Final Drainage Report

Venture on Venetucci Filing No. 1
El Paso County, Colorado

Prepared for:

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Project #: 096302017

Prepared: November 12th, 2024

PCD File Number: PPR2444 and SF2431

CERTIFICATION

DESIGN ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of this report.

____

Michael Hart, P.E. # 58724 Date

OWNER/DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all of the requirements specified in this Drainage Report and Plan.

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Name of Developer

____

Authorized Signature Date

____

Printed Name

____

Title

____

Address:

El Paso County:

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

____________________________________ ____________

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

Conditions:

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INTRODUCTION

PURPOSE AND SCOPE OF STUDY

The purpose of this Final Drainage Report (FDR) is to provide the hydrologic and hydraulic calculations and to document and finalize the drainage design methodology in support of the Venture on Venetucci Filing No. 1 (the "Site") for a proposed Multi-Family development (the "Project"). The Project is located within the jurisdictional limits of El Paso County (the "County"). Thus, the guidelines for the hydrologic and hydraulic design components were based on the criteria for the County and City of Colorado Springs, described below.

LOCATION

The Site is located in the South Half of Section 4, Township 15 South, Range 66 West of the 6th P.M. County of El Paso, State of Colorado, totaling 16.23-acres. The Site borders Venetucci Blvd to the West. A vicinity map has been provided in the **Appendix A** of this report.

DESCRIPTION OF PROPERTY

The Site is located on approximately 16.23 acres of land consisting of vacant land with native vegetation and is classified as "Undeveloped" per Table 6-6 of the City of Colorado Springs Drainage Criteria Manual. The Project consists of 10 multi-family buildings, 8 detached garage buildings, a fitness center, a management garage, and a clubhouse/leasing amenity space with a pool deck. The Site currently has a sediment basin located in the center of the existing Site. The existing land use is undeveloped vacant land.

The existing topography consists of slopes ranging from 1% to 40% with the majority of the property sloping to the center of the property to the existing sediment basin with the western side flowing into Fisher's Canyon Creek.

NRCS soil data is available for this Site and it has been noted that soils onsite are generally USCS Type A. The NRCS soil data can be found in **Appendix B**.

Improvements will consist of clearing and grubbing, weed control, paved access road construction, roadway grading, a detention pond, drainage swales, and native seeding.

An updated Topographic field survey was completed for the Project by Kimley-Horn dated September 10, 2024 and is the basis for design for the drainage improvements.

DRAINAGE BASINS

MAJOR BASIN DESCRIPTIONS

The Site improvements are located in Zone X, as determined by the Flood Insurance Rate Map (FIRM) number 08041C0743G effective date, December 7, 2018 (see **Appendix A**).

please discuss the western tributary to fishers canyon on the west side of the proposed lot. Is the tributary stable, in need of improvements etc? Per DCMV1 1.4.2 developers in and along a drainageway are required to implement the proper measures to maintain or create stable characteristics.

Also, provide a brief discussion regarding the analysis and improvements that are being completed by this development at the downstream fishers canyon tributary. Be sure to discuss how the proposed outfall and spillway for the pond will tie in to the proposed channel improvements. Recommend adding excerpts of that analysis once complete into this report.

The western portion of the Site flows directly into Fisher's Canyon Creek. Below is a description of each existing onsite sub-basins.

Please include area, Q5, and Q100 with each basin description throughout the report

Sub-Basin EX-1 consists of the central portion of the private multi-family development. Drainage from the south portion of the sub-basin flows east to a swale that conveys it to the sediment basin in the middle of the site, while the north portion of the sub-basin flows directly to the sediment basin at Design Point 1. This runoff will eventually outfall into Fisher's Canyon Creek. Table 1 shows the basin area, impervious value, and runoff during the 5-year and 100-year events. Refer to **Appendix D** for the Existing Conditions Drainage Map.

add street name

Sub-Basin OF-1 consists of a private onsite basin to the southwest of the Site Drainage flows overland from north to south across native vegetation and conveys to the southern line of Sub-basin OF-1 at Design Point OF1. This runoff flows offsite to the adjacent (add street name) and is convey by curb and gutter into an existing Type R inlet and will eventually outfall into Fisher's Canyon Creek. Table 1 shows the basin area, impervious value, and runoff during the 5-year and 100-year events. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-Basin OF-2 consists of a private onsite basin in the southern central part of the Site. Drainage flows overland from north to south across native vegetation and conveys to the southern line of Sub-basin OF-2 at Design Point OF2. This runoff flows offsite to the adjacent (add street name) and is convey by curb and gutter into an existing Type R inlet and will eventually outfall into Fisher's Canyon Creek. Table 1 shows the basin area, impervious value, and runoff during the 5-year and 100-year events. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-Basin OF-3 consists of a private onsite basin to the southeast of the Site. Drainage flows overland across native vegetation from west to east and conveys to the eastern line of Sub-basin OF-3 at Design Point OF3. This runoff flows offsite to the adjacent Venetucci Blvd. and is convey by curb and gutter into an existing Type R inlet and will eventually outfall into Fisher's Canyon Creek. Table 1 shows the basin area, impervious value, and runoff during the 5-year and 100-year events. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-Basin OF-4 consists of a public onsite basin to the northeast of the Site. Drainage flows overland across native vegetation from west to east and conveys to the eastern line of Sub-Basin OF-4 at Design Point OF4. This runoff flows offsite to the adjacent Venetucci Blvd. and is convey by curb and gutter into an existing Type R inlet and will eventually outfall into Fisher's Canyon Creek. Table 1 shows the basin area, impervious value, and runoff during the 5-year and 100-year events. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-Basin OF-5 consists of a private onsite basin to the west of the Property. Drainage flows overland across native vegetation from east to west and conveys to the western line of Sub-basin OF-5 at Design Point OF5. This runoff outfalls directly into Fisher's Canyon Creek. Table 1 shows the basin area, impervious value, and runoff during the 5-year and 100-year events. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Please show this sub-basin on the proposed drainage map, I don't see it. If it's already on there, you can disregard this comment.

SUMMARY - EXISTING RUNOFF TABLE					
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
EX1	EX-1	9.63	0.00	2.67	19.64
OF1	OF-1	0.15	0.00	0.05	0.37
OF2	OF-2	0.12	0.00	0.04	0.30
OF3	OF-3	1.10	0.00	0.35	2.62
OF4	OF-4	0.82	0.00	0.26	1.96
OF5	OF-5	4.41	0.00	1.82	13.76

Table 1. Existing Runoff

PROPOSED RATIONAL SUB-BASIN DESCRIPTIONS

Sub-Basin 01 is located in the north portion of the Project. This sub-basin encompasses the proposed private extended detention basin on the Project. The basin consists of landscaping and gravel, along with infrastructure associated with facilitating drainage in the proposed private detention basin. Additional information about the sizing and design of the detention basin can be found in Appendix C. Emergency overflow for the pond with be on the west side of the pond. Flows will overtop the spill way and flow into OF-2. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 02 consists of landscaping and pavement within the clubhouse/amenity area in the north portion of the Project. Runoff developed within this sub-basin is collected by area drains and ultimately discharges into the proposed private detention basin via proposed private storm sewer infrastructure. Emergency overflow for the basin will be routed north into sub-basin 01. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 03 consists of surface parking, sidewalk, pavement, and landscaping area in the northeast portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed northeast into sub-basin OF-1. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 04 consists of surface parking, sidewalk, pavement, and landscaping area in the north portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 03 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 03. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 05 consists of surface parking, sidewalk, pavement, and landscaping area in the north portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northwest corner of the basin. This runoff will continue to travel and be collected in sub-basin 06 and will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 06. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 06 consists of surface parking, sidewalk, pavement, and landscaping area in the northwest portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northwest corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed northeast into sub-basin OF-2. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 07 consists of landscaping area in the eastern portion of the Project. Runoff developed within this sub-basin is conveyed via a proposed private grass swale to a proposed curb cut along the north portion of the basin. This runoff will continue to travel and be collected in sub-basin 06 and will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed north into sub-basin 03. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 08 consists of surface parking, sidewalk, pavement, and landscaping area in the northeast portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed northeast into sub-basin 03. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 09 consists of surface parking, sidewalk, pavement, and landscaping area in the north portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northwest corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed northeast into sub-basin 06. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 10 consists of surface parking, sidewalk, pavement, and landscaping area in the northwest portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northwest corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed northeast into sub-basin OF-2. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 11 consists of landscaping area in the eastern portion of the Project. Runoff developed within this sub-basin is conveyed via a proposed private grass swale to a proposed Type C inlet in sump located in the northern portion of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed northwest into sub-basin 12. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 12 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 08 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 08. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 13 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northwest corner of the basin. This runoff will continue to travel and be collected in sub-basin 09 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 09. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 14 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 13. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 15 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 14 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 14. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 16 consists of surface parking, sidewalk, pavement, and landscaping area in the western portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the north portion of the basin. This runoff will continue to travel and be collected in sub-basin 10 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 10. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 17 consists of surface parking and pavement in the western portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the north portion corner of the basin. This runoff will continue to travel and be collected in sub-basin 14 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 14. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 18 consists of surface parking, sidewalk, pavement, and landscaping area in the northeast portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed north into sub-basin 12. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 19 consists of landscaping area in the central portion of the Project. Runoff developed within this sub-basin is conveyed via a proposed private grass swale to a proposed Type C inlet in sump located in the eastern portion of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed east into sub-basin 18. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 20 consists of surface parking, sidewalk, pavement, and landscaping area in the western portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 15. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 21 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 18 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 18. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 22 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the southeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed north into sub-basin 25. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 23 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 22. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 24 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 23 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 23. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 25 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin OF-3. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 26 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the southeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 29. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 27 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the southeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 26 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 26. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 28 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed north into sub-basin 25. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 29 consists of surface parking, sidewalk, pavement, and landscaping area in the central portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northwest corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 25. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 30 consists of surface parking, sidewalk, pavement, and landscaping area in the western portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 41. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 31 consists of landscaping area in the south portion of the Project. Runoff developed within this sub-basin is conveyed via a proposed private grass swale to a proposed Type C inlet in sump located in the northern portion of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed north into sub-basin 27. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 32 consists of surface parking, sidewalk, pavement, and landscaping area in the southwest portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 30 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 30. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 33 consists of surface parking, sidewalk, pavement, and landscaping area in the south portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 28 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 28. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 34 consists of surface parking, sidewalk, pavement, and landscaping area in the south portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northwest portion of the basin. This runoff will continue to travel and be collected in sub-basin 29 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 29. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 35 consists of surface parking, sidewalk, pavement, and landscaping area in the south portion of the Project. Runoff developed within this sub-basin is collected by a proposed private Type R inlet in sump in the northeast corner of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 34. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 36 consists of surface parking, sidewalk, pavement, and landscaping area in the south portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel and be collected in sub-basin 35 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 35. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 37 consists of surface parking, sidewalk, pavement, and landscaping area in the southwest portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the northeast corner of the basin. This runoff will continue to travel through sub-basin 36 and will be collected in sub-basin 35 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 36. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 38 consists of landscaping and pavement within the dog park area in the south portion of the Project. Runoff developed within this sub-basin is collected by a Type C inlet and ultimately discharges into the proposed private detention basin via proposed private storm sewer infrastructure. Emergency overflow for the basin will be routed south into sub-basin 39. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 39 consists of landscaping area in the south portion of the Project. Runoff developed within this sub-basin is conveyed via a proposed private grass swale to a proposed Type C inlet in sump located in the northern portion of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed south offsite. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 40 consists of landscaping area in the north portion of the Project. Runoff developed within this sub-basin is conveyed via a proposed private grass swale to a proposed Type C inlet in sump located in the northern portion of the basin. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed north into sub-basin 06. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin 41 consists of surface parking, sidewalk, pavement, and landscaping area in the west portion of the Project. Runoff developed within this sub-basin is collected by a proposed curb cut in the southeast corner of the basin. This runoff will continue to travel through sub-basin 27 and finally be collected in sub-basin 26 where it will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Emergency overflow for the basin will be routed around the landscape island into sub-basin 27. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin OF-1 consists of an onsite basin with surface parking, sidewalk, pavement, and landscaping area in the northeast portion of the Project. Drainage flows offsite and is collected in an existing inlet in Venetucci Blvd. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin OF-2 consists of an onsite basin with landscaping area in the west portion of the Project. Drainage flows offsite and is collected in the existing Fisher’s Canyon Creek. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin OF-3 consists of an onsite basin with surface parking, sidewalk, pavement, and landscaping area in the east portion of the Project. Drainage flows offsite and is collected in an existing inlet in Venetucci Blvd. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin OF-4 consists of an onsite basin with landscaping area in the southeast portion of the Project. Drainage flows offsite and is collected in an existing inlet in Venetucci Blvd. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin RW-1 consists of an offsite basin to the northeast portion of the site with landscaping and sidewalk. Drainage flows offsite and is collected in an existing inlet in Venetucci Blvd. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basin RW-2 consists of an offsite basin to the east portion of the site with pavement and sidewalk. Drainage flows offsite and is collected in an existing inlet in Venetucci Blvd. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basins R1 to R12 consist of the building roof areas. Runoff from these basins will be routed to Type R inlets or manholes and collected. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

Sub-Basins G1 to G9 consist of the garage roof areas. Runoff from these basins will be routed to Type R inlets and manholes or outlet at grade to be collected. This runoff will ultimately discharge to a proposed private detention basin via proposed private storm sewer. Table 2 shows the basin area, impervious value, and runoff during the 5-year and 100-year events.

SUMMARY - PROPOSED RUNOFF TABLE					
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
ONSITE BASINS					
01	01	1.90	5%	1.12	6.13
02	02	0.23	80%	0.75	1.43
03	03	0.30	73%	1.27	2.97
04	04	0.07	80%	0.28	0.53
05	05	0.03	89%	0.13	0.25
06	06	0.34	79%	1.41	2.70
07	07	0.25	1%	0.10	1.39
08	08	0.19	79%	1.52	2.89
09	09	0.14	84%	1.47	2.75
10	10	0.31	85%	1.98	3.65
11	11	0.37	1%	0.13	1.09
12	12	0.21	82%	0.81	1.54
13	13	0.23	89%	0.92	1.71
14	14	0.26	79%	1.55	2.95
15	15	0.15	86%	0.59	1.10
16	16	0.13	98%	0.80	1.44
17	17	0.04	100%	0.20	0.35
18	18	0.34	76%	1.58	1.80
19	19	0.28	0%	0.96	1.35
20	20	0.29	84%	1.14	2.15
21	21	0.11	86%	0.46	0.86
22	22	0.11	76%	0.41	0.79
23	23	0.18	80%	1.59	3.01
24	24	0.25	84%	0.99	1.87
25	25	0.27	74%	0.96	1.89
26	26	0.10	78%	1.31	2.51
27	27	0.16	82%	0.94	1.81
28	28	0.20	82%	1.55	2.91
29	29	0.22	78%	1.82	3.49
30	30	0.21	81%	1.62	3.05
31	31	0.30	0%	0.87	1.28
32	32	0.20	86%	0.80	1.50
33	33	0.21	87%	0.81	1.52

34	34	0.29	80%	1.06	2.02
35	35	0.17	71%	1.79	3.45
36	36	0.21	85%	1.19	2.27
37	37	0.10	75%	0.37	0.72
38	38	0.23	37%	0.35	0.90
39	39	0.14	0%	0.67	0.93
40	40	0.21	0%	0.79	1.12
41	41	0.10	72%	0.33	0.66
R1-A	R1-A	0.12	90%	0.44	0.82
R1-B	R1-B	0.12	90%	0.44	0.82
R2-A	R2-A	0.13	90%	0.51	0.95
R2-B	R2-B	0.13	90%	0.51	0.95
R3-A	R3-A	0.16	90%	0.61	1.13
R3-B	R3-B	0.16	90%	0.61	1.13
R4-A	R4-A	0.15	90%	0.58	1.08
R4-B	R4-B	0.15	90%	0.58	1.08
R5-A	R5-A	0.16	90%	0.61	1.13
R5-B	R5-B	0.16	90%	0.61	1.13
R6-A	R6-A	0.15	90%	0.58	1.08
R6-B	R6-B	0.15	90%	0.58	1.08
R7-A	R7-A	0.13	90%	0.51	0.95
R7-B	R7-B	0.13	90%	0.51	0.95
R8-A	R8-A	0.13	90%	0.51	0.95
R8-B	R8-B	0.13	90%	0.51	0.95
R9-A	R9-A	0.12	90%	0.44	0.82
R9-B	R9-B	0.12	90%	0.44	0.82
R10-A	R10-A	0.16	90%	0.61	1.13
R10-B	R10-B	0.16	90%	0.61	1.13
R11	R11	0.12	90%	0.45	0.84
R12	R12	0.07	90%	0.28	0.52
G1	G1	0.04	90%	0.17	0.31
G2-A	G2-A	0.04	90%	0.17	0.31
G2-B	G2-B	0.04	90%	0.17	0.31
G3-A	G3-A	0.04	90%	0.17	0.31
G3-B	G3-B	0.04	90%	0.17	0.31
G4-A	G4-A	0.04	90%	0.17	0.31
G4-B	G4-B	0.04	90%	0.17	0.31
G5-A	G5-A	0.05	90%	0.17	0.32
G5-B	G5-B	0.05	90%	0.17	0.32
G6-A	G6-A	0.04	90%	0.17	0.31

G6-B	G6-B	0.04	90%	0.17	0.31
G7-A	G7-A	0.04	90%	0.17	0.31
G7-B	G7-B	0.04	90%	0.17	0.31
G8	G8	0.04	90%	0.17	0.31
G9	G9	0.03	90%	0.13	0.23
OF-1	OF-1	0.16	17%	0.15	0.51
OF-2	OF-2	1.62	5%	0.74	4.17
OF-3	OF-3	0.21	12%	0.19	0.76
OF-4	OF-4	0.52	9%	0.41	1.76
RW-1	RW-1	0.16	31%	0.28	0.75
RW-2	RW-2	0.03	14%	0.06	0.37

Table 2. Proposed Runoff

DRAINAGE DESIGN CRITERIA

DEVELOPMENT CRITERIA REFERENCE

The proposed storm facilities are designed to be in compliance with the City of Colorado Springs and El Paso County “Drainage Criteria Manual (DCM)” (Current Adopted Version) (”the MANUAL”), El Paso County “Engineering Criteria Manual” (“the Engineering Manual”), Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014 (“the Colorado Springs MANUAL”).

HYDROLOGIC CRITERIA

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the existing and proposed drainage analysis per the MANUAL. The IDF equations from the DCM were used for the Rational Calculations. Refer to **Appendix B** for the hydrologic methods and calculations for the site.

Calculations for the runoff coefficients and percent impervious are included in the **Appendix B**. Rational method was used to determine the peak flows for the project. These flows were used to determine the size of the proposed curb cuts, inlets, and storm drain system.

The proposed impervious values in Table 6-6 of the DCM were utilized in this report for the final design. Refer to **Appendix B** of this report for Table 6-6.

The Site is proposing a private extended detention basin to maintain the historic drainage release rates with the increased impervious surface being proposed with the development. NOAA 1-hour rainfall values were used per the Colorado Springs Manual and input into the UD-Detention Spreadsheet in the Optional User Overrides. There are no additional provisions selected or deviations from the criteria in both the MANUAL and Colorado Springs MANUAL.

HYDRAULIC CRITERIA

Applicable design methods were utilized to size the proposed pond, which includes the use of the UD-Detention spreadsheet, UD-Inlet spreadsheet, rational calculations spreadsheet, StormCAD, and FlowMaster.

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

- Major Storm: 100-year Storm Event

Hydraulic calculations for detention volume were computed using Mile High Flood District spreadsheets. Proposed underground storm sewer pipe sizes were calculated using StormCAD with the outfall set based on the tailwater condition for the 5-year and 100-year water surface elevation in the private full spectrum extended detention basin. The pond outlet pipe will be sized based on the proposed basin flows at the pond as shown in the StormCAD analysis provided in **Appendix C**. Headloss coefficients for the StormCAD model were based on the values provided in the StormCAD criteria.

Inlet sizing, outlet structure, forebay sizing, riprap sizing, trickle channel and concrete channel capacity, and StormCAD inputs/outputs along with all other necessary calculations are provided in **Appendix C** of this report.

THE FOUR STEP PROCESS

The Project was designed in accordance with the four-step process to minimize adverse impacts of urbanization, as outlined in the County's "Four-Step Process" for selecting structural BMPs (ECM Section I.7.2 BMP Selection).

Step 1. **Employ Runoff Reduction Practices**- The project is proposing a multifamily development that will be designed to minimize the impact to the current existing terrain. The Site's proposed paved roadways will increase the Site's impervious area; however, a full detention pond will be used to capture stormwater and maintain flows discharging off site at or below historic levels. Landscape drainage swales are proposed around the site to reduce runoff by disconnecting some roof impervious areas.

Step 2. Stabilize Drainageways– Stabilizing proposed drainage paths with landscape or riprap will slow flow rates and is anticipated to reduce erosion. Swales will be constructed to increase the time of concentration of runoff entering the pond.

Step 3. Provide Water Quality Capture Volume (WQCV) – A permanent water quality measures and detention facility will be provided with the Project. More specifically, this project proposes the construction of an Extended Detention Basin to provide for the required water quality capture volume.

Step 4. Consider Need for Industrial and Commercial BMPs – The proposed project is proposing a multifamily development; therefore, covering of storage/handling areas and spill containment and control will not need to be provided.

DRAINAGE FACILITY DESIGN

GENERAL CONCEPT

The proposed drainage patterns will match the historic patterns where possible. To maintain historic flows, a detention pond is being proposed and will capture and control the flows from the proposed development to release as historic levels even with the increase in imperviousness.

Provided in the **Appendix B** are hydrologic calculations utilizing the Rational method for the existing and proposed conditions. Provided in **Appendix C** are the hydraulic calculations for the proposed conditions, Flow master details, and cross sections for the proposed drainage features. As previously mentioned, the existing drainage map and proposed drainage map can be found in **Appendix D.**

clarify that you wish to apply the aforementioned exclusion to these sub-basins and state the area of each.

MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4)

The Site will handle post construction stormwater by meeting the water quality capture volume design standard from the MS4. Sub-basins 01-41, R1-R12, and G1-G9 will be captured onsite and directed to the onsite extended detention basin to treat the WQCV. The design standard allows for up to 20 percent (not to exceed 1 acre) to be excluded from the capture are when not practicable to capture runoff. Sub-basins RW-1 and RW-2 are located at the access points to the Site. This runoff will flow offsite and be collected in two different inlets located in the ROW. These basins are excluded as they total under 1 acre and meet the exclusion from needing water quality per ECM Appendix I.7.1.C.1.

Basins OF-1 to OF-4 are proposed to be excluded land disturbances as they contain land disturbance to undeveloped land that will remain undeveloped. These sub-basins are excluded as they will remain undeveloped land with the proposed Site in accordance with ECM Appendix I.7.1.B.7. The basins will be stabilized after construction and are primarily made up of Type A hydrologic soil group which has low runoff potential due to high infiltration rates.

per the narrative above, OF-1 has pavement, sidewalk, parking, landscaping etc. Revise accordingly.

SPECIFIC DETAILS

Sub-basins 01 through 41 consist of landscaping, pavement/sidewalks, gravel and the detention pond. Sub-basins R1 through R12 and G1 through G12 consist of multifamily buildings and garages. All basins have flows being captured and conveyed onsite. Flows are conveyed from the south and west sides of the Site to the north and east side of the Site. On site flows enter the detention pond which then discharges into a proposed 18-inch storm drain pipe at the southwest corner of the site.

northwest

Overall, the Site is reducing onsite runoff flows during the 100-year storm from 38.66 cfs to 14.05 cfs for existing to proposed conditions respectively (includes pond discharge and Basins OF-1, OF-2, OF-3, OF-4 and OF-5 which drain directly offsite). This is a 24.61 cfs reduction in onsite runoff flows and will provide stormwater flood protection for the properties located downstream of the Site. This reduction in flow will also allow portions of the Site to maintain historical drainage patterns, by allowing un-detained runoff from Sub-basins OF-1, OF-2, OF-3, OF-4, and OF-5. Refer to **Table 3** for offsite flow comparisons from existing conditions to proposed conditions.

see my comments on PDF pg 5 above.

The hydrologic calculations, hydraulic calculations, and Drainage Maps are included in the **Appendix B, Appendix C,** and **Appendix D** of this report for reference.

The Site will disturb more than 1 acre and will require a Colorado Discharge Permit System (CDPS) General Permit for Stormwater Discharge Associated with Construction Activities from the Colorado Department of Public Health and Environment (CDPHE).

Please update to the 2024 fee schedule

The required fees for the Fisher's Canyon Drainage Basin based upon the 2023 fee schedule, are listed below. Fees will be paid prior to plat recordation.

- Drainage Fee/Impervious Acre = $23,078 x 8.66 acres = $199,855.48

Total = $199,855.48

Summary of Flows Offsite					
Existing Condition					
Sub-Basin Designation	Design Points Contributing	Area (Acres)	Location Leaving Site	5-Year Runoff (CFS)	100-Year Runoff (CFS)
EX-1	EX1	9.63	Fisher's Canyon Creek	2.67	19.64
OF-1	OF1	0.15	SW Corner of Site	0.05	0.37
OF-2	OF2	0.12	SE Corner of Site	0.04	0.30
OF-3	OF3	1.10	Venetucci Blvd	0.35	2.62
OF-4	OF4	0.82	Venetucci Blvd	0.26	1.96
OF-5	OF5	4.41	Fisher's Canyon Creek	1.82	13.76
			Total	5.19	38.66
Proposed Condition					
Sub-Basin Designation	Design Points Contributing	Area (Acres)	Location Leaving Site	5-Year Runoff (CFS)	100-Year Runoff (CFS)
Pond Outfall	(01-41, R1-R12, and G1-G9)	13.71	Fisher's Canyon Creek	0.22	6.85
OF-1	OF1	0.16	Venetucci Blvd	0.15	0.51
OF-2	OF2	1.62	Fisher's Canyon Creek	0.74	4.17
OF-3	OF3	0.21	Venetucci Blvd	0.19	0.76
OF-4	OF4	0.52	Venetucci Blvd	0.41	1.76
			Total	1.70	14.05

why no OF-5 in the proposed condition?

Table 3. Offsite Comparison

SUMMARY

total flows summary should be separated into flows going to the west into fishers canyon and the east to venetucci to provide an accurate comparison between the ultimate outfalls. Revise the narrative above accordingly.

The proposed drainage design is to maintain the historic drainage patterns whe minimize the imperviousness and release rates for the Site. Runoff from controllably discharged through the proposed drainage system and will conti proposed detention basin before out falling to an existing El Paso County Canyon Creek. The drainage design presented within this report conforms presented in both the MANUAL and the Colorado Springs MANUAL. Addit runoff and storm drain facilities will not adversely affect the downstream a developments, including Fisher's Canyon Creek.

Kimley»Horn

REFERENCES

1. City of Colorado Springs “Drainage Criteria Manual (DCM) Volume 1”, dated May, 2014, Revised January 2021.

2. El Paso County “Drainage Criteria Manual”, dated October 31, 2018

3. El Paso County “Engineering Criteria Manual” Supplement 2, dated October, 14, 2024

4. Chapter 6 and Section 3.2.1. of Chapter 13-City of Colorado Springs Drainage Criteria Manual, May 2014.

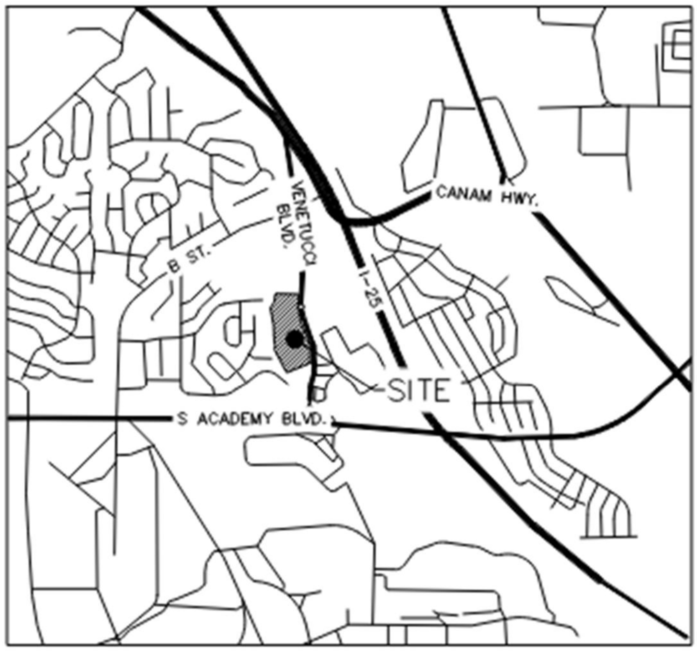
5. Mile High Flood District, Urban Storm Drainage Criteria Manual (UDFCDCM), Vol. 1, Partially Updated March 2024, Originally Published September 1969.

6. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0743G, Effective Date December 7, 2018, prepared by the Federal Emergency Management Agency (FEMA).

Include a cost estimate for each PBMP with line items for all components (ex: riprap, road base, forebay, trickle channel, outlet structure, outlet pipe, spillway, etc). Input the total value into the FAE form under “Permanent Pond/BMP (provide engineer’s estimate)” in Section 1. The total should not include grading, which is a separate line item in Section 1: “Earthwork.” The cost estimate should include labor costs (as a separate line item or added into the cost of each component).

