FINAL DRAINAGE REPORT
FOR
STERLING RANCH EAST FILING NO. 1

November 2022

Prepared for:
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Job no. 2183.30
PCD File # SF2235

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 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.

Kyle R Campbell, Colorado P.E. #29794 Date

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: Classic SRJ Land, LLC

By:

Title:

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

EL PASO COUNTY ONLY:

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.

For County Engineer / ECM Administrator Date

Conditions:

FINAL DRAINAGE REPORT FOR STERLING RANCH EAST FILING NO. 1

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PURPOSE

This document is the Final Drainage Repot for Sterling Ranch East Filing No. 1. The purpose of this report is to identify onsite and offsite drainage patterns, define areas tributary to the proposed full spectrum detention and water quality facility (Pond 14A), and to safely route developed storm water runoff via a proposed storm sewer system. The proposed Sterling Ranch East Filing No. 1 development shall be in adherence to the El Paso County approved Master Development Drainage Plan and MDDP Amendment for Sterling Ranch as well as current County Drainage Criteria.

PROJECT DESCRIPTION

The Sterling Ranch East Filing No. 1 development is 161.52 acres of the 321.37 total acres of Sterling Ranch East, a phased master planned community located in northern El Paso County, Colorado. The Filing 1 limits contains the adjacent Sand Creek Reach SC-8 channel improvements, Tract A – 28.52 acres to the west of the proposed home lots. Filing 1 also contains a large neighborhood park and further open space along the adjacent channel – Tract B, 27.43 acres. Tract J is 38.55 acres of a future school site, located northeast of the proposed single-family home lots. Tract C is 5.86 acres of the proposed detention and water quality facility, Pond 14A. The remaining 61.16 acres of Filing 1 consists of interior open space tracts, public residential roadways, and 294 single family home lots. The property lies to the east of the aforementioned Sand Creek Reach SC-8 and the existing subdivisions Branding Iron @ Sterling Ranch No. 2 and Homestead at Sterling Ranch Filings 1 & 2. A future D20 school site is located directly northeast of the Filing boundary and southwest of the intersection of Briargate Parkway and Sterling Ranch Road. North of the Filing 1 boundary is future Briargate Parkway and to the east and south is future Sterling Ranch Road. Beyond these future roadways is unplatted and future Sterling Ranch subdivisions. The site is in the upper portion of both the Sand Creek and Sand Creek East Fork Drainage Basins. Sterling Ranch East Filing No. 1 is located in portions of Sections 28 & 33, Township 12 South, Range 65 West of the Sixth Principal Meridian.

PREVIOUS REPORTS

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

1. "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1," by Classic Consulting Engineers & Surveyors, LLC approval pending.
2. "Master Development Drainage Plan Amendment for Sterling Ranch," by JR Engineering, LLC, dated September 2022.
3. "2018 Sterling Ranch MDDP," by M&S Civil Consultants, Inc. June 2018.
4. "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan," by JR Engineering, LLC dated September 2022.
5. "Final Drainage Report for Sand Creek Restoration," by JR Engineering, LLC, dated September 2022.

SOILS AND GEOLOGY

The soils within the Sterling Ranch East Filing No. 1 site and tributary area are Hydrologic Soil Group A, Blakeland loamy sand and Columbine gravelly sandy loam (See Appendix for Soil Map). Per the El Paso County DCM, Chapter 6, Section 4.3, to recognize that soils within a development project are usually disturbed and covered with top soil, sod or landscaping and irrigated, Type A soils must be represented as Type B soils for post development runoff coefficients. Therefore, Type B soils are used in the developed runoff calculations and sizing the proposed storm sewer infrastructure, however Type A soils are used in the MHFD-Detention and full spectrum detention/water quality facility (Pond 14A).

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the DCM as revised in May 2014. Full Spectrum Detention and Stormwater quality analysis, Extended Detention Basin (EDB) design, are per the Mile High Flood District Manual and MHFD-Detention version 4.06 and UD-BMP version 3.07 spreadsheet. The Rational Method was used to estimate stormwater runoff from the developed project and tributary to the proposed full spectrum detention/water quality pond. The UDFCD UD-Inlet excel workbook was used to verify street capacities, size sump inlets, and calculate interception and flow-by rates of at-grade inlets. The UD-Sewer computer program was used to calculate the hydraulic grade line (HGL) within the storm sewer system. An overall tributary area exhibit is included to show the various types of pervious and impervious areas established to determine the overall imperviousness of the 156.85 acres tributary to the proposed full spectrum detention/water quality facility (Pond 14A).

FLOODPLAIN STATEMENT

Portions of the Sterling Ranch East Filing No. 1 are located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Numbers 08041C 0535G, effective date, December 7, 2018 and a LOMR 08-08-0541P with an effective date of July 23, 2009 (See Appendix). The portion within the floodplain is entirely within Tract A – Sand Creek Reach SC-8 channel improvements and not within the park/open space (Tract B) or the development area of Filing No. 1. The adjacent channel improvements within the floodplain are detailed within the "Final Drainage Report for Sand Creek Restoration," by JR Engineering, LLC, dated September 2022 and appropriate permitting will be completed with the channel construction.

EXISTING DRAINAGE CONDITIONS

The "Sterling Ranch MDDP Amendment No. 2 & Preliminary Drainage Report for Sterling Ranch East Preliminary Plan No. 1," by Classic Consulting Engineers & Surveyors, LLC is currently under review and approval process with El Paso County Development Services and in full detail describes the Existing Conditions of the proposed development area. Please see this report for the full descriptions. The Pre-Developed (Existing) Conditions Maps are included in the Appendix of this Report and include the Sterling Ranch East Filing No. 1 boundary and adjacent existing floodplain limits.

The proposed site is located within Basins EX-4A, EX-7, and EX-9 of the Preliminary Drainage Report study and drains north to south, including the Sand Creek Channel (Reach SC-8). The site has been previously disturbed with mass grading operations and vegetation is sparse and of natural grassland consistency (no trees or shrubs). See previous reports for additional details on the Existing Conditions.

The adjacent Briargate Parkway and Sterling Ranch Road drainage and roadway design was completed by JR Engineering, "Drainage Letter for Sterling Ranch Road and Briargate Parkway Interim Plan," May 2022. These roadways and storm system will be constructed prior to and in conjunction with the proposed Filing No. 1 development. Therefore, the storm system described within this JR Engineering Letter and Construction Drawings is shown as 'Existing' with proposed storm sewer extensions into the storm system for Sterling Ranch East Filing No. 1. Re-routing of the runoff and storm system within Briargate Parkway is necessary as final design prohibited the storm pipe from getting into the northly Pond FSD-16, north of Briargate Parkway, and must drain south into the proposed Pond 14A. The following Proposed Drainage Conditions section describes these basins and 'existing' storm system in detail.

PROPOSED DRAINAGE CONDITIONS

Developed runoff from Sterling Ranch East Filing No. 1 will be collected in a public (within County R.O.W.) and private (within Private Tracts) storm system and piped into the Privately owned and maintained full spectrum detention/water quality facility (Pond 14A) that will detain and treat the developed runoff prior to releasing at or below historic rates to the downstream channel (Sand Creek Reach SC-8). As previously mentioned, the rational method was used to estimate developed runoff values. All storm sewer inlets and pipes collecting runoff within the County right-of-way will be 'Public'. All storm sewer outside of right-of-way, including the pond outfall pipe, is 'Private' as is the proposed full spectrum detention facility. Private facilities will be owned and maintained by the Sterling Ranch Metropolitan District #3. HGL grade line calculations are included in the Appendix in support of the construction drawings for the proposed Public and Private storm systems.

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

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

At-grade inlets and sump (low-points) were designed in a way that street capacity is not an issue anywhere within the proposed Filing or surrounding and future roadways. Homes near sump inlets shall be constructed at least 1 foot above the 100-year water surface ponding elevation. Street capacity has also been verified at each design point by using the UD-Inlet Excel workbook (located in Appendix) from Urban Drainage Flood Control District (UDFCD). Inlet sizing is also per the UD-Inlet Excel workbook. Drainage from individual lots shall travel in side-lot swales to the street. One Site-Level Low Impact Development form (IRF form) is included in the Appendix of this report, for the basins that discharge to the proposed full spectrum detention and water quality Pond 14A. A detailed description of the developed flows for Sterling Ranch East Filing No. 1 is as follows:

DESIGN POINT 1 (Q_5 = 10.2 cfs and Q_{100} = 20.3 cfs) is the developed runoff from Basin P1-A1, 4.45 acres of existing Briargate Parkway located north of the Filing 1 boundary and starting at the Vollmer Road/Briargate Pkwy. intersection. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 20' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 10.2 cfs, Q_{100} = 16.9 cfs) while the remaining runoff (Q_5 = 0 cfs, Q_{100} = 3.4 cfs) continues east along Briargate Parkway to the at-grade inlet at Design Point 3. Pipe 2 (Existing Public 30" RCP, Q_5 = 23.4 cfs and Q_{100} = 36.6 cfs) conveys this intercepted runoff, and that from Pipe 1 (intercepted DP-2 runoff), to the east within Briargate Parkway toward Design Points 3 & 4.

DESIGN POINT 2 (Q_5 = 14.4 cfs and Q_{100} = 29.1 cfs) is the developed runoff from Basin P1-A2, 6.59 acres of existing Briargate Parkway located north of the Filing 1 boundary and starting at the Vollmer Road/Briargate Pkwy. intersection and the adjacent tributary landscaped area to Briargate Parkway. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 20' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 13.2 cfs, Q_{100} = 19.7 cfs) while the remaining runoff (Q_5 = 1.2 cfs, Q_{100} = 9.4 cfs) continues east along Briargate Parkway to the at-grade inlet at Design Point 4. Pipe 1 (Existing Public 30" RCP, Q_5 = 13.2 cfs and Q_{100} = 19.7 cfs) conveys this intercepted runoff to the south into the existing inlet at Design Point 1.

DESIGN POINT 3 (Q_5 = 5.2 cfs and Q_{100} = 14.7 cfs) is the developed runoff from Basin P1-A4, 1.64 acres of existing Briargate Parkway located north of the Filing 1 boundary and ending at the Sterling Ranch Rd./Briargate Pkwy. intersection, and the flow-by runoff from Design Point 1. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 5.2 cfs, Q_{100} = 11.7 cfs) while the remaining runoff (Q_5 = 0 cfs, Q_{100} = 3.0 cfs) continues east then south onto Sterling Ranch Road and to the at-grade inlet at Design Point 9. Pipe 4 (Existing Public 18" RCP, Q_5 = 5.2 cfs and Q_{100} = 11.7 cfs) conveys this intercepted runoff to the north to a junction manhole with Pipes 2 & 3 within Briargate Parkway.

DESIGN POINT 4 (Q_5 = 5.6 cfs and Q_{100} = 18.1 cfs) is the developed runoff from Basin P1-A3, 1.83 acres of existing Briargate Parkway located north of the Filing 1 boundary and ending at the Sterling Ranch

Rd./Briargate Pkwy. intersection and the adjacent tributary landscaped area to Briargate Parkway. This design point also contains the flow-by from Design Point 2. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15’ CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 5.6 cfs, Q_{100} = 13.1 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 5.0 cfs) continues east along Briargate Parkway, across Sterling Ranch Rd., and to the sump inlet at Design Point 6. Pipe 3 (Proposed Public 24” RCP, Q_5 = 5.6 cfs and Q_{100} = 13.1 cfs) conveys this intercepted runoff to the south to a junction manhole with Pipes 2 & 4. Pipe 3 differentiates from the JR Engineering Drainage Letter and design in that this runoff no longer drains north to the interim 16B pond, but drains into the proposed Filing No. 1 storm system and to the proposed Pond 14A (matching the latest Preliminary Drainage Report for the Preliminary Plan and MDDP Amendment No. 2.). Pipe 5 (Proposed Public 36” RCP, Q_5 = 33.0 cfs and Q_{100} = 58.6 cfs) conveys the existing Briargate Parkway and tributary area runoff (Pipes 2, 3, & 4) to the east and into another junction manhole with Pipe 9 coming from the east.

DESIGN POINT 5 (Q_5 = 7.0 cfs and Q_{100} = 15.7 cfs) is the developed runoff from Basin P1-A7, 3.11 acres of future Briargate Parkway located east of the Sterling Ranch Rd./Briargate Pkwy. intersection. The basin limits are estimated based upon preliminary lot and roadway layouts for the future development to the north and in order to properly size the downstream storm system. A future 15’ CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 7.0 cfs, Q_{100} = 12.1 cfs) while the remaining runoff (Q_5 = 0 cfs, Q_{100} = 3.6 cfs) continues west along future Briargate Parkway to the proposed sump inlet at Design Point 6. Pipe 6 (Future Public 24” RCP, Q_5 = 7.0 cfs and Q_{100} = 12.1 cfs) conveys the intercepted runoff to the west within Briargate Parkway to a junction manhole with Pipes 6 & 7. A future drainage report will be completed at this time of development within this basin that will discuss compliance with this estimation or any differences with final design.

DESIGN POINT 6 (Q_5 = 10.3 cfs and Q_{100} = 31.6 cfs) is the developed runoff from Basin P1-A5, 1.86 acres of future Briargate Parkway located east of the Sterling Ranch Rd./Briargate Pkwy. intersection, and Basin P1-C2, 1.73 acres of future Sterling Ranch Road located north of the intersection. This design point also receives the by-pass (flow-by) runoff from Design Points 4 & 5. A proposed 20’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 7 (Proposed Public 30” RCP) conveys the runoff to the south and into a junction manhole combining with Pipes 6 & 8. The emergency overflow path for this sump inlet is to overtop the crown in the roadway and the southeast curb return of Briargate/Sterling Ranch Rd. intersection and continue south along Sterling Ranch Rd. to downstream facilities. A future drainage report will be completed at this time of development within this basin that will discuss compliance with this estimation or any differences with final design of the adjacent tributary area.

DESIGN POINT 7 (Q_5 = 8.0 cfs and Q_{100} = 17.3 cfs) is the developed runoff from Basin P1-A6, 3.55 acres of future Briargate Parkway located east of the Sterling Ranch Rd./Briargate Pkwy. A proposed 15’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 8 (Proposed Public 24” RCP) conveys the runoff to the north and into a junction manhole combining with Pipes 7 & 8. Pipe 9 (Proposed Public 36” RCP, Q_5 = 23.3 cfs and Q_{100} = 56.0 cfs) conveys the intercepted runoff to the west within Briargate Parkway to a junction manhole with Pipe 5 from the opposite side of the roadway intersection. Pipe 10 (Proposed Public 42” RCP, Q_5 = 52.3 cfs and Q_{100} = 105.0 cfs) then conveys this combined runoff to the south within Sterling Ranch Road and ultimately takes this roadway and tributary area into the proposed Full Spectrum Detention Pond 14A. The emergency overflow path for this sump inlet is to overtop the high point at the southeast curb return of Briargate/Sterling Ranch Rd. intersection and continue south along Sterling Ranch Rd. to downstream facilities. A future drainage report will be completed at this time of development within this basin that will discuss compliance with this estimation or any differences with final design of the adjacent tributary area.

DESIGN POINT 8 (Q_5 = 5.2 cfs and Q_{100} = 10.7 cfs) is the developed runoff from Basin P2-B2, 1.87 acres of existing Sterling Ranch Rd. located south of Briargate Parkway. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 10’ CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 4.8 cfs, Q_{100} = 7.3 cfs) while the remaining runoff (Q_5 = 0.4 cfs, Q_{100} = 3.4 cfs) continues south on Sterling Ranch Road and to the at-grade inlet at Design Point 15. Pipe 11 (Existing Public 18” RCP, Q_5 = 4.8 cfs and Q_{100} = 7.3 cfs) conveys this intercepted runoff to the west to the existing inlet at Design Point 9, on the opposite side of Sterling Ranch Road.

DESIGN POINT 9 (Q_5 = 5.2 cfs and Q_{100} = 13.7 cfs) is the developed runoff from Basin P2-B1, 1.82 acres of existing Sterling Ranch Rd. located south of Briargate Parkway, and the flow-by from the at-grade inlet at Design Point 3. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 10' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 4.8 cfs, Q_{100} = 8.3 cfs) while the remaining runoff (Q_5 = 0.4 cfs, Q_{100} = 5.4 cfs) continues south on Sterling Ranch Road and to the at-grade inlet at Design Point 16. Pipe 12 (Existing Public 18" RCP, Q_5 = 9.6 cfs and Q_{100} = 15.6 cfs) conveys this intercepted runoff and that from existing Pipe 11, to the west into a proposed storm manhole, combining with the proposed 42" RCP storm main (Pipe 10) from the north. Pipe 13 (Proposed Public 48" RCP, Q_5 = 57.2 cfs and Q_{100} = 112.2 cfs) then conveys this combined runoff south, on the outside of the pavement section of Sterling Ranch Rd., to another junction manhole east of Design Point 50. The proposed Public storm main is located within the County Right-of-way, but outside of the pavement section as the existing utilities within Sterling Ranch Road, including an existing 48" RCP Storm Main (Bypass System), does not allow for adequate horizontal separation to each other. A Public Improvement (Storm Sewer) Easement is included on the proposed Plat at 15' from centerline of the storm main into the proposed lots and future school parcel.

DESIGN POINT 10 (Q_5 = 6.0 cfs and Q_{100} = 12.5 cfs) is the developed runoff from Basin X, 2.93 acres of proposed Filing No. 1 home lots and residential roadway Newport Beach Drive. A proposed 15' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 16 (Proposed Public 24" RCP) conveys the runoff to the south and into a junction manhole combining with Pipe 17 from the sump inlet across the road (Newport Beach Drive). The emergency overflow path for this sump inlet is to overtop the crown in the roadway and the southwest curb return of the Newport Beach/Palo Alto intersection and continue south along Palo Alto Trail to downstream facilities.

DESIGN POINT 11 (Q_5 = 4.2 cfs and Q_{100} = 8.5 cfs) is the developed runoff from Basin Y, 1.67 acres of proposed Filing No. 1 home lots and residential roadway Newport Beach Drive. A proposed 10' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 17 (Proposed Public 18" RCP) conveys the runoff to the north and into a junction manhole combining with Pipe 16 from the sump inlet across the road (Newport Beach Drive). Pipe 18 (Proposed Public 24" RCP, Q_5 = 9.7 cfs and Q_{100} = 20.0 cfs) conveys this combined runoff east then south within Palo Alto Trail to the next set of sump inlets at DP 13 & 14. The emergency overflow path for this sump inlet is to overtop the southwest curb return of the Newport Beach/Palo Alto intersection and continue south along Palo Alto Trail to downstream facilities.

DESIGN POINT 12 (Q_5 = 6.4 cfs and Q_{100} = 13.4 cfs) is the developed runoff from Basin Z, 3.22 acres of proposed Filing No. 1 home lots and residential roadway, Long Beach Terrace. A proposed 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 6.4 cfs, Q_{100} = 11.1 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 2.3 cfs) continues east onto Palo Alto Trail and to the sump inlet at Design Point 13. Pipe 23 (Proposed Public 18" RCP, Q_5 = 6.4 cfs and Q_{100} = 11.1 cfs) conveys this intercepted runoff to the east within Long Beach Terrace and to a junction manhole with Pipe 18, main within Palo Alto Trail. Pipe 19 (Proposed Public 30" RCP, Q_5 = 15.7 cfs and Q_{100} = 30.4 cfs) conveys this combined runoff south, within Palo Alto Trail, to another junction manhole between Design Points 13 & 14.

DESIGN POINT 13 (Q_5 = 6.1 cfs and Q_{100} = 14.7 cfs) is the developed runoff from Basin FF, 2.84 acres of proposed Filing No. 1 home lots and residential roadway Long Beach Terrace and the flow-by runoff from the at-grade inlet at DP-12. A proposed 15' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 24 (Proposed Public 24" RCP) conveys the runoff to the south and into an adjacent junction manhole combining with Pipes 19 & 25. The emergency overflow path for this sump inlet is to overtop the high point to the south within Palo Alto Trail and continue south along the roadway to downstream facilities.

DESIGN POINT 14 (Q_5 = 3.7 cfs and Q_{100} = 7.5 cfs) is the developed runoff from Basin AA, 1.66 acres of proposed Filing No. 1 home lots and residential roadway Palo Alto Drive. A proposed 10' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 25 (Proposed Public 18" RCP) conveys the runoff to the north and into an adjacent junction manhole combining with Pipes 19 & 24. Pipe 26 (Proposed Public 36" RCP, Q_5 = 25.2 cfs and Q_{100} = 52.0 cfs) conveys the combined runoff from this manhole to the southwest within Palo Alto Trail to another set of inlets/manholes at the next intersection. The emergency overflow path for this sump inlet is to overtop the high point to the south within Palo Alto Trail and continue south along the roadway to downstream facilities.

DESIGN POINT 15 (Q_5 = 4.8 cfs and Q_{100} = 12.6 cfs) is the developed runoff from Basin P2-B4, 1.64 acres of existing Sterling Ranch Rd. located south of Briargate Parkway, and the flow-by runoff from the existing at-grade inlet at DP-8. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 4.8 cfs, Q_{100} = 10.7 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 1.9 cfs) continues southwest on Sterling Ranch Road and to the at-grade inlet at Design Point 23. Pipe 20 (Existing Public 18" RCP, Q_5 = 4.8 cfs and Q_{100} = 10.7 cfs) conveys this intercepted runoff to the north to the existing inlet at Design Point 16, on the opposite side of Sterling Ranch Road.

DESIGN POINT 16 (Q_5 = 4.7 cfs and Q_{100} = 14.3 cfs) is the developed runoff from Basin P2-B3, 1.55 acres of existing Sterling Ranch Rd. located south of Briargate Parkway, and the flow-by from the at-grade inlet at Design Point 9. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 4.7 cfs, Q_{100} = 11.5 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 2.8 cfs) continues southwest on Sterling Ranch Road and to the at-grade inlet at Design Point 24. Pipe 21 (Existing Public 18" RCP, Q_5 = 9.5 cfs and Q_{100} = 22.2 cfs) conveys this intercepted runoff and that from existing Pipe 20, to the west into a proposed storm manhole, combining with the proposed 60" RCP storm main (Pipe 15) from the north. Pipe 22 (Proposed Public 60" RCP, Q_5 = 112.8 cfs and Q_{100} = 247.8 cfs) then conveys this combined runoff southwest, on the outside of the pavement section of Sterling Ranch Rd., to another junction manhole north of Design Point 24. The proposed Public storm main is located within the County Right-of-way, but outside of the pavement section as the existing utilities within Sterling Ranch Road, including an existing 48" RCP Storm Main (Bypass System), does not allow for adequate horizontal separation to each other. A Public Improvement (Storm Sewer) Easement is included on the proposed Plat at 15' from centerline of the storm main into the proposed lots and future school parcel.

DESIGN POINT 17 (Q_5 = 6.2 cfs and Q_{100} = 13.0 cfs) is the developed runoff from Basin BB, 3.13 acres of proposed Filing No. 1 home lots and residential roadway, San Diego Way. A proposed 10' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 5.4 cfs, Q_{100} = 8.1 cfs) while the remaining runoff (Q_5 = 0.8 cfs, Q_{100} = 4.9 cfs) continues southeast onto Palo Alto Trail and to the sump inlet at Design Point 18. Pipe 28 (Proposed Public 18" RCP, Q_5 = 5.4 cfs and Q_{100} = 8.1 cfs) conveys this intercepted runoff to the south within San Diego Way and to a junction manhole with Pipe 26, main within Palo Alto Trail. Pipe 27 (Proposed Public 36" RCP, Q_5 = 29.9 cfs and Q_{100} = 58.8 cfs) conveys this combined runoff west, within Palo Alto Trail, to another junction manhole between Design Points 18 & 19.

DESIGN POINT 18 (Q_5 = 5.6 cfs and Q_{100} = 14.5 cfs) is the developed runoff from Basin GG, 2.14 acres of proposed Filing No. 1 home lots and residential roadway San Diego Way and the flow-by runoff from the at-grade inlet at DP-17. A proposed 15' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 29 (Proposed Public 24" RCP) conveys the runoff to the south and into an adjacent junction manhole combining with Pipes 27 & 30. The emergency overflow path for this sump inlet is to overtop the high point to the west within Palo Alto Trail and continue west along the roadway to downstream facilities.

DESIGN POINT 19 (Q_5 = 3.5 cfs and Q_{100} = 7.1 cfs) is the developed runoff from Basin CC, 1.50 acres of proposed Filing No. 1 home lots and residential roadway Palo Alto Trail. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 30 (Proposed Public 18" RCP) conveys the runoff to the north and into an adjacent junction manhole combining with Pipes 27 & 29. Pipe 31 (Proposed Public 42" RCP, Q_5 = 38.6 cfs and Q_{100} = 79.4 cfs) conveys the combined runoff from this manhole to the west within Palo Alto Trail to another set of inlets/manholes at the next intersection. The emergency overflow path for this sump inlet is to overtop the high point to the west within Palo Alto Trail and continue west along the roadway to downstream facilities.

DESIGN POINT 20 (Q_5 = 6.2 cfs and Q_{100} = 13.2 cfs) is the developed runoff from Basin DD, 3.19 acres of proposed Filing No. 1 home lots and residential roadway, Westmont Drive. A proposed 10' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 5.4 cfs, Q_{100} = 8.1 cfs) while the remaining runoff (Q_5 = 0.8 cfs, Q_{100} = 5.1 cfs) continues south along Westmont Drive, across Palo Alto Trail and to the sump inlet at Design Point 21. Pipe 32 (Proposed Public 18" RCP, Q_5 = 5.4 cfs and Q_{100} = 8.1 cfs) conveys this intercepted runoff to the south within Westmont Drive to a junction manhole with Pipes 31 & 33.

DESIGN POINT 21 (Q_5 = 3.8 cfs and Q_{100} = 11.2 cfs) is the developed runoff from Basin HH, 1.33 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive and the flow-by runoff from the at-grade inlet at DP-20. A proposed 10’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 34 (Proposed Public 24” RCP) conveys the runoff to the west to an adjacent junction manhole combining with Pipe 35 from Design Point 22. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south onto Sterling Ranch Road and to downstream facilities.

DESIGN POINT 22 (Q_5 = 2.4 cfs and Q_{100} = 4.9 cfs) is the developed runoff from Basin EE, 0.92 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive. A proposed 5’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 35 (Proposed Public 18” RCP) conveys the runoff to the east to an adjacent junction manhole combining with Pipe 34. Pipe 33 (Proposed Public 24” RCP, Q_5 = 6.0 cfs and Q_{100} = 15.6 cfs) conveys the combined runoff from this manhole to the north within Westmont Drive to another junction manhole at the intersection of Westmont and Palo Alto. At this junction, Pipes 31, 32, & 33 converge at Pipe 36A (Proposed Public 48” RCP, Q_5 = 48.6 cfs and Q_{100} = 100.4 cfs) conveying the combined runoff to the southwest into Tract B and continuing toward Pond 14A. The emergency overflow for this low point is to overtop the high point to the south within Westmont Drive and continue south onto Sterling Ranch Road and to downstream facilities.

DESIGN POINT 23 (Q_5 = 3.1 cfs and Q_{100} = 8.6 cfs) is the developed runoff from Basin P2-B6, 1.07 acres of existing Sterling Ranch Rd. located south of the proposed Filing 1 home lots, and the flow-by runoff from the existing at-grade inlet at DP-15. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15’ CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 3.1 cfs, Q_{100} = 8.3 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 0.3 cfs) continues southwest on Sterling Ranch Road and to the at-grade inlet at Design Point 25. Pipe 37 (Existing Public 18” RCP, Q_5 = 3.1 cfs and Q_{100} = 8.3 cfs) conveys this intercepted runoff to the north to the existing inlet at Design Point 24, on the opposite side of Sterling Ranch Road.

DESIGN POINT 24 (Q_5 = 3.1 cfs and Q_{100} = 9.1 cfs) is the developed runoff from Basin P2-B5, 0.97 acres of existing Sterling Ranch Rd. located south of the proposed Filing No. 1 home lots, and the flow-by from the at-grade inlet at Design Point 16. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 3.1 cfs, Q_{100} = 8.6 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 0.5 cfs) continues southwest on Sterling Ranch Road and to the at-grade inlet at Design Point 26. Pipe 38 (Existing Public 18" RCP, Q_5 = 6.2 cfs and Q_{100} = 16.9 cfs) conveys this intercepted runoff and that from existing Pipe 37, to the west into a proposed storm manhole, combining with the proposed 60" RCP storm main (Pipe 22) from the northeast. Pipe 39A (Proposed Public 60" RCP, Q_5 = 114.9 cfs and Q_{100} = 254.6 cfs) then conveys this combined runoff southwest, on the outside of the pavement section of Sterling Ranch Rd., to another junction manhole to the west, combining with the lot development storm main (Pipe 36B).

DESIGN POINT 25 (Q_5 = 3.7 cfs and Q_{100} = 7.7 cfs) is the developed runoff from Basin P2-B8, 1.21 acres of existing Sterling Ranch Rd. located south of the proposed Filing 1 home lots, and the flow-by runoff from the existing at-grade inlet at DP-23. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 3.7 cfs, Q_{100} = 7.6 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 0.1 cfs) continues southwest on Sterling Ranch Road and to the sump inlet at Design Point 27. Pipe 40 (Existing Public 18" RCP, Q_5 = 3.7 cfs and Q_{100} = 7.6 cfs) conveys this intercepted runoff to the north to the existing inlet at Design Point 26, on the opposite side of Sterling Ranch Road.

DESIGN POINT 26 (Q_5 = 3.8 cfs and Q_{100} = 9.1 cfs) is the developed runoff from Basin P2-B7, 1.62 acres of existing Sterling Ranch Rd. located south of the proposed Filing No. 1 home lots, and the flow-by from the at-grade inlet at Design Point 24. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction and was completed in order to model the interception and pipe runoff rates. An existing 15' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 3.1 cfs, Q_{100} = 8.6 cfs) while the remaining runoff (Q_5 = 0.0 cfs, Q_{100} = 0.5 cfs) continues southwest on Sterling Ranch Road and to the sump inlet at Design Point 28. Pipe 41 (Existing Public 18” RCP, Q_5 = 7.5 cfs and Q_{100} = 16.2 cfs) conveys this intercepted runoff and that from existing Pipe 40, to the west into a proposed storm manhole, combining with the proposed 72” RCP storm main (Pipe 39B) from the east and Pipe 96 from Design Point 59. Pipe 42 (Proposed Public 72” RCP, Q_5 = 166.2 cfs and Q_{100} = 364.8 cfs) then conveys this combined runoff west, directly into the proposed Full Spectrum Detention and Water Quality Facility – Pond 14A (Design Point 60).

DESIGN POINT 27 (Q_5 = 7.5 cfs and Q_{100} = 15.1 cfs) is the developed runoff from Basin P2-B10, 2.31 acres of existing Sterling Ranch Rd. located southeast of the proposed Filing 1 home lots, and the flow-by runoff from the existing at-grade inlet at DP-25. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction, however due to the final elevations of Pond 14A, this design point/basin/pipe run does not drain into Pond 14A and must drain to the south into a separate FSD facility. An existing 15’ CDOT Type R Sump inlet intercepts the entirety of this runoff. Pipe 44 (Existing Public 24” RCP, Q_5 = 14.8 cfs and Q_{100} = 29.7 cfs) conveys this combined runoff from this Design Point and that from Pipe 43 (DP-28) to the south into a separate existing temporary detention and storm water quality facility. This existing separate temporary facility will be detailed and designed by JR Engineering prior to the installation of Sterling Ranch Road. The emergency overflow for this low point is to overtop the adjacent curb and drain south into the adjacent Sand Creek drainage channel.

DESIGN POINT 28 (Q_5 = 7.3 cfs and Q_{100} = 14.6 cfs) is the developed runoff from Basin P2-B9, 2.08 acres of existing Sterling Ranch Rd. located southeast of the proposed Filing 1 home lots, and the flow-by runoff from the existing at-grade inlet at DP-26. This matches the JR Engineering Drainage Letter basins and design point location for Briargate Pkwy./Sterling Ranch Road construction, however due to the final elevations of Pond 14A, this design point/basin/pipe run does not drain into Pond 14A and must drain to the south into a separate FSD facility. An existing 15’ CDOT Type R Sump inlet intercepts the entirety of this runoff. Pipe 43 (Existing Public 24” RCP, Q_5 = 7.3 cfs and Q_{100} = 14.6 cfs) conveys this runoff to the sump inlet across Sterling Ranch Road (Design Point 27). The emergency overflow for this low point is to overtop the roadway crown then the southerly adjacent curb and drain south into the adjacent Sand Creek drainage channel.

DESIGN POINT 29A (Q_5 = 5.9 cfs and Q_{100} = 14.0 cfs) is the developed runoff from Basin A1, 3.78 acres of proposed Filing No. 1 home lots and residential roadway, Pocatello Trail at the north end of the Filing No. 1 home lots. A proposed 10' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 5.2 cfs, Q_{100} = 8.4 cfs) while the remaining runoff (Q_5 = 0.7 cfs, Q_{100} = 5.6 cfs) continues southwest along Pocatello Trail to the sump inlet at Design Point 29B. Pipe 45 (Proposed Public 18" RCP, Q_5 = 5.2 cfs and Q_{100} = 8.4 cfs) conveys this intercepted runoff to the southwest within Pocatello Trail to a junction manhole with Pipe 46 from DP-30A.

DESIGN POINT 29B (Q_5 = 2.1 cfs and Q_{100} = 8.7 cfs) is the developed runoff from Basin A2, 0.72 acres of proposed Filing No. 1 home lots and residential roadway Pocatello Trail and the flow-by runoff from the at-grade inlet at DP-29A. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 48 (Proposed Public 18" RCP) conveys the runoff to the south to an adjacent junction manhole combining with Pipes 47 and 49. The emergency overflow path for this sump inlet is to overtop the high point to the southeast within Pocatello Trail and continue southeast along the roadway to downstream facilities.

DESIGN POINT 30A (Q_5 = 8.3 cfs and Q_{100} = 18.6 cfs) is the developed runoff from Basin B1, 4.72 acres of proposed Filing No. 1 home lots and residential roadway, Pocatello Trail at the north end of the Filing No. 1 home lots. A proposed 10' CDOT Type R At-Grade inlet intercepts the majority of this runoff (Q_5 = 6.4 cfs, Q_{100} = 9.6 cfs) while the remaining runoff (Q_5 = 1.9 cfs, Q_{100} = 9.0 cfs) continues southwest along Pocatello Trail to the sump inlet at Design Point 30B. Pipe 46 (Proposed Public 18" RCP, Q_5 = 6.4 cfs and Q_{100} = 9.6 cfs) conveys this intercepted runoff to the north within Pocatello Trail to a junction manhole with Pipe 45 from DP-29A. Pipe 47 (Proposed Public 24" RCP, Q_5 = 11.6 cfs and Q_{100} = 18.0 cfs) conveys the combined runoff from this manhole to the southwest within Pocatello Trail to another junction manhole between the sump inlets at Design Points 29 & 30B.

DESIGN POINT 30B (Q_5 = 2.4 cfs and Q_{100} = 9.9 cfs) is the developed runoff from Basin B2 (Q_5 = 0.7 cfs, Q_{100} = 1.2 cfs), 0.18 acres of proposed Filing No. 1 home lots and residential roadway Pocatello Trail, and the flow-by from the at-grade inlet at Design Point 30A (Q_5 = 1.9 cfs, Q_{100} = 9.0 cfs). A proposed 10' CDOT

Type R sump inlet intercepts the entirety of this runoff. Pipe 49 (Proposed Public 18” RCP) conveys the runoff to the north to an adjacent junction manhole combining with Pipes 47 & 48. Pipe 50 (Proposed Public 30” RCP, Q_5 = 16.1 cfs and Q_{100} = 36.5 cfs) conveys the combined runoff from this manhole to the southwest within Pocatello Trail toward the next sump inlets at Design Points 37 & 38. The emergency overflow path for this sump inlet is to overtop the high point to the southeast within Pocatello Trail and continue southeast along the roadway to downstream facilities.

DESIGN POINT 31 (Q_5 = 5.1 cfs and Q_{100} = 10.6 cfs) is the developed runoff from Basin L, 2.40 acres of proposed Filing No. 1 home lots and residential roadway Newport Beach Drive. A proposed 10’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 68 (Proposed Public 18” RCP) conveys the runoff to the south to an adjacent junction manhole combining with Pipe 69. The emergency overflow path for this sump inlet is to overtop the roadway crown and then high point at the southwest curb return of the Newport Beach Drive/Santa Clara Place intersection and continue southwest along Santa Clara Place to downstream facilities.

DESIGN POINT 32 (Q_5 = 3.5 cfs and Q_{100} = 7.2 cfs) is the developed runoff from Basin M, 1.40 acres of proposed Filing No. 1 home lots and residential roadway Newport Beach Drive. A proposed 5’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 69 (Proposed Public 18” RCP) conveys the runoff to the north to an adjacent junction manhole combining with Pipe 68. Pipe 70 (Proposed Public 24” RCP, Q_5 = 8.1 cfs and Q_{100} = 16.8 cfs) conveys the combined runoff from this manhole to the southeast within Newport Beach Drive and then south down Santa Clara Place. The emergency overflow path for this sump inlet is to overtop the high point at the southwest curb return of the Newport Beach Drive/Santa Clara Place intersection and continue southwest along Santa Clara Place to downstream facilities.

DESIGN POINT 33 (Q_5 = 5.3 cfs and Q_{100} = 11.0 cfs) is the developed runoff from Basin N, 2.46 acres of proposed Filing No. 1 home lots and residential roadway Long Beach Terrace. A proposed 10’ CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 71 (Proposed Public 18” RCP) conveys the runoff to the southwest to an adjacent junction manhole combining with Pipe 72. The emergency overflow path for this sump inlet is to overtop the roadway crown and then high point at the southwest curb return of the Long Beach Terrace/Santa Clara Place intersection and continue southwest along Santa Clara Place to downstream facilities.

DESIGN POINT 34 (Q_5 = 4.0 cfs and Q_{100} = 8.2 cfs) is the developed runoff from Basin P, 1.59 acres of proposed Filing No. 1 home lots and residential roadway Newport Beach Drive. A proposed 10' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 72 (Proposed Public 18" RCP) conveys the runoff to the north to an adjacent junction manhole combining with Pipe 71. Pipe 73 (Proposed Public 24" RCP, Q_5 = 8.8 cfs and Q_{100} = 18.1 cfs) conveys the combined runoff from this manhole to the southeast within Long Beach Terrace to a junction manhole at Santa Clara Place with Pipe 70. Pipe 74 (Proposed Public 30" RCP, Q_5 = 16.5 cfs and Q_{100} = 34.1 cfs) conveys the combined runoff from this manhole to the southwest within Santa Clara Place to the next set of inlets/manholes at the San Diego Way intersection. The emergency overflow path for this sump inlet is to overtop the high point at the southwest curb return of the Long Beach Terrace/Santa Clara Place intersection and continue southwest along Santa Clara Place to downstream facilities.

DESIGN POINT 35 (Q_5 = 2.8 cfs and Q_{100} = 5.6 cfs) is the developed runoff from Basin R, 1.18 acres of proposed Filing No. 1 home lots and residential roadway San Diego Way. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 77 (Proposed Public 18" RCP) conveys the runoff to the southwest to an adjacent junction manhole combining with Pipes 56 & 78. The emergency overflow path for this sump inlet is to overtop the roadway crown and then high point at the southwest curb return of the San Diego Way/Santa Clara Place intersection and continue southwest along Santa Clara Place to downstream facilities.

DESIGN POINT 36 (Q_5 = 2.2 cfs and Q_{100} = 4.6 cfs) is the developed runoff from Basin S, 1.02 acres of proposed Filing No. 1 home lots and residential roadway San Diego Way. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 78 (Proposed Public 18" RCP) conveys the runoff to the north to an adjacent junction manhole combining with Pipes 56 & 77. Pipe 79 (Proposed Public 24" RCP, Q_5 = 11.2 cfs and Q_{100} = 23.3 cfs) conveys the combined runoff from this manhole to the southeast within San Diego Way to a junction manhole at Santa Clara Place with Pipe 76. See Design Point 47A for continued pipe network discussion. The emergency overflow path for this sump inlet is to overtop the high point at the southwest curb return of the San Diego Way/Santa Clara Place intersection and continue southwest along Santa Clara Place to downstream facilities.

DESIGN POINT 37 (Q_5 = 3.5 cfs and Q_{100} = 7.0 cfs) is the developed runoff from Basin D, 1.50 acres of proposed Filing No. 1 home lots and residential roadways Pocatello Trail and San Diego Way. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 51 (Proposed Public 18" RCP) conveys the runoff to the west to an adjacent junction manhole combining with Pipes 50 and 52. The emergency overflow path for this sump inlet is to overtop the high point to the south within San Diego Way and continue south along the roadway to downstream facilities.

DESIGN POINT 38 (Q_5 = 4.7 cfs and Q_{100} = 9.9 cfs) is the developed runoff from Basin C, 2.31 acres of proposed Filing No. 1 home lots and residential roadways Pocatello Trail and San Diego Way. A proposed 10' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 52 (Proposed Public 18" RCP) conveys the runoff to the east to an adjacent junction manhole combining with Pipes 50 & 51. Pipe 53 (Proposed Public 36" RCP, Q_5 = 23.3 cfs and Q_{100} = 51.1 cfs) conveys the combined runoff from this manhole to the southeast within San Diego Way and then southwest within Clearlake Way and Pipe 57 (Proposed Public 36" RCP, Q_5 = 23.0 cfs and Q_{100} = 50.5 cfs). The emergency overflow path for this sump inlet is to overtop the high point to the south within San Diego Way and continue south along the roadway to downstream facilities.

DESIGN POINT 39 (Q_5 = 3.9 cfs and Q_{100} = 8.3 cfs) is the developed runoff from Basin G, 1.89 acres of proposed Filing No. 1 home lots and residential roadway San Diego Way. A proposed 10' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 54 (Proposed Public 18" RCP) conveys the runoff to the southwest to an adjacent junction manhole combining with Pipe 55. The emergency overflow path for this sump inlet is to overtop the high point to the south within San Diego Way and continue south along the roadway to downstream facilities.

DESIGN POINT 40 (Q_5 = 2.4 cfs and Q_{100} = 4.9 cfs) is the developed runoff from Basin H, 1.08 acres of proposed Filing No. 1 home lots and residential roadway San Diego Way. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 55 (Proposed Public 18" RCP) conveys the runoff to the east to an adjacent junction manhole combining with Pipe 54. Pipe 56 (Proposed Public 24" RCP, Q_5 = 6.3 cfs and Q_{100} = 13.1 cfs) conveys the combined runoff from this manhole to the southeast within San Diego Way toward the storm main within Santa Clara Place. The emergency overflow path for this sump inlet is to overtop the high point to the south within San Diego Way and continue south along the roadway to downstream facilities.

DESIGN POINT 41 (Q_5 = 3.2 cfs and Q_{100} = 6.4 cfs) is the developed runoff from Basin E, 1.07 acres of proposed Filing No. 1 home lots and residential roadways Clearlake Way and Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 60 (Proposed Public 18" RCP) conveys the runoff to the south to an adjacent junction manhole combining with Pipe 59. Pipe 61 (Proposed Public 42" RCP, Q_5 = 26.1 cfs and Q_{100} = 56.6 cfs) conveys the combined runoff from this manhole to the southeast within Westmont Drive to another manhole between Design Points 43 & 44. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 42 (Q_5 = 1.5 cfs and Q_{100} = 3.0 cfs) is the developed runoff from Basin F, 0.46 acres of proposed Filing No. 1 home lots and residential roadways Clearlake Way and Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 58 (Proposed Public 18" RCP) conveys the runoff to the north into an adjacent junction manhole combining with Pipe 57. Pipe 59 (Proposed Public 36" RCP, Q_5 = 23.8 cfs and Q_{100} = 52.1 cfs) conveys the combined runoff from this manhole to the southwest within Clearlake Way to another manhole combining with Pipe 60. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 43 (Q_5 = 2.0 cfs and Q_{100} = 4.2 cfs) is the developed runoff from Basin J, 0.93 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 62 (Proposed Public 18" RCP) conveys the runoff to the southwest to an adjacent junction manhole combining with Pipes 61 & 63. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 44 (Q_5 = 1.3 cfs and Q_{100} = 2.5 cfs) is the developed runoff from Basin K, 0.44 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 63 (Proposed Public 18" RCP) conveys the runoff to the north into an adjacent junction manhole combining with Pipes 61 & 62. Pipe 64 (Proposed Public 42" RCP, Q_5 = 28.3 cfs and Q_{100} = 61.1 cfs) conveys the combined runoff from this manhole to the southeast within Westmont Drive to another manhole between the sump inlets at Design Points 45 & 46. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 45 (Q_5 = 2.2 cfs and Q_{100} = 4.6 cfs) is the developed runoff from Basin V, 1.02 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 65 (Proposed Public 18" RCP) conveys the runoff to the southwest to an adjacent junction manhole combining with Pipes 64 & 66. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 46 (Q_5 = 1.4 cfs and Q_{100} = 2.7 cfs) is the developed runoff from Basin U, 0.46 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 66 (Proposed Public 18" RCP) conveys the runoff to the north into an adjacent junction manhole combining with Pipes 64 & 65. Pipe 67 (Proposed Public 42" RCP, Q_5 = 30.7 cfs and Q_{100} = 65.8 cfs) conveys the combined runoff from this manhole to the southeast within Westmont Drive to another manhole about 150' south, combining with Pipe 84 from the southeast. See DP-48 for continued pipe network discussion. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 47A (Q_5 = 5.1 cfs and Q_{100} = 10.3 cfs) is the developed runoff from Basin Q, 2.28 acres of proposed Filing No. 1 home lots and residential roadways, Santa Clara Place, Newport Beach Drive, and Long Beach Terrace. A proposed 10' CDOT Type R At-Grade inlet intercepts the majority of this runoff

(Q_5 = 4.6 cfs, Q_{100} = 6.9 cfs) while the remaining runoff (Q_5 = 0.5 cfs, Q_{100} = 3.4 cfs) continues southwest along Santa Clara Place all the way to the sump inlet at Design Point 47B. Pipe 75 (Proposed Public 18" RCP, Q_5 = 4.6 cfs and Q_{100} = 6.9 cfs) conveys this intercepted runoff to an adjacent manhole combining with Pipe 74 from the north. Pipe 76 (Proposed Public 30" RCP, Q_5 = 20.9 cfs and Q_{100} = 40.4 cfs) conveys this combined runoff southwest within Santa Clara Place to another junction manhole at the intersection of San Diego Way & Santa Clara Place where Pipe 79 (from DP-35 & 36) connects. Pipe 80 (Proposed Public 42" RCP, Q_5 = 31.4 cfs and Q_{100} = 62.3 cfs) conveys the combined runoff from this manhole to the southwest within Santa Clara Place to Westmont Drive.

DESIGN POINT 47B (Q_5 = 5.3 cfs and Q_{100} = 13.0 cfs) is the developed runoff from Basin T (Q_5 = 4.9 cfs, Q_{100} = 9.9 cfs), 2.10 acres of proposed Filing No. 1 home lots and residential roadways Santa Clara Place, San Diego Way, & Westmont Drive and the flow-by from the at-grade inlet at DP-47A (Q_5 = 0.5 cfs, Q_{100} = 3.4 cfs). A proposed 10' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 81 (Proposed Public 24" RCP) conveys the runoff to the south into an adjacent junction manhole combining with Pipe 82. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 48 (Q_5 = 1.1 cfs and Q_{100} = 2.1 cfs) is the developed runoff from Basin W, 0.36 acres of proposed Filing No. 1 home lots and residential roadway Westmont Drive. A proposed 5' CDOT Type R sump inlet intercepts the entirety of this runoff. Pipe 82 (Proposed Public 18" RCP) conveys the runoff to the north into an adjacent junction manhole combining with Pipe 81. Pipe 83 (Proposed Public 24" RCP, Q_5 = 6.2 cfs and Q_{100} = 14.7 cfs) conveys the combined runoff from this manhole to the northwest within Westmont Drive to another manhole about 100' north, combining with Pipe 80 within Santa Clara Place. Pipe 84 (Proposed Public 42" RCP, Q_5 = 36.9 cfs and Q_{100} = 75.7 cfs) conveys the combined runoff (Pipes 80 & 83) from this junction manhole to the northwest within Westmont Drive to another manhole about 60' north, combining with Pipe 67 coming from the northwest within Westmont Drive. Pipe 85 (Proposed Public 48" RCP, Q_5 = 64.6 cfs and Q_{100} = 135.3 cfs) conveys the combined runoff (Pipes 67 & 84) from this junction manhole to the southwest into Tract B and the proposed community park. The emergency overflow path for this sump inlet is to overtop the high point to the south within Westmont Drive and continue south along the roadway to downstream facilities.

DESIGN POINT 50 (Q_5 = 51.9 cfs and Q_{100} = 126.6 cfs) is the developed runoff from Basin P2-S1, 36.59 acres of a future D20 Middle School site located directly adjacent to the proposed Filing 1 home lots with future access off both Sterling Ranch Road and Briargate Parkway. A site layout has not been completed at this time and therefore an estimated 42.2% composite imperviousness value for Basin P2-S1 (Developed) has been assumed based off similar sized middle school sites completed in the past. Corresponding 'C' value runoff coefficients were applied to estimate this developed flow rate and therefore properly size the 48" Private RCP stub (Pipe 14) and downstream storm system. Pipe 14 connects to the proposed storm main running along the outside of the Sterling Ranch Road pavement section (Pipe 13, Public 48" RCP). Pipe 15 (Proposed Public 60" RCP, Q_5 = 108.1 cfs and Q_{100} = 236.5 cfs) conveys the combined runoff from the future school development and that from Pipe 13, to the south within a public storm easement and continuing outside of the Sterling Ranch Road pavement section to the inlets at Design Points 15 & 16.

The school site is not required to contain its own onsite water quality and detention facility and therefore the estimated developed flow rate and imperviousness was also utilized in sizing the proposed Full Spectrum Detention and Storm Water Quality Pond 14A. A separate Final Drainage Report for the school site will be completed at the time of Development Plan and will extend the private storm system throughout the school campus as needed and also confirm the estimated runoff rates and imperviousness value. If drastically different than this Final Drainage Report, modifications may be required to the downstream facilities or onsite detention/water quality may need to be implemented. Appropriate drainage fees will be assessed at the time of school site development and new final plat for the parcel.

The following Design Points 50B & 50C were completed to collect the Undeveloped runoff from Basin P2-S1 prior to the development of the Middle School.

DESIGN POINT 50B (Q_5 = 3.6 cfs and Q_{100} = 26.6 cfs) is the undeveloped runoff from half of Basin P2-S1, 36.59 acres of the future school site parcel. A proposed CDOT Type D grated inlet (in-series, depressed) intercepts the entirety of this runoff. Pipe 14B (Proposed Private 30" RCP) conveys the runoff to the east into the inlet at DP-50C and ultimately connects to the 48" storm lateral (Pipe 14) for the school site runoff.

