARY

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

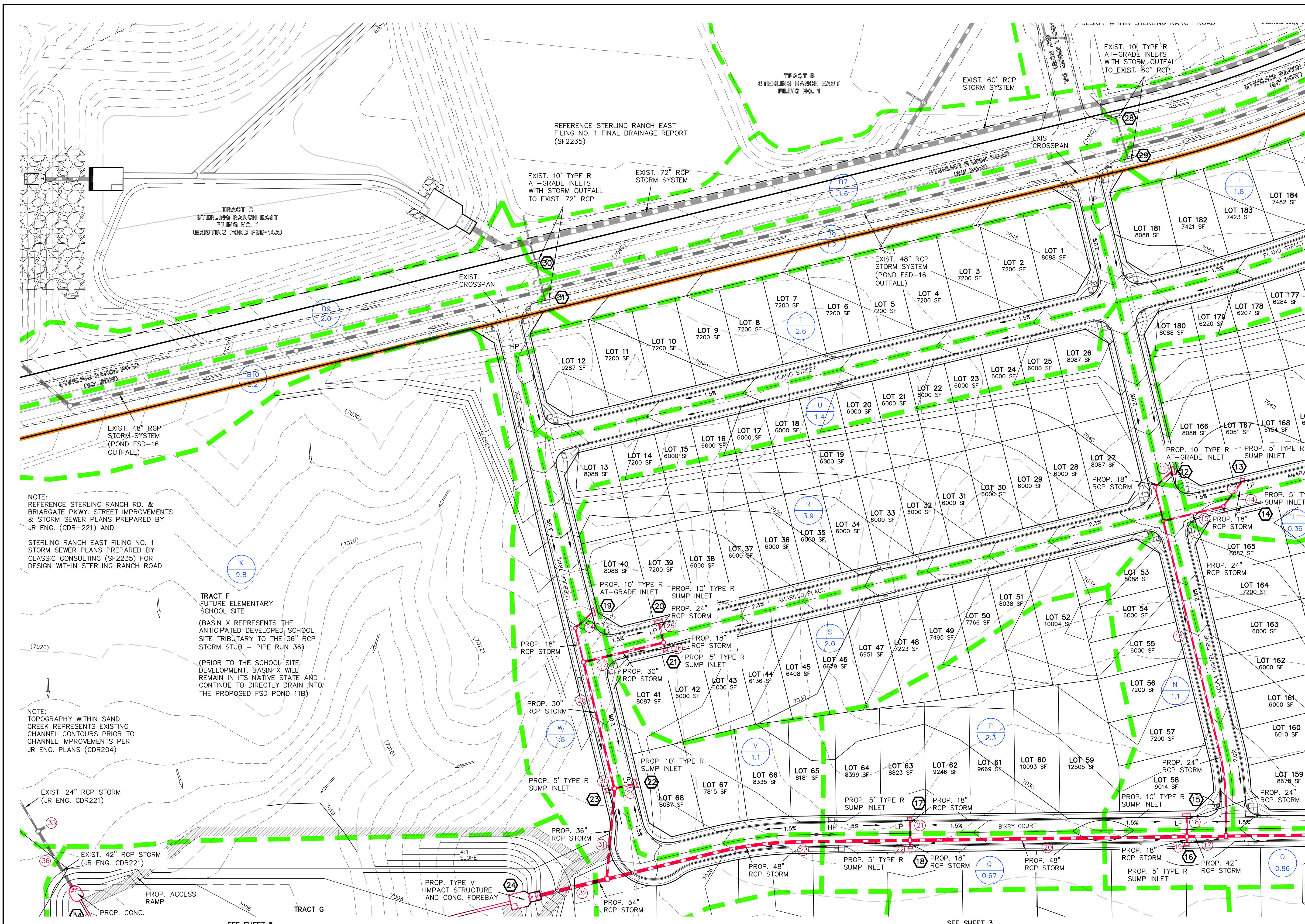
CLASSIC CONSULTING

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

STERLING RANCH EAST FILING NO. 3

FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE	DATE	6/1/23
DRAWN BY	MAW	(H) 1" = 60'	SHEET	3 OF 5
CHECKED BY		(V) 1" = N/A	JOB NO.	1183.33



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

DESIGN POINT

PIPE RUN

FILING NO. 3 BOUNDARY

NOTE:
REFERENCE STERLING RANCH RD. &
BRIARGATE PKWY. STREET IMPROVEMENTS
& STORM SEWER PLANS PREPARED BY
JR ENG. (CDR-221) AND