APPENDIX

APPENDIX A: VICINITY MAP, NRCS WEB SOIL SURVEY, AND FEMA FIRMETTE



VICINITY MAP

GRAPHIC SCALE IN FEET

0 1000 2000 4000

United States Department of Agriculture

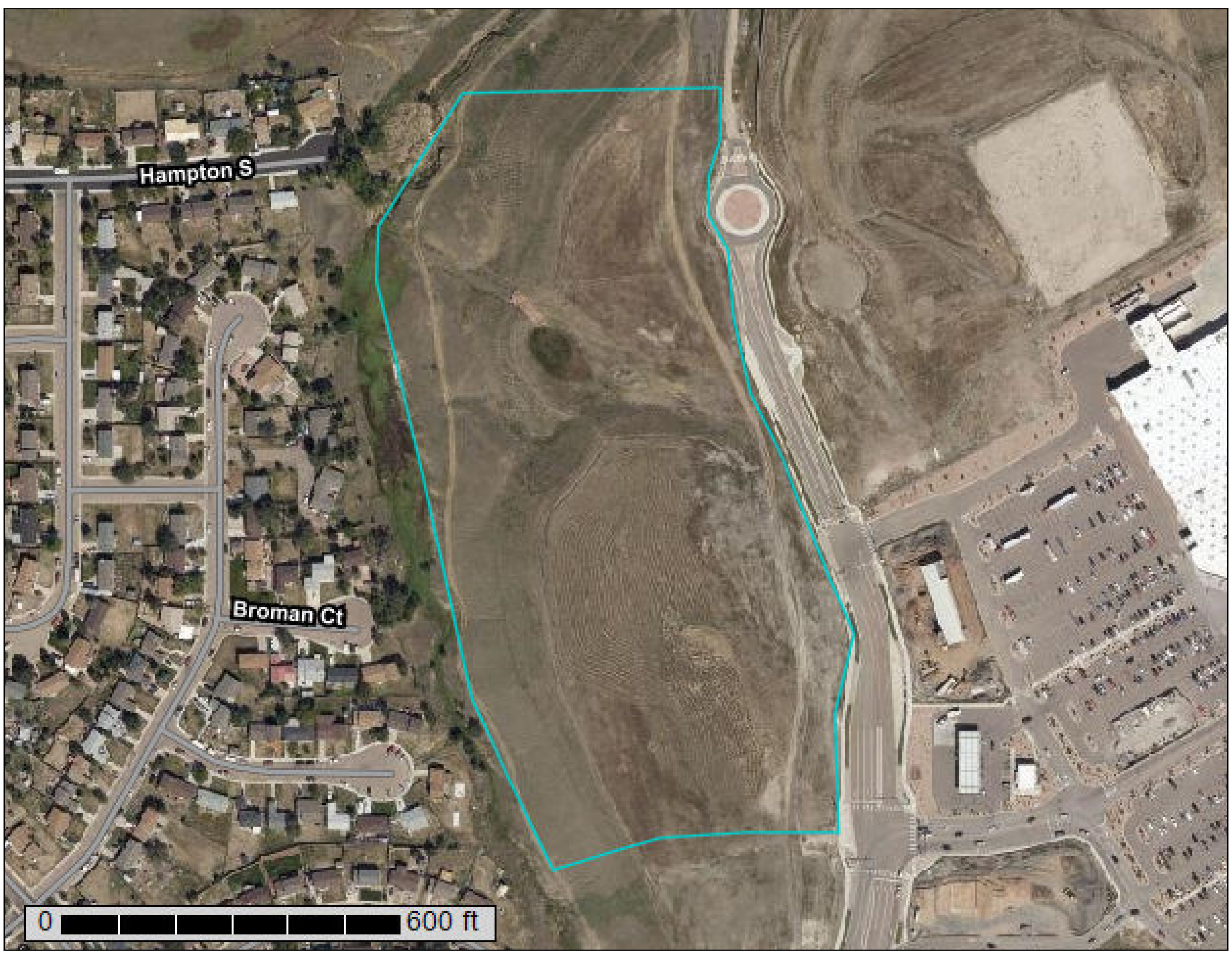
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

El Paso County Area, Colorado



May 10, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

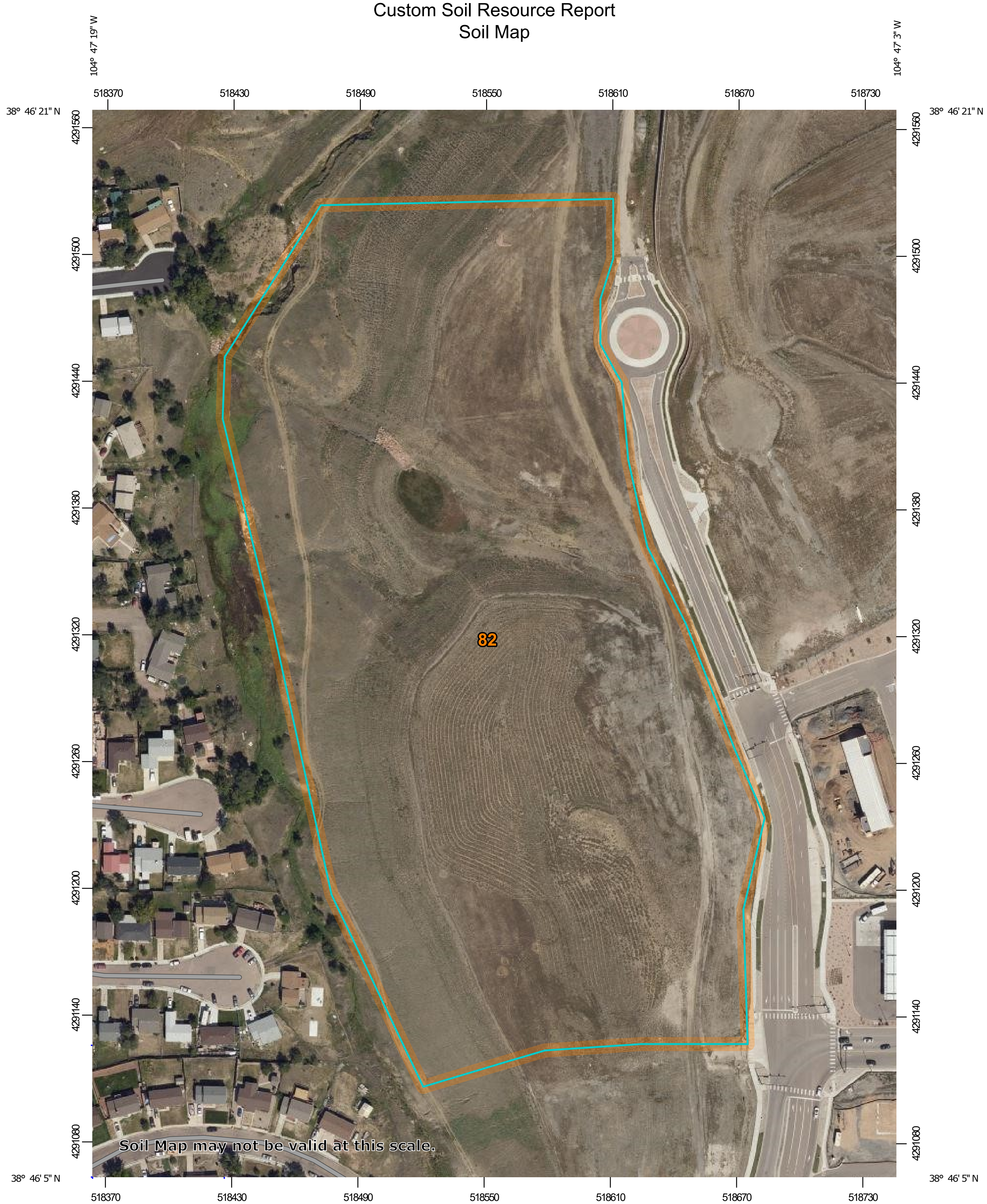
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:2,460 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.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
82	Schamber-Razor complex, 8 to 50 percent slopes	18.7	100.0%
Totals for Area of Interest		**18.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

82—Schamber-Razor complex, 8 to 50 percent slopes

Map Unit Setting

National map unit symbol: 369y
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Schamber and similar soils: 55 percent
Razor and similar soils: 43 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Schamber

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite and/or colluvium derived from granite and/or eolian deposits derived from granite

Typical profile

A - 0 to 5 inches: gravelly loam
AC - 5 to 15 inches: very gravelly loam
C - 15 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R069XY064CO - Gravel Breaks
Hydric soil rating: No

Description of Razor

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 3 inches: clay loam
Bw - 3 to 9 inches: clay loam
Bk - 9 to 31 inches: clay
Cr - 31 to 35 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R069XY047CO - Alkaline Plains
Other vegetative classification: ALKALINE PLAINS (069AY047CO)
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

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

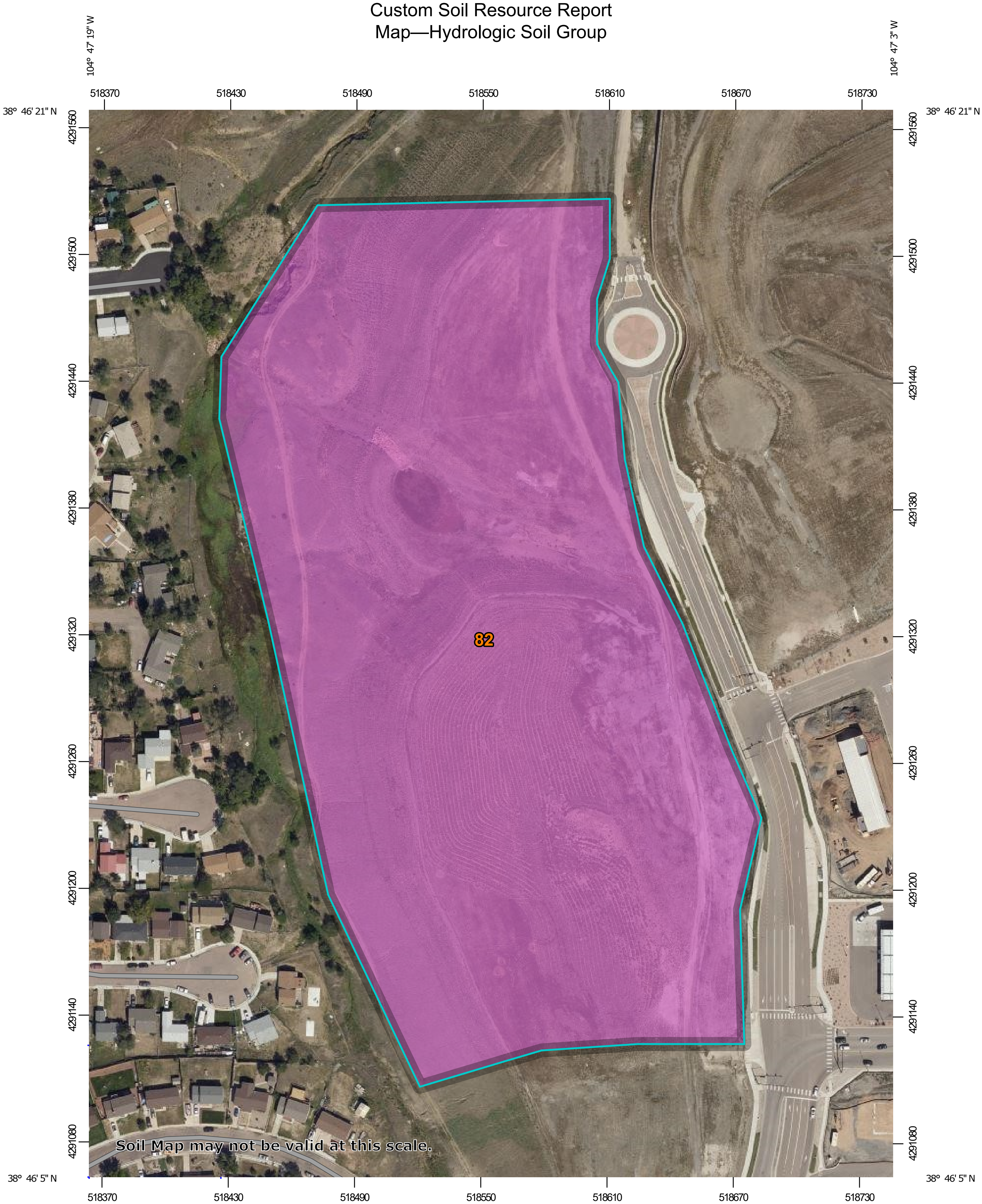
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

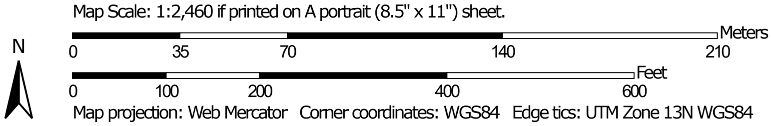
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over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

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

Map—Hydrologic Soil Group



Map Scale: 1:2,460 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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
82	Schamber-Razor complex, 8 to 50 percent slopes	A	18.7	100.0%
Totals for Area of Interest			**18.7**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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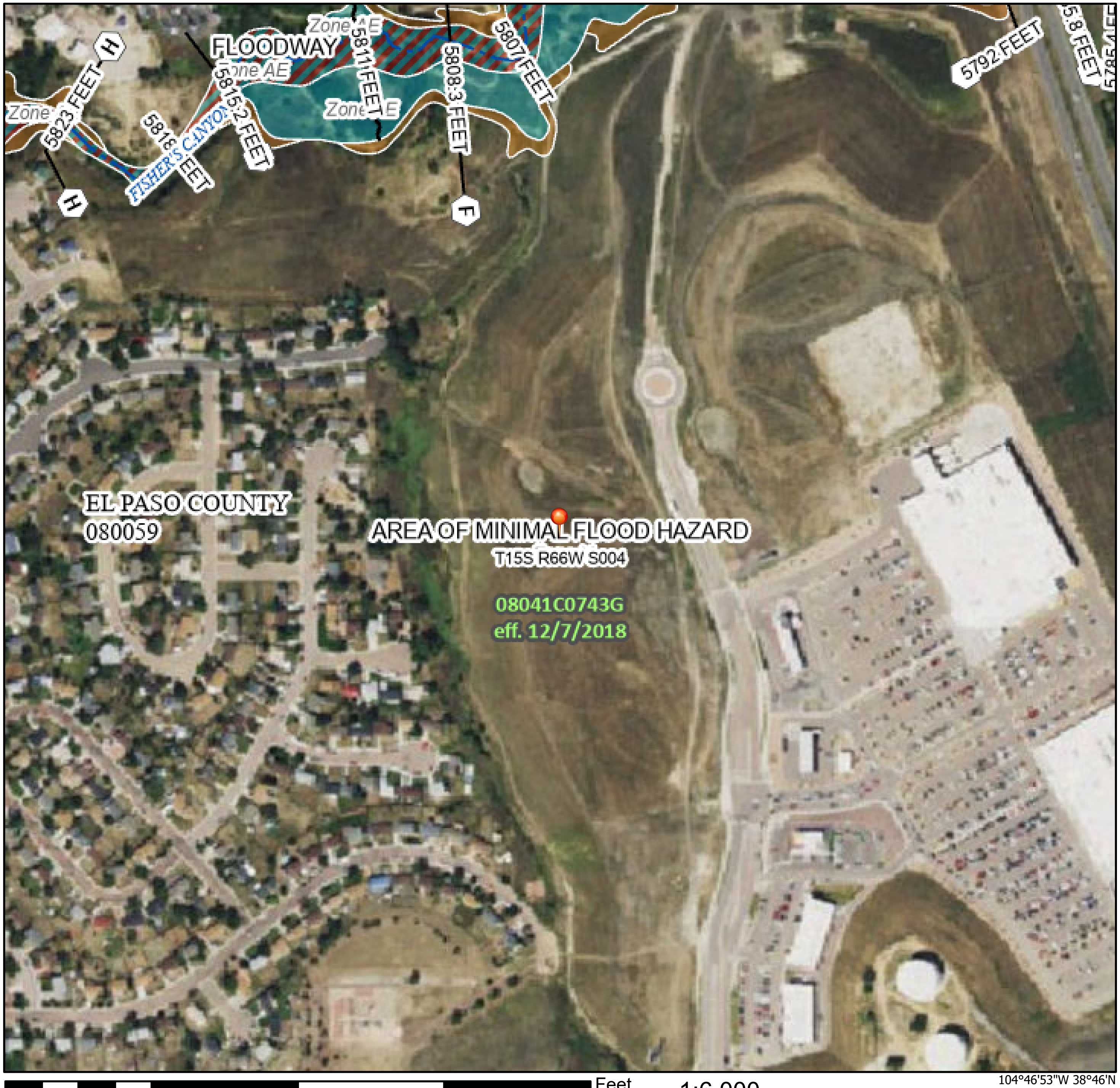
National Flood Hazard Layer FIRMette

FEMA

104°47'30"W 38°46'28"N



1:6,000

104°46'53"W 38°46'N

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) *Zone A, V, A99*
		With BFE or Depth *Zone AE, AO, AH, VE, AR*
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
		Future Conditions 1% Annual Chance Flood Hazard *Zone X*
		Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
		Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN	Area of Minimal Flood Hazard *Zone X*
		Effective LOMRs
		Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES	B 20.2 / 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	8	Coastal Transect
	513	Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/16/2024 at 7:35 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

APPENDIX B: HYDROLOGY

IDF Equations

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

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

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

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

I_5 = -1.50 ln(D) + 7.583

I_2 = -1.19 ln(D) + 6.035

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

Time Intensity Frequency Tabulation

TIME	2 YR	5 YR	10 YR	100 YR
5	4.12	5.17	6.03	8.66
10	3.29	4.13	4.82	6.91
15	2.81	3.52	4.11	5.88
30	1.99	2.48	2.89	4.13
60	1.16	1.44	1.68	2.38
120	0.34	0.40	0.47	0.62

Weighted Imperviousness Calculations - Existing Conditions

SUB-BASIN	AREA (SF)	AREA (Acres)	ROOF AREA	ROOF IMPERVIOUSNESS	ROOF				LANDSCAPE AREA (Acres)	LANDSCAPE IMPERVIOUSNESS	LANDSCAPE				PAVEMENT AREA (Acres)	PAVEMENT IMPERVIOUSNESS	PAVEMENT				WEIGHTED IMPERVIOUSNESS	WEIGHTED COEFFICIENTS			
					C2	C5	C10	C100			C2	C5	C10	C100			C2	C5	C10	C100		C2	C5	C10	C100
EX-1	419,389	9.63	0	90%	0.71	0.73	0.75	0.81	9.63	0%	0.02	0.08	0.15	0.35	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.35
ONSITE FLOWING OFFSITE																									
OF-1	6,608	0.15	0	90%	0.71	0.73	0.75	0.81	0.15	0%	0.02	0.08	0.15	0.36	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.36
OF-2	5,420	0.12	0	90%	0.71	0.73	0.75	0.81	0.12	0%	0.02	0.08	0.15	0.36	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.36
OF-3	48,078	1.10	0	90%	0.71	0.73	0.75	0.81	1.10	0%	0.02	0.08	0.15	0.36	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.36
OF-4	35,561	0.82	0	90%	0.71	0.73	0.75	0.81	0.82	0%	0.02	0.08	0.15	0.36	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.36
OF-5	191,893	4.41	0	90%	0.71	0.73	0.75	0.81	4.41	0%	0.02	0.08	0.15	0.36	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.36
TOTAL	706,949	16.23	0.00	90%	0.71	0.73	0.75	0.81	16.23	0%	0.02	0.08	0.15	0.36	0	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.36

Venture on Venetucci - Final Drainage Report
Existing Runoff Calculations
Time of Concentration

Watercourse Coefficient					
Heavy Meadow	2.50	Short Pasture & Lawns	7.00	Grassed Waterway	15.00
Tillage/Field	5.00	Nearly Bare Ground	10.00	Paved Area & Paved Swales	20.00

	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN POINT	DRAIN BASIN	AREA sq. ft.	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	L/180+10	min.
EX1	EX-1	419,389	9.63	0.08	300	5.8%	18.1	682	4.0%	7.00	1.4	8.1	26.2	982	15.5	15.5
OF1	OF-1	6608.22	0.15	0.08	135	3.0%	15.0					0.0	15.0	135	10.8	10.8
OF2	OF-2	5420.3	0.12	0.08	170	4.0%	15.3					0.0	15.3	170	10.9	10.9
OF3	OF-3	48077.83	1.10	0.08	255	5.5%	16.9					0.0	16.9	255	11.4	11.4
OF4	OF-4	35560.78	0.82	0.08	195	2.4%	19.5					0.0	19.5	195	11.1	11.1
OF5	OF-5	191892.6	4.41	0.08	250	24.0%	10.2					0.0	10.2	250	11.4	5.0

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}} \qquad t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t} \qquad t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Venture on Venetucci - Final Drainage Report

Existing Runoff Calculations

Design Storm *5 Year*

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
EX1	EX-1	9.63	0.08	15.5	0.77	3.47	2.67				2.67	
OF1	OF-1	0.15	0.08	10.8	0.01	4.01	0.05				0.05	
OF2	OF-2	0.12	0.08	10.9	0.01	4.00	0.04				0.04	
OF3	OF-3	1.10	0.08	11.4	0.09	3.93	0.35				0.35	
OF4	OF-4	0.82	0.08	11.1	0.07	3.97	0.26				0.26	
OF5	OF-5	4.41	0.08	5.0	0.35	5.17	1.82				1.82	

Venture on Venetucci - Final Drainage Report
Existing Runoff Calculations
(Rational Method Procedure)

Design Storm *100 Year*

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
EX1	EX-1	9.63	0.35	15.5	3.37	5.83	19.64				19.64	
OF1	OF-1	0.15	0.36	10.8	0.05	6.74	0.37				0.37	
OF2	OF-2	0.12	0.36	10.9	0.04	6.72	0.30				0.30	
OF3	OF-3	1.10	0.36	11.4	0.40	6.60	2.62				2.62	
OF4	OF-4	0.82	0.36	11.1	0.29	6.67	1.96				1.96	
OF5	OF-5	4.41	0.36	5.0	1.59	8.68	13.76				13.76	

SUMMARY - EXISTING RUNOFF TABLE					
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
EX1	EX-1	9.63	0.00	2.67	19.64
OF1	OF-1	0.15	0.00	0.05	0.37
OF2	OF-2	0.12	0.00	0.04	0.30
OF3	OF-3	1.10	0.00	0.35	2.62
OF4	OF-4	0.82	0.00	0.26	1.96
OF5	OF-5	4.41	0.00	1.82	13.76

Table 6-6. Runoff Coefficients for Rational Method

1 (Source: UDFCD 2001)

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

IDF Equations

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

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

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

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

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

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

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

Time Intensity Frequency Tabulation

TIME	2 YR	5 YR	10 YR	100 YR
5	4.12	5.17	6.03	8.66
10	3.29	4.13	4.82	6.91
15	2.81	3.52	4.11	5.88
30	1.99	2.48	2.89	4.13
60	1.16	1.44	1.68	2.38
120	0.34	0.40	0.47	0.62

Weighted Imperviousness Calculations

SUB-BASIN	AREA	AREA	ROOF	ROOF	ROOF				GRAVEL	GRAVEL	GRAVEL				LANDSCAPE	LANDSCAPE	LANDSCAPE				PAVEMENT	PAVEMENT	PAVEMENT				WEIGHTED	WEIGHTED COEFFICIENTS			
	(SF)	(AC)	AREA (AC)	IMPERVIOUSNESS	C2	C5	C10	C100	AREA (AC)	IMPERVIOUSNESS	C2	C5	C10	C100	AREA (AC)	IMPERVIOUSNESS	C2	C5	C10	C100	AREA (AC)	IMPERVIOUSNESS	C2	C5	C10	C100	IMPERVIOUSNESS	C2	C5	C10	C100
01	82554.44	1.895	0.00	90%	0.71	0.73	0.75	0.81	0.08	80%	0.57	0.59	0.63	0.70	1.78	0%	0.02	0.08	0.15	0.35	0.03	100%	0.89	0.90	0.92	0.96	5%	0.06	0.12	0.18	0.38
02	9830.71	0.226	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.05	0%	0.02	0.08	0.15	0.35	0.18	100%	0.89	0.90	0.92	0.96	80%	0.72	0.74	0.77	0.84
03	13082.50	0.300	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.08	0%	0.02	0.08	0.15	0.35	0.22	100%	0.89	0.90	0.92	0.96	73%	0.66	0.68	0.72	0.80
04	3184.87	0.073	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.01	0%	0.02	0.08	0.15	0.35	0.06	100%	0.89	0.90	0.92	0.96	80%	0.71	0.73	0.76	0.84
05	1391.86	0.032	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.03	100%	0.89	0.90	0.92	0.96	89%	0.79	0.81	0.83	0.89
06	14724.32	0.338	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.07	0%	0.02	0.08	0.15	0.35	0.27	100%	0.89	0.90	0.92	0.96	79%	0.71	0.73	0.76	0.83
07	10903.25	0.250	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.25	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	1%	0.03	0.09	0.16	0.35
08	8076.80	0.185	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.04	0%	0.02	0.08	0.15	0.35	0.15	100%	0.89	0.90	0.92	0.96	79%	0.71	0.73	0.76	0.83
09	6260.32	0.144	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.02	0%	0.02	0.08	0.15	0.35	0.12	100%	0.89	0.90	0.92	0.96	84%	0.75	0.77	0.80	0.86
10	13472.93	0.309	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.05	0%	0.02	0.08	0.15	0.35	0.26	100%	0.89	0.90	0.92	0.96	85%	0.76	0.78	0.81	0.87
11	15900.76	0.365	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.36	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	1%	0.02	0.08	0.15	0.35
12	9093.58	0.209	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.04	0%	0.02	0.08	0.15	0.35	0.17	100%	0.89	0.90	0.92	0.96	82%	0.74	0.75	0.78	0.85
13	9999.48	0.230	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.20	100%	0.89	0.90	0.92	0.96	89%	0.79	0.81	0.83	0.89
14	11215.56	0.257	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.06	0%	0.02	0.08	0.15	0.35	0.20	100%	0.89	0.90	0.92	0.96	79%	0.70	0.72	0.75	0.83
15	6328.38	0.145	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.02	0%	0.02	0.08	0.15	0.35	0.12	100%	0.89	0.90	0.92	0.96	86%	0.77	0.78	0.81	0.87
16	5769.99	0.132	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.13	100%	0.89	0.90	0.92	0.96	98%	0.87	0.88	0.90	0.95
17	1846.41	0.042	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.04	100%	0.89	0.90	0.92	0.96	100%	0.89	0.90	0.92	0.96
18	14621.66	0.336	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.08	0%	0.02	0.08	0.15	0.35	0.25	100%	0.89	0.90	0.92	0.96	76%	0.68	0.70	0.73	0.81
19	12107.43	0.278	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.28	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.35
20	12501.18	0.287	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.05	0%	0.02	0.08	0.15	0.35	0.24	100%	0.89	0.90	0.92	0.96	84%	0.75	0.77	0.80	0.86
21	4925.14	0.113	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.02	0%	0.02	0.08	0.15	0.35	0.10	100%	0.89	0.90	0.92	0.96	86%	0.77	0.79	0.81	0.88
22	4865.98	0.112	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.08	100%	0.89	0.90	0.92	0.96	76%	0.68	0.70	0.74	0.81
23	7686.10	0.176	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.14	100%	0.89	0.90	0.92	0.96	80%	0.72	0.74	0.77	0.84
24	10901.02	0.250	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.04	0%	0.02	0.08	0.15	0.35	0.21	100%	0.89	0.90	0.92	0.96	84%	0.75	0.77	0.79	0.86
25	11868.69	0.272	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.07	0%	0.02	0.08	0.15	0.35	0.20	100%	0.89	0.90	0.92	0.96	74%	0.66	0.68	0.72	0.80
26	4355.60	0.100	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.02	0%	0.02	0.08	0.15	0.35	0.08	100%	0.89	0.90	0.92	0.96	78%	0.70	0.72	0.75	0.83
27	6964.98	0.160	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.13	100%	0.89	0.90	0.92	0.96	82%	0.74	0.76	0.78	0.85
28	8818.61	0.202	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.04	0%	0.02	0.08	0.15	0.35	0.17	100%	0.89	0.90	0.92	0.96	82%	0.73	0.75	0.78	0.85
29	9524.15	0.219	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.05	0%	0.02	0.08	0.15	0.35	0.17	100%	0.89	0.90	0.92	0.96	78%	0.70	0.72	0.75	0.83
30	9202.82	0.211	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.04	0%	0.02	0.08	0.15	0.35	0.17	100%	0.89	0.90	0.92	0.96	81%	0.73	0.75	0.78	0.85
31	13152.14	0.302	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.30	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.35
32	8599.62	0.197	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.17	100%	0.89	0.90	0.92	0.96	86%	0.77	0.79	0.81	0.88
33	9272.35	0.213	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.19	100%	0.89	0.90	0.92	0.96	87%	0.78	0.80	0.82	0.88
34	12649.63	0.290	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.06	0%	0.02	0.08	0.15	0.35	0.23	100%	0.89	0.90	0.92	0.96	80%	0.71	0.73	0.76	0.84
35	7600.20	0.174	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.05	0%	0.02	0.08	0.15	0.35	0.12	100%	0.89	0.90	0.92	0.96	71%	0.64	0.66	0.70	0.78
36	8931.22	0.205	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.17	100%	0.89	0.90	0.92	0.96	85%	0.76	0.78	0.80	0.87
37	4475.89	0.103	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.08	100%	0.89	0.90	0.92	0.96	75%	0.67	0.70	0.73	0.81
38	10102.16	0.232	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.15	0%	0.02	0.08	0.15	0.35	0.08	100%	0.89	0.90	0.92	0.96	37%	0.34	0.38	0.43	0.57
39	6034.89	0.139	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.14	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.35
40	9015.38	0.207	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.21	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	0%	0.02	0.08	0.15	0.35
41	4175.02	0.096	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.03	0%	0.02	0.08	0.15	0.35	0.07	100%	0.89	0.90	0.92	0.96	72%	0.65	0.67	0.71	0.79
R1-A	5101.62	0.117	0.12	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R1-B	5101.62	0.117	0.12	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81

Weighted Imperviousness Calculations

R2-A	5869.14	0.135	0.13	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R2-B	5869.14	0.135	0.13	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R3-A	7028.43	0.161	0.16	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R3-B	7028.43	0.161	0.16	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R4-A	6679.62	0.153	0.15	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R4-B	6679.62	0.153	0.15	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R5-A	7028.43	0.161	0.16	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R5-B	7028.43	0.161	0.16	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R6-A	6679.62	0.153	0.15	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R6-B	6679.62	0.153	0.15	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R7-A	5869.14	0.135	0.13	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R7-B	5869.14	0.135	0.13	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R8-A	5869.14	0.135	0.13	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R8-B	5869.14	0.135	0.13	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R9-A	5101.62	0.117	0.12	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R9-B	5101.62	0.117	0.12	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R10-A	7028.43	0.161	0.16	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R10-B	7028.43	0.161	0.16	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R11	5174.04	0.119	0.12	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
R12	3220.54	0.074	0.07	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G1	1933.18	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G2-A	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G2-B	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G3-A	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G3-B	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G4-A	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G4-B	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G5-A	2001.93	0.046	0.05	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G5-B	2001.93	0.046	0.05	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G6-A	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G6-B	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G7-A	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G7-B	1911.08	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G8	1933.18	0.044	0.04	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
G9	1449.97	0.033	0.03	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.00	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	90%	0.71	0.73	0.75	0.81
OF-1	6976.57	0.160	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.13	0%	0.02	0.08	0.15	0.35	0.03	100%	0.89	0.90	0.92	0.96	17%	0.17	0.22	0.28	0.45
OF-2	70368.75	1.615	0.00	90%	0.71	0.73	0.75	0.81	0.10	80%	0.57	0.59	0.63	0.70	1.52	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	5%	0.05	0.11	0.18	0.37
OF-3	9097.46	0.209	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.18	0%	0.02	0.08	0.15	0.35	0.02	100%	0.89	0.90	0.92	0.96	12%	0.12	0.18	0.24	0.42
OF-4	22781.08	0.523	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.47	0%	0.02	0.08	0.15	0.35	0.05	100%	0.89	0.90	0.92	0.96	9%	0.10	0.16	0.22	0.41
RW-1	7017.05	0.161	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.11	0%	0.02	0.08	0.15	0.35	0.05	100%	0.89	0.90	0.92	0.96	31%	0.29	0.33	0.39	0.54
RW-2	1109.96	0.025	0.00	90%	0.71	0.73	0.75	0.81	0.00	80%	0.57	0.59	0.63	0.70	0.11	0%	0.02	0.08	0.15	0.35	0.00	100%	0.89	0.90	0.92	0.96	14%	0.21	0.48	0.79	1.67
	714,675	16.407	3.70	90%	0.71	0.73	0.75	0.81	0.18	80%	0.57	0.59	0.63	0.70	7.20	0%	0.02	0.08	0.15	0.35	5.42	100%	0.89	0.90	0.92	0.96	54%	0.47	0.50	0.55	0.66

Venture on Venetucci - Final Drainage Report

Proposed Runoff Calculations

Time of Concentration

Watercourse Coefficient					
Heavy Meadow	2.50	Short Pasture & Lawns	7.00	Grassed Waterway	15.00
Tillage/Field	5.00	Nearly Bare Ground	10.00	Paved Area & Paved Swales	20.00

	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN POINT	DRAIN BASIN	AREA sq. ft.	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	L/180+10	min.
01	01	82,554	1.90	0.12	77	30.8%	5.1	0	0.0%	7.0	0.0	0.0	5.1	77	10.4	5.1
02	02	9,831	0.23	0.74	99	0.6%	7.8	0	0.0%	20.0	0.0	0.0	7.8	99	10.5	7.8
03	03	13,083	0.30	0.68	121	1.8%	6.9	48	2.3%	20.0	3.0	0.3	7.2	169	10.9	7.2
04	04	3,185	0.07	0.73	49	2.0%	3.8	44	1.8%	20.0	2.7	0.3	5.0	94	10.5	5.0
05	05	1,392	0.03	0.81	52	2.0%	3.1	6	2.0%	20.0	2.8	0.0	5.0	58	10.3	5.0
06	06	14,724	0.34	0.73	2	2.7%	0.7	94	2.0%	20.0	2.8	0.6	5.0	96	10.5	5.0
07	07	10,903	0.25	0.09	24	6.1%	4.9	243	1.0%	15.0	1.5	2.7	7.6	266	11.5	7.6
08	08	8,077	0.19	0.73	83	3.1%	4.2	71	1.5%	20.0	2.4	0.5	5.0	154	10.9	5.0
09	09	6,260	0.14	0.77	57	3.3%	3.1	91	1.3%	20.0	2.3	0.7	5.0	148	10.8	5.0
10	10	13,473	0.31	0.78	201	3.8%	5.3	68	3.3%	20.0	3.6	0.3	5.6	269	11.5	5.6
11	11	15,901	0.37	0.08	23	3.5%	5.9	317	0.9%	15.0	1.4	3.7	9.6	341	11.9	9.6
12	12	9,094	0.21	0.75	72	3.6%	3.5	111	2.4%	20.0	3.1	0.6	5.0	183	11.0	5.0
13	13	9,999	0.23	0.81	125	1.6%	5.2	89	2.3%	20.0	3.1	0.5	5.7	213	11.2	5.7
14	14	11,216	0.26	0.72	104	4.7%	4.2	51	1.3%	20.0	2.3	0.4	5.0	154	10.9	5.0
15	15	6,328	0.15	0.78	65	1.3%	4.3	63	1.0%	20.0	2.0	0.5	5.0	128	10.7	5.0
16	16	5,770	0.13	0.88	217	2.0%	4.7	15	3.8%	20.0	3.9	0.1	5.0	233	11.3	5.0
17	17	1,846	0.04	0.90	91	2.4%	2.6	11	2.0%	20.0	2.8	0.1	5.0	103	10.6	5.0
18	18	14,622	0.34	0.70	131	3.2%	5.6	89	1.6%	20.0	2.5	0.6	6.2	220	11.2	6.2
19	19	12,107	0.28	0.08	56	2.0%	11.1	211	2.0%	15.0	2.1	1.7	12.8	267	11.5	11.5
20	20	12,501	0.29	0.77	74	3.9%	3.3	185	3.2%	20.0	3.5	0.9	5.0	259	11.4	5.0
21	21	4,925	0.11	0.79	79	3.1%	3.5	4	1.3%	20.0	2.3	0.0	5.0	83	10.5	5.0
22	22	4,866	0.11	0.70	81	2.7%	4.7	20	2.2%	20.0	3.0	0.1	5.0	101	10.6	5.0
23	23	7,686	0.18	0.74	124	2.1%	5.8	13	1.9%	20.0	2.8	0.1	5.9	137	10.8	5.9
24	24	10,901	0.25	0.77	67	4.3%	3.1	146	2.1%	20.0	2.9	0.8	5.0	214	11.2	5.0

Venture on Venetucci - Final Drainage Report

El Paso County, CO

Proposed Runoff Calculations

Time of Concentration

Watercourse Coefficient					
Heavy Meadow	2.50	Short Pasture & Lawns	7.00	Grassed Waterway	15.00
Tillage/Field	5.00	Nearly Bare Ground	10.00	Paved Area & Paved Swales	20.00