DESIGN POINT 50C (Q_5 = 3.6 cfs and Q_{100} = 26.6 cfs) is the undeveloped runoff from half of Basin P2-S1, 36.59 acres of the future school site parcel. A proposed CDOT Type D grated inlet (in-series, depressed) intercepts the entirety of this runoff. Pipe 14C (Proposed Private 36" RCP, Q_5 = 7.2 cfs and Q_{100} = 53.2 cfs) conveys the combined runoff from the undeveloped school parcel to the east into the 48" storm lateral (Pipe 14, 48" RCP for the developed school site runoff). The inlets and storm system within this parcel are Private and will be owned and maintained by the school once the property is dedicated as such.

DESIGN POINT 51 (Q_5 = 7.9 cfs and Q_{100} = 16.1 cfs) is the developed runoff from Basin JJ, 2.63 acres of a future neighborhood park, future parking lot, and future small recreation center, located south of the proposed Filing 1 home lots and north of existing Sterling Ranch Road. A preliminary site layout is shown and was used in estimated this developed condition runoff rate. A future Final Drainage Report will be completed with this parking lot and building development. This future report will detail the private storm sewer collection and connection to the proposed Pipe 100 (Private 24" RCP stub). This Pipe 100 connects to the proposed storm main (Pipe 36A) coming from Palo Alto Trail and Design Points 20-22. Pipe 36B (Proposed Public 48" RCP, Q_5 = 54.7 cfs and Q_{100} = 112.7 cfs) conveys the combined runoff from the future recreation center/parking and that from Pipe 36A, to the southwest within a public storm easement and continuing through Tract B where it connects with the main outside of the Sterling Ranch Road pavement section (Pipe 39A). Pipe 39B (Proposed Public 72" RCP, Q_5 = 162.0 cfs and Q_{100} = 351.4 cfs) conveys the combined runoff from this junction manhole (Pipes 39A & 36B) to the west directly toward the proposed Full Spectrum Pond 14A.

The recreation center/park/parking site is not required to contain its own onsite water quality and detention facility and therefore the estimated developed flow rate and imperviousness was also utilized in sizing the proposed Full Spectrum Detention and Storm Water Quality Pond 14A. A separate Final Drainage Report for the recreation center development will be completed at the time of Development Plan and will extend the private storm system as needed and also confirm the estimated runoff rates and imperviousness value. If drastically different than this Final Drainage Report, modifications may be required to the downstream facilities.

DESIGN POINT 52 (Q_5 = 1.8 cfs and Q_{100} = 4.7 cfs) is the developed runoff from Basin MM, 1.05 acres of open space and the back of a few proposed Filing 1 home lots located southwest of Clearlake Way. A proposed CDOT Type C grated (depressed) inlet intercepts the entirety of this runoff. Pipe 86 (Proposed Private 18" RCP) conveys the runoff to the south into the grated inlet at Design Point 53. The inlets and storm system within the Park parcel are Private and will be owned and maintained by the Sterling Ranch East Metro District.

DESIGN POINT 53 (Q_5 = 1.1 cfs and Q_{100} = 3.1 cfs) is the developed runoff from Basin NN, 0.73 acres of park area and the back of a few proposed Filing 1 home lots located off Westmont Drive. A proposed CDOT Type C grated (depressed) inlet intercepts the entirety of this runoff. Pipe 87 (Proposed Private 18" RCP, Q_5 = 2.7 cfs and Q_{100} = 7.3 cfs) conveys the combined runoff from Pipe 86 and this design point, to the southeast into the next Type C inlet at Design Point 54.

DESIGN POINT 54 (Q_5 = 1.4 cfs and Q_{100} = 3.7 cfs) is the developed runoff from Basin SS, 0.84 acres of park area and the back of a few proposed Filing 1 home lots located off Westmont Drive. A proposed CDOT Type C grated (depressed) inlet intercepts the entirety of this runoff. Pipe 88 (Proposed Private 18" RCP, Q_5 = 3.9 cfs and Q_{100} = 10.5 cfs) conveys the combined runoff from Pipe 87 and this design point, to the southeast into a junction manhole with Pipe 85 (48" RCP) from the north. Pipe 89 (Proposed Public 54" RCP, Q_5 = 67.0 cfs and Q_{100} = 142.1 cfs) conveys the combined runoff (Pipes 85 & 88) from this junction manhole to the south within Tract B and the proposed community park.

DESIGN POINT 55A (Q_5 = 1.1 cfs and Q_{100} = 3.2 cfs) is the developed runoff from Basin LL1, 0.79 acres of park area and the back of a few proposed Filing 1 home lots located off Westmont Drive. A proposed CDOT Type C grated (depressed) inlet will intercept the entirety of this runoff. Pipe 89B (Proposed Private 18" RCP, Q_5 = 1.1 cfs and Q_{100} = 3.2 cfs) conveys the runoff to the west into a junction manhole with Pipe 89A (54" RCP) from the north. Pipe 89C (Proposed Public 54" RCP, Q_5 = 67.7 cfs and Q_{100} =

144.2 cfs) conveys the combined runoff (Pipes 89A & 89B) from this junction manhole to the southwest within Tract B and the future community park.

DESIGN POINT 55B (Q_5 = 2.2 cfs and Q_{100} = 7.0 cfs) is the developed runoff from Basin LL2, 1.75 acres of park area and the back of a few proposed Filing 1 home lots located off Westmont Drive. Pipe 90 (Proposed Private 18" RCP, Q_5 = 2.2 cfs and Q_{100} = 7.0 cfs) conveys the runoff to the west into a junction manhole with Pipe 89C (54" RCP) from the north. Pipe 91 (Proposed Public 54" RCP, Q_5 = 67.6 cfs and Q_{100} = 145.4 cfs) conveys the combined runoff (Pipes 89C & 90) from this junction manhole to the southwest within Tract B and the future community park.

DESIGN POINT 56 (Q_5 = 0.8 cfs and Q_{100} = 4.3 cfs) is the future developed runoff from Basin TT, 1.63 acres of park and open space within Tract B. A future inlet/storm system will intercept this runoff and route to the proposed storm main. Pipe 92A (Future Private 18" RCP) will convey this runoff south to a future storm system and ultimately to the stub provided off Pipes 95/91. A future Final Drainage Report will be completed with the park development and will detail the extension of the private storm system.

DESIGN POINT 57 (Q_5 = 2.1 cfs and Q_{100} = 11.0 cfs) is the future developed runoff from Basin PP, 4.21 acres of park and open space within Tract B. A future inlet/storm system will intercept this runoff and route to the proposed storm main. Pipe 92B (Future Private 24" RCP, Q_5 = 2.9 cfs and Q_{100} = 15.2 cfs) will convey this design point's runoff, and that from Future Pipe 92A, to the south to a future storm system and ultimately to the stub provided off Pipes 95/91. A future Final Drainage Report will be completed with the park development and will detail the extension of the private storm system.

DESIGN POINT 58 (Q_5 = 3.0 cfs and Q_{100} = 5.6 cfs) is the future developed runoff from Basin QQ, 0.74 acres of park and planned amphitheater (outside seating/stairs) within Tract B. A future inlet/storm system will intercept this runoff and route to the proposed storm main. Pipe 93 (Future Private 18" RCP) will convey this runoff to the south to a future storm system combining with Future Pipe 92B. Pipe 94 (Proposed Private 24" RCP, Q_5 = 5.4 cfs and Q_{100} = 20.0 cfs) conveys the combined runoff (Pipes 92B & 93) from this junction manhole to the southeast within Tract B to the proposed pipe stub provided with the Filing 1 storm construction. A future Final Drainage Report will be completed with the park

Future?

development and will detail the extension of the private storm system. Pipe 95 (Proposed Public 54" RCP, Q_5 = 71.1 cfs and Q_{100} = 159.8 cfs) conveys the combined runoff (Pipes 91 & 94) from this junction manhole to the southwest, directly into the proposed Full Spectrum Detention and Storm Water Quality Facility Pond 14A (Design Point 60). A concrete impact structure per Mile High Flood District/City DCM Criteria will be installed at the entry point of this 54" RCP into Pond 14A and prior to the concrete forebay required. A separate UD-BMP spreadsheet was completed and included in the Appendix for Pipe 95 (54" RCP) in order to accurately size the concrete forebay larger than the required 0.023 forebay volume. This spreadsheet also sized the 9.9" wide notch needed at the end of the 18" tall concrete forebay wall which will drain into the pond concrete trickle channel.

DESIGN POINT 59 (Q_5 = 1.5 cfs and Q_{100} = 9.2 cfs) is the future developed runoff from Basin KK, 3.51 acres of the future park/fields within Tract B, west of the future recreation center and parking lot. A future inlet/storm system will intercept this runoff and route to the proposed storm main. Pipe 96 (Future Private 18" RCP) will convey this runoff to the south to a proposed manhole along the 72" RCP Public main coming from the east. Pipe 42 (Proposed Public 72" RCP, Q_5 = 166.2 cfs and Q_{100} = 364.8 cfs) conveys the combined runoff (Pipes 39B, 41, & 96) from this junction manhole to the west, directly into the proposed Full Spectrum Detention and Storm Water Quality Facility Pond 14A (Design Point 60). A concrete impact structure per Mile High Flood District/City DCM Criteria will be installed at the entry point of this 72" RCP into Pond 14A and prior to the concrete forebay required. A separate UD-BMP spreadsheet was completed and included in the Appendix for Pipe 42 (72" RCP) in order to accurately size the concrete forebay larger than the required 0.044 forebay volume. This spreadsheet also sized the 18" wide notch needed at the end of the 18" tall concrete forebay wall which will drain into the pond concrete trickle channel.

DESIGN POINT 60 – FULL SPECTRUM DETENTION AND STORM WATER QUALITY FACILITY 'POND 14A' (Q_5 = 232.0 cfs, Q_{100}= 520.5 cfs) is the overall developed runoff into the proposed Full Spectrum Detention/Storm Water Quality Facility 'Pond 14A', including Basin RR and Pipes 42 & 95. Basin RR is 5.99 acres of the detention facility and surrounding slope area. This facility is a Private Full Spectrum Extended Detention Basin per the El Paso County & City of Colorado Springs and Mile High Flood District (MHFD), formally Urban Drainage Flood Control District, drainage criteria. The proposed facility was sized utilizing two excel workbooks from MHFD, UD-BMP version 3.07 and MHFD-Detention version 4.06. The composite impervious value was determined using Site-Level Low Impact Development (LID) Design Effective Impervious Calculator (IRF Form) located in the Appendix of this report. Also, an exhibit of the tributary area to the pond and the assumed impervious/pervious types is included in the Appendix.

A total of 156.85 acres of Sterling Ranch East Filing No. 1, future D20 middle school, and adjacent arterial and collector roadways is tributary to this facility at a calculated imperviousness of 48.8%. The required EURV (Excess Urban Runoff Volume) is 8.766 acre-feet and the proposed top of outlet box at an elevation of 7023.80 (micropool w.s.e./start of SWQ = 7017.00) provides a volume of 8.98 acre-feet. A 7' wide low flow concrete trickle channel will be installed from the proposed forebays at Pipe 42 & Pipe 95 to the proposed pond outlet box at a 0.50% minimum slope.

Per MHFD spreadsheet, 2nd orifice has 20 sq in opening and 3rd orifice has 24 sq in opening

A 30' wide outlet box (4' deep opening) is proposed with a top of box at 7023.80 elevation. For a Full Spectrum facility, the outlet box orifice hole within the front plate is to drain the EURV in less than 72 hours. Per the MHFD-Detention version 4.06 spreadsheet from Mile High Flood District a total of (3) orifice holes are to be installed in the front plate of the outlet box with the bottom orifice hole of 2" wide x 3" high, and middle orifice of 4" wide x 4" high, and upper orifice of 5" wide x 4" high. A 2.5' deep concrete bottom micropool is to be installed within the wing walls of the outlet structure, with a surface area of 1,070 square feet. An initial surcharge depth of 6" will be provided within the micropool outlet structure. A removable trash screen of 24" in width opening (per UD-BMP) will be placed in front of the orifice plate to help prevent the orifice holes from clogging. A Private 48" RCP outlet pipe (Pipe 98) will convey the detained release (Q_5 = 3.0 cfs, Q_{100}= 54.2 cfs, 100-yr water surface elevation of 7025.88, MH-Detention) to the existing Sand Creek corridor (Reach SC-8) located directly west of Filing 1. A concrete impact structure per Mile High Flood District will be installed at the end of this 48" outfall pipe, followed by riprap pad protection (D50 = 9", Width = 7' min. (14' used), Length = 19' min. (20' used), Depth 1.5' min.) sized using the UD-Culvert spreadsheet located in the appendix. The use of both types of energy dissipation will ensure adequate protection against erosion at the downstream channel. <u>This facility restricts the release to below pre-development (historic levels) per the MHFD-Detention spreadsheet and is in conformance with the Preliminary Drainage Report and MDDP Amendment.</u>

A 180’ length riprap emergency spillway located at elevation 7026.00 will pass the entire incoming 100-year storm event (Q_{100}= 520.5 cfs) at a flood depth of 0.80’ in case of complete outlet box and pipe failure. Per the Drainage Criteria Manual (DCM), the top of the pond berm shall be minimum 2.0’ higher than the flood depth water surface elevation. The proposed 12’ wide top of berm elevation is at 7029.00. This emergency spillway will only be utilized in the case of a complete outlet box failure, and will drain directly into the Sand Creek channel improvements to the west. A 12’ wide maintenance access road at 15% max. grade will be installed to the bottom of the facility and to each concrete structure per the DCM.

This facility adequately treats all 156.85 tributary acres of Sterling Ranch East developed flows for storm water quality and detains the release to below historic rates (Q_5 = 3.0 cfs, Q_{100}= 124.7 cfs per MHFD-Detention). Per the Code of Colorado Regulations 4.2.5.1 a Jurisdictional Size Dam height is measured, either from the invert of the outlet pipe at the longitudinal centerline of the embankment (spillway elevation = 7026.00 & 48” invert at centerline of dam is 7016.47, 9.53’) or the spillway elevation compared to the existing ground at the centerline (spillway elevation = 7026.00 & existing ground (prior to any land disturbance, including the JR temporary pond) = 7036.69, height = 10.69’. The existing ground elevation as shown on the construction drawings and drainage maps (JR Engineering temporary pond and roadway ditch) = 7010.00, for a dam height = 16.00’. As the natural grades at this pond, prior to any land disturbance are higher than the proposed top of dam (excavated conditions), a dam height of 10.69’ is established. A dam height of higher than 10’ is considered a ‘Jurisdictional’ facility with the State of Colorado. Additional documentation/coordination with the State Engineer is required and in process for the proposed facility. Maintenance and ownership of the Private detention/water quality facility and the pond outfall pipe is by the Sterling Ranch Metropolitan District #3. An El Paso County Detention Pond Maintenance Agreement will be required indicating these Facilities are to be owned and maintained by the Metro District.

BASIN CH-1 (Q_5 = 6.9 cfs and Q_{100} = 51.0 cfs) is 27.11 acres of the open space and adjacent existing Sand Creek (Reach SC-8) and future channel improvements (by JR Engineering) that are within the boundary of Sterling Ranch East Filing No. 1. No Development is located within this basin as it’s only open space and channel work including FEMA floodplain limits. There is no proposed grading with the Filing No. 1 development within the Floodplain Limits and all channel work is completed per the “Final Drainage Report for Sand Creek Restoration,” by JR Engineering, LLC, dated September 2022.

BASIN CH-2 (Q_5 = 3.6 cfs and Q_{100} = 26.2 cfs) is 10.62 acres of the open space and adjacent Sand Creek (Reach SC-8) channel improvements that are within the boundary of Sterling Ranch East Filing No. 1. No Development is located within this basin as it’s only open space and channel work including FEMA floodplain limits. There is no proposed grading with the Filing No. 1 development within the Floodplain Limits and all channel work is completed per the “Final Drainage Report for Sand Creek Restoration,” by JR Engineering, LLC, dated September 2022.

STORMWATER QUALITY (FOUR STEP PROCESS)

El Paso County 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 to achieve stormwater permit requirements is required. The site adheres to this Four Step Process as follows:

1. Individual home roof downspouts will be directed onto pervious landscape areas. The additional grass buffer BMP provides the following: 1) Minimize directly connected impervious areas. 2) Provides initial pollutant and sediment removal before entering the storm system. Rear yard flows of those proposed lots adjacent to public streets will be directed over a grass buffer area (both landscaped and native grasses) to provide treatment of these small rear year areas.

2. The proposed Pond 14A provides Detention and Stormwater Quality Treatment for the entirety of the proposed development and surrounding arterial and collector roadways. The facility in conjunction with Step 1 implementation above will address all required Water Quality Capture Volume and Slow Release Requirements.

3. The recipient of the drainage flows from the site is Sand Creek (Reach SC-8), with an estimated 100-year storm runoff rate along Filing No. 1 between 1,487 cfs to 1,904 cfs. This portion of the creek contains 100-year FEMA floodplain, but no jurisdictional wetlands or Preble's Jumping Mouse habitat. As such the downstream corridor is very well established and as the detained developed release rate is far less than historic, theoretically no additional erosion will occur. The adjacent Sand Creek Channel Improvements accounted for the restricted runoff from Pond 14A.

4. Does not apply to this Residential subdivision as this step is to 'consider the need for Industrial and Commercial BMPs'. Temporary construction BMPs will be installed per the approved grading and erosion control plans.

DRAINAGE AND BRIDGE FEES

Sterling Ranch East Filing No. 1 is within the Sand Creek Drainage Basin and is a total of 161.524 acres. Per the year 2022 El Paso County Basin Fees, the Sand Creek Drainage Fee is $21,814 per impervious acre of development and the Bridge Fee is $8,923 per impervious acre. Filing 1 consists of 47.444 acres of typical home lots, 12.934 acres of public right-of-way (roads), and 101.146 acres of open space/undeveloped area (including a future school site in Tract J, and a future park & recreation center in Tract B). Future Final Drainage Reports will be completed at the time of park and school developments that will detail those site imperviousness and basin fees. Using Table 6-6 of the DCM, specifically 65% imperviousness for typical home lots, 100% imperviousness for pavement/right-of-way, and 0% imperviousness for open space/undeveloped area; an overall Filing No. 1 impervious area is calculated at 43.773 acres. (See below of breakdown)

could be lower based
on average lot size?

47.444 acres @ 65% = 30.839 acres of imperviousness
12.934 acres @ 100% = 12.934 acres of imperviousness
101.146 acres @ 0% = 0.00 acres of imperviousness
<u>TOTAL IMPERVIOUSNESS = 43.773 ACRES</u>

FILING No. 1 (43.773 Impervious acres)

DRAINAGE FEE:

$21,814/acre x 43.773 acres $ 954,864.22

BRIDGE FEE:

$8,923/acre x 43.773 acres $ 390,586.48

Basin fees will be required to be paid prior to plat recordation.

CONSTRUCTION COST OPINION

The following is a construction cost opinion for the public facilities, located within the public right-of-way and accepting runoff from the public roadways, and the private facilities, intercepting the runoff from the adjacent school and park sites, and routing to the downstream natural channel:

Public Drainage Facilities Non-reimbursable (FILING NO. 1)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	5’ Type-R Inlet	15 EACH	$7,981/EA	$ 119,715.00
2.	10’ Type-R Inlet	16 EACH	$8,706/EA	$ 139,296.00
3.	15’ D-10-R Inlet	5 EACH	$11,775/EA	$ 58,875.00
4.	18” RCP Storm Drain	1,102 LF	$70/LF	$ 77,140.00
5.	24” RCP Storm Drain	1,450 LF	$83/LF	$ 120,350.00
6.	30” RCP Storm Drain	920 LF	$104/LF	$ 95,680.00
7.	36” RCP Storm Drain	1,130 LF	$128/LF	$ 144,640.00
8.	42” RCP Storm Drain	2,541 LF	$171/LF	$ 434,511.00
9.	48” RCP Storm Drain	629 LF	$209/LF	$ 131,461.00
10.	54” RCP Storm Drain	565 LF	$272/LF	$ 153,680.00
11.	60” RCP Storm Drain	1,713 LF	$319/LF	$ 546,447.00
12.	72” RCP Storm Drain	609 LF	$421/LF	$ 256,389.00
13.	Type II Storm MH	18 EACH	$7,082/EA	$ 127,476.00
14.	Type I Storm MH	33 EACH	$12,876/EA	$ 424,908.00

SUB-TOTAL	$ 2,830,568.00
10% ENGINEERING	$ 283,056.80
5% CONTINGENCIES	$ 141,528.40
TOTAL	**$ 3,255,153.20**

Private Drainage Facilities Non-reimbursable (FILING NO. 1)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	Geotextile (under riprap)	3,079 SY	$7.00/SY	$ 21,553.00
2.	Riprap (spillway)	1,775 TONS	$89/TON	$ 157,975.00
3.	18" RCP Storm Drain	1,021 LF	$70/LF	$ 71,470.00
4.	24" RCP Storm Drain	24 LF	$83/LF	$ 1,992.00
5.	30" RCP Storm Drain	870 LF	$104/LF	$ 90,480.00
6.	36" RCP Storm Drain	247 LF	$128/LF	$ 31,616.00
7.	48" RCP Storm Drain	98 LF	$209/LF	$ 20,482.00
8.	CDOT Type C & D Inlets	7 EA	$5,138/EA	$ 35,966.00
9.	Type II Storm MH	1 EA	$7,082/EA	$ 7,082.00
10.	Type I Storm MH	1 EA	$12,876/EA	$ 12,876.00
11.	Permanent Pond '14A'*	1 EA	$200,000/EA	$ 200,000.00
SUB-TOTAL				$ 651,492.00
10% ENGINEERING				$ 65,149.20
5% CONTINGENCIES				$ 32,574.60
TOTAL				**$ 749,215.80**

*Includes cost of impact structures, forebays, trickle channel, road, and outlet box.

SUMMARY

Developed runoff from the proposed Sterling Ranch East Filing No. 1 development and the surrounding tributary arterial (Briargate Parkway) and collector (Sterling Ranch Road) roadways is proposed to outfall to one proposed private Full Spectrum Detention (EDB) and Storm Water Quality Facility (owned and maintained by the Sterling Ranch Metropolitan District #3) prior to discharging to downstream facilities. The proposed Full Spectrum detention & water quality pond was sized using the current and applicable drainage criteria and provides release rates below existing allowable release rates. Therefore, the developed site runoff and proposed storm sewer facilities will not adversely affect the downstream facilities or surrounding developments.

PREPARED BY:

Matthew Larson
Project Manager

mal/118330/FDR-STERLING RANCH EAST FILING 1.doc

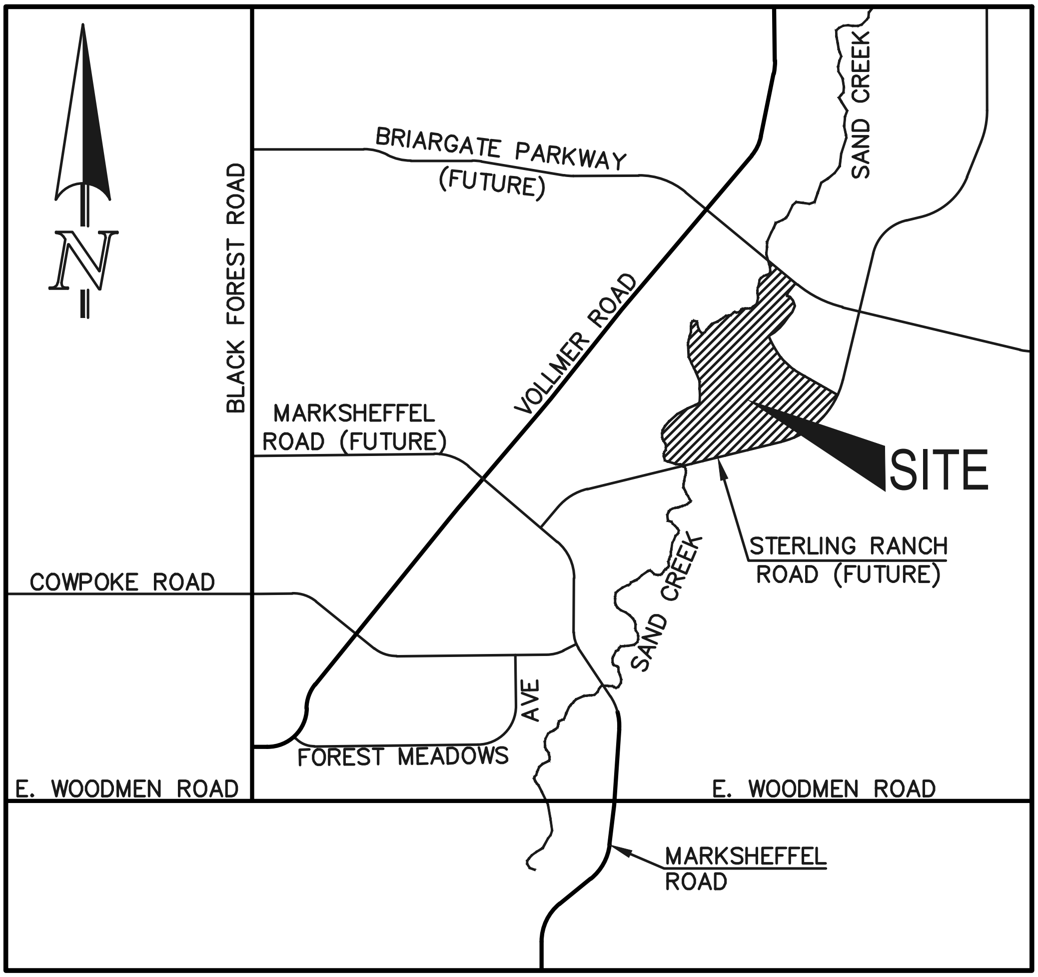
REFERENCES

1. City of Colorado Springs/County of El Paso Drainage Criteria Manual Volume 1, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.
2. "Urban Storm Drainage Criteria Manual Volume 1, 2 & 3," Urban Drainage and Flood Control District, dated January 2016.
3. "Sand Creek Drainage Basin Planning Study," by Kiowa Engineering Corporation, dated March 1996.
4. "2018 Sterling Ranch MDDP," by M&S Consultants, Inc., June 2018.
5. "Final Drainage Report for Retreat at TimberRidge Filing No. 1", Classic Consulting, approved November, 2020.
6. "Final Drainage Report for Retreat at TimberRidge Filing No. 2", Classic Consulting, dated March, 2022
7. "Final Design Report for Sand Creek Restoration", JR Engineering, LLC, dated September 2022
8. "Drainage Letter for Sterling Ranch Road and Briargate Pkwy. Interim Plan", prepared by JR Engineering, LLC, dated September 2022
9. "Master Development Drainage Plan Amendment for Sterling Ranch", prepared by JR Engineering, LLC, dated September 2022

Unresolved:
Update reports to latest version

APPENDIX

VICINITY MAP



VICINITY MAP

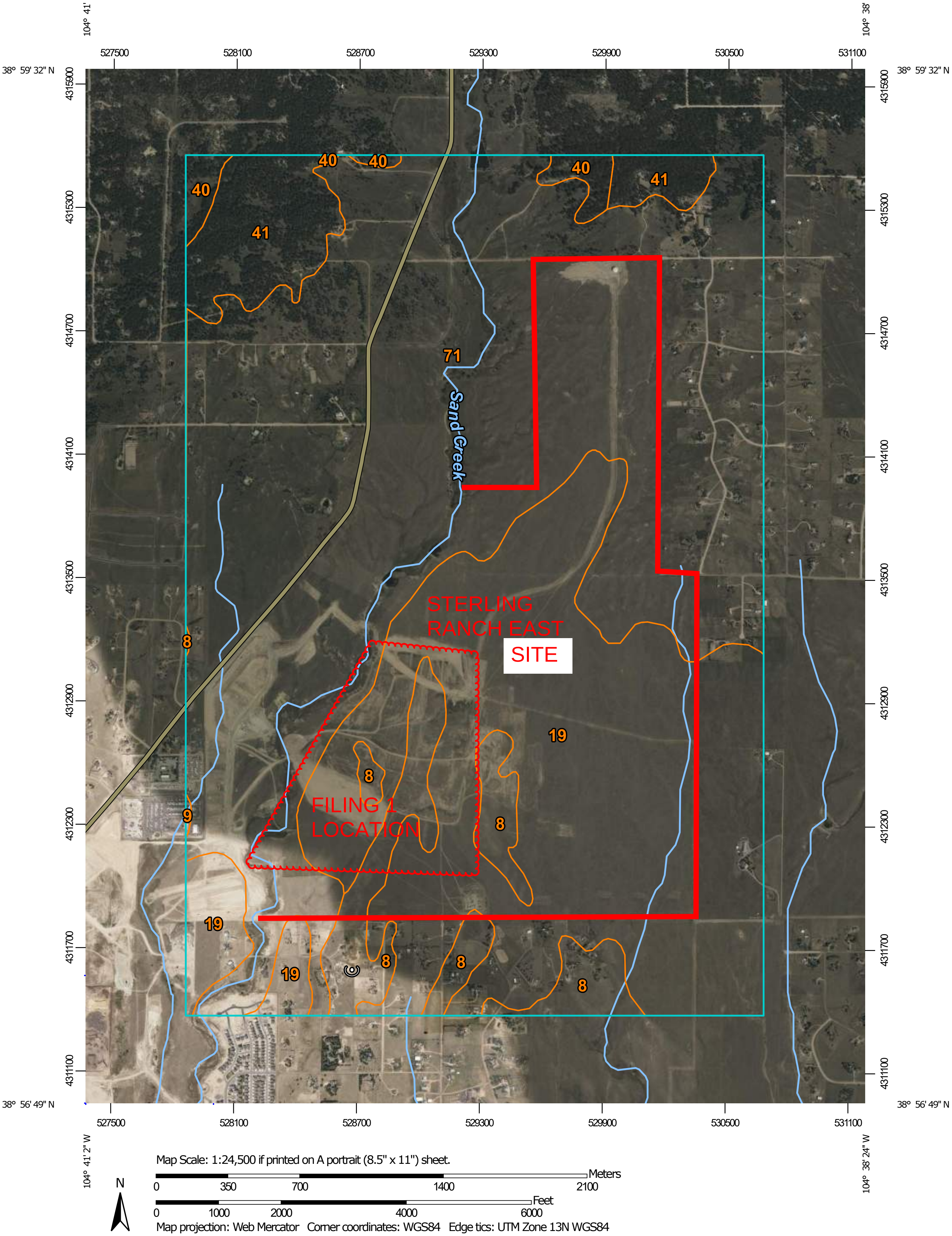
NOT TO SCALE

N:\118330\DRAWINGS\CONSTRUCTION\UTILITIES\01-118330-SAN.dwg, 11/14/2022 3:38:54 PM, 1:1

SOILS MAP (S.C.S. SURVEY)

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

Soil Map—El Paso County Area, Colorado



Map Scale: 1:24,500 if printed on A portrait (8.5" x 11") sheet.

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Aug 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	171.3	5.8%
9	Blakeland-Fluvaquentic Haplaquolls	1.0	0.0%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	982.6	33.5%
40	Kettle gravelly loamy sand, 3 to 8 percent slopes	33.7	1.2%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	135.2	4.6%
71	Pring coarse sandy loam, 3 to 8 percent slopes	1,605.2	54.8%
Totals for Area of Interest		**2,929.0**	**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 19, Aug 31, 2021

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

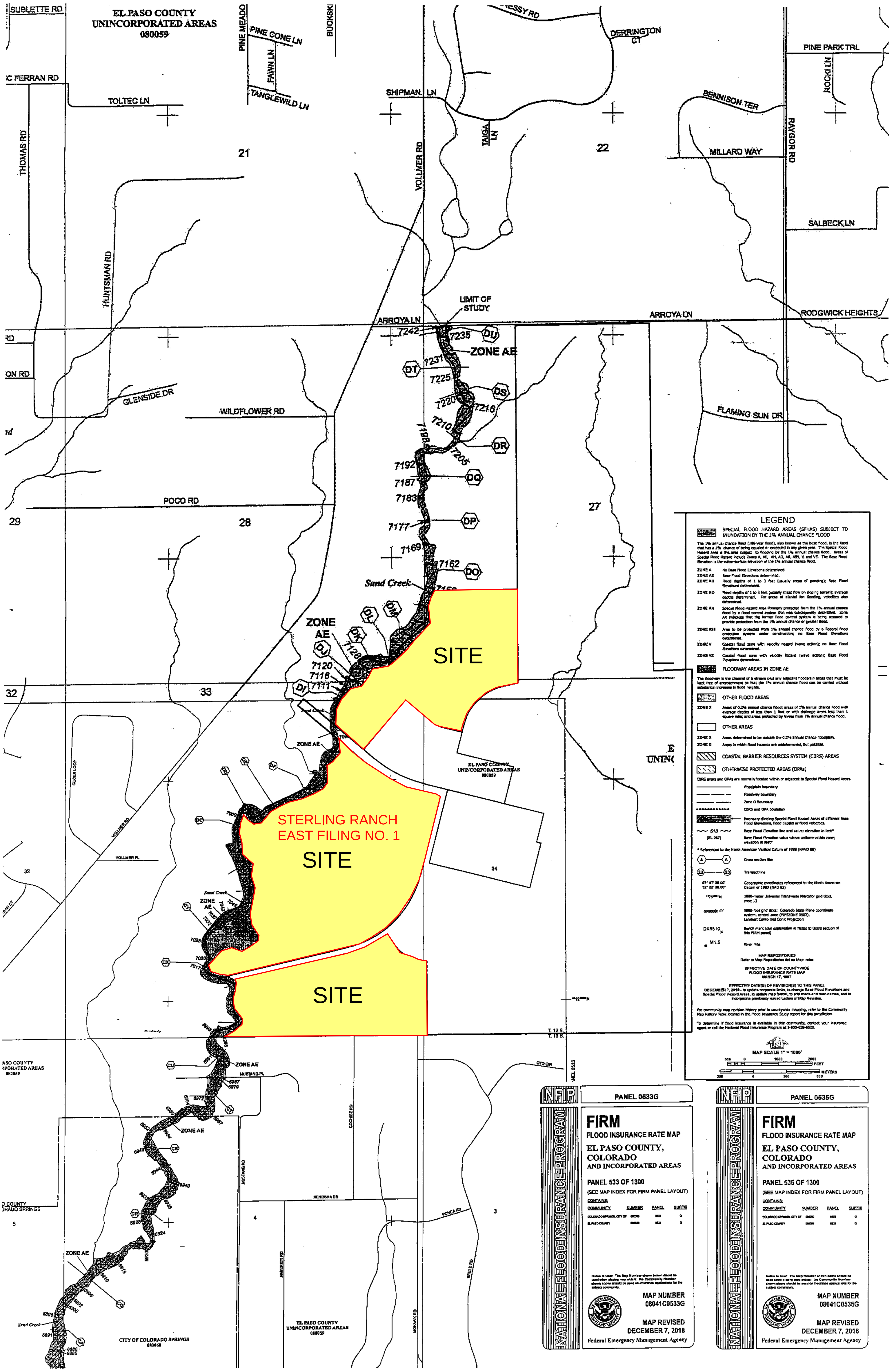
Pleasant

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 19, Aug 31, 2021

F.E.M.A. MAP



LEGEND

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

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

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

▩ FLOODWAY AREAS IN ZONE AE

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

▨ OTHER FLOOD AREAS

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

☐ OTHER AREAS

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

▧ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▧ OTHERWISE PROTECTED AREAS (OPAs)

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

———	Floodplain boundary
— — —	Floodway boundary
—— ——	Zone D Boundary
●●●●●●●●	CBRS and OPA boundary
▩	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

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

(A)——(A)	Cross section line
(23)——(23)	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

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

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

MAP SCALE 1" = 1000'

PANEL 0533G

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

PANEL 533 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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

MAP NUMBER
08041C0533G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

PANEL 0535G

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

PANEL 535 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0535	G
EL PASO COUNTY	080059	0535	G

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

MAP NUMBER
08041C0535G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

Page 1 of 4	**Issue Date: March 6, 2009**	**Effective Date: July 23, 2009**	**Case No.: 08-08-0541P**	LOMR-APP

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		**PROJECT DESCRIPTION**	**BASIS OF REQUEST**
COMMUNITY	**El Paso County Colorado (Unincorporated Areas)** **COMMUNITY NO.: 080059**	**NO PROJECT**	**HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA**
IDENTIFIER	Sand Creek Letter of Map Revision, Mustang Place to Arroya Lane	**APPROXIMATE LATITUDE & LONGITUDE: 38.971, -104.668** **SOURCE:** USGS QUADRANGLE **DATUM:** NAD 27	

ANNOTATED MAPPING ENCLOSURES	**ANNOTATED STUDY ENCLOSURES**
TYPE: FIRM* NO.: 08041C0535 F DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 204P(a), 204P(b), 204P(c) AND 204P(d) FLOODWAY DATA TABLE: 5

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Sand Creek - from approximately 360 feet downstream of Mustang Place to just downstream of Arroya Lane

SUMMARY OF REVISIONS

Flooding Source	**Effective Flooding**	**Revised Flooding**	**Increases**	**Decreases**
Sand Creek	Zone A	Zone AE	YES	YES
	No BFEs*	BFEs	YES	NONE
	No Floodway	Floodway	YES	NONE

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

David N. Bascom

David N. Bascom, Program Specialist
Engineering Management Branch
Mitigation Directorate

U.S. DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

David N. Bascom

David N. Bascom, Program Specialist
Engineering Management Branch
Mitigation Directorate

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson
Director, Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

David N. Bascom

David N. Bascom, Program Specialist
Engineering Management Branch
Mitigation Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD 29)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Sand Creek	Just upstream of Mustang Place	None	6,984	08041C0535 F
	Just downstream of Arroya Lane	None	7,238	08041C0535 F

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

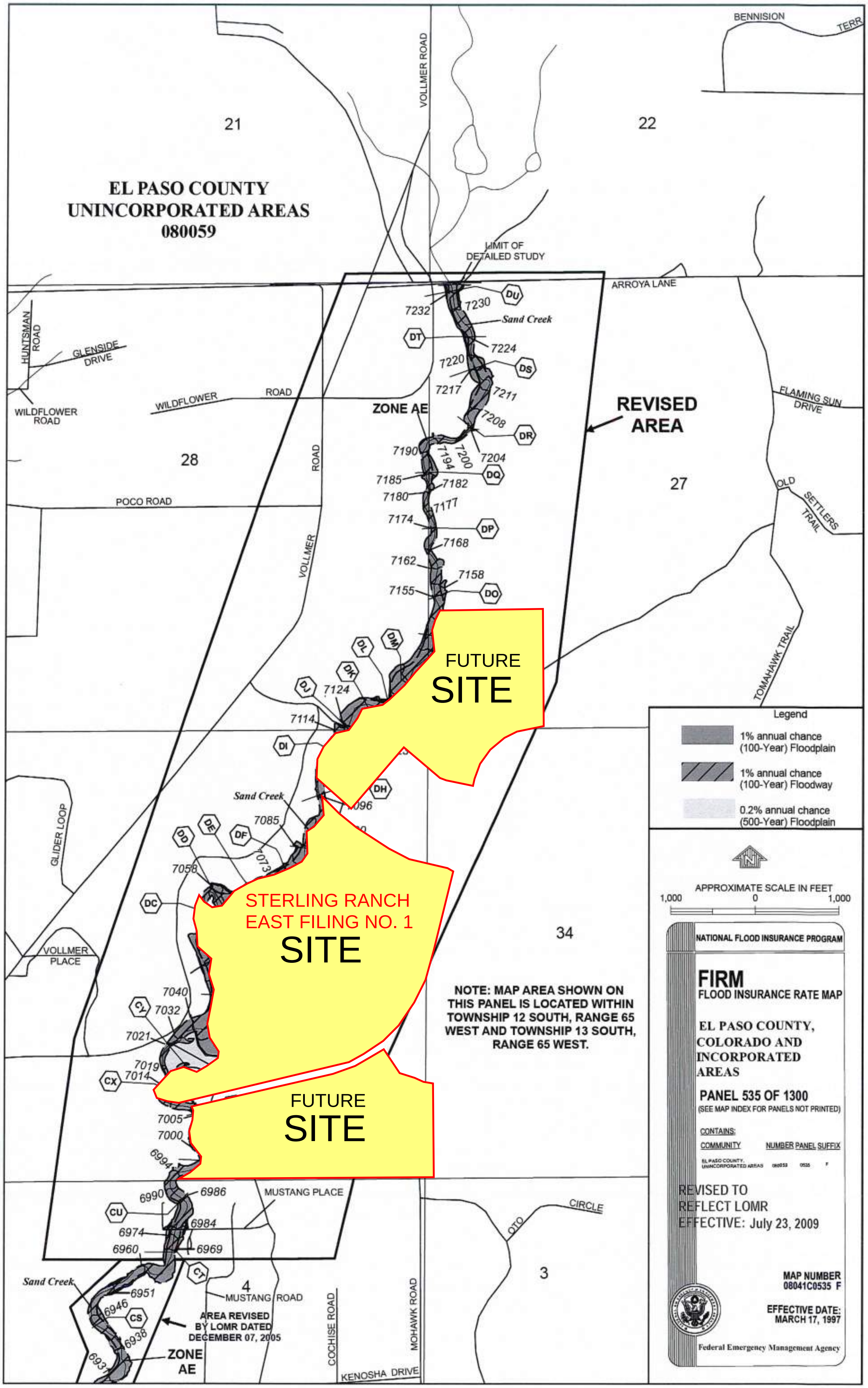
A notice of changes will be published in the *Federal Register*. A short notice also will be published in your local newspaper on or about the dates listed below. Please refer to FEMA's website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp for a more detailed description of proposed BFE changes, which will be posted within a week of the date of this letter.

LOCAL NEWSPAPER	Name: *El Paso County News* Dates: 03/18/09 03/25/09

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

David N. Bascom

David N. Bascom, Program Specialist
Engineering Management Branch
Mitigation Directorate

BENNISION
TERR
VOLLMER ROAD
21
22
EL PASO COUNTY
UNINCORPORATED AREAS
080059
LIMIT OF
DETAILED STUDY
ARROYA LANE
DU
7232
7230
Sand Creek
DT
7224
7220
DS
7217
7211
HUNTSMAN ROAD
GLENSIDE DRIVE
WILDFLOWER ROAD
WILDFLOWER
ROAD
ZONE AE
REVISED
AREA
7208
DR
FLAMING SUN DRIVE
7190
7194
7200
7204
28
ROAD
7185
DQ
7182
27
7180
OLD SETTLERS TRAIL
POCO ROAD
7177
7174
DP
VOLLMER
7168
7162
7158
7155
DO
DM
DL
FUTURE
SITE
DK
DJ
7124
TOMAHAWK TRAIL
7114
DI
DH
Sand Creek
7096
GLIDER LOOP
7085
DD
DE
DF
7073
7058
STERLING RANCH
EAST FILING NO. 1
SITE
DC
34
VOLLMER PLACE
7040
CY
7032
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.
7021
7019
CX
7014
FUTURE
SITE
7005
7000
6994
6990
6986
MUSTANG PLACE
CU
6984
6974
CIRCLE
OTO
6960
6969
CT
Sand Creek
6951
4
MUSTANG ROAD
3
6946
CS
AREA REVISED
BY LOMR DATED
DECEMBER 07, 2005
6938
ZONE
AE
6931
COCHISE ROAD
MOHAWK ROAD
KENOSHA DRIVE
Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
N
APPROXIMATE SCALE IN FEET
1,000
0
1,000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO AND
INCORPORATED
AREAS
PANEL 535 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0535 F
REVISED TO
REFLECT LOMR
EFFECTIVE: July 23, 2009
MAP NUMBER
08041C0535 F
EFFECTIVE DATE:
MARCH 17, 1997
Federal Emergency Management Agency

DEVELOPED CONDITIONS CALCULATIONS

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

		IMPERVIOUS AREA / STREETS			LOTS/LANDSCAPE/UNDEV. AREAS (NOT PAVEMENT)				WEIGHTED		WEIGHTED CA	
BASIN	TOTAL AREA (AC)	AREA (AC)	C(5)	C(100)	AREA (AC)	LAND USE	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
A1	3.78	0.46	0.90	0.96	2.24	S/F	0.45	0.59	0.40	0.57	**1.51**	**2.14**
					1.08	OPEN	0.08	0.35				
A2	0.72	0.12	0.90	0.96	0.60	S/F	0.45	0.59	0.53	0.65	**0.38**	**0.47**
B1	4.72	0.71	0.90	0.96	0.78	OPEN	0.08	0.35	0.46	0.61	**2.15**	**2.86**
					3.23	S/F	0.45	0.59				
B2	0.18	0.10	0.90	0.96	0.08	S/F	0.45	0.59	0.70	0.80	**0.13**	**0.14**
C	2.31	0.33	0.90	0.96	1.98	S/F	0.45	0.59	0.51	0.64	**1.19**	**1.49**
D	1.50	0.44	0.90	0.96	1.06	S/F	0.45	0.59	0.58	0.70	**0.87**	**1.05**
E	1.07	0.29	0.90	0.96	0.78	S/F	0.45	0.59	0.57	0.69	**0.61**	**0.74**
F	0.46	0.20	0.90	0.96	0.26	S/F	0.45	0.59	0.65	0.75	**0.30**	**0.35**
G	1.89	0.24	0.90	0.96	1.65	S/F	0.45	0.59	0.51	0.64	**0.96**	**1.20**
H	1.08	0.20	0.90	0.96	0.88	S/F	0.45	0.59	0.53	0.66	**0.58**	**0.71**
J	0.93	0.16	0.90	0.96	0.77	S/F	0.45	0.59	0.53	0.65	**0.49**	**0.61**
K	0.44	0.16	0.90	0.96	0.28	S/F	0.45	0.59	0.61	0.72	**0.27**	**0.32**
L	2.40	0.43	0.90	0.96	1.97	S/F	0.45	0.59	0.53	0.66	**1.27**	**1.58**
M	1.40	0.29	0.90	0.96	1.11	S/F	0.45	0.59	0.54	0.67	**0.76**	**0.93**
N	2.46	0.52	0.90	0.96	1.94	S/F	0.45	0.59	0.55	0.67	**1.34**	**1.64**
P	1.59	0.37	0.90	0.96	1.22	S/F	0.45	0.59	0.55	0.68	**0.88**	**1.08**
Q	2.28	0.65	0.90	0.96	1.63	S/F	0.45	0.59	0.58	0.70	**1.32**	**1.59**
R	1.18	0.33	0.90	0.96	0.85	S/F	0.45	0.59	0.58	0.69	**0.68**	**0.82**
S	1.02	0.18	0.90	0.96	0.84	S/F	0.45	0.59	0.53	0.66	**0.54**	**0.67**
T	2.10	0.67	0.90	0.96	1.43	S/F	0.45	0.59	0.59	0.71	**1.25**	**1.49**

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

		IMPERVIOUS AREA / STREETS			LOTS/LANDSCAPE/UNDEV. AREAS (NOT PAVEMENT)				WEIGHTED		WEIGHTED CA	
BASIN	TOTAL AREA (AC)	AREA (AC)	C(5)	C(100)	AREA (AC)	LAND USE	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
U	0.46	0.18	0.90	0.96	0.28	S/F	0.45	0.59	0.63	0.73	**0.29**	**0.34**
V	1.02	0.18	0.90	0.96	0.84	S/F	0.45	0.59	0.53	0.66	**0.54**	**0.67**
W	0.36	0.14	0.90	0.96	0.22	S/F	0.45	0.59	0.63	0.73	**0.23**	**0.26**
X	2.93	0.50	0.90	0.96	2.43	S/F	0.45	0.59	0.53	0.65	**1.54**	**1.91**
Y	1.67	0.42	0.90	0.96	1.25	S/F	0.45	0.59	0.56	0.68	**0.94**	**1.14**
Z	3.22	0.43	0.90	0.96	2.79	S/F	0.45	0.59	0.51	0.64	**1.64**	**2.06**
AA	1.66	0.33	0.90	0.96	1.33	S/F	0.45	0.59	0.54	0.66	**0.90**	**1.10**
BB	3.13	0.40	0.90	0.96	2.73	S/F	0.45	0.59	0.51	0.64	**1.59**	**1.99**
CC	1.50	0.38	0.90	0.96	1.12	S/F	0.45	0.59	0.56	0.68	**0.85**	**1.03**
DD	3.19	0.33	0.90	0.96	2.86	S/F	0.45	0.59	0.50	0.63	**1.58**	**2.00**
EE	0.92	0.45	0.90	0.96	0.31	S/F	0.45	0.59	0.61	0.73	**0.56**	**0.67**
					0.16	OPEN	0.08	0.35				
FF	2.84	0.77	0.90	0.96	2.07	S/F	0.45	0.59	0.57	0.69	**1.62**	**1.96**
GG	2.14	0.72	0.90	0.96	1.42	S/F	0.45	0.59	0.60	0.71	**1.29**	**1.53**
HH	1.33	0.36	0.90	0.96	0.97	S/F	0.45	0.59	0.57	0.69	**0.76**	**0.92**
JJ	2.63	1.76	0.90	0.96	0.87	OPEN	0.08	0.35	0.63	0.76	**1.65**	**1.99**
KK	3.51	0.09	0.90	0.96	3.42	OPEN	0.08	0.35	0.10	0.37	**0.35**	**1.28**
LL1	0.79	0.00	0.90	0.96	0.41	OPEN	0.08	0.35	0.26	0.47	**0.20**	**0.37**
					0.38	S/F	0.45	0.59				
LL2	1.75	0.06	0.90	0.96	1.03	OPEN	0.08	0.35	0.25	0.46	**0.43**	**0.81**
					0.66	S/F	0.45	0.59				
MM	1.05	0.01	0.90	0.96	0.36	OPEN	0.08	0.35	0.33	0.51	**0.34**	**0.54**
					0.68	S/F	0.45	0.59				
NN	0.73	0.01	0.90	0.96	0.33	OPEN	0.08	0.35	0.29	0.49	**0.21**	**0.36**
					0.39	S/F	0.45	0.59				
PP	4.21	0.23	0.90	0.96	3.98	OPEN	0.08	0.35	0.12	0.38	**0.53**	**1.61**
QQ	0.74	0.63	0.90	0.96	0.11	OPEN	0.08	0.35	0.78	0.87	**0.58**	**0.64**
RR	5.99	0.00	0.90	0.96	5.99	OPEN	0.08	0.35	0.08	0.35	**0.48**	**2.10**
SS	0.84	0.01	0.90	0.96	0.30	OPEN	0.08	0.35	0.32	0.51	**0.27**	**0.43**
					0.53	S/F	0.45	0.59				