STERLING RANCH EAST FILING NO. 1
STORM SEWER PLANS PREPARED BY
CLASSIC CONSULTING (SF2235) FOR
DESIGN WITHIN STERLING RANCH ROAD

TRACT F
FUTURE ELEMENTARY
SCHOOL SITE

(BASIN X REPRESENTS THE
ANTICIPATED DEVELOPED SCHOOL
SITE TRIBUTARY TO THE 36" RCP
STORM STUB - PIPE RUN 36)

(PRIOR TO THE SCHOOL SITE
DEVELOPMENT, BASIN X WILL
REMAIN IN ITS NATIVE STATE AND
CONTINUE TO DIRECTLY DRAIN INTO
THE PROPOSED FSD POND 11B)

NOTE:
TOPOGRAPHY WITHIN SAND
CREEK REPRESENTS EXISTING
CHANNEL CONTOURS PRIOR TO
CHANNEL IMPROVEMENTS PER
JR ENG. PLANS (CDR204)

60 30 0 60 120

SCALE: 1" = 60'

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DATE

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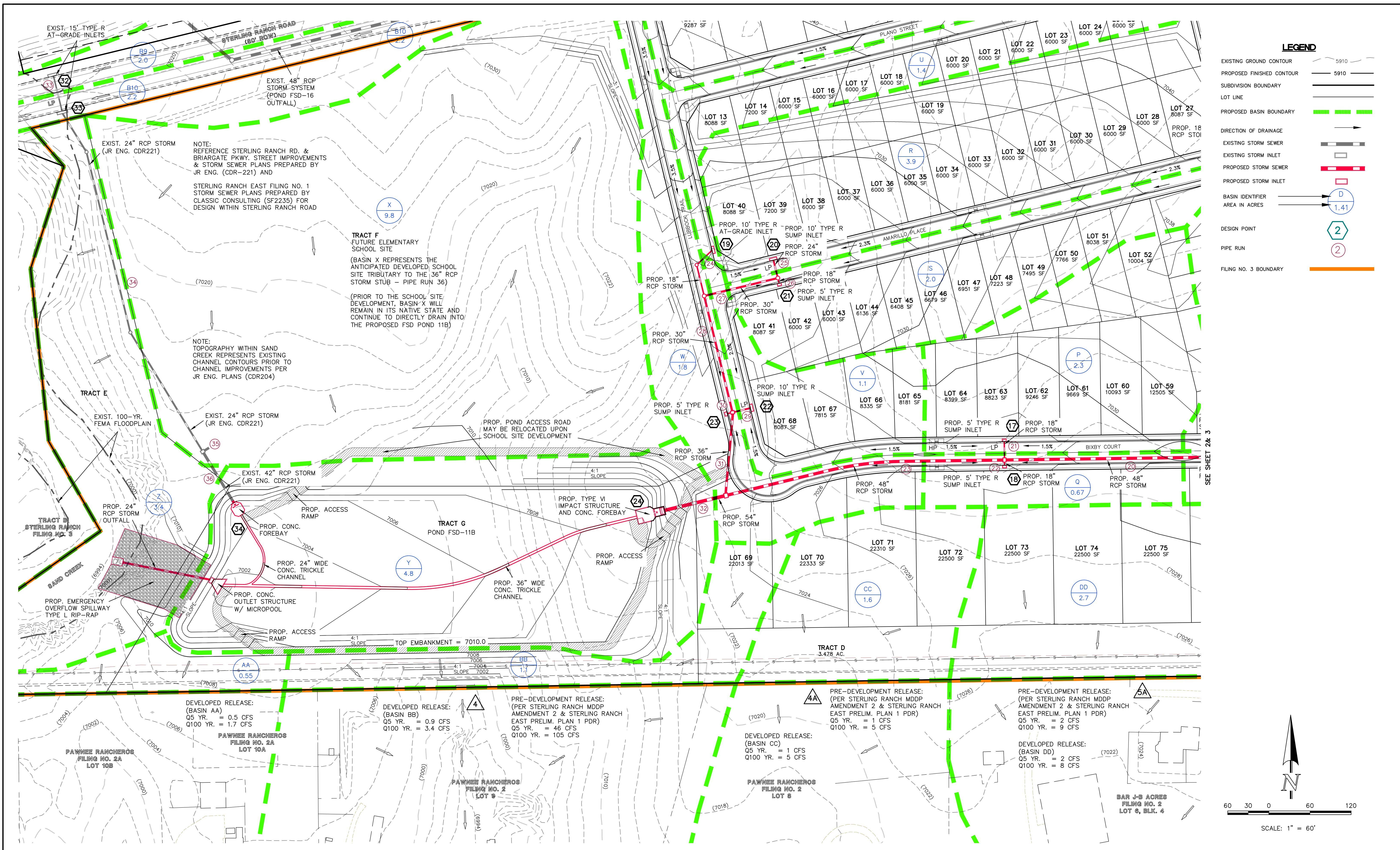
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(719) 785-0799 (Fax)