	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN	DRAIN	AREA	AREA	C(5)	Length	Slope	T(i)	Length	Slope	Coeff.	Velocity	T(t)	COMP.	TOTAL	L/180+10	
25	25	11,869	0.27	0.68	67	4.8%	3.7	124	3.1%	20.0	3.5	0.6	5.0	192	11.1	5.0
26	26	4,356	0.10	0.72	93	2.4%	5.0	0	0.0%	20.0	0.0	0.0	5.0	93	10.5	5.0
27	27	6,965	0.16	0.76	126	3.0%	4.9	72	2.1%	20.0	2.9	0.4	5.3	198	11.1	5.3
28	28	8,819	0.20	0.75	87	3.3%	4.0	74	2.3%	20.0	3.0	0.4	5.0	161	10.9	5.0
29	29	9,524	0.22	0.72	100	1.8%	5.7	42	1.6%	20.0	2.5	0.3	6.0	143	10.8	6.0
30	30	9,203	0.21	0.75	58	4.2%	3.0	40	2.0%	20.0	2.8	0.2	5.0	98	10.5	5.0
31	31	13,152	0.30	0.08	54	2.4%	10.3	175	2.4%	15.0	2.3	1.3	11.6	229	11.3	11.3
32	32	8,600	0.20	0.79	61	2.8%	3.2	103	2.3%	20.0	3.0	0.6	5.0	164	10.9	5.0
33	33	9,272	0.21	0.80	145	1.3%	6.2	36	2.8%	20.0	3.3	0.2	6.4	181	11.0	6.4
34	34	12,650	0.29	0.73	76	1.6%	5.0	146	2.8%	20.0	3.4	0.7	5.7	222	11.2	5.7
35	35	7,600	0.17	0.66	61	4.6%	3.8	61	1.0%	20.0	2.0	0.5	5.0	122	10.7	5.0
36	36	8,931	0.21	0.78	68	4.3%	3.0	77	1.9%	20.0	2.7	0.5	5.0	145	10.8	5.0
37	37	4,476	0.10	0.70	53	2.0%	4.2	52	2.0%	20.0	2.8	0.3	5.0	105	10.6	5.0
38	38	10,102	0.23	0.38	86	1.1%	11.9	37	1.0%	20.0	2.0	0.3	12.2	124	10.7	10.7
39	39	6,035	0.14	0.08	7	28.0%	1.6	128	1.0%	15.0	1.5	1.4	5.0	134	10.7	5.0
40	40	9,015	0.21	0.08	32	7.0%	5.5	179	1.7%	15.0	1.9	1.5	7.0	211	11.2	7.0
41	41	4,175	0.10	0.67	93	3.8%	4.8	19	1.9%	20.0	2.7	0.1	5.0	113	10.6	5.0
R1-A	R1-A	5,102	0.12	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R1-B	R1-B	5,102	0.12	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R2-A	R2-A	5,869	0.13	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R2-B	R2-B	5,869	0.13	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R3-A	R3-A	7,028	0.16	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R3-B	R3-B	7,028	0.16	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R4-A	R4-A	6,680	0.15	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R4-B	R4-B	6,680	0.15	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R5-A	R5-A	7,028	0.16	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0
R5-B	R5-B	7,028	0.16	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0

Venture on Venetucci - Final Drainage Report																	
							Watercourse Coefficient										
Proposed Runoff Calculations						Heavy Meadow	2.50		Short Pasture & Lawns	7.00				Grassed Waterway	15.00		
Time of Concentration						Tillage/Field	5.00		Nearly Bare Ground	10.00				Paved Area & Paved Swales	20.00		
	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)	
DESIGN	DRAIN	AREA	AREA	C(5)	Length	Slope	T(i)	Length	Slope	Coeff.	Velocity	T(t)	COMP.	TOTAL	L/180+10		
R6-A	R6-A	6,680	0.15	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R6-B	R6-B	6,680	0.15	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R7-A	R7-A	5,869	0.13	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R7-B	R7-B	5,869	0.13	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R8-A	R8-A	5,869	0.13	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R8-B	R8-B	5,869	0.13	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R9-A	R9-A	5,102	0.12	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R9-B	R9-B	5,102	0.12	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R10-A	R10-A	7,028	0.16	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R10-B	R10-B	7,028	0.16	0.73	35	2.0%	3.2	0	0.0%	20.0	0.0	0.0	5.0	35	10.2	5.0	
R11	R11	5,174	0.12	0.73	30	2.0%	2.9	0	0.0%	20.0	0.0	0.0	5.0	30	10.2	5.0	
R12	R12	3,221	0.07	0.73	30	2.0%	2.9	0	0.0%	20.0	0.0	0.0	5.0	30	10.2	5.0	
G1	G1	1,933	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G2-A	G2-A	1,911	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G2-B	G2-B	1,911	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G3-A	G3-A	1,911	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G3-B	G3-B	1,911	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G4-A	G4-A	1,911	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G4-B	G4-B	1,911	0.04	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G5-A	G5-A	2,002	0.05	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	
G5-B	G5-B	2,002	0.05	0.73	20	2.0%	2.4	0	0.0%	20.0	0.0	0.0	5.0	20	10.1	5.0	

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(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
01	01	1.90	0.12	5.1	0.22	5.14	1.12				1.12	
02	02	0.23	0.74	7.8	0.17	4.50	0.75				0.75	
03	03	0.30	0.68	7.2	0.20	4.63	0.95	7.6	0.28	4.54	1.27	Basin 04, 07, & 03
04	04	0.07	0.73	5.0	0.05	5.17	0.28				0.28	
05	05	0.03	0.81	5.0	0.03	5.17	0.13				0.13	
06	06	0.34	0.73	5.0	0.25	5.17	1.28	5.0	0.27	5.17	1.41	Basin 05 & 06
07	07	0.25	0.09	7.6	0.02	4.54	0.10	7.6	0.2	4.54	0.10	Basin 07, R3-A, RW-1
08	08	0.19	0.73	5.0	0.14	5.17	0.70	5.0	0.29	5.17	1.52	Basin 12 & 08
09	09	0.14	0.77	5.0	0.11	5.17	0.57	5.7	0.30	4.98	1.47	Basin 13 & 09
10	10	0.31	0.78	5.6	0.24	5.00	1.20	5.6	0.40	5.00	1.98	Basin 16, 17 & 10
11	11	0.37	0.08	9.6	0.03	4.20	0.13	9.6	0.1	4.20	0.13	Basin 11, R5-A
12	12	0.21	0.75	5.0	0.16	5.17	0.81				0.81	
13	13	0.23	0.81	5.7	0.18	4.98	0.92				0.92	
14	14	0.26	0.72	5.0	0.19	5.17	0.96	5.0	0.30	5.17	1.55	Basin 14 & 15
15	15	0.15	0.78	5.0	0.11	5.17	0.59				0.59	
16	16	0.13	0.88	5.0	0.12	5.17	0.60	5.0	0.15	5.17	0.80	Basin 17 & 16
17	17	0.04	0.90	5.0	0.04	5.17	0.20				0.20	
18	18	0.34	0.70	6.2	0.24	4.85	1.14	6.2	0.32	4.85	1.58	Basin 18 & 21
19	19	0.28	0.08	11.5	0.02	3.92	0.09	11.5	0.2	3.92	0.96	Basin 19, R6-A, R4-B
20	20	0.29	0.77	5.0	0.22	5.17	1.14				1.14	
21	21	0.11	0.79	5.0	0.09	5.17	0.46				0.46	
22	22	0.11	0.70	5.0	0.08	5.17	0.41				0.41	
23	23	0.18	0.74	5.9	0.13	4.93	0.64	5.9	0.32	4.93	1.59	Basin 24 & 23
24	24	0.25	0.77	5.0	0.19	5.17	0.99				0.99	

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Design Storm *5 Year*

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN	DRAIN	AREA	RUNOFF	T(c)	C x A	I	Q	T(c)	C x A	I	Q	
25	25	0.27	0.68	5.0	0.19	5.17	0.96				0.96	
26	26	0.10	0.72	5.0	0.07	5.17	0.37	5.3	0.26	5.08	1.31	Basin 41, 27, & 26
27	27	0.16	0.76	5.3	0.12	5.08	0.61	5.3	0.19	5.08	0.94	Basin 41 & 27
28	28	0.20	0.75	5.0	0.15	5.17	0.79	6.4	0.32	4.80	1.55	Basin 33 & 28
29	29	0.22	0.72	6.0	0.16	4.90	0.77	6.0	0.37	4.90	1.82	Basin 34 & 29
30	30	0.21	0.75	5.0	0.16	5.17	0.82	5.0	0.31	5.17	1.62	Basin 32 & 30
31	31	0.30	0.08	11.3	0.02	3.95	0.10	11.3	0.2	3.95	0.87	Basin 31, R7-A, R8-B
32	32	0.20	0.79	5.0	0.16	5.17	0.80				0.80	
33	33	0.21	0.80	6.4	0.17	4.80	0.81				0.81	
34	34	0.29	0.73	5.7	0.21	4.96	1.06				1.06	
35	35	0.17	0.66	5.0	0.12	5.17	0.60	5.0	0.35	5.17	1.79	Basin 37, 36, & 35
36	36	0.21	0.78	5.0	0.16	5.17	0.82	5.0	0.23	5.17	1.19	Basin 37 & 36
37	37	0.10	0.70	5.0	0.07	5.17	0.37				0.37	
38	38	0.23	0.38	10.7	0.09	4.03	0.35				0.35	
39	39	0.14	0.08	5.0	0.01	5.17	0.06	5.0	0.1	5.17	0.67	Basin 39, R10-B
40	40	0.21	0.08	7.0	0.02	4.65	0.08	7.0	0.2	4.65	0.79	Basin 40, R12, R2-B
41	41	0.10	0.67	5.0	0.06	5.17	0.33				0.33	
R1-A	R1-A	0.12	0.73	5.0	0.09	5.17	0.44				0.44	
R1-B	R1-B	0.12	0.73	5.0	0.09	5.17	0.44				0.44	
R2-A	R2-A	0.13	0.73	5.0	0.10	5.17	0.51				0.51	
R2-B	R2-B	0.13	0.73	5.0	0.10	5.17	0.51				0.51	
R3-A	R3-A	0.16	0.73	5.0	0.12	5.17	0.61				0.61	
R3-B	R3-B	0.16	0.73	5.0	0.12	5.17	0.61				0.61	
R4-A	R4-A	0.15	0.73	5.0	0.11	5.17	0.58				0.58	
R4-B	R4-B	0.15	0.73	5.0	0.11	5.17	0.58				0.58	
R5-A	R5-A	0.16	0.73	5.0	0.12	5.17	0.61				0.61	
R5-B	R5-B	0.16	0.73	5.0	0.12	5.17	0.61				0.61	

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Proposed Runoff Calculations *Design Storm* *5 Year*

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN	DRAIN	AREA	RUNOFF	T(c)	C x A	I	Q	T(c)	C x A	I	Q	
R6-A	R6-A	0.15	0.73	5.0	0.11	5.17	0.58				0.58	
R6-B	R6-B	0.15	0.73	5.0	0.11	5.17	0.58				0.58	
R7-A	R7-A	0.13	0.73	5.0	0.10	5.17	0.51				0.51	
R7-B	R7-B	0.13	0.73	5.0	0.10	5.17	0.51				0.51	
R8-A	R8-A	0.13	0.73	5.0	0.10	5.17	0.51				0.51	
R8-B	R8-B	0.13	0.73	5.0	0.10	5.17	0.51				0.51	
R9-A	R9-A	0.12	0.73	5.0	0.09	5.17	0.44				0.44	
R9-B	R9-B	0.12	0.73	5.0	0.09	5.17	0.44				0.44	
R10-A	R10-A	0.16	0.73	5.0	0.12	5.17	0.61				0.61	
R10-B	R10-B	0.16	0.73	5.0	0.12	5.17	0.61				0.61	
R11	R11	0.12	0.73	5.0	0.09	5.17	0.45				0.45	
R12	R12	0.07	0.73	5.0	0.05	5.17	0.28				0.28	
G1	G1	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G2-A	G2-A	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G2-B	G2-B	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G3-A	G3-A	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G3-B	G3-B	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G4-A	G4-A	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G4-B	G4-B	0.04	0.73	5.0	0.03	5.17	0.17				0.17	
G5-A	G5-A	0.05	0.73	5.0	0.03	5.17	0.17				0.17	
G5-B	G5-B	0.05	0.73	5.0	0.03	5.17	0.17				0.17	

Venture on Venetucci - Final Drainage Report

Proposed Runoff Calculations — *Design Storm* 100 Year

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
01	01	1.90	0.38	5.1	0.71	8.63	6.13				6.13	
02	02	0.23	0.84	7.8	0.19	7.56	1.43				1.43	
03	03	0.30	0.80	7.2	0.24	7.77	1.86	7.6	0.4	7.62	2.97	Basin 04, 07, & 03
04	04	0.07	0.84	5.0	0.06	8.68	0.53				0.53	
05	05	0.03	0.89	5.0	0.03	8.68	0.25				0.25	
06	06	0.34	0.83	5.0	0.28	8.68	2.45	5.0	0.3	8.68	2.70	Basin 05 & 06
07	07	0.25	0.35	7.6	0.09	7.62	0.68	7.6	0.3	4.54	1.39	Basin 07, R3-A, RW-1
08	08	0.19	0.83	5.0	0.15	8.68	1.34	5.0	0.3	8.68	2.89	Basin 12 & 08
09	09	0.14	0.86	5.0	0.12	8.68	1.08	5.7	0.3	8.36	2.75	Basin 13 & 09
10	10	0.31	0.87	5.6	0.27	8.39	2.26	5.6	0.4	8.39	3.65	Basin 16, 17 & 10
11	11	0.37	0.35	9.6	0.13	7.05	0.91	9.6	0.3	4.20	1.09	Basin 11, R5-A
12	12	0.21	0.85	5.0	0.18	8.68	1.54				1.54	
13	13	0.23	0.89	5.7	0.20	8.36	1.71				1.71	
14	14	0.26	0.83	5.0	0.21	8.68	1.85	5.0	0.3	8.68	2.95	Basin 14 & 15
15	15	0.15	0.87	5.0	0.13	8.68	1.10				1.10	
16	16	0.13	0.95	5.0	0.13	8.68	1.09	5.0	0.2	8.68	1.44	Basin 17 & 16
17	17	0.04	0.96	5.0	0.04	8.68	0.35				0.35	
18	18	0.34	0.81	6.2	0.27	8.14	2.22	6.2	0.37	4.85	1.80	Basin 18 & 21
19	19	0.28	0.35	11.5	0.10	6.58	0.64	11.5	0.3	3.92	1.35	Basin 19, R6-A, R4-B
20	20	0.29	0.86	5.0	0.25	8.68	2.15				2.15	
21	21	0.11	0.88	5.0	0.10	8.68	0.86				0.86	
22	22	0.11	0.81	5.0	0.09	8.68	0.79				0.79	
23	23	0.18	0.84	5.9	0.15	8.27	1.22	5.9	0.4	8.27	3.01	Basin 24 & 23
24	24	0.25	0.86	5.0	0.22	8.68	1.87				1.87	

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Design Storm 100 Year

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN	DRAIN	AREA	RUNOFF	T(c)	C x A	I	Q	T(c)	C x A	I	Q	
25	25	0.27	0.80	5.0	0.22	8.68	1.89				1.89	
26	26	0.10	0.83	5.0	0.08	8.68	0.72	5.3	0.3	8.52	2.51	Basin 41, 27, & 26
27	27	0.16	0.85	5.3	0.14	8.52	1.16	5.3	0.2	8.52	1.81	Basin 41 & 27
28	28	0.20	0.85	5.0	0.17	8.68	1.50	6.4	0.4	8.07	2.91	Basin 33 & 28
29	29	0.22	0.83	6.0	0.18	8.23	1.49	6.0	0.4	8.23	3.49	Basin 34 & 29
30	30	0.21	0.85	5.0	0.18	8.68	1.55	5.0	0.4	8.68	3.05	Basin 32 & 30
31	31	0.30	0.35	11.3	0.11	6.62	0.70	11.3	0.3	3.95	1.28	Basin 31, R7-A, R8-B
32	32	0.20	0.88	5.0	0.17	8.68	1.50				1.50	
33	33	0.21	0.88	6.4	0.19	8.07	1.52				1.52	
34	34	0.29	0.84	5.7	0.24	8.34	2.02				2.02	
35	35	0.17	0.78	5.0	0.14	8.68	1.19	5.0	0.4	8.68	3.45	Basin 37, 36, & 35
36	36	0.21	0.87	5.0	0.18	8.68	1.54	5.0	0.3	8.68	2.27	Basin 37 & 36
37	37	0.10	0.81	5.0	0.08	8.68	0.72				0.72	
38	38	0.23	0.57	10.7	0.13	6.76	0.90				0.90	
39	39	0.14	0.35	5.0	0.05	8.68	0.42	5.0	0.2	5.17	0.93	Basin 39, R10-B
40	40	0.21	0.35	7.0	0.07	7.81	0.57	7.0	0.2	4.65	1.12	Basin 40, R12, R2-B
41	41	0.10	0.79	5.0	0.08	8.68	0.66				0.66	
R1-A	R1-A	0.12	0.81	5.0	0.09	8.68	0.82				0.82	
R1-B	R1-B	0.12	0.81	5.0	0.09	8.68	0.82				0.82	
R2-A	R2-A	0.13	0.81	5.0	0.11	8.68	0.95				0.95	
R2-B	R2-B	0.13	0.81	5.0	0.11	8.68	0.95				0.95	
R3-A	R3-A	0.16	0.81	5.0	0.13	8.68	1.13				1.13	
R3-B	R3-B	0.16	0.81	5.0	0.13	8.68	1.13				1.13	
R4-A	R4-A	0.15	0.81	5.0	0.12	8.68	1.08				1.08	
R4-B	R4-B	0.15	0.81	5.0	0.12	8.68	1.08				1.08	
R5-A	R5-A	0.16	0.81	5.0	0.13	8.68	1.13				1.13	
R5-B	R5-B	0.16	0.81	5.0	0.13	8.68	1.13				1.13	

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(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMULATIVE RUNOFF				NOTES
DESIGN	DRAIN	AREA	RUNOFF	T(c)	C x A	I	Q	T(c)	C x A	I	Q	
R6-A	R6-A	0.15	0.81	5.0	0.12	8.68	1.08				1.08	
R6-B	R6-B	0.15	0.81	5.0	0.12	8.68	1.08				1.08	
R7-A	R7-A	0.13	0.81	5.0	0.11	8.68	0.95				0.95	
R7-B	R7-B	0.13	0.81	5.0	0.11	8.68	0.95				0.95	
R8-A	R8-A	0.13	0.81	5.0	0.11	8.68	0.95				0.95	
R8-B	R8-B	0.13	0.81	5.0	0.11	8.68	0.95				0.95	
R9-A	R9-A	0.12	0.81	5.0	0.09	8.68	0.82				0.82	
R9-B	R9-B	0.12	0.81	5.0	0.09	8.68	0.82				0.82	
R10-A	R10-A	0.16	0.81	5.0	0.13	8.68	1.13				1.13	
R10-B	R10-B	0.16	0.81	5.0	0.13	8.68	1.13				1.13	
R11	R11	0.12	0.81	5.0	0.10	8.68	0.84				0.84	
R12	R12	0.07	0.81	5.0	0.06	8.68	0.52				0.52	
G1	G1	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G2-A	G2-A	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G2-B	G2-B	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G3-A	G3-A	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G3-B	G3-B	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G4-A	G4-A	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G4-B	G4-B	0.04	0.81	5.0	0.04	8.68	0.31				0.31	
G5-A	G5-A	0.05	0.81	5.0	0.04	8.68	0.32				0.32	
G5-B	G5-B	0.05	0.81	5.0	0.04	8.68	0.32				0.32	

Venture on Venetucci - Final Drainage Report
Proposed Runoff Calculations Design Storm 10 Year
(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
01	01	1.895	0.18	5.1	0.35	6.00	2.08				2.08	
02	02	0.226	0.77	7.8	0.17	5.25	0.91				0.91	
03	03	0.3	0.72	7.2	0.21	5.40	1.16	7.6	0.3	7.62	2.36	Basin 04, 07, & 03
04	04	0.073	0.76	5.0	0.06	6.03	0.34				0.34	
05	05	0.032	0.83	5.0	0.03	6.03	0.16				0.16	
06	06	0.338	0.76	5.0	0.26	6.03	1.55	5.0	0.3	8.68	2.47	Basin 05 & 06
07	07	0.25	0.16	7.6	0.04	5.29	0.21				0.21	
08	08	0.185	0.76	5.0	0.14	6.03	0.85	5.0	0.3	8.68	2.65	Basin 12 & 08
09	09	0.144	0.80	5.0	0.11	6.03	0.69	5.7	0.3	8.36	2.56	Basin 13 & 09
10	10	0.309	0.81	5.6	0.25	5.83	1.45	5.6	0.4	8.39	3.42	Basin 16, 17 & 10
11	11	0.365	0.15	9.6	0.06	4.90	0.28				0.28	
12	12	0.209	0.78	5.0	0.16	6.03	0.99				0.99	
13	13	0.23	0.83	5.7	0.19	5.81	1.11				1.11	
14	14	0.257	0.75	5.0	0.19	6.03	1.17	5.0	0.3	8.68	2.71	Basin 14 & 15
15	15	0.145	0.81	5.0	0.12	6.03	0.71				0.71	
16	16	0.132	0.90	5.0	0.12	6.03	0.72	5.0	0.2	8.68	1.38	Basin 17 & 16
17	17	0.042	0.92	5.0	0.04	6.03	0.24				0.24	
18	18	0.336	0.73	6.2	0.25	5.66	1.40	6.2	0.34	4.85	1.64	Basin 18 & 21
19	19	0.278	0.15	11.5	0.04	4.57	0.19				0.19	
20	20	0.287	0.80	5.0	0.23	6.03	1.38				1.38	
21	21	0.113	0.81	5.0	0.09	6.03	0.55				0.55	
22	22	0.112	0.74	5.0	0.08	6.03	0.50				0.50	
23	23	0.176	0.77	5.9	0.14	5.75	0.78	5.9	0.3	8.27	2.76	Basin 24 & 23
24	24	0.25	0.79	5.0	0.20	6.03	1.20				1.20	

Venture on Venetucci - Final Drainage Report

El Paso County, CO

Proposed Runoff Calculations Design Storm 10 Year

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMMULATIVE RUNOFF				NOTES
DESIGN	DRAIN	AREA	RUNOFF	T(c)	C x A	I	Q	T(c)	C x A	I	Q	
25	25	0.272	0.72	5.0	0.20	6.03	1.18				1.18	
26	26	0.1	0.75	5.0	0.08	6.03	0.45	5.3	0.3	8.52	2.29	Basin 41, 27, & 26
27	27	0.16	0.78	5.3	0.13	5.92	0.74	5.3	0.2	8.52	1.65	Basin 41 & 27
28	28	0.202	0.78	5.0	0.16	6.03	0.96	6.4	0.3	8.07	2.69	Basin 33 & 28
29	29	0.219	0.75	6.0	0.16	5.72	0.94	6.0	0.4	8.23	3.18	Basin 34 & 29
30	30	0.211	0.78	5.0	0.16	6.03	0.99	5.0	0.3	8.68	2.82	Basin 32 & 30
31	31	0.302	0.15	11.3	0.05	4.60	0.21				0.21	
32	32	0.197	0.81	5.0	0.16	6.03	0.97				0.97	
33	33	0.213	0.82	6.4	0.18	5.60	0.98				0.98	
34	34	0.29	0.76	5.7	0.22	5.79	1.28				1.28	
35	35	0.174	0.70	5.0	0.12	6.03	0.73	5.0	0.4	8.68	3.14	Basin 37, 36, & 35
36	36	0.205	0.80	5.0	0.16	6.03	0.99	5.0	0.2	8.68	2.08	Basin 37 & 36
37	37	0.103	0.73	5.0	0.07	6.03	0.45				0.45	
38	38	0.232	0.43	10.7	0.10	4.70	0.47				0.47	
39	39	0.139	0.15	5.0	0.02	6.03	0.13				0.13	
40	40	0.207	0.15	7.0	0.03	5.43	0.17				0.17	
41	41	0.096	0.71	5.0	0.07	6.03	0.41				0.41	
R1-A	R1-A	0.117	0.75	5.0	0.09	6.03	0.53				0.53	
R1-B	R1-B	0.117	0.75	5.0	0.09	6.03	0.53				0.53	
R2-A	R2-A	0.135	0.75	5.0	0.10	6.03	0.61				0.61	
R2-B	R2-B	0.135	0.75	5.0	0.10	6.03	0.61				0.61	
R3-A	R3-A	0.161	0.75	5.0	0.12	6.03	0.73				0.73	
R3-B	R3-B	0.161	0.75	5.0	0.12	6.03	0.73				0.73	
R4-A	R4-A	0.153	0.75	5.0	0.12	6.03	0.69				0.69	
R4-B	R4-B	0.153	0.75	5.0	0.12	6.03	0.69				0.69	
R5-A	R5-A	0.161	0.75	5.0	0.12	6.03	0.73				0.73	
R5-B	R5-B	0.161	0.75	5.0	0.12	6.03	0.73				0.73	

Venture on Venetucci - Final Drainage Report

Proposed Runoff Calculations *Design Storm* *10 Year*

(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMMULATIVE RUNOFF				NOTES
DESIGN	DRAIN	AREA	RUNOFF	T(c)	C x A	I	Q	T(c)	C x A	I	Q	
R6-A	R6-A	0.153	0.75	5.0	0.12	6.03	0.69				0.69	
R6-B	R6-B	0.153	0.75	5.0	0.12	6.03	0.69				0.69	
R7-A	R7-A	0.135	0.75	5.0	0.10	6.03	0.61				0.61	
R7-B	R7-B	0.135	0.75	5.0	0.10	6.03	0.61				0.61	
R8-A	R8-A	0.135	0.75	5.0	0.10	6.03	0.61				0.61	
R8-B	R8-B	0.135	0.75	5.0	0.10	6.03	0.61				0.61	
R9-A	R9-A	0.117	0.75	5.0	0.09	6.03	0.53				0.53	
R9-B	R9-B	0.117	0.75	5.0	0.09	6.03	0.53				0.53	
R10-A	R10-A	0.161	0.75	5.0	0.12	6.03	0.73				0.73	
R10-B	R10-B	0.161	0.75	5.0	0.12	6.03	0.73				0.73	
R11	R11	0.119	0.75	5.0	0.09	6.03	0.54				0.54	
R12	R12	0.074	0.75	5.0	0.06	6.03	0.33				0.33	
G1	G1	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G2-A	G2-A	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G2-B	G2-B	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G3-A	G3-A	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G3-B	G3-B	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G4-A	G4-A	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G4-B	G4-B	0.044	0.75	5.0	0.03	6.03	0.20				0.20	
G5-A	G5-A	0.046	0.75	5.0	0.03	6.03	0.21				0.21	
G5-B	G5-B	0.046	0.75	5.0	0.03	6.03	0.21				0.21	

SUMMARY - PROPOSED RUNOFF TABLE

DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
ONSITE BASINS					
01	01	1.90	5%	1.12	6.13
02	02	0.23	80%	0.75	1.43
03	03	0.30	73%	1.27	2.97
04	04	0.07	80%	0.28	0.53
05	05	0.03	89%	0.13	0.25
06	06	0.34	79%	1.41	2.70
07	07	0.25	1%	0.10	1.39
08	08	0.19	79%	1.52	2.89
09	09	0.14	84%	1.47	2.75
10	10	0.31	85%	1.98	3.65
11	11	0.37	1%	0.13	1.09
12	12	0.21	82%	0.81	1.54
13	13	0.23	89%	0.92	1.71
14	14	0.26	79%	1.55	2.95
15	15	0.15	86%	0.59	1.10
16	16	0.13	98%	0.80	1.44
17	17	0.04	100%	0.20	0.35
18	18	0.34	76%	1.58	1.80
19	19	0.28	0%	0.96	1.35
20	20	0.29	84%	1.14	2.15
21	21	0.11	86%	0.46	0.86
22	22	0.11	76%	0.41	0.79
23	23	0.18	80%	1.59	3.01
24	24	0.25	84%	0.99	1.87
25	25	0.27	74%	0.96	1.89
26	26	0.10	78%	1.31	2.51
27	27	0.16	82%	0.94	1.81
28	28	0.20	82%	1.55	2.91
29	29	0.22	78%	1.82	3.49
30	30	0.21	81%	1.62	3.05
31	31	0.30	0%	0.87	1.28
32	32	0.20	86%	0.80	1.50
33	33	0.21	87%	0.81	1.52
34	34	0.29	80%	1.06	2.02
35	35	0.17	71%	1.79	3.45
36	36	0.21	85%	1.19	2.27
37	37	0.10	75%	0.37	0.72
38	38	0.23	37%	0.35	0.90
39	39	0.14	0%	0.67	0.93
40	40	0.21	0%	0.79	1.12
41	41	0.10	72%	0.33	0.66
R1-A	R1-A	0.12	90%	0.44	0.82

R1-B	R1-B	0.12	90%	0.44	0.82
R2-A	R2-A	0.13	90%	0.51	0.95
R2-B	R2-B	0.13	90%	0.51	0.95
R3-A	R3-A	0.16	90%	0.61	1.13
R3-B	R3-B	0.16	90%	0.61	1.13
R4-A	R4-A	0.15	90%	0.58	1.08
R4-B	R4-B	0.15	90%	0.58	1.08
R5-A	R5-A	0.16	90%	0.61	1.13
R5-B	R5-B	0.16	90%	0.61	1.13
R6-A	R6-A	0.15	90%	0.58	1.08
R6-B	R6-B	0.15	90%	0.58	1.08
R7-A	R7-A	0.13	90%	0.51	0.95
R7-B	R7-B	0.13	90%	0.51	0.95
R8-A	R8-A	0.13	90%	0.51	0.95
R8-B	R8-B	0.13	90%	0.51	0.95
R9-A	R9-A	0.12	90%	0.44	0.82
R9-B	R9-B	0.12	90%	0.44	0.82
R10-A	R10-A	0.16	90%	0.61	1.13
R10-B	R10-B	0.16	90%	0.61	1.13
R11	R11	0.12	90%	0.45	0.84
R12	R12	0.07	90%	0.28	0.52
G1	G1	0.04	90%	0.17	0.31
G2-A	G2-A	0.04	90%	0.17	0.31
G2-B	G2-B	0.04	90%	0.17	0.31
G3-A	G3-A	0.04	90%	0.17	0.31
G3-B	G3-B	0.04	90%	0.17	0.31
G4-A	G4-A	0.04	90%	0.17	0.31
G4-B	G4-B	0.04	90%	0.17	0.31
G5-A	G5-A	0.05	90%	0.17	0.32
G5-B	G5-B	0.05	90%	0.17	0.32
G6-A	G6-A	0.04	90%	0.17	0.31
G6-B	G6-B	0.04	90%	0.17	0.31
G7-A	G7-A	0.04	90%	0.17	0.31
G7-B	G7-B	0.04	90%	0.17	0.31
G8	G8	0.04	90%	0.17	0.31
G9	G9	0.03	90%	0.13	0.23
OF-1	OF-1	0.16	17%	0.15	0.51
OF-2	OF-2	1.62	5%	0.74	4.17
OF-3	OF-3	0.21	12%	0.19	0.76
OF-4	OF-4	0.52	9%	0.41	1.76
RW-1	RW-1	0.16	31%	0.28	0.75
RW-2	RW-2	0.03	14%	0.06	0.37

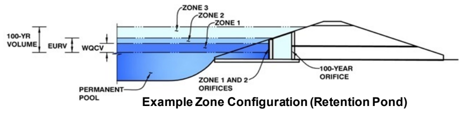
APPENDIX C: HYDRAULICS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Venture on Venetucci

Basin ID: Extended Detention Basin



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**			
Watershed Area =	13.71	acres		
Watershed Length =	1,250	ft		
Watershed Length to Centroid =	650	ft		
Watershed Slope =	0.017	ft/ft		
Watershed Imperviousness =	63.20%	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 =	Denver - Capitol Building			

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.283	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.067	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.97 in.) =	0.625	acre-feet	0.97	inches
5-yr Runoff Volume (P1 = 1.24 in.) =	0.819	acre-feet	1.24	inches
10-yr Runoff Volume (P1 = 1.5 in.) =	1.024	acre-feet	1.50	inches
25-yr Runoff Volume (P1 = 1.89 in.) =	1.373	acre-feet	1.89	inches
50-yr Runoff Volume (P1 = 2.24 in.) =	1.730	acre-feet	2.24	inches
100-yr Runoff Volume (P1 = 2.61 in.) =	2.150	acre-feet	2.61	inches
500-yr Runoff Volume (P1 = 3.62 in.) =	3.290	acre-feet	3.62	inches
Approximate 2-yr Detention Volume =	0.565	acre-feet		
Approximate 5-yr Detention Volume =	0.750	acre-feet		
Approximate 10-yr Detention Volume =	0.938	acre-feet		
Approximate 25-yr Detention Volume =	1.247	acre-feet		
Approximate 50-yr Detention Volume =	1.449	acre-feet		
Approximate 100-yr Detention Volume =	1.657	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.283	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.784	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.590	acre-feet
Total Detention Basin Volume =	1.657	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	40	0.001		
5847.98 ISV	--	0.50	--	--	--	40	0.001	20	0.000
5848.5	--	1.02	--	--	--	224	0.005	89	0.002
5849	--	1.52	--	--	--	2,128	0.049	677	0.016
5849.5	--	2.02	--	--	--	6,422	0.147	2,814	0.065
5850	--	2.52	--	--	--	12,058	0.277	7,434	0.171
5850.5	--	3.02	--	--	--	15,225	0.350	14,255	0.327
5851	--	3.52	--	--	--	16,790	0.385	22,259	0.511
5851.5	--	4.02	--	--	--	18,058	0.415	30,971	0.711
5852	--	4.52	--	--	--	19,351	0.444	40,323	0.926
5852.5	--	5.02	--	--	--	20,668	0.474	50,328	1.155
5853	--	5.52	--	--	--	22,008	0.505	60,997	1.400
5853.5	--	6.02	--	--	--	23,389	0.537	72,346	1.661
5854	--	6.52	--	--	--	24,814	0.570	84,397	1.937
5854.5	--	7.02	--	--	--	26,276	0.603	97,169	2.231
5855	--	7.52	--	--	--	27,768	0.637	110,680	2.541
5855.5	--	8.02	--	--	--	29,318	0.673	124,952	2.868
5856	--	8.52	--	--	--	31,054	0.713	140,045	3.215
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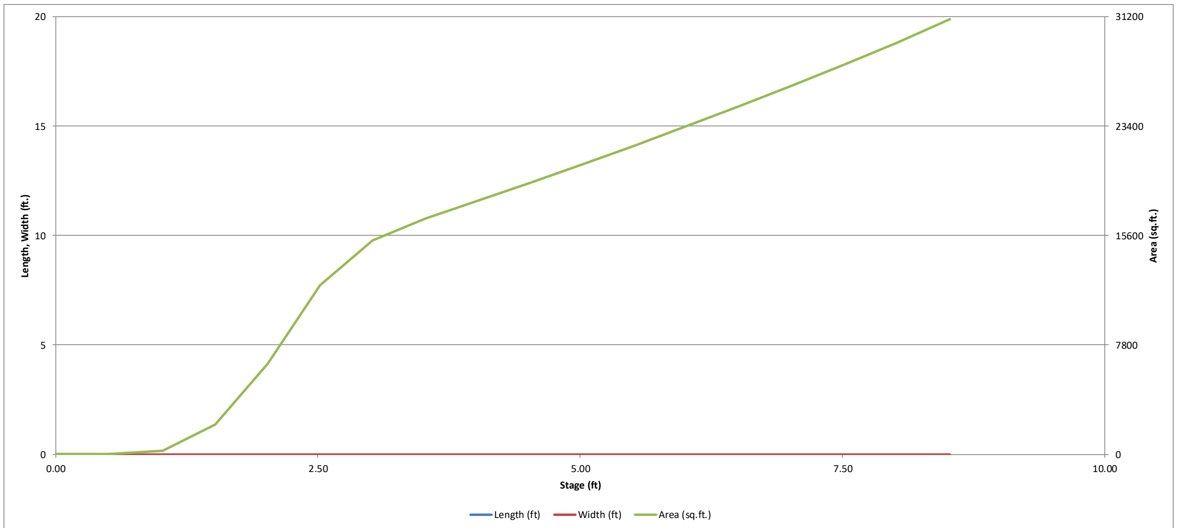
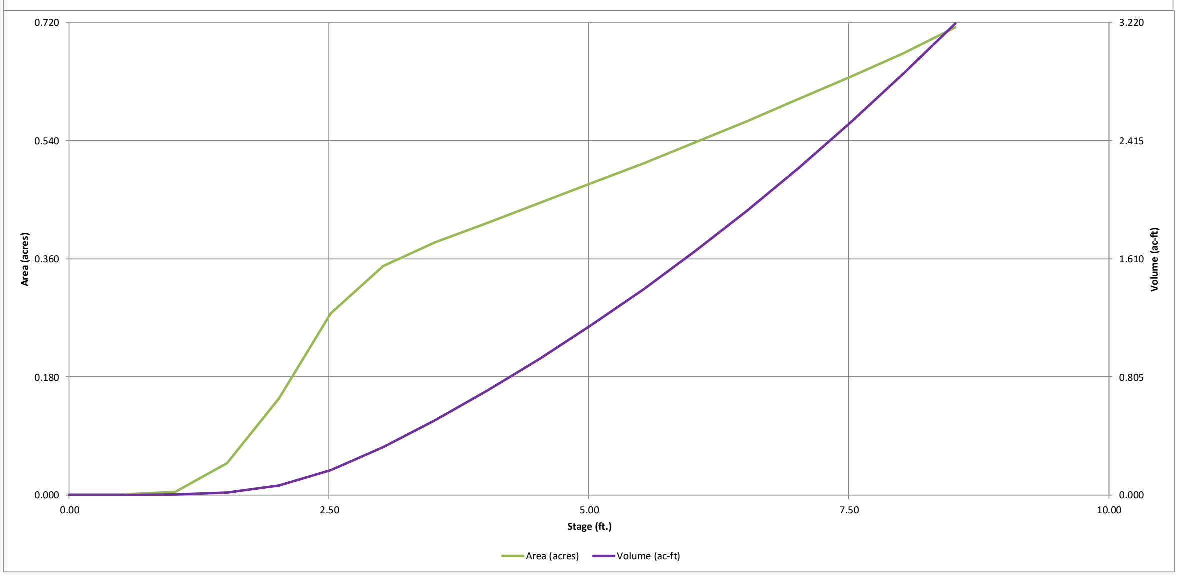

Length, Width (ft.)
Area (sq.ft.)
Stage (ft)
0.00
2.50
5.00
7.50
10.00
0
5
10
15
20
0
7800
15600
23400
31200
Length (ft)
Width (ft)
Area (sq.ft.)