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

		IMPERVIOUS AREA / STREETS			LOTS/LANDSCAPE/UNDEV. AREAS (NOT PAVEMENT)				WEIGHTED		WEIGHTED CA	
BASIN	TOTAL AREA (AC)	AREA (AC)	C(5)	C(100)	AREA (AC)	LAND USE	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
TT	1.63	0.08	0.90	0.96	1.55	OPEN	0.08	0.35	0.12	0.38	**0.20**	**0.62**
CH-1	27.11	0.00	0.90	0.96	27.11	OPEN	0.08	0.35	0.08	0.35	**2.17**	**9.49**
CH-2	10.62	0.00	0.90	0.96	10.62	OPEN	0.08	0.35	0.08	0.35	**0.85**	**3.72**
P1-A1	4.45	3.12	0.90	0.96	1.33	OPEN	0.08	0.35	0.65	0.78	**2.91**	**3.46**
P1-A2	6.59	4.20	0.90	0.96	2.01	OPEN	0.08	0.35	0.62	0.75	**4.11**	**4.96**
					0.38	S/F	0.45	0.59				
P1-A3	1.83	1.37	0.90	0.96	0.46	OPEN	0.08	0.35	0.69	0.81	**1.27**	**1.48**
P1-A4	1.64	1.22	0.90	0.96	0.42	OPEN	0.08	0.35	0.69	0.80	**1.13**	**1.32**
P1-A5	1.86	1.01	0.90	0.96	0.85	OPEN	0.08	0.35	0.53	0.68	**0.98**	**1.27**
					0.00	S/F	0.45	0.59				
P1-A6	3.55	1.97	0.90	0.96	1.58	OPEN	0.08	0.35	0.54	0.69	**1.90**	**2.44**
P1-A7	3.11	1.06	0.90	0.96	1.11	OPEN	0.08	0.35	0.47	0.63	**1.47**	**1.96**
					0.94	S/F	0.45	0.59				
P2-B1	1.82	1.19	0.90	0.96	0.63	OPEN	0.08	0.35	0.62	0.75	**1.12**	**1.36**
P2-B2	1.87	1.17	0.90	0.96	0.70	OPEN	0.08	0.35	0.59	0.73	**1.11**	**1.37**
P2-B3	1.55	0.98	0.90	0.96	0.57	OPEN	0.08	0.35	0.60	0.74	**0.93**	**1.14**
P2-B4	1.64	1.00	0.90	0.96	0.64	OPEN	0.08	0.35	0.58	0.72	**0.95**	**1.18**
P2-B5	0.97	0.66	0.90	0.96	0.31	OPEN	0.08	0.35	0.64	0.77	**0.62**	**0.74**
P2-B6	1.07	0.67	0.90	0.96	0.40	OPEN	0.08	0.35	0.59	0.73	**0.64**	**0.78**
P2-B7	1.62	0.80	0.90	0.96	0.82	OPEN	0.08	0.35	0.48	0.65	**0.79**	**1.06**
P2-B8	1.21	0.80	0.90	0.96	0.41	OPEN	0.08	0.35	0.62	0.75	**0.75**	**0.91**
P2-B9	2.08	1.60	0.90	0.96	0.48	OPEN	0.08	0.35	0.71	0.82	**1.48**	**1.70**
P2-B10	2.31	1.64	0.90	0.96	0.67	OPEN	0.08	0.35	0.66	0.78	**1.53**	**1.81**
P2-C2	1.73	1.26	0.90	0.96	0.47	OPEN	0.08	0.35	0.68	0.79	**1.17**	**1.37**
P2-S1	36.59	0.00	0.90	0.96	36.59	SCHOOL	0.42	0.61	0.42	0.61	**15.37**	**22.32**
P2-S1 (UNDEV)	36.59	0.00	0.90	0.96	36.59	OPEN	0.08	0.35	0.08	0.35	**2.93**	**12.81**

JOB NAME: **Sterling Ranch East Filing No. 1**
JOB NUMBER: **1183.30**
DATE: **8/4/2022**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
A1	1.51	2.14	0.45	100	2	9.3	670	1.8%	4.7	2.4	11.7	3.89	6.53	**5.9**	**14.0**
A2	0.38	0.47	0.45	100	2	9.3	140	1.5%	4.3	0.5	9.9	4.15	6.96	**1.6**	**3.3**
B1	2.15	2.86	0.45	100	2	9.3	720	1.8%	4.7	2.6	11.9	3.87	6.50	**8.3**	**18.6**
B2	0.13	0.14	0.45	20	6	1.7	100	1.5%	4.3	0.4	5.0	5.17	8.68	**0.7**	**1.2**
C	1.19	1.49	0.45	100	2	9.3	420	1.5%	4.3	1.6	11.0	3.99	6.70	**4.7**	**9.9**
D	0.87	1.05	0.45	100	2	9.3	460	1.5%	4.3	1.8	11.1	3.97	6.66	**3.5**	**7.0**
E	0.61	0.74	0.45	20	1	3.1	210	1.5%	4.3	0.8	5.0	5.17	8.68	**3.2**	**6.4**
F	0.30	0.35	0.45	20	1	3.1	210	1.5%	4.3	0.8	5.0	5.17	8.68	**1.5**	**3.0**
G	0.96	1.20	0.45	100	2	9.3	250	1.5%	4.3	1.0	10.3	4.08	6.86	**3.9**	**8.3**
H	0.58	0.71	0.45	100	2	9.3	200	1.5%	4.3	0.8	10.1	4.11	6.90	**2.4**	**4.9**
J	0.49	0.61	0.45	100	2	9.3	180	1.5%	4.3	0.7	10.0	4.12	6.92	**2.0**	**4.2**
K	0.27	0.32	0.45	40	0.8	5.9	180	1.5%	4.3	0.7	6.6	4.75	7.98	**1.3**	**2.5**

JOB NAME: **Sterling Ranch East Filing No. 1**
JOB NUMBER: **1183.30**
DATE: **8/4/2022**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	CA(5)	CA(100)	C(5)	Length	Height	Tc	Length	Slope	Velocity	Tc	TOTAL	I(5)	I(100)	Q(5)	Q(100)
				(ft)	*(ft)*	*(min)*	*(ft)*	*(%)*	*(fps)*	*(min)*	*(min)*	*(in/hr)*	*(in/hr)*	*(cfs)*	*(cfs)*
L	1.27	1.58	0.45	100	2	9.3	400	1.5%	4.3	1.6	10.9	4.00	6.72	**5.1**	**10.6**
M	0.76	0.93	0.45	40	0.8	5.9	340	1.5%	4.3	1.3	7.2	4.62	7.75	**3.5**	**7.2**
N	1.34	1.64	0.45	100	2	9.3	450	1.5%	4.3	1.7	11.1	3.97	6.67	**5.3**	**11.0**
P	0.88	1.08	0.45	40	0.8	5.9	450	1.5%	4.3	1.7	7.7	4.53	7.61	**4.0**	**8.2**
Q	1.32	1.59	0.45	100	2	9.3	670	1.5%	4.3	2.6	11.9	3.86	6.49	**5.1**	**10.3**
R	0.68	0.82	0.45	100	2	9.3	200	1.5%	4.3	0.8	10.1	4.11	6.90	**2.8**	**5.6**
S	0.54	0.67	0.45	100	2	9.3	200	1.5%	4.3	0.8	10.1	4.11	6.90	**2.2**	**4.6**
T	1.25	1.49	0.45	100	2	9.3	500	1.5%	4.3	1.9	11.3	3.95	6.63	**4.9**	**9.9**
U	0.29	0.34	0.45	40	0.8	5.9	200	1.5%	4.3	0.8	6.7	4.73	7.95	**1.4**	**2.7**
V	0.54	0.67	0.45	100	2	9.3	200	1.5%	4.3	0.8	10.1	4.11	6.90	**2.2**	**4.6**
W	0.23	0.26	0.45	40	0.8	5.9	150	1.5%	4.3	0.6	6.5	4.78	8.02	**1.1**	**2.1**
X	1.54	1.91	0.45	100	2	9.3	600	1.5%	4.3	2.3	11.7	3.90	6.54	**6.0**	**12.5**
Y	0.94	1.14	0.45	40	0.8	5.9	600	1.5%	4.3	2.3	8.2	4.42	7.42	**4.2**	**8.5**
Z	1.64	2.06	0.45	100	2	9.3	650	1.5%	4.3	2.5	11.9	3.87	6.50	**6.4**	**13.4**

JOB NAME: **Sterling Ranch East Filing No. 1**
JOB NUMBER: **1183.30**
DATE: **8/4/2022**
CALC'D BY: **MAL**

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
AA	0.90	1.10	0.45	100	2	9.3	340	2.6%	5.6	1.0	10.3	4.08	6.85	**3.7**	**7.5**
BB	1.59	1.99	0.45	100	2	9.3	650	1.5%	4.3	2.5	11.9	3.87	6.50	**6.2**	**13.0**
CC	0.85	1.03	0.45	100	2	9.3	210	1.5%	4.3	0.8	10.2	4.11	6.89	**3.5**	**7.1**
DD	1.58	2.00	0.45	100	2	9.3	530	1.5%	4.3	2.1	11.4	3.93	6.60	**6.2**	**13.2**
EE	0.56	0.67	0.45	40	0.8	5.9	670	1.5%	4.3	2.6	8.5	4.37	7.34	**2.4**	**4.9**
FF	1.62	1.96	0.45	100	2	9.3	850	1.5%	4.3	3.3	12.6	3.78	6.34	**6.1**	**12.4**
GG	1.29	1.53	0.45	100	2	9.3	830	1.5%	4.3	3.2	12.6	3.79	6.36	**4.9**	**9.7**
HH	0.76	0.92	0.45	100	2	9.3	230	1.5%	4.3	0.9	10.2	4.09	6.88	**3.1**	**6.3**
JJ	1.65	1.99	0.08	30	2	5.4	250	1.5%	4.3	1.0	6.4	4.81	8.07	**7.9**	**16.1**
KK	0.35	1.28	0.08	60	4	7.6	340	1.0%	3.5	1.6	9.2	4.25	7.13	**1.5**	**9.2**
LL1	0.20	0.37	0.45	60	7	4.0	100	2.0%	4.9	0.3	5.0	5.17	8.68	**1.1**	**3.2**
LL2	0.43	0.81	0.45	60	7	4.0	200	2.0%	4.9	0.7	5.0	5.17	8.68	**2.2**	**7.0**
MM	0.34	0.54	0.45	60	8	3.9	250	2.0%	4.9	0.8	5.0	5.17	8.68	**1.8**	**4.7**
NN	0.21	0.36	0.45	60	7	4.0	180	2.0%	4.9	0.6	5.0	5.17	8.68	**1.1**	**3.1**
PP	0.53	1.61	0.08	60	2	9.6	250	2.0%	4.9	0.8	10.4	4.07	6.83	**2.1**	**11.0**
QQ	0.58	0.64	0.08	10	1	2.7	180	1.0%	3.5	0.9	5.0	5.17	8.68	**3.0**	**5.6**

JOB NAME: **Sterling Ranch East Filing No. 1**
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FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
RR	0.48	2.10	0.08	100	25	6.4	360	1.0%	3.5	1.7	8.1	4.45	7.47	**2.1**	**15.7**
SS	0.27	0.43	0.45	60	7	4.0	150	2.0%	4.9	0.5	5.0	5.17	8.68	**1.4**	**3.7**
TT	0.20	0.62	0.08	40	1	8.6	400	2.0%	4.9	1.3	10.0	4.14	6.94	**0.8**	**4.3**
CH-1	2.17	9.49	0.08	100	18	7.1	3050	1.6%	4.4	11.5	18.6	3.20	5.37	**6.9**	**51.0**
CH-2	0.85	3.72	0.08	100	25	6.4	475	0.5%	2.5	3.2	9.6	4.20	7.04	**3.6**	**26.2**
P1-A1	2.91	3.46	0.08	10	0.5	3.4	2350	0.9%	3.3	11.8	15.2	3.50	5.87	**10.2**	**20.3**
P1-A2	4.11	4.96	0.08	10	0.5	3.4	2350	0.9%	3.3	11.8	15.2	3.50	5.87	**14.4**	**29.1**
P1-A3	1.27	1.48	0.08	10	0.5	3.4	780	0.9%	3.3	3.9	7.3	4.59	7.71	**5.8**	**11.4**
P1-A4	1.13	1.32	0.08	10	0.5	3.4	780	0.9%	3.3	3.9	7.3	4.59	7.71	**5.2**	**10.2**
P1-A5	0.98	1.27	0.08	10	0.5	3.4	600	1.0%	3.5	2.9	6.3	4.83	8.10	**4.7**	**10.3**
P1-A6	1.90	2.44	0.08	10	0.5	3.4	1250	1.0%	3.5	6.0	9.4	4.23	7.09	**8.0**	**17.3**
P1-A7	1.47	1.96	0.08	10	0.5	3.4	650	1.0%	3.5	3.1	6.5	4.77	8.01	**7.0**	**15.7**
P2-B1	1.12	1.36	0.08	10	0.5	3.4	1100	2.2%	5.2	3.5	7.0	4.67	7.85	**5.2**	**10.7**
P2-B2	1.11	1.37	0.08	10	0.5	3.4	1100	2.2%	5.2	3.5	7.0	4.67	7.85	**5.2**	**10.7**

JOB NAME: **Sterling Ranch East Filing No. 1**
JOB NUMBER: **1183.30**
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FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
BASIN	CA(5)	CA(100)	C(5)	Length *(ft)*	Height *(ft)*	Tc *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	Tc *(min)*	TOTAL *(min)*	I(5) *(in/hr)*	I(100) *(in/hr)*	Q(5) *(cfs)*	Q(100) *(cfs)*
P2-B3	0.93	1.14	0.08	10	0.5	3.4	980	1.6%	4.4	3.7	7.1	4.64	7.79	**4.3**	**8.9**
P2-B4	0.95	1.18	0.08	10	0.5	3.4	980	1.6%	4.4	3.7	7.1	4.64	7.79	**4.4**	**9.2**
P2-B5	0.62	0.74	0.08	10	0.5	3.4	615	1.6%	4.4	2.3	5.7	4.96	8.33	**3.1**	**6.2**
P2-B6	0.64	0.78	0.08	10	0.5	3.4	615	1.6%	4.4	2.3	5.7	4.96	8.33	**3.2**	**6.5**
P2-B7	0.79	1.06	0.08	10	0.5	3.4	760	1.6%	4.4	2.9	6.3	4.83	8.10	**3.8**	**8.5**
P2-B8	0.75	0.91	0.08	10	0.5	3.4	760	1.6%	4.4	2.9	6.3	4.83	8.10	**3.6**	**7.4**
P2-B9	1.48	1.70	0.08	10	0.5	3.4	770	2.3%	5.3	2.4	5.8	4.94	8.29	**7.3**	**14.1**
P2-B10	1.53	1.81	0.08	10	0.5	3.4	770	2.3%	5.3	2.4	5.8	4.94	8.29	**7.5**	**15.0**
P2-C2	1.17	1.37	0.08	10	0.5	3.4	610	3.4%	6.5	1.6	5.0	5.17	8.68	**6.1**	**11.9**
P2-S1	15.37	22.32									16.5	3.38	5.67	**51.9**	**126.6**
P2-S1 (UNDEV)	2.93	12.81	0.08	300	8	23.1	1760	1.4%	4.1	7.1	30.2	2.47	4.15	**7.2**	**53.2**

JOB NAME: *Sterling Ranch East Filing No. 1*
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CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Inlet Size
1	BASIN P1-A1	2.91	3.46	15.2	3.50	5.87	10.2	20.3	EX. 20' AT-GRADE
2	BASIN P1-A2	4.11	4.96	15.2	3.50	5.87	14.4	29.1	EX. 20' AT-GRADE
3	BASIN P1-A4 + Flow-By DP-1	1.13	1.90	7.3	4.59	7.71	5.2	14.7	EX. 15' AT-GRADE
4	BASIN P1-A3 + Flow-By DP-2	1.61	3.08	15.2	3.50	5.87	5.6	18.1	EX. 15' AT-GRADE
5	BASIN P1-A7	1.47	1.96	6.5	4.77	8.01	7.0	15.7	FUT. 15' AT-GRADE
6	BASIN P1-A5 + BASIN P1-C2 + Flow-By DP-4 + Flow-By DP-5	2.15	3.94	6.5	4.77	8.01	10.3	31.6	20' SUMP
7	BASIN P1-A6	1.90	2.44	9.4	4.23	7.09	8.0	17.3	15' SUMP
8	BASIN P2-B2	1.11	1.37	7.0	4.67	7.85	5.2	10.7	EX. 10' AT-GRADE
9	BASIN P2-B1 + Flow-By DP-3	1.12	1.75	7.0	4.67	7.85	5.2	13.7	EX. 10' AT-GRADE
10	BASIN X	1.54	1.91	11.7	3.90	6.54	6.0	12.5	15' SUMP

JOB NAME:	*Sterling Ranch East Filing No. 1*
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FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
11	BASIN Y	0.94	1.14	8.2	4.42	7.42	4.2	8.5	10' SUMP
12	BASIN Z	1.64	2.06	11.9	3.87	6.50	6.4	13.4	15' AT-GRADE
13	BASIN FF + Flow-By DP-12	1.62	2.31	12.6	3.78	6.34	6.1	14.7	15' SUMP
14	BASIN AA	0.90	1.10	10.3	4.08	6.85	3.7	7.5	10' SUMP
15	BASIN P2-B4 + Flow-By DP-8	1.03	1.62	7.1	4.64	7.79	4.8	12.6	EX. 15' AT-GRADE
16	BASIN P2-B3 + Flow-By DP-9	1.02	1.83	7.1	4.64	7.79	4.7	14.3	EX. 15' AT-GRADE
17	BASIN BB	1.59	1.99	11.9	3.87	6.50	6.2	13.0	10' AT-GRADE
18	BASIN GG + Flow-By DP-17	1.48	2.28	12.6	3.79	6.36	5.6	14.5	15' SUMP
19	BASIN CC	0.85	1.03	10.2	4.11	6.89	3.5	7.1	5' SUMP
20	BASIN DD	1.58	2.00	11.4	3.93	6.60	6.2	13.2	10' AT-GRADE
21	BASIN HH + Flow-By DP-20	0.97	1.70	11.4	3.93	6.60	3.8	11.2	10' SUMP
22	BASIN EE	0.56	0.67	8.5	4.37	7.34	2.4	4.9	5' SUMP

JOB NAME: *Sterling Ranch East Filing No. 1*
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FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Inlet Size
23	BASIN P2-B6 + Flow-By DP-15	0.63	1.03	5.7	4.96	8.33	3.1	8.6	EX. 15' AT-GRADE
24	BASIN P2-B5 + Flow-By DP-16	0.63	1.10	5.7	4.96	8.33	3.1	9.1	EX. 15' AT-GRADE
25	BASIN P2-B8 + Flow-By DP-23	0.76	0.95	6.3	4.83	8.10	3.7	7.7	EX. 15' AT-GRADE
26	BASIN P2-B7 + Flow-By DP-24	0.79	1.12	6.3	4.83	8.10	3.8	9.1	EX. 15' AT-GRADE
27	BASIN P2-B10 + Flow-By DP-25	1.52	1.82	5.8	4.94	8.29	7.5	15.1	EX. 15' SUMP
28	BASIN P2-B9 + Flow-By DP-26	1.48	1.76	5.8	4.94	8.29	7.3	14.6	EX. 15' SUMP
29A	BASIN A1	1.51	2.14	11.7	3.89	6.53	5.9	14.0	10' AT-GRADE
29B	BASIN A2 + Flow-By DP-29A	0.55	1.32	11.7	3.89	6.53	2.1	8.7	5' SUMP
30A	BASIN B1	2.15	2.86	11.9	3.87	6.50	8.3	18.6	10' AT-GRADE
30B	BASIN B2 + Flow-By DP-30A	0.63	1.53	11.9	3.87	6.50	2.4	9.9	10' SUMP
31	BASIN L	1.27	1.58	10.9	4.00	6.72	5.1	10.6	10' SUMP
32	BASIN M	0.76	0.93	7.2	4.62	7.75	3.5	7.2	5' SUMP
33	BASIN N	1.34	1.64	11.1	3.97	6.67	5.3	11.0	10' SUMP
34	BASIN P	0.88	1.08	7.7	4.53	7.61	4.0	8.2	10' SUMP

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FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Inlet Size
35	BASIN R	0.68	0.82	10.1	4.11	6.90	2.8	5.6	5' SUMP
36	BASIN S	0.54	0.67	10.1	4.11	6.90	2.2	4.6	5' SUMP
37	BASIN D	0.87	1.05	11.1	3.97	6.66	3.5	7.0	5' SUMP
38	BASIN C	1.19	1.49	11.0	3.99	6.70	4.7	9.9	10' SUMP
39	BASIN G	0.96	1.20	10.3	4.08	6.86	3.9	8.3	10' SUMP
40	BASIN H	0.58	0.71	10.1	4.11	6.90	2.4	4.9	5' SUMP
41	BASIN E	0.61	0.74	5.0	5.17	8.68	3.2	6.4	5' SUMP
42	BASIN F	0.30	0.35	5.0	5.17	8.68	1.5	3.0	5' SUMP
43	BASIN J	0.49	0.61	10.0	4.12	6.92	2.0	4.2	5' SUMP
44	BASIN K	0.27	0.32	6.6	4.75	7.98	1.3	2.5	5' SUMP
45	BASIN V	0.54	0.67	10.1	4.11	6.90	2.2	4.6	5' SUMP
46	BASIN U	0.29	0.34	6.7	4.73	7.95	1.4	2.7	5' SUMP
47A	BASIN Q	1.32	1.59	11.9	3.86	6.49	5.1	10.3	10' AT-GRADE

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FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Inlet Size
47B	BASIN T + Flow-By DP-47A	1.37	2.01	11.9	3.86	6.49	5.3	13.0	10' SUMP
48	BASIN W	0.23	0.26	6.5	4.78	8.02	1.1	2.1	5' SUMP
50	BASIN P2-S1	15.37	22.32	16.5	3.38	5.67	51.9	126.6	FUT. STORM
50B	1/2 BASIN P2-S1 (UNDEV)	1.46	6.40	30.2	2.47	4.15	3.6	26.6	TYPE D INLET (IN-SERIES, DEPRESSED)
50C	1/2 BASIN P2-S1 (UNDEV)	1.46	6.40	30.2	2.47	4.15	3.6	26.6	TYPE D INLET (IN-SERIES, DEPRESSED)
51	BASIN JJ	1.65	1.99	6.4	4.81	8.07	7.9	16.1	FUT. STORM
52	BASIN MM	0.34	0.54	5.0	5.17	8.68	1.8	4.7	TYPE C INLET
53	BASIN NN	0.21	0.36	5.0	5.17	8.68	1.1	3.1	TYPE C INLET
54	BASIN SS	0.27	0.43	5.0	5.17	8.68	1.4	3.7	TYPE C INLET
55A	BASIN LL1	0.20	0.37	5.0	5.17	8.68	1.1	3.2	TYPE C INLET
55B	BASIN LL2	0.43	0.81	5.0	5.17	8.68	2.2	7.0	TYPE C INLET (DEPRESSED)
56	BASIN TT	0.20	0.62	10.0	4.14	6.94	0.8	4.3	FUT. STORM
57	BASIN PP	0.53	1.61	10.4	4.07	6.83	2.1	11.0	FUT. STORM
58	BASIN QQ	0.58	0.64	5.0	5.17	8.68	3.0	5.6	FUT. STORM
59	BASIN KK	0.35	1.28	9.2	4.25	7.13	1.5	9.2	FUT. STORM
60	BASIN RR + PIPE 42 + PIPE 95	74.26	99.25	19.5	3.12	5.24	232.0	520.5	POND 14A

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REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
1	DP-2 (Intercepted)	3.77	3.35	15.2	3.50	5.87	13.2	19.7	EX. 30"
2	PIPE 1 + DP-1 (Intercepted)	6.68	6.23	15.2	3.50	5.87	23.4	36.6	EX. 30"
3	DP-4 (Intercepted)	1.61	2.23	15.2	3.50	5.87	5.6	13.1	24"
4	DP-3 (Intercepted)	1.13	1.52	7.3	4.59	7.71	5.2	11.7	EX. 18"
5	PIPE 2 + PIPE 3 + PIPE 4	9.42	9.98	15.2	3.50	5.87	33.0	58.6	36"
6	DP-5 (Intercepted)	1.47	1.51	6.5	4.77	8.01	7.0	12.1	24"
7	DP-6	2.15	3.94	6.5	4.77	8.01	10.3	31.6	30"
8	DP-7	1.90	2.44	9.4	4.23	7.09	8.0	17.3	24"
9	PIPE 6 + PIPE 7 + PIPE 8	5.52	7.90	9.4	4.23	7.09	23.3	56.0	36"
10	PIPE 5 + PIPE 9	14.94	17.88	15.2	3.50	5.87	52.3	105.0	42"
11	DP-8 (Intercepted)	1.03	0.93	7.0	4.67	7.85	4.8	7.3	EX. 18"
12	PIPE 11 + DP-9 (Intercepted)	2.05	1.99	7.0	4.67	7.85	9.6	15.6	EX. 18"

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FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
13	PIPE 10 + PIPE 12	16.99	19.86	16.6	3.36	5.65	57.2	112.2	48"
14	DP-50	15.37	22.32	16.5	3.38	5.67	51.9	126.6	48"
14B	DP-50B	1.46	6.40	30.2	2.47	4.15	3.6	26.6	30"
14C	PIPE 14B + DP-50C	2.93	12.81	30.2	2.47	4.15	7.2	53.2	36"
15	PIPE 13 + PIPE 14	32.36	42.18	16.9	3.34	5.61	108.1	236.5	60"
16	DP-10	1.54	1.91	11.7	3.90	6.54	6.0	12.5	24"
17	DP-11	0.94	1.14	8.2	4.42	7.42	4.2	8.5	18"
18	PIPE 16 + PIPE 17	2.48	3.05	11.7	3.90	6.54	9.7	20.0	24"
19	PIPE 18 + PIPE 23	4.13	4.76	12.4	3.81	6.39	15.7	30.4	30"
20	DP-15 (Intercepted)	1.03	1.37	7.1	4.64	7.79	4.8	10.7	EX. 18"

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FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
21	PIPE 20 + DP-16 (Intercepted)	2.05	2.85	7.1	4.64	7.79	9.5	22.2	18"
22	PIPE 15 + PIPE 21	34.41	45.03	17.6	3.28	5.50	112.8	247.8	60"
23	DP-12 (Intercepted)	1.65	1.71	11.9	3.87	6.50	6.4	11.1	18"
24	DP-13	1.62	2.31	12.6	3.78	6.34	6.1	14.7	24"
25	DP-14	0.90	1.10	10.3	4.08	6.85	3.7	7.5	18"
26	PIPE 19 + PIPE 24 + PIPE 25	6.65	8.18	12.6	3.79	6.36	25.2	52.0	36"
27	PIPE 26 + PIPE 28	8.04	9.42	13.1	3.72	6.24	29.9	58.8	36"
28	DP-17 (Intercepted)	1.39	1.25	11.9	3.87	6.50	5.4	8.1	18"
29	DP-18	1.48	2.28	12.6	3.79	6.36	5.6	14.5	24"
30	DP-19	0.85	1.03	10.2	4.11	6.89	3.5	7.1	18"

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FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
31	PIPE 27 + PIPE 29 + PIPE 30	10.37	12.72	13.1	3.72	6.24	38.6	79.4	42"
32	DP-20 (Intercepted)	1.37	1.23	11.4	3.93	6.60	5.4	8.1	18"
33	PIPE 34 + PIPE 35	1.53	2.37	11.4	3.93	6.60	6.0	15.6	24"
34	DP-21	0.97	1.70	11.4	3.93	6.60	3.8	11.2	24"
35	DP-22	0.56	0.67	8.5	4.37	7.34	2.4	4.9	18"
36A	PIPE 31 + PIPE 32 + PIPE 33	13.27	16.32	13.6	3.67	6.15	48.6	100.4	48"
36B	PIPE 36A + PIPE 100	14.92	18.31	13.6	3.67	6.15	54.7	112.7	48"
37	DP-23 (Intercepted)	0.63	1.00	5.7	4.96	8.33	3.1	8.3	EX. 18"
38	PIPE 37 + DP-24 (Intercepted)	1.25	2.03	5.7	4.96	8.33	6.2	16.9	EX. 18"
39A	PIPE 22 + PIPE 38	35.67	47.06	18.3	3.22	5.41	114.9	254.6	60"

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FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
39B	PIPE 39A + PIPE 36B	50.59	65.37	18.6	3.20	5.38	162.0	351.4	72"
40	DP-25 (Intercepted)	0.76	0.94	6.3	4.83	8.10	3.7	7.6	EX. 18"
41	PIPE 40 + DP-26 (Intercepted)	1.55	2.00	6.3	4.83	8.10	7.5	16.2	EX. 18"
42	PIPE 39B + PIPE 41 + PIPE 96	52.49	68.66	19.0	3.17	5.31	166.2	364.8	72"
43	DP-28	1.48	1.76	5.8	4.94	8.29	7.3	14.6	EX. 24"
44	PIPE 43 + DP-27	3.00	3.58	5.8	4.94	8.29	14.8	29.7	EX. 24"
45	DP-29A (Intercepted)	1.34	1.29	11.7	3.89	6.53	5.2	8.4	18"
46	DP-30A (Intercepted)	1.65	1.48	11.9	3.87	6.50	6.4	9.6	18"
47	PIPE 45 + PIPE 46	2.99	2.76	11.9	3.87	6.50	11.6	18.0	24"
48	DP-29B	0.55	1.32	11.7	3.89	6.53	2.1	8.7	18"

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FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
49	DP-30B	0.63	1.53	11.9	3.87	6.50	2.4	9.9	18"
50	PIPE 47 + PIPE 48 + PIPE 49	4.17	5.61	11.9	3.87	6.50	16.1	36.5	30"
51	DP-37	0.87	1.05	11.1	3.97	6.66	3.5	7.0	18"
52	DP-38	1.19	1.49	11.0	3.99	6.70	4.7	9.9	18"
53	PIPE 50 + PIPE 51 + PIPE 52	6.23	8.15	13.0	3.74	6.27	23.3	51.1	36"
54	DP-39	0.96	1.20	10.3	4.08	6.86	3.9	8.3	18"
55	DP-40	0.58	0.71	10.1	4.11	6.90	2.4	4.9	18"
56	PIPE 54 + PIPE 55	1.53	1.92	10.3	4.08	6.86	6.3	13.1	24"
57	PIPE 53	6.23	8.15	13.4	3.70	6.20	23.0	50.5	36"
58	DP-42	0.30	0.35	5.0	5.17	8.68	1.5	3.0	18"

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FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
59	PIPE 57 + PIPE 58	6.53	8.49	13.7	3.65	6.13	23.8	52.1	36"
60	DP-41	0.61	0.74	5.0	5.17	8.68	3.2	6.4	18"
61	PIPE 59 + PIPE 60	7.14	9.23	13.7	3.65	6.13	26.1	56.6	42"
62	DP-43	0.49	0.61	10.0	4.12	6.92	2.0	4.2	18"
63	DP-44	0.27	0.32	6.6	4.75	7.98	1.3	2.5	18"
64	PIPE 61 + PIPE 62 + PIPE 63	7.90	10.16	14.4	3.58	6.01	28.3	61.1	42"
65	DP-45	0.54	0.67	10.1	4.11	6.90	2.2	4.6	18"
66	DP-46	0.29	0.34	6.7	4.73	7.95	1.4	2.7	18"
67	PIPE 64 + PIPE 65 + PIPE 66	8.73	11.16	15.1	3.51	5.90	30.7	65.8	42"
68	DP-31	1.27	1.58	10.9	4.00	6.72	5.1	10.6	18"

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
69	DP-32	0.76	0.93	7.2	4.62	7.75	3.5	7.2	18"
70	PIPE 68 + PIPE 69	2.03	2.51	10.9	4.00	6.72	8.1	16.8	24"
71	DP-33	1.34	1.64	11.1	3.97	6.67	5.3	11.0	18"
72	DP-34	0.88	1.08	7.7	4.53	7.61	4.0	8.2	18"
73	PIPE 71 + PIPE 72	2.22	2.72	11.1	3.97	6.67	8.8	18.1	24"
74	PIPE 70 + PIPE 73	4.26	5.23	11.8	3.88	6.52	16.5	34.1	30"
75	DP-47A (Intercepted)	1.19	1.06	11.9	3.86	6.49	4.6	6.9	18"
76	PIPE 74 + PIPE 75	5.45	6.29	12.2	3.83	6.43	20.9	40.4	30"
77	DP-35	0.68	0.82	10.1	4.11	6.90	2.8	5.6	18"
78	DP-36	0.54	0.67	10.1	4.11	6.90	2.2	4.6	18"

JOB NAME:	*Sterling Ranch East Filing No. 1*
JOB NUMBER:	*1183.30*
DATE:	*08/04/22*
CALCULATED BY:	*MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
79	PIPE 56 + PIPE 77 + PIPE 78	2.75	3.40	10.3	4.08	6.86	11.2	23.3	24"
80	PIPE 76 + PIPE 79	8.20	9.69	12.2	3.83	6.43	31.4	62.3	42"
81	DP-47B	1.37	2.01	11.9	3.86	6.49	5.3	13.0	24"
82	DP-48	0.23	0.26	6.5	4.78	8.02	1.1	2.1	18"
83	PIPE 81 + PIPE 82	1.60	2.27	11.9	3.86	6.49	6.2	14.7	24"
84	PIPE 80 + PIPE 83	9.80	11.97	12.7	3.77	6.33	36.9	75.7	42"
85	PIPE 67 + PIPE 84	18.53	23.13	15.4	3.48	5.85	64.6	135.3	48"
86	DP-52	0.34	0.54	5.0	5.17	8.68	1.8	4.7	18"
87	PIPE 86 + DP-53	0.55	0.89	6.0	4.90	8.23	2.7	7.3	18"
88	PIPE 87 + DP-54	0.83	1.32	6.7	4.73	7.95	3.9	10.5	18"

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
89A	PIPE 85 + PIPE 88	19.35	24.45	15.6	3.46	5.81	67.0	142.1	54"
89B	DP-55A	0.20	0.37	5.0	5.17	8.68	1.1	3.2	18"
89C	PIPE 89A + PIPE 89B	19.56	24.82	15.6	3.46	5.81	67.7	144.2	54"
90	DP-55B	0.43	0.81	5.0	5.17	8.68	2.2	7.0	18"
91	PIPE 89C + PIPE 90	19.99	25.62	16.5	3.38	5.67	67.6	145.4	54"
92A	DP-56	0.20	0.62	10.0	4.14	6.94	0.8	4.3	18"
92B	PIPE 92A + DP-57	0.72	2.23	10.4	4.07	6.83	2.9	15.2	24"
93	DP-58	0.58	0.64	5.0	5.17	8.68	3.0	5.6	18"
94	PIPE 92B + PIPE 93	1.30	2.88	10.0	4.14	6.94	5.4	20.0	24"
95	PIPE 91 + PIPE 94	21.29	28.50	16.9	3.34	5.61	71.1	159.8	54"

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
96	DP-59	0.35	1.28	9.2	4.25	7.13	1.5	9.2	18"
97	DP/PIPE 26A From JR Engineering Letter - Sterling Ranch & Briargate	3.66	30.21	18.6	3.20	5.36	11.7	162.0	EX. 54"
98	POND A OUTFALL	0.96	10.34	19.5	3.12	5.24	3.0	54.2	48"
100	DP-51	1.65	1.99	6.4	4.81	8.07	7.9	16.1	24"

JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

At-Grade Inlet - Flow Routing (DEVELOPED CONDITIONS)

Design Point	TOTAL						INTERCEPTED				FLOW-BY			
	CA5	CA100	I5	I100	Q5	Q100	Q5	Q100	CA5	CA100	Q5	Q100	CA5	CA100
1	2.91	3.46	3.50	5.87	10.2	20.3	10.2	16.9	2.91	2.88	0.0	3.4	0.00	0.58
2	4.11	4.96	3.50	5.87	14.4	29.1	13.2	19.7	3.77	3.35	1.2	9.4	0.34	1.61
3	1.13	1.90	4.59	7.71	5.2	14.7	5.2	11.7	1.13	1.52	0.0	3.0	0.00	0.38
4	1.61	3.08	3.50	5.87	5.6	18.1	5.6	13.1	1.61	2.23	0.0	5.0	0.00	0.85
5	1.47	1.96	4.77	8.01	7.0	15.7	7.0	12.1	1.47	1.51	0.0	3.6	0.00	0.45
8	1.11	1.37	4.67	7.85	5.2	10.7	4.8	7.3	1.03	0.93	0.4	3.4	0.08	0.44
9	1.12	1.75	4.67	7.85	5.2	13.7	4.8	8.3	1.03	1.06	0.4	5.4	0.10	0.69
12	1.64	2.06	3.87	6.50	6.4	13.4	6.4	11.1	1.65	1.71	0.0	2.3	0.00	0.35
15	1.03	1.62	4.64	7.79	4.8	12.6	4.8	10.7	1.03	1.37	0.0	1.9	0.00	0.25
16	1.02	1.83	4.64	7.79	4.7	14.3	4.7	11.5	1.02	1.48	0.0	2.8	0.01	0.35
17	1.59	1.99	3.87	6.50	6.2	13.0	5.4	8.1	1.39	1.25	0.8	4.9	0.19	0.75
20	1.58	2.00	3.93	6.60	6.2	13.2	5.4	8.1	1.37	1.23	0.8	5.1	0.21	0.78
23	0.63	1.03	4.96	8.33	3.1	8.6	3.1	8.3	0.63	1.00	0.0	0.3	0.00	0.04
24	0.63	1.10	4.96	8.33	3.1	9.1	3.1	8.6	0.62	1.03	0.0	0.5	0.00	0.06
25	0.76	0.95	4.83	8.10	3.7	7.7	3.7	7.6	0.76	0.94	0.0	0.1	0.00	0.01
26	0.79	1.12	4.83	8.10	3.8	9.1	3.8	8.6	0.79	1.06	0.0	0.5	0.00	0.06
29A	1.51	2.14	3.89	6.53	5.9	14.0	5.2	8.4	1.34	1.29	0.7	5.6	0.17	0.86
30A	2.15	2.86	3.87	6.50	8.3	18.6	6.4	9.6	1.65	1.48	1.9	9.0	0.50	1.38
47A	1.32	1.59	3.86	6.49	5.1	10.3	4.6	6.9	1.19	1.06	0.5	3.4	0.13	0.52

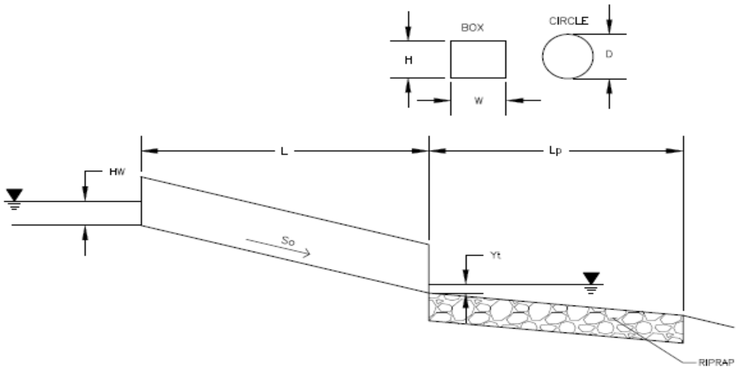
JOB NAME: *Sterling Ranch East Filing No. 1*
JOB NUMBER: *1183.30*
DATE: *08/04/22*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ PIPE TRAVEL TIMES

PIPE RUN	**STREET / CHANNEL FLOW**				
	Pipe Diameter *(ft)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	Tc *(min)*
10	4.0	1200	1.5%	14.0	1.4
13	4.0	240	1.5%	14.0	0.3
15	5.5	740	1.5%	17.4	0.7
18	2.0	320	1.0%	7.2	0.7
19	2.5	80	1.0%	8.4	0.2
26	3.0	330	1.0%	9.5	0.6
31	3.5	300	1.0%	10.5	0.5
33	3.0	60	0.5%	6.7	0.1
22	5.0	650	1.5%	16.3	0.7
39A	5.0	240	1.5%	16.3	0.2
39B	6.0	510	1.5%	18.4	0.5
50	2.5	500	0.8%	7.5	1.1
53	3.0	140	0.5%	6.7	0.3
57	3.5	250	1.0%	10.5	0.4
61	3.5	290	0.5%	7.4	0.7
64	3.5	300	0.5%	7.4	0.7
70	2.0	380	1.0%	7.2	0.9
74	2.5	230	1.0%	8.4	0.5
80	3.0	280	1.0%	9.5	0.5
67	3.5	130	0.5%	7.4	0.3
86	1.5	350	1.0%	6.0	1.0
87	1.5	250	1.0%	6.0	0.7
85	4.0	160	1.0%	11.5	0.2
89	4.5	650	1.0%	12.4	0.9
91	4.5	340	1.0%	12.4	0.5
42	6.0	400	0.7%	12.6	0.5

Determination of Culvert Headwater and Outlet Protection

Project: STERLING RANCH EAST FILING NO. 1
Basin ID: POND 14A OUTFALL



Soil Type:
Choose One:
● Sandy
○ Non-Sandy

Supercritical Flow! Using Da to calculate protection type.

Design Information (Input):

Design Discharge	Q =	54.2	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	48	inches
Inlet Edge Type (Choose from pull-down list)	Square End with Headwall		
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	Height (Rise) =		ft
Barrel Width (Span) in Feet	Width (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	No =	1	
Inlet Elevation	Elev IN =	7016.75	ft
Outlet Elevation **OR** Slope	Elev OUT =	7016.05	ft
Culvert Length	L =	58.94	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	Elev Y_t =		ft
Max Allowable Channel Velocity	V =	5	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	1.60	ft
Flow Area at Max Channel Velocity	A_t =	10.84	ft^2
Culvert Cross Sectional Area Available	A =	12.57	ft^2
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.29	
Sum of All Losses Coefficients	k_s =	1.79	ft
Culvert Normal Depth	Y_n =	1.62	ft
Culvert Critical Depth	Y_c =	2.21	ft
Tailwater Depth for Design	d =	3.11	ft
Adjusted Diameter **OR** Adjusted Rise	D_a =	2.81	ft
Expansion Factor	1/(2*tan(Θ)) =	6.70	
Flow/Diameter$^{2.5}$ **OR** Flow/(Span * Rise$^{1.5}$)	Q/D^2.5 =	1.69	$ft^{0.5}/s$
Froude Number	Fr =	1.81	**Supercritical!**
Tailwater/Adjusted Diameter **OR** Tailwater/Adjusted Rise	Yt/D =	0.57	
Inlet Control Headwater	HW_I =	3.30	ft
Outlet Control Headwater	HW_O =	2.92	
Design Headwater Elevation	**HW =**	**7,020.05**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**0.82**	
Minimum Theoretical Riprap Size	d_{50} =	6	in
Nominal Riprap Size	d_{50} =	9	in
UDFCD Riprap Type	**Type =**	**L**	
Length of Protection	**L_p =**	**19**	**ft**
Width of Protection	**T =**	**7**	**ft**

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-1	DP-2	DP-3
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	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)	10.2	14.4	5.2
Major Q_{Known} (cfs)	20.3	29.1	11.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	3.4

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)	**10.2**	**14.4**	**5.2**
Major Total Design Peak Flow, Q (cfs)	**20.3**	**29.1**	**14.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	1.2	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	3.4	9.4	3.0

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-4	DP-5	DP-6
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type	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)	4.4	7.0	10.3
Major Q_{Known} (cfs)	8.7	15.7	23.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	1.2	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	9.4	0.0	8.6

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)	**5.6**	**7.0**	**10.3**
Major Total Design Peak Flow, Q (cfs)	**18.1**	**15.7**	**31.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	5.0	3.6	N/A

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-7	DP-8	DP-9
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	On Grade
Inlet Type	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)	8.0	5.2	5.2
Major Q_{Known} (cfs)	17.3	10.7	10.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	3.0

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)	**8.0**	**5.2**	**5.2**
Major Total Design Peak Flow, Q (cfs)	**17.3**	**10.7**	**13.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.4	0.4
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	3.4	5.4

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-10	DP-11	DP-12
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade
Inlet Type	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	4.2	6.4
Major Q_{Known} (cfs)	12.5	8.5	13.4

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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**	**4.2**	**6.4**
Major Total Design Peak Flow, Q (cfs)	**12.5**	**8.5**	**13.4**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	2.3

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-13	DP-14	DP-15
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade
Inlet Type	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)	6.1	3.7	4.4
Major Q_{Known} (cfs)	12.4	7.5	9.2

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.4
Major Bypass Flow Received, Q_b (cfs)	2.3	0.0	3.4

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)	**6.1**	**3.7**	**4.8**
Major Total Design Peak Flow, Q (cfs)	**14.7**	**7.5**	**12.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	1.9

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INLET MANAGEMENT

INLET NAME	DP-16	DP-17	DP-18
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type	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)	4.3	6.2	4.8
Major Q_{Known} (cfs)	8.9	13.0	9.6

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.4	0.0	0.8
Major Bypass Flow Received, Q_b (cfs)	5.4	0.0	4.9

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)	**4.7**	**6.2**	**5.6**
Major Total Design Peak Flow, Q (cfs)	**14.3**	**13.0**	**14.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.8	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	2.8	4.9	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-19	DP-20	DP-21
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	In Sump
Inlet Type	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)	3.5	6.2	3.0
Major Q_{Known} (cfs)	7.1	13.2	6.1

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.8
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	5.1

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)	**3.5**	**6.2**	**3.8**
Major Total Design Peak Flow, Q (cfs)	**7.1**	**13.2**	**11.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.8	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	5.1	N/A

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INLET MANAGEMENT

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INLET NAME	DP-22	DP-23	DP-24
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	On Grade
Inlet Type	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)	2.4	3.1	3.1
Major Q_{Known} (cfs)	4.9	6.7	6.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	0.0	1.9	2.8

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)	**2.4**	**3.1**	**3.1**
Major Total Design Peak Flow, Q (cfs)	**4.9**	**8.6**	**9.1**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	0.3	0.5

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INLET MANAGEMENT

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INLET NAME	DP-25	DP-26	DP-27
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type	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)	3.7	3.8	7.5
Major Q_{Known} (cfs)	7.4	8.5	15.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.3	0.6	0.1

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)	**3.7**	**3.8**	**7.5**
Major Total Design Peak Flow, Q (cfs)	**7.7**	**9.1**	**15.1**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	0.1	0.5	N/A

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INLET MANAGEMENT

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INLET NAME	DP-28	DP-29A	DP-29B
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	In Sump
Inlet Type	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)	7.3	5.9	1.4
Major Q_{Known} (cfs)	13.9	14.0	3.1

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.7
Major Bypass Flow Received, Q_b (cfs)	0.7	0.0	5.6

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)	**7.3**	**5.9**	**2.1**
Major Total Design Peak Flow, Q (cfs)	**14.6**	**14.0**	**8.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	0.7	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	5.6	N/A

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INLET MANAGEMENT

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INLET NAME	DP-30A	DP-30B	DP-31
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	In Sump
Inlet Type	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)	8.3	0.5	5.1
Major Q_{Known} (cfs)	18.6	0.9	10.6

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	1.9	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	9.0	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)	**8.3**	**2.4**	**5.1**
Major Total Design Peak Flow, Q (cfs)	**18.6**	**9.9**	**10.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	1.9	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	9.0	N/A	N/A

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INLET MANAGEMENT

INLET NAME	DP-32	DP-33	DP-34
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	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)	3.5	5.3	4.0
Major Q_{Known} (cfs)	7.2	11.0	8.2

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**3.5**	**5.3**	**4.0**
Major Total Design Peak Flow, Q (cfs)	**7.2**	**11.0**	**8.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-35	DP-36	DP-37
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	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)	2.8	2.2	3.5
Major Q_{Known} (cfs)	5.6	4.6	7.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**2.8**	**2.2**	**3.5**
Major Total Design Peak Flow, Q (cfs)	**5.6**	**4.6**	**7.0**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-38	DP-39	DP-40
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	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)	4.7	3.9	2.4
Major Q_{Known} (cfs)	9.9	8.3	4.9

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**4.7**	**3.9**	**2.4**
Major Total Design Peak Flow, Q (cfs)	**9.9**	**8.3**	**4.9**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-41	DP-42	DP-43
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	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)	3.2	1.5	2.0
Major Q_{Known} (cfs)	6.4	3.0	4.2

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**3.2**	**1.5**	**2.0**
Major Total Design Peak Flow, Q (cfs)	**6.4**	**3.0**	**4.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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INLET MANAGEMENT

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INLET NAME	DP-44	DP-45	DP-46
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	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)	1.3	2.2	1.4
Major Q_{Known} (cfs)	2.5	4.6	2.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**1.3**	**2.2**	**1.4**
Major Total Design Peak Flow, Q (cfs)	**2.5**	**4.6**	**2.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-47B	DP-48	DP-47A
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade
Inlet Type	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)	4.8	1.1	5.1
Major Q_{Known} (cfs)	9.6	2.1	10.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.5	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	3.4	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)	**5.3**	**1.1**	**5.1**
Major Total Design Peak Flow, Q (cfs)	**13.0**	**2.1**	**10.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.5
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	3.4

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INLET MANAGEMENT

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INLET NAME	DP-50B	DP-50C	DP-52
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	AREA	AREA	AREA
Hydraulic Condition	Swale	Swale	Swale
Inlet Type	CDOT Type D (In Series & Depressed)	CDOT Type D (In Series & Depressed)	CDOT Type C

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.5	3.6	1.8
Major Q_{Known} (cfs)	32.8	26.6	4.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**4.5**	**3.6**	**1.8**
Major Total Design Peak Flow, Q (cfs)	**32.8**	**26.6**	**4.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.1

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INLET MANAGEMENT

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INLET NAME	DP-53	DP-54	DP-55A
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	AREA	AREA	AREA
Hydraulic Condition	Swale	Swale	Swale
Inlet Type	CDOT Type C	CDOT Type C	CDOT Type C

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.1	1.4	1.1
Major Q_{Known} (cfs)	3.1	3.7	3.2

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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)	**1.1**	**1.4**	**1.1**
Major Total Design Peak Flow, Q (cfs)	**3.1**	**3.7**	**3.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-55B
Site Type (Urban or Rural)	URBAN
Inlet Application (Street or Area)	AREA
Hydraulic Condition	Swale
Inlet Type	CDOT Type C (Depressed)

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.2
Major Q_{Known} (cfs)	7.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0
Major Bypass Flow Received, Q_b (cfs)	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)	**2.2**
Major Total Design Peak Flow, Q (cfs)	**7.0**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.0

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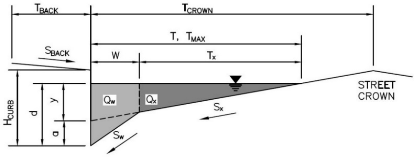
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project:
Inlet ID: **DP-1**

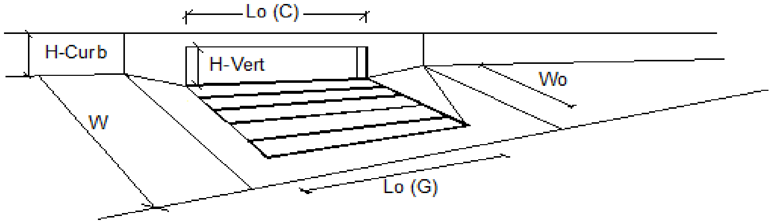


Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.009		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**13.1**	**52.6**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**10.2**	**16.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**83**	**%**