STERLING RANCH EAST FILING NO. 3

FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE	DATE	6/1/23
DRAWN BY	MAW	(H) 1"= 60'	SHEET	4 OF 5
CHECKED BY	(V) 1"= N/A	JOB NO.	1183.33	

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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

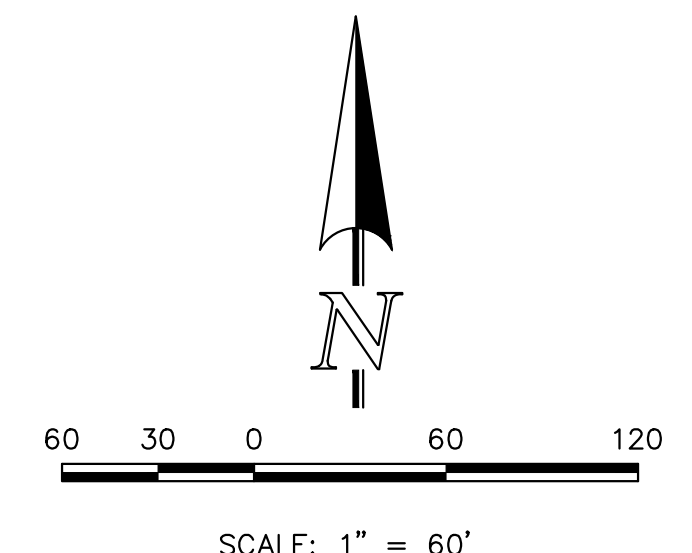
PROPOSED STORM INLET

BASIN IDENTIFIER
AREA IN ACRES

DESIGN POINT

PIPE RUN

FILING NO. 3 BOUNDARY



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DATE

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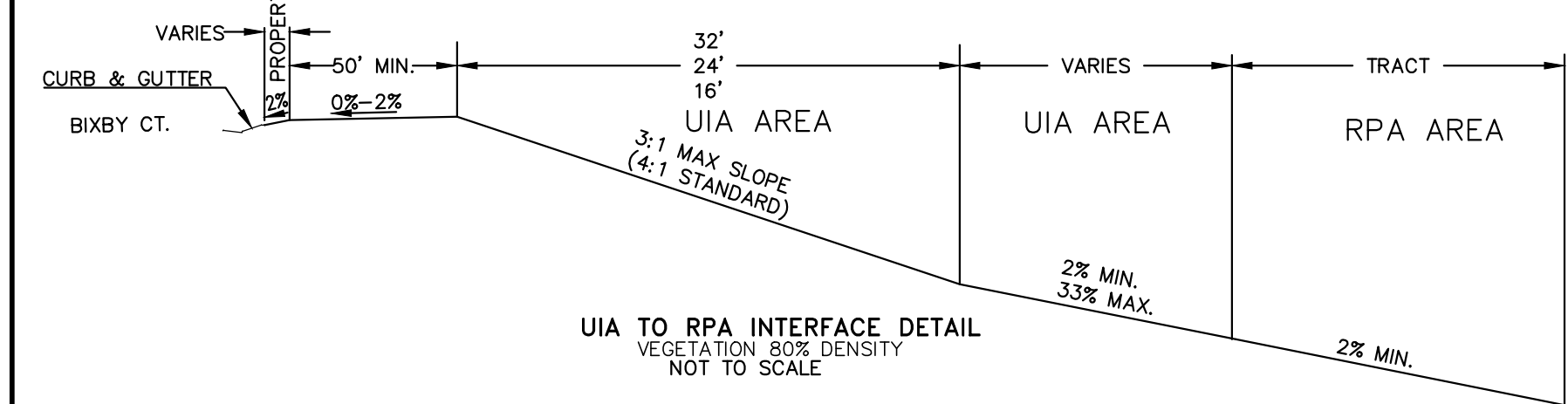
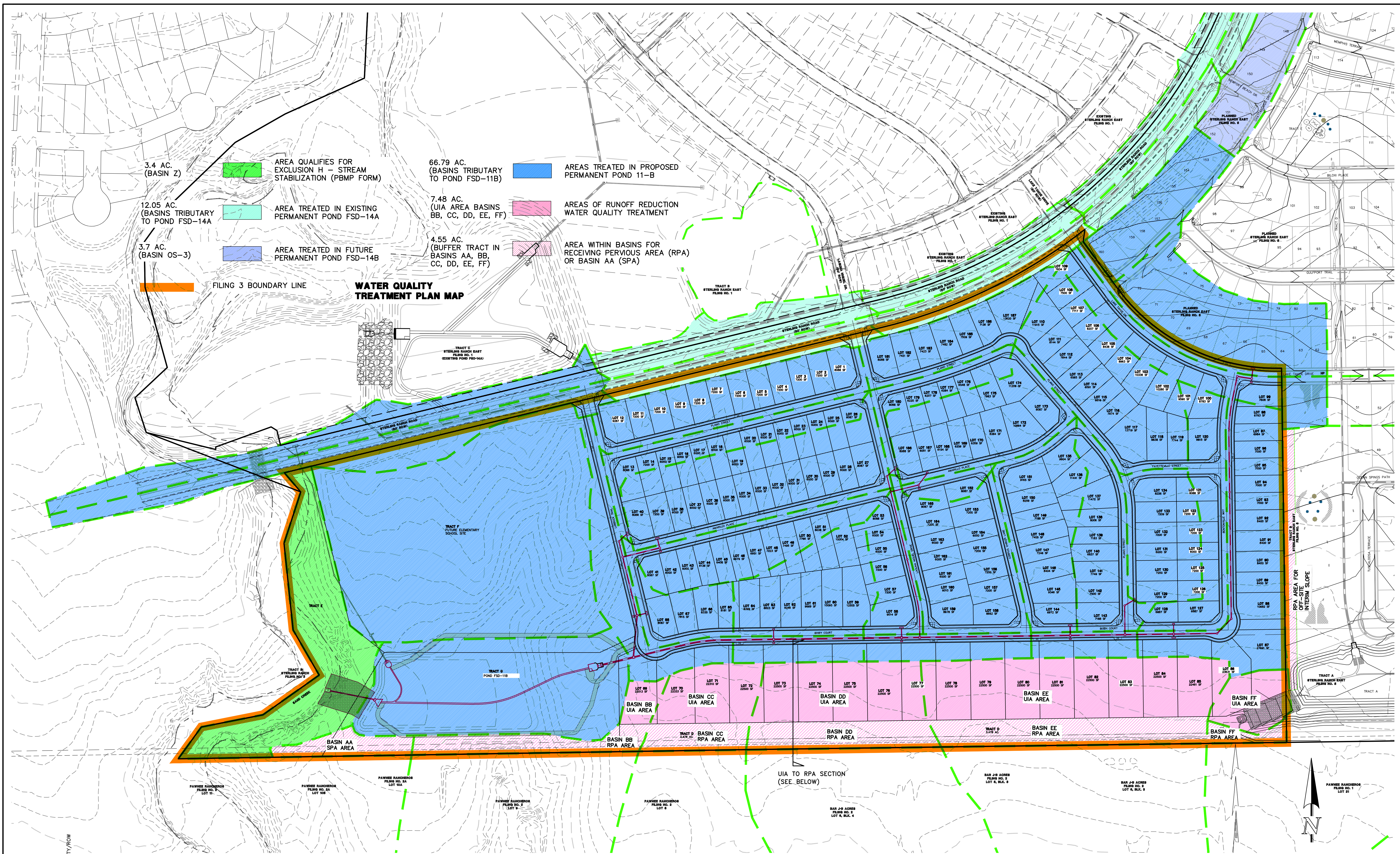
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Colorado Springs, Colorado 80903

(719)785-0790
(719)785-0799(Fax)

STERLING RANCH EAST FILING NO. 3

FINAL DRAINAGE REPORT
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE	DATE	6/1/23
DRAWN BY	MAW	(H) 1"= 60'	SHEET	5 OF 5
CHECKED BY		(V) 1"= N/A	JOB NO.	1183.33



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

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CONSULTING

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Colorado Springs, Colorado 80903

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(719)785-0799(Fax)

STERLING RANCH EAST FILING NO. 3			
FINAL DRAINAGE REPORT STORMWATER QUALITY TREATMENT PLAN MAP			
DESIGNED BY	MAW	SCALE	DATE 6/1/23
DRAWN BY	MAW	(H) 1"= N.T.S.	SHEET 1 OF 1
CHECKED BY	(V) 1"= N/A	JOB NO.	1183.33

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