Area (acres)
Volume (ac-ft)
Stage (ft.)
0.00
2.50
5.00
7.50
10.00
0.000
0.180
0.360
0.540
0.720
0.000
0.805
1.610
2.415
3.220
Area (acres)
Volume (ac-ft)

✓ = calcs match details in plans

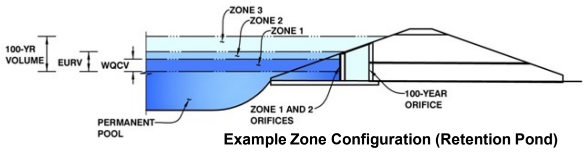
X = calcs do <u>not</u> match details in plans

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Venture on Venetucci**

Basin ID: **Extended Detention Basin**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.89	0.283	Orifice Plate
Zone 2 (EURV)	4.84	0.784	Orifice Plate
Zone 3 (100-year)	6.02	0.590	Weir&Pipe (Restrict)
Total (all zones)		1.657	

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

			<u>Calculated Parameters for Underdrain</u>		
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

<u>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)</u>

			<u>Calculated Parameters for Plate</u>		
Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	7.708E-03	ft^2
Depth at top of Zone using Orifice Plate =	5.00	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.11	sq. inches (diameter = 1-3/16 inches)	Elliptical Slot Area =	N/A	ft^2

only 3 orifice shown on CDs

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.70	2.50	3.00				
Orifice Area (sq. inches)	1.11	1.11	1.11	1.11				

	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)								

<u>User Input: Vertical Orifice (Circular or Rectangular)</u>

	Not Selected	Not Selected		<u>Calculated Parameters for Vertical Orifice</u>	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				

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

dimension not labeled on pond details

	Zone 3 Weir	Not Selected		<u>Calculated Parameters for Overflow Weir</u>	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.00	N/A	ft (relative	ight of Grate Upper Edge, H_t =	5.00	N/A	feet
Overflow Weir Front Edge Length =	3.44	N/A	feet	verflow Weir Slope Length =	2.79	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Area / 100-yr Orifice Area =	14.72	N/A	
Horiz. Length of Weir Sides =	2.79	N/A	feet	Overflow Grate Open Area w/o Debris =	7.59	N/A	ft^2
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	3.80	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Restrictor	Not Selected		<u>Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate</u>	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.52	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.29	N/A	feet
Restrictor Plate Height Above Pipe Invert =	6.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.23	N/A	radians

<u>User Input: Emergency Spillway (Rectangular or Trapezoidal)</u>

			<u>Calculated Parameters for Spillway</u>		
Spillway Invert Stage=	6.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.36	feet
Spillway Crest Length =	49.84	feet	Stage at Top of Freeboard =	8.36	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.70	acres
Freeboard above Max Water Surface =	2.00	feet	Basin Volume at Top of Freeboard =	3.10	acre-ft

<u>Routed Hydrograph Results</u>

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

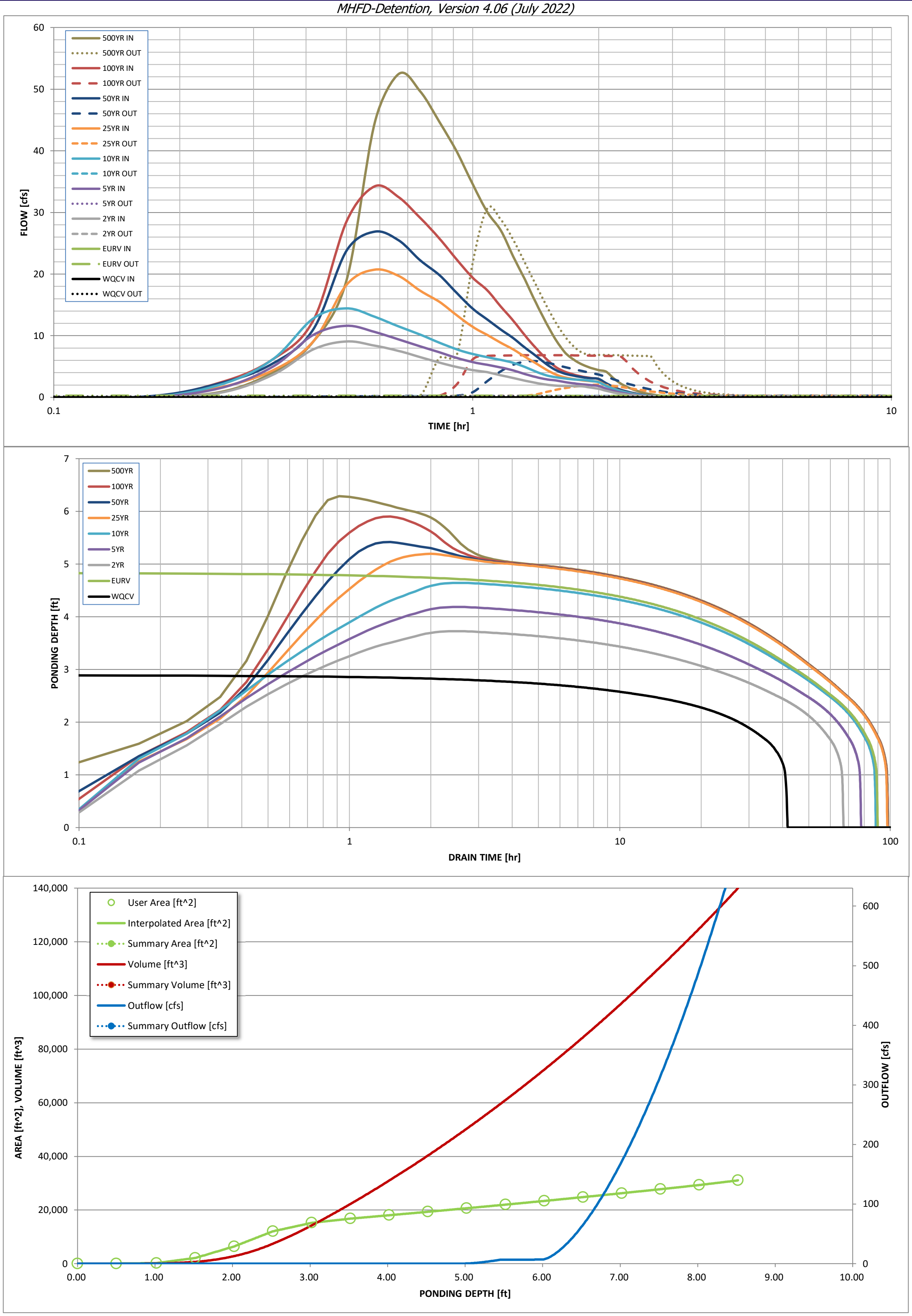
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.97	1.24	1.50	1.89	2.24	2.61	3.62
CUHP Runoff Volume (acre-ft) =	0.283	1.067	0.625	0.819	1.024	1.373	1.730	2.150	3.290
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.625	0.819	1.024	1.373	1.730	2.150	3.290
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.1	0.2	1.2	4.2	7.8	17.7
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.01	0.01	0.09	0.31	0.57	1.29
Peak Inflow Q (cfs) =	N/A	N/A	9.1	11.6	14.4	20.7	26.9	34.2	52.5
Peak Outflow Q (cfs) =	0.1	0.3	0.2	0.2	0.2	2.0	5.9	6.8	30.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	2.5	1.6	1.7	1.4	0.9	1.7
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.2	0.7	0.9	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) =	39	81	62	71	80	87	85	83	78
Time to Drain 99% of Inflow Volume (hours) =	**41**	87	65	75	85	93	93	92	89
Maximum Ponding Depth (ft) =	2.89	4.84	3.73	4.19	4.64	5.19	5.42	5.90	6.29
Area at Maximum Ponding Depth (acres) =	0.33	0.46	0.40	0.42	0.45	0.48	0.50	0.53	0.55
Maximum Volume Stored (acre-ft) =	0.283	1.071	0.589	0.778	0.979	1.237	1.345	1.597	1.803

Ratio should be less than or equal to 1 for minor (5-yr) and major (100-yr) design storms. See Chapter 4.1 of DCM volume 2 (and also Chap 2 of MHFD DCM vol. 3).

But since the increase in outflow from pre-development is only 0.1cfs, just discuss this in the report text above.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.09	0.87
	0:15:00	0.00	0.00	0.76	1.50	2.08	1.64	2.29	2.40	4.01
	0:20:00	0.00	0.00	3.64	4.96	6.15	4.36	5.47	6.15	9.06
	0:25:00	0.00	0.00	7.78	10.15	12.81	9.12	11.05	12.52	18.95
	0:30:00	0.00	0.00	9.07	11.61	14.43	18.23	23.77	28.52	44.48
	0:35:00	0.00	0.00	8.38	10.61	13.06	20.73	26.87	34.23	52.51
	0:40:00	0.00	0.00	7.52	9.37	11.48	19.66	25.43	32.43	49.62
	0:45:00	0.00	0.00	6.52	8.27	10.17	17.28	22.21	29.09	44.68
	0:50:00	0.00	0.00	5.64	7.32	8.88	15.50	19.83	25.78	39.87
	0:55:00	0.00	0.00	4.92	6.39	7.78	13.32	16.92	22.36	34.60
	1:00:00	0.00	0.00	4.42	5.72	7.03	11.44	14.39	19.41	30.08
	1:05:00	0.00	0.00	4.07	5.26	6.52	10.12	12.64	17.39	27.12
	1:10:00	0.00	0.00	3.58	4.86	6.06	8.87	11.02	14.75	22.85
	1:15:00	0.00	0.00	3.13	4.35	5.60	7.78	9.61	12.44	19.10
	1:20:00	0.00	0.00	2.71	3.78	4.93	6.58	8.08	10.06	15.33
	1:25:00	0.00	0.00	2.33	3.28	4.17	5.52	6.73	7.99	12.06
	1:30:00	0.00	0.00	2.06	2.93	3.58	4.48	5.40	6.22	9.26
	1:35:00	0.00	0.00	1.92	2.74	3.26	3.68	4.40	4.89	7.21
	1:40:00	0.00	0.00	1.85	2.47	3.05	3.22	3.83	4.13	6.03
	1:45:00	0.00	0.00	1.80	2.25	2.90	2.93	3.48	3.67	5.29
	1:50:00	0.00	0.00	1.78	2.10	2.80	2.74	3.25	3.35	4.78
	1:55:00	0.00	0.00	1.57	1.98	2.67	2.61	3.09	3.13	4.42
	2:00:00	0.00	0.00	1.39	1.84	2.44	2.52	2.98	2.98	4.16
	2:05:00	0.00	0.00	1.07	1.41	1.88	1.94	2.30	2.26	3.14
	2:10:00	0.00	0.00	0.80	1.06	1.40	1.45	1.71	1.67	2.31
	2:15:00	0.00	0.00	0.60	0.79	1.05	1.08	1.27	1.24	1.72
	2:20:00	0.00	0.00	0.45	0.59	0.78	0.80	0.95	0.93	1.28
	2:25:00	0.00	0.00	0.33	0.43	0.57	0.59	0.69	0.68	0.94
	2:30:00	0.00	0.00	0.24	0.30	0.41	0.42	0.50	0.49	0.68
	2:35:00	0.00	0.00	0.17	0.21	0.30	0.31	0.36	0.36	0.49
	2:40:00	0.00	0.00	0.11	0.15	0.21	0.22	0.25	0.25	0.35
	2:45:00	0.00	0.00	0.07	0.10	0.13	0.14	0.17	0.16	0.22
	2:50:00	0.00	0.00	0.04	0.06	0.07	0.08	0.10	0.09	0.13
	2:55:00	0.00	0.00	0.02	0.03	0.03	0.04	0.05	0.04	0.06
	3:00:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02
	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).

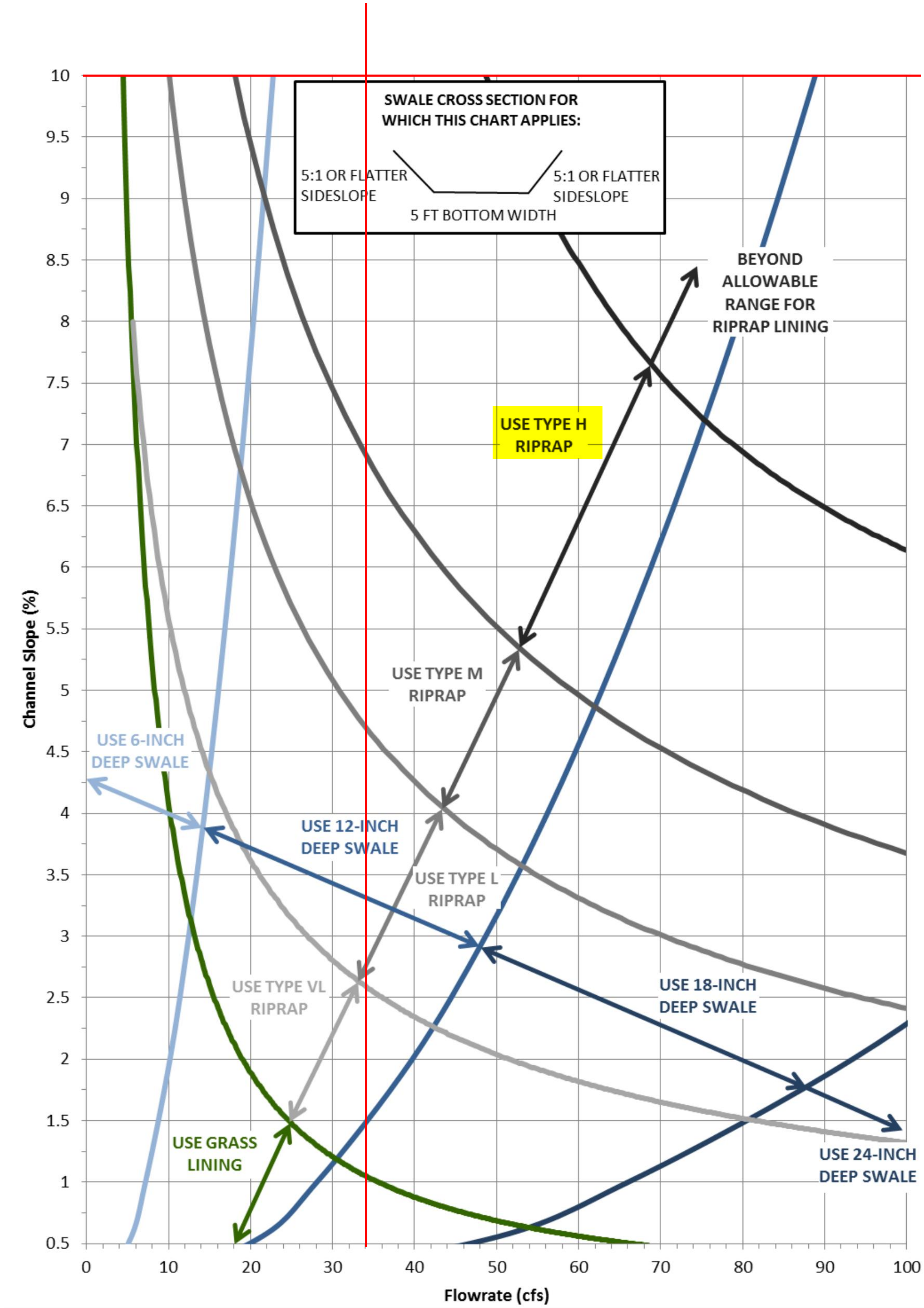
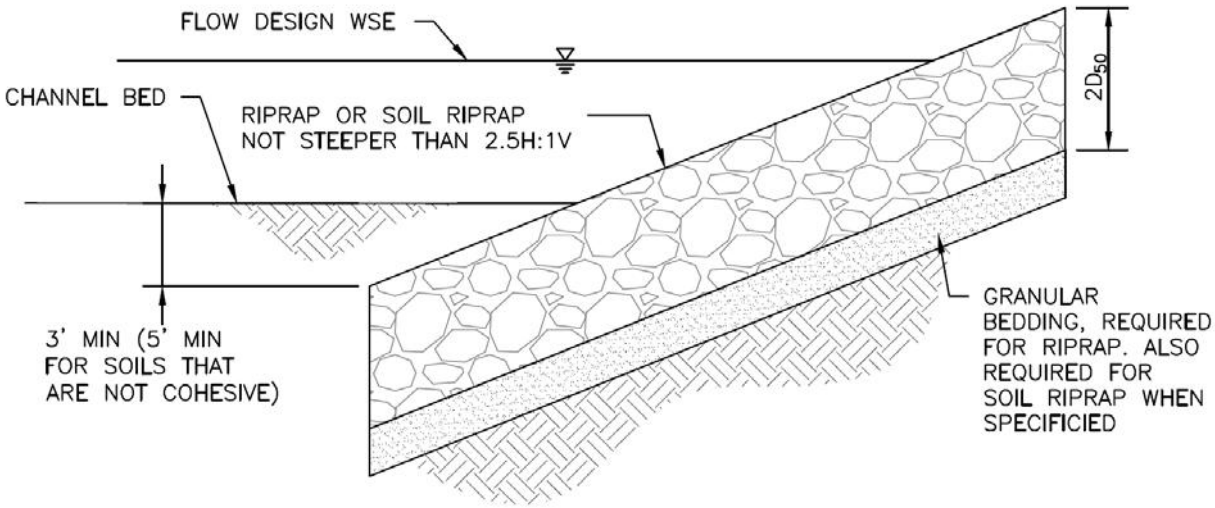


Figure 8-24. Swale stability chart: greater than 4-foot bottom width and side slopes between 5:1 and 10:1

(Note: Riprap classifications refer to gradation for riprap used in soil riprap or void-filled riprap. See Figure 8-34 for gradations.) (Source: Muller Engineering Company)



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18
*D_{50} = MEAN ROCK SIZE			

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)

SOIL RIPRAP NOTES:

1. ELEVATION TOLERANCES FOR THE SOIL RIPRAP SHALL BE 0.10 FEET. THICKNESS OF SOIL RIPRAP SHALL BE NO LESS THAN THICKNESS SHOWN AND NO MORE THAN 2–INCHES GREATER THAN THE THICKNESS SHOWN.

2. WHERE "SOIL RIPRAP" IS DESIGNATED ON THE CONTRACT DRAWINGS, RIPRAP VOIDS ARE TO BE FILLED WITH NATIVE SOIL. THE RIPRAP SHALL BE PRE–MIXED WITH THE NATIVE SOIL AT THE FOLLOWING PROPORTIONS BY VOLUME: 65PERCENT RIPRAP AND 35 PERCENT SOIL. THE SOIL USED FOR MIXING SHALL BE NATIVE TOPSOIL AND SHALL HAVE A MINIMUM FINES CONTENT OF 15 PERCENT. THE SOIL RIPRAP SHALL BE INSTALLED IN A MANNER THAT RESULTS IN A DENSE, INTERLOCKED LAYER OF RIPRAP WITH RIPRAP VOIDS FILLED COMPLETELY WITH SOIL. SEGREGATION OF MATERIALS SHALL BE AVOIDED AND IN NO CASE SHALL THE COMBINED MATERIAL CONSIST PRIMARILY OF SOIL; THE DENSITY AND INTERLOCKING NATURE OF RIPRAP IN THE MIXED MATERIAL SHALL ESSENTIALLY BE THE SAME AS IF THE RIPRAP WAS PLACED WITHOUT SOIL.

3. WHERE SPECIFIED (TYPICALLY AS "BURIED SOIL RIPRAP"), A SURFACE LAYER OF TOPSOIL SHALL BE PLACED OVER THE SOIL RIPRAP ACCORDING TO THE THICKNESS SPECIFIED ON THE CONTRACT DRAWINGS. THE TOPSOIL SURFACE LAYER SHALL BE COMPACTED TO APPROXIMATELY 85% OF MAXIMUM DENSITY AND WITHIN TWO PERCENTAGE POINTS OF OPTIMUM MOISTURE IN ACCORDANCE WITH ASTM D698. TOPSOIL SHALL BE ADDED TO ANY AREAS THAT SETTLE.

4. ALL SOIL RIPRAP THAT IS BURIED WITH TOPSOIL SHALL BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO ANY TOPSOIL PLACEMENT.

GRADATION FOR GRANULAR BEDDING		
U.S. STANDARD SIEVE SIZE	PERCENT PASSING BY WEIGHT	
	TYPE I CDOT SECT. 703.01	TYPE II CDOT SECT. 703.09 CLASS A
3 INCHES	–	90 – 100
1½ INCHES	–	–
¾ INCHES	–	20 – 90
⅜ INCHES	100	–
#4	95 – 100	0 – 20
#16	45 – 80	–
#50	10 – 30	–
#100	2 – 10	–
#200	0 – 2	0 – 3

RIPRAP BEDDING

Figure 8-34. Riprap and soil riprap placement and gradation (part 2 of 3)

THICKNESS REQUIREMENTS FOR GRANULAR BEDDING			
RIPRAP DESIGNATION	MINIMUM BEDDING THICKNESS (INCHES)		
	FINE-GRAINED SOILS [1]		COARSE-GRAINED SOILS [2]
	TYPE I (LOWER LAYER)	TYPE II (UPPER LAYER)	TYPE II
VL (D_{50} = 6 IN)	4	4	6
L (D_{50} = 9 IN)	4	4	6
M (D_{50} = 12 IN)	4	4	6
H (D_{50} = 18 IN)	4	6	8
VH (D_{50} = 24 IN)	4	6	8

NOTES:
1. MAY SUBSTITUTE ONE 12-INCH LAYER OF TYPE II BEDDING. THE SUBSTITUTION OF ONE LAYER OF TYPE II BEDDING SHALL NOT BE PERMITTED AT DROP STRUCTURES. THE USE OF A COMBINATION OF FILTER FABRIC AND TYPE II BEDDING AT DROP STRUCTURES IS ACCEPTABLE.
2. FIFTY PERCENT OR MORE BY WEIGHT RETAINED ON THE #40 SIEVE.

Figure 8-34. Riprap and soil riprap placement and gradation (part 3 of 3)

NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado Springs, Colorado, USA*
Latitude: 38.7697°, Longitude: -104.786°
Elevation: 5896 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.242** (0.199-0.298)	**0.291** (0.238-0.358)	**0.375** (0.306-0.464)	**0.451** (0.366-0.561)	**0.564** (0.443-0.739)	**0.658** (0.502-0.874)	**0.757** (0.556-1.04)	**0.864** (0.605-1.22)	**1.01** (0.680-1.48)	**1.13** (0.736-1.67)
10-min	**0.355** (0.291-0.437)	**0.425** (0.348-0.525)	**0.550** (0.448-0.680)	**0.661** (0.535-0.822)	**0.826** (0.649-1.08)	**0.963** (0.735-1.28)	**1.11** (0.814-1.52)	**1.26** (0.886-1.78)	**1.48** (0.995-2.16)	**1.66** (1.08-2.45)
15-min	**0.433** (0.355-0.533)	**0.519** (0.425-0.640)	**0.670** (0.547-0.829)	**0.806** (0.653-1.00)	**1.01** (0.792-1.32)	**1.18** (0.897-1.56)	**1.35** (0.993-1.85)	**1.54** (1.08-2.18)	**1.81** (1.21-2.64)	**2.02** (1.32-2.98)
30-min	**0.635** (0.521-0.783)	**0.764** (0.625-0.942)	**0.989** (0.806-1.22)	**1.19** (0.965-1.48)	**1.49** (1.17-1.96)	**1.74** (1.33-2.31)	**2.00** (1.47-2.74)	**2.29** (1.60-3.23)	**2.69** (1.80-3.92)	**3.01** (1.95-4.44)
60-min	**0.824** (0.676-1.02)	**0.970** (0.794-1.20)	**1.24** (1.01-1.53)	**1.50** (1.21-1.86)	**1.89** (1.50-2.50)	**2.24** (1.72-2.99)	**2.61** (1.92-3.59)	**3.02** (2.13-4.29)	**3.62** (2.44-5.30)	**4.11** (2.67-6.06)
2-hr	**1.01** (0.835-1.24)	**1.18** (0.968-1.44)	**1.49** (1.22-1.83)	**1.80** (1.47-2.22)	**2.30** (1.84-3.04)	**2.73** (2.12-3.65)	**3.22** (2.40-4.42)	**3.76** (2.67-5.32)	**4.55** (3.09-6.64)	**5.21** (3.41-7.63)
3-hr	**1.11** (0.919-1.35)	**1.27** (1.05-1.55)	**1.59** (1.31-1.95)	**1.92** (1.57-2.37)	**2.47** (2.00-3.28)	**2.97** (2.32-3.97)	**3.53** (2.65-4.85)	**4.17** (2.98-5.90)	**5.11** (3.49-7.44)	**5.90** (3.88-8.61)
6-hr	**1.27** (1.06-1.54)	**1.44** (1.19-1.74)	**1.79** (1.48-2.18)	**2.17** (1.78-2.65)	**2.80** (2.29-3.72)	**3.39** (2.67-4.52)	**4.06** (3.07-5.56)	**4.82** (3.48-6.80)	**5.96** (4.12-8.64)	**6.92** (4.60-10.0)
12-hr	**1.43** (1.20-1.72)	**1.64** (1.37-1.98)	**2.06** (1.72-2.50)	**2.50** (2.07-3.04)	**3.22** (2.63-4.21)	**3.86** (3.05-5.10)	**4.59** (3.49-6.22)	**5.42** (3.94-7.56)	**6.64** (4.62-9.54)	**7.66** (5.13-11.0)
24-hr	**1.62** (1.36-1.93)	**1.88** (1.58-2.25)	**2.39** (2.01-2.87)	**2.89** (2.41-3.48)	**3.67** (3.01-4.74)	**4.36** (3.46-5.69)	**5.13** (3.92-6.87)	**5.98** (4.36-8.26)	**7.22** (5.05-10.3)	**8.24** (5.57-11.8)
2-day	**1.85** (1.57-2.20)	**2.17** (1.84-2.58)	**2.76** (2.33-3.29)	**3.32** (2.78-3.98)	**4.18** (3.43-5.32)	**4.92** (3.92-6.34)	**5.72** (4.40-7.58)	**6.61** (4.85-9.03)	**7.88** (5.55-11.1)	**8.92** (6.08-12.7)
3-day	**2.03** (1.72-2.40)	**2.38** (2.02-2.82)	**3.02** (2.56-3.59)	**3.62** (3.05-4.33)	**4.54** (3.74-5.76)	**5.33** (4.26-6.84)	**6.19** (4.77-8.16)	**7.12** (5.25-9.69)	**8.46** (5.99-11.9)	**9.55** (6.54-13.5)
4-day	**2.18** (1.86-2.57)	**2.55** (2.18-3.01)	**3.23** (2.74-3.82)	**3.86** (3.26-4.60)	**4.82** (3.98-6.08)	**5.64** (4.53-7.21)	**6.53** (5.05-8.59)	**7.50** (5.56-10.2)	**8.90** (6.32-12.4)	**10.0** (6.90-14.2)
7-day	**2.58** (2.21-3.02)	**2.97** (2.55-3.49)	**3.70** (3.16-4.36)	**4.36** (3.71-5.17)	**5.39** (4.47-6.75)	**6.26** (5.05-7.94)	**7.20** (5.60-9.40)	**8.23** (6.13-11.1)	**9.70** (6.94-13.5)	**10.9** (7.54-15.3)
10-day	**2.91** (2.50-3.40)	**3.34** (2.87-3.90)	**4.10** (3.51-4.82)	**4.80** (4.09-5.67)	**5.87** (4.88-7.30)	**6.77** (5.47-8.54)	**7.73** (6.04-10.0)	**8.78** (6.57-11.8)	**10.3** (7.38-14.2)	**11.5** (8.00-16.1)
20-day	**3.81** (3.30-4.43)	**4.36** (3.78-5.07)	**5.31** (4.58-6.20)	**6.14** (5.27-7.20)	**7.34** (6.12-9.00)	**8.32** (6.76-10.4)	**9.34** (7.33-12.0)	**10.4** (7.84-13.8)	**11.9** (8.61-16.3)	**13.1** (9.20-18.2)
30-day	**4.56** (3.96-5.27)	**5.23** (4.55-6.06)	**6.36** (5.50-7.38)	**7.30** (6.29-8.53)	**8.63** (7.19-10.5)	**9.68** (7.87-11.9)	**10.7** (8.44-13.7)	**11.8** (8.92-15.6)	**13.3** (9.65-18.1)	**14.4** (10.2-20.0)
45-day	**5.52** (4.82-6.36)	**6.36** (5.54-7.33)	**7.70** (6.69-8.91)	**8.80** (7.60-10.2)	**10.3** (8.58-12.4)	**11.4** (9.31-14.0)	**12.5** (9.88-15.8)	**13.7** (10.3-17.8)	**15.1** (11.0-20.4)	**16.2** (11.5-22.3)
60-day	**6.36** (5.57-7.31)	**7.33** (6.41-8.43)	**8.86** (7.72-10.2)	**10.1** (8.74-11.7)	**11.7** (9.78-14.0)	**12.9** (10.6-15.7)	**14.1** (11.1-17.7)	**15.2** (11.5-19.7)	**16.7** (12.1-22.3)	**17.7** (12.6-24.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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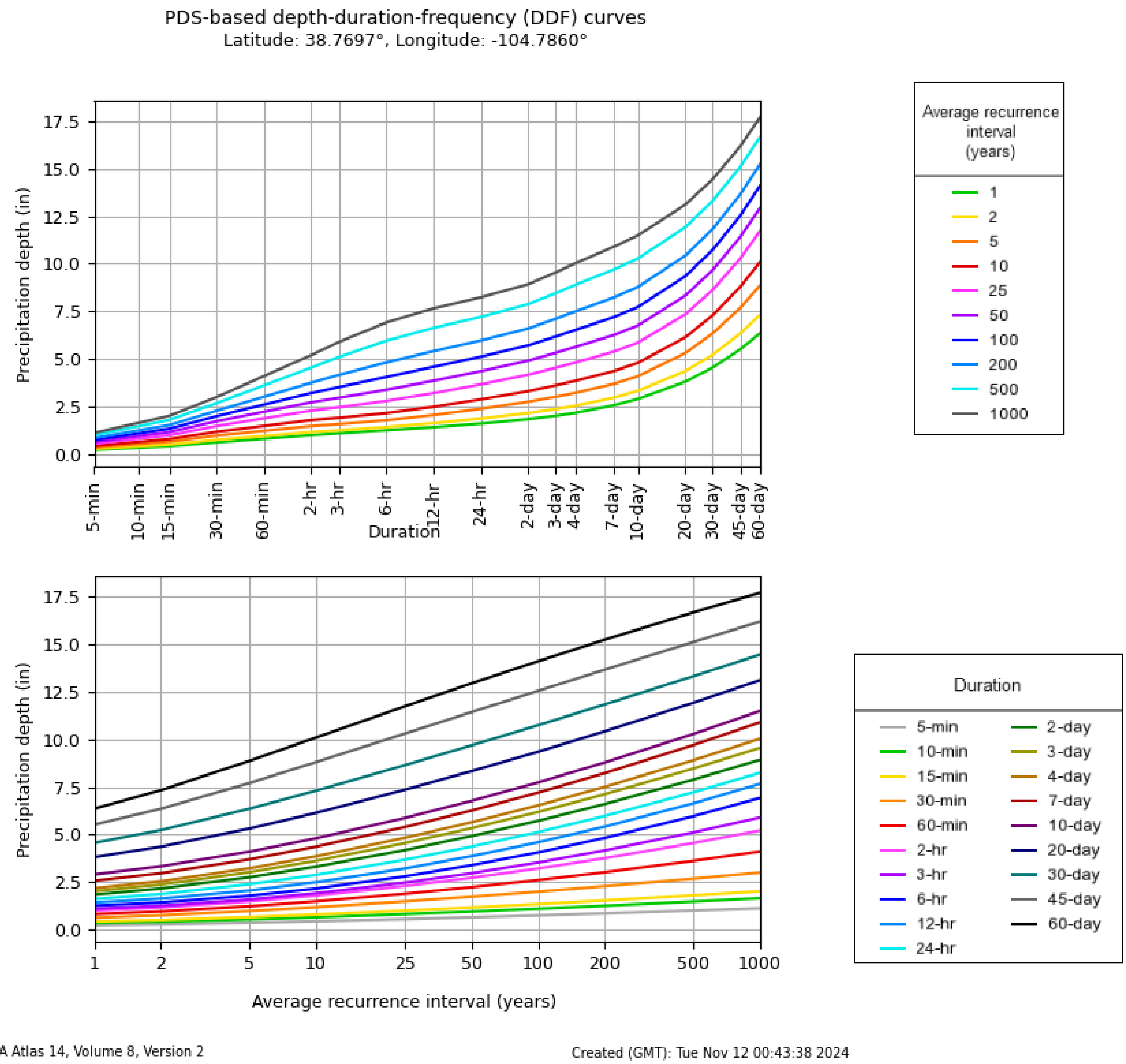
PF graphical