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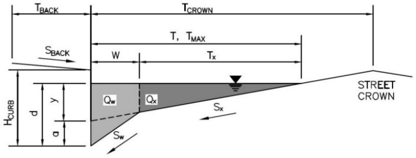
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project:
Inlet ID: **DP-2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.009	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

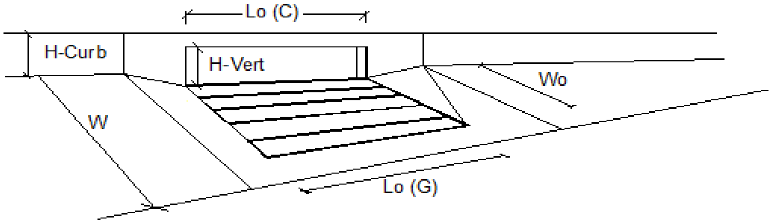
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	27.0	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.2**	**63.6**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



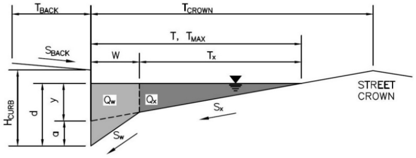
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**13.2**	**19.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.2**	**9.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**91**	**68**	**%**

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-3**

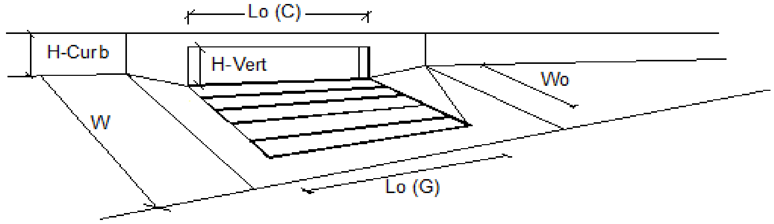


Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.009		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**13.1**	**52.6**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



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

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.2**	**11.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**79**	**%**

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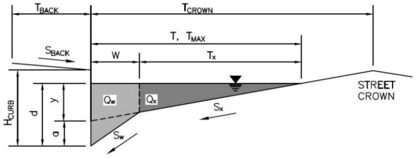
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project:

Inlet ID: DP-4



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.009	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

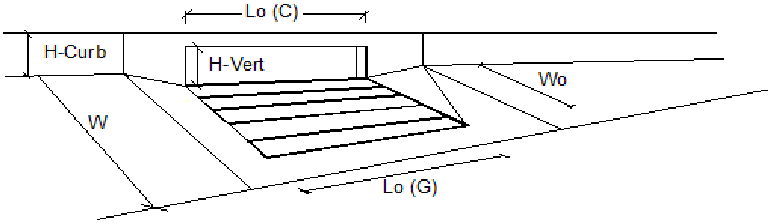
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**13.1**	**52.6**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)

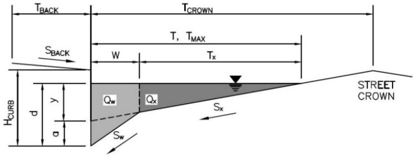


Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.6**	**13.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**72**	**%**

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

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

Project:
Inlet ID: **DP-5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

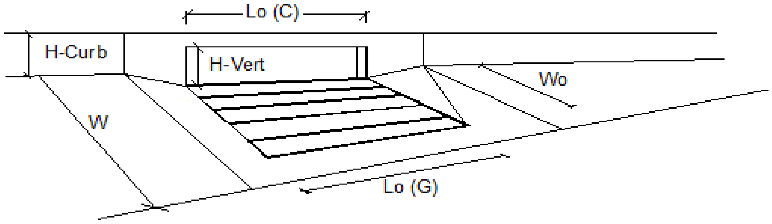
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**13.8**	**55.5**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



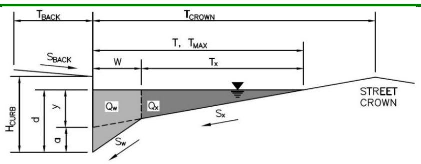
Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**7.0**	**12.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**3.6**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**77**	**%**

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

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

Project:

Inlet ID: DP-6



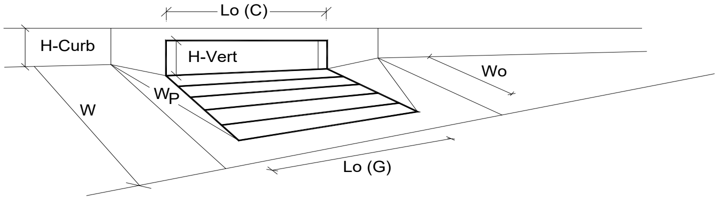
Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



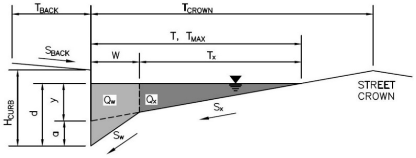
		MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening ▾			
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	9.1	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.59	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	0.86	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.94	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**12.5**	**35.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	Q PEAK REQUIRED =	10.3	31.6	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-7**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	39.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

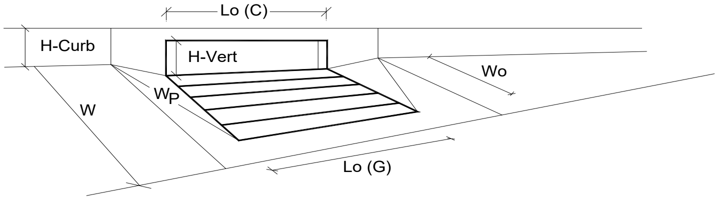
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	31.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.1	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



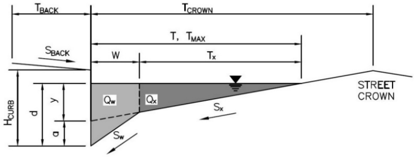
Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	9.1	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.59	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	0.86	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.94	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.7**	**27.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	8.0	17.3	cfs

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

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

Project:

Inlet ID: **DP-8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

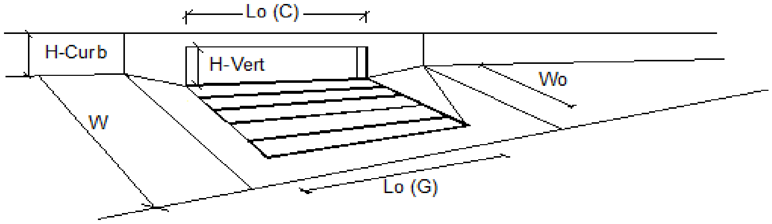
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**17.4**	**23.4**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**4.8**	**7.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.4**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**93**	**69**	**%**

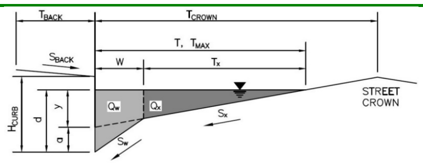
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: DP-9



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

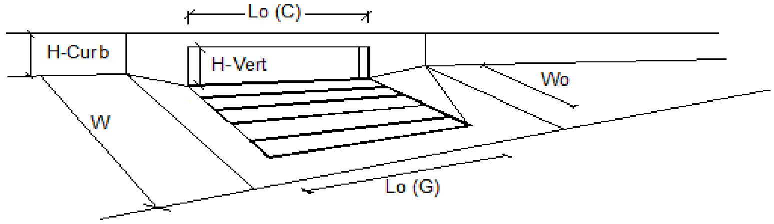
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**17.4**	**23.4**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



<u>Design Information (Input)</u>			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	
<u>Street Hydraulics: OK - Q < Allowable Street Capacity'</u>			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**4.8**	**8.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.4**	**5.4**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**93**	**61**	**%**

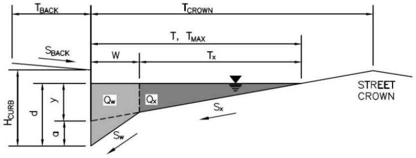
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-10**



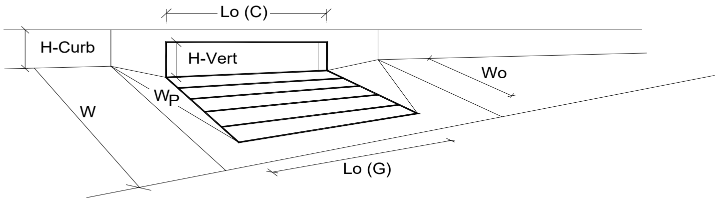
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.73	0.88	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

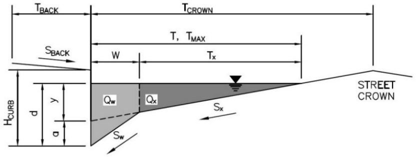
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.1**	**19.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	6.0	12.5	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-11**

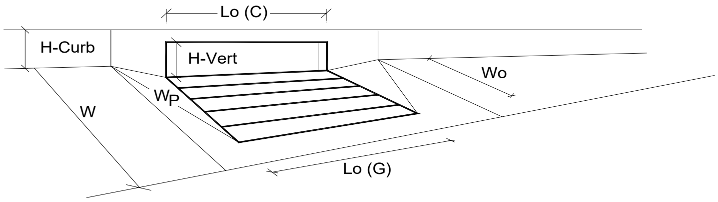


Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

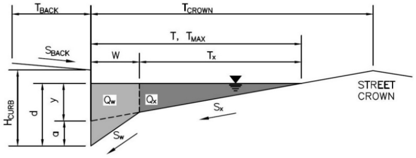


<u>Design Information (Input)</u> CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	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
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
<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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
<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} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.2	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:
Inlet ID: **DP-12**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

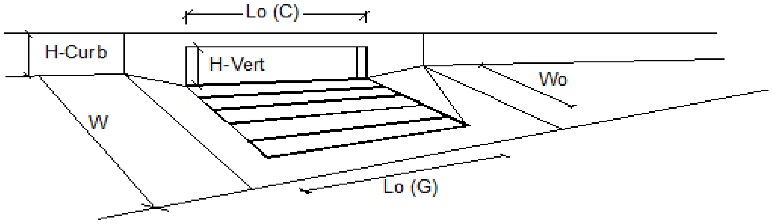
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.7**	**39.2**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



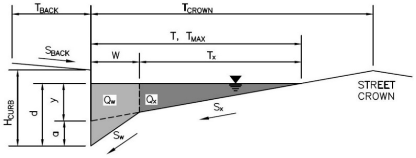
CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.4**	**11.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**83**	**%**

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

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

Project:
Inlet ID: **DP-13**



Gutter Geometry:

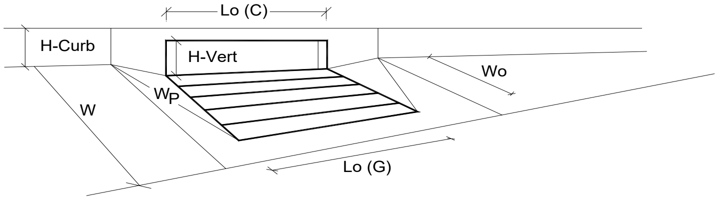
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



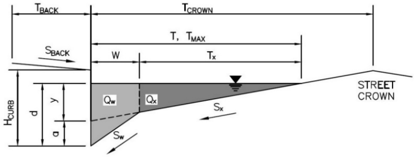
Design Information (Input) CDOT Type R Curb Opening ▼		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.73	0.88	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.1**	**19.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	6.1	14.7	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-14**



Gutter Geometry:

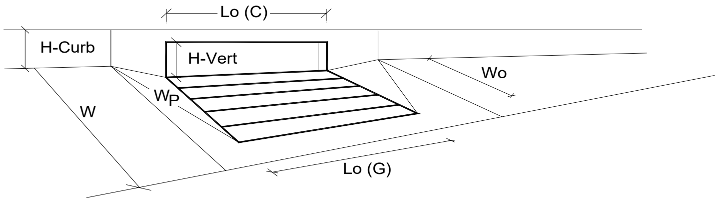
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



<u>Design Information (Input)</u> CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	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
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
<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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
<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} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{\text{PEAK REQUIRED}}$ =	3.7	7.5	cfs

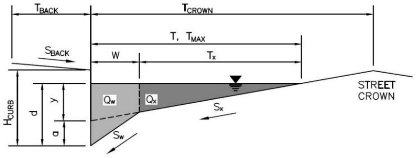
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-15**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb T_{BACK} = 13.5 ft

Side Slope Behind Curb (leave blank for no conveyance credit behind curb) S_{BACK} = 0.020 ft/ft

Manning's Roughness Behind Curb (typically between 0.012 and 0.020) n_{BACK} = 0.013

Height of Curb at Gutter Flow Line H_{CURB} = 6.00 inches

Distance from Curb Face to Street Crown T_{CROWN} = 26.0 ft

Gutter Width W = 2.00 ft

Street Transverse Slope S_X = 0.020 ft/ft

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

Street Longitudinal Slope - Enter 0 for sump condition S_O = 0.016 ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020) n_{STREET} = 0.016

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

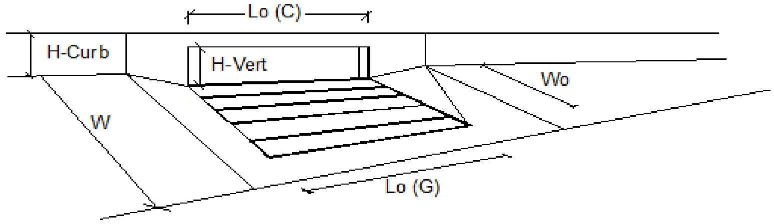
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**17.4**	**23.4**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**4.8**	**10.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**1.9**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**85**	**%**

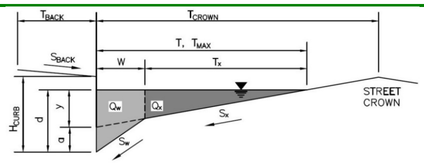
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-16**



Gutter Geometry:

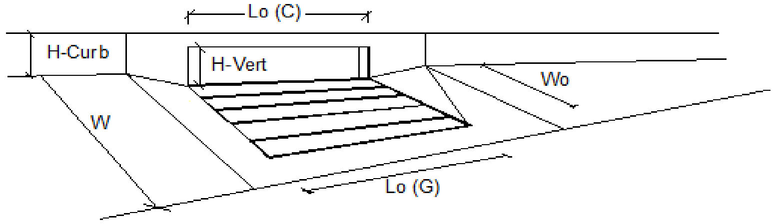
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**17.4**	**23.4**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



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

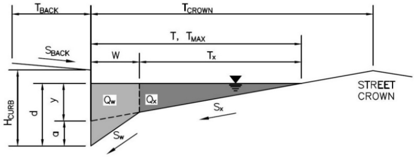
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.7**	**11.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**81**	**%**

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

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

Project:

Inlet ID: DP-17



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

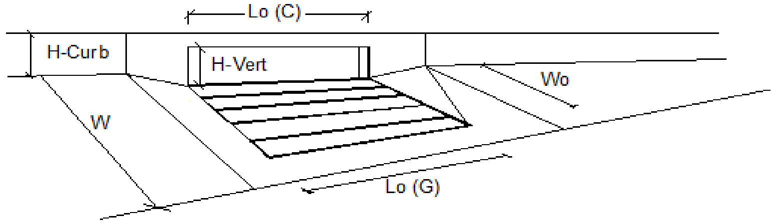
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.7**	**39.2**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	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 < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.4**	**8.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.8**	**4.9**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**87**	**62**	**%**

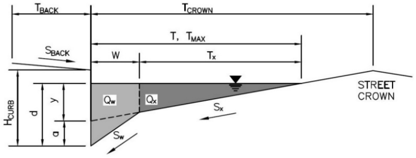
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: DP-18



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

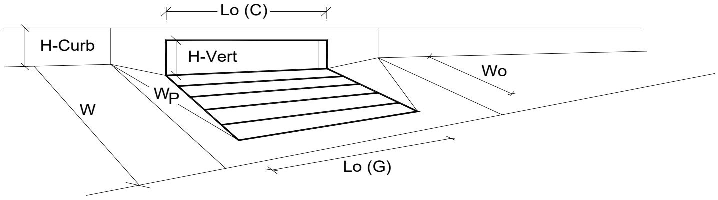
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

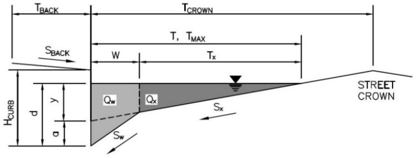


Design Information (Input)	CDOT Type R Curb Opening ▼	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.73	0.88	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.1**	**19.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.6	14.5	cfs

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

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

Project:
Inlet ID: **DP-19**



Gutter Geometry:

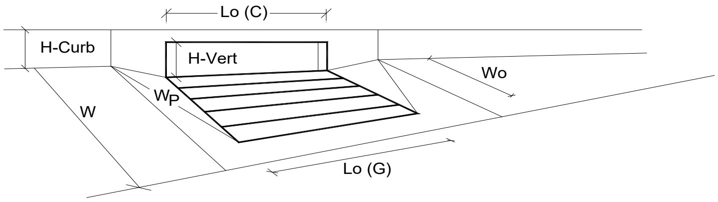
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



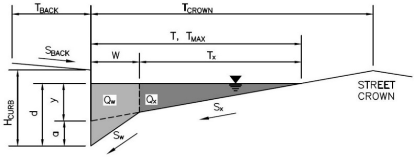
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{\text{PEAK REQUIRED}}$ =	3.5	7.1	cfs

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

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

Project:

Inlet ID: **DP-20**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

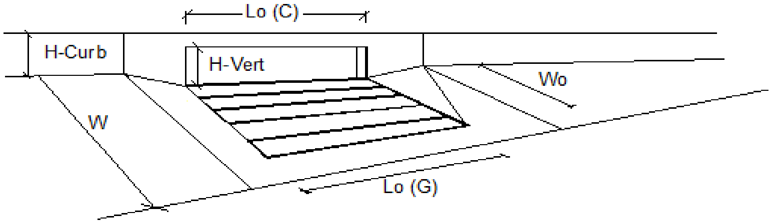
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.7**	**39.2**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



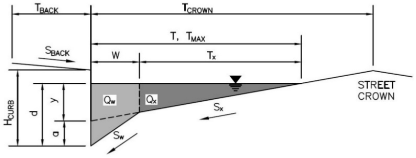
Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.4**	**8.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.8**	**5.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**87**	**62**	**%**

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-21**



Gutter Geometry:

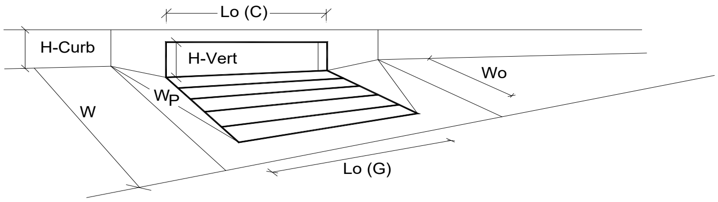
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



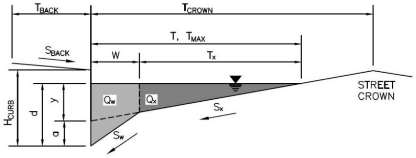
Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.8	11.2	cfs

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

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

Project:

Inlet ID: **DP-22**



Gutter Geometry:

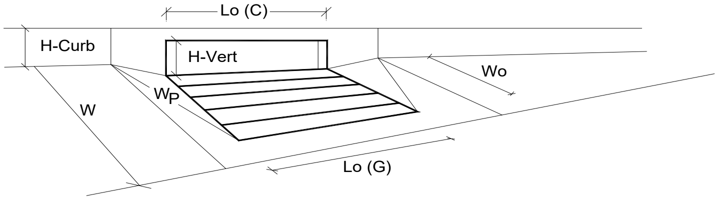
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



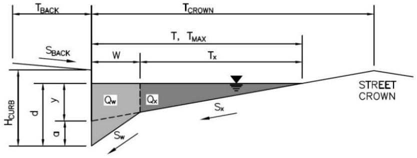
Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.4	4.9	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-23**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

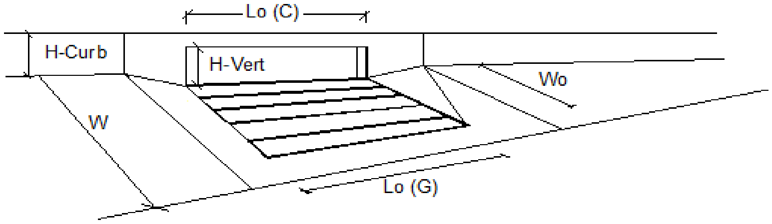
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.9**	**22.7**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



		MINOR	MAJOR	
Design Information (Input)				
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 =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.1**	**8.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

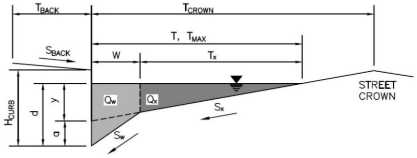
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-24**



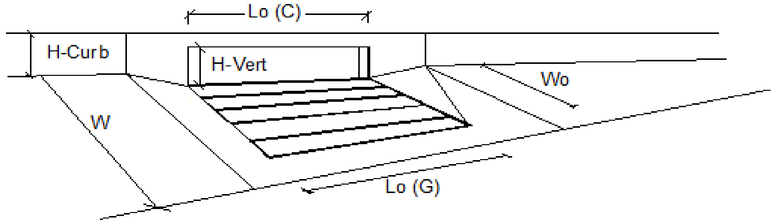
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.9**	**22.7**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.1**	**8.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.5**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**95**	**%**

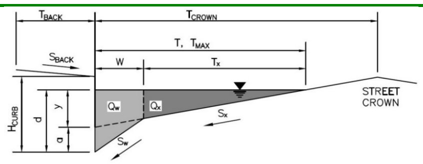
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-25**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

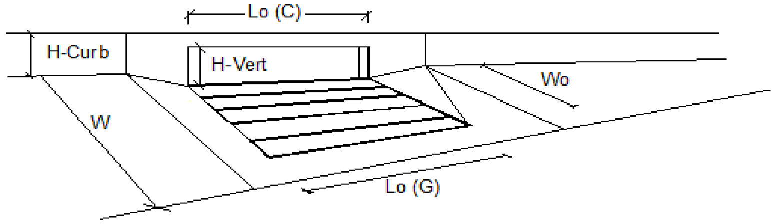
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.9**	**22.7**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



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

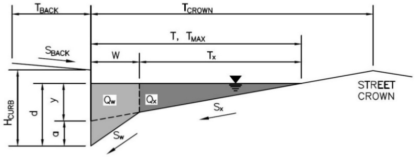
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.7**	**7.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-26**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

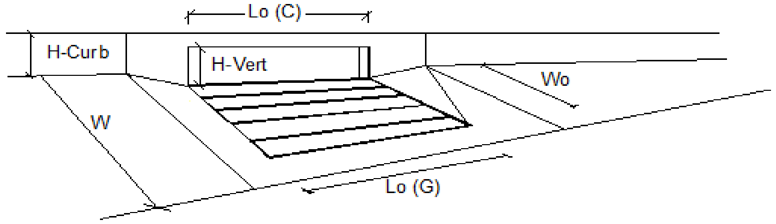
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.9**	**22.7**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.8**	**8.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**95**	**%**

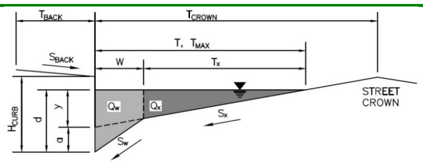
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-27**



Gutter Geometry:

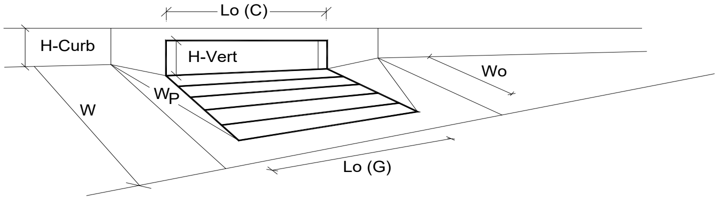
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening ▾

		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.9	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

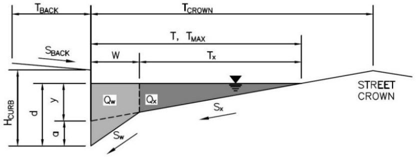
		MINOR	MAJOR	
Low Head Performance Reduction (Calculated)				
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.58	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	0.84	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.93	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.7**	**26.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	7.5	15.1	cfs

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

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

Project:
Inlet ID: **DP-28**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

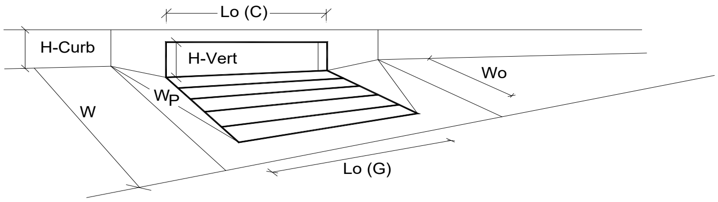
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.8	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



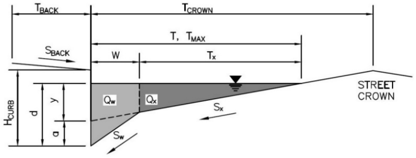
Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.9	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.57	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	0.84	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.93	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.7**	**25.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	7.3	14.6	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-29A**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

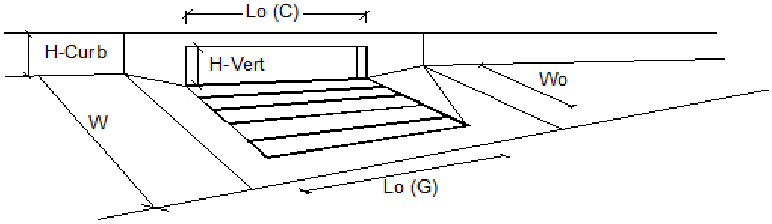
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.7**	**39.2**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



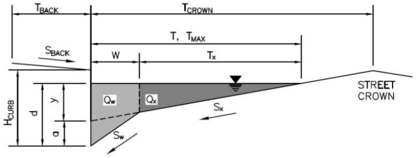
Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▼	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.2**	**8.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.7**	**5.6**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**89**	**60**	**%**

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-29B**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

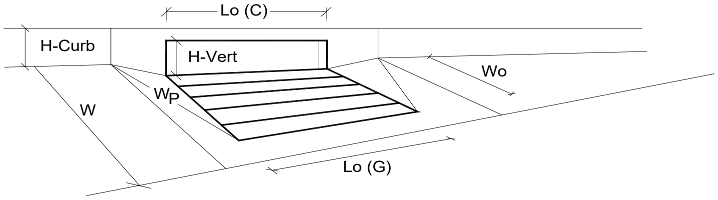
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



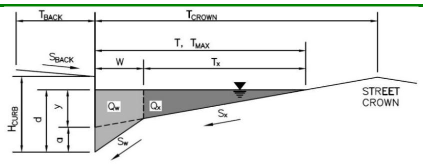
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.1	8.7	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-30A**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

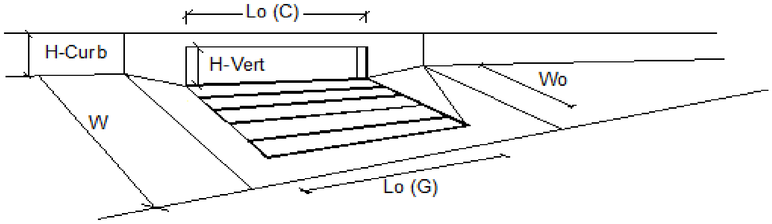
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.7**	**39.2**	**cfs**

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



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

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.4**	**9.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.9**	**9.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**77**	**51**	**%**

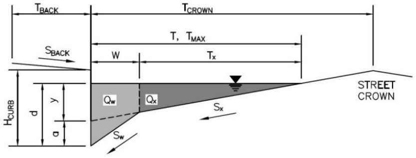
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: DP-30B



Gutter Geometry:

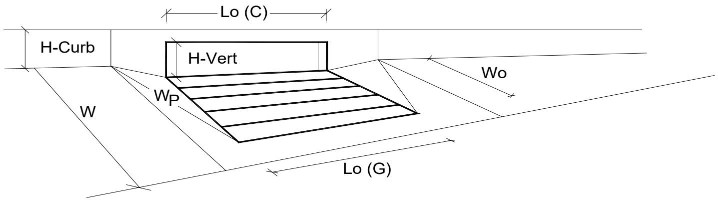
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



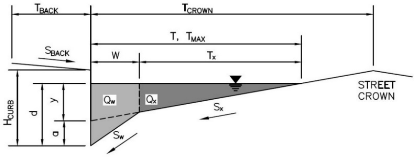
Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.4	9.9	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-31**



Gutter Geometry:

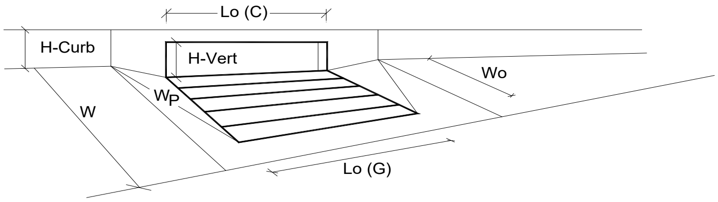
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.1	10.6	cfs

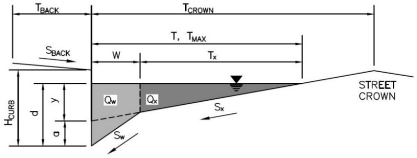
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-32**



Gutter Geometry:

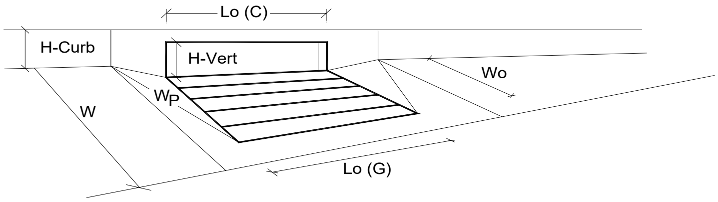
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



		MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening			
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.5	7.2	cfs

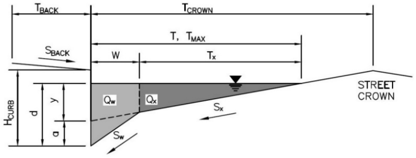
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-33**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

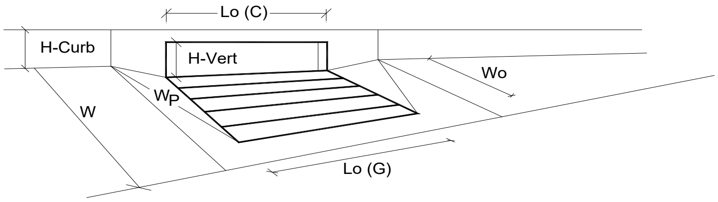
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening	CDOT Type R Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches

CDOT Type R Curb Opening ▾

Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

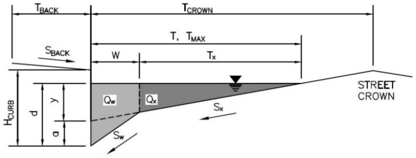
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.3	11.0	cfs

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

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

Project:

Inlet ID: DP-34



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

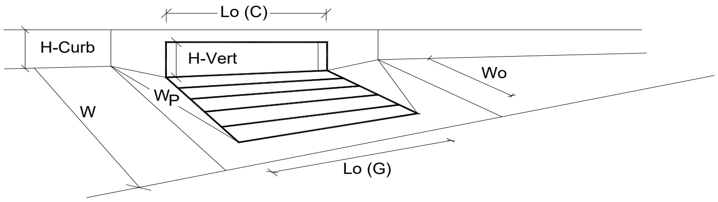
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



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 =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.0	8.2	cfs

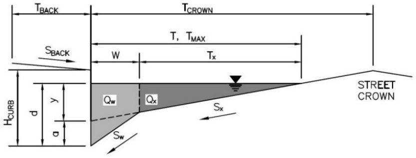
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-35**



Gutter Geometry:

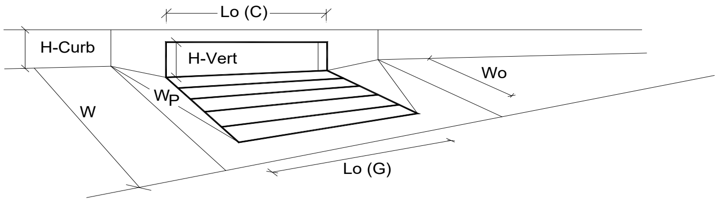
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



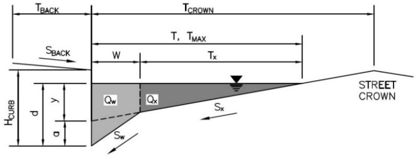
Design Information (Input)	CDOT Type R Curb Opening ▼	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.8	5.6	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-36**



Gutter Geometry:

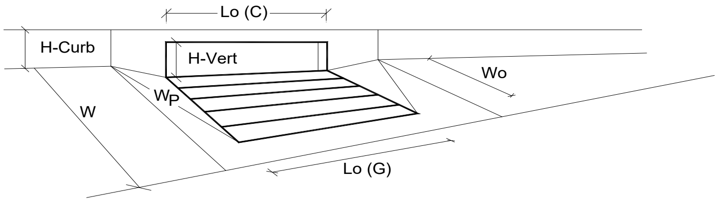
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

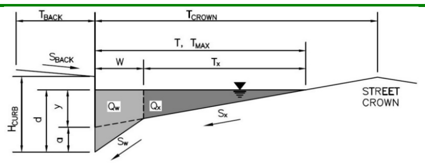


		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.2	4.6	cfs

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

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

Project:
Inlet ID: **DP-37**



Gutter Geometry:

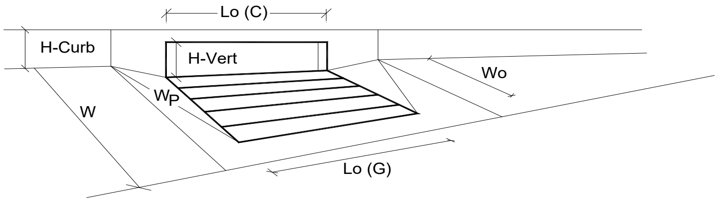
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

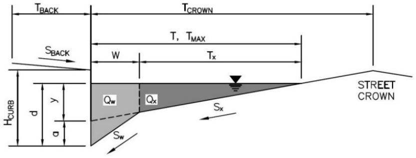


		MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening			
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.5	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:
Inlet ID: **DP-38**



Gutter Geometry:

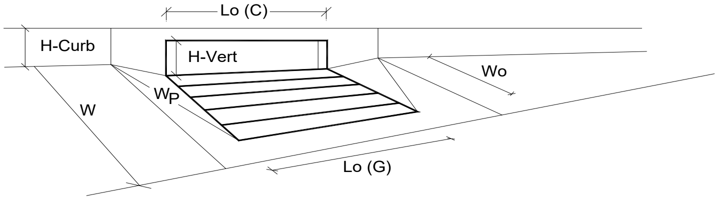
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



		MINOR	MAJOR	
<u>Design Information (Input)</u> CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	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
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
<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 (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
<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} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.7	9.9	cfs

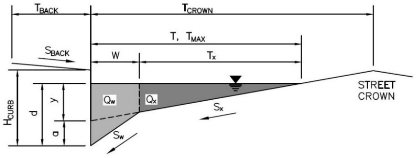
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: DP-39



Gutter Geometry:

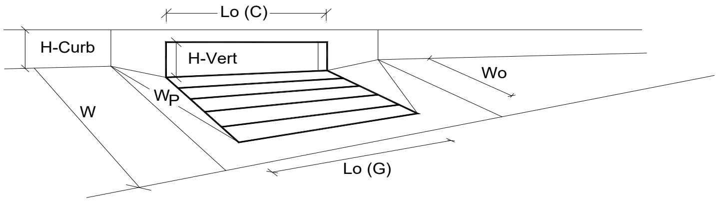
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



		MINOR	MAJOR	
Design Information (Input)				
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 =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.9	8.3	cfs

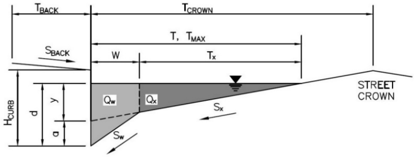
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-40**



Gutter Geometry:

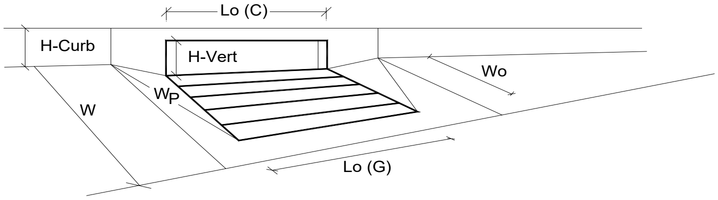
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

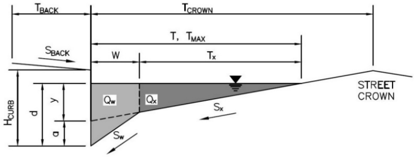


Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.4	4.9	cfs

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

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

Project:
Inlet ID: DP-41



Gutter Geometry:

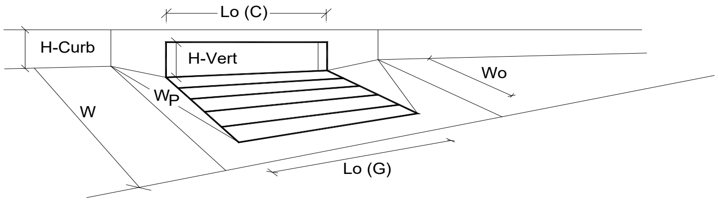
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



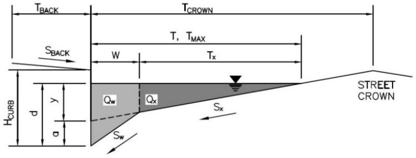
Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.2	6.4	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-42**



Gutter Geometry:

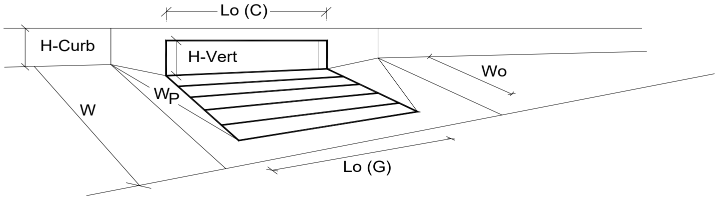
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.1	7.8	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

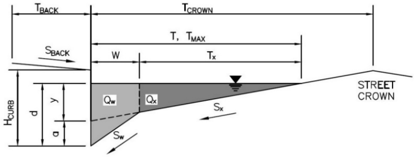
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.5	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:
Inlet ID: **DP-43**



Gutter Geometry:

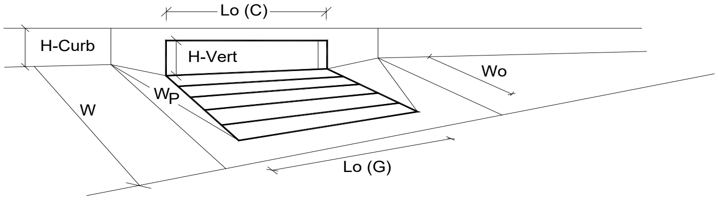
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



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 =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{\text{PEAK REQUIRED}}$ =	2.0	4.2	cfs

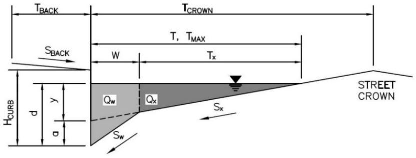
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: DP-44



Gutter Geometry:

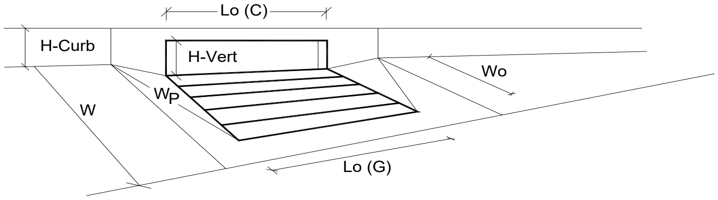
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.3	2.5	cfs

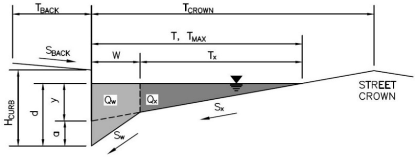
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-45**



Gutter Geometry:

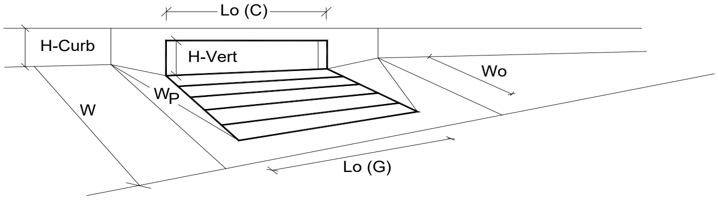
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



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 =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.2	4.6	cfs

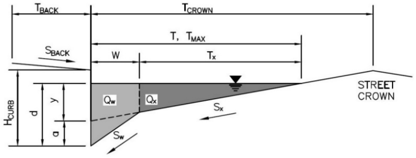
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:

Inlet ID: **DP-46**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

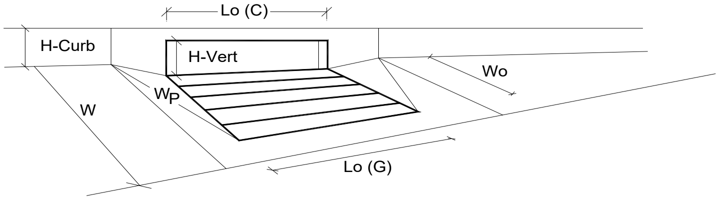
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



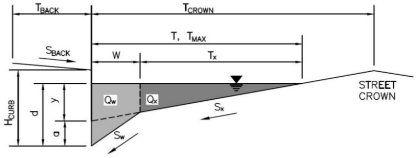
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	Q PEAK REQUIRED =	1.4	2.7	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-47B**



Gutter Geometry:

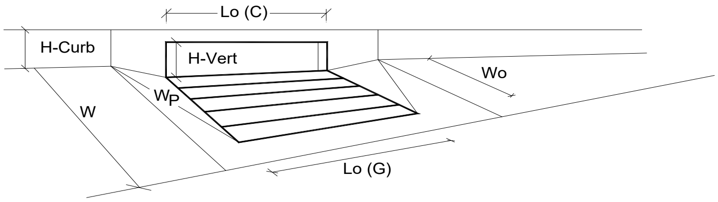
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



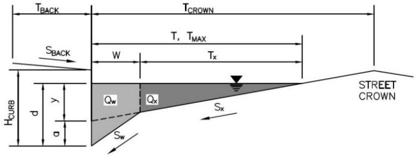
Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.48	0.74	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.88	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.3**	**15.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.3	13.0	cfs

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project:
Inlet ID: **DP-48**

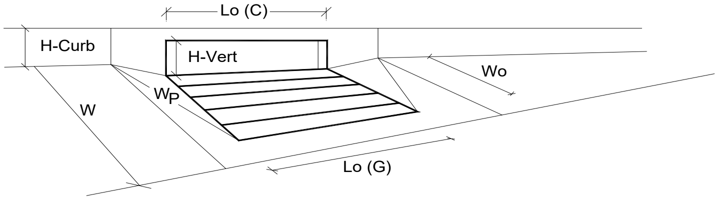


Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.1	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.65	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.7**	**9.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	2.1	cfs

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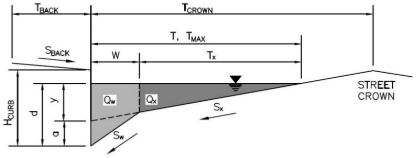
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project:

Inlet ID: **DP-47A**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.0**	**47.9**	**cfs**

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

INLET ON A CONTINUOUS GRADE

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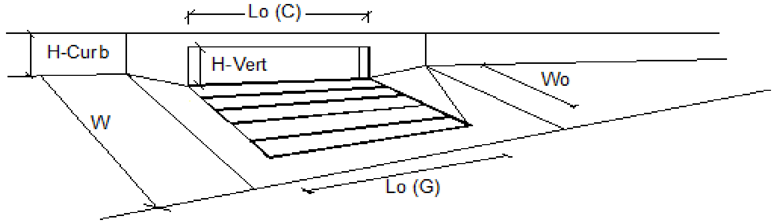

Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**4.6**	**6.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.5**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**90**	**67**	**%**

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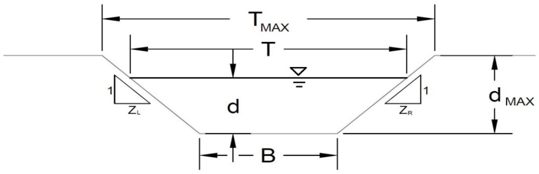
AREA INLET IN A SWALE

DP-50B



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Sloe	Z2 =	4.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**13.50**	**13.50**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.50**	**1.50**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**50.8**	**50.8**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**1.44**	**1.44**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**4.5**	**32.8**	**cfs**
Water Depth	**d =**	**0.48**	**1.19**	**ft**

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

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AREA INLET IN A SWALE

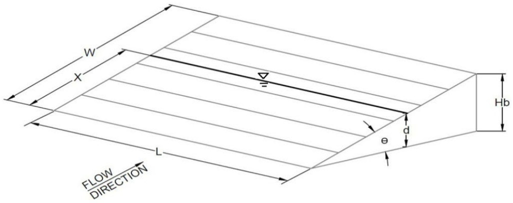
DP-50B

Inlet Design Information (Input)

Type of Inlet: CDOT Type D (In Series & Depressed) ▾

Inlet Type = CDOT Type D (In Series & Depressed)

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	6.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.72	
Orifice Coefficient	C_o =	0.48	
Weir Coefficient	C_w =	1.53	



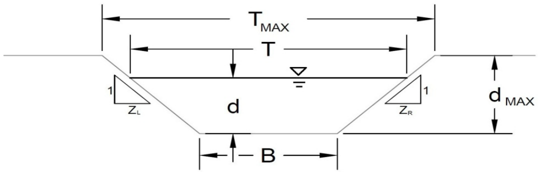
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.48	2.19	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**36.6**	**44.6**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

AREA INLET IN A SWALE

DP-50C



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Sloe	Z2 =	4.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ Non-Cohesive
○ Cohesive
○ Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**13.50**	**13.50**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.50**	**1.50**	**ft**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**50.8**	**50.8**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**1.44**	**1.44**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**3.6**	**26.6**	**cfs**
Water Depth	d =	**0.43**	**1.09**	**ft**

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

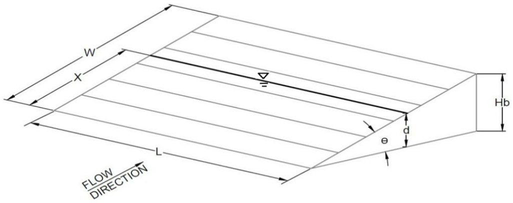
MHFD-Inlet, Version 5.01 (April 2021)

AREA INLET IN A SWALE

DP-50C

Inlet Design Information (Input)

Type of Inlet CDOT Type D (In Series & Depressed) ▾ Inlet Type = CDOT Type D (In Series & Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	6.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.72	
Orifice Coefficient	C_o =	0.48	
Weir Coefficient	C_w =	1.53	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.43	2.09	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**36.0**	**43.5**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

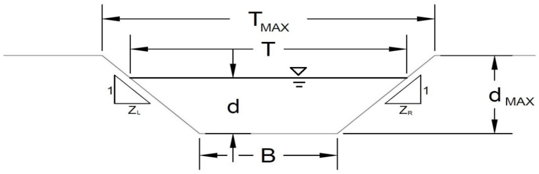
Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

MHFD-Inlet, Version 5.01 (April 2021)

AREA INLET IN A SWALE

DP-52



This worksheet uses the NRCS vegetal
retardance method to determine
Manning's n.

For more information see
Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Sloe	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**10.00**	**10.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.00**	**1.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**4.9**	**4.9**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.40**	**0.40**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**1.8**	**4.7**	**cfs**
Water Depth	d =	**0.25**	**0.39**	**ft**

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

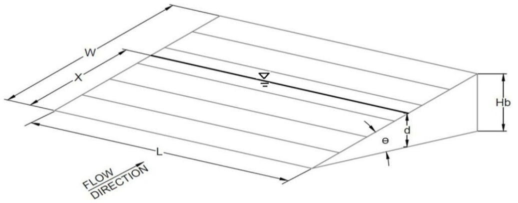
MHFD-Inlet, Version 5.01 (April 2021)

AREA INLET IN A SWALE

DP-52

Inlet Design Information (Input)

Type of Inlet: CDOT Type C ▾ | Inlet Type = CDOT Type C



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	3.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

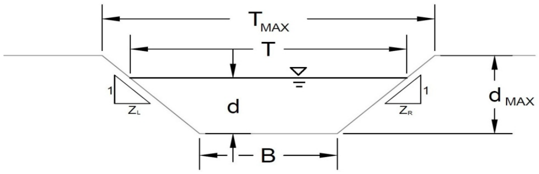
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.25	0.39	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.4**	**4.6**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**97**	**%**

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

AREA INLET IN A SWALE

DP-53



This worksheet uses the NRCS vegetal
retardance method to determine
Manning's n.

For more information see
Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Sloe	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**10.00**	**10.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**4.9**	**4.9**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.40**	**0.40**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**1.1**	**3.1**	**cfs**
Water Depth	**d =**	**0.20**	**0.33**	**ft**

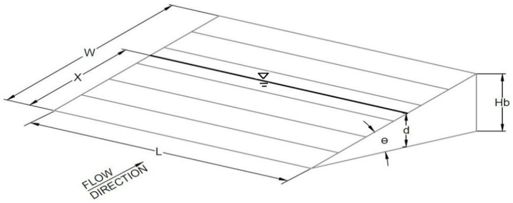
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

AREA INLET IN A SWALE

DP-53

Inlet Design Information (Input)

Type of Inlet	CDOT Type C ▾	Inlet Type =	CDOT Type C



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	3.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.20	0.33	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.7**	**3.4**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

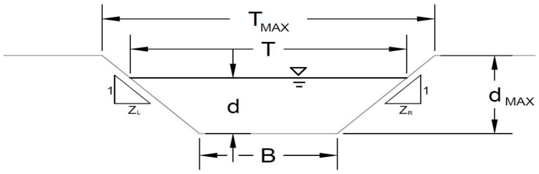
Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

MHFD-Inlet, Version 5.01 (April 2021)

AREA INLET IN A SWALE

DP-54



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Sloe	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**10.00**	**10.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**4.9**	**4.9**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.40**	**0.40**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**1.4**	**3.7**	**cfs**
Water Depth	**d =**	**0.22**	**0.35**	**ft**

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

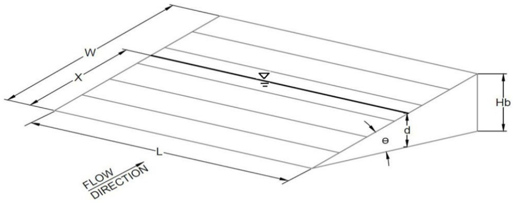
MHFD-Inlet, Version 5.01 (April 2021)

AREA INLET IN A SWALE

DP-54

Inlet Design Information (Input)

Type of Inlet: CDOT Type C	Inlet Type =	CDOT Type C	
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	3.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



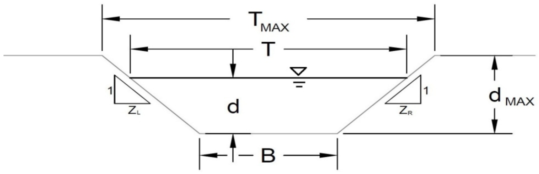
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.22	0.35	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.0**	**3.9**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

AREA INLET IN A SWALE

DP-55A



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Sloe	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ Non-Cohesive
○ Cohesive
○ Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**10.00**	**10.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**4.9**	**4.9**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.40**	**0.40**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**1.1**	**3.2**	**cfs**
Water Depth	**d =**	**0.20**	**0.33**	**ft**

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

MHFD-Inlet, Version 5.01 (April 2021)

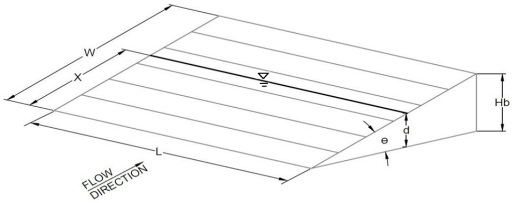
AREA INLET IN A SWALE

DP-55A

Inlet Design Information (Input)

Type of Inlet: CDOT Type C

Inlet Type = CDOT Type C



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	3.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.20	0.33	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.7**	**3.5**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

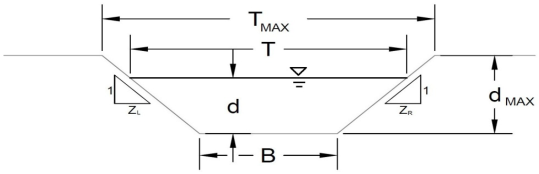
Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

MHFD-Inlet, Version 5.01 (April 2021)

AREA INLET IN A SWALE

DP-55B



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.040	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Sloe	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
● Non-Cohesive
○ Cohesive
○ Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**15.00**	**15.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**14.9**	**14.9**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.65**	**0.65**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**2.2**	**7.0**	**cfs**
Water Depth	**d =**	**0.28**	**0.47**	**ft**

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

MHFD-Inlet, Version 5.01 (April 2021)

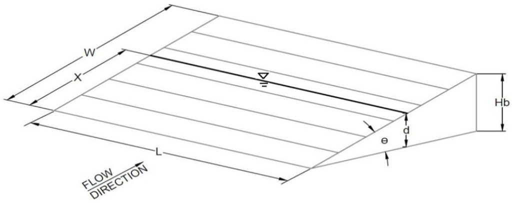
AREA INLET IN A SWALE

DP-55B

Inlet Design Information (Input)

Type of Inlet	CDOT Type C (Depressed)	Inlet Type =	CDOT Type C (Depressed)

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	3.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.84	
Orifice Coefficient	C_o =	0.56	
Weir Coefficient	C_w =	1.81	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.28	1.47	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**16.1**	**17.2**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Provide explanation and mitigation for high FR #

DETENTION & STORMWATER QUALITY POND ‘14A’

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **August 17, 2020**
Project: **STERLING RANCH FILING NO. 1**
Location: **POND 14A**

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.53	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.75	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**PIPE 42**	**PIPE 95**	**BASIN RR**											
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam											
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	103.770	47.090	5.990											
Directly Connected Impervious Area (DCIA, acres)	51.152	19.265	0.000											
Unconnected Impervious Area (UIA, acres)	3.454	2.720	0.000											
Receiving Pervious Area (RPA, acres)	14.320	15.175	2.320											
Separate Pervious Area (SPA, acres)	34.844	9.930	3.670											
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C											

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	103.770	47.090	5.990											
Directly Connected Impervious Area (DCIA, %)	49.3%	40.9%	0.0%											
Unconnected Impervious Area (UIA, %)	3.3%	5.8%	0.0%											
Receiving Pervious Area (RPA, %)	13.8%	32.2%	38.7%											
Separate Pervious Area (SPA, %)	33.6%	21.1%	61.3%											
A_R (RPA / UIA)	4.146	5.579	0.000											
I_a Check	0.190	0.150	1.000											
f / I for WQCV Event:	2.0	2.0	2.0											
f / I for 5-Year Event:	0.5	0.5	0.5											
f / I for 100-Year Event:	0.3	0.3	0.3											
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.42	0.33	1.00											
IRF for 5-Year Event:	0.80	0.63	1.00											
IRF for 100-Year Event:	0.84	0.67	1.00											
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	52.6%	46.7%	0.0%											
Effective Imperviousness for WQCV Event:	50.7%	42.8%	0.0%											
Effective Imperviousness for 5-Year Event:	52.0%	44.6%	0.0%											
Effective Imperviousness for 100-Year Event:	52.1%	44.8%	0.0%											
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	2.5%	5.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	1.0%	4.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**48.8%**
Total Site Effective Imperviousness for WQCV Event:	**46.4%**
Total Site Effective Imperviousness for 5-Year Event:	**47.8%**
Total Site Effective Imperviousness for 100-Year Event:	**47.9%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **March 31, 2023**
Project: **STERLING RANCH EAST FILING NO. 1**
Location: **POND 14A**

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 48.8 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.488
C) Contributing Watershed Area	Area = 156.850 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 in
E) Design Concept (Select EURV when also designing for flood control)	Choose One ○ Water Quality Capture Volume (WQCV) ● Excess Urban Runoff Volume (EURV)
F) Design Volume (WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)$)	V_{DESIGN}= ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$	$V_{DESIGN\ OTHER}$= 2.592 ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= ac-ft
I) NRCS Hydrologic Soil Groups of Tributary Watershed	
i) Percentage of Watershed consisting of Type A Soils	HSG_A = 100 %
ii) Percentage of Watershed consisting of Type B Soils	HSG_B = 0 %
iii) Percentage of Watershed consisting of Type C/D Soils	$HSG_{C/D}$ = 0 %
J) Excess Urban Runoff Volume (EURV) Design Volume For HSG A: $EURV_A = 1.68 * i^{1.28}$ For HSG B: $EURV_B = 1.36 * i^{1.08}$ For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$	$EURV_{DESIGN}$ = 8.766 ac-f t
K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)	$EURV_{DESIGN\ USER}$= ac-f t
2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)	L : W = 2.0 : 1
3. Basin Side Slopes	
A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z = 4.00 ft / ft
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	impact structures and forebays
5. Forebay	
A) Minimum Forebay Volume (V_{FMIN} = 3% of the WQCV)	V_{FMIN} = 0.078 ac-ft
B) Actual Forebay Volume	V_F = ac-ft
C) Forebay Depth (D_F = 30 inch maximum)	D_F = in
D) Forebay Discharge	
i) Undetained 100-year Peak Discharge	Q_{100} = cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F = 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 = in

THESE INPUTS LEFT BLANK AS THERE ARE (2) FOREBAYS. SEE ADDITIONAL CALCS FOR EACH FOREBAY

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 3

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **March 31, 2023**
Project: **STERLING RANCH EAST FILING NO. 1**
Location: **POND 14A**

6. Trickle Channel	
A) Type of Trickle Channel	Choose One ● Concrete ○ Soft Bottom
F) Slope of Trickle Channel	S = 0.0050 ft / ft
7. Micropool and Outlet Structure	
A) Depth of Micropool (2.5-feet minimum)	D_M = 2.5 ft
B) Surface Area of Micropool (10 ft^2 minimum)	A_M = 1070 sq ft
C) Outlet Type	Choose One ● Orifice Plate ○ Other (Describe):
D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)	$D_{orifice}$ = 2.00 inches
E) Total Outlet Area	A_{ot} = 50.00 square inches
8. Initial Surcharge Volume	
A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)	D_{IS} = 6 in
B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)	V_{IS} = 339 cu ft
C) Initial Surcharge Provided Above Micropool	V_s= 535.0 cu ft
9. Trash Rack	
A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$	A_t = 1,592 square inches
B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open are to the total screen are for the material specified.) Other (Y/N): N	*Aluminum Amico-Klemp SR Series with Cross Rods 2" O.C.*
C) Ratio of Total Open Area to Total Area (only for type 'Other')	User Ratio =
D) Total Water Quality Screen Area (based on screen type)	A_{total} = 2242 sq. in.
E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)	H= 6.8 feet
F) Height of Water Quality Screen (H_{TR})	H_{TR}= 109.6 inches
G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended)	$W_{opening}$ = 20.5 inches

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 3 of 3

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: March 31, 2023
Project: STERLING RANCH EAST FILING NO. 1
Location: POND 14A

10. Overflow Embankment A) Describe embankment protection for 100-year and greater overtopping:	180' spillway at elevation 7026.00 - buried riprap
B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Ze = 4.00 ft / ft
11. Vegetation	Choose One ● Irrigated ○ Not Irrigated AVOID PLACING IRRIGATION HEADS IN THE BOTTOM OF THE BASIN
12. Access A) Describe Sediment Removal Procedures	Access road provided to all structures and pond bottom

Notes:

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: August 17, 2020
Project: STERLING RANCH FILING NO. 1
Location: FOREBAY 54" RCP

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.53	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.75	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**PIPE 95**													
Receiving Pervious Area Soil Type	Sandy Loam													
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	47.090													
Directly Connected Impervious Area (DCIA, acres)	19.265													
Unconnected Impervious Area (UIA, acres)	2.720													
Receiving Pervious Area (RPA, acres)	15.175													
Separate Pervious Area (SPA, acres)	9.930													
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C													

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	47.090													
Directly Connected Impervious Area (DCIA, %)	40.9%													
Unconnected Impervious Area (UIA, %)	5.8%													
Receiving Pervious Area (RPA, %)	32.2%													
Separate Pervious Area (SPA, %)	21.1%													
A_R (RPA / UIA)	5.579													
I_a Check	0.150													
f / I for WQCV Event:	2.0													
f / I for 5-Year Event:	0.5													
f / I for 100-Year Event:	0.3													
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.33													
IRF for 5-Year Event:	0.63													
IRF for 100-Year Event:	0.67													
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	46.7%													
Effective Imperviousness for WQCV Event:	42.8%													
Effective Imperviousness for 5-Year Event:	44.6%													
Effective Imperviousness for 100-Year Event:	44.8%													
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	5.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	4.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**46.7%**
Total Site Effective Imperviousness for WQCV Event:	**42.8%**
Total Site Effective Imperviousness for 5-Year Event:	**44.6%**
Total Site Effective Imperviousness for 100-Year Event:	**44.8%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.06, November 2016)

Sheet 1 of 4

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **September 6, 2022**
Project: **STERLING RANCH FILING 1**
Location: **FOREBAY 54" RCP**

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 46.7 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.467
C) Contributing Watershed Area	Area = 47.090 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 in
E) Design Concept (Select EURV when also designing for flood control)	Choose One ○ Water Quality Capture Volume (WQCV) ● Excess Urban Runoff Volume (EURV)
F) Design Volume (WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)$)	V_{DESIGN}= 0.775 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} / 0.43))$)	$V_{DESIGN\ OTHER}$= 0.757 ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One ● A ○ B ○ C / D
J) Excess Urban Runoff Volume (EURV) Design Volume For HSG A: $EURV_A = 1.68 * i^{1.28}$ For HSG B: $EURV_B = 1.36 * i^{1.08}$ For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$	EURV = 2.488 ac-f t
2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)	L : W = 2.0 : 1
3. Basin Side Slopes	
A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z = 4.00 ft / ft
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	impact structures and forebays

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 4

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **September 6, 2022**
Project: **STERLING RANCH FILING 1**
Location: **FOREBAY 54" RCP**

5. Forebay

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

V_{FMIN} = 0.023 ac-ft

B) Actual Forebay Volume

V_F = 0.024 ac-ft

C) Forebay Depth
(D_F = 30 inch maximum)

D_F = 18.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge

Q_{100} = 159.80 cfs

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

Q_F = 3.20 cfs

E) Forebay Discharge Design

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

F) Discharge Pipe Size (minimum 8-inches)

Calculated D_P = ______ in

G) Rectangular Notch Width

Calculated W_N = 9.9 in

6. Trickle Channel

A) Type of Trickle Channel

Choose One
● Concrete
○ Soft Bottom

F) Slope of Trickle Channel

S = ______ ft / ft

7. Micropool and Outlet Structure

A) Depth of Micropool (2.5-feet minimum)

D_M = ______ ft

B) Surface Area of Micropool (10 ft^2 minimum)

A_M = ______ sq ft

C) Outlet Type

Choose One
● Orifice Plate
○ Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing
(Use UD-Detention)

$D_{orifice}$ = ______ inches

E) Total Outlet Area

A_{ot} = ______ square inches

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: Matt Larson
Company: Classic Consulting Engineers & Surveyors, LLC
Date: August 17, 2020
Project: STERLING RANCH FILING NO. 1
Location: FOREBAY 72" RCP

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.53	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.75	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**PIPE 42**													
Receiving Pervious Area Soil Type	Sandy Loam													
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	103.770													
Directly Connected Impervious Area (DCIA, acres)	37.211													
Unconnected Impervious Area (UIA, acres)	1.947													
Receiving Pervious Area (RPA, acres)	10.862													
Separate Pervious Area (SPA, acres)	53.750													
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C													

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	103.770													
Directly Connected Impervious Area (DCIA, %)	35.9%													
Unconnected Impervious Area (UIA, %)	1.9%													
Receiving Pervious Area (RPA, %)	10.5%													
Separate Pervious Area (SPA, %)	51.8%													
A_R (RPA / UIA)	5.579													
I_a Check	0.150													
f / I for WQCV Event:	2.0													
f / I for 5-Year Event:	0.5													
f / I for 100-Year Event:	0.3													
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.33													
IRF for 5-Year Event:	0.63													
IRF for 100-Year Event:	0.67													
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	37.7%													
Effective Imperviousness for WQCV Event:	36.5%													
Effective Imperviousness for 5-Year Event:	37.0%													
Effective Imperviousness for 100-Year Event:	37.1%													
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	2.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	1.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**37.7%**
Total Site Effective Imperviousness for WQCV Event:	**36.5%**
Total Site Effective Imperviousness for 5-Year Event:	**37.0%**
Total Site Effective Imperviousness for 100-Year Event:	**37.1%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

[*] Use Green-Ampt average infiltration rate values from Table 3-3.

[**] Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.06, November 2016)

Sheet 1 of 4

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **August 26, 2022**
Project: **STERLING RANCH FILING 1**
Location: **FOREBAY 72" RCP**

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 37.7 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.377
C) Contributing Watershed Area	Area = 103.770 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 in
E) Design Concept (Select EURV when also designing for flood control)	Choose One ○ Water Quality Capture Volume (WQCV) ● Excess Urban Runoff Volume (EURV)
F) Design Volume (WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)$)	V_{DESIGN}= 1.502 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$= 1.467 ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One ● A ○ B ○ C / D
J) Excess Urban Runoff Volume (EURV) Design Volume For HSG A: $EURV_A = 1.68 * i^{1.28}$ For HSG B: $EURV_B = 1.36 * i^{1.08}$ For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$	EURV = 4.168 ac-f t
2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)	L : W = 2.0 : 1
3. Basin Side Slopes	
A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z = 4.00 ft / ft
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	impact structures and forebays

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 4

Designer: **Matt Larson**
Company: **Classic Consulting Engineers & Surveyors, LLC**
Date: **August 26, 2022**
Project: **STERLING RANCH FILING 1**
Location: **FOREBAY 72" RCP**

5. Forebay

A) Minimum Forebay Volume (V_{FMIN} = 3% of the WQCV) — V_{FMIN} = 0.044 ac-ft

B) Actual Forebay Volume — V_F = 0.056 ac-ft

C) Forebay Depth (D_F = 30 inch maximum) — D_F = 18.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 366.00 cfs

ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$) — Q_F = 7.32 cfs

E) Forebay Discharge Design — Choose One
○ Berm With Pipe
● Wall with Rect. Notch
○ Wall with V-Notch Weir

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

G) Rectangular Notch Width — Calculated W_N = 18.0 in

6. Trickle Channel

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

F) Slope of Trickle Channel — S = ______ ft / ft

7. Micropool and Outlet Structure

A) Depth of Micropool (2.5-feet minimum) — D_M = ______ ft

B) Surface Area of Micropool (10 ft^2 minimum) — A_M = ______ sq ft

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

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

E) Total Outlet Area — A_{ot} = ______ square inches

Worksheet for 54 release Trickle

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Bottom Width	7.00 ft
Discharge	6.40 cfs

FLOW IS 2X FOREBAY RELEASE RATE

Results

Normal Depth	3.3 in
Flow Area	2.0 ft²
Wetted Perimeter	7.6 ft
Hydraulic Radius	3.1 in
Top Width	7.00 ft
Critical Depth	3.6 in
Critical Slope	0.004 ft/ft
Velocity	3.28 ft/s
Velocity Head	0.17 ft
Specific Energy	0.45 ft
Froude Number	1.094
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	3.3 in
Critical Depth	3.6 in
Channel Slope	0.005 ft/ft
Critical Slope	0.004 ft/ft

NORMAL DEPTH IS LESS THAN 6" CURB HEAD, THEREFORE TRICKLE CHANNEL DESIGN IS ACCEPTABLE.

Worksheet for 72 release Trickle

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Bottom Width	7.00 ft
Discharge	14.64 cfs

FLOW IS 2X FOREBAY RELEASE RATE

Results

Normal Depth	5.6 in
Flow Area	3.3 ft²
Wetted Perimeter	7.9 ft
Hydraulic Radius	4.9 in
Top Width	7.00 ft
Critical Depth	6.2 in
Critical Slope	0.004 ft/ft
Velocity	4.47 ft/s
Velocity Head	0.31 ft
Specific Energy	0.78 ft
Froude Number	1.154
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	5.6 in
Critical Depth	6.2 in
Channel Slope	0.005 ft/ft
Critical Slope	0.004 ft/ft

NORMAL DEPTH IS LESS THAN 6" CURB HEAD, THEREFORE TRICKLE CHANNEL DESIGN IS ACCEPTABLE.

JOB NAME: STERLING RANCH EAST FIL. 1
JOB NUMBER: 1183.30
DATE: 04/03/23
CALCULATED BY: MAL

POND 14A - SPILLWAY

POND SIZING WITH PONDPACK EQUATION:

INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)	**AREA (BTM to TOP):**		
7017.00		-	acres
7017.00	1,070	0.02	acres
7017.50	1,070	0.02	acres
7018.00	1,835	0.04	acres
7019.00	15,728	0.36	acres
7020.00	47,089	1.08	acres
7022.00	103,984	2.39	acres
7024.00	129,654	2.98	acres
7026.00	144,608	3.32	acres
		-	acres
		-	acres
		-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	7,017	to	7,017	
0.01	AC-FT	from	7,017	to	7,018	0.01
0.02	AC-FT	from	7,018	to	7,018	0.03
0.17	AC-FT	from	7,018	to	7,019	0.20
0.68	AC-FT	from	7,019	to	7,020	0.88
3.35	AC-FT	from	7,020	to	7,022	4.23
5.30	AC-FT	from	7,022	to	7,024	9.53
6.23	AC-FT	from	7,024	to	7,026	15.76
-	AC-FT	from	7,026	to	-	15.76
-	AC-FT	from	-	to	-	15.76
-	AC-FT	from	-	to	-	15.76

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 15.76 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	**POND VOLUME** AC-FT		CF	**SURFACE AREA** (SF)
4	15.76	=	686,630	171,658
6	15.76	=	686,630	114,438
8	15.76	=	686,630	85,829
10	15.76	=	686,630	68,663

JOB NAME: STERLING RANCH EAST FIL. 1
JOB NUMBER: 1183.30
DATE: 04/03/23
CALCULATED BY: MAL

POND 14A - TOTAL

POND SIZING WITH PONDPACK EQUATION:

INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
7017.00
7017.00
7017.50
7018.00
7019.00
7020.00
7022.00
7024.00
7026.00
7028.00
7029.00

AREA (BTM to TOP):		
	-	acres
1,070	0.02	acres
1,070	0.02	acres
1,835	0.04	acres
15,728	0.36	acres
47,089	1.08	acres
103,984	2.39	acres
129,654	2.98	acres
144,608	3.32	acres
160,255	3.68	acres
168,321	3.86	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	7,017	to	7,017	
0.01	AC-FT	from	7,017	to	7,018	0.01
0.02	AC-FT	from	7,018	to	7,018	0.03
0.17	AC-FT	from	7,018	to	7,019	0.20
0.68	AC-FT	from	7,019	to	7,020	0.88
3.35	AC-FT	from	7,020	to	7,022	4.23
5.30	AC-FT	from	7,022	to	7,024	9.53
6.23	AC-FT	from	7,024	to	7,026	15.76
6.93	AC-FT	from	7,026	to	7,028	22.69
3.73	AC-FT	from	7,028	to	7,029	26.42
-	AC-FT	from	7,029	to	-	26.42

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 26.42 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	**POND VOLUME** AC-FT		CF	**SURFACE AREA** (SF)
4	26.42	=	1,150,941	287,735
6	26.42	=	1,150,941	191,823
8	26.42	=	1,150,941	143,868
10	26.42	=	1,150,941	115,094

JOB NAME: STERLING RANCH EAST FIL. 1
JOB NUMBER: 1183.30
DATE: 04/03/23
CALCULATED BY: MAL

POND 14A - EURV

POND SIZING WITH PONDPACK EQUATION:

INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)	**AREA (BTM to TOP):**		
7017.00		-	acres
7017.00	1,070	0.02	acres
7017.50	1,070	0.02	acres
7018.00	1,835	0.04	acres
7019.00	15,728	0.36	acres
7020.00	47,089	1.08	acres
7022.00	103,984	2.39	acres
7023.80	128,444	2.95	acres
		-	acres
		-	acres
		-	acres
		-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	7,017	to	7,017	
0.01	AC-FT	from	7,017	to	7,018	0.01
0.02	AC-FT	from	7,018	to	7,018	0.03
0.17	AC-FT	from	7,018	to	7,019	0.20
0.68	AC-FT	from	7,019	to	7,020	0.88
3.35	AC-FT	from	7,020	to	7,022	4.23
4.75	AC-FT	from	7,022	to	7,024	8.98
-	AC-FT	from	7,024	to	-	8.98
-	AC-FT	from	-	to	-	8.98
-	AC-FT	from	-	to	-	8.98
-	AC-FT	from	-	to	-	8.98

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 8.98 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

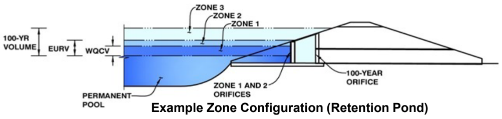
POND DEPTH (FT)	**POND VOLUME** AC-FT		CF	**SURFACE AREA** (SF)
4	8.98	=	391,121	97,780
6	8.98	=	391,121	65,187
8	8.98	=	391,121	48,890
10	8.98	=	391,121	39,112

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **STERLING RANCH EAST FILING NO. 1**

Basin ID: **POND 14A**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type = **EDB**
Watershed Area = 156.85 acres
Watershed Length = 2,650 ft
Watershed Length to Centroid = 1,200 ft
Watershed Slope = 0.025 ft/ft
Watershed Imperviousness = 48.80% percent
Percentage Hydrologic Soil Group A = 100.0% percent
Percentage Hydrologic Soil Group B = 0.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Target WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

Verify/adjust Length, centroid and slope to obtain flows approximating calculated flows

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	2.653	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	8.766	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	6.608	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	8.791	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	10.519	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	13.327	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	16.062	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	19.552	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.48 in.) =	31.496	acre-feet	3.48	inches
Approximate 2-yr Detention Volume =	5.631	acre-feet		
Approximate 5-yr Detention Volume =	7.417	acre-feet		
Approximate 10-yr Detention Volume =	9.062	acre-feet		
Approximate 25-yr Detention Volume =	11.103	acre-feet		
Approximate 50-yr Detention Volume =	12.408	acre-feet		
Approximate 100-yr Detention Volume =	14.024	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) = 2.653 acre-feet
Zone 2 Volume (EURV - Zone 1) = 6.112 acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) = 5.258 acre-feet
Total Detention Basin Volume = 14.024 acre-feet
Initial Surcharge Volume (ISV) = user ft^3
Initial Surcharge Depth (ISD) = user ft
Total Available Detention Depth (H_{total}) = user ft
Depth of Trickle Channel (H_{TC}) = user ft
Slope of Trickle Channel (S_{TC}) = user ft/ft
Slopes of Main Basin Sides (S_{main}) = user H:V
Basin Length-to-Width Ratio ($R_{L/W}$) = user

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

Depth Increment = 0.25 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	1,070	0.025		
7017.5	--	0.50	--	--	--	1,070	0.025	535	0.012
7018	--	1.00	--	--	--	1,835	0.042	1,261	0.029
7019	--	2.00	--	--	--	15,728	0.361	10,043	0.231
7020	--	3.00	--	--	--	47,089	1.081	41,451	0.952
7022	--	5.00	--	--	--	103,984	2.387	192,524	4.420
7024	--	7.00	--	--	--	129,654	2.976	426,162	9.783
7026	--	9.00	--	--	--	144,608	3.320	700,424	16.080
7028	--	11.00	--	--	--	160,255	3.679	1,005,287	23.078
7029	--	12.00	--	--	--	168,321	3.864	1,169,575	26.850
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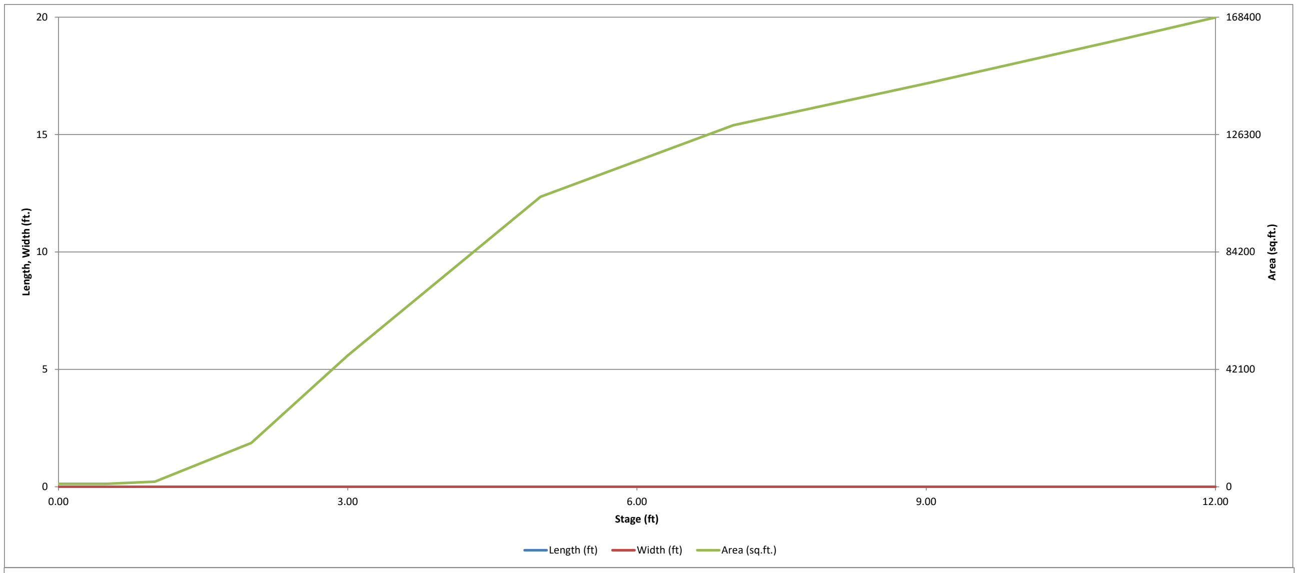
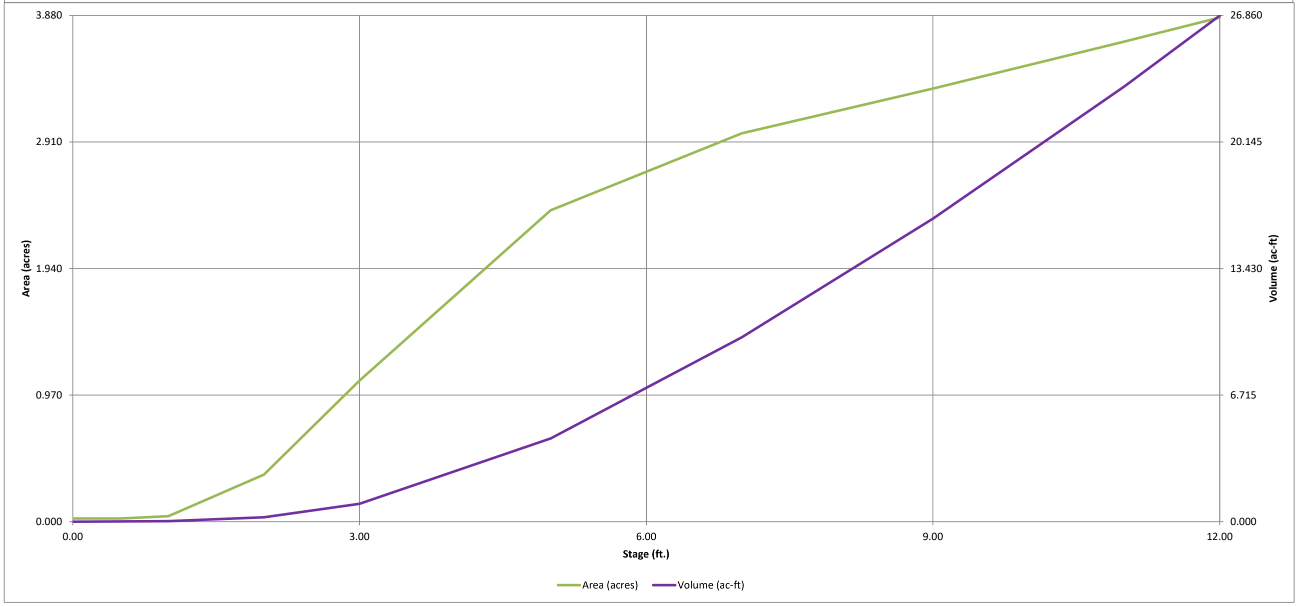
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

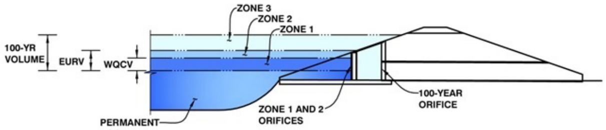




DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **STERLING RANCH EAST FILING NO. 1**
Basin ID: **POND 14A**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.17	2.653	Orifice Plate
Zone 2 (EURV)	6.66	6.112	Orifice Plate
Zone 3 (100-year)	8.38	5.258	Weir&Pipe (Restrict)
Total (all zones)		14.024	

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

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

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) — Calculated Parameters for Plate

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	6.80	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	25.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	2.27	4.53					
Orifice Area (sq. inches)	6.00	20.00	24.00					

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

User Input: Vertical Orifice (Circular or Rectangular) — Calculated Parameters for Vertical Orifice

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

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.80	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	8.13	N/A	feet
Overflow Weir Front Edge Length =	30.00	N/A	feet	Overflow Weir Slope Length =	4.22	N/A	feet
Overflow Weir Grate Slope =	3.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	7.01	N/A	
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	88.04	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	44.02	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	12.57	N/A	ft^2
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	2.00	N/A	feet
Restrictor Plate Height Above Pipe Invert =	48.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal) — Calculated Parameters for Spillway

Spillway Invert Stage=	9.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.80	feet
Spillway Crest Length =	180.00	feet	Stage at Top of Freeboard =	10.80	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	3.64	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	22.35	acre-ft

Routed Hydrograph Results

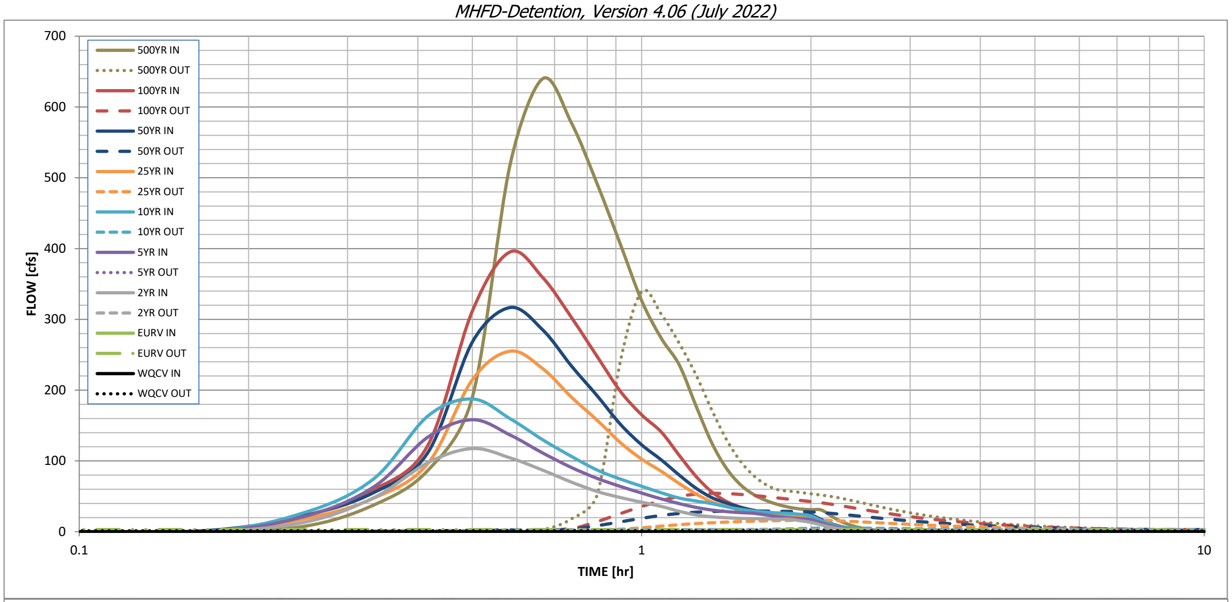
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

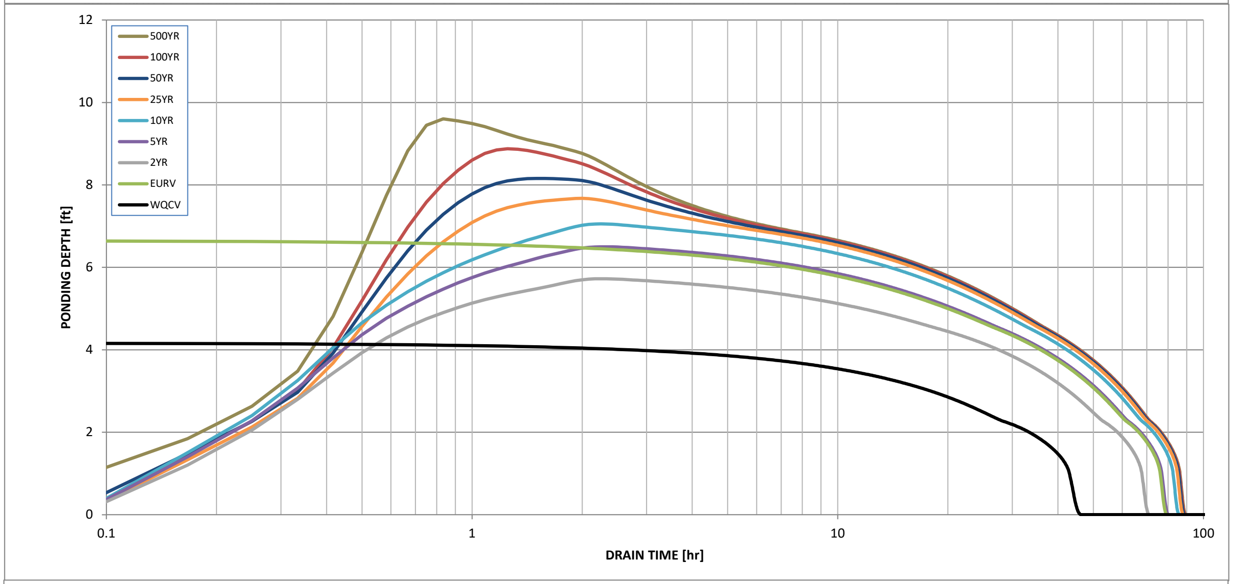
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.48
CUHP Runoff Volume (acre-ft) =	2.653	8.766	6.608	8.791	10.519	13.327	16.062	19.552	31.496
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	6.608	8.791	10.519	13.327	16.062	19.552	31.496
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	1.5	3.0	4.2	38.6	76.4	124.7	281.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.03	0.25	0.49	0.80	1.80
Peak Inflow Q (cfs) =	N/A	N/A	117.5	158.2	187.5	255.0	316.7	395.2	639.9
Peak Outflow Q (cfs) =	1.3	3.1	2.6	3.0	5.2	16.4	29.3	54.2	339.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.0	1.2	0.4	0.4	0.4	1.2
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.1	0.3	0.6	0.9
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) =	40	65	60	66	70	69	68	66	61
Time to Drain 99% of Inflow Volume (hours) =	**43**	73	66	74	79	80	79	78	73
Maximum Ponding Depth (ft) =	4.17	6.66	5.72	6.50	7.05	7.68	8.16	8.88	9.60
Area at Maximum Ponding Depth (acres) =	1.85	2.88	2.60	2.83	2.99	3.09	3.17	3.30	3.43
Maximum Volume Stored (acre-ft) =	2.663	8.788	6.215	8.304	9.932	11.816	13.320	15.649	18.104

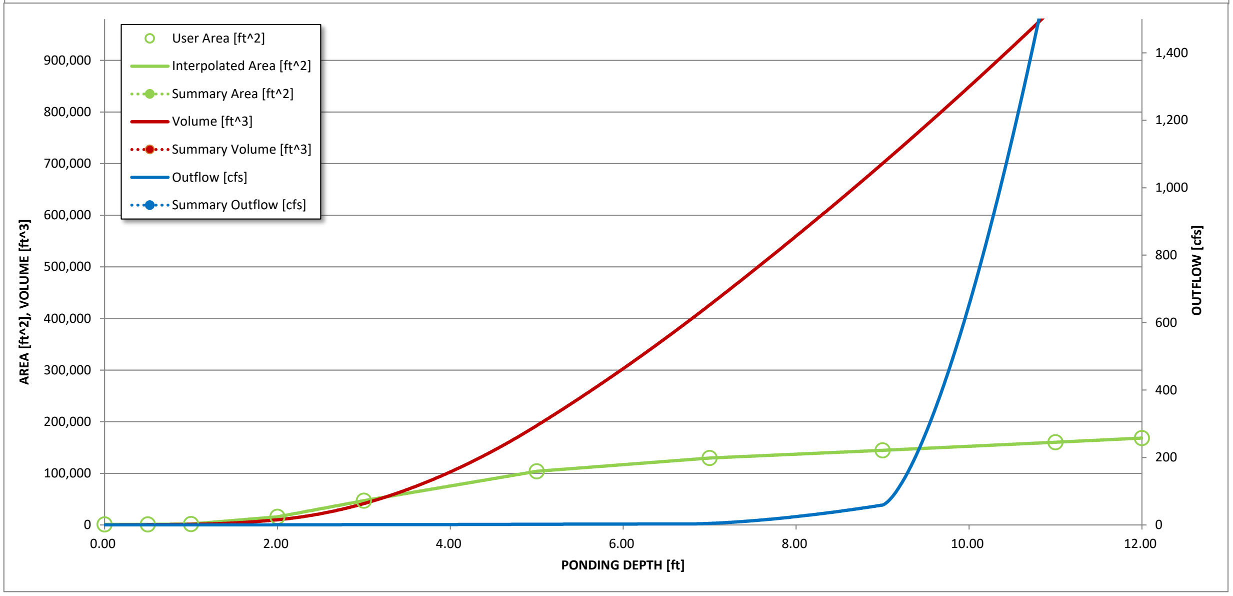
These should be closer to the calculated flows (232 and 520)

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.

Time Interval

5.00 min

SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
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]
0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.15	7.43
0:15:00	0.00	0.00	12.98	21.09	26.48	17.87	22.49	21.92	37.49
0:20:00	0.00	0.00	47.71	63.00	74.33	47.13	55.01	59.00	86.67
0:25:00	0.00	0.00	97.60	133.60	163.41	96.30	111.77	122.02	190.19
0:30:00	0.00	0.00	117.50	158.21	187.49	214.78	268.03	311.84	518.20
0:35:00	0.00	0.00	104.35	136.69	159.74	255.04	316.70	395.22	639.90
0:40:00	0.00	0.00	86.99	111.26	129.92	230.45	285.20	359.20	577.50
0:45:00	0.00	0.00	70.08	90.74	106.43	190.08	234.15	302.73	491.41
0:50:00	0.00	0.00	56.84	75.34	87.08	157.49	192.05	247.53	405.83
0:55:00	0.00	0.00	48.30	63.98	74.38	125.76	151.69	198.22	326.18
1:00:00	0.00	0.00	41.71	54.62	64.25	102.54	122.72	165.09	273.35
1:05:00	0.00	0.00	35.75	46.38	55.04	85.34	101.52	140.94	235.39
1:10:00	0.00	0.00	28.80	39.67	47.52	67.98	79.89	107.65	177.06
1:15:00	0.00	0.00	23.69	34.31	43.36	53.16	61.27	77.90	124.89
1:20:00	0.00	0.00	21.10	30.65	39.73	42.14	48.08	56.06	88.86
1:25:00	0.00	0.00	19.71	28.41	35.16	35.60	40.34	42.58	66.04
1:30:00	0.00	0.00	18.89	26.98	31.63	30.50	34.43	34.70	52.31
1:35:00	0.00	0.00	18.43	26.02	29.27	26.84	30.24	29.91	43.87
1:40:00	0.00	0.00	18.07	23.51	27.63	24.54	27.62	26.70	38.23
1:45:00	0.00	0.00	17.81	21.18	26.52	23.04	25.91	24.55	34.43
1:50:00	0.00	0.00	17.66	19.62	25.74	22.01	24.73	23.18	32.06
1:55:00	0.00	0.00	15.45	18.52	24.51	21.40	24.04	22.61	31.21
2:00:00	0.00	0.00	13.27	17.25	22.21	21.01	23.62	22.37	30.86
2:05:00	0.00	0.00	9.67	12.73	16.14	15.59	17.50	16.65	22.89
2:10:00	0.00	0.00	6.46	8.48	10.86	10.43	11.69	11.16	15.28
2:15:00	0.00	0.00	4.31	5.64	7.31	7.04	7.87	7.52	10.26
2:20:00	0.00	0.00	2.82	3.64	4.78	4.62	5.15	4.91	6.66
2:25:00	0.00	0.00	1.74	2.31	3.04	2.95	3.28	3.12	4.22
2:30:00	0.00	0.00	1.02	1.45	1.86	1.86	2.06	1.95	2.60
2:35:00	0.00	0.00	0.50	0.80	0.98	1.02	1.11	1.05	1.37
2:40:00	0.00	0.00	0.20	0.34	0.39	0.43	0.46	0.42	0.52
2:45:00	0.00	0.00	0.05	0.08	0.08	0.09	0.09	0.07	0.07
2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

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

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

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

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

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

Figure 13-12c. Emergency Spillway Protection

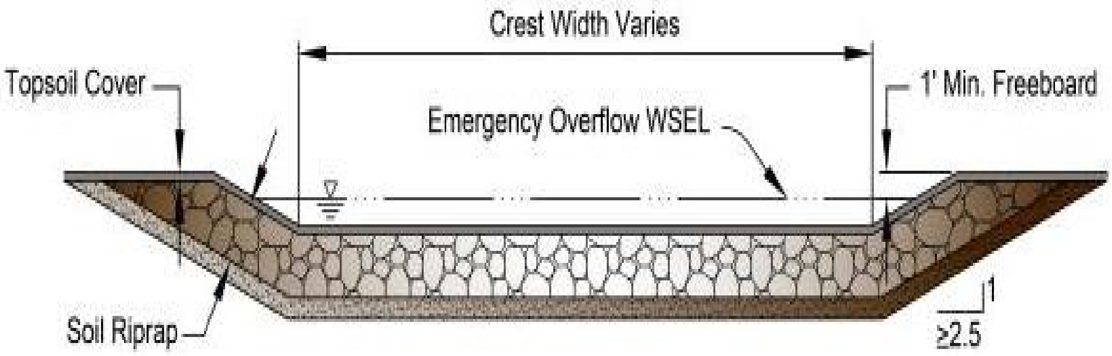
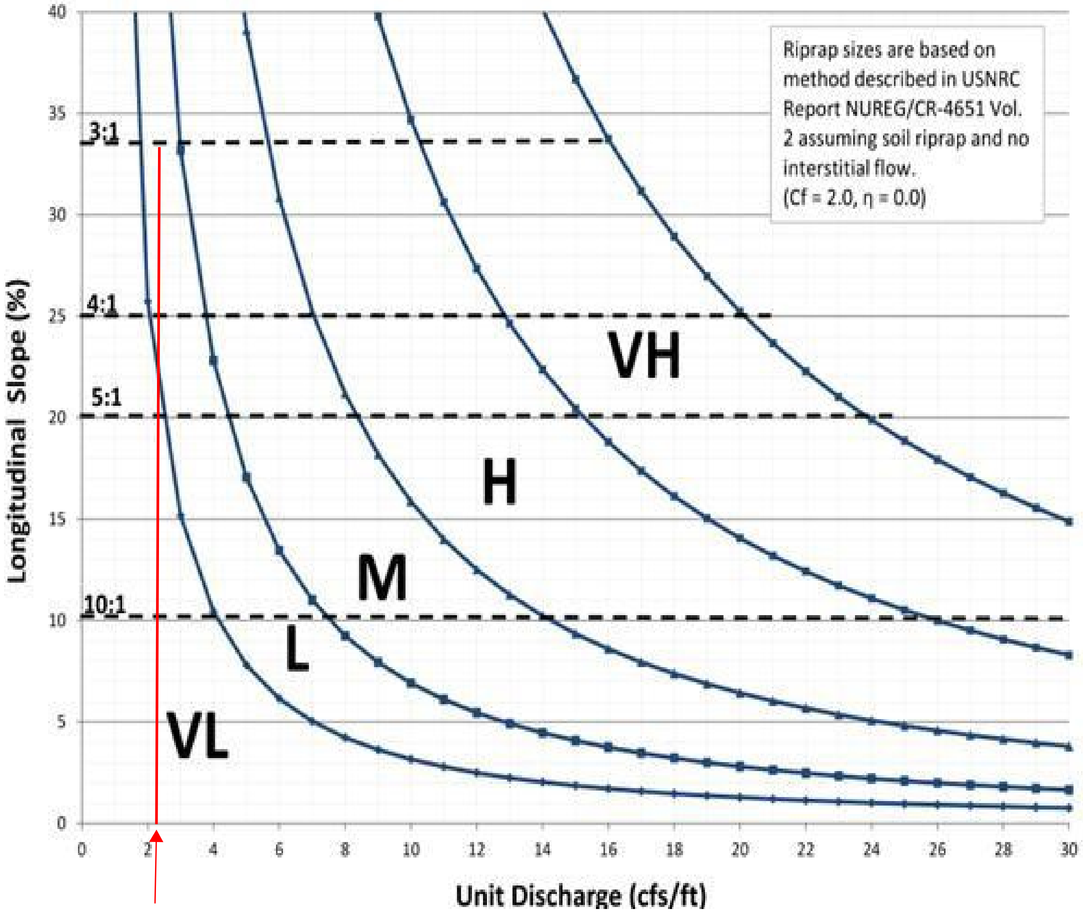


Figure 13-12d. Riprap Types for Emergency Spillway Protection



Riprap sizes are based on method described in USNRC Report NUREG/CR-4651 Vol. 2 assuming soil riprap and no interstitial flow. (Cf = 2.0, η = 0.0)

4:1 SLOPE

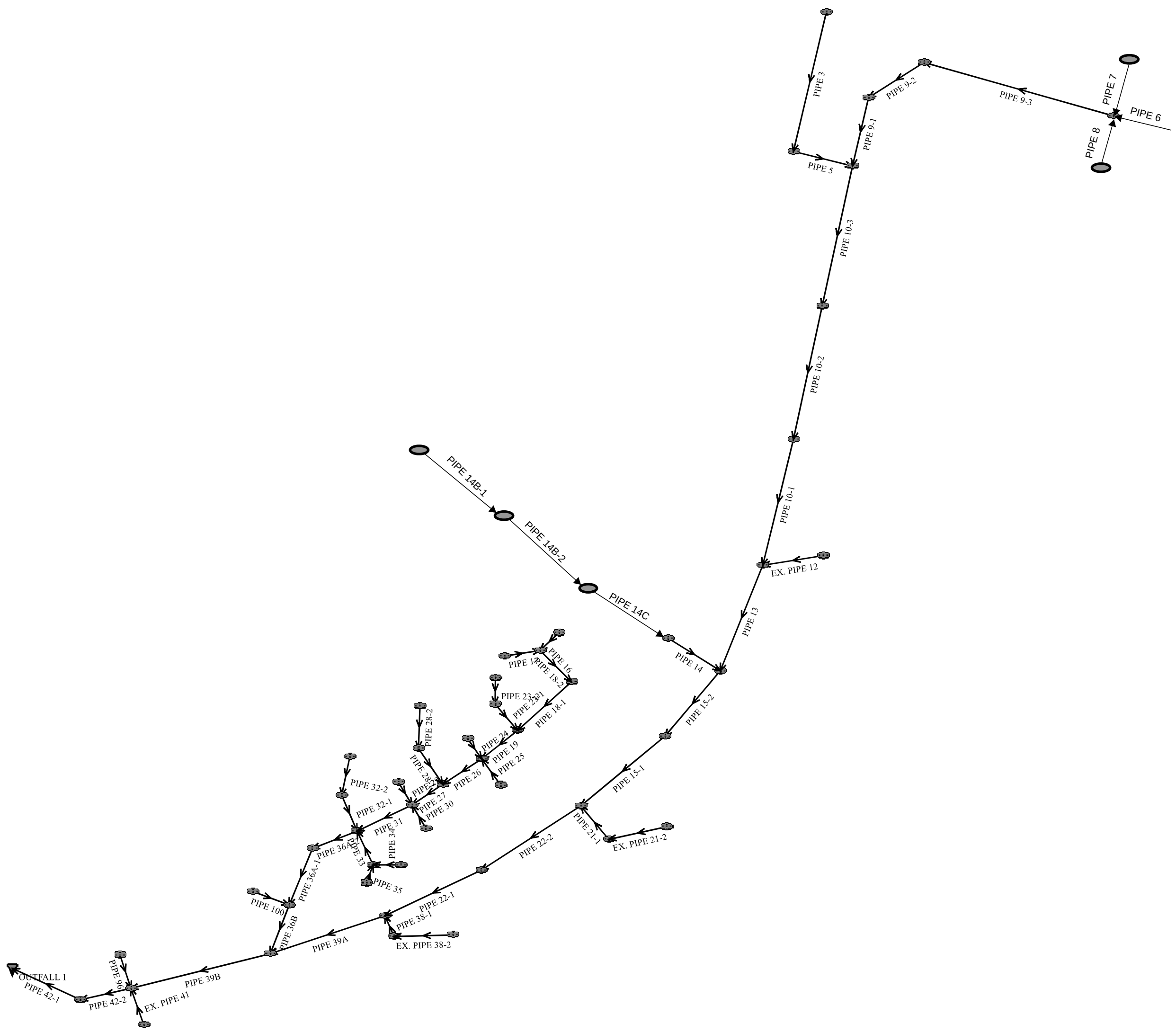
520.5 cfs/ 240 LF = 2.17 cfs/ft

TYPE L
RIPRAP

Update with currrent flow and spillway width

HYDRAULIC GRADE LINE (HGL)