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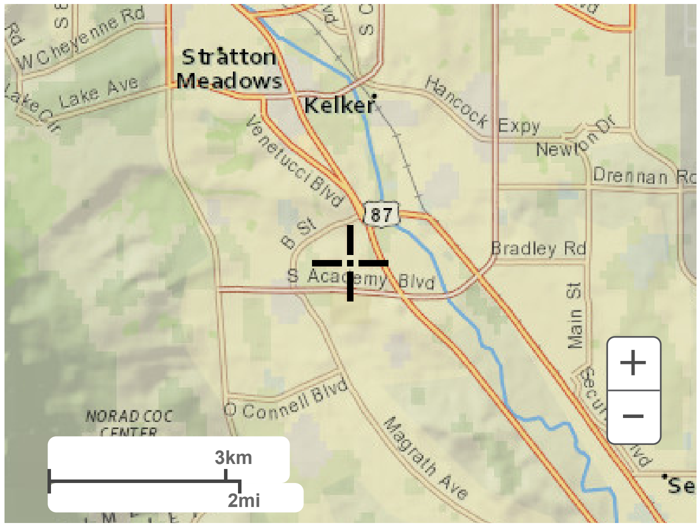
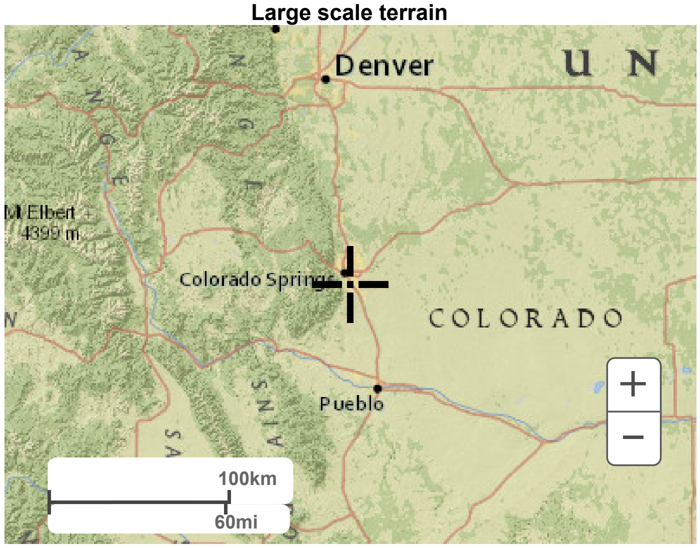
Maps & aerials

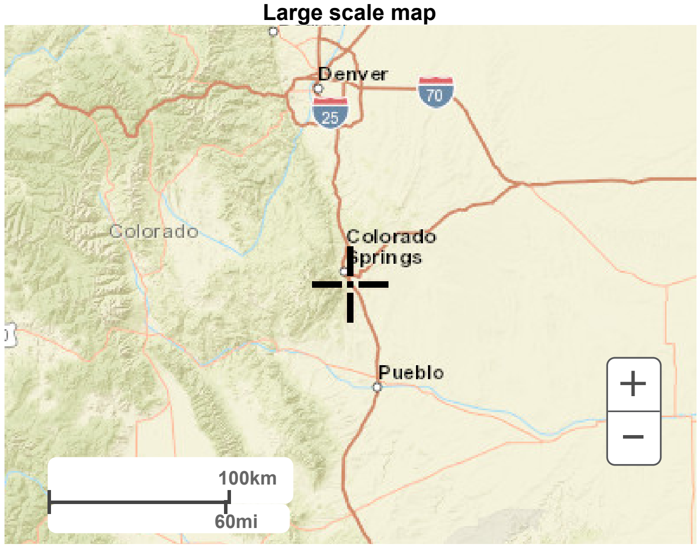
Small scale terrain



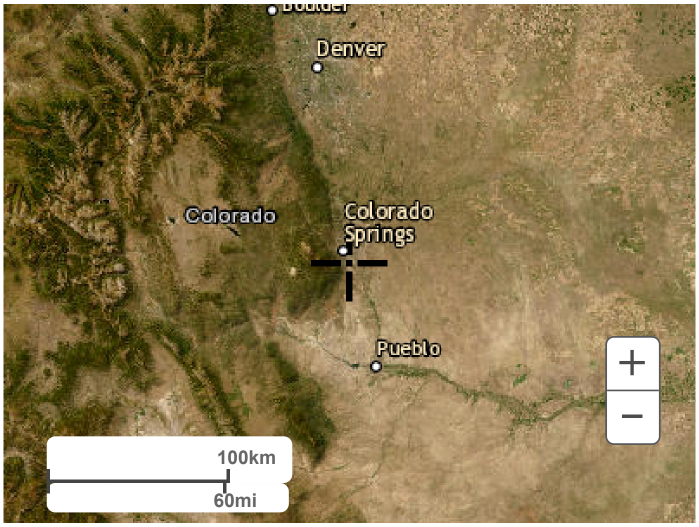
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Worksheet for Emergency Spillway Conveyance Channel

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.078
Channel Slope	0.090 ft/ft
Normal Depth	15.0 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	5.00 ft

Results

Discharge	62.41 cfs
Flow Area	12.5 ft²
Wetted Perimeter	15.3 ft
Hydraulic Radius	9.8 in
Top Width	15.00 ft
Critical Depth	14.7 in
Critical Slope	0.097 ft/ft
Velocity	4.99 ft/s
Velocity Head	0.39 ft
Specific Energy	1.64 ft
Froude Number	0.964
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	15.0 in
Critical Depth	14.7 in
Channel Slope	0.090 ft/ft
Critical Slope	0.097 ft/ft

Extended Detention Basin (EDB) Struture Component Calculations

Date 10/31/2024
Prepared By MTH

Forebay Release and Configuration (Per MHFD Table 4-12)	Impervious Area to EDB (AC) 8.66	Required Size to drain in 4 to 5 minutes using equation 4-1

Minimum Forebay Volume (Per MHFD Table 4-12)	1% of the WQCV	WQCV 0.283 acre-feet	Forebay A Criteria (Using 18" depth) 184.91	Provided 292.50

Forebay Depth (Per MHFD Table 4-12)	Forebay A Required 15 to 18 inches	Provided 18"

Trickle Channel Capacity	See seperate calculations.

Micropool	Required Area Area ≥ $10ft^2$	Provided Area $40\ ft^2$

Forebay Notch Calculations

$w = 9.23\ (A_{FB} / t)\ (1 / \sqrt{h_{max}})$

Where:

w = width of the rectangular vertical notch (inches)

A_{FB} = surface area of the forebay (square feet)

t = emptying time of the brim-full forebay (seconds)

h_{max} = maximum depth of the forebay (feet)

w_A	**4.9**	inches
w_B	**4.9**	inches
A_{FBA}	195	ft^2
A_{FBB}	195	ft^2
t_A	300	seconds
t_B	300	seconds
h_{MAXA}	1.50	feet
h_{MAXB}	1.50	feet

$w = 9.23\ (A_{FB} / t)\ (1 / \sqrt{h_{max}})$ **Equation 4-1**

Where:

w = width of the rectangular vertical notch (inches)

A_{FB} = surface area of the forebay (square feet)

t = emptying time of the brim-full forebay (seconds)

h_{max} = maximum depth of the forebay (feet)

TABLE 4-12. FOREBAY SIZING CRITERIA

FOREBAY SIZING CRITERIA	WATERSHED IMPERVIOUS AREA (IA)				
	IA UP TO 2 ACRES	IA 2 UP TO 5 ACRES	IA 5 UP TO 10 ACRES	IA 10 UP TO 20 ACRES	IA GREATER THAN 20 ACRES
Forebay Release Rate and Configuration	Concrete sediment pad with dense grasses surrounding, concrete pad with slotted metal edge, or similar design	Size to drain in 4 to 5 minutes using Equation 4-1			
Minimum Forebay Volume [1]		1% of WQCV			
Forebay Depth [1]		12 to 15 inches	15 to 18 inches	18 to 24 inches	24 to 30 inches

[1] Appropriate volume and depth should consider maintenance and access needs. The values provided are approximate and provide a starting point for design.

Worksheet for Trickle Channel Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.600 %
Normal Depth	6.0 in
Bottom Width	2.00 ft

Results

Discharge	4.26 cfs
Flow Area	1.0 ft²
Wetted Perimeter	3.0 ft
Hydraulic Radius	4.0 in
Top Width	2.00 ft
Critical Depth	6.2 in
Critical Slope	0.535 %
Velocity	4.26 ft/s
Velocity Head	0.28 ft
Specific Energy	0.78 ft
Froude Number	1.061
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.0 in
Critical Depth	6.2 in
Channel Slope	0.600 %
Critical Slope	0.535 %

Worksheet for Forebay Weir Flowrate for Trickle Channel Sizing

Project Description

Solve For	Discharge

Input Data

Headwater Elevation	1.50 ft
Crest Elevation	0.00 ft
Tailwater Elevation	0.00 ft
Weir Coefficient	3.00 ft^(1/2)/s
Crest Length	0.4 ft
Number Of Contractions	1

Results

Discharge	1.42 cfs
Headwater Height Above Crest	1.50 ft
Tailwater Height Above Crest	0.00 ft
Flow Area	0.6 ft²
Velocity	2.32 ft/s
Wetted Perimeter	3.4 ft
Top Width	0.41 ft

PROJECT: Venetucci MF | Date: 11/6/2024

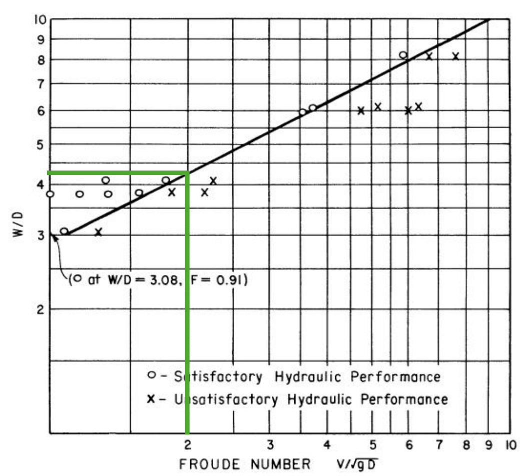
MODIFIED STILLING BASIN DESIGN PER MHFD VOL 2 CH 9

V = Flow Velocity (ft/s)	9.52	*(StormCAD 100-YR Scenario)*
A = Flow Area (ft^2)	1.80	*(18" Diameter Pipe)*
D(ft)	1.34	*(See MHFD Equation Below)*
Froude Number	1.45	*(See MHFD Equation Below)*
W/D	4.25	*(MHFD Figure 9-46)*

W (ft)	5.70
H (ft)	4.28
L (ft)	13.30
a (ft)	2.85
b (ft)	2.14
c (ft)	2.85
d (ft)	0.95
e (ft)	0.48
f (ft)	0.71
t (ft)	0.48

$$\text{Froude number} = \frac{V}{(gD)^{1/2}}$$

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



"W" is the inside width of the basin.
"D" represents the depth of flow entering the basin and is the square root of the flow area at the conduit outlet.
"V" is the velocity of the incoming flow.
The tailwater depth is uncontrolled.

Figure 9-46. Basin width diagram for the USBR type VI impact stilling basin

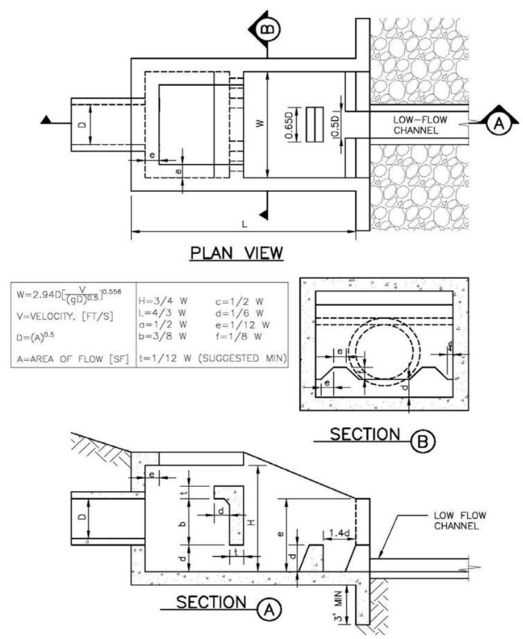


Figure 9-45. UDFCD modified USBR type VI impacts stilling basin (general design dimensions)

Figure 13-12c. Emergency Spillway Protection

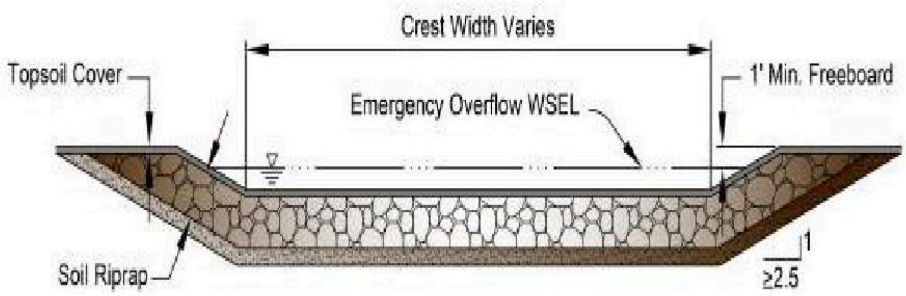
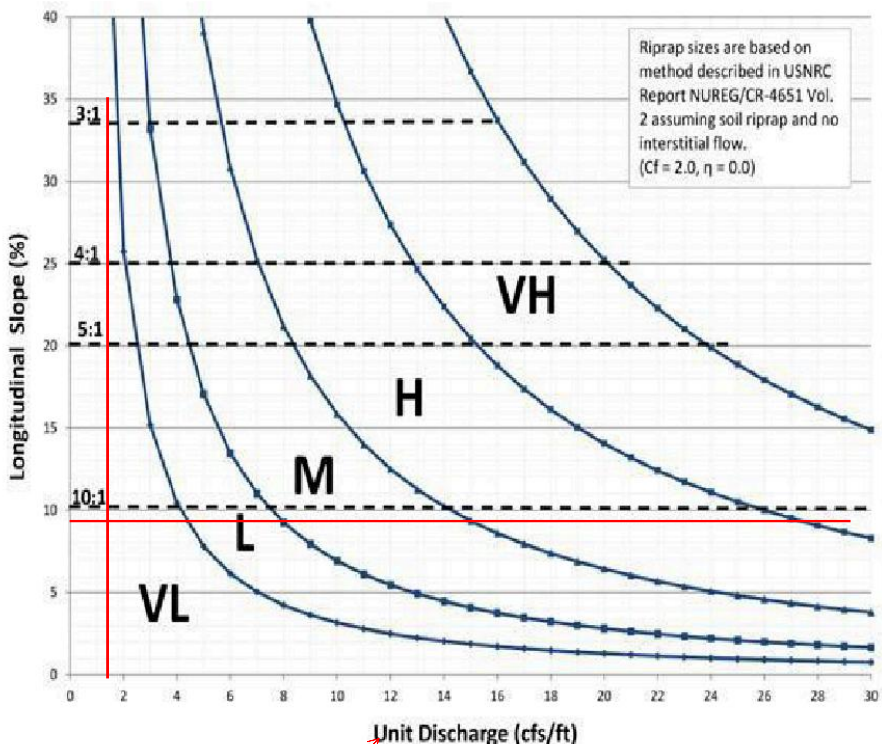


Figure 13-12d. Riprap Types for Emergency Spillway Protection



Emergency spillway designed using 100-year Peak Inflow to the Detention Pond (UD-Detention Spreadsheet)

34.2 cfs/ 49.84 = 0.69 cfs/ft

Outfall Protection Rip-Rap Calculation

Rip Rap Downstream of Stilling Basin

.

Applicable Equations:

$L_p = (1/2\tan\Theta)(A_t/Y_t\text{-}D)$	Equation 9-11 per USCDM
$A_t = Q/V$	Equation 9-12 per USDCM
$\Theta = \tan^{-1}(1/(2*\text{ExpansionFactor}))$	Equation 9-13 per USDCM
$W = 2(L_p\tan\Theta)+D$	Equation 9-14 per USDCM
$T = 2D_{50}$	Equation 9-15 per USDCM

Assumptions

Maximum Major Event Velocity is 5fps for FES outletting into trickle channels

Input parameters:

Description	Variable	Input	Unit
Width of the conduit (use diameter for circular conduits),	D:	1.50	ft
HGL Elevation		5823.64	ft
Invert Elevation		5823.00	ft
Tailwater depth (ft),	Y_t:	0.64	ft
Expansion angle of the culvert flow	Θ:	0.08	radians
Design discharge (cfs) (100-YR Peak Outflow UD Det.)	Q:	6.80	cfs
Froude Number	F_r	0.85	Subcritical
Unitless Variables for Tables:			
For Figure 9-35	$Q/D^{2.5}$	2.47	
For Figure 9-35	Y_t/D	0.43	
For Figure 9-38	$Q/D^{1.5}$	3.70	
For Figure 9-38	Y_t/D	0.43	
Allowable non-eroding velocity in the downstream channel (ft/sec)	V:	5	ft/sec
Expansion Factor (Figure 9-35), 1/(2tan(θ))		6.5	

Solve for:

Description	Variable	Output	Unit
1. Required area of flow at allowable velocity (ft^2)	A_t:	1.36	ft^2
2. Length of Protection	L_p:	4.06	ft
	$L_p < 3D$?	Yes	
	L_{pmin}:	4.50	ft
3. Width of downstream riprap protection	W:	2.19	ft
4. Rip Rap Type (Figure 9-38)	-	L	
5. Rip Rap Size (Figure 8-34)	D_{50}:	9	inches

Rip Rap Summary

Length	L_p	5.00	ft
Width	W	2.19	ft
Size	D_{50}	9	inches
Type	-	L	-
Thickness	T	18	inches

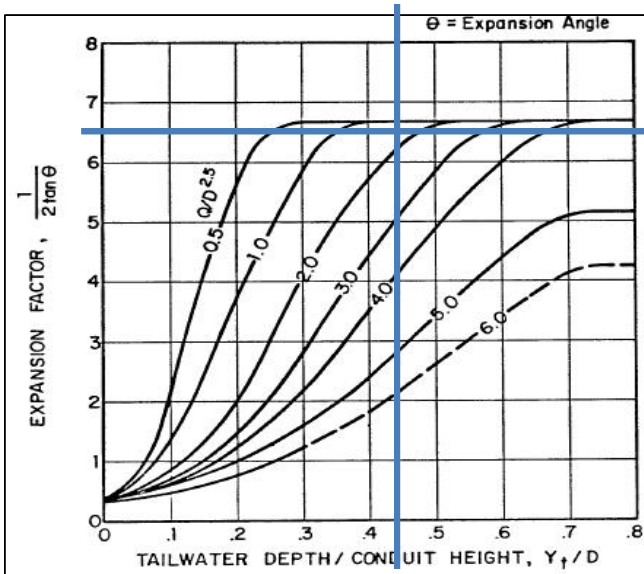
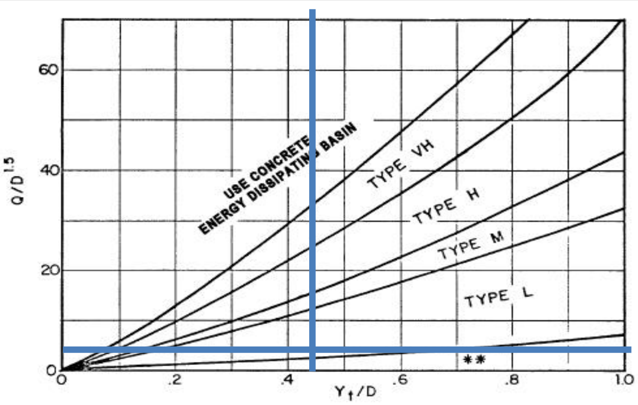


Figure 9-35. Expansion factor for circular conduits



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for $Q/D_{2.5} \leq 6.0$)

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)

Worksheet for Swale 07

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.010	ft/ft
Left Side Slope	6.200	H:V
Right Side Slope	18.800	H:V
Discharge	1.39	cfs

Results

Normal Depth	3.5	in
Flow Area	1.0	ft²
Wetted Perimeter	7.2	ft
Hydraulic Radius	1.7	in
Top Width	7.19	ft
Critical Depth	2.9	in
Critical Slope	0.027	ft/ft
Velocity	1.34	ft/s
Velocity Head	0.03	ft
Specific Energy	0.32	ft
Froude Number	0.624	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	3.5	in
Critical Depth	2.9	in
Channel Slope	0.010	ft/ft
Critical Slope	0.027	ft/ft

Worksheet for Swale 11

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.009	ft/ft
Left Side Slope	72.500	H:V
Right Side Slope	2.870	H:V
Discharge	1.09	cfs

Results

Normal Depth	2.1	in
Flow Area	1.2	ft²
Wetted Perimeter	13.2	ft
Hydraulic Radius	1.0	in
Top Width	13.22	ft
Critical Depth	1.7	in
Critical Slope	0.032	ft/ft
Velocity	0.94	ft/s
Velocity Head	0.01	ft
Specific Energy	0.19	ft
Froude Number	0.560	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	2.1	in
Critical Depth	1.7	in
Channel Slope	0.009	ft/ft
Critical Slope	0.032	ft/ft

Worksheet for Swale 19

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.020	ft/ft
Left Side Slope	10.590	H:V
Right Side Slope	3.000	H:V
Discharge	1.35	cfs

Results

Normal Depth	3.8	in
Flow Area	0.7	ft²
Wetted Perimeter	4.3	ft
Hydraulic Radius	1.9	in
Top Width	4.27	ft
Critical Depth	3.6	in
Critical Slope	0.025	ft/ft
Velocity	2.02	ft/s
Velocity Head	0.06	ft
Specific Energy	0.38	ft
Froude Number	0.898	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	3.8	in
Critical Depth	3.6	in
Channel Slope	0.020	ft/ft
Critical Slope	0.025	ft/ft

Worksheet for Swale 31

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.024 ft/ft
Left Side Slope	6.260 H:V
Right Side Slope	14.500 H:V
Discharge	1.28 cfs

Results

Normal Depth	3.0 in
Flow Area	0.7 ft²
Wetted Perimeter	5.3 ft
Hydraulic Radius	1.5 in
Top Width	5.26 ft
Critical Depth	3.0 in
Critical Slope	0.026 ft/ft
Velocity	1.92 ft/s
Velocity Head	0.06 ft
Specific Energy	0.31 ft
Froude Number	0.951
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	3.0 in
Critical Depth	3.0 in
Channel Slope	0.024 ft/ft
Critical Slope	0.026 ft/ft

Worksheet for Swale 39

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.010 ft/ft
Left Side Slope	8.200 H:V
Right Side Slope	3.600 H:V
Discharge	0.93 cfs

Results

Normal Depth	3.9 in
Flow Area	0.6 ft²
Wetted Perimeter	3.9 ft
Hydraulic Radius	1.9 in
Top Width	3.87 ft
Critical Depth	3.3 in
Critical Slope	0.026 ft/ft
Velocity	1.47 ft/s
Velocity Head	0.03 ft
Specific Energy	0.36 ft
Froude Number	0.639
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	3.9 in
Critical Depth	3.3 in
Channel Slope	0.010 ft/ft
Critical Slope	0.026 ft/ft

Worksheet for Swale 40

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.017 ft/ft
Left Side Slope	6.600 H:V
Right Side Slope	3.800 H:V
Discharge	1.12 cfs

Results

Normal Depth	4.0 in
Flow Area	0.6 ft²
Wetted Perimeter	3.6 ft
Hydraulic Radius	2.0 in
Top Width	3.49 ft
Critical Depth	3.7 in
Critical Slope	0.025 ft/ft
Velocity	1.91 ft/s
Velocity Head	0.06 ft
Specific Energy	0.39 ft
Froude Number	0.823
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.0 in
Critical Depth	3.7 in
Channel Slope	0.017 ft/ft
Critical Slope	0.025 ft/ft

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	15-ft Inlet (Typ)	10-ft Inlet (Typ)	5-ft Inlet (Typ)
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)	2.0	1.8	1.3
Major Q_{Known} (cfs)	3.7	2.5	1.5

Bypass (Carry-Over) Flow from Upstream

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

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
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

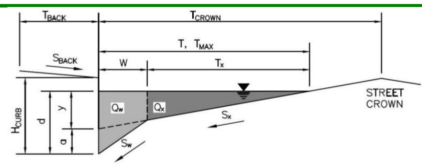
Minor Total Design Peak Flow, Q (cfs)	2.0	1.8	1.3
Major Total Design Peak Flow, Q (cfs)	3.7	2.5	1.5
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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

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

Project: Venetucci MF

Inlet ID: 15-ft Inlet (Typ)



Gutter Geometry:

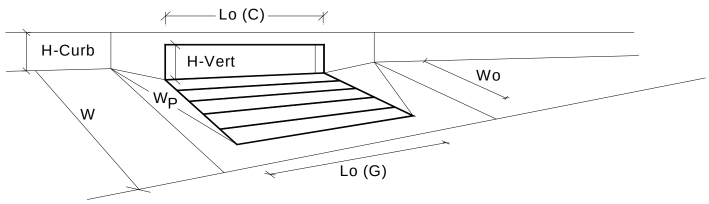
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	116.0	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} =	9.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition MAJOR STORM Allowable Capacity is not applicable to Sump Condition	Q_{allow} =	SUMP	SUMP	cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



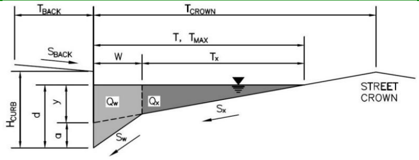
Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	3.7	5.8	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
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.14	0.32	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.61	0.78	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		Q_a =	2.0	9.0	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		$Q_{PEAK\ REQUIRED}$ =	2.0	3.7	cfs

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

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

Project: Venetucci MF

Inlet ID: 10-ft Inlet (Typ)



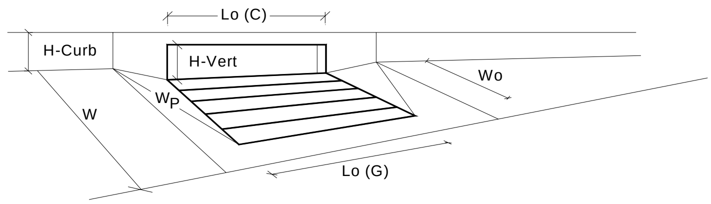
Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	116.0		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} =	9.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition MAJOR STORM Allowable Capacity is not applicable to Sump Condition	Q_{allow} =	SUMP	SUMP	cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

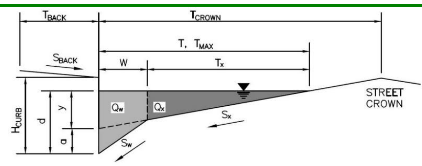


Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.7	5.8	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
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.14	0.32	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.92	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	1.8	7.7	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.8	2.5	cfs

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

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

Project: Venetucci MF
Inlet ID: 5-ft Inlet (Typ)



Gutter Geometry:

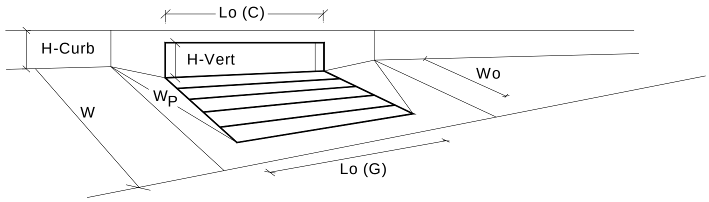
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.000	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	116.0	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} =	9.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition MAJOR STORM Allowable Capacity is not applicable to Sump Condition	Q_{allow} =	SUMP	SUMP	cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.7	5.8	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
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.14	0.32	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	1.5	5.0	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.3	1.5	cfs

Worksheet for Typical Curb Cut

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.010	ft/ft
Normal Depth	5.0	in
Bottom Width	2.00	ft

Results

Discharge	4.21	cfs
Flow Area	0.8	ft²
Wetted Perimeter	2.8	ft
Hydraulic Radius	3.5	in
Top Width	2.00	ft
Critical Depth	6.2	in
Critical Slope	0.005	ft/ft
Velocity	5.06	ft/s
Velocity Head	0.40	ft
Specific Energy	0.81	ft
Froude Number	1.381	
Flow Type	Supercritical	

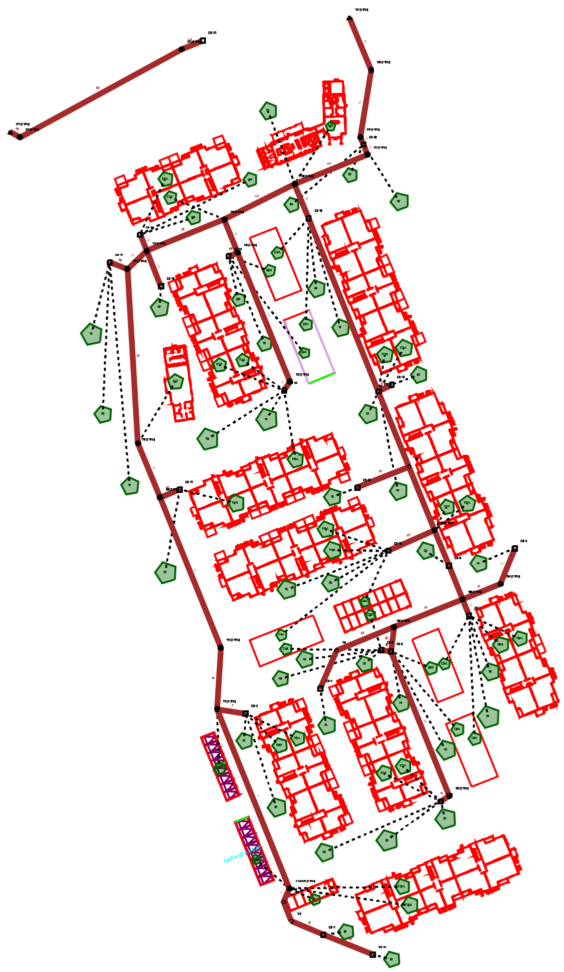
GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.0	in
Critical Depth	6.2	in
Channel Slope	0.010	ft/ft
Critical Slope	0.005	ft/ft

Scenario: Base



Venture on Venetucci

5-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
1	5,889.62	5,889.26	29.5	0.012	10.0	HDPE Pressure Pipe	0.010	0.40	3.96	5,889.89	5,889.53
2	5,889.26	5,889.00	20.8	0.013	10.0	HDPE Pressure Pipe	0.010	0.40	3.99	5,889.53	5,889.20
3	5,888.70	5,884.58	274.7	0.015	10.0	HDPE Pressure Pipe	0.010	0.80	5.20	5,889.10	5,884.85
4	5,890.19	5,889.62	48.9	0.012	10.0	HDPE Pressure Pipe	0.010	0.40	3.90	5,890.47	5,889.89
5	5,884.12	5,883.13	87.2	0.011	15.0	HDPE Pressure Pipe	0.010	2.25	6.07	5,884.72	5,883.56
6	5,881.43	5,878.68	230.0	0.012	15.0	HDPE Pressure Pipe	0.010	2.23	6.18	5,882.03	5,879.09
7	5,886.04	5,885.62	41.3	0.010	12.0	HDPE Pressure Pipe	0.010	1.82	5.55	5,886.61	5,886.07
8	5,887.67	5,887.47	14.7	0.014	15.0	HDPE Pressure Pipe	0.010	1.98	6.23	5,888.23	5,887.90
9	5,883.78	5,883.49	14.1	0.021	10.0	HDPE Pressure Pipe	0.010	1.67	7.15	5,884.36	5,883.90
10	5,882.49	5,882.07	34.9	0.012	15.0	HDPE Pressure Pipe	0.010	5.60	7.87	5,883.44	5,882.82
11	5,881.07	5,880.02	105.0	0.010	15.0	HDPE Pressure Pipe	0.010	4.49	6.96	5,881.92	5,880.67
12	5,883.82	5,882.07	87.9	0.020	10.0	HDPE Pressure Pipe	0.010	0.09	3.07	5,883.95	5,882.23
13	5,879.98	5,878.54	72.0	0.020	12.0	HDPE Pressure Pipe	0.010	2.16	7.48	5,880.61	5,878.94
14	5,881.35	5,880.80	24.6	0.022	15.0	HDPE Pressure Pipe	0.010	1.96	7.43	5,881.90	5,881.16
15	5,876.98	5,875.98	82.9	0.012	15.0	HDPE Pressure Pipe	0.010	3.12	6.77	5,877.69	5,876.48
16	5,879.13	5,878.68	30.2	0.015	12.0	HDPE Pressure Pipe	0.010	1.28	5.83	5,879.61	5,879.01
17	5,879.60	5,879.09	51.5	0.010	24.0	HDPE Pressure Pipe	0.010	6.72	7.59	5,880.52	5,879.77
18	5,879.90	5,880.57	58.2	-0.012	15.0	HDPE Pressure Pipe	0.010	0.95	4.77	5,880.96	5,880.87
19	5,878.09	5,877.54	54.5	0.010	24.0	HDPE Pressure Pipe	0.010	6.99	7.70	5,879.03	5,878.24
20	5,877.05	5,876.07	97.2	0.010	24.0	HDPE Pressure Pipe	0.010	8.82	8.22	5,878.11	5,877.43
21	5,874.38	5,873.14	247.9	0.005	15.0	HDPE Pressure Pipe	0.010	3.12	4.90	5,875.09	5,873.78
22	5,880.87	5,881.51	54.5	-0.012	10.0	HDPE Pressure Pipe	0.010	0.96	4.97	5,881.94	5,881.19
23	5,885.01	5,883.82	59.2	0.020	10.0	HDPE Pressure Pipe	0.010	0.10	3.08	5,885.14	5,883.91
24	5,873.34	5,871.37	197.5	0.010	15.0	HDPE Pressure Pipe	0.010	1.88	5.51	5,873.89	5,871.77
25	5,873.92	5,871.27	264.7	0.010	24.0	HDPE Pressure Pipe	0.010	10.31	8.54	5,875.07	5,872.09
26	5,876.07	5,874.92	115.3	0.010	24.0	HDPE Pressure Pipe	0.010	8.85	8.19	5,877.13	5,875.68
27	5,876.45	5,875.42	20.7	0.050	10.0	HDPE Pressure Pipe	0.010	0.13	4.60	5,876.60	5,875.50

Venture on Venetucci

5-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
28	5,871.51	5,871.37	13.9	0.010	15.0	HDPE Pressure Pipe	0.010	1.77	5.43	5,872.03	5,871.79
29	5,869.87	5,869.36	50.8	0.010	15.0	HDPE Pressure Pipe	0.010	3.57	6.56	5,870.63	5,869.94
30	5,870.27	5,869.75	52.6	0.010	24.0	HDPE Pressure Pipe	0.010	11.47	8.71	5,871.48	5,870.69
31	5,869.95	5,869.36	118.8	0.005	24.0	HDPE Pressure Pipe	0.010	5.57	5.61	5,870.79	5,870.07
32	5,867.86	5,867.30	111.8	0.005	30.0	HDPE Pressure Pipe	0.010	8.14	6.13	5,868.81	5,868.95
33	5,878.23	5,876.65	79.1	0.020	12.0	HDPE Pressure Pipe	0.010	0.09	2.92	5,878.35	5,877.43
34	5,867.00	5,866.44	111.3	0.005	30.0	HDPE Pressure Pipe	0.010	19.81	7.77	5,868.51	5,867.75
35	5,871.64	5,871.45	37.7	0.005	24.0	HDPE Pressure Pipe	0.010	4.48	5.27	5,872.39	5,872.10
36	5,873.54	5,873.14	26.8	0.015	12.0	HDPE Pressure Pipe	0.010	1.98	6.57	5,874.14	5,873.57
37	5,858.94	5,858.89	11.2	0.005	30.0	HDPE Pressure Pipe	0.010	20.65	7.86	5,860.49	5,860.32
38	5,854.89	5,854.40	96.6	0.005	30.0	HDPE Pressure Pipe	0.010	20.63	7.85	5,856.43	5,855.74
39	5,871.70	5,871.45	24.8	0.010	12.0	HDPE Pressure Pipe	0.010	1.49	5.26	5,872.22	5,871.86
40	5,872.27	5,871.45	54.3	0.015	10.0	HDPE Pressure Pipe	0.010	0.08	2.63	5,872.39	5,871.54
41	5,862.44	5,862.36	15.4	0.005	30.0	HDPE Pressure Pipe	0.010	19.68	7.77	5,863.95	5,863.75
42	5,850.40	5,850.00	80.5	0.005	36.0	HDPE Pressure Pipe	0.010	20.51	7.81	5,851.86	5,851.67
43	5,840.52	5,827.77	261.6	0.049	18.0	HDPE Pressure Pipe	0.010	0.00	0.00	5,840.53	5,827.78
44	5,845.48	5,844.52	32.0	0.030	18.0	HDPE Pressure Pipe	0.010	0.00	0.00	5,845.49	5,844.53
45	5,823.77	5,823.00	15.7	0.049	18.0	HDPE Pressure Pipe	0.010	0.00	0.00	5,823.78	5,823.01
46	5,886.47	5,883.49	0.0	0.014	15.0		0.013	1.97	5.16	5,887.03	5,883.92
47	5,876.09	5,875.34	0.0	0.051	12.0	HDPE Pressure Pipe	0.010	1.88	10.06	5,876.67	5,875.68
48	5,891.17	5,890.29	0.0	0.012	10.0	HDPE Pressure Pipe	0.010	0.06	2.19	5,891.27	5,890.52

Venture on Venetucci

5-YEAR

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Flow (Additional Subsurface) (cfs)	Inlet Location	Headloss (ft)
CB-1	5,896.74	5,896.74	5,890.19	5,890.52	0.00	In Sag	0.05
CB-2	5,893.87	5,893.87	5,887.67	5,888.34	0.00	In Sag	0.11
CB-3	5,893.41	5,893.41	5,886.04	5,886.73	0.00	In Sag	0.12
CB-4	5,888.29	5,888.29	5,885.01	5,885.16	0.00	In Sag	0.02
CB-5	5,889.87	5,889.87	5,883.77	5,884.49	0.00	In Sag	0.13
CB-6	5,889.77	5,889.77	5,882.49	5,883.83	0.00	In Sag	0.38
CB-7	5,888.95	5,888.95	5,881.35	5,882.01	0.00	In Sag	0.11
CB-8	5,884.35	5,884.35	5,881.51	5,882.03	0.00	In Sag	0.09
CB-9	5,887.01	5,887.01	5,878.09	5,879.21	0.00	In Sag	0.18
CB-10	5,889.01	5,889.01	5,879.98	5,880.74	0.00	In Sag	0.13
CB-11	5,887.95	5,887.95	5,879.13	5,879.70	0.00	In Sag	0.09
CB-12	5,879.78	5,879.78	5,876.45	5,876.63	0.00	In Sag	0.03
CB-13	5,883.71	5,883.71	5,873.92	5,875.40	0.00	In Sag	0.33
CB-14	5,880.10	5,880.10	5,871.51	5,872.19	0.00	In Sag	0.16
CB-16	5,879.49	5,879.49	5,872.27	5,872.41	0.00	In Sag	0.02
CB-17	5,877.96	5,877.96	5,873.54	5,874.27	0.00	In Sag	0.13
CB-18	5,877.20	5,877.20	5,871.70	5,872.32	0.00	In Sag	0.10
CB-19	5,879.30	5,879.30	5,870.27	5,871.74	0.00	In Sag	0.26
CB-20	5,877.26	5,877.26	5,858.94	5,860.81	0.00	In Sag	0.33
CB-21	5,851.46	5,851.46	5,845.48	5,845.49	0.20	In Sag	0.00
CB-22	5,884.24	5,884.24	5,878.23	5,878.38	0.00	In Sag	0.02
CB-23	5,884.23	5,884.23	5,876.09	5,876.79	0.00	In Sag	0.12
CB-24	5,894.68	5,894.68	5,891.17	5,891.27	0.00	In Sag	0.00

Venture on Venetucci

5-YEAR

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
121 (STRM)	5,850.25	5,850.00	User Defined Tailwater	5,851.67	5,851.67	20.42
371 (STRM)	5,823.00	5,823.00	Free Outfall	0.00	5,823.01	0.00

Venture on Venetucci

5-YEAR

Manhole Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)
STMH-01 (STRM)	5,897.94	5,897.94	5,888.70	0.80	0.40	5,889.10	5,889.19
113 (STRM)	5,894.81	5,894.81	5,881.43	2.23	0.60	5,882.03	5,882.17
112 (STRM)	5,894.25	5,894.25	5,884.12	2.25	0.60	5,884.72	5,884.91
308 (STRM)	5,893.80	5,893.80	5,886.47	1.97	0.56	5,887.03	5,887.20
156 (STRM)	5,889.59	5,889.59	5,881.07	4.49	0.86	5,881.92	5,882.23
356 (STRM)	5,888.37	5,888.37	5,876.98	3.12	0.71	5,877.69	5,877.89
155 (STRM)	5,888.02	5,888.02	5,879.60	6.72	0.92	5,880.52	5,880.87
350 (STRM)	5,887.46	5,887.46	5,877.04	8.82	1.07	5,878.11	5,878.41
116 (STRM)	5,886.53	5,886.53	5,874.38	3.12	0.71	5,875.09	5,875.27
364 (STRM)	5,886.31	5,886.31	5,880.57	0.95	0.38	5,880.96	5,881.04
123 (STRM)	5,883.83	5,883.83	5,873.34	1.88	0.54	5,873.89	5,874.01
149 (STRM)	5,879.80	5,879.80	5,869.87	3.57	0.76	5,870.63	5,870.85
119 (STRM)	5,879.21	5,879.21	5,867.86	8.14	0.95	5,868.81	5,869.06
120 (STRM)	5,878.99	5,878.99	5,867.00	19.81	1.51	5,868.51	5,868.95
117 (STRM)	5,878.35	5,878.35	5,871.64	4.48	0.74	5,872.39	5,872.60
370 (STRM)	5,877.74	5,877.74	5,854.89	20.63	1.54	5,856.43	5,856.82
118 (STRM)	5,877.57	5,877.57	5,869.95	5.57	0.83	5,870.79	5,871.10
134 (STRM)	5,876.98	5,876.98	5,862.44	19.68	1.51	5,863.95	5,864.45
135 (STRM)	5,861.66	5,861.66	5,850.40	20.51	1.45	5,851.86	5,852.20
373 (STRM)	5,852.35	5,852.35	5,840.52	0.00	0.00	5,840.53	5,840.53
372 (STRM)	5,828.33	5,828.33	5,823.77	0.00	0.00	5,823.78	5,823.78

Venture on Venetucci

5-YEAR

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
02	120 (STRM)	0.230	0.740	7.800	0.77
03	CB-20	0.300	0.680	7.200	0.95
04	CB-20	0.070	0.730	5.000	0.27
05	CB-18	0.030	0.810	5.000	0.13
06	CB-18	0.340	0.730	5.000	1.29
07	CB-20	0.250	0.090	7.600	0.10
08	CB-19	0.190	0.730	5.000	0.72
09	CB-14	0.140	0.770	5.000	0.56
10	CB-17	0.310	0.780	5.600	1.22
11	CB-12	0.370	0.080	9.600	0.13
12	CB-19	0.210	0.750	5.000	0.82
13	CB-14	0.230	0.810	5.700	0.93
14	CB-23	0.260	0.720	5.000	0.98
15	CB-23	0.150	0.780	5.000	0.61
16	CB-17	0.130	0.880	5.000	0.60
17	CB-17	0.040	0.900	5.000	0.19
18	CB-13	0.340	0.700	6.200	1.16
19	CB-22	0.280	0.080	11.500	0.09
20	CB-11	0.290	0.770	5.000	1.16
21	CB-13	0.110	0.790	5.000	0.45
22	CB-9	0.110	0.700	5.000	0.40
23	CB-10	0.180	0.740	5.900	0.66
24	CB-10	0.250	0.770	5.000	1.00
25	CB-8	0.270	0.680	5.000	0.96
26	CB-5	0.100	0.720	5.000	0.38
27	CB-5	0.160	0.760	5.300	0.62
28	CB-7	0.200	0.750	5.000	0.78
29	CB-6	0.220	0.720	6.000	0.78
30	CB-3	0.210	0.750	5.000	0.82

Venture on Venetucci

5-YEAR

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
31	CB-4	0.300	0.080	11.300	0.10
32	CB-3	0.200	0.790	5.000	0.82
33	CB-7	0.210	0.800	6.400	0.81
34	CB-6	0.290	0.730	5.700	1.06
35	CB-2	0.170	0.660	5.000	0.58
36	CB-2	0.210	0.780	5.000	0.85
37	CB-2	0.100	0.700	5.000	0.36
38	CB-1	0.230	0.380	10.700	0.35
39	CB-24	0.140	0.080	5.000	0.06
40	CB-16	0.210	0.080	7.000	0.08
41	CB-5	0.100	0.670	5.000	0.35
G1	112 (STRM)	0.040	0.730	5.000	0.15
G2-A	CB-19	0.040	0.730	5.000	0.15
G2-B	CB-14	0.040	0.730	5.000	0.15
G3-A	CB-19	0.040	0.730	5.000	0.15
G3-B	CB-14	0.040	0.730	5.000	0.15
G4-A	CB-10	0.040	0.730	5.000	0.15
G4-B	CB-5	0.040	0.730	5.000	0.15
G5-A	CB-10	0.050	0.730	5.000	0.19
G5-B	CB-5	0.050	0.730	5.000	0.19
G6-A	CB-7	0.040	0.730	5.000	0.15
G6-B	CB-6	0.040	0.730	5.000	0.15
G7-A	CB-7	0.040	0.730	5.000	0.15
G7-B	CB-6	0.040	0.730	5.000	0.15
G8	STMH-01 (STRM)	0.040	0.730	5.000	0.15
G9	STMH-01 (STRM)	0.030	0.730	5.000	0.11
R1-A	CB-18	0.120	0.120	5.000	0.08

Venture on Venetucci

5-YEAR

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
R1-B	119 (STRM)	0.120	0.120	5.000	0.08
R2-A	CB-23	0.130	0.130	5.000	0.09
R2-B	CB-23	0.130	0.130	5.000	0.09
R3-A	CB-13	0.160	0.160	5.000	0.13
R3-B	CB-13	0.160	0.160	5.000	0.13
R4-A	CB-23	0.150	0.150	5.000	0.12
R4-B	CB-11	0.150	0.150	5.000	0.12
R5-A	350 (STRM)	0.160	0.160	5.000	0.13
R5-B	350 (STRM)	0.160	0.160	5.000	0.13
R6-A	CB-10	0.150	0.150	5.000	0.12
R6-B	CB-10	0.150	0.150	5.000	0.12
R7-A	CB-3	0.130	0.130	5.000	0.09
R7-B	CB-3	0.130	0.130	5.000	0.09
R8-A	CB-2	0.130	0.130	5.000	0.09
R8-B	CB-2	0.130	0.130	5.000	0.09
R9-A	CB-7	0.120	0.120	5.000	0.08
R9-B	CB-7	0.120	0.120	5.000	0.08
R10-A	STMH-01 (STRM)	0.160	0.160	5.000	0.13
R10-B	STMH-01 (STRM)	0.160	0.160	5.000	0.13
R11	120 (STRM)	0.120	0.120	5.000	0.08
R12	116 (STRM)	0.070	0.070	5.000	0.03

Venture on Venetucci

100-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
1	5,889.62	5,889.26	29.5	0.012	10.0	HDPE Pressure Pipe	0.010	1.22	5.43	5,890.11	5,889.80
2	5,889.26	5,889.00	20.8	0.013	10.0	HDPE Pressure Pipe	0.010	1.22	5.45	5,889.80	5,889.85
3	5,888.70	5,884.58	274.7	0.015	10.0	HDPE Pressure Pipe	0.010	3.35	7.28	5,889.48	5,885.71
4	5,890.19	5,889.62	48.9	0.012	10.0	HDPE Pressure Pipe	0.010	1.23	5.34	5,890.69	5,890.11
5	5,884.12	5,883.13	87.2	0.011	15.0	HDPE Pressure Pipe	0.010	7.22	8.12	5,885.20	5,884.00
6	5,881.43	5,878.68	230.0	0.012	15.0	HDPE Pressure Pipe	0.010	7.18	8.29	5,882.50	5,880.02
7	5,886.04	5,885.62	41.3	0.010	12.0	HDPE Pressure Pipe	0.010	4.94	6.63	5,886.95	5,886.53
8	5,887.67	5,887.47	14.7	0.014	15.0	HDPE Pressure Pipe	0.010	5.31	8.12	5,888.60	5,888.23
9	5,883.78	5,883.49	14.1	0.021	10.0	HDPE Pressure Pipe	0.010	3.19	5.85	5,886.31	5,886.13
10	5,882.49	5,882.07	34.9	0.012	15.0	HDPE Pressure Pipe	0.010	12.17	9.92	5,884.91	5,884.18
11	5,881.07	5,880.02	105.0	0.010	15.0	HDPE Pressure Pipe	0.010	10.36	8.44	5,883.29	5,881.69
12	5,883.82	5,882.07	87.9	0.020	10.0	HDPE Pressure Pipe	0.010	0.70	5.54	5,884.19	5,884.18
13	5,879.98	5,878.54	72.0	0.020	12.0	HDPE Pressure Pipe	0.010	5.68	9.39	5,880.92	5,879.57
14	5,881.35	5,880.80	24.6	0.022	15.0	HDPE Pressure Pipe	0.010	4.99	9.62	5,882.25	5,881.43
15	5,876.98	5,875.98	82.9	0.012	15.0	HDPE Pressure Pipe	0.010	9.47	7.72	5,879.37	5,878.32
16	5,879.13	5,878.68	30.2	0.015	12.0	HDPE Pressure Pipe	0.010	3.24	4.13	5,880.17	5,880.02
17	5,879.60	5,879.09	51.5	0.010	24.0	HDPE Pressure Pipe	0.010	15.71	9.52	5,881.03	5,880.21
18	5,879.90	5,880.57	58.2	-0.012	15.0	HDPE Pressure Pipe	0.010	1.87	5.81	5,881.72	5,881.69
19	5,878.09	5,877.54	54.5	0.010	24.0	HDPE Pressure Pipe	0.010	16.24	9.63	5,879.54	5,879.57
20	5,877.05	5,876.07	97.2	0.010	24.0	HDPE Pressure Pipe	0.010	22.31	10.34	5,879.02	5,878.47
21	5,874.38	5,873.14	247.9	0.005	15.0	HDPE Pressure Pipe	0.010	9.78	7.97	5,877.73	5,874.32
22	5,880.87	5,881.51	54.5	-0.012	10.0	HDPE Pressure Pipe	0.010	1.89	5.91	5,882.12	5,881.74
23	5,885.01	5,883.82	59.2	0.020	10.0	HDPE Pressure Pipe	0.010	0.70	5.54	5,885.37	5,884.06
24	5,873.34	5,871.37	197.5	0.010	15.0	HDPE Pressure Pipe	0.010	5.93	7.41	5,874.33	5,872.80
25	5,873.92	5,871.27	264.7	0.010	24.0	HDPE Pressure Pipe	0.010	27.59	10.64	5,875.74	5,872.81
26	5,876.07	5,874.92	115.3	0.010	24.0	HDPE Pressure Pipe	0.010	22.83	10.34	5,877.77	5,876.66
27	5,876.45	5,875.42	20.7	0.050	10.0	HDPE Pressure Pipe	0.010	0.92	8.30	5,876.88	5,876.66

Venture on Venetucci

100-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
28	5,871.51	5,871.37	13.9	0.010	15.0	HDPE Pressure Pipe	0.010	3.28	2.67	5,872.82	5,872.80
29	5,869.87	5,869.36	50.8	0.010	15.0	HDPE Pressure Pipe	0.010	8.95	7.29	5,872.23	5,871.65
30	5,870.27	5,869.75	52.6	0.010	24.0	HDPE Pressure Pipe	0.010	29.77	10.53	5,872.13	5,871.49
31	5,869.95	5,869.36	118.8	0.005	24.0	HDPE Pressure Pipe	0.010	15.34	4.88	5,871.97	5,871.65
32	5,867.86	5,867.30	111.8	0.005	30.0	HDPE Pressure Pipe	0.010	22.42	4.57	5,871.42	5,871.22
33	5,878.23	5,876.65	79.1	0.020	12.0	HDPE Pressure Pipe	0.010	0.65	5.32	5,878.57	5,878.47
34	5,867.00	5,866.44	111.3	0.005	30.0	HDPE Pressure Pipe	0.010	52.83	10.76	5,869.96	5,868.78
35	5,871.64	5,871.45	37.7	0.005	24.0	HDPE Pressure Pipe	0.010	12.35	6.90	5,872.90	5,872.59
36	5,873.54	5,873.14	26.8	0.015	12.0	HDPE Pressure Pipe	0.010	3.65	7.67	5,874.36	5,873.77
37	5,858.94	5,858.89	11.2	0.005	30.0	HDPE Pressure Pipe	0.010	54.88	11.18	5,861.44	5,861.24
38	5,854.89	5,854.40	96.6	0.005	30.0	HDPE Pressure Pipe	0.010	54.86	11.18	5,857.86	5,856.76
39	5,871.70	5,871.45	24.8	0.010	12.0	HDPE Pressure Pipe	0.010	3.55	6.50	5,872.51	5,872.34
40	5,872.27	5,871.45	54.3	0.015	10.0	HDPE Pressure Pipe	0.010	0.58	4.73	5,872.60	5,872.34
41	5,862.44	5,862.36	15.4	0.005	30.0	HDPE Pressure Pipe	0.010	52.56	10.71	5,864.94	5,864.69
42	5,850.40	5,850.00	80.5	0.005	36.0	HDPE Pressure Pipe	0.010	54.63	7.73	5,853.70	5,853.38
43	5,840.52	5,827.77	261.6	0.049	18.0	HDPE Pressure Pipe	0.010	6.80	13.78	5,841.53	5,828.25
44	5,845.48	5,844.52	32.0	0.030	18.0	HDPE Pressure Pipe	0.010	6.80	11.56	5,846.49	5,845.16
45	5,823.77	5,823.00	15.7	0.049	18.0	HDPE Pressure Pipe	0.010	6.80	13.81	5,824.78	5,823.64
46	5,886.47	5,883.49	0.0	0.014	15.0		0.013	5.30	6.63	5,887.56	5,886.13
47	5,876.09	5,875.34	0.0	0.051	12.0	HDPE Pressure Pipe	0.010	5.94	13.71	5,877.04	5,876.03
48	5,891.17	5,890.29	0.0	0.012	10.0	HDPE Pressure Pipe	0.010	0.43	3.97	5,891.46	5,890.79

Venture on Venetucci

100-YEAR

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Flow (Additional Subsurface) (cfs)	Inlet Location	Headloss (ft)
CB-1	5,896.74	5,896.74	5,890.19	5,890.79	0.00	In Sag	0.10
CB-2	5,893.87	5,893.87	5,887.67	5,888.83	0.00	In Sag	0.23
CB-3	5,893.41	5,893.41	5,886.04	5,887.29	0.00	In Sag	0.34
CB-4	5,888.29	5,888.29	5,885.01	5,885.44	0.00	In Sag	0.07
CB-5	5,889.87	5,889.87	5,883.77	5,886.57	0.00	In Sag	0.27
CB-6	5,889.77	5,889.77	5,882.49	5,886.13	0.00	In Sag	1.22
CB-7	5,888.95	5,888.95	5,881.35	5,882.46	0.00	In Sag	0.21
CB-8	5,884.35	5,884.35	5,881.51	5,882.27	0.00	In Sag	0.15
CB-9	5,887.01	5,887.01	5,878.09	5,879.89	0.00	In Sag	0.34
CB-10	5,889.01	5,889.01	5,879.98	5,881.35	0.00	In Sag	0.42
CB-11	5,887.95	5,887.95	5,879.13	5,880.30	0.00	In Sag	0.13
CB-12	5,879.78	5,879.78	5,876.45	5,876.96	0.00	In Sag	0.08
CB-13	5,883.71	5,883.71	5,873.92	5,876.66	0.00	In Sag	0.92
CB-14	5,880.10	5,880.10	5,871.51	5,872.91	0.00	In Sag	0.09
CB-16	5,879.49	5,879.49	5,872.27	5,872.66	0.00	In Sag	0.06
CB-17	5,877.96	5,877.96	5,873.54	5,874.58	0.00	In Sag	0.22
CB-18	5,877.20	5,877.20	5,871.70	5,872.72	0.00	In Sag	0.21
CB-19	5,879.30	5,879.30	5,870.27	5,872.87	0.00	In Sag	0.74
CB-20	5,877.26	5,877.26	5,858.94	5,862.41	0.00	In Sag	0.97
CB-21	5,851.46	5,851.46	5,845.48	5,846.49	6.80	In Sag	0.00
CB-22	5,884.24	5,884.24	5,878.23	5,878.63	0.00	In Sag	0.06
CB-23	5,884.23	5,884.23	5,876.09	5,877.50	0.00	In Sag	0.46
CB-24	5,894.68	5,894.68	5,891.17	5,891.46	0.00	In Sag	0.00

Venture on Venetucci

100-YEAR

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
121 (STRM)	5,850.25	5,850.00	User Defined Tailwater	5,853.38	5,853.38	54.35
371 (STRM)	5,823.00	5,823.00	Free Outfall	0.00	5,823.64	6.80

Venture on Venetucci

100-YEAR

Manhole Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)
STMH-01 (STRM)	5,897.94	5,897.94	5,888.70	3.35	0.77	5,889.48	5,889.85
113 (STRM)	5,894.81	5,894.81	5,881.43	7.18	1.07	5,882.50	5,882.89
112 (STRM)	5,894.25	5,894.25	5,884.12	7.22	1.07	5,885.20	5,885.71
308 (STRM)	5,893.80	5,893.80	5,886.47	5.30	1.09	5,887.56	5,887.83
156 (STRM)	5,889.59	5,889.59	5,881.07	10.36	2.23	5,883.29	5,884.18
356 (STRM)	5,888.37	5,888.37	5,876.98	9.47	2.40	5,879.37	5,880.02
155 (STRM)	5,888.02	5,888.02	5,879.60	15.71	1.43	5,881.03	5,881.69
350 (STRM)	5,887.46	5,887.46	5,877.04	22.31	1.98	5,879.02	5,879.57
116 (STRM)	5,886.53	5,886.53	5,874.38	9.78	3.34	5,877.73	5,878.32
364 (STRM)	5,886.31	5,886.31	5,880.57	1.87	1.15	5,881.72	5,881.74
123 (STRM)	5,883.83	5,883.83	5,873.34	5.93	0.99	5,874.33	5,874.63
149 (STRM)	5,879.80	5,879.80	5,869.87	8.95	2.36	5,872.23	5,872.80
119 (STRM)	5,879.21	5,879.21	5,867.86	22.42	3.56	5,871.42	5,871.65
120 (STRM)	5,878.99	5,878.99	5,867.00	52.83	2.96	5,869.96	5,871.22
117 (STRM)	5,878.35	5,878.35	5,871.64	12.35	1.26	5,872.90	5,873.34
370 (STRM)	5,877.74	5,877.74	5,854.89	54.86	2.98	5,857.86	5,859.03
118 (STRM)	5,877.57	5,877.57	5,869.95	15.34	2.02	5,871.97	5,872.34
134 (STRM)	5,876.98	5,876.98	5,862.44	52.56	2.50	5,864.94	5,866.36
135 (STRM)	5,861.66	5,861.66	5,850.40	54.63	3.30	5,853.70	5,854.26
373 (STRM)	5,852.35	5,852.35	5,840.52	6.80	1.01	5,841.53	5,841.53
372 (STRM)	5,828.33	5,828.33	5,823.77	6.80	1.01	5,824.78	5,824.78

Venture on Venetucci

100-YEAR

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
02	120 (STRM)	0.230	0.840	7.800	1.47
03	CB-20	0.300	0.800	7.200	1.88
04	CB-20	0.070	0.840	5.000	0.51
05	CB-18	0.030	0.890	5.000	0.23
06	CB-18	0.340	0.830	5.000	2.47
07	CB-20	0.250	0.350	7.600	0.67
08	CB-19	0.190	0.830	5.000	1.38
09	CB-14	0.140	0.860	5.000	1.05
10	CB-17	0.310	0.870	5.600	2.28
11	CB-12	0.370	0.350	9.600	0.92
12	CB-19	0.210	0.850	5.000	1.56
13	CB-14	0.230	0.890	5.700	1.72
14	CB-23	0.260	0.830	5.000	1.89
15	CB-23	0.150	0.870	5.000	1.14
16	CB-17	0.130	0.950	5.000	1.08
17	CB-17	0.040	0.960	5.000	0.34
18	CB-13	0.340	0.810	6.200	2.26
19	CB-22	0.280	0.350	11.500	0.65
20	CB-11	0.290	0.860	5.000	2.18
21	CB-13	0.110	0.880	5.000	0.85
22	CB-9	0.110	0.810	5.000	0.78
23	CB-10	0.180	0.840	5.900	1.26
24	CB-10	0.250	0.860	5.000	1.88
25	CB-8	0.270	0.800	5.000	1.89
26	CB-5	0.100	0.830	5.000	0.73
27	CB-5	0.160	0.850	5.300	1.17
28	CB-7	0.200	0.850	5.000	1.49
29	CB-6	0.220	0.830	6.000	1.51
30	CB-3	0.210	0.850	5.000	1.56

Venture on Venetucci

100-YEAR

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
31	CB-4	0.300	0.350	11.300	0.70
32	CB-3	0.200	0.880	5.000	1.54
33	CB-7	0.210	0.880	6.400	1.50
34	CB-6	0.290	0.840	5.700	2.05
35	CB-2	0.170	0.780	5.000	1.16
36	CB-2	0.210	0.870	5.000	1.60
37	CB-2	0.100	0.810	5.000	0.71
38	CB-1	0.230	0.570	10.700	0.89
39	CB-24	0.140	0.350	5.000	0.43
40	CB-16	0.210	0.350	7.000	0.58
41	CB-5	0.100	0.790	5.000	0.69
G1	112 (STRM)	0.040	0.810	5.000	0.28
G2-A	CB-19	0.040	0.810	5.000	0.28
G2-B	CB-14	0.040	0.810	5.000	0.28
G3-A	CB-19	0.040	0.810	5.000	0.28
G3-B	CB-14	0.040	0.810	5.000	0.28
G4-A	CB-10	0.040	0.810	5.000	0.28
G4-B	CB-5	0.040	0.810	5.000	0.28
G5-A	CB-10	0.050	0.810	5.000	0.35
G5-B	CB-5	0.050	0.810	5.000	0.35
G6-A	CB-7	0.040	0.810	5.000	0.28
G6-B	CB-6	0.040	0.810	5.000	0.28
G7-A	CB-7	0.040	0.810	5.000	0.28
G7-B	CB-6	0.040	0.810	5.000	0.28
G8	STMH-01 (STRM)	0.040	0.810	5.000	0.28
G9	STMH-01 (STRM)	0.030	0.810	5.000	0.21
R1-A	CB-18	0.120	0.810	5.000	0.85