CALCULATIONS



MAIN A & B
100-YR HGL PIPE SCHEMATIC

N

System Input Summary 100-YR HGLS MAINS A & B & LATERALS

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

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

Rational Method Constraints

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

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.1
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	7020.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 42-1	7039.00	364.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 42-2	7039.75	364.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 96	7040.00	9.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 39B	7047.37	351.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 39A	7052.99	254.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 22-1	7058.39	247.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 22-2	7061.20	247.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 15-1	7070.33	236.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 15-2	7074.76	236.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14	7072.50	126.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14C	7068.00	53.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14B-2	7075.77	26.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14B-1	7073.00	26.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 13	7077.94	112.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX. PIPE 12	7077.00	15.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10-1	7086.20	105.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10-2	7096.28	105.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PIPE 10-3	7102.85	105.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-1	7102.00	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-2	7102.00	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-3	7102.63	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 6	7106.00	12.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7	7101.93	31.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 8	7101.93	17.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 5	7103.50	58.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 3	7103.29	13.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 21-1	7060.80	22.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX. PIPE 21-2	7061.00	22.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 38-1	7050.68	16.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX. PIPE 38-2	7050.50	16.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 36B	7050.58	112.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 100	7050.00	16.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 36A-1	7052.00	100.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 36A-2	7051.13	100.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 31	7055.22	79.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 29	7055.40	14.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 30	7055.40	7.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 27	7056.42	58.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 26	7059.38	52.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 19	7060.13	30.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 23-1	7061.09	11.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 23-2	7061.86	11.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PIPE 18-1	7068.99	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 18-2	7068.20	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 17	7068.39	8.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 16	7068.39	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 24	7059.58	14.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 25	7059.58	7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 28-1	7057.45	8.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 28-2	7058.14	8.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 33	7050.36	15.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 34	7050.60	11.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 35	7050.60	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 32-1	7052.02	8.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 32-2	7052.38	8.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX. PIPE 41	7038.00	16.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					**Total Design Flow**				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 42-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364.80	Surface Water Present (Downstream)
PIPE 42-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364.80	

PIPE 96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.20	
PIPE 39B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	351.40	
PIPE 39A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	254.60	
PIPE 22-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	247.80	
PIPE 22-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	247.80	
PIPE 15-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	236.50	
PIPE 15-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	236.50	
PIPE 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	126.20	
PIPE 14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	
PIPE 14B-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.60	
PIPE 14B-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.60	
PIPE 13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.20	
EX. PIPE 12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.60	
PIPE 10-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	105.00	
PIPE 10-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	105.00	
PIPE 10-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	105.00	
PIPE 9-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.00	
PIPE 9-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.00	
PIPE 9-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.00	
PIPE 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.10	
PIPE 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.60	
PIPE 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.30	
PIPE 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.60	
PIPE 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.10	
PIPE 21-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	

EX. PIPE 21-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	
PIPE 38-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.90	
EX. PIPE 38-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.90	
PIPE 36B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.70	
PIPE 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.10	
PIPE 36A-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.40	
PIPE 36A-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.40	
PIPE 31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	79.40	
PIPE 29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.50	
PIPE 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	
PIPE 27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.80	
PIPE 26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.00	
PIPE 19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	
PIPE 23-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.10	
PIPE 23-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.10	
PIPE 18-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	
PIPE 18-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	
PIPE 17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.50	
PIPE 16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.50	
PIPE 24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.70	
PIPE 25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	
PIPE 28-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.10	
PIPE 28-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.10	

PIPE 33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.60	
PIPE 34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.20	
PIPE 35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.90	
PIPE 32-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.10	
PIPE 32-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.10	
EX. PIPE 41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.20	

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)**
PIPE 42-1	50.36	7023.83	1.0	7024.33	0.013	0.03	1.00	CIRCULAR	72.00 in	72.00 in
PIPE 42-2	31.36	7024.34	1.0	7024.65	0.013	0.38	0.44	CIRCULAR	72.00 in	72.00 in
PIPE 96	32.00	7029.45	2.0	7030.09	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 39B	499.00	7025.19	1.5	7032.67	0.013	0.05	1.00	CIRCULAR	72.00 in	72.00 in
PIPE 39A	274.91	7033.67	1.5	7037.79	0.013	0.05	1.00	CIRCULAR	60.00 in	60.00 in
PIPE 22-1	340.26	7038.13	0.8	7040.85	0.013	0.05	1.00	CIRCULAR	0.00 in	0.00 in
PIPE 22-2	301.60	7041.15	1.5	7045.67	0.013	0.05	1.00	CIRCULAR	60.00 in	60.00 in
PIPE 15-1	550.00	7045.97	1.5	7054.22	0.013	0.05	0.00	CIRCULAR	60.00 in	60.00 in
PIPE 15-2	171.67	7054.57	0.8	7055.94	0.013	0.05	1.00	CIRCULAR	60.00 in	60.00 in
PIPE 14	24.00	7056.94	0.5	7057.06	0.013	0.94	0.00	CIRCULAR	48.00 in	48.00 in
PIPE 14C	254.48	7058.10	0.5	7059.37	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 14B-2	435.48	7059.96	0.6	7062.57	0.013	0.05	0.92	CIRCULAR	30.00 in	30.00 in

PIPE 14B-1	435.48	7062.90	0.6	7065.51	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 13	264.07	7057.18	2.5	7063.78	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
EX. PIPE 12	24.23	7070.36	3.1	7071.11	0.013	0.83	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 10-1	400.00	7064.34	2.1	7072.74	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 10-2	400.00	7073.14	2.1	7081.54	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 10-3	391.34	7081.96	1.5	7087.92	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 9-1	16.11	7088.72	0.5	7088.80	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 9-2	24.00	7088.80	0.5	7088.92	0.013	0.38	0.44	CIRCULAR	36.00 in	36.00 in
PIPE 9-3	234.95	7088.93	0.5	7090.10	0.013	0.38	0.44	CIRCULAR	36.00 in	36.00 in
PIPE 6	32.00	7091.09	2.8	7091.99	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 7	57.67	7090.39	0.5	7090.68	0.013	1.32	0.00	CIRCULAR	30.00 in	30.00 in
PIPE 8	57.67	7090.87	7.0	7094.91	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 5	22.08	7088.22	1.3	7088.50	0.013	1.32	0.00	CIRCULAR	42.00 in	42.00 in
PIPE 3	92.36	7091.38	1.0	7092.30	0.013	1.32	0.25	CIRCULAR	24.00 in	24.00 in
PIPE 21-1	10.90	7049.47	6.7	7050.20	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
EX. PIPE 21-2	12.02	7054.76	5.0	7055.36	0.013	0.87	0.28	CIRCULAR	18.00 in	18.00 in
PIPE 38-1	11.57	7041.59	8.0	7042.52	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
EX. PIPE 38-2	10.06	7044.14	7.0	7044.84	0.013	0.87	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 36B	71.50	7034.67	1.0	7035.38	0.013	0.38	0.00	CIRCULAR	48.00 in	48.00 in
PIPE 100	24.00	7037.68	1.0	7037.92	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 36A-1	150.46	7035.74	1.3	7037.70	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
PIPE 36A-2	68.51	7037.73	1.3	7038.62	0.013	0.38	0.44	CIRCULAR	48.00 in	48.00 in
PIPE 31	303.64	7038.97	1.6	7043.83	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 29	5.69	7045.33	9.8	7045.89	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 30	24.67	7045.82	1.0	7046.07	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in

PIPE 27	97.53	7044.30	0.8	7045.08	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 26	317.33	7045.42	1.0	7048.59	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 19	66.87	7049.08	0.9	7049.68	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 23-1	55.51	7050.70	1.7	7051.64	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 23-2	36.88	7051.94	1.0	7052.31	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 18-1	310.23	7050.27	2.3	7057.41	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 18-2	60.33	7057.71	0.5	7058.01	0.013	1.32	0.25	CIRCULAR	24.00 in	24.00 in
PIPE 17	16.14	7058.81	8.1	7060.12	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 16	24.67	7058.31	1.0	7058.56	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 24	5.67	7049.59	9.9	7050.15	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 25	24.66	7050.08	1.0	7050.33	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 28-1	57.60	7046.87	1.4	7047.68	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 28-2	32.89	7047.97	1.8	7048.56	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 33	56.20	7040.62	0.5	7040.90	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 34	25.87	7041.19	10.0	7043.78	0.013	0.90	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 35	9.05	7041.70	5.0	7042.15	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 32-1	51.83	7041.11	2.0	7042.15	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 32-2	29.44	7042.46	1.0	7042.75	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
EX. PIPE 41	21.55	7025.62	5.0	7026.70	0.013	1.21	0.00	CIRCULAR	18.00 in	18.00 in

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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**
PIPE 42-1	424.65	15.02	61.85	14.12	51.42	16.89	1.49	Supercritical	364.80	0.00	
PIPE 42-2	424.65	15.02	61.85	14.12	51.42	16.89	1.49	Pressurized	364.80	31.36	
PIPE 96	14.90	8.43	14.07	6.21	10.23	8.87	1.87	Pressurized	9.20	32.00	
PIPE 39B	520.09	18.39	60.92	13.77	43.36	19.75	2.00	Supercritical Jump	351.40	240.69	Velocity is Too High
PIPE 39A	319.83	16.29	53.41	13.79	40.45	18.08	1.84	Supercritical	254.60	0.00	
PIPE 22-1	301.17	12.68	52.70	12.18	45.59	14.15	1.34	Pressurized	247.80	340.26	
PIPE 22-2	319.83	16.29	52.91	13.52	39.67	17.99	1.86	Supercritical Jump	247.80	55.24	
PIPE 15-1	319.83	16.29	51.99	13.08	38.39	17.83	1.89	Supercritical	236.50	0.00	
PIPE 15-2	233.57	11.90	60.00	12.04	60.00	12.04	0.00	Pressurized	236.50	171.67	
PIPE 14	101.84	8.10	48.00	10.04	48.00	10.04	0.00	Pressurized	126.20	24.00	
PIPE 14C	47.29	6.69	36.00	7.53	36.00	7.53	0.00	Pressurized	53.20	254.48	
PIPE 14B-2	31.86	6.49	21.10	7.21	20.96	7.26	1.01	Pressurized	26.60	435.48	
PIPE 14B-1	31.86	6.49	21.10	7.21	20.96	7.26	1.01	Pressurized	26.60	435.48	
PIPE 13	227.73	18.12	38.40	10.41	23.79	18.06	2.55	Supercritical Jump	112.20	99.73	
EX. PIPE 12	18.54	10.49	17.01	9.02	12.65	11.76	2.11	Supercritical	15.60	0.00	
PIPE 10-1	146.19	15.19	37.46	11.59	26.34	16.53	2.13	Supercritical	105.00	0.00	
PIPE 10-2	146.19	15.19	37.46	11.59	26.34	16.53	2.13	Supercritical	105.00	0.00	
PIPE 10-3	124.50	12.94	37.46	11.59	29.57	14.51	1.70	Supercritical	105.00	0.00	
PIPE 9-1	47.29	6.69	36.00	7.92	36.00	7.92	0.00	Pressurized	56.00	16.11	
PIPE 9-2	47.29	6.69	36.00	7.92	36.00	7.92	0.00	Pressurized	56.00	24.00	

PIPE 9-3	47.29	6.69	36.00	7.92	36.00	7.92	0.00	Pressurized	56.00	234.95	
PIPE 6	37.96	12.08	15.00	5.86	9.31	10.74	2.49	Pressurized	12.10	32.00	
PIPE 7	29.08	5.92	30.00	6.44	30.00	6.44	0.00	Pressurized	31.60	57.67	
PIPE 8	60.01	19.10	17.99	6.85	8.82	16.52	3.95	Pressurized	17.30	57.67	
PIPE 5	113.56	11.80	28.77	8.34	21.40	11.90	1.77	Pressurized	58.60	22.08	
PIPE 3	22.68	7.22	15.63	6.05	13.09	7.48	1.41	Pressurized	13.10	92.36	
PIPE 21-1	27.26	15.43	17.74	12.60	12.34	17.19	3.15	Pressurized	22.20	10.90	
EX. PIPE 21-2	23.55	13.33	17.74	12.60	13.90	15.16	2.48	Pressurized	22.20	12.02	
PIPE 38-1	29.79	16.86	17.26	9.70	9.71	17.39	3.80	Pressurized	16.90	11.57	
EX. PIPE 38-2	27.87	15.77	17.26	9.70	10.12	16.52	3.51	Pressurized	16.90	10.06	
PIPE 36B	144.03	11.46	38.47	10.44	31.96	12.68	1.46	Pressurized	112.70	71.50	
PIPE 100	22.68	7.22	17.36	6.62	14.93	7.84	1.34	Pressurized	16.10	24.00	
PIPE 36A-1	164.22	13.07	36.43	9.81	27.11	13.72	1.78	Supercritical Jump	100.40	144.53	
PIPE 36A-2	164.22	13.07	36.43	9.81	27.11	13.72	1.78	Pressurized	100.40	68.51	
PIPE 31	127.60	13.26	33.41	9.67	23.99	13.98	1.92	Supercritical Jump	79.40	47.80	
PIPE 29	71.01	22.60	16.46	6.31	7.36	17.75	4.70	Supercritical	14.50	0.00	
PIPE 30	10.53	5.96	12.38	5.48	10.82	6.40	1.30	Pressurized	7.10	24.67	
PIPE 27	59.82	8.46	29.76	9.41	28.97	9.65	1.06	Supercritical	58.80	0.00	
PIPE 26	66.88	9.46	28.13	8.77	23.86	10.46	1.39	Supercritical	52.00	0.00	
PIPE 19	39.02	7.95	22.55	7.68	19.91	8.79	1.28	Supercritical Jump	30.40	65.23	
PIPE 23-1	13.73	7.77	15.30	6.93	12.27	8.65	1.59	Pressurized	11.10	55.51	

PIPE 23-2	10.53	5.96	18.00	6.28	18.00	6.28	0.00	Pressurized	11.10	36.88	
PIPE 18-1	34.40	10.95	19.27	7.40	13.14	11.36	2.13	Supercritical	20.00	0.00	
PIPE 18-2	16.04	5.11	24.00	6.37	24.00	6.37	0.00	Pressurized	20.00	60.33	
PIPE 17	29.98	16.96	13.55	5.96	6.56	14.60	4.05	Pressurized	8.50	16.14	
PIPE 16	22.68	7.22	15.25	5.94	12.72	7.40	1.42	Pressurized	12.50	24.67	
PIPE 24	71.37	22.72	16.58	6.35	7.39	17.89	4.72	Supercritical	14.70	0.00	
PIPE 25	10.53	5.96	12.73	5.61	11.22	6.47	1.28	Pressurized	7.50	24.66	
PIPE 28-1	12.46	7.05	13.23	5.82	10.57	7.51	1.55	Pressurized	8.10	57.60	
PIPE 28-2	14.13	8.00	13.23	5.82	9.77	8.27	1.80	Supercritical Jump	8.10	18.08	
PIPE 33	16.04	5.11	17.09	6.52	19.10	5.82	0.79	Pressurized	15.60	56.20	
PIPE 34	71.73	22.83	14.41	5.69	6.41	16.61	4.74	Supercritical Jump	11.20	14.73	
PIPE 35	23.55	13.33	10.21	4.73	5.57	10.52	3.20	Pressurized	4.90	9.05	
PIPE 32-1	14.90	8.43	13.23	5.82	9.46	8.61	1.91	Pressurized	8.10	51.83	
PIPE 32-2	10.53	5.96	13.23	5.82	11.84	6.57	1.25	Pressurized	8.10	29.44	
EX. PIPE 41	23.55	13.33	17.13	9.33	10.97	14.37	2.88	Pressurized	16.20	21.55	

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

Sewer Sizing Summary:

	Existing	**Calculated**	**Used**	

Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 42-1	364.80	CIRCULAR	72.00 in	72.00 in	72.00 in	72.00 in	72.00 in	72.00 in	28.27	
PIPE 42-2	364.80	CIRCULAR	72.00 in	72.00 in	72.00 in	72.00 in	72.00 in	72.00 in	28.27	
PIPE 96	9.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 39B	351.40	CIRCULAR	72.00 in	72.00 in	66.00 in	66.00 in	72.00 in	72.00 in	28.27	
PIPE 39A	254.60	CIRCULAR	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	19.63	
PIPE 22-1	247.80	CIRCULAR	0.00 in	0.00 in	66.00 in	66.00 in	66.00 in	66.00 in	23.76	
PIPE 22-2	247.80	CIRCULAR	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	60.00 in	19.63	
PIPE 15-1	236.50	CIRCULAR	60.00 in	60.00 in	54.00 in	54.00 in	60.00 in	60.00 in	19.63	
PIPE 15-2	236.50	CIRCULAR	60.00 in	60.00 in	66.00 in	66.00 in	60.00 in	60.00 in	19.63	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 14	126.20	CIRCULAR	48.00 in	48.00 in	54.00 in	54.00 in	48.00 in	48.00 in	12.57	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 14C	53.20	CIRCULAR	36.00 in	36.00 in	42.00 in	42.00 in	36.00 in	36.00 in	7.07	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 14B-2	26.60	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	
PIPE 14B-1	26.60	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	

PIPE 13	112.20	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	
EX. PIPE 12	15.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 10-1	105.00	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PIPE 10-2	105.00	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PIPE 10-3	105.00	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PIPE 9-1	56.00	CIRCULAR	36.00 in	36.00 in	42.00 in	42.00 in	36.00 in	36.00 in	7.07	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 9-2	56.00	CIRCULAR	36.00 in	36.00 in	42.00 in	42.00 in	36.00 in	36.00 in	7.07	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 9-3	56.00	CIRCULAR	36.00 in	36.00 in	42.00 in	42.00 in	36.00 in	36.00 in	7.07	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 6	12.10	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 7	31.60	CIRCULAR	30.00 in	30.00 in	33.00 in	33.00 in	30.00 in	30.00 in	4.91	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 8	17.30	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 5	58.60	CIRCULAR	42.00 in	42.00 in	33.00 in	33.00 in	42.00 in	42.00 in	9.62	
PIPE 3	13.10	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	

PIPE 21-1	22.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
EX. PIPE 21-2	22.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 38-1	16.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
EX. PIPE 38-2	16.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 36B	112.70	CIRCULAR	48.00 in	48.00 in	48.00 in	48.00 in	48.00 in	48.00 in	12.57	
PIPE 100	16.10	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 36A-1	100.40	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	
PIPE 36A-2	100.40	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	
PIPE 31	79.40	CIRCULAR	42.00 in	42.00 in	36.00 in	36.00 in	42.00 in	42.00 in	9.62	
PIPE 29	14.50	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 30	7.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 27	58.80	CIRCULAR	36.00 in	36.00 in	36.00 in	36.00 in	36.00 in	36.00 in	7.07	
PIPE 26	52.00	CIRCULAR	36.00 in	36.00 in	33.00 in	33.00 in	36.00 in	36.00 in	7.07	
PIPE 19	30.40	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	
PIPE 23-1	11.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 23-2	11.10	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 18-1	20.00	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PIPE 18-2	20.00	CIRCULAR	24.00 in	24.00 in	27.00 in	27.00 in	24.00 in	24.00 in	3.14	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 17	8.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

PIPE 16	12.50	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PIPE 24	14.70	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 25	7.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 28-1	8.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 28-2	8.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 33	15.60	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 34	11.20	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 35	4.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 32-1	8.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 32-2	8.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
EX. PIPE 41	16.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

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

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	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)**

PIPE 42-1	7023.83	7024.33	0.00	0.00	7028.11	7029.48	7032.54	0.04	7032.58
PIPE 42-2	7024.34	7024.65	0.98	1.45	7032.42	7032.65	7035.01	0.23	7035.24
PIPE 96	7029.45	7030.09	0.56	0.00	7035.37	7035.62	7035.79	0.24	7036.04
PIPE 39B	7025.19	7032.67	0.12	0.19	7033.15	7037.75	7035.55	5.15	7040.69
PIPE 39A	7033.67	7037.79	0.13	0.00	7037.88	7042.24	7042.11	3.08	7045.19
PIPE 22-1	7038.13	7040.85	0.08	0.92	7044.51	7046.35	7046.20	1.84	7048.04
PIPE 22-2	7041.15	7045.67	0.12	0.00	7046.48	7050.08	7048.62	4.30	7052.92
PIPE 15-1	7045.97	7054.22	0.11	0.00	7050.19	7058.55	7054.10	7.11	7061.21
PIPE 15-2	7054.57	7055.94	0.11	0.00	7059.57	7060.97	7061.82	1.41	7063.23
PIPE 14	7056.94	7057.06	1.47	0.00	7063.13	7063.32	7064.70	0.18	7064.88
PIPE 14C	7058.10	7059.37	0.04	0.69	7064.73	7066.35	7065.61	1.61	7067.22
PIPE 14B-2	7059.96	7062.57	0.02	0.46	7067.25	7069.07	7067.71	1.82	7069.53
PIPE 14B-1	7062.90	7065.51	0.02	0.00	7069.10	7070.92	7069.55	1.82	7071.37
PIPE 13	7057.18	7063.78	0.06	1.01	7063.07	7066.98	7064.30	4.36	7068.66
EX. PIPE 12	7070.36	7071.11	1.00	0.00	7071.41	7072.53	7073.56	0.23	7073.79
PIPE 10-1	7064.34	7072.74	0.09	0.00	7067.07	7075.86	7070.78	7.17	7077.95
PIPE 10-2	7073.14	7081.54	0.09	0.00	7075.95	7084.66	7079.58	7.17	7086.75
PIPE 10-3	7081.96	7087.92	0.09	0.00	7084.75	7091.04	7087.69	5.44	7093.13
PIPE 9-1	7088.72	7088.80	0.05	0.87	7093.08	7093.19	7094.05	0.11	7094.16
PIPE 9-2	7088.80	7088.92	0.37	0.55	7094.11	7094.27	7095.08	0.17	7095.25
PIPE 9-3	7088.93	7090.10	0.37	0.55	7095.19	7096.84	7096.16	1.65	7097.81
PIPE 6	7091.09	7091.99	0.01	0.74	7098.34	7098.43	7098.57	0.09	7098.66
PIPE 7	7090.39	7090.68	0.85	0.00	7098.02	7098.36	7098.66	0.34	7099.00
PIPE 8	7090.87	7094.91	0.62	0.00	7097.96	7098.30	7098.43	0.34	7098.77
PIPE 5	7088.22	7088.50	0.76	0.00	7093.31	7093.39	7093.89	0.07	7093.96

PIPE 3	7091.38	7092.30	0.36	0.51	7094.56	7094.87	7094.83	0.31	7095.14
PIPE 21-1	7049.47	7050.20	3.23	0.00	7053.70	7054.19	7056.15	0.48	7056.64
EX. PIPE 21-2	7054.76	7055.36	2.13	1.76	7058.08	7058.62	7060.53	0.53	7061.07
PIPE 38-1	7041.59	7042.52	1.87	0.00	7045.65	7045.95	7047.07	0.30	7047.37
EX. PIPE 38-2	7044.14	7044.84	1.24	0.00	7047.18	7047.44	7048.60	0.26	7048.86
PIPE 36B	7034.67	7035.38	0.47	0.00	7039.92	7040.36	7041.17	0.44	7041.60
PIPE 100	7037.68	7037.92	0.54	0.00	7041.73	7041.86	7042.14	0.12	7042.26
PIPE 36A-1	7035.74	7037.70	0.05	0.26	7040.92	7041.61	7041.91	0.70	7042.61
PIPE 36A-2	7037.73	7038.62	0.38	0.56	7042.55	7042.89	7043.55	0.33	7043.88
PIPE 31	7038.97	7043.83	0.05	0.00	7042.94	7046.61	7044.00	4.07	7048.07
PIPE 29	7045.33	7045.89	0.44	0.00	7047.05	7050.51	7050.84	0.00	7050.84
PIPE 30	7045.82	7046.07	0.33	0.00	7048.15	7048.26	7048.40	0.11	7048.51
PIPE 27	7044.30	7045.08	0.05	0.00	7046.71	7047.56	7048.16	0.78	7048.93
PIPE 26	7045.42	7048.59	0.04	0.23	7048.36	7050.93	7049.21	2.92	7052.13
PIPE 19	7049.08	7049.68	0.03	0.24	7051.81	7052.16	7052.40	0.36	7052.76
PIPE 23-1	7050.70	7051.64	0.81	0.00	7052.97	7053.59	7053.59	0.62	7054.20
PIPE 23-2	7051.94	7052.31	0.23	0.34	7054.17	7054.58	7054.78	0.41	7055.19
PIPE 18-1	7050.27	7057.41	0.03	0.00	7052.20	7059.02	7053.37	6.49	7059.87
PIPE 18-2	7057.71	7058.01	0.83	0.47	7060.54	7061.01	7061.17	0.47	7061.64
PIPE 17	7058.81	7060.12	0.14	0.47	7061.89	7061.99	7062.25	0.11	7062.35
PIPE 16	7058.31	7058.56	0.32	0.00	7061.72	7061.79	7061.96	0.07	7062.04
PIPE 24	7049.59	7050.15	0.45	0.00	7051.38	7054.83	7055.17	0.00	7055.17
PIPE 25	7050.08	7050.33	0.37	0.00	7052.22	7052.34	7052.50	0.13	7052.62
PIPE 28-1	7046.87	7047.68	0.43	0.00	7049.04	7049.38	7049.37	0.34	7049.71
PIPE 28-2	7047.97	7048.56	0.12	0.18	7049.69	7049.69	7050.01	0.18	7050.19

PIPE 33	7040.62	7040.90	0.51	0.00	7044.00	7044.27	7044.38	0.27	7044.65
PIPE 34	7041.19	7043.78	0.18	0.00	7044.63	7044.98	7044.83	0.66	7045.48
PIPE 35	7041.70	7042.15	0.05	0.33	7044.91	7044.93	7045.03	0.02	7045.05
PIPE 32-1	7041.11	7042.15	0.43	0.00	7043.98	7044.29	7044.31	0.31	7044.62
PIPE 32-2	7042.46	7042.75	0.12	0.18	7044.60	7044.77	7044.92	0.17	7045.10
EX. PIPE 41	7025.62	7026.70	1.58	0.00	7035.51	7036.02	7036.82	0.51	7037.33

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

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			**Upstream**				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 42-1	50.36	7.00	8.00	10.17	0.00	0.00	0.00	24.34	15.92	8.09	197.78	Sewer Too Shallow
PIPE 42-2	31.36	7.00	8.00	10.17	24.33	15.91	8.08	25.20	16.35	8.52	252.42	
PIPE 96	32.00	2.50	4.00	4.92	20.10	10.84	8.59	19.32	10.45	8.20	126.93	
PIPE 39B	499.00	7.00	8.00	10.17	24.13	15.82	7.98	24.40	15.95	8.12	3902.69	

PIPE 39A	274.91	6.00	8.00	9.00	23.41	14.87	8.20	26.40	16.37	9.70	2080.74	
PIPE 22-1	340.26	6.50	8.00	9.58	25.22	16.07	8.82	30.58	18.75	11.50	3182.40	
PIPE 22-2	301.60	6.00	8.00	9.00	30.49	18.41	11.74	27.06	16.70	10.03	2864.87	
PIPE 15-1	550.00	6.00	8.00	9.00	26.46	16.40	9.73	28.22	17.28	10.61	4803.59	
PIPE 15-2	171.67	6.00	8.00	9.00	27.53	16.93	10.26	33.64	19.99	13.32	1811.57	
PIPE 14	24.00	5.00	6.00	7.83	32.64	18.74	13.40	27.88	16.36	11.02	235.20	
PIPE 14C	254.48	4.00	6.00	6.67	26.80	15.24	11.07	15.26	9.46	5.30	1340.77	
PIPE 14B-2	435.48	3.50	6.00	6.08	14.59	8.83	5.25	24.90	13.99	10.41	1979.41	
PIPE 14B-1	435.48	3.50	6.00	6.08	24.25	13.66	10.08	13.48	8.28	4.70	1852.02	
PIPE 13	264.07	5.00	6.00	7.83	32.16	18.50	13.17	25.32	15.08	9.74	2383.67	
EX. PIPE 12	24.23	2.50	4.00	4.92	14.66	8.12	5.87	11.28	6.43	4.18	47.31	
PIPE 10-1	400.00	4.50	6.00	7.25	24.70	14.48	9.73	24.42	14.34	9.59	2657.04	
PIPE 10-2	400.00	4.50	6.00	7.25	23.62	13.94	9.19	26.98	15.62	10.87	2804.07	
PIPE 10-3	391.34	4.50	6.00	7.25	26.14	15.19	10.44	27.36	15.81	11.06	3007.96	
PIPE 9-1	16.11	4.00	6.00	6.67	26.26	14.96	10.80	24.40	14.03	9.87	109.76	
PIPE 9-2	24.00	4.00	6.00	6.67	24.40	14.03	9.87	24.16	13.91	9.75	151.75	
PIPE 9-3	234.95	4.00	6.00	6.67	24.15	13.91	9.74	23.06	13.36	9.20	1415.82	
PIPE 6	32.00	3.00	4.00	5.50	22.07	12.12	9.29	27.02	14.59	11.76	196.36	
PIPE 7	57.67	3.50	6.00	6.08	22.98	13.03	9.45	21.00	12.04	8.46	298.49	
PIPE 8	57.67	3.00	4.00	5.50	22.51	12.34	9.51	13.04	7.60	4.77	209.61	
PIPE 5	22.08	4.50	6.00	7.25	26.76	15.50	10.75	27.50	15.88	11.13	173.85	
PIPE 3	92.36	3.00	4.00	5.50	23.25	12.71	9.87	20.98	11.57	8.74	465.55	
PIPE 21-1	10.90	2.50	4.00	4.92	22.96	12.27	10.02	20.70	11.14	8.89	52.24	
EX. PIPE 21-2	12.02	2.50	4.00	4.92	11.58	6.58	4.33	10.78	6.18	3.93	18.35	
PIPE 38-1	11.57	2.50	4.00	4.92	22.29	11.94	9.69	15.82	8.70	6.45	44.28	

EX. PIPE 38-2	10.06	2.50	4.00	4.92	12.59	7.09	4.84	10.82	6.20	3.95	16.54	
PIPE 36B	71.50	5.00	6.00	7.83	22.41	13.62	8.29	27.40	16.12	10.78	505.51	
PIPE 100	24.00	3.00	4.00	5.50	24.80	13.48	10.65	23.16	12.66	9.83	139.95	
PIPE 36A-1	150.46	5.00	6.00	7.83	26.67	15.75	10.42	25.60	15.22	9.88	1143.02	
PIPE 36A-2	68.51	5.00	6.00	7.83	25.54	15.19	9.85	22.02	13.43	8.09	447.66	
PIPE 31	303.64	4.50	6.00	7.25	21.82	13.03	8.28	20.28	12.27	7.52	1568.26	
PIPE 29	5.69	3.00	4.00	5.50	18.78	10.47	7.64	18.02	10.09	7.26	20.69	
PIPE 30	24.67	2.50	4.00	4.92	18.29	9.94	7.69	18.16	9.87	7.62	84.97	
PIPE 27	97.53	4.00	6.00	6.67	19.84	11.75	7.59	20.68	12.17	8.01	455.13	
PIPE 26	317.33	4.00	6.00	6.67	20.01	11.84	7.67	19.58	11.62	7.46	1425.50	
PIPE 19	66.87	3.50	6.00	6.08	19.10	11.09	7.51	19.40	11.24	7.66	275.64	
PIPE 23-1	55.51	2.50	4.00	4.92	18.37	9.98	7.73	18.40	9.99	7.74	194.13	
PIPE 23-2	36.88	2.50	4.00	4.92	17.80	9.69	7.44	18.60	10.09	7.84	126.72	
PIPE 18-1	310.23	3.00	4.00	5.50	18.71	10.44	7.61	22.16	12.16	9.33	1363.46	
PIPE 18-2	60.33	3.00	4.00	5.50	21.56	11.86	9.03	19.38	10.77	7.94	264.98	
PIPE 17	16.14	2.50	4.00	4.92	18.27	9.93	7.68	16.04	8.81	6.56	50.12	
PIPE 16	24.67	3.00	4.00	5.50	18.77	10.47	7.64	18.66	10.41	7.58	92.38	
PIPE 24	5.67	3.00	4.00	5.50	18.58	10.37	7.54	17.86	10.01	7.18	20.28	
PIPE 25	24.66	2.50	4.00	4.92	18.09	9.84	7.59	18.00	9.79	7.54	83.44	
PIPE 28-1	57.60	2.50	4.00	4.92	18.59	10.09	7.84	19.04	10.31	8.06	210.05	
PIPE 28-2	32.89	2.50	4.00	4.92	18.46	10.02	7.77	18.66	10.12	7.87	117.03	
PIPE 33	56.20	3.00	4.00	5.50	20.02	11.09	8.26	17.92	10.04	7.21	216.00	
PIPE 34	25.87	3.00	4.00	5.50	17.33	9.75	6.92	12.64	7.40	4.57	68.08	
PIPE 35	9.05	2.50	4.00	4.92	16.83	9.20	6.95	16.40	8.99	6.74	26.46	
PIPE 32-1	51.83	2.50	4.00	4.92	19.53	10.56	8.31	19.24	10.41	8.16	199.45	

PIPE 32-2	29.44	2.50	4.00	4.92	18.63	10.11	7.86	18.76	10.17	7.92	106.10	
EX. PIPE 41	21.55	2.50	4.00	4.92	27.76	14.67	12.42	22.10	11.84	9.59	133.51	

Total earth volume for sewer trenches = 48022 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

System Input Summary 5 YR HGL – MAINS A & B & LATERALS

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

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

Rational Method Constraints

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

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.1
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	7016.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 42-1	7039.00	166.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 42-2	7039.75	166.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 39B	7047.37	162.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 39A	7052.99	114.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 22-1	7058.39	112.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 22-2	7061.20	112.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 15-1	7070.33	108.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 15-2	7074.76	108.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14	7072.50	51.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14C	7068.00	7.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14B-2	7075.77	3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 14B-1	7073.00	3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 13	7077.94	57.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX. PIPE 12	7077.00	9.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10-1	7086.20	52.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10-2	7096.28	52.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 10-3	7102.85	52.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PIPE 9-1	7102.00	23.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-2	7102.00	23.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 9-3	7102.63	23.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 6	7106.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 7	7101.93	10.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 8	7101.93	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 5	7103.50	33.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 3	7103.29	5.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 21-1	7060.80	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX. PIPE 21-2	7061.00	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 36B	7050.58	54.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					**Total Design Flow**				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 42-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	166.20	Surface Water Present (Downstream)
PIPE 42-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	166.20	
PIPE 39B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	162.00	
PIPE 39A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	114.90	
PIPE 22-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.80	

PIPE 22-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.80	
PIPE 15-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	108.10	
PIPE 15-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	108.10	
PIPE 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	
PIPE 14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	
PIPE 14B-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.60	
PIPE 14B-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.60	
PIPE 13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.20	
EX. PIPE 12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.60	
PIPE 10-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.30	
PIPE 10-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.30	
PIPE 10-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.30	
PIPE 9-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.30	
PIPE 9-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.30	
PIPE 9-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.30	
PIPE 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
PIPE 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.30	
PIPE 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	
PIPE 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.00	
PIPE 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	
PIPE 21-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.50	
EX. PIPE 21-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.50	
PIPE 36B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.70	

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)**
PIPE 42-1	78.16	7019.79	1.0	7020.57	0.013	0.03	1.00	CIRCULAR	72.00 in	72.00 in
PIPE 42-2	31.36	7020.58	1.0	7020.89	0.013	0.38	0.44	CIRCULAR	72.00 in	72.00 in
PIPE 39B	499.00	7022.69	2.0	7032.67	0.013	0.05	1.00	CIRCULAR	72.00 in	72.00 in
PIPE 39A	274.91	7033.67	1.5	7037.79	0.013	0.05	1.00	CIRCULAR	60.00 in	60.00 in
PIPE 22-1	340.26	7038.13	0.8	7040.85	0.013	0.05	1.00	CIRCULAR	0.00 in	0.00 in
PIPE 22-2	301.60	7041.15	1.5	7045.67	0.013	0.05	1.00	CIRCULAR	60.00 in	60.00 in
PIPE 15-1	550.00	7045.97	1.5	7054.22	0.013	0.05	0.00	CIRCULAR	60.00 in	60.00 in
PIPE 15-2	171.67	7054.52	0.8	7055.94	0.013	0.05	1.00	CIRCULAR	60.00 in	60.00 in
PIPE 14	24.00	7056.94	0.5	7057.06	0.013	1.32	0.00	CIRCULAR	48.00 in	48.00 in
PIPE 14C	254.48	7058.10	0.5	7059.37	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 14B-2	435.48	7059.87	0.6	7062.57	0.013	0.08	0.77	CIRCULAR	30.00 in	30.00 in
PIPE 14B-1	435.48	7062.85	0.6	7065.51	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 13	264.07	7057.27	2.5	7063.78	0.013	0.05	1.00	CIRCULAR	48.00 in	48.00 in
EX. PIPE 12	24.23	7070.36	3.1	7071.11	0.013	0.83	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 10-1	400.00	7064.34	2.1	7072.74	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 10-2	400.00	7073.14	2.1	7081.54	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 10-3	391.34	7081.96	1.5	7087.92	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 9-1	16.11	7088.72	0.5	7088.80	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 9-2	24.00	7088.80	0.5	7088.92	0.013	0.38	0.44	CIRCULAR	36.00 in	36.00 in
PIPE 9-3	234.95	7088.93	0.5	7090.10	0.013	0.38	0.44	CIRCULAR	36.00 in	36.00 in

PIPE 6	32.00	7091.09	2.8	7091.99	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 7	57.67	7090.39	0.5	7090.68	0.013	1.32	0.00	CIRCULAR	30.00 in	30.00 in
PIPE 8	57.67	7090.87	7.0	7094.91	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 5	22.08	7088.22	1.3	7088.50	0.013	1.32	0.00	CIRCULAR	42.00 in	42.00 in
PIPE 3	92.36	7091.38	1.0	7092.30	0.013	1.32	0.25	CIRCULAR	24.00 in	24.00 in
PIPE 21-1	10.90	7049.47	6.7	7050.20	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
EX. PIPE 21-2	12.02	7054.76	5.0	7055.36	0.013	0.87	0.28	CIRCULAR	18.00 in	18.00 in
PIPE 36B	71.50	7034.67	1.0	7035.38	0.013	0.38	0.00	CIRCULAR	48.00 in	48.00 in

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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**
PIPE 42-1	424.65	15.02	42.12	9.67	31.28	14.10	1.77	Supercritical	166.20	0.00	
PIPE 42-2	424.65	15.02	42.12	9.67	31.28	14.10	1.77	Supercritical	166.20	0.00	
PIPE 39B	600.54	21.24	41.56	9.58	25.54	18.03	2.54	Supercritical	162.00	0.00	
PIPE 39A	319.83	16.29	36.72	9.12	24.86	14.95	2.11	Supercritical	114.90	0.00	
PIPE 22-1	128.82	10.25	38.49	10.44	34.80	11.56	1.23	Supercritical	112.80	0.00	
PIPE 22-2	319.83	16.29	36.37	9.06	24.61	14.88	2.11	Supercritical	112.80	0.00	
PIPE 15-1	319.83	16.29	35.57	8.91	24.04	14.71	2.12	Supercritical	108.10	0.00	
PIPE 15-2	237.50	12.10	35.57	8.91	28.40	11.81	1.54	Supercritical	108.10	0.00	
PIPE 14	101.89	8.11	25.96	7.48	24.26	8.15	1.14	Supercritical	51.90	0.00	
PIPE 14C	47.25	6.68	10.13	4.41	9.50	4.83	1.13	Supercritical	7.20	0.00	

PIPE 14B-2	32.38	6.60	7.47	3.77	6.75	4.35	1.22	Supercritical	3.60	0.00	
PIPE 14B-1	32.14	6.55	7.47	3.77	6.78	4.33	1.21	Supercritical	3.60	0.00	
PIPE 13	226.14	18.00	27.31	7.75	16.46	15.01	2.64	Supercritical	57.20	0.00	
EX. PIPE 12	18.54	10.49	14.36	6.35	9.19	10.59	2.40	Supercritical	9.60	0.00	
PIPE 10-1	146.19	15.19	27.14	7.95	17.36	13.93	2.35	Supercritical	52.30	0.00	
PIPE 10-2	146.19	15.19	27.14	7.95	17.36	13.93	2.35	Supercritical	52.30	0.00	
PIPE 10-3	124.50	12.94	27.14	7.95	18.99	12.38	1.98	Supercritical	52.30	0.00	
PIPE 9-1	47.29	6.69	18.65	6.30	17.85	6.67	1.09	Supercritical	23.30	0.00	
PIPE 9-2	47.29	6.69	18.65	6.30	17.85	6.67	1.09	Supercritical	23.30	0.00	
PIPE 9-3	47.29	6.69	18.65	6.30	17.85	6.67	1.09	Supercritical	23.30	0.00	
PIPE 6	37.96	12.08	11.26	4.83	6.98	9.22	2.51	Supercritical	7.00	0.00	
PIPE 7	29.08	5.92	12.87	5.12	12.33	5.42	1.09	Supercritical	10.30	0.00	
PIPE 8	60.01	19.10	12.08	5.05	5.92	13.28	3.96	Supercritical	8.00	0.00	
PIPE 5	113.56	11.80	21.34	6.72	15.51	10.23	1.84	Supercritical	33.00	0.00	
PIPE 3	22.68	7.22	10.03	4.50	8.12	5.98	1.50	Supercritical	5.60	0.00	
PIPE 21-1	27.26	15.43	14.29	6.32	7.33	14.04	3.65	Supercritical	9.50	0.00	
EX. PIPE 21-2	23.55	13.33	14.29	6.32	7.95	12.61	3.13	Supercritical	9.50	0.00	
PIPE 36B	144.03	11.46	26.68	7.62	20.51	10.68	1.65	Supercritical	54.70	0.00	

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

Sewer Sizing Summary:

			Existing		**Calculated**		**Used**			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 42-1	166.20	CIRCULAR	72.00 in	72.00 in	54.00 in	54.00 in	72.00 in	72.00 in	28.27	
PIPE 42-2	166.20	CIRCULAR	72.00 in	72.00 in	54.00 in	54.00 in	72.00 in	72.00 in	28.27	
PIPE 39B	162.00	CIRCULAR	72.00 in	72.00 in	48.00 in	48.00 in	72.00 in	72.00 in	28.27	
PIPE 39A	114.90	CIRCULAR	60.00 in	60.00 in	42.00 in	42.00 in	60.00 in	60.00 in	19.63	
PIPE 22-1	112.80	CIRCULAR	0.00 in	0.00 in	48.00 in	48.00 in	48.00 in	48.00 in	12.57	
PIPE 22-2	112.80	CIRCULAR	60.00 in	60.00 in	42.00 in	42.00 in	60.00 in	60.00 in	19.63	
PIPE 15-1	108.10	CIRCULAR	60.00 in	60.00 in	42.00 in	42.00 in	60.00 in	60.00 in	19.63	
PIPE 15-2	108.10	CIRCULAR	60.00 in	60.00 in	48.00 in	48.00 in	60.00 in	60.00 in	19.63	
PIPE 14	51.90	CIRCULAR	48.00 in	48.00 in	42.00 in	42.00 in	48.00 in	48.00 in	12.57	
PIPE 14C	7.20	CIRCULAR	36.00 in	36.00 in	18.00 in	18.00 in	36.00 in	36.00 in	7.07	
PIPE 14B-2	3.60	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
PIPE 14B-1	3.60	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
PIPE 13	57.20	CIRCULAR	48.00 in	48.00 in	30.00 in	30.00 in	48.00 in	48.00 in	12.57	
EX. PIPE 12	9.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 10-1	52.30	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
PIPE 10-2	52.30	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
PIPE 10-3	52.30	CIRCULAR	42.00 in	42.00 in	33.00 in	33.00 in	42.00 in	42.00 in	9.62	
PIPE 9-1	23.30	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
PIPE 9-2	23.30	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
PIPE 9-3	23.30	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
PIPE 6	7.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	

PIPE 7	10.30	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
PIPE 8	8.00	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 5	33.00	CIRCULAR	42.00 in	42.00 in	27.00 in	27.00 in	42.00 in	42.00 in	9.62	
PIPE 3	5.60	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 21-1	9.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
EX. PIPE 21-2	9.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 36B	54.70	CIRCULAR	48.00 in	48.00 in	36.00 in	36.00 in	48.00 in	48.00 in	12.57	

- 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): 0.00

	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)**
PIPE 42-1	7019.79	7020.57	0.00	0.00	7022.40	7024.08	7025.48	0.05	7025.53
PIPE 42-2	7020.58	7020.89	0.20	0.30	7024.58	7025.47	7026.27	0.00	7026.27
PIPE 39B	7022.69	7032.67	0.03	0.03	7025.52	7036.13	7029.87	7.69	7037.56
PIPE 39A	7033.67	7037.79	0.03	0.00	7036.16	7040.85	7039.21	2.93	7042.14

PIPE 22-1	7038.13	7040.85	0.06	0.00	7041.03	7044.06	7043.10	2.65	7045.75
PIPE 22-2	7041.15	7045.67	0.03	0.74	7044.82	7048.70	7046.63	3.34	7049.98
PIPE 15-1	7045.97	7054.22	0.02	0.00	7048.72	7057.18	7051.33	7.09	7058.42
PIPE 15-2	7054.52	7055.94	0.02	0.00	7057.21	7058.90	7059.05	1.09	7060.14
PIPE 14	7056.94	7057.06	0.35	0.00	7060.12	7060.12	7060.49	0.03	7060.52
PIPE 14C	7058.10	7059.37	0.00	0.25	7060.75	7060.75	7060.77	0.06	7060.83
PIPE 14B-2	7059.87	7062.57	0.00	0.01	7060.76	7063.19	7060.84	2.57	7063.41
PIPE 14B-1	7062.85	7065.51	0.00	0.00	7063.42	7066.13	7063.71	2.65	7066.35
PIPE 13	7057.27	7063.78	0.02	0.15	7059.07	7066.06	7062.14	4.85	7066.99
EX. PIPE 12	7070.36	7071.11	0.38	0.00	7071.12	7072.31	7072.86	0.07	7072.93
PIPE 10-1	7064.34	7072.74	0.02	0.00	7066.08	7075.00	7068.80	7.18	7075.98
PIPE 10-2	7073.14	7081.54	0.02	0.00	7075.02	7083.80	7077.60	7.18	7084.78
PIPE 10-3	7081.96	7087.92	0.02	0.00	7083.82	7090.18	7085.92	5.24	7091.16
PIPE 9-1	7088.72	7088.80	0.01	0.29	7091.25	7091.25	7091.46	0.01	7091.47
PIPE 9-2	7088.80	7088.92	0.06	0.09	7091.44	7091.44	7091.63	0.02	7091.65
PIPE 9-3	7088.93	7090.10	0.06	0.09	7091.62	7091.65	7091.81	0.46	7092.27
PIPE 6	7091.09	7091.99	0.00	0.09	7091.75	7092.93	7093.00	0.30	7093.29
PIPE 7	7090.39	7090.68	0.09	0.00	7092.25	7092.25	7092.36	0.05	7092.41
PIPE 8	7090.87	7094.91	0.13	0.00	7091.79	7095.92	7094.10	2.21	7096.31
PIPE 5	7088.22	7088.50	0.24	0.00	7091.18	7091.18	7091.41	0.05	7091.45
PIPE 3	7091.38	7092.30	0.07	0.17	7092.05	7093.14	7092.61	0.84	7093.45
PIPE 21-1	7049.47	7050.20	0.59	0.00	7050.27	7051.39	7051.80	0.21	7052.01
EX. PIPE 21-2	7054.76	7055.36	0.39	0.32	7055.59	7056.55	7056.96	0.21	7057.17
PIPE 36B	7034.67	7035.38	0.11	0.00	7036.37	7037.60	7038.14	0.36	7038.51

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

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

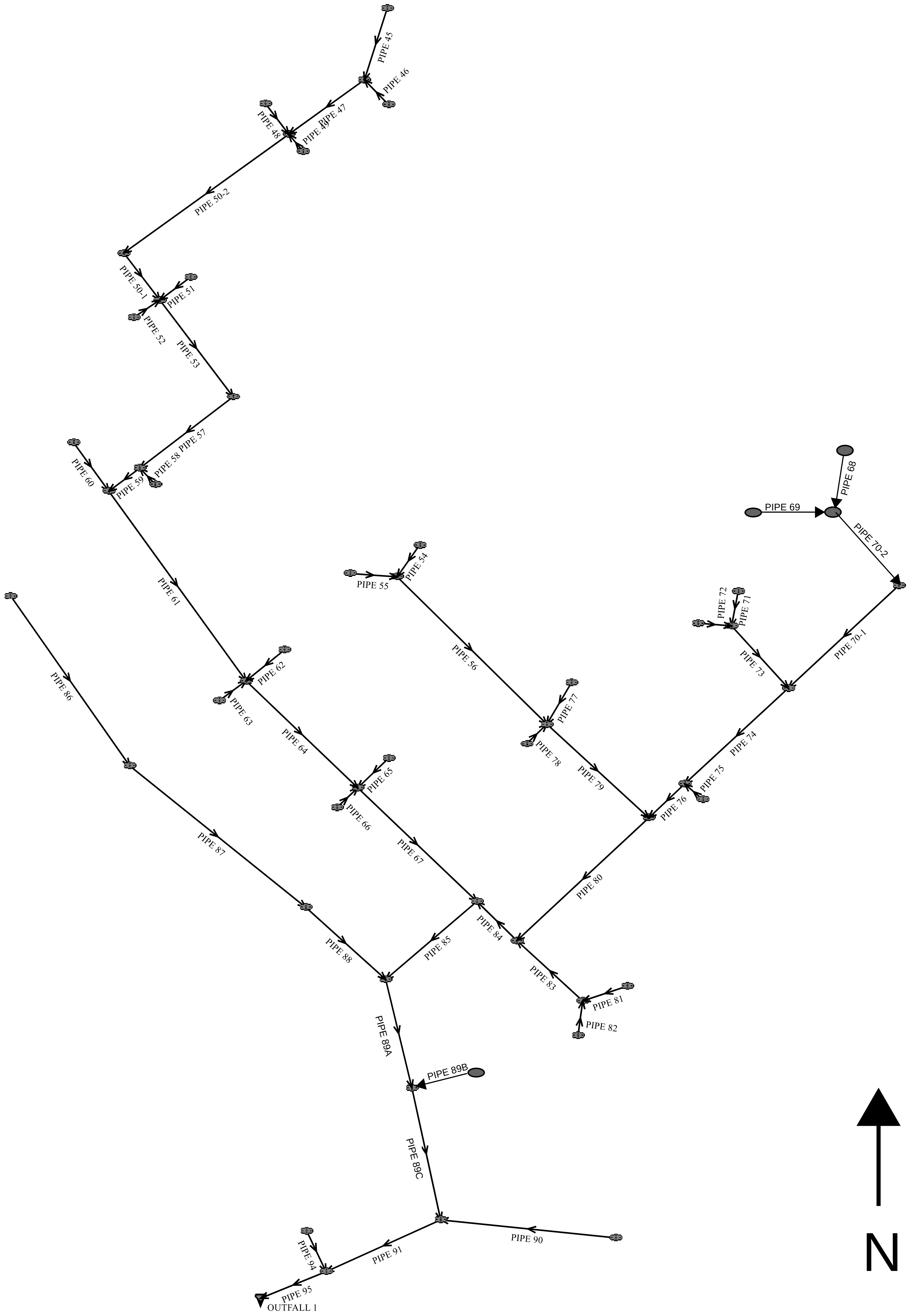
					Downstream			**Upstream**				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 42-1	78.16	7.00	8.00	10.17	0.00	0.00	0.00	31.86	19.68	11.85	459.89	Sewer Too Shallow
PIPE 42-2	31.36	7.00	8.00	10.17	31.85	19.67	11.84	32.72	20.11	12.28	376.98	
PIPE 39B	499.00	7.00	8.00	10.17	29.12	18.31	10.48	24.40	15.95	8.12	4516.54	
PIPE 39A	274.91	6.00	8.00	9.00	23.41	14.87	8.20	26.40	16.37	9.70	2080.74	
PIPE 22-1	340.26	5.00	6.00	7.83	26.72	15.78	10.45	32.08	18.46	13.12	3178.08	
PIPE 22-2	301.60	6.00	8.00	9.00	30.49	18.41	11.74	27.06	16.70	10.03	2864.87	
PIPE 15-1	550.00	6.00	8.00	9.00	26.46	16.40	9.73	28.22	17.28	10.61	4803.59	
PIPE 15-2	171.67	6.00	8.00	9.00	27.62	16.98	10.31	33.64	19.99	13.32	1815.65	
PIPE 14	24.00	5.00	6.00	7.83	32.64	18.74	13.40	27.88	16.36	11.02	235.21	
PIPE 14C	254.48	4.00	6.00	6.67	26.80	15.23	11.07	15.26	9.46	5.30	1340.47	

PIPE 14B-2	435.48	3.50	6.00	6.08	14.76	8.92	5.34	24.90	13.99	10.41	1989.68	
PIPE 14B-1	435.48	3.50	6.00	6.08	24.34	13.71	10.13	13.48	8.28	4.70	1861.18	
PIPE 13	264.07	5.00	6.00	7.83	31.98	18.41	13.07	25.32	15.08	9.74	2369.25	
EX. PIPE 12	24.23	2.50	4.00	4.92	14.66	8.12	5.87	11.28	6.43	4.18	47.31	
PIPE 10-1	400.00	4.50	6.00	7.25	24.70	14.48	9.73	24.42	14.34	9.59	2657.04	
PIPE 10-2	400.00	4.50	6.00	7.25	23.62	13.94	9.19	26.98	15.62	10.87	2804.07	
PIPE 10-3	391.34	4.50	6.00	7.25	26.14	15.19	10.44	27.36	15.81	11.06	3007.96	
PIPE 9-1	16.11	4.00	6.00	6.67	26.26	14.96	10.80	24.40	14.03	9.87	109.76	
PIPE 9-2	24.00	4.00	6.00	6.67	24.40	14.03	9.87	24.16	13.91	9.75	151.75	
PIPE 9-3	234.95	4.00	6.00	6.67	24.15	13.91	9.74	23.06	13.36	9.20	1415.82	
PIPE 6	32.00	3.00	4.00	5.50	22.07	12.12	9.29	27.02	14.59	11.76	196.36	
PIPE 7	57.67	3.50	6.00	6.08	22.98	13.03	9.45	21.00	12.04	8.46	298.49	
PIPE 8	57.67	3.00	4.00	5.50	22.51	12.34	9.51	13.04	7.60	4.77	209.61	
PIPE 5	22.08	4.50	6.00	7.25	26.76	15.50	10.75	27.50	15.88	11.13	173.85	
PIPE 3	92.36	3.00	4.00	5.50	23.25	12.71	9.87	20.98	11.57	8.74	465.55	
PIPE 21-1	10.90	2.50	4.00	4.92	22.96	12.27	10.02	20.70	11.14	8.89	52.24	
EX. PIPE 21-2	12.02	2.50	4.00	4.92	11.58	6.58	4.33	10.78	6.18	3.93	18.35	
PIPE 36B	71.50	5.00	6.00	7.83	22.41	13.62	8.29	27.40	16.12	10.78	505.51	

Total earth volume for sewer trenches = 40006 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:

    - Four inches for pipes less than 33 inches.
    - Six inches for pipes less than 60 inches.
    - Eight inches for all larger sizes.



MAINS C - G
100-YR HGL PIPE
SCHEMATIC

System Input Summary MAINS C THRU G - 100 YR HGL

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

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

Rational Method Constraints

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

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.1
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	7020.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 95	7041.30	159.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 94	7039.50	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 91	7049.80	145.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 90	7049.00	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 89C	7051.49	144.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 89A	7053.00	142.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 85	7061.70	135.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 84	7060.95	75.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 80	7065.16	62.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 79	7064.25	23.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 77	7064.44	5.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 78	7064.44	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 56	7065.90	13.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 55	7066.09	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 54	7066.09	8.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 76	7066.15	40.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 74	7069.53	34.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PIPE 70-1	7074.34	16.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 70-2	7073.19	16.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 69	7073.39	7.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 68	7073.39	10.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 73	7068.60	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 72	7068.79	8.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 71	7068.82	11.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 75	7066.27	6.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 83	7059.97	14.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 82	7060.17	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 81	7060.17	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 67	7061.15	65.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 65	7061.33	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 64	7063.05	61.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 61	7064.41	56.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 59	7064.80	52.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 58	7064.90	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 57	7068.80	50.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 53	7068.95	51.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 51	7069.14	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 50-1	7069.60	36.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 50-2	7074.20	36.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 48	7074.40	8.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 47	7075.38	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 45	7076.24	8.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PIPE 46	7075.52	9.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 49	7074.40	9.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 52	7069.14	9.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 60	7064.39	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 62	7063.24	4.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 63	7063.24	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 66	7061.33	2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 88	7052.00	10.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 87	7053.50	7.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 86	7052.40	4.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 89B	7050.30	3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					**Total Design Flow**				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	159.80	Surface Water Present (Downstream)
PIPE 94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	
PIPE 91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	145.40	
PIPE 90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.20	

PIPE 89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	144.20	
PIPE 89A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	142.10	
PIPE 85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	135.30	
PIPE 84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.70	
PIPE 80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.30	
PIPE 79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.30	
PIPE 77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	
PIPE 78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.60	
PIPE 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.10	
PIPE 55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.90	
PIPE 54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.30	
PIPE 76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.40	
PIPE 74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.10	
PIPE 70-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.80	
PIPE 70-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.80	
PIPE 69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	
PIPE 68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.60	
PIPE 73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	
PIPE 72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.20	
PIPE 71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	
PIPE 75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.90	
PIPE 83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.70	
PIPE 82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	
PIPE 81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00	
PIPE 67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.80	

PIPE 65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.60	
PIPE 64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.10	
PIPE 61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.60	
PIPE 59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.10	
PIPE 58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	
PIPE 57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.50	
PIPE 53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.10	
PIPE 51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	
PIPE 50-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.50	
PIPE 50-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.50	
PIPE 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.70	
PIPE 47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.00	
PIPE 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.40	
PIPE 46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.60	
PIPE 49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.90	
PIPE 52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.90	
PIPE 60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
PIPE 62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.20	
PIPE 63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	
PIPE 66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	
PIPE 88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.50	
PIPE 87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	
PIPE 86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.70	
PIPE 89B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.20	

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)**
PIPE 95	50.36	7022.54	1.0	7023.04	0.013	0.03	1.00	CIRCULAR	54.00 in	54.00 in
PIPE 94	32.00	7026.45	2.0	7027.09	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 91	206.32	7023.45	3.0	7029.66	0.013	0.05	1.00	CIRCULAR	54.00 in	54.00 in
PIPE 90	278.14	7036.78	2.5	7043.73	0.013	0.38	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 89C	165.53	7033.65	1.0	7035.31	0.013	0.57	0.35	CIRCULAR	54.00 in	54.00 in
PIPE 89A	120.91	7035.61	1.0	7036.82	0.013	0.05	1.00	CIRCULAR	54.00 in	54.00 in
PIPE 85	149.23	7040.76	4.2	7047.03	0.013	0.57	0.35	CIRCULAR	48.00 in	48.00 in
PIPE 84	46.29	7047.53	0.5	7047.76	0.013	1.32	0.25	CIRCULAR	42.00 in	42.00 in
PIPE 80	287.05	7048.18	1.4	7052.20	0.013	1.32	0.00	CIRCULAR	42.00 in	42.00 in
PIPE 79	109.86	7053.70	0.5	7054.25	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 77	26.48	7055.06	1.1	7055.35	0.013	0.83	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 78	5.71	7055.05	10.0	7055.62	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 56	330.45	7054.55	0.5	7056.20	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 55	9.15	7056.70	10.1	7057.62	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 54	25.89	7056.70	0.5	7056.83	0.013	0.92	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 76	50.48	7053.19	1.4	7053.90	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 74	231.49	7054.19	1.5	7057.66	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 70-1	287.50	7058.14	1.5	7062.45	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 70-2	84.73	7062.75	0.5	7063.17	0.013	1.32	0.25	CIRCULAR	24.00 in	24.00 in
PIPE 69	9.59	7063.67	10.0	7064.63	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in

PIPE 68	26.35	7063.68	0.5	7063.81	0.013	0.92	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 73	106.44	7058.16	0.5	7058.69	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 72	9.58	7059.19	10.0	7060.15	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 71	30.38	7059.19	0.5	7059.34	0.013	0.83	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 75	5.67	7055.20	10.0	7055.77	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 83	70.19	7049.56	0.5	7049.91	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 82	9.05	7050.71	10.1	7051.62	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 81	25.87	7050.21	0.5	7050.34	0.013	0.92	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 67	123.01	7047.59	0.7	7048.45	0.013	1.32	0.00	CIRCULAR	42.00 in	42.00 in
PIPE 65	24.68	7050.76	8.4	7052.83	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 64	301.80	7048.62	0.7	7050.73	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 61	287.48	7050.90	0.7	7052.91	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 59	33.15	7053.41	0.5	7053.58	0.013	1.32	0.25	CIRCULAR	36.00 in	36.00 in
PIPE 58	14.04	7055.38	10.0	7056.78	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 57	247.75	7053.90	1.2	7056.87	0.013	0.05	1.00	CIRCULAR	36.00 in	36.00 in
PIPE 53	136.50	7057.17	0.5	7057.85	0.013	1.32	0.25	CIRCULAR	36.00 in	36.00 in
PIPE 51	24.66	7059.35	3.6	7060.24	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 50-1	68.62	7058.35	0.5	7058.69	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 50-2	444.33	7059.10	1.1	7063.99	0.013	1.32	0.25	CIRCULAR	30.00 in	30.00 in
PIPE 48	24.67	7064.99	0.5	7065.11	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 47	94.00	7064.51	1.2	7065.64	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 45	55.09	7066.13	1.1	7066.74	0.013	0.18	0.61	CIRCULAR	18.00 in	18.00 in
PIPE 46	6.17	7066.14	9.7	7066.74	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 49	5.66	7064.99	10.1	7065.56	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 52	5.67	7059.35	9.9	7059.91	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in

PIPE 60	23.77	7054.91	10.0	7057.29	0.013	0.05	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 62	24.67	7053.03	4.8	7054.21	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 63	5.66	7053.03	9.9	7053.59	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 66	5.66	7050.75	9.9	7051.31	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 88	89.60	7040.12	1.0	7041.02	0.013	0.23	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 87	257.14	7041.32	1.0	7043.89	0.013	0.05	1.00	CIRCULAR	18.00 in	18.00 in
PIPE 86	298.71	7044.19	1.0	7047.18	0.013	0.10	0.73	CIRCULAR	18.00 in	18.00 in
PIPE 89B	65.78	7038.61	10.0	7045.19	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in

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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**
PIPE 95	196.47	12.35	44.36	11.43	36.98	13.77	1.46	Supercritical	159.80	0.00	
PIPE 94	14.89	8.43	18.00	11.32	18.00	11.32	0.00	Pressurized	20.00	32.00	
PIPE 91	342.08	21.51	42.49	10.83	24.58	20.64	2.90	Supercritical	145.40	0.00	Velocity is Too High
PIPE 90	16.65	9.42	14.75	6.58	10.18	9.90	2.10	Supercritical	10.20	0.00	
PIPE 89C	197.18	12.40	42.33	10.78	34.29	13.54	1.52	Supercritical	144.20	0.00	
PIPE 89A	197.18	12.40	42.03	10.70	33.95	13.50	1.53	Supercritical	142.10	0.00	
PIPE 85	295.17	23.49	41.59	11.70	22.81	22.98	3.34	Supercritical	135.30	0.00	Velocity is Too High
PIPE 84	71.33	7.41	42.00	7.87	42.00	7.87	0.00	Pressurized	75.70	46.29	
PIPE 80	119.36	12.41	29.68	8.57	21.54	12.54	1.85	Pressurized	62.30	287.05	
PIPE 79	16.04	5.11	24.00	7.42	24.00	7.42	0.00	Pressurized	23.30	109.86	

PIPE 77	11.05	6.25	10.95	4.98	9.07	6.27	1.43	Pressurized	5.60	26.48	
PIPE 78	33.31	18.85	9.88	4.63	4.52	13.24	4.51	Pressurized	4.60	5.71	
PIPE 56	16.04	5.11	15.63	6.05	16.49	5.69	0.90	Pressurized	13.10	330.45	
PIPE 55	33.47	18.94	10.21	4.73	4.65	13.53	4.54	Pressurized	4.90	9.15	
PIPE 54	7.45	4.21	18.00	4.70	18.00	4.70	0.00	Pressurized	8.30	25.89	
PIPE 76	48.66	9.91	25.65	9.04	20.87	11.09	1.55	Pressurized	40.40	50.48	
PIPE 74	50.37	10.26	23.82	8.16	18.09	11.02	1.73	Supercritical Jump	34.10	185.46	
PIPE 70-1	27.78	8.84	17.73	6.75	13.46	9.26	1.71	Supercritical Jump	16.80	44.62	
PIPE 70-2	16.04	5.11	24.00	5.35	24.00	5.35	0.00	Pressurized	16.80	84.73	
PIPE 69	33.31	18.85	12.47	5.51	5.68	15.04	4.52	Pressurized	7.20	9.59	
PIPE 68	7.45	4.21	18.00	6.00	18.00	6.00	0.00	Pressurized	10.60	26.35	
PIPE 73	16.04	5.11	24.00	5.76	24.00	5.76	0.00	Pressurized	18.10	106.44	
PIPE 72	33.31	18.85	13.31	5.85	6.08	15.60	4.52	Pressurized	8.20	9.58	
PIPE 71	7.45	4.21	18.00	6.22	18.00	6.22	0.00	Pressurized	11.00	30.38	
PIPE 75	33.31	18.85	12.20	5.41	5.56	14.86	4.53	Pressurized	6.90	5.67	
PIPE 83	16.04	5.11	16.58	6.35	18.08	5.79	0.84	Pressurized	14.70	70.19	
PIPE 82	33.47	18.94	6.56	3.60	3.06	10.56	4.43	Pressurized	2.10	9.05	
PIPE 81	16.04	5.11	15.56	6.03	16.39	5.69	0.90	Pressurized	13.00	25.87	
PIPE 67	84.40	8.77	30.51	8.79	27.89	9.70	1.19	Pressurized	65.80	123.01	
PIPE 65	30.53	17.27	9.88	4.63	4.72	12.44	4.14	Supercritical Jump	4.60	22.89	
PIPE 64	84.40	8.77	29.39	8.50	26.49	9.56	1.22	Pressurized	61.10	301.80	
PIPE 61	84.40	8.77	28.27	8.22	25.17	9.40	1.25	Supercritical Jump	56.60	135.32	

PIPE 59	47.29	6.69	36.00	7.37	36.00	7.37	0.00	Pressurized	52.10	33.15	
PIPE 58	33.31	18.85	7.90	4.02	3.65	11.69	4.47	Supercritical Jump	3.00	11.03	
PIPE 57	73.26	10.36	27.75	8.64	21.97	11.18	1.59	Supercritical Jump	50.50	56.63	
PIPE 53	47.29	6.69	36.00	7.23	36.00	7.23	0.00	Pressurized	51.10	136.50	
PIPE 51	19.98	11.31	12.29	5.45	7.35	10.31	2.68	Pressurized	7.00	24.66	
PIPE 50-1	29.08	5.92	30.00	7.44	30.00	7.44	0.00	Pressurized	36.50	68.62	
PIPE 50-2	43.13	8.79	24.57	8.48	21.17	9.86	1.36	Pressurized	36.50	444.33	
PIPE 48	7.45	4.21	18.00	4.92	18.00	4.92	0.00	Pressurized	8.70	24.67	
PIPE 47	24.85	7.91	18.34	6.99	15.14	8.62	1.46	Pressurized	18.00	94.00	
PIPE 45	11.05	6.25	13.47	5.92	11.74	6.88	1.31	Pressurized	8.40	55.09	
PIPE 46	32.80	18.56	14.36	6.35	6.67	16.12	4.43	Pressurized	9.60	6.17	
PIPE 49	33.47	18.94	14.56	6.47	6.71	16.49	4.52	Pressurized	9.90	5.66	
PIPE 52	33.14	18.75	14.56	6.47	6.74	16.37	4.47	Pressurized	9.90	5.67	
PIPE 60	33.31	18.85	11.74	5.24	5.35	14.55	4.53	Supercritical	6.40	0.00	
PIPE 62	23.08	13.06	9.42	4.49	5.20	9.93	3.14	Supercritical Jump	4.20	18.16	
PIPE 63	33.14	18.75	7.18	3.80	3.35	11.04	4.42	Pressurized	2.50	5.66	
PIPE 66	33.14	18.75	7.48	3.89	3.47	11.29	4.43	Pressurized	2.70	5.66	
PIPE 88	10.53	5.96	14.94	6.70	14.70	6.79	1.04	Supercritical	10.50	0.00	
PIPE 87	10.53	5.96	12.56	5.55	11.02	6.44	1.29	Supercritical Jump	7.30	33.54	
PIPE 86	10.53	5.96	9.99	4.66	8.42	5.79	1.39	Supercritical	4.70	0.00	
PIPE 89B	33.31	18.85	8.17	4.10	3.77	11.91	4.47	Supercritical	3.20	0.00	

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

Sewer Sizing Summary:

			Existing		**Calculated**		**Used**			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 95	159.80	CIRCULAR	54.00 in	54.00 in	54.00 in	54.00 in	54.00 in	54.00 in	15.90	
PIPE 94	20.00	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 91	145.40	CIRCULAR	54.00 in	54.00 in	42.00 in	42.00 in	54.00 in	54.00 in	15.90	
PIPE 90	10.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 89C	144.20	CIRCULAR	54.00 in	54.00 in	54.00 in	54.00 in	54.00 in	54.00 in	15.90	
PIPE 89A	142.10	CIRCULAR	54.00 in	54.00 in	48.00 in	48.00 in	54.00 in	54.00 in	15.90	
PIPE 85	135.30	CIRCULAR	48.00 in	48.00 in	36.00 in	36.00 in	48.00 in	48.00 in	12.57	
PIPE 84	75.70	CIRCULAR	42.00 in	42.00 in	48.00 in	48.00 in	42.00 in	42.00 in	9.62	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 80	62.30	CIRCULAR	42.00 in	42.00 in	33.00 in	33.00 in	42.00 in	42.00 in	9.62	

PIPE 79	23.30	CIRCULAR	24.00 in	24.00 in	30.00 in	30.00 in	24.00 in	24.00 in	3.14	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 77	5.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 78	4.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 56	13.10	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 55	4.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 54	8.30	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 76	40.40	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	
PIPE 74	34.10	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
PIPE 70-1	16.80	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
PIPE 70-2	16.80	CIRCULAR	24.00 in	24.00 in	27.00 in	27.00 in	24.00 in	24.00 in	3.14	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 69	7.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 68	10.60	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise

PIPE 73	18.10	CIRCULAR	24.00 in	24.00 in	27.00 in	27.00 in	24.00 in	24.00 in	3.14	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 72	8.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 71	11.00	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 75	6.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 83	14.70	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 82	2.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 81	13.00	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 67	65.80	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PIPE 65	4.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 64	61.10	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PIPE 61	56.60	CIRCULAR	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	42.00 in	9.62	
PIPE 59	52.10	CIRCULAR	36.00 in	36.00 in	42.00 in	42.00 in	36.00 in	36.00 in	7.07	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 58	3.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 57	50.50	CIRCULAR	36.00 in	36.00 in	33.00 in	33.00 in	36.00 in	36.00 in	7.07	
PIPE 53	51.10	CIRCULAR	36.00 in	36.00 in	42.00 in	42.00 in	36.00 in	36.00 in	7.07	Existing height is smaller than the suggested height.

										Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 51	7.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 50-1	36.50	CIRCULAR	30.00 in	30.00 in	33.00 in	33.00 in	30.00 in	30.00 in	4.91	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 50-2	36.50	CIRCULAR	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	30.00 in	4.91	
PIPE 48	8.70	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
PIPE 47	18.00	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 45	8.40	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 46	9.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 49	9.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 52	9.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 60	6.40	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 62	4.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 63	2.50	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 66	2.70	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 88	10.50	CIRCULAR	18.00 in	18.00 in	21.00 in	21.00 in	18.00 in	18.00 in	1.77	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width.

PIPE 87	7.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 86	4.70	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 89B	3.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

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

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	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)**
PIPE 95	7022.54	7023.04	0.00	0.00	7025.62	7026.74	7028.56	0.20	7028.77
PIPE 94	7026.45	7027.09	2.63	0.00	7029.40	7030.56	7031.39	1.15	7032.54
PIPE 91	7023.45	7029.66	0.06	0.27	7027.07	7033.20	7032.11	2.91	7035.02
PIPE 90	7036.78	7043.73	0.20	0.00	7037.62	7044.96	7039.15	6.49	7045.63
PIPE 89C	7033.65	7035.31	0.73	0.85	7036.51	7038.84	7039.36	1.28	7040.64
PIPE 89A	7035.61	7036.82	0.06	0.04	7038.94	7040.32	7041.27	0.83	7042.10
PIPE 85	7040.76	7047.03	1.03	0.61	7042.66	7050.50	7050.86	1.76	7052.62
PIPE 84	7047.53	7047.76	1.27	1.56	7054.49	7054.75	7055.45	0.26	7055.71

PIPE 80	7048.18	7052.20	0.86	0.00	7055.92	7057.01	7056.57	1.09	7057.66
PIPE 79	7053.70	7054.25	1.13	0.00	7058.14	7059.30	7058.99	1.16	7060.15
PIPE 77	7055.06	7055.35	0.13	0.00	7060.13	7060.20	7060.28	0.07	7060.36
PIPE 78	7055.05	7055.62	0.14	0.00	7060.19	7060.20	7060.29	0.01	7060.30
PIPE 56	7054.55	7056.20	0.01	0.58	7060.48	7061.58	7060.75	1.10	7061.85
PIPE 55	7056.70	7057.62	0.05	0.22	7062.00	7062.02	7062.12	0.02	7062.14
PIPE 54	7056.70	7056.83	0.32	0.00	7061.90	7062.06	7062.24	0.16	7062.40
PIPE 76	7053.19	7053.90	0.05	0.00	7057.07	7057.55	7058.12	0.49	7058.60
PIPE 74	7054.19	7057.66	0.04	0.30	7058.19	7059.65	7058.94	1.73	7060.68
PIPE 70-1	7058.14	7062.45	0.02	0.31	7060.56	7063.93	7061.01	3.63	7064.64
PIPE 70-2	7062.75	7063.17	0.59	0.33	7065.11	7065.58	7065.55	0.46	7066.02
PIPE 69	7063.67	7064.63	0.10	0.33	7066.19	7066.24	7066.45	0.04	7066.49
PIPE 68	7063.68	7063.81	0.51	0.00	7066.09	7066.36	7066.65	0.27	7066.91
PIPE 73	7058.16	7058.69	0.68	0.00	7060.84	7061.52	7061.36	0.68	7062.04
PIPE 72	7059.19	7060.15	0.13	0.37	7062.20	7062.26	7062.53	0.06	7062.59
PIPE 71	7059.19	7059.34	0.50	0.00	7062.02	7062.35	7062.62	0.33	7062.95
PIPE 75	7055.20	7055.77	0.31	0.00	7058.68	7058.70	7058.92	0.02	7058.94
PIPE 83	7049.56	7049.91	0.02	0.62	7056.01	7056.30	7056.35	0.29	7056.64
PIPE 82	7050.71	7051.62	0.01	0.33	7056.96	7056.96	7056.98	0.00	7056.98
PIPE 81	7050.21	7050.34	0.24	0.00	7056.62	7056.71	7056.89	0.08	7056.97
PIPE 67	7047.59	7048.45	0.96	0.00	7052.85	7053.38	7053.58	0.52	7054.10
PIPE 65	7050.76	7052.83	0.14	0.00	7054.14	7054.17	7054.24	0.04	7054.28
PIPE 64	7048.62	7050.73	0.03	0.10	7053.61	7054.71	7054.23	1.11	7055.34
PIPE 61	7050.90	7052.91	0.03	0.09	7054.92	7055.27	7055.46	0.86	7056.31
PIPE 59	7053.41	7053.58	1.11	0.33	7056.91	7057.11	7057.75	0.20	7057.96

PIPE 58	7055.38	7056.78	0.06	0.00	7057.97	7057.97	7058.01	0.02	7058.03
PIPE 57	7053.90	7056.87	0.04	0.05	7057.25	7059.18	7058.05	2.29	7060.34
PIPE 53	7057.17	7057.85	1.07	0.59	7061.19	7061.99	7062.00	0.80	7062.80
PIPE 51	7059.35	7060.24	0.32	0.00	7062.88	7062.99	7063.12	0.11	7063.23
PIPE 50-1	7058.35	7058.69	0.04	0.00	7062.03	7062.57	7062.89	0.54	7063.43
PIPE 50-2	7059.10	7063.99	1.13	0.64	7064.35	7067.85	7065.21	3.50	7068.71
PIPE 48	7064.99	7065.11	0.50	0.00	7068.83	7068.99	7069.20	0.17	7069.37
PIPE 47	7064.51	7065.64	0.03	0.35	7068.57	7069.16	7069.08	0.59	7069.67
PIPE 45	7066.13	7066.74	0.06	0.30	7069.68	7070.03	7070.03	0.35	7070.38
PIPE 46	7066.14	7066.74	0.60	0.00	7069.82	7069.87	7070.28	0.05	7070.33
PIPE 49	7064.99	7065.56	0.64	0.00	7068.86	7068.91	7069.35	0.05	7069.40
PIPE 52	7059.35	7059.91	0.64	0.00	7062.95	7063.00	7063.44	0.05	7063.49
PIPE 60	7054.91	7057.29	0.01	0.00	7055.36	7058.27	7058.65	0.05	7058.70
PIPE 62	7053.03	7054.21	0.12	0.00	7055.37	7055.37	7055.46	0.04	7055.50
PIPE 63	7053.03	7053.59	0.04	0.00	7055.35	7055.35	7055.38	0.00	7055.38
PIPE 66	7050.75	7051.31	0.05	0.00	7054.11	7054.12	7054.15	0.00	7054.15
PIPE 88	7040.12	7041.02	0.13	0.00	7041.12	7042.27	7042.23	0.74	7042.96
PIPE 87	7041.32	7043.89	0.01	0.28	7042.99	7044.94	7043.26	2.16	7045.41
PIPE 86	7044.19	7047.18	0.01	0.18	7045.48	7048.01	7045.61	2.74	7048.35
PIPE 89B	7038.61	7045.19	0.07	0.00	7038.93	7045.87	7041.13	5.00	7046.13

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

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 95	50.36	5.50	8.00	8.42	0.00	0.00	0.00	33.02	19.39	13.30	293.29	Sewer Too Shallow
PIPE 94	32.00	2.50	4.00	4.92	29.20	15.39	13.14	24.32	12.95	10.70	225.71	
PIPE 91	206.32	5.50	8.00	8.42	32.20	18.97	12.89	36.78	21.27	15.18	2602.75	
PIPE 90	278.14	2.50	4.00	4.92	25.55	13.57	11.32	10.04	5.81	3.56	1072.56	
PIPE 89C	165.53	5.50	8.00	8.42	28.79	17.27	11.19	28.86	17.31	11.22	1530.43	
PIPE 89A	120.91	5.50	8.00	8.42	28.26	17.00	10.92	28.86	17.31	11.22	1100.89	
PIPE 85	149.23	5.00	6.00	7.83	21.48	13.15	7.82	26.34	15.59	10.25	987.37	
PIPE 84	46.29	4.50	6.00	7.25	25.84	15.05	10.30	23.88	14.07	9.32	314.28	
PIPE 80	287.05	4.50	6.00	7.25	23.04	13.64	8.89	23.42	13.84	9.09	1737.71	
PIPE 79	109.86	3.00	4.00	5.50	21.92	12.04	9.21	19.00	10.58	7.75	482.97	
PIPE 77	26.48	2.50	4.00	4.92	17.88	9.73	7.48	17.68	9.63	7.38	87.27	
PIPE 78	5.71	2.50	4.00	4.92	17.90	9.74	7.49	17.14	9.36	7.11	18.34	
PIPE 56	330.45	3.00	4.00	5.50	18.40	10.29	7.45	18.40	10.28	7.45	1201.63	
PIPE 55	9.15	2.50	4.00	4.92	17.91	9.75	7.50	16.44	9.01	6.76	28.40	
PIPE 54	25.89	2.50	4.00	4.92	17.90	9.74	7.49	18.02	9.80	7.55	86.85	

PIPE 76	50.48	3.50	6.00	6.08	22.43	12.76	9.18	23.00	13.04	9.46	276.07	
PIPE 74	231.49	3.50	6.00	6.08	22.42	12.75	9.17	22.24	12.66	9.08	1228.75	
PIPE 70-1	287.50	3.00	4.00	5.50	21.79	11.98	9.14	22.78	12.47	9.64	1466.36	
PIPE 70-2	84.73	3.00	4.00	5.50	22.19	12.18	9.34	19.04	10.60	7.77	377.74	
PIPE 69	9.59	2.50	4.00	4.92	18.54	10.06	7.81	17.02	9.30	7.05	31.65	
PIPE 68	26.35	2.50	4.00	4.92	18.52	10.05	7.80	18.66	10.12	7.87	94.03	
PIPE 73	106.44	3.00	4.00	5.50	21.74	11.96	9.12	18.82	10.49	7.66	460.83	
PIPE 72	9.58	2.50	4.00	4.92	18.32	9.95	7.70	16.78	9.18	6.93	30.89	
PIPE 71	30.38	2.50	4.00	4.92	18.32	9.95	7.70	18.46	10.02	7.77	106.33	
PIPE 75	5.67	2.50	4.00	4.92	21.39	11.49	9.24	20.50	11.04	8.79	25.13	
PIPE 83	70.19	3.00	4.00	5.50	21.78	11.97	9.14	19.12	10.64	7.81	308.12	
PIPE 82	9.05	2.50	4.00	4.92	18.03	9.81	7.56	16.60	9.09	6.84	28.49	
PIPE 81	25.87	3.00	4.00	5.50	18.52	10.34	7.51	18.66	10.41	7.58	95.73	
PIPE 67	123.01	4.50	6.00	7.25	25.72	14.99	10.24	22.90	13.58	8.83	805.50	
PIPE 65	24.68	2.50	4.00	4.92	20.29	10.93	8.68	16.50	9.04	6.79	87.21	
PIPE 64	301.80	4.50	6.00	7.25	22.57	13.41	8.66	22.14	13.20	8.45	1715.43	
PIPE 61	287.48	4.50	6.00	7.25	21.80	13.03	8.28	20.50	12.38	7.63	1496.05	
PIPE 59	33.15	4.00	6.00	6.67	19.99	11.83	7.66	20.44	12.05	7.89	154.10	
PIPE 58	14.04	2.50	4.00	4.92	18.35	9.97	7.72	15.74	8.66	6.41	43.15	
PIPE 57	247.75	4.00	6.00	6.67	19.81	11.74	7.57	21.86	12.76	8.60	1212.14	
PIPE 53	136.50	4.00	6.00	6.67	21.27	12.47	8.30	20.20	11.93	7.77	661.59	
PIPE 51	24.66	2.50	4.00	4.92	18.70	10.14	7.89	17.30	9.44	7.19	83.15	
PIPE 50-1	68.62	3.50	6.00	6.08	19.71	11.39	7.81	20.32	11.70	8.12	301.89	
PIPE 50-2	444.33	3.50	6.00	6.08	19.50	11.29	7.71	18.92	11.00	7.42	1824.78	
PIPE 48	24.67	2.50	4.00	4.92	17.93	9.76	7.51	18.08	9.83	7.58	83.12	

PIPE 47	94.00	3.00	4.00	5.50	18.38	10.27	7.44	18.48	10.32	7.49	342.64	
PIPE 45	55.09	2.50	4.00	4.92	17.99	9.79	7.54	18.50	10.04	7.79	190.12	
PIPE 46	6.17	2.50	4.00	4.92	17.98	9.78	7.53	17.06	9.32	7.07	19.82	
PIPE 49	5.66	2.50	4.00	4.92	17.92	9.75	7.50	17.18	9.38	7.13	18.23	
PIPE 52	5.67	2.50	4.00	4.92	18.70	10.14	7.89	17.96	9.77	7.52	19.74	
PIPE 60	23.77	2.50	4.00	4.92	18.49	10.04	7.79	13.70	7.64	5.39	67.04	
PIPE 62	24.67	2.50	4.00	4.92	19.55	10.57	8.32	17.56	9.57	7.32	87.94	
PIPE 63	5.66	2.50	4.00	4.92	19.54	10.56	8.31	18.80	10.19	7.94	21.35	
PIPE 66	5.66	2.50	4.00	4.92	20.30	10.94	8.69	19.54	10.56	8.31	22.89	
PIPE 88	89.60	2.50	4.00	4.92	25.25	13.42	11.17	21.46	11.52	9.27	488.52	
PIPE 87	257.14	2.50	4.00	4.92	20.86	11.22	8.97	18.72	10.15	7.90	1029.97	
PIPE 86	298.71	2.50	4.00	4.92	18.11	9.85	7.60	9.94	5.76	3.51	700.33	
PIPE 89B	65.78	2.50	4.00	4.92	25.26	13.42	11.17	9.72	5.65	3.40	247.23	

Total earth volume for sewer trenches = 28025 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

System Input Summary MAINS C, D, & G 5-YR HGL

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

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

Rational Method Constraints

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

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.1
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	7020.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 95	7041.30	71.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 94	7039.50	5.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 91	7049.80	67.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 90	7049.00	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 89C	7051.49	67.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 89A	7053.00	67.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 85	7061.70	64.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 67	7061.15	30.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 64	7063.05	28.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 61	7064.41	26.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 84	7060.95	36.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 83	7059.97	6.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 81	7060.17	5.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 82	7060.17	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 80	7065.16	31.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 79	7064.25	11.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 78	7064.44	2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PIPE 56	7065.90	6.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 55	7066.09	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 54	7066.09	3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 77	7064.44	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 76	7066.15	20.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 89B	7050.30	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					**Total Design Flow**				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.10	Surface Water Present (Downstream)
PIPE 94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.40	
PIPE 91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.60	
PIPE 90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30	
PIPE 89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.70	
PIPE 89A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.00	
PIPE 85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.60	
PIPE 67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.70	
PIPE 64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.30	

PIPE 61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.10	
PIPE 84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.90	
PIPE 83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.20	
PIPE 81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30	
PIPE 82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	
PIPE 80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.40	
PIPE 79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.20	
PIPE 78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	
PIPE 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.30	
PIPE 55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	
PIPE 54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.90	
PIPE 77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.80	
PIPE 76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.90	
PIPE 89B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	**Sewer Length (ft)**	**Downstream Invert (ft)**	**Slope (%)**	**Upstream Invert (ft)**	**Mannings n**	**Bend Loss**	**Lateral Loss**	**Cross Section**	**Rise (ft or in)**	**Span (ft or in)**
PIPE 95	50.36	7022.54	1.0	7023.04	0.013	0.03	1.00	CIRCULAR	54.00 in	54.00 in
PIPE 94	32.00	7026.45	2.0	7027.09	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 91	206.32	7023.45	3.0	7029.66	0.013	0.05	1.00	CIRCULAR	54.00 in	54.00 in
PIPE 90	278.14	7036.78	2.5	7043.73	0.013	0.38	0.00	CIRCULAR	18.00 in	18.00 in

PIPE 89C	165.53	7033.65	1.0	7035.31	0.013	0.57	0.35	CIRCULAR	54.00 in	54.00 in
PIPE 89A	120.91	7035.61	1.0	7036.82	0.013	0.05	1.00	CIRCULAR	54.00 in	54.00 in
PIPE 85	149.23	7040.76	4.2	7047.03	0.013	0.57	0.35	CIRCULAR	48.00 in	48.00 in
PIPE 67	123.01	7047.59	0.7	7048.45	0.013	1.32	0.00	CIRCULAR	42.00 in	42.00 in
PIPE 64	301.80	7048.62	0.7	7050.73	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 61	287.48	7050.90	0.7	7052.91	0.013	0.05	1.00	CIRCULAR	42.00 in	42.00 in
PIPE 84	46.29	7047.53	0.5	7047.76	0.013	1.32	0.25	CIRCULAR	42.00 in	42.00 in
PIPE 83	70.19	7049.56	0.5	7049.91	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 81	25.87	7050.21	0.5	7050.34	0.013	0.92	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 82	9.05	7050.71	10.1	7051.62	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 80	287.05	7048.18	1.4	7052.20	0.013	1.32	0.00	CIRCULAR	42.00 in	42.00 in
PIPE 79	109.86	7053.70	0.5	7054.25	0.013	1.32	0.00	CIRCULAR	24.00 in	24.00 in
PIPE 78	5.71	7055.05	10.0	7055.62	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 56	330.45	7054.55	0.5	7056.20	0.013	0.05	1.00	CIRCULAR	24.00 in	24.00 in
PIPE 55	9.15	7056.70	10.1	7057.62	0.013	0.38	0.44	CIRCULAR	18.00 in	18.00 in
PIPE 54	25.89	7056.70	0.5	7056.83	0.013	0.83	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 77	26.48	7055.06	1.1	7055.35	0.013	0.83	0.00	CIRCULAR	18.00 in	18.00 in
PIPE 76	50.48	7053.19	1.4	7053.90	0.013	0.05	1.00	CIRCULAR	30.00 in	30.00 in
PIPE 89B	65.78	7038.61	10.0	7045.19	0.013	1.32	0.00	CIRCULAR	18.00 in	18.00 in

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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
PIPE 95	196.47	12.35	29.51	7.99	22.46	11.36	1.69	Supercritical	71.10	0.00	
PIPE 94	14.89	8.43	10.75	4.91	7.50	7.75	1.99	Supercritical	5.40	0.00	
PIPE 91	342.08	21.51	28.74	7.86	16.28	16.74	2.98	Supercritical	67.60	0.00	
PIPE 90	16.65	9.42	8.30	4.14	5.43	7.34	2.26	Supercritical	3.30	0.00	
PIPE 89C	197.18	12.40	28.77	7.86	21.82	11.24	1.70	Supercritical	67.70	0.00	
PIPE 89A	197.18	12.40	28.61	7.83	21.70	11.21	1.70	Supercritical	67.00	0.00	
PIPE 85	295.17	23.49	29.10	8.10	15.25	18.81	3.45	Supercritical	64.60	0.00	Velocity is Too High
PIPE 67	84.40	8.77	20.55	6.56	17.52	8.08	1.36	Supercritical	30.70	0.00	
PIPE 64	84.40	8.77	19.69	6.39	16.75	7.90	1.36	Supercritical	28.30	0.00	
PIPE 61	84.40	8.77	18.88	6.23	16.03	7.73	1.37	Supercritical	26.10	0.00	
PIPE 84	71.33	7.41	22.63	6.98	21.43	7.48	1.11	Supercritical	36.90	0.00	
PIPE 83	16.04	5.11	10.57	4.65	10.36	4.78	1.04	Supercritical	6.20	0.00	
PIPE 81	16.04	5.11	9.74	4.43	9.50	4.58	1.05	Supercritical	5.30	0.00	
PIPE 82	33.47	18.94	4.70	3.00	2.24	8.71	4.30	Supercritical	1.10	0.00	
PIPE 80	119.36	12.41	20.79	6.61	14.70	10.46	1.94	Supercritical	31.40	0.00	
PIPE 79	16.04	5.11	14.41	5.69	14.77	5.52	0.95	Subcritical	11.20	0.00	
PIPE 78	33.31	18.85	6.72	3.65	3.13	10.67	4.42	Supercritical	2.20	0.00	
PIPE 56	16.04	5.11	10.66	4.67	10.45	4.80	1.04	Supercritical	6.30	0.00	
PIPE 55	33.47	18.94	7.03	3.75	3.26	10.98	4.45	Supercritical	2.40	0.00	
PIPE 54	7.45	4.21	9.06	4.37	9.25	4.26	0.96	Subcritical	3.90	0.00	
PIPE 77	11.05	6.25	7.62	3.93	6.18	5.22	1.50	Supercritical	2.80	0.00	
PIPE 76	48.66	9.91	18.64	6.52	13.74	9.54	1.79	Supercritical	20.90	0.00	

PIPE 89B	33.31	18.85	4.70	3.00	2.24	8.68	4.28	Supercritical	1.10	0.00	

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

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 95	71.10	CIRCULAR	54.00 in	54.00 in	42.00 in	42.00 in	54.00 in	54.00 in	15.90	
PIPE 94	5.40	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 91	67.60	CIRCULAR	54.00 in	54.00 in	30.00 in	30.00 in	54.00 in	54.00 in	15.90	
PIPE 90	3.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 89C	67.70	CIRCULAR	54.00 in	54.00 in	42.00 in	42.00 in	54.00 in	54.00 in	15.90	
PIPE 89A	67.00	CIRCULAR	54.00 in	54.00 in	42.00 in	42.00 in	54.00 in	54.00 in	15.90	
PIPE 85	64.60	CIRCULAR	48.00 in	48.00 in	30.00 in	30.00 in	48.00 in	48.00 in	12.57	
PIPE 67	30.70	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
PIPE 64	28.30	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
PIPE 61	26.10	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
PIPE 84	36.90	CIRCULAR	42.00 in	42.00 in	33.00 in	33.00 in	42.00 in	42.00 in	9.62	
PIPE 83	6.20	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 81	5.30	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	

PIPE 82	1.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 80	31.40	CIRCULAR	42.00 in	42.00 in	27.00 in	27.00 in	42.00 in	42.00 in	9.62	
PIPE 79	11.20	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
PIPE 78	2.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 56	6.30	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
PIPE 55	2.40	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 54	3.90	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 77	2.80	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
PIPE 76	20.90	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
PIPE 89B	1.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

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

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	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)**
PIPE 95	7022.54	7023.04	0.00	0.00	7024.41	7025.50	7026.42	0.08	7026.49

PIPE 94	7026.45	7027.09	0.19	0.00	7027.08	7027.99	7028.01	0.35	7028.36
PIPE 91	7023.45	7029.66	0.01	0.03	7025.54	7032.06	7029.16	3.86	7033.01
PIPE 90	7036.78	7043.73	0.02	0.00	7037.23	7044.42	7038.07	6.62	7044.69
PIPE 89C	7033.65	7035.31	0.16	0.18	7035.47	7037.71	7037.44	1.23	7038.67
PIPE 89A	7035.61	7036.82	0.01	0.01	7037.73	7039.20	7039.37	0.79	7040.16
PIPE 85	7040.76	7047.03	0.23	0.13	7042.03	7049.46	7047.53	2.95	7050.48
PIPE 67	7047.59	7048.45	0.21	0.00	7050.48	7050.48	7050.68	0.23	7050.92
PIPE 64	7048.62	7050.73	0.01	0.02	7050.51	7052.37	7050.98	2.02	7053.00
PIPE 61	7050.90	7052.91	0.01	0.02	7052.40	7054.48	7053.16	1.92	7055.08
PIPE 84	7047.53	7047.76	0.30	0.35	7050.90	7050.90	7051.13	0.02	7051.15
PIPE 83	7049.56	7049.91	0.00	0.17	7051.25	7051.25	7051.32	0.05	7051.37
PIPE 81	7050.21	7050.34	0.04	0.00	7051.29	7051.29	7051.43	0.06	7051.49
PIPE 82	7050.71	7051.62	0.00	0.06	7051.31	7052.01	7052.07	0.08	7052.15
PIPE 80	7048.18	7052.20	0.22	0.00	7051.17	7053.93	7051.37	3.24	7054.61
PIPE 79	7053.70	7054.25	0.26	0.00	7054.90	7055.51	7055.40	0.55	7055.96
PIPE 78	7055.05	7055.62	0.03	0.00	7055.54	7057.05	7057.08	0.00	7057.08
PIPE 56	7054.55	7056.20	0.00	0.13	7055.99	7057.09	7056.10	1.33	7057.43
PIPE 55	7056.70	7057.62	0.01	0.05	7057.15	7058.80	7058.84	0.00	7058.84
PIPE 54	7056.70	7056.83	0.06	0.00	7057.46	7057.61	7057.75	0.13	7057.88
PIPE 77	7055.06	7055.35	0.03	0.00	7055.57	7055.99	7056.00	0.23	7056.23
PIPE 76	7053.19	7053.90	0.01	0.00	7054.34	7055.45	7055.75	0.36	7056.11
PIPE 89B	7038.61	7045.19	0.01	0.00	7038.80	7045.58	7039.97	5.75	7045.72

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

- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

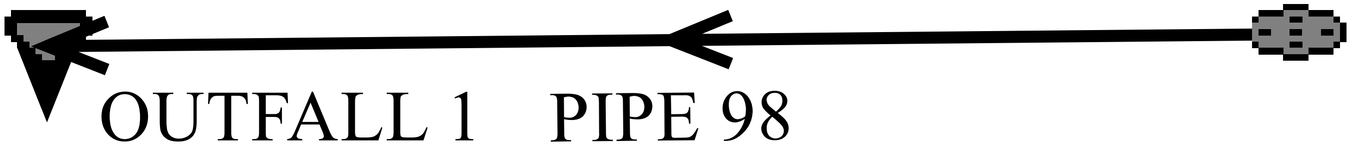
The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			**Upstream**				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 95	50.36	5.50	8.00	8.42	0.00	0.00	0.00	33.02	19.39	13.30	293.29	Sewer Too Shallow
PIPE 94	32.00	2.50	4.00	4.92	29.20	15.39	13.14	24.32	12.95	10.70	225.71	
PIPE 91	206.32	5.50	8.00	8.42	32.20	18.97	12.89	36.78	21.27	15.18	2602.75	
PIPE 90	278.14	2.50	4.00	4.92	25.55	13.57	11.32	10.04	5.81	3.56	1072.56	
PIPE 89C	165.53	5.50	8.00	8.42	28.79	17.27	11.19	28.86	17.31	11.22	1530.43	
PIPE 89A	120.91	5.50	8.00	8.42	28.26	17.00	10.92	28.86	17.31	11.22	1100.89	
PIPE 85	149.23	5.00	6.00	7.83	21.48	13.15	7.82	26.34	15.59	10.25	987.37	
PIPE 67	123.01	4.50	6.00	7.25	25.72	14.99	10.24	22.90	13.58	8.83	805.50	
PIPE 64	301.80	4.50	6.00	7.25	22.57	13.41	8.66	22.14	13.20	8.45	1715.43	
PIPE 61	287.48	4.50	6.00	7.25	21.80	13.03	8.28	20.50	12.38	7.63	1496.05	
PIPE 84	46.29	4.50	6.00	7.25	25.84	15.05	10.30	23.88	14.07	9.32	314.28	
PIPE 83	70.19	3.00	4.00	5.50	21.78	11.97	9.14	19.12	10.64	7.81	308.12	
PIPE 81	25.87	3.00	4.00	5.50	18.52	10.34	7.51	18.66	10.41	7.58	95.73	

PIPE 82	9.05	2.50	4.00	4.92	18.03	9.81	7.56	16.60	9.09	6.84	28.49	
PIPE 80	287.05	4.50	6.00	7.25	23.04	13.64	8.89	23.42	13.84	9.09	1737.71	
PIPE 79	109.86	3.00	4.00	5.50	21.92	12.04	9.21	19.00	10.58	7.75	482.97	
PIPE 78	5.71	2.50	4.00	4.92	17.90	9.74	7.49	17.14	9.36	7.11	18.34	
PIPE 56	330.45	3.00	4.00	5.50	18.40	10.29	7.45	18.40	10.28	7.45	1201.63	
PIPE 55	9.15	2.50	4.00	4.92	17.91	9.75	7.50	16.44	9.01	6.76	28.40	
PIPE 54	25.89	2.50	4.00	4.92	17.90	9.74	7.49	18.02	9.80	7.55	86.85	
PIPE 77	26.48	2.50	4.00	4.92	17.88	9.73	7.48	17.68	9.63	7.38	87.27	
PIPE 76	50.48	3.50	6.00	6.08	22.43	12.76	9.18	23.00	13.04	9.46	276.07	
PIPE 89B	65.78	2.50	4.00	4.92	25.26	13.42	11.17	9.72	5.65	3.40	247.23	

Total earth volume for sewer trenches = 16743 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.