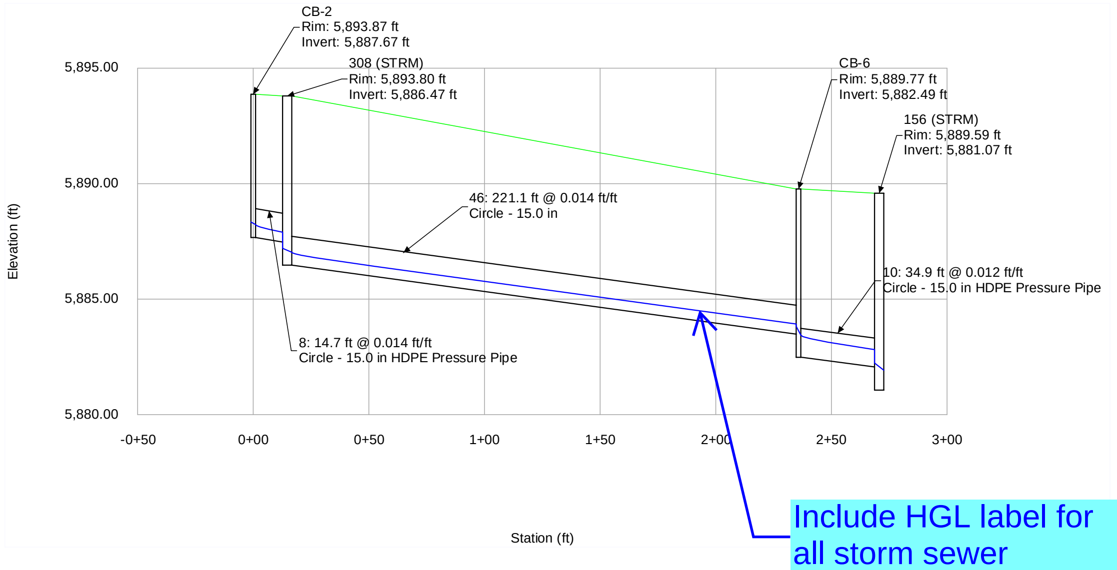
Venture on Venetucci

100-YEAR

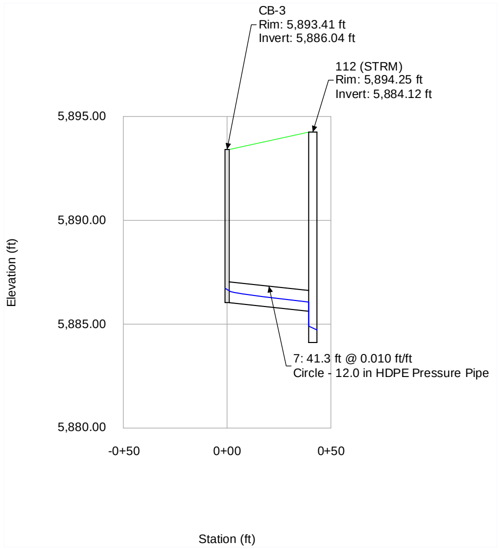
Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
R1-B	119 (STRM)	0.120	0.810	5.000	0.85
R2-A	CB-23	0.130	0.810	5.000	0.92
R2-B	CB-23	0.130	0.810	5.000	0.92
R3-A	CB-13	0.160	0.810	5.000	1.13
R3-B	CB-13	0.160	0.810	5.000	1.13
R4-A	CB-23	0.150	0.810	5.000	1.06
R4-B	CB-11	0.150	0.810	5.000	1.06
R5-A	350 (STRM)	0.160	0.810	5.000	1.13
R5-B	350 (STRM)	0.160	0.810	5.000	1.13
R6-A	CB-10	0.150	0.810	5.000	1.06
R6-B	CB-10	0.150	0.810	5.000	1.06
R7-A	CB-3	0.130	0.810	5.000	0.92
R7-B	CB-3	0.130	0.810	5.000	0.92
R8-A	CB-2	0.130	0.810	5.000	0.92
R8-B	CB-2	0.130	0.810	5.000	0.92
R9-A	CB-7	0.120	0.810	5.000	0.85
R9-B	CB-7	0.120	0.810	5.000	0.85
R10-A	STMH-01 (STRM)	0.160	0.810	5.000	1.13
R10-B	STMH-01 (STRM)	0.160	0.810	5.000	1.13
R11	120 (STRM)	0.120	0.810	5.000	0.85
R12	116 (STRM)	0.070	0.810	5.000	0.50

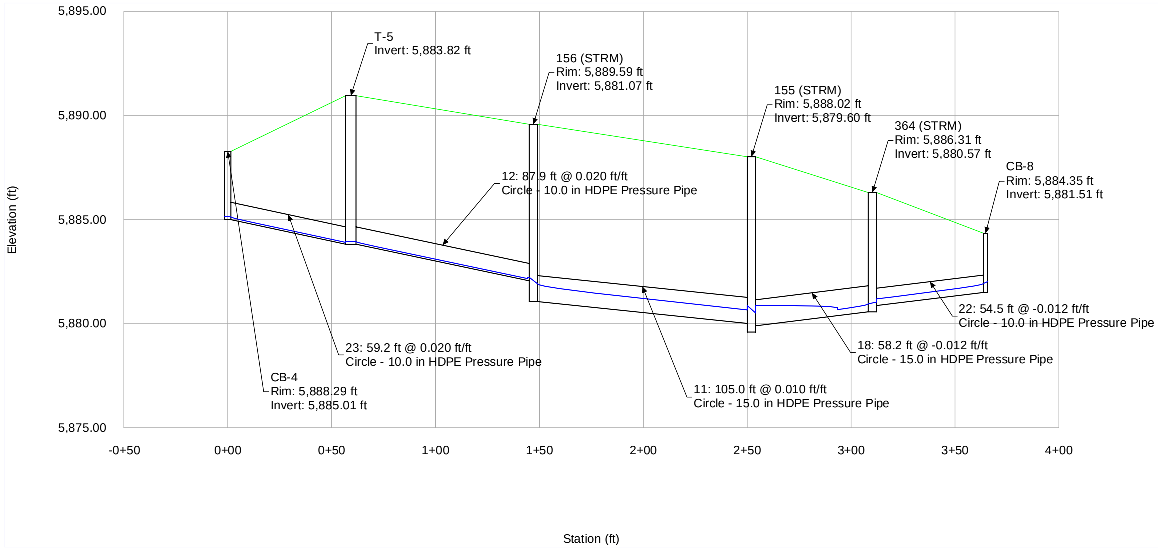
Profile Report
Engineering Profile - CB 2 to 156 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



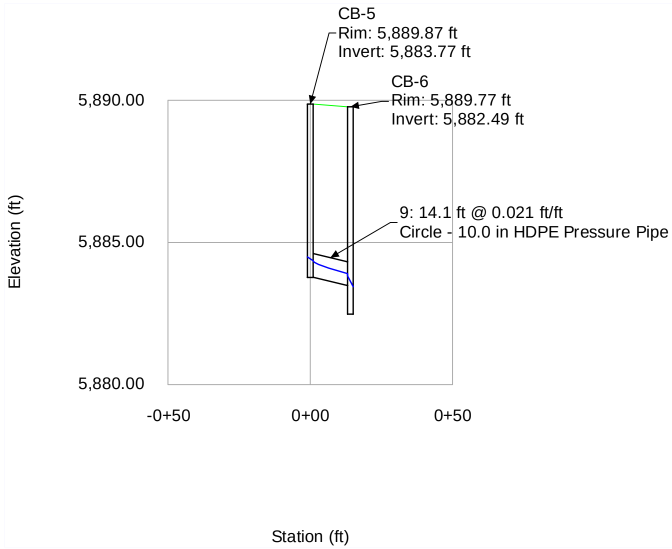
Profile Report
Engineering Profile - CB 3 to 112 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



Profile Report
Engineering Profile - CB 4 to CB 8 (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



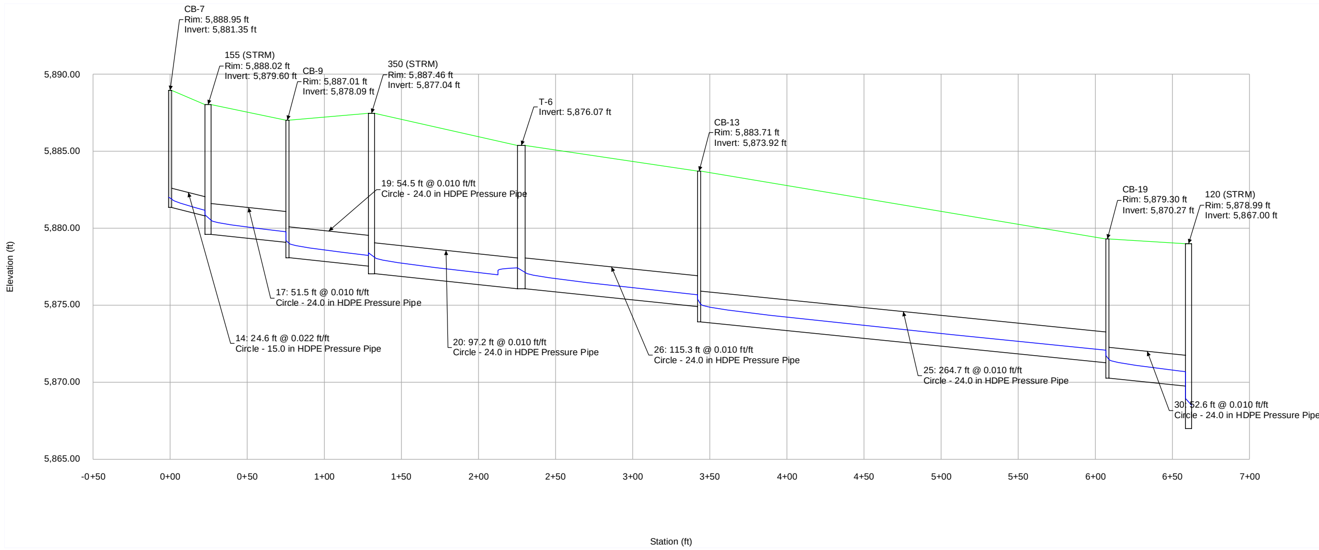
Profile Report
Engineering Profile - CB 5 to CB 6 (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



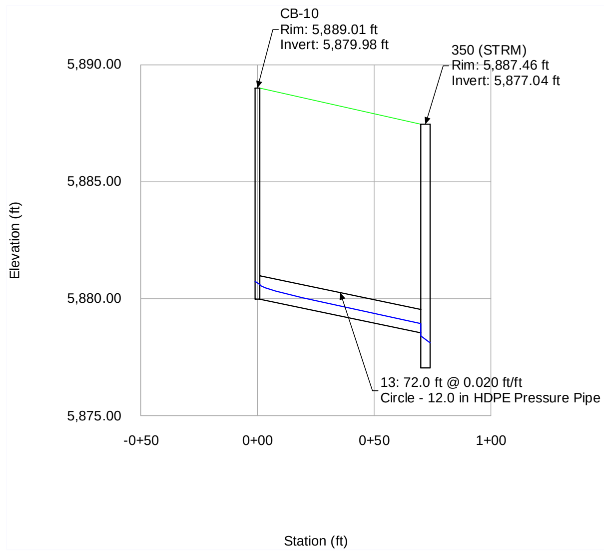
Profile Report

Engineering Profile - CB 7 to 120 (STRM) (Venetucci StormCAD.stsw)

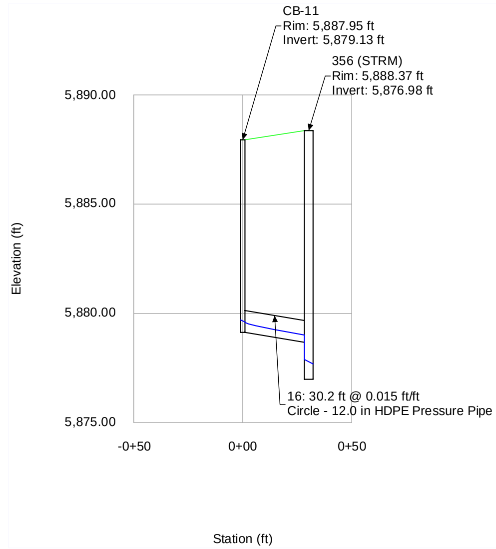
Active Scenario: 5-YEAR



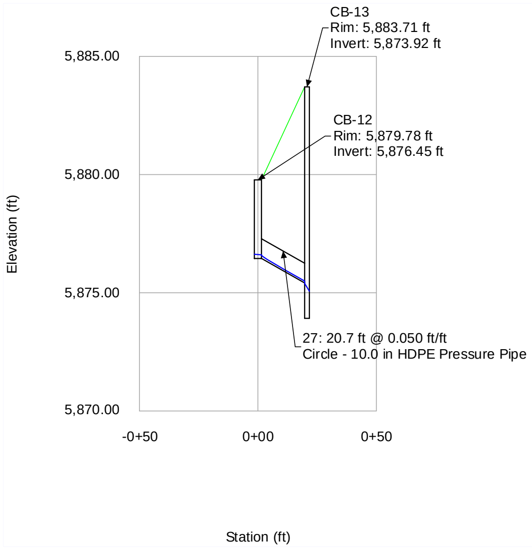
Profile Report
Engineering Profile - CB 10 to 350 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



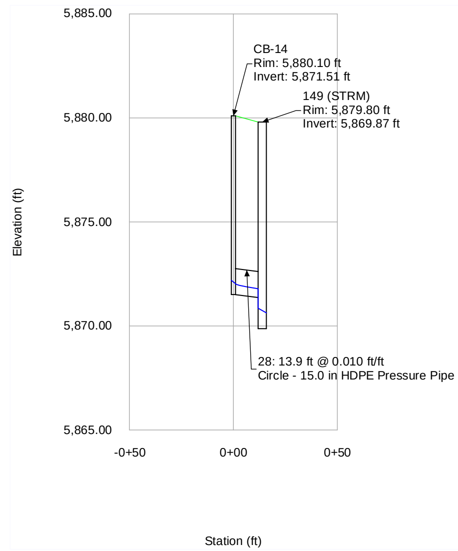
Profile Report
Engineering Profile - CB 11 to 356 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



Profile Report
Engineering Profile - CB 12 to CB 13 (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



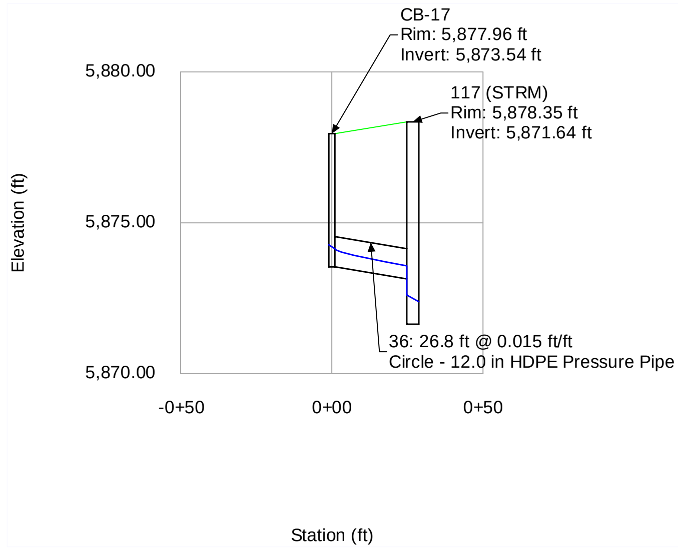
Profile Report
Engineering Profile - CB 14 to 149 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



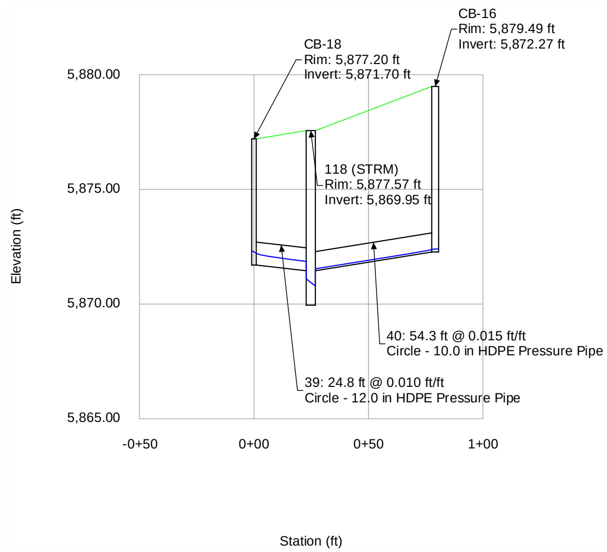
Profile Report

Engineering Profile - CB 17 to 117 (STRM) (Venetucci StormCAD.stsw)

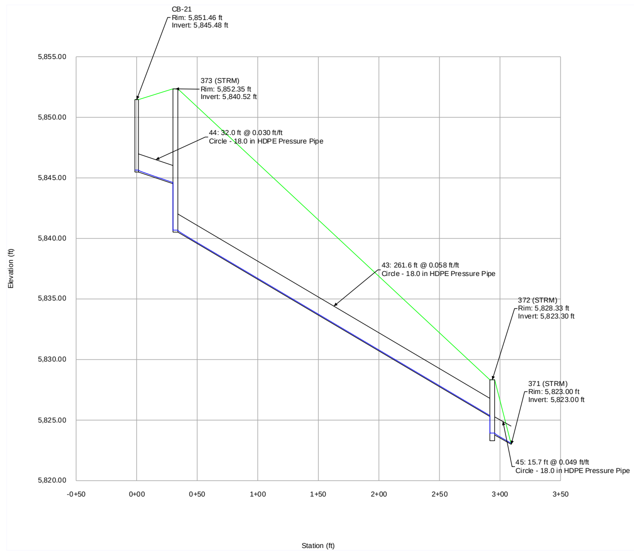
Active Scenario: 5-YEAR



Profile Report
Engineering Profile - CB 18 to CB 16 (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



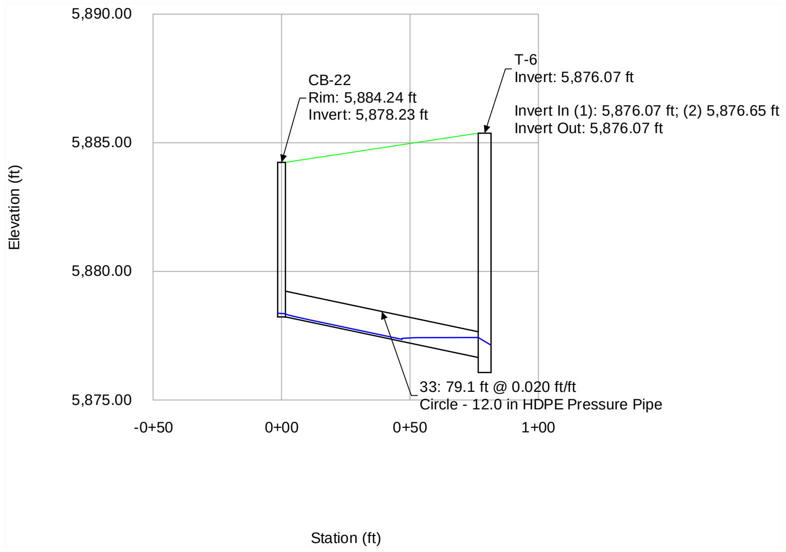
Profile Report
Engineering Profile - CB 21 to Creek Outfall (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



Profile Report

Engineering Profile - CB 22 to T 6 (Venetucci StormCAD.stsw)

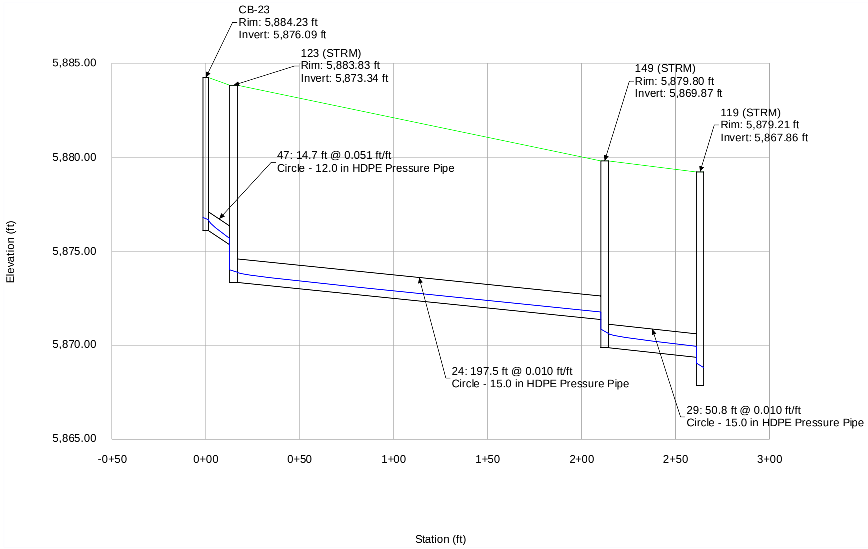
Active Scenario: 5-YEAR



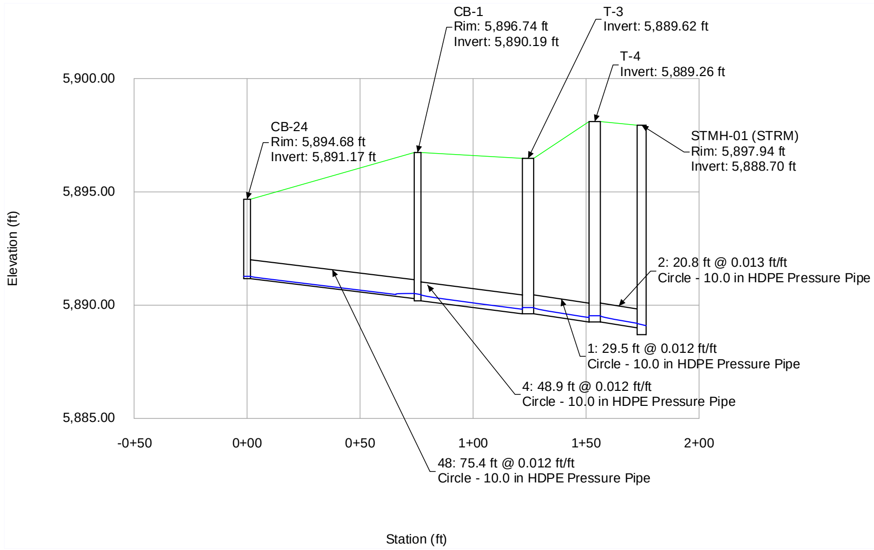
Profile Report

Engineering Profile - CB 23 to 119 (STRM) (Venetucci StormCAD.stsw)

Active Scenario: 5-YEAR



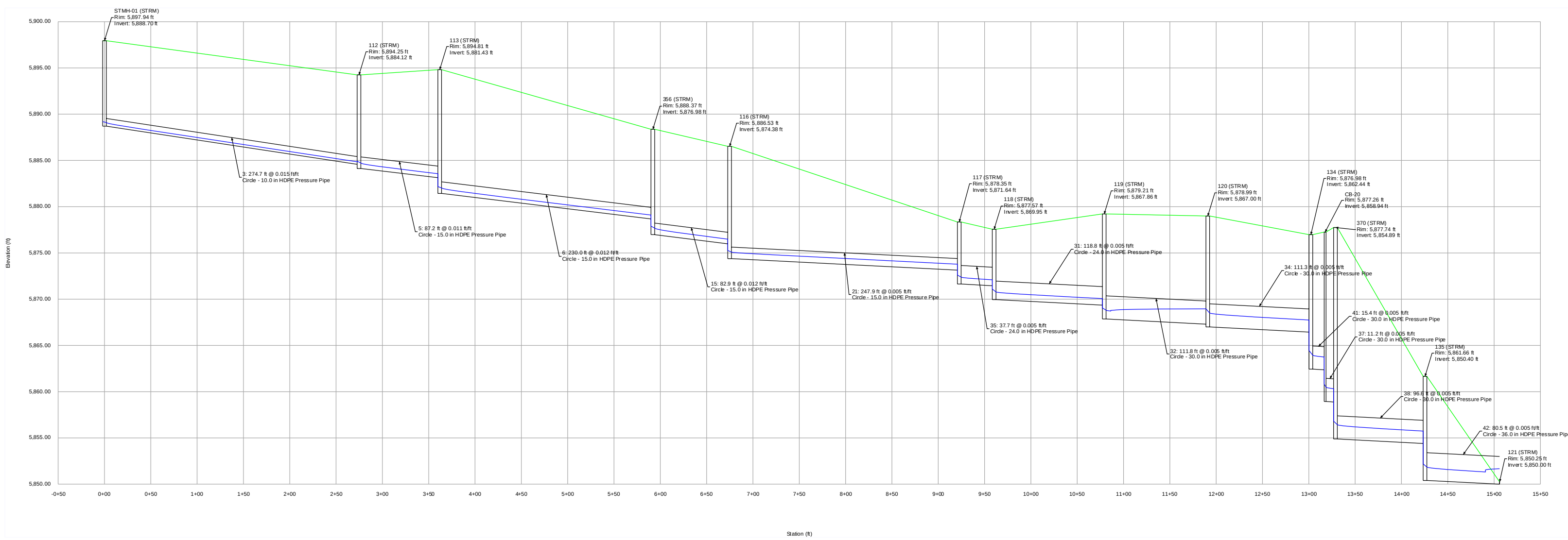
Profile Report
Engineering Profile - CB 24 to STMH 01 (Venetucci StormCAD.stsw)
Active Scenario: 5-YEAR



Profile Report

Engineering Profile - STMH 01 to Pond Outfall (Venetucci StormCAD.stsw)

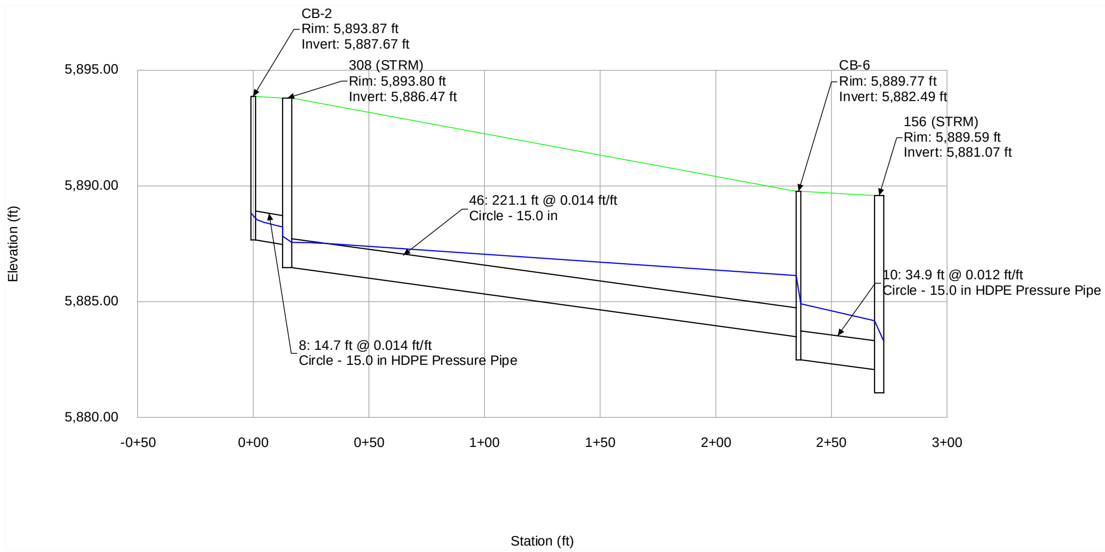
Active Scenario: 5-YEAR



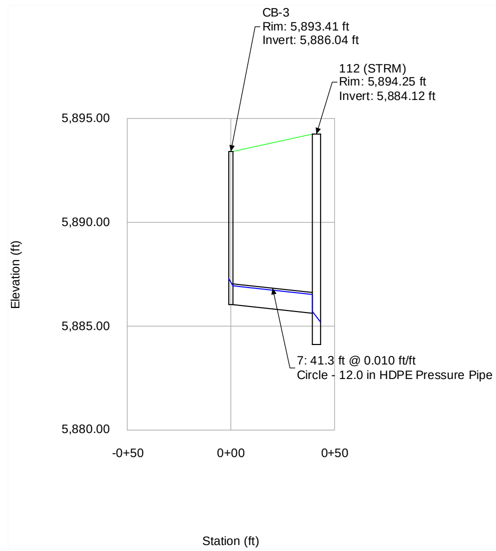
Profile Report

Engineering Profile - CB 2 to 156 (STRM) (Venetucci StormCAD.stsw)

Active Scenario: 100-YEAR



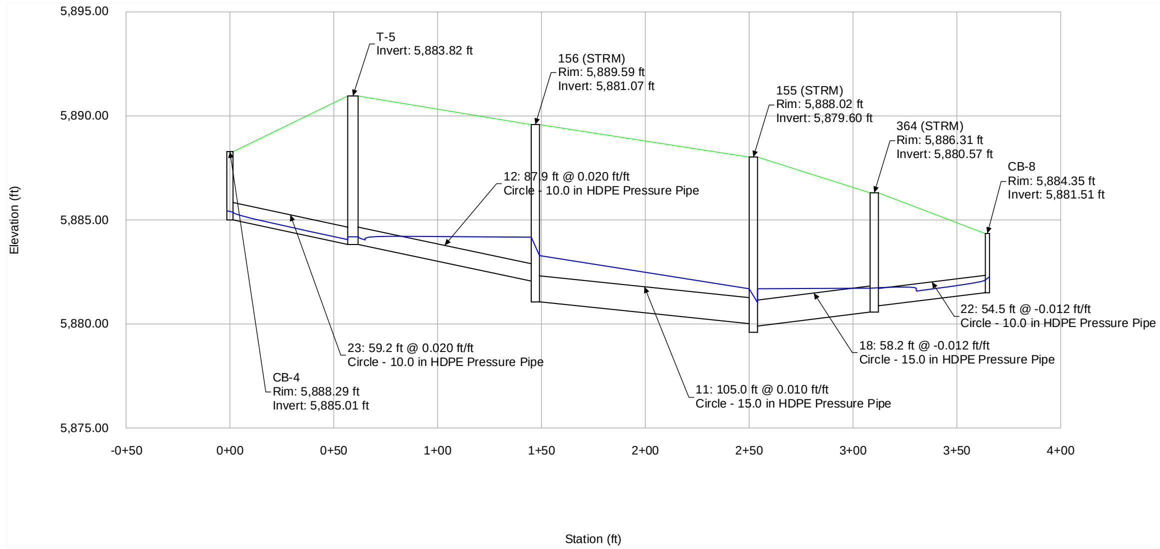
Profile Report
Engineering Profile - CB 3 to 112 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



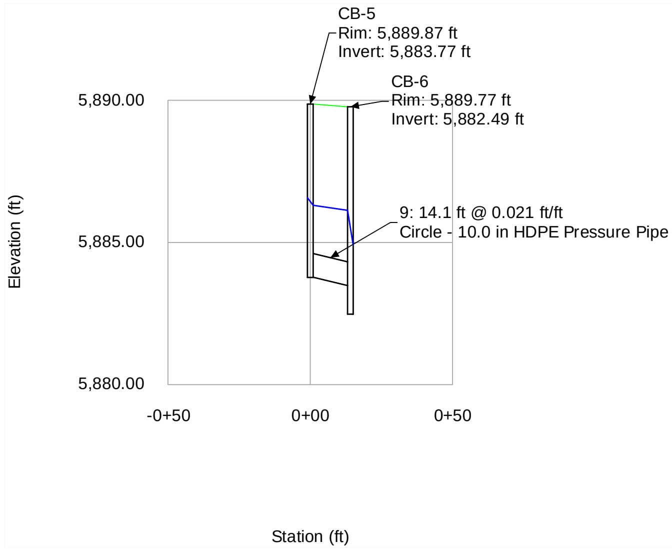
Profile Report

Engineering Profile - CB 4 to CB 8 (Venetucci StormCAD.stsw)

Active Scenario: 100-YEAR



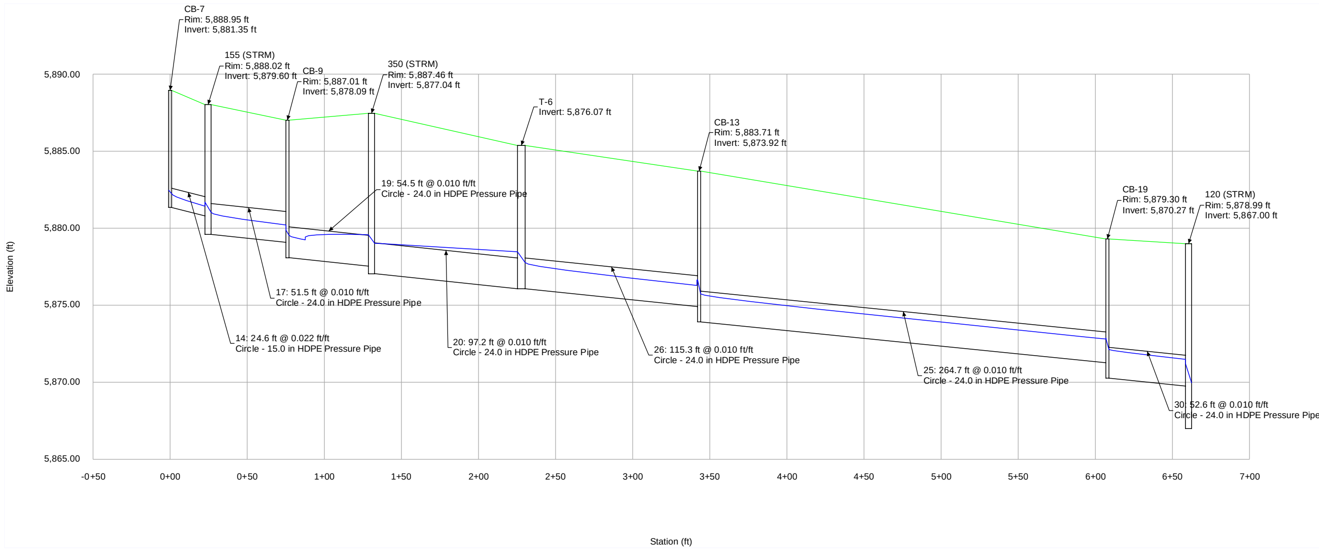
Profile Report
Engineering Profile - CB 5 to CB 6 (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



Profile Report

Engineering Profile - CB 7 to 120 (STRM) (Venetucci StormCAD.stsw)

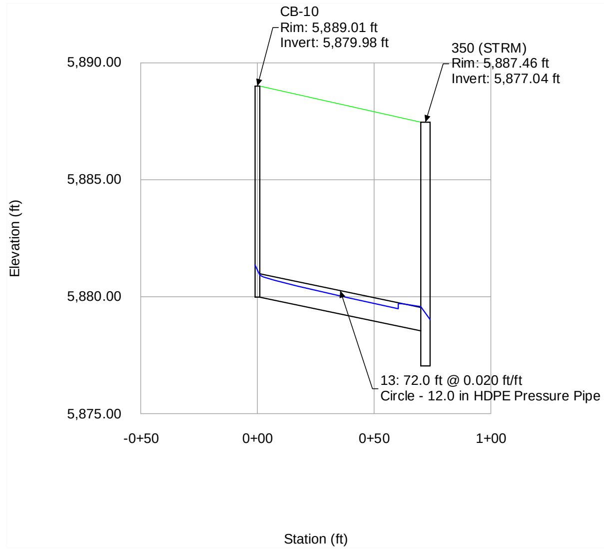
Active Scenario: 100-YEAR



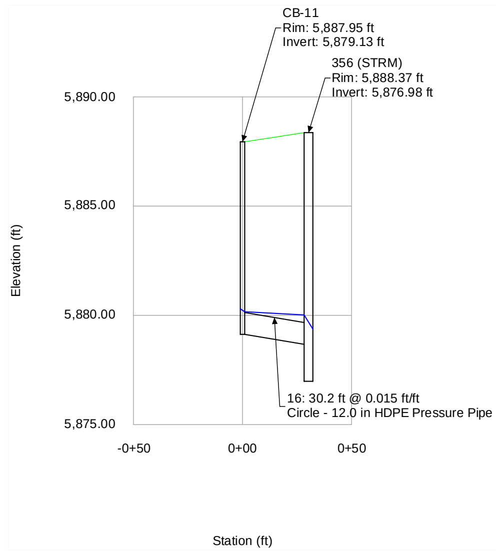
Profile Report

Engineering Profile - CB 10 to 350 (STRM) (Venetucci StormCAD.stsw)

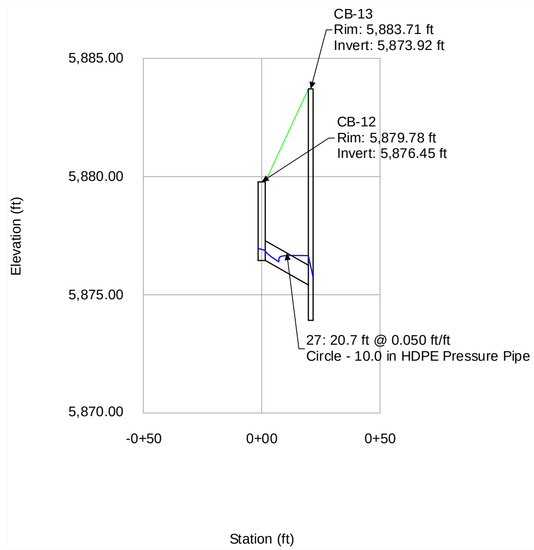
Active Scenario: 100-YEAR



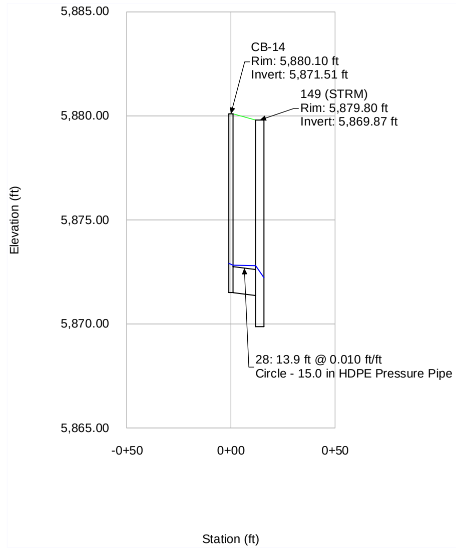
Profile Report
Engineering Profile - CB 11 to 356 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



Profile Report
Engineering Profile - CB 12 to CB 13 (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



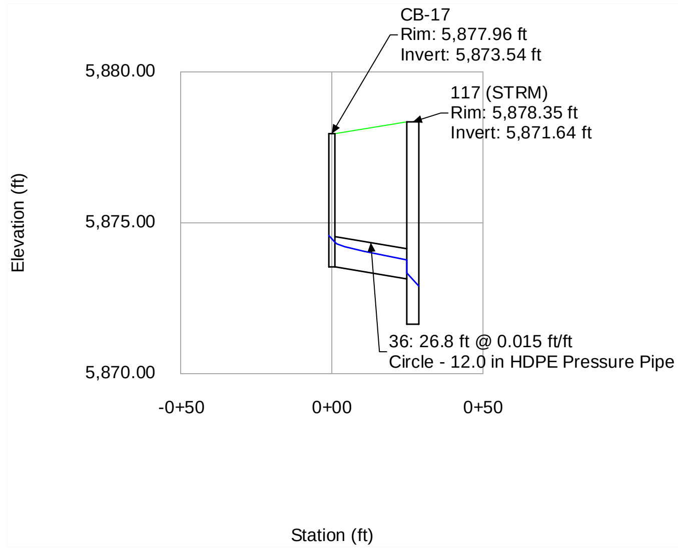
Profile Report
Engineering Profile - CB 14 to 149 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



Profile Report

Engineering Profile - CB 17 to 117 (STRM) (Venetucci StormCAD.stsw)

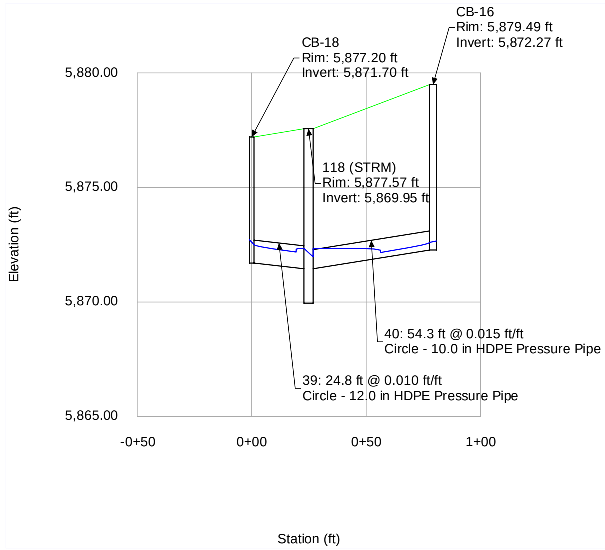
Active Scenario: 100-YEAR



Profile Report

Engineering Profile - CB 18 to CB 16 (Venetucci StormCAD.stsw)

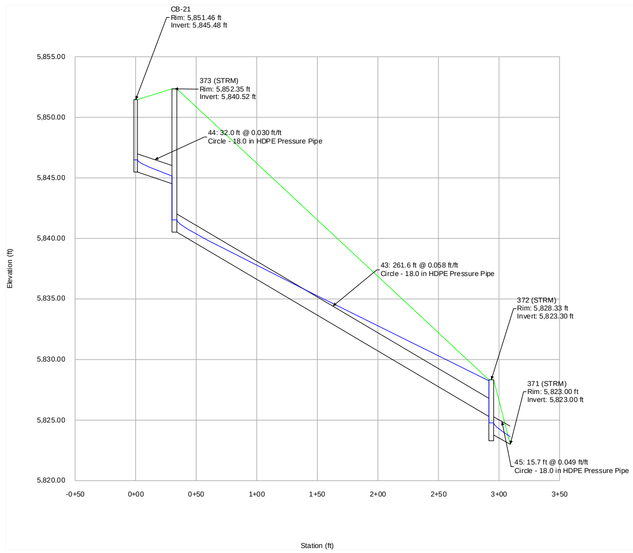
Active Scenario: 100-YEAR



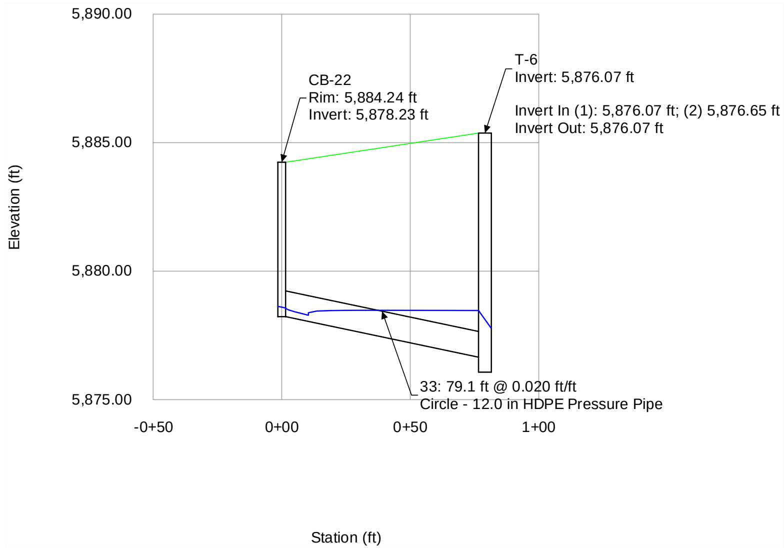
Profile Report

Engineering Profile - CB 21 to Creek Outfall (Venetucci StormCAD.stsw)

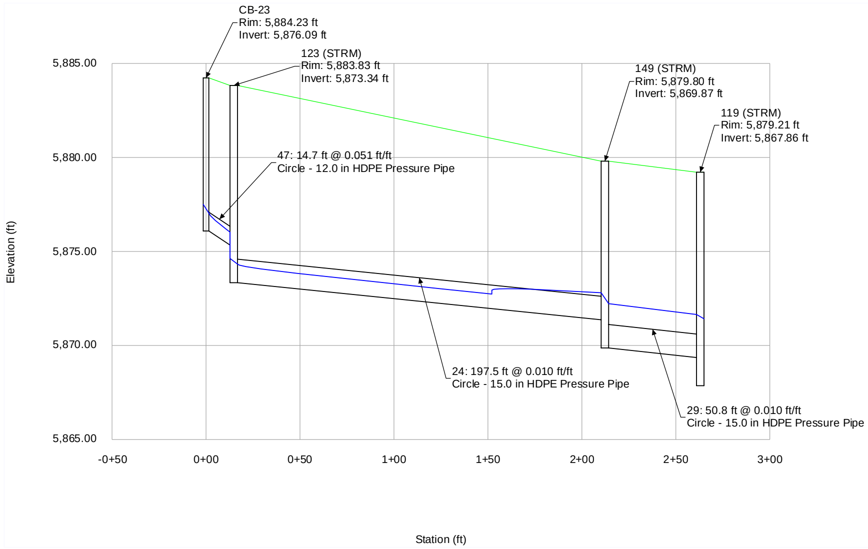
Active Scenario: 100-YEAR



Profile Report
Engineering Profile - CB 22 to T 6 (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



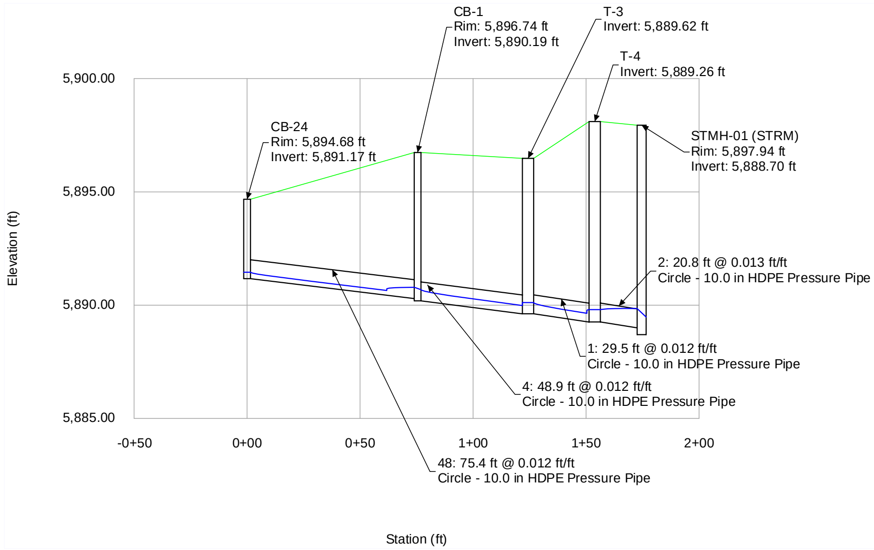
Profile Report
Engineering Profile - CB 23 to 119 (STRM) (Venetucci StormCAD.stsw)
Active Scenario: 100-YEAR



Profile Report

Engineering Profile - CB 24 to STMH 01 (Venetucci StormCAD.stsw)

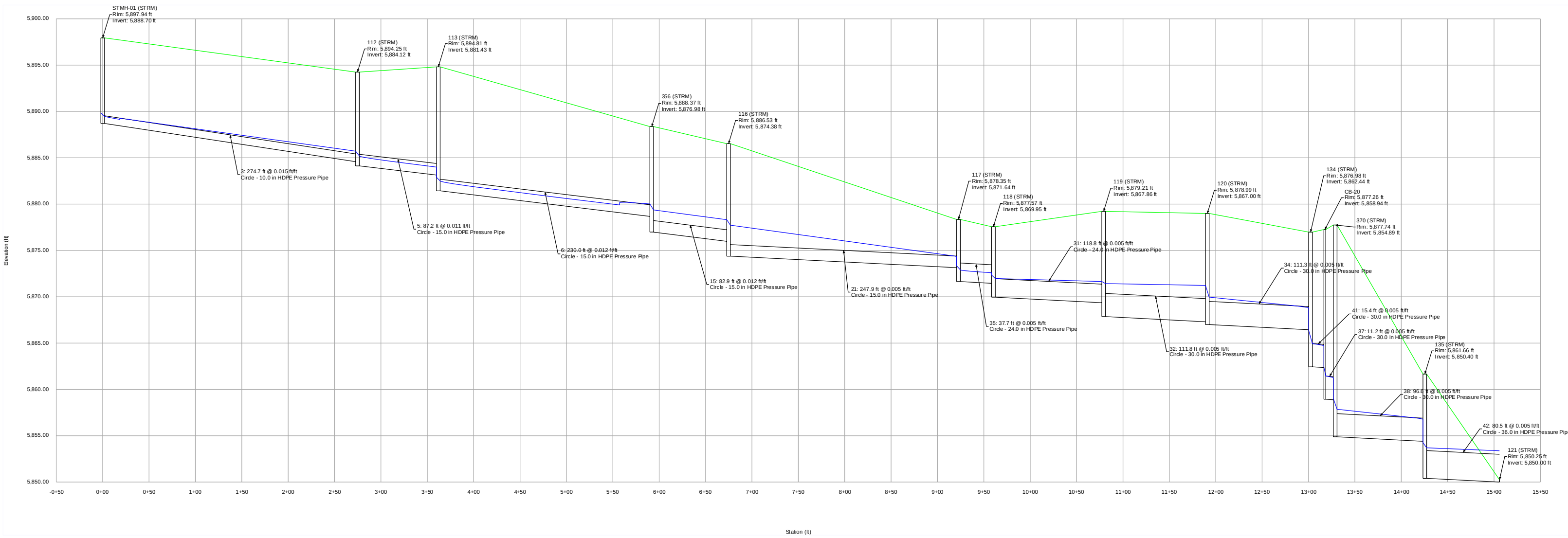
Active Scenario: 100-YEAR



Profile Report

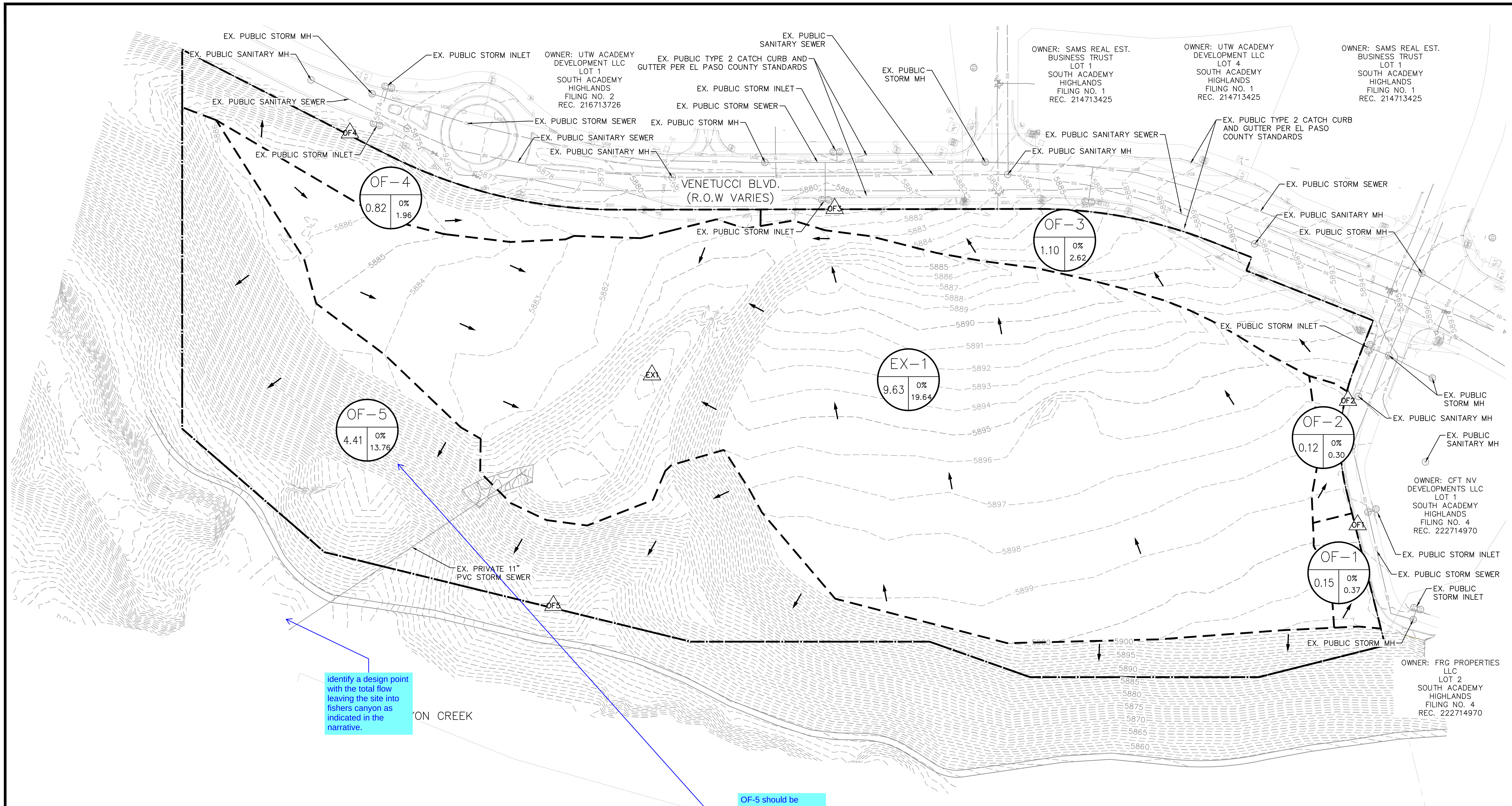
Engineering Profile - STMH 01 to Pond Outfall (Venetucci StormCAD.stsw)

Active Scenario: 100-YEAR



APPENDIX D: DRAINAGE MAPS

Please move this to the end of the report



SUMMARY - EXISTING RUNOFF TABLE

DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
EX1	EX-1	9.63	0.00	2.67	19.64
OF1	OF-1	0.15	0.00	0.05	0.37
OF2	OF-2	0.12	0.00	0.04	0.30
OF3	OF-3	1.10	0.00	0.35	2.62
OF4	OF-4	0.82	0.00	0.26	1.96
OF5	OF-5	4.41	0.00	1.82	13.76

LEGEND

A = BASIN DESIGNATION
B = AREA (ACRES)
C = WEIGHTED IMPERVIOUSNESS (%)
D = 100-YR DIRECT STORM RUNOFF (CFS)

DESIGN POINT
FLOW DIRECTION
DRAINAGE BASIN BOUNDARY
PROPERTY LINE
EX. MAJOR CONTOUR
EX. MAJOR CONTOUR

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

GRAPHIC SCALE IN FEET 0 30 60 120

NORTH

NO. | REVISION | BY | DATE | APPR.

Kimley»Horn
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6200 South Syracuse Way, Suite 300
Greenwood Village, Colorado 80111 (303) 228-2300

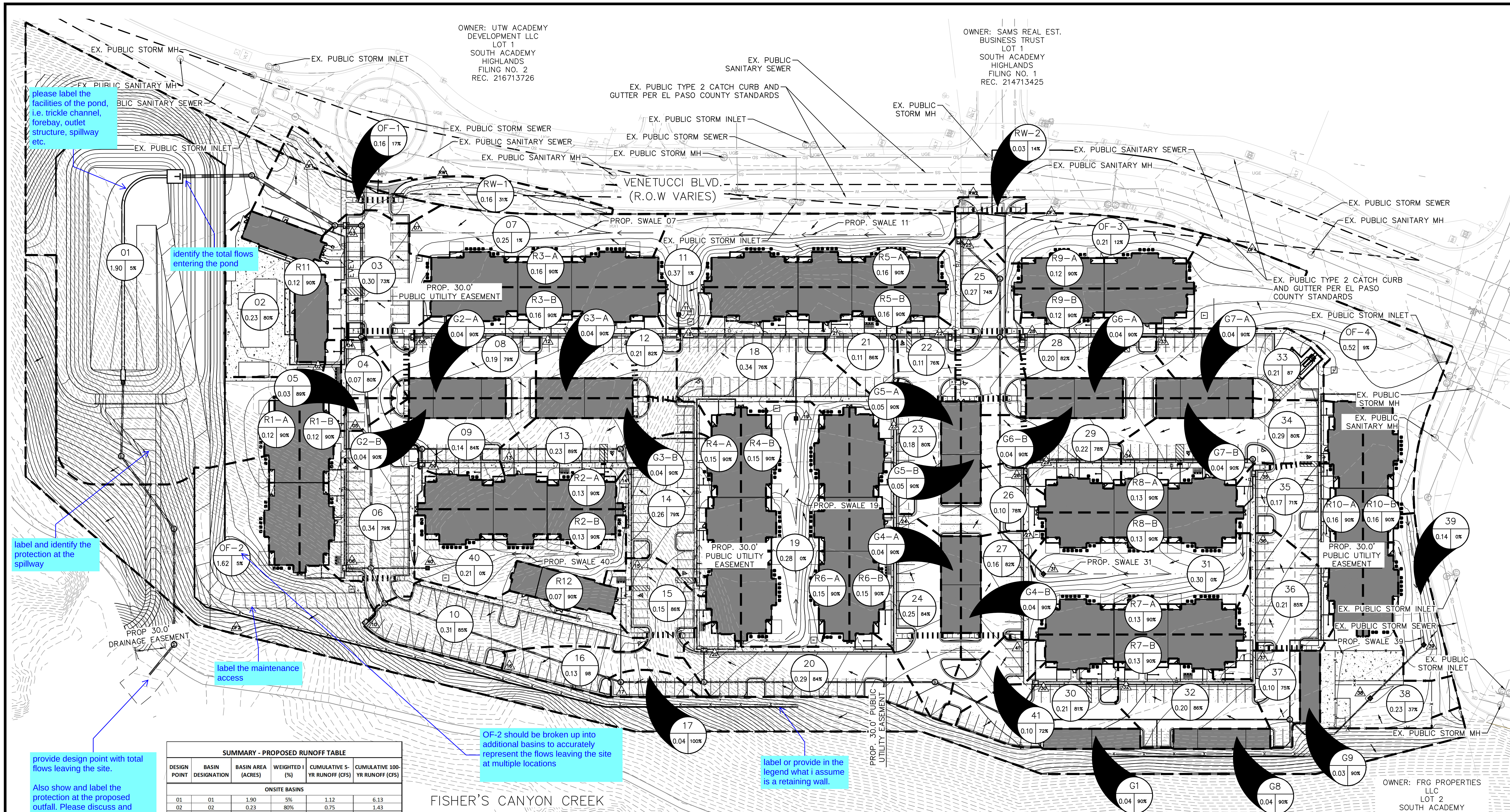
DESIGNED BY: CRA
DRAWN BY: CRA
CHECKED BY: MTH
DATE: 11/12/2024

VENETUCCI MULTIFAMILY
FINAL DRAINAGE REPORT
DRAINAGE MAP
COLORADO SPRINGS, CO 80921
EXISTING DRAINAGE MAP

PROJECT NO. 096302017

SHEET EX-1

K:\DEN_Civil\096302017_Venetucci Multi-Family\CADD\PlanSheets\Drainage\096302017_DP-EX.dwg Ayers, Connor 11/13/2024 8:15 AM



please label the facilities of the pond, i.e. trickle channel, forebay, outlet structure, spillway etc.

identify the total flows entering the pond

label and identify the protection at the spillway

label the maintenance access

provide design point with total flows leaving the site.

Also show and label the protection at the proposed outfall. Please discuss and analyze the channel between this outfall and the beginning of the proposed channel improvements downstream.

OF-2 should be broken up into additional basins to accurately represent the flows leaving the site at multiple locations

label or provide in the legend what i assume is a retaining wall.

SUMMARY - PROPOSED RUNOFF TABLE

DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)
ONSITE BASINS					
01	01	1.90	5%	1.12	6.13
02	02	0.23	80%	0.75	1.43
03	03	0.30	73%	1.27	2.97
04	04	0.07	80%	0.28	0.53
05	05	0.03	89%	0.13	0.25
06	06	0.34	79%	1.41	2.70
07	07	0.25	1%	0.10	1.39
08	08	0.19	79%	1.52	2.89
09	09	0.14	84%	1.47	2.75
10	10	0.31	85%	1.98	3.65
11	11	0.37	1%	0.13	1.09
12	12	0.21	82%	0.81	1.54
13	13	0.23	89%	0.92	1.71
14	14	0.26	79%	1.55	2.95
15	15	0.15	86%	0.59	1.10
16	16	0.13	98%	0.80	1.44
17	17	0.04	100%	0.20	0.35
18	18	0.34	76%	1.58	1.80
19	19	0.28	0%	0.96	1.35
20	20	0.29	84%	1.14	2.15
21	21	0.11	86%	0.46	0.86
22	22	0.11	76%	0.41	0.79
23	23	0.18	80%	1.59	3.01
24	24	0.25	84%	0.99	1.87
25	25	0.27	74%	0.96	1.89
26	26	0.10	78%	1.31	2.51
27	27	0.16	82%	0.94	1.81
28	28	0.20	82%	1.55	2.91
29	29	0.22	78%	1.82	3.49
30	30	0.21	81%	1.62	3.05
31	31	0.30	0%	0.87	1.28
32	32	0.20	86%	0.80	1.50
33	33	0.21	87%	0.81	1.52
34	34	0.29	80%	1.06	2.02
35	35	0.17	71%	1.79	3.45
36	36	0.21	85%	1.19	2.27
37	37	0.10	75%	0.37	0.72
38	38	0.23	37%	0.35	0.90
39	39	0.14	0%	0.67	0.93
40	40	0.21	0%	0.79	1.12
41	41	0.10	72%	0.33	0.66
R1-A	R1-A	0.12	90%	0.44	0.82
R1-B	R1-B	0.12	90%	0.44	0.82
R2-A	R2-A	0.13	90%	0.51	0.95
R2-B	R2-B	0.13	90%	0.51	0.95
R3-A	R3-A	0.16	90%	0.61	1.13
R3-B	R3-B	0.16	90%	0.61	1.13
R4-A	R4-A	0.15	90%	0.58	1.08
R4-B	R4-B	0.15	90%	0.58	1.08
R5-A	R5-A	0.16	90%	0.61	1.13
R5-B	R5-B	0.16	90%	0.61	1.13
R6-A	R6-A	0.15	90%	0.58	1.08
R6-B	R6-B	0.15	90%	0.58	1.08
R7-A	R7-A	0.13	90%	0.51	0.95
R7-B	R7-B	0.13	90%	0.51	0.95
R8-A	R8-A	0.13	90%	0.51	0.95
R8-B	R8-B	0.13	90%	0.51	0.95
R9-A	R9-A	0.12	90%	0.44	0.82
R9-B	R9-B	0.12	90%	0.44	0.82
R10-A	R10-A	0.16	90%	0.61	1.13
R10-B	R10-B	0.16	90%	0.61	1.13
R11	R11	0.12	90%	0.45	0.84
R12	R12	0.07	90%	0.28	0.52
G1	G1	0.04	90%	0.17	0.31
G2-A	G2-A	0.04	90%	0.17	0.31
G2-B	G2-B	0.04	90%	0.17	0.31
G3-A	G3-A	0.04	90%	0.17	0.31
G3-B	G3-B	0.04	90%	0.17	0.31
G4-A	G4-A	0.04	90%	0.17	0.31
G4-B	G4-B	0.04	90%	0.17	0.31
G5-A	G5-A	0.05	90%	0.17	0.32
G5-B	G5-B	0.05	90%	0.17	0.32
G6-A	G6-A	0.04	90%	0.17	0.31
G6-B	G6-B	0.04	90%	0.17	0.31
G7-A	G7-A	0.04	90%	0.17	0.31
G7-B	G7-B	0.04	90%	0.17	0.31
G8	G8	0.04	90%	0.17	0.31
G9	G9	0.03	90%	0.13	0.23
OF-1	OF-1	0.16	17%	0.15	0.51
OF-2	OF-2	1.62	5%	0.74	4.17
OF-3	OF-3	0.21	12%	0.19	0.76
OF-4	OF-4	0.52	9%	0.41	1.76
RW-1	RW-1	0.16	31%	0.28	0.75
RW-2	RW-2	0.03	14%	0.06	0.37

where is OF-5 that is discussed in the report text?

I think my confusion about the OF-5 basin is that there is "OF-#" basins in the existing and proposed condition, but they are completely unrelated. So OF-1 in the existing condition is on the other side of the site than OF-1 in the proposed condition. Recommend renaming the existing basins to EX-1 to EX-5 to avoid this confusion.

LEGEND

A = BASIN DESIGNATION
B = AREA (ACRES)
I = IMPERVIOUSNESS
D = DESIGN POINT
PROP. FLOW DIRECTION
DRAINAGE BASIN BOUNDARY
PROP. INLET
EX. MANHOLE
EX. MAJOR CONTOUR
EX. MINOR CONTOUR
PROP. MAJOR CONTOUR
PROP. MINOR CONTOUR
PROP. STORM SEWER

GRAPHIC SCALE IN FEET
0 25 50 100

NORTH

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

K:\DEN_Civil\096302017_Venetucci Multi-Family\CADD\PlanSheets\Drainage\096302017_DP-PR.dwg Ayers, Connor 11/13/2024 8:11 AM

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
© 2024 KIMLEY-HORN AND ASSOCIATES, INC.
6200 South Syracuse Way, Suite 300
Greenwood Village, Colorado 80111 (303) 228-2300

DESIGNED BY: CRA
DRAWN BY: CRA
CHECKED BY: MTH
DATE: 11/12/2024

VENETUCCI MULTIFAMILY
FINAL DRAINAGE REPORT
DRAINAGE MAP
COLORADO SPRINGS, CO 80921
PROPOSED DRAINAGE MAP

PROJECT NO.
096302017
SHEET
PR-1

APPENDIX E: EXCERPTS FROM ADJACENT PROPERTY DRAINAGE REPORTS

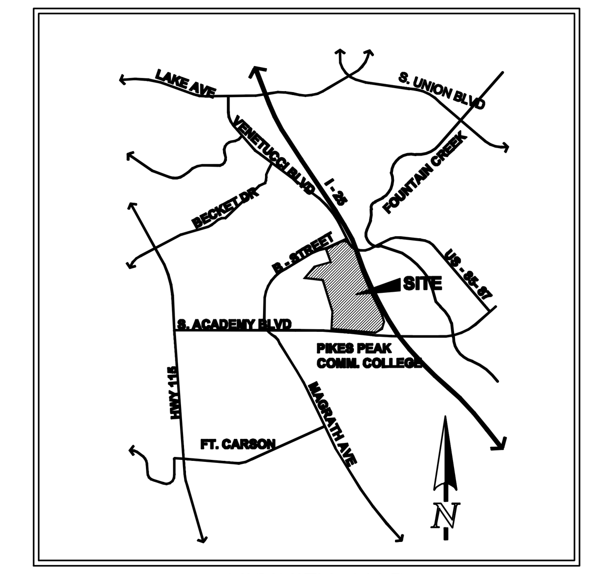
FINAL DRAINAGE REPORT

CITY OF FOUNTAIN, COUNTY OF EL PASO, STATE OF COLORADO

SOUTH ACADEMY HIGHLANDS FILING NO. 1

EXISTING CONDITIONS