OUTFALL 1
PIPE 98

System Input Summary POND OUTFALL 100-YR HGL

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

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

Rational Method Constraints

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

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.1
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	7015.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPE 98	7023.50	54.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	Comment
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PIPE 98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.20	Surface Water Present (Downstream)

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)
PIPE 98	58.94	7016.04	1.2	7016.75	0.013	0.03	1.00	CIRCULAR	48.00 in	48.00 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**
PIPE 98	157.78	12.56	26.55	7.60	19.40	11.39	1.82	Supercritical	54.20	0.00	

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

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
PIPE 98	54.20	CIRCULAR	48.00 in	48.00 in	33.00 in	33.00 in	48.00 in	48.00 in	12.57	

- 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): 0.00

	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)**
PIPE 98	7016.04	7016.75	0.00	0.00	7017.66	7018.96	7019.67	0.19	7019.86

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

Excavation Estimate:

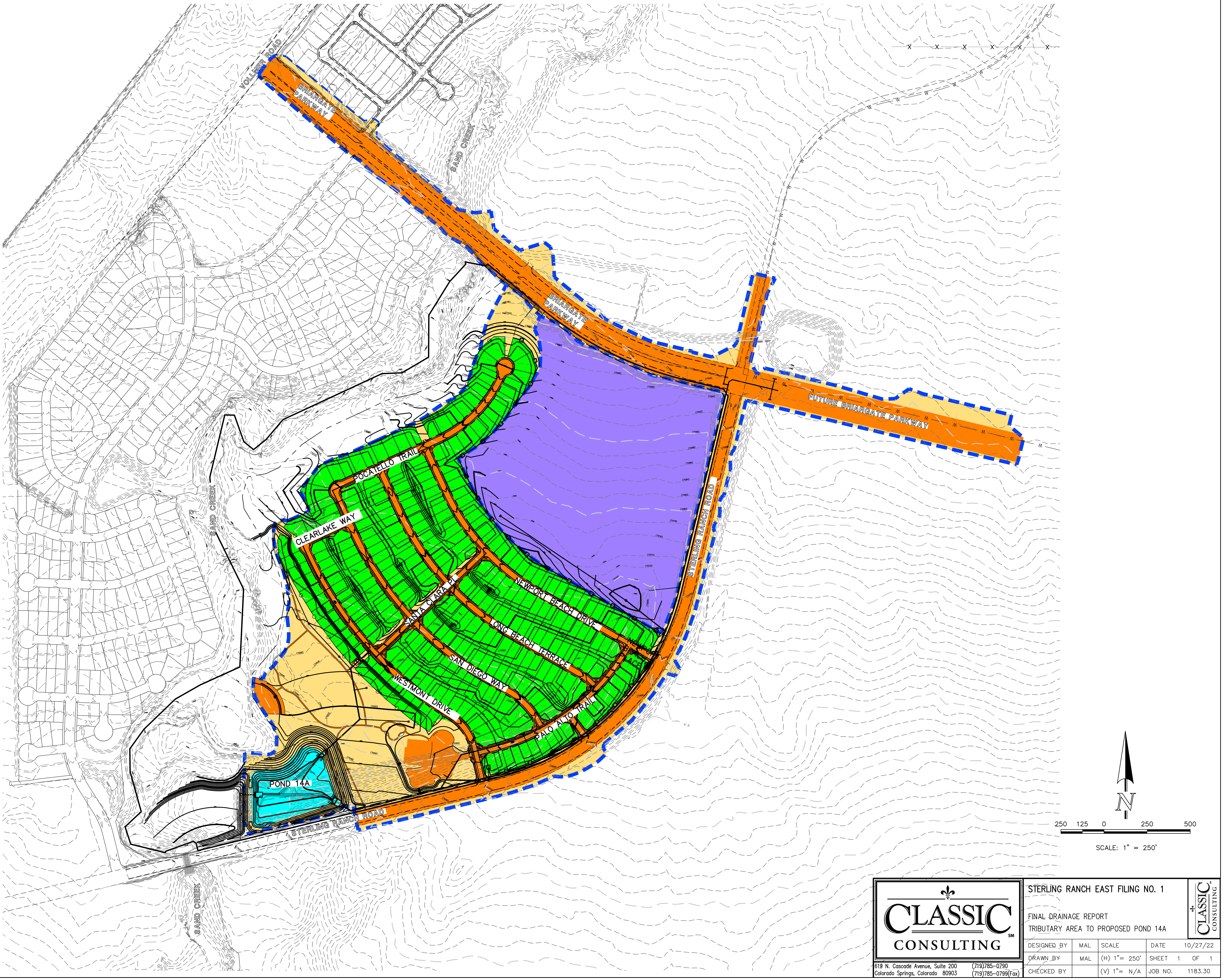
The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 98	58.94	5.00	6.00	7.83	0.00	0.37	0.00	10.50	7.67	2.33	70.69	Sewer Too Shallow

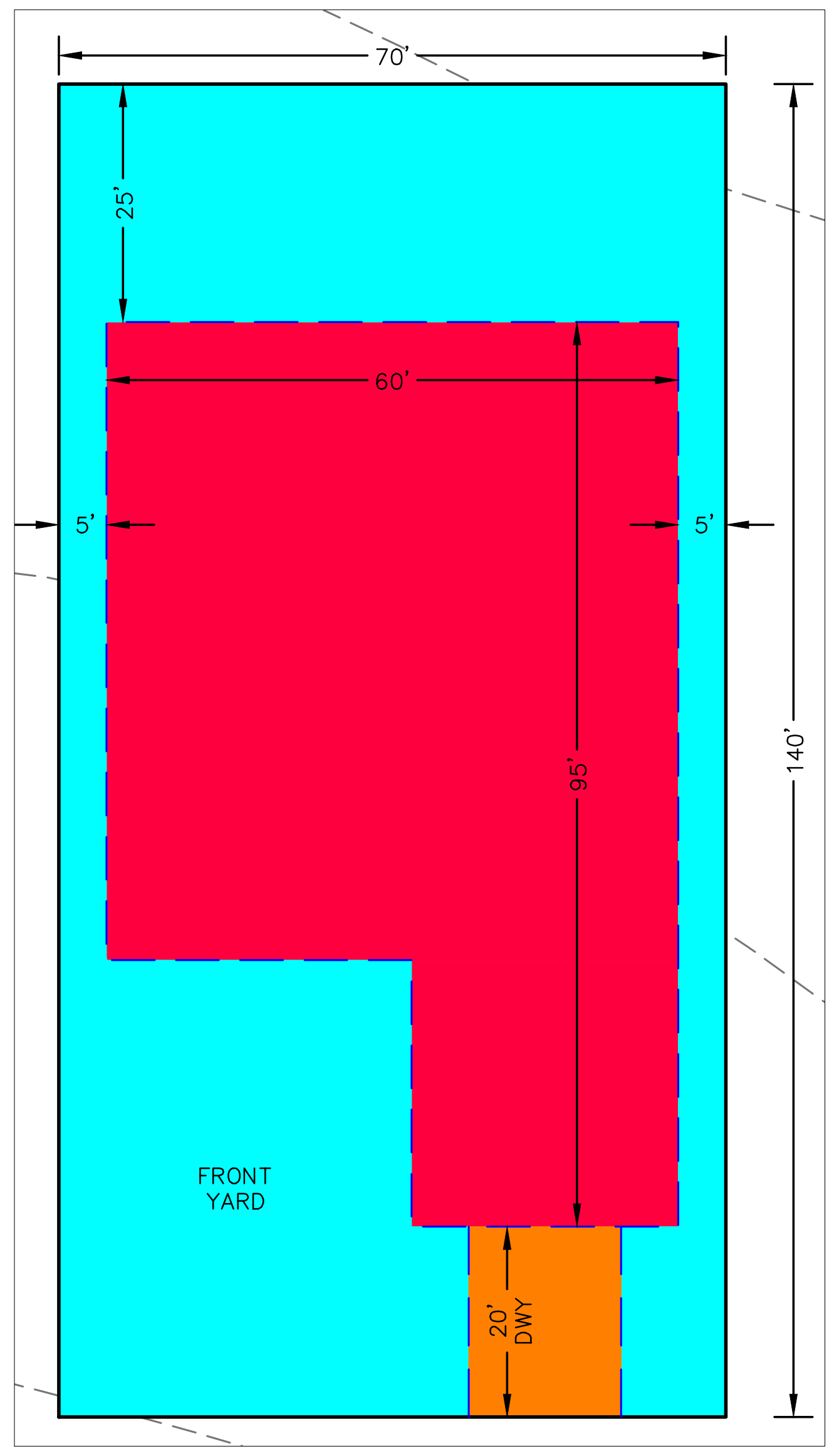
Total earth volume for sewer trenches = 71 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

DRAINAGE MAPS



SCALE: 1" = 250'



TYPICAL HOME LOT

UIA = 55% OF LOT AREA
DCIA = 0.72% OF LOT AREA
RPA = 44.28% OF LOT AREA

🟪	FUTURE SCHOOL SITE – ESTIMATED 13.94 AC. DCIA, 1.51 AC. UIA, 3.46 AC. RPA, 17.68 AC. SPA
🟩	HOME LOTS (SEE BREAKDOWN ABOVE)
🟨	SPA – SEPARATE PERVIOUS AREA
🟥	UIA – UNCONNECTED IMPERVIOUS AREA
🟧	DCIA – DIRECTLY CONNECTED IMPERVIOUS AREA
🟦	RPA – RECEIVING PERVIOUS AREA

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STERLING RANCH EAST FILING NO. 1

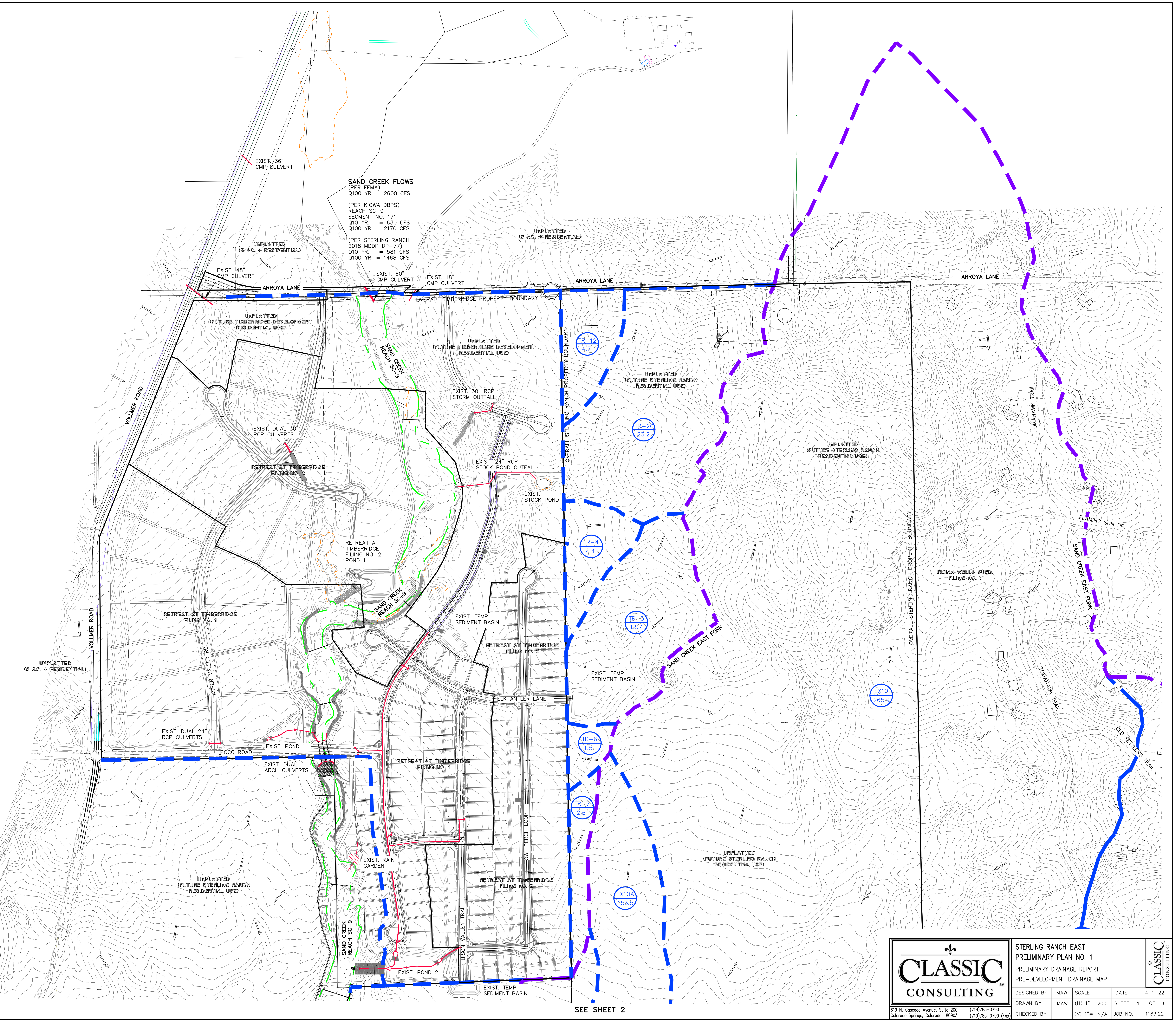
FINAL DRAINAGE REPORT
TRIBUTARY AREA TO PROPOSED POND 14A

DESIGNED BY	MAL	SCALE	DATE 10/27/22
DRAWN BY	MAL	(H) 1"= 250'	SHEET 1 OF 1
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.30

N:\118330\DRAWINGS\DEVELOPMENT\TRIB-AREA-IMPERVIOUS.dwg, 4/5/2023 10:28:26 AM, 1:1

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

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

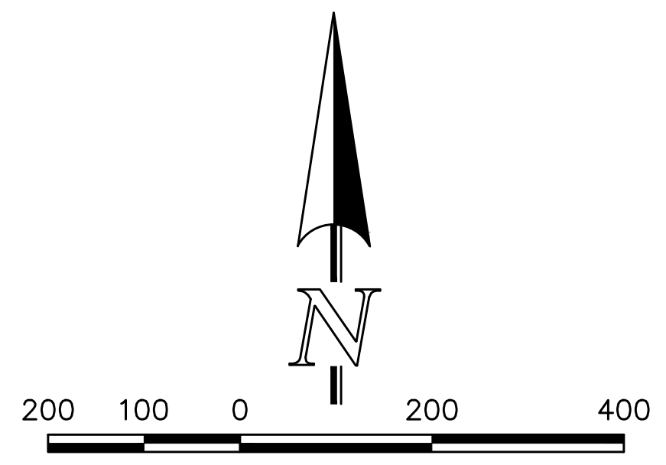


SAND CREEK FLOWS
(PER FEMA)
Q100 YR. = 2600 CFS

(PER KIOWA DBPS)
REACH SC-9
SEGMENT NO. 171
Q10 YR. = 630 CFS
Q100 YR. = 2170 CFS

(PER STERLING RANCH
2018 MDDP DP-77)
Q10 YR. = 581 CFS
Q100 YR. = 1468 CFS

SEE SHEET 2



SCALE: 1" = 200'

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
SUB-BASIN BOUNDARY	▬ ▬ ▬
SAND CREEK EAST FORK BASIN LINE	▬ ▬
DESIGN POINT	△ 4
BASIN IDENTIFIER	BB
AREA IN ACRES	10.0
EXISTING DIRECTION OF FLOW	⇨
EXISTING STORM SEWER	▬
FEMA 100-YR FLOODPLAIN	▬ ▬ ▬

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

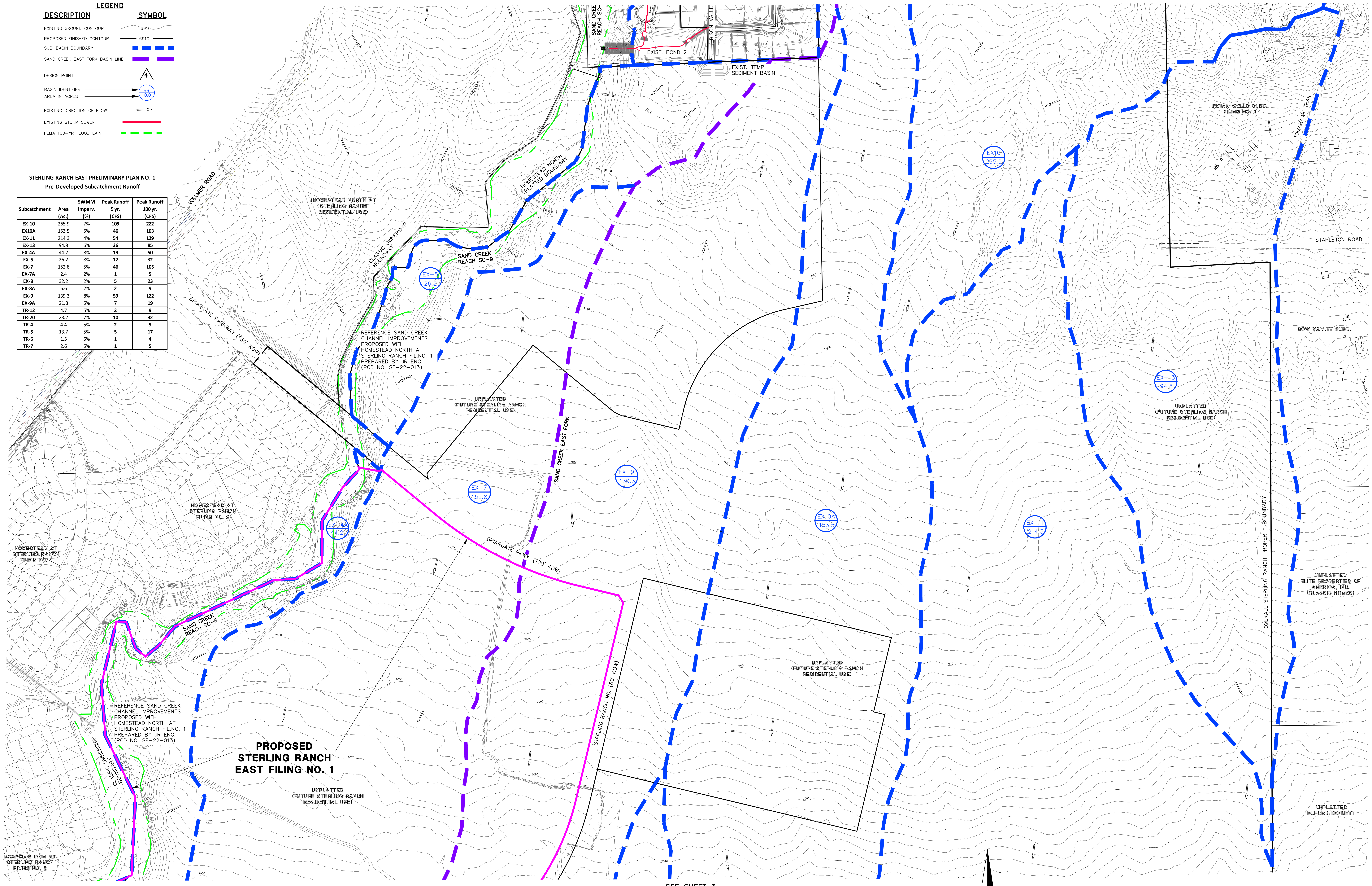
DESIGNED BY	MAW	SCALE	DATE 4-1-22
DRAWN BY	MAW	(H) 1"= 200'	SHEET 1 OF 6
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.22

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	- - 6910 - -
PROPOSED FINISHED CONTOUR	—— 6910 ——
SUB–BASIN BOUNDARY	▬ ▬ ▬ ▬
SAND CREEK EAST FORK BASIN LINE	▬▬ ▬▬
DESIGN POINT	△ 4
BASIN IDENTIFIER AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	⇨
EXISTING STORM SEWER	▬
FEMA 100–YR FLOODPLAIN	▬ ▬ ▬ ▬

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

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



N

200 100 0 200 400

SCALE: 1" = 200'

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

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

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

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

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

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

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
SUB-BASIN BOUNDARY	
SAND CREEK EAST FORK BASIN LINE	
DESIGN POINT	4
BASIN IDENTIFIER AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
EXISTING STORM SEWER	
FEMA 100-YR FLOODPLAIN	

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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

Amphitheater appears to conflict with maintenance access road.

Is no outlet needed for the stock pond? It was showed in previous submittal

Is this no longer being considered as a pond?

Is a low-flow channel needed? Show Sand Creek low flow channel

Address what is happening here with labeling. How is flow from pipe 97 treated for WQ?

Contours don't match channel design.

LEGEND

EXISTING GROUND CONTOUR	(7000)	PROPOSED BASIN BOUNDARY	▬ ▬ ▬
PROPOSED FINISHED GRADE CONTOURS	7000	BASIN IDENTIFIER AREA IN ACRES	D 1.41
SUBDIVISION BOUNDARY	▬ ▪ ▪ ▬	DIRECTION OF DRAINAGE	⇨
100–YR FLOODPLAIN LIMITS	▬ ▪ ▪ ▬	DESIGN POINT	①
EXISTING STORM SEWER	▬	PIPE RUN	△1
EXISTING STORM INLET	▭	EXISTING RIPRAP	▨
PROPOSED STORM SEWER	▬	PROPOSED RIPRAP	▨
PROPOSED STORM INLET	▭		
FUTURE STORM SEWER	- - -		

48 HOURS BEFORE YOU DIG,
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NO.	REVISION	DATE

REVIEW:

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

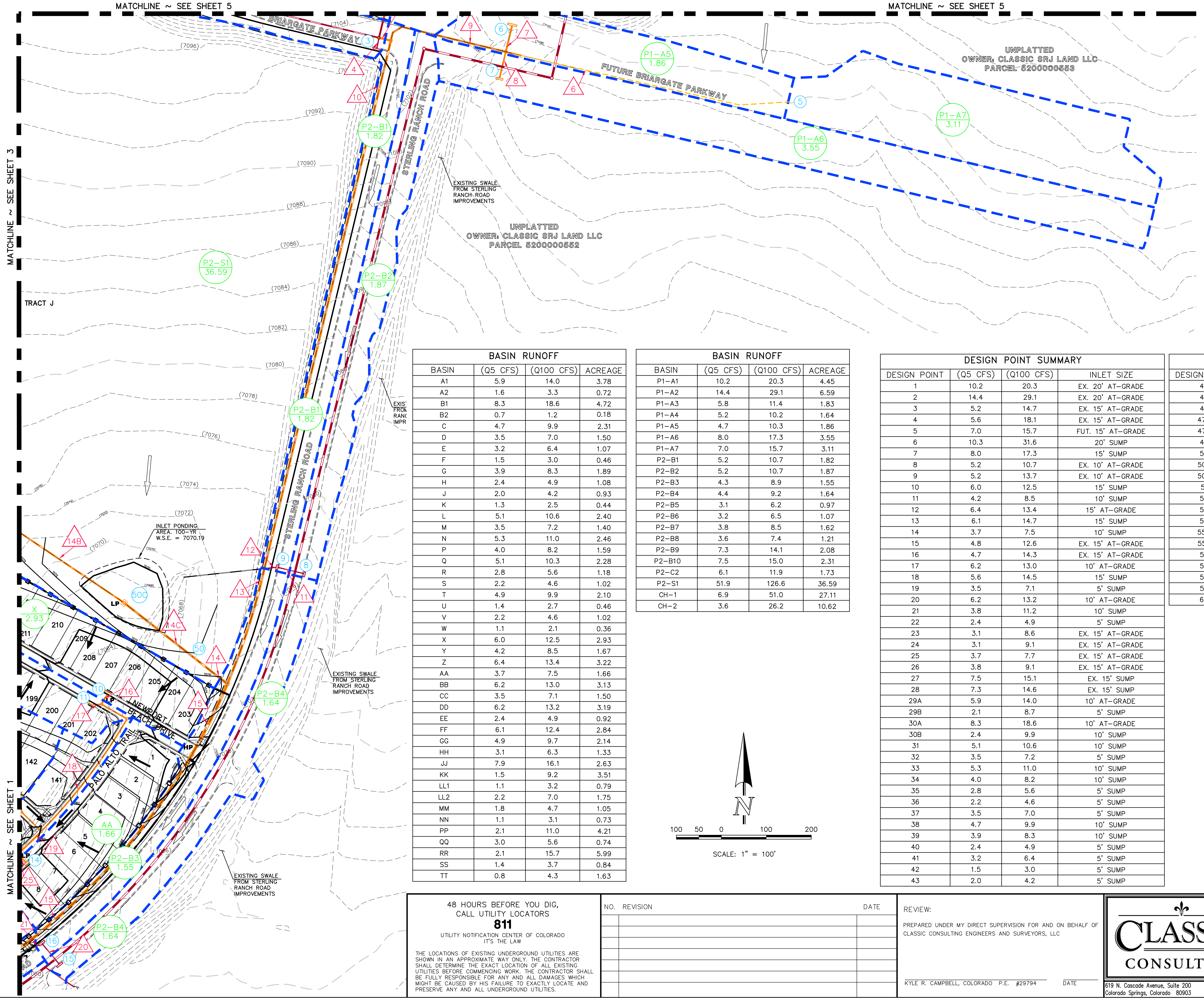
KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE

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

STERLING RANCH EAST FILING NO. 1

FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS DRAINAGE MAP

DESIGNED BY	MAL	SCALE		DATE	11/04/22
DRAWN BY	MAL	(H) 1"= 100'		SHEET 1	OF 5
CHECKED BY		(V) 1"= N/A		JOB NO.	1183.30



BASIN RUNOFF

BASIN	(Q5 CFS)	(Q100 CFS)	ACREAGE
A1	5.9	14.0	3.78
A2	1.6	3.3	0.72
B1	8.3	18.6	4.72
B2	0.7	1.2	0.18
C	4.7	9.9	2.31
D	3.5	7.0	1.50
E	3.2	6.4	1.07
F	1.5	3.0	0.46
G	3.9	8.3	1.89
H	2.4	4.9	1.08
J	2.0	4.2	0.93
K	1.3	2.5	0.44
L	5.1	10.6	2.40
M	3.5	7.2	1.40
N	5.3	11.0	2.46
P	4.0	8.2	1.59
Q	5.1	10.3	2.28
R	2.8	5.6	1.18
S	2.2	4.6	1.02
T	4.9	9.9	2.10
U	1.4	2.7	0.46
V	2.2	4.6	1.02
W	1.1	2.1	0.36
X	6.0	12.5	2.93
Y	4.2	8.5	1.67
Z	6.4	13.4	3.22
AA	3.7	7.5	1.66
BB	6.2	13.0	3.13
CC	3.5	7.1	1.50
DD	6.2	13.2	3.19
EE	2.4	4.9	0.92
FF	6.1	12.4	2.84
GG	4.9	9.7	2.14
HH	3.1	6.3	1.33
JJ	7.9	16.1	2.63
KK	1.5	9.2	3.51
LL1	1.1	3.2	0.79
LL2	2.2	7.0	1.75
MM	1.8	4.7	1.05
NN	1.1	3.1	0.73
PP	2.1	11.0	4.21
QQ	3.0	5.6	0.74
RR	2.1	15.7	5.99
SS	1.4	3.7	0.84
TT	0.8	4.3	1.63

BASIN RUNOFF

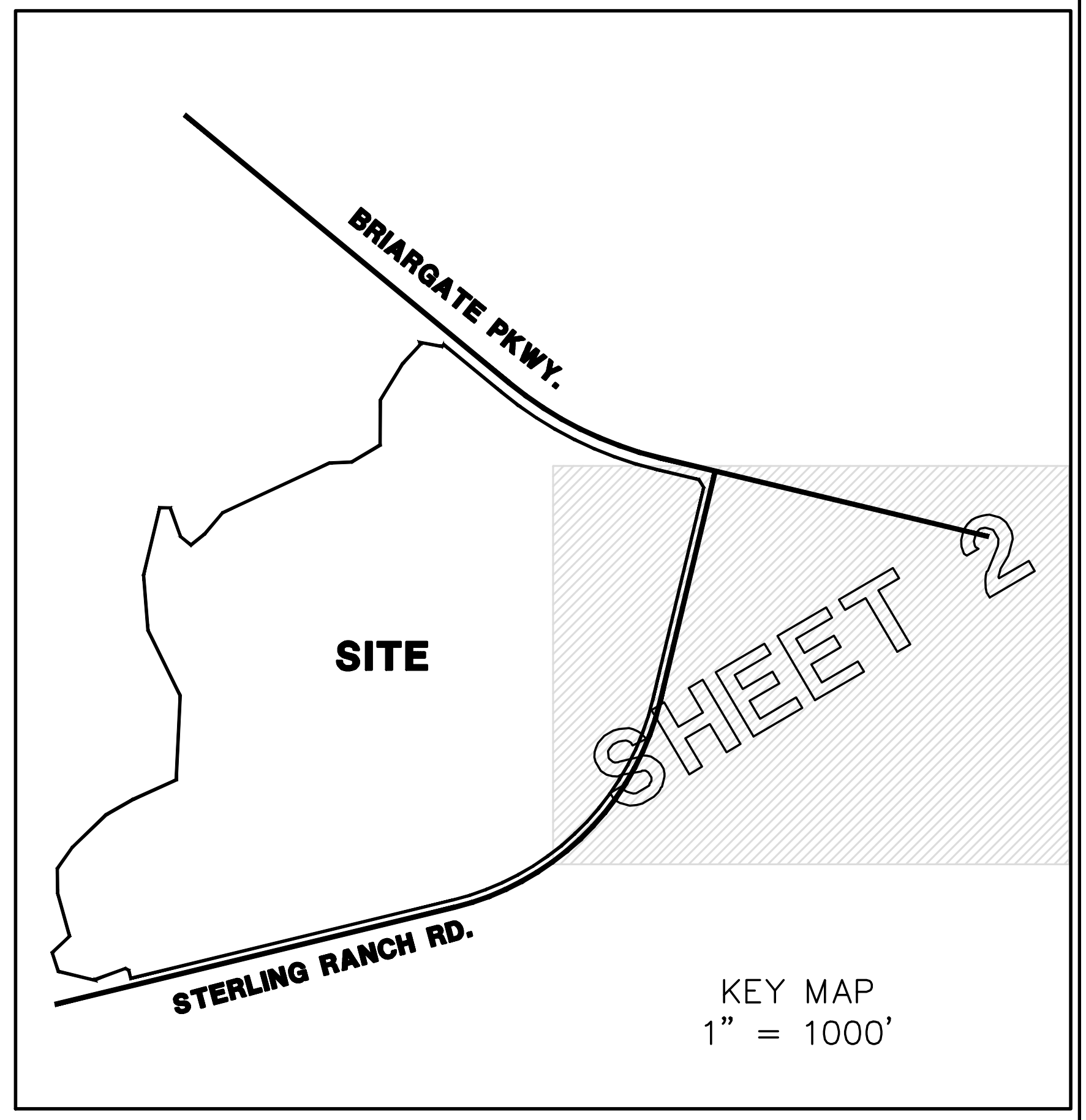
BASIN	(Q5 CFS)	(Q100 CFS)	ACREAGE
P1–A1	10.2	20.3	4.45
P1–A2	14.4	29.1	6.59
P1–A3	5.8	11.4	1.83
P1–A4	5.2	10.2	1.64
P1–A5	4.7	10.3	1.86
P1–A6	8.0	17.3	3.55
P1–A7	7.0	15.7	3.11
P2–B1	5.2	10.7	1.82
P2–B2	5.2	10.7	1.87
P2–B3	4.3	8.9	1.55
P2–B4	4.4	9.2	1.64
P2–B5	3.1	6.2	0.97
P2–B6	3.2	6.5	1.07
P2–B7	3.8	8.5	1.62
P2–B8	3.6	7.4	1.21
P2–B9	7.3	14.1	2.08
P2–B10	7.5	15.0	2.31
P2–C2	6.1	11.9	1.73
P2–S1	51.9	126.6	36.59
CH–1	6.9	51.0	27.11
CH–2	3.6	26.2	10.62

DESIGN POINT SUMMARY

DESIGN POINT	(Q5 CFS)	(Q100 CFS)	INLET SIZE
1	10.2	20.3	EX. 20' AT–GRADE
2	14.4	29.1	EX. 20' AT–GRADE
3	5.2	14.7	EX. 15' AT–GRADE
4	5.6	18.1	EX. 15' AT–GRADE
5	7.0	15.7	FUT. 15' AT–GRADE
6	10.3	31.6	20' SUMP
7	8.0	17.3	15' SUMP
8	5.2	10.7	EX. 10' AT–GRADE
9	5.2	13.7	EX. 10' AT–GRADE
10	6.0	12.5	15' SUMP
11	4.2	8.5	10' SUMP
12	6.4	13.4	15' AT–GRADE
13	6.1	14.7	15' SUMP
14	3.7	7.5	10' SUMP
15	4.8	12.6	EX. 15' AT–GRADE
16	4.7	14.3	EX. 15' AT–GRADE
17	6.2	13.0	10' AT–GRADE
18	5.6	14.5	15' SUMP
19	3.5	7.1	5' SUMP
20	6.2	13.2	10' AT–GRADE
21	3.8	11.2	10' SUMP
22	2.4	4.9	5' SUMP
23	3.1	8.6	EX. 15' AT–GRADE
24	3.1	9.1	EX. 15' AT–GRADE
25	3.7	7.7	EX. 15' AT–GRADE
26	3.8	9.1	EX. 15' AT–GRADE
27	7.5	15.1	EX. 15' SUMP
28	7.3	14.6	EX. 15' SUMP
29A	5.9	14.0	10' AT–GRADE
29B	2.1	8.7	5' SUMP
30A	8.3	18.6	10' AT–GRADE
30B	2.4	9.9	10' SUMP
31	5.1	10.6	10' SUMP
32	3.5	7.2	5' SUMP
33	5.3	11.0	10' SUMP
34	4.0	8.2	10' SUMP
35	2.8	5.6	5' SUMP
36	2.2	4.6	5' SUMP
37	3.5	7.0	5' SUMP
38	4.7	9.9	10' SUMP
39	3.9	8.3	10' SUMP
40	2.4	4.9	5' SUMP
41	3.2	6.4	5' SUMP
42	1.5	3.0	5' SUMP
43	2.0	4.2	5' SUMP

DESIGN POINT SUMMARY

DESIGN POINT	(Q5 CFS)	(Q100 CFS)	INLET SIZE
44	1.3	2.5	5' SUMP
45	2.2	4.6	5' SUMP
46	1.4	2.7	5' SUMP
47A	5.1	10.3	10' AT–GRADE
47B	5.3	13.0	10' SUMP
48	1.1	2.1	5' SUMP
50	51.9	126.6	FUTURE STORM
50B	3.6	26.6	TYPE C INLET
50C	3.6	26.6	TYPE C INLET
51	7.9	16.1	FUTURE STORM
52	1.8	4.7	TYPE C INLET
53	1.1	3.1	TYPE C INLET
54	1.4	3.7	TYPE C INLET
55A	1.1	3.2	TYPE C INLET
55B	2.2	7.0	TYPE C INLET
56	0.8	4.3	FUTURE STORM
57	2.1	11.0	FUTURE STORM
58	3.0	5.6	FUTURE STORM
59	1.5	9.2	FUTURE STORM
60	232.0	520.5	PROPOSED POND 14A



LEGEND

EXISTING GROUND CONTOUR	(7000)
PROPOSED FINISHED GRADE CONTOURS	7000
SUBDIVISION BOUNDARY	▬ ■ ■ ▬
100–YR FLOODPLAIN LIMITS	▬ ■ ■ ▬
EXISTING STORM SEWER	▬
EXISTING STORM INLET	▭
PROPOSED STORM SEWER	▬
PROPOSED STORM INLET	▭
FUTURE STORM SEWER	- - - - - -
PROPOSED BASIN BOUNDARY	▬ ▬ ▬
BASIN IDENTIFIER AREA IN ACRES	D 1.41
DIRECTION OF DRAINAGE	⇨
DESIGN POINT	①
PIPE RUN	△1
EXISTING RIPRAP	▨
PROPOSED RIPRAP	▨

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STERLING RANCH EAST FILING NO. 1

FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS DRAINAGE MAP

DESIGNED BY	MAL	SCALE	DATE 11/04/22
DRAWN BY	MAL	(H) 1"= 100'	SHEET 2 OF 5
CHECKED BY		(V) 1"= N/A	JOB NO. 1183.30

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE
CONSTRUCTION DRAWINGS
EL PASO COUNTY CDR-21-013
43' CLEAR SPAN BRIDGE BY
KIOWA ENGINEERING.

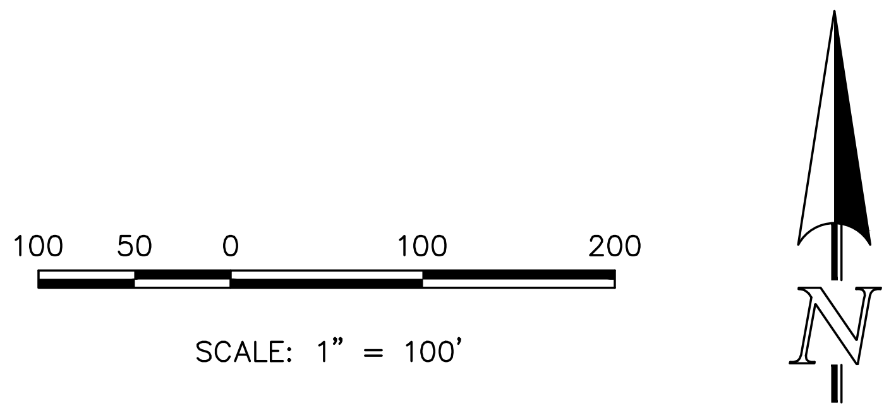
SAND CREEK RESTORATION
PROJECT BY JR ENGINEERING.
EL PASO COUNTY CDR-20-004

Unresolved: Add a note about timing of channel construction.

Unresolved:
Show ponding areas and elevations and overflow paths for all sump inlets

LEGEND

EXISTING GROUND CONTOUR (7000)
PROPOSED FINISHED GRADE CONTOURS 7000
SUBDIVISION BOUNDARY
100–YR FLOODPLAIN LIMITS
EXISTING STORM SEWER
EXISTING STORM INLET
PROPOSED STORM SEWER
PROPOSED STORM INLET
FUTURE STORM SEWER
PROPOSED BASIN BOUNDARY
BASIN IDENTIFIER D
AREA IN ACRES 1.41
DIRECTION OF DRAINAGE
DESIGN POINT ①
PIPE RUN △1
EXISTING RIPRAP
PROPOSED RIPRAP



SCALE: 1" = 100'

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FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS DRAINAGE MAP

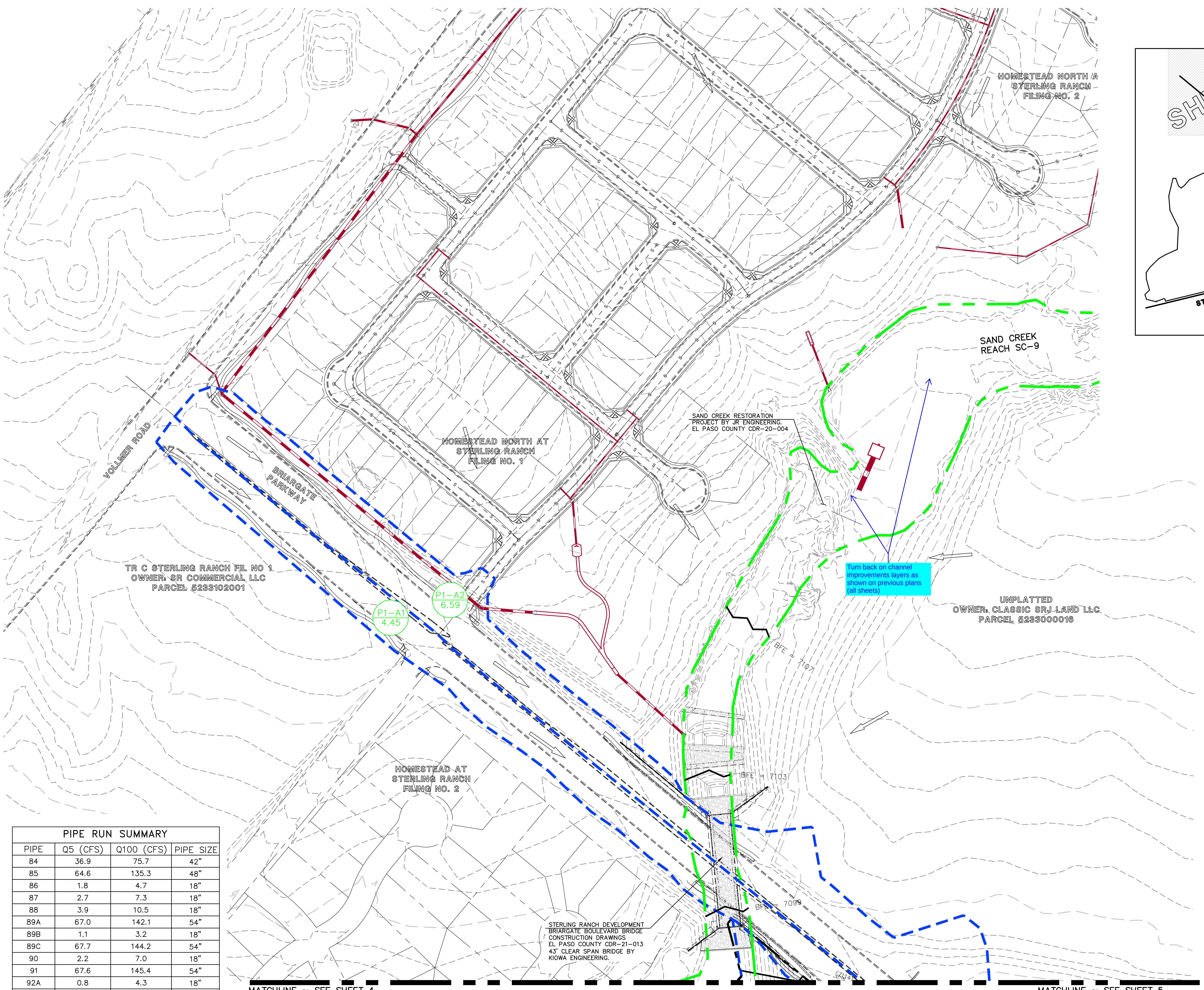
DESIGNED BY MAL	SCALE	DATE	11/04/22
DRAWN BY MAL	(H) 1"= 100'	SHEET 3	OF 5
CHECKED BY	(V) 1"= N/A	JOB NO.	1183.30

PIPE RUN SUMMARY

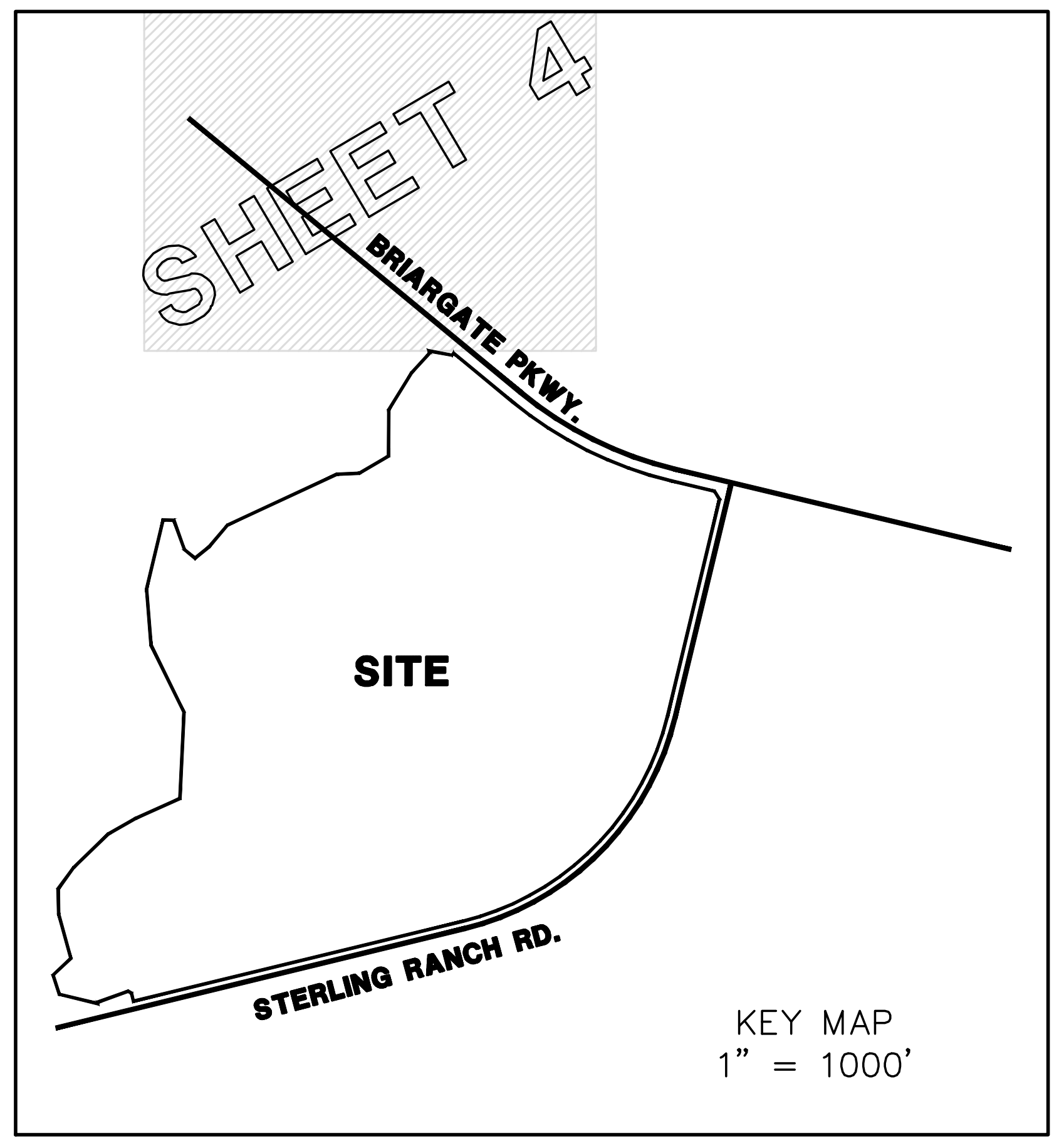
PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE
1	13.2	19.7	EX. 30"
2	23.4	36.6	EX. 30"
3	5.6	13.1	24"
4	5.2	11.7	EX. 18"
5	33.0	58.6	36"
6	7.0	12.1	24"
7	10.3	31.6	30"
8	8.0	17.3	24"
9	23.3	56.0	36"
10	52.3	105.0	42"
11	4.8	7.3	EX. 18"
12	9.6	15.6	EX. 18"
13	57.2	112.2	48"
14	51.9	126.6	48"
14B	3.6	26.6	30"
14C	7.2	53.2	36"
15	108.1	236.5	60"
16	6.0	12.5	24"
17	4.2	8.5	18"
18	9.7	20.0	24"
19	15.7	30.4	30"
20	4.8	10.7	EX. 18"
21	9.5	22.2	18"
22	112.8	247.8	60"
23	6.4	11.1	18"
24	6.1	14.7	24"
25	3.7	7.5	18"
26	25.2	52.0	36"
27	29.9	58.8	36"
28	5.4	8.1	18"
29	5.6	14.5	24"
30	3.5	7.1	18"
31	38.6	79.4	42"
32	5.4	8.1	18"
33	6.0	15.6	24"
34	3.8	11.2	24"
35	2.4	4.9	18"
36A	48.6	100.4	48"
36B	54.7	112.7	48"
37	3.1	8.3	EX. 18"
38	6.2	16.9	EX. 18"
39A	114.9	254.6	60"
39B	162.0	351.4	72"
40	3.7	7.6	EX. 18"
41	7.5	16.2	EX. 18"
42	166.2	364.8	72"
43	7.3	14.6	EX. 24"
44	14.8	29.7	EX. 24"
45	5.2	8.4	18"
46	6.4	9.6	18"
47	11.6	18.0	24"
48	2.1	8.7	18"
49	2.4	9.9	18"
50	16.1	36.5	30"
51	3.5	7.0	18"
52	4.7	9.9	18"
53	23.3	51.1	36"
54	3.9	8.3	18"
55	2.4	4.9	18"
56	6.3	13.1	24"
57	23.0	50.5	36"
58	1.5	3.0	18"
59	23.8	52.1	36"
60	3.2	6.4	18"
61	26.1	56.6	42"
62	2.0	4.2	18"
63	1.3	2.5	18"
64	28.3	61.1	42"
65	2.2	4.6	18"
66	1.4	2.7	18"
67	30.7	65.8	42"
68	5.1	10.6	18"
69	3.5	7.2	18"
70	8.1	16.8	24"
71	5.3	11.0	18"
72	4.0	8.2	18"
73	8.8	18.1	24"
74	16.5	34.1	30"
75	4.6	6.9	18"
76	20.9	40.4	30"
77	2.8	5.6	18"
78	2.2	4.6	18"
79	11.2	23.3	24"
80	31.4	62.3	42"
81	5.3	13.0	24"
82	1.1	2.1	18"
83	6.2	14.7	24"

PIPE RUN SUMMARY

PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE
84	36.9	75.7	42"
85	64.6	135.3	48"
86	1.8	4.7	18"
87	2.7	7.3	18"
88	3.9	10.5	18"
89A	67.0	142.1	54"
89B	1.1	3.2	18"
89C	67.7	144.2	54"
90	2.2	7.0	18"
91	67.6	145.4	54"
92A	0.8	4.3	18"
92B	2.9	15.2	24"
93	3.0	5.6	18"
94	5.4	20.0	24"
95	71.1	159.8	54"
96	1.5	9.2	18"
97	11.7	162.0	EX. 54"
98	3.0	54.2	48"
100	7.9	16.1	24"



Turn back on channel improvements layers as shown on previous plans (all sheets)



KEY MAP
1" = 1000'

N

100 50 0 100 200

SCALE: 1" = 100'

LEGEND

EXISTING GROUND CONTOUR	(7000)
PROPOSED FINISHED GRADE CONTOURS	7000
SUBDIVISION BOUNDARY	▬ ▪ ▪ ▬
100-YR FLOODPLAIN LIMITS	▬ ▪ ▪ ▬
EXISTING STORM SEWER	▬
EXISTING STORM INLET	▭
PROPOSED STORM SEWER	▬
PROPOSED STORM INLET	▭
FUTURE STORM SEWER	- - - - - -
PROPOSED BASIN BOUNDARY	▬ ▬ ▬
BASIN IDENTIFIER AREA IN ACRES	D 1.41
DIRECTION OF DRAINAGE	⇨
DESIGN POINT	①
PIPE RUN	△1
EXISTING RIPRAP	▨
PROPOSED RIPRAP	▨

MATCHLINE ~ SEE SHEET 4

MATCHLINE ~ SEE SHEET 5

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CHECKED BY		(V) 1"=	JOB NO. 1183.30

LEGEND

EXISTING GROUND CONTOUR	(7000)
PROPOSED FINISHED GRADE CONTOURS	7000
SUBDIVISION BOUNDARY	▬ ▪ ▪ ▬
100-YR FLOODPLAIN LIMITS	▬ ▪ ▪ ▬
EXISTING STORM SEWER	▬▭▬▭▬
EXISTING STORM INLET	▭
PROPOSED STORM SEWER	▬▭▬▭▬
PROPOSED STORM INLET	▭
FUTURE STORM SEWER	- - - - - -
PROPOSED BASIN BOUNDARY	▬ ▬ ▬
BASIN IDENTIFIER AREA IN ACRES	D 1.41
DIRECTION OF DRAINAGE	⇨
DESIGN POINT	①
PIPE RUN	△1
EXISTING RIPRAP	▨
PROPOSED RIPRAP	▨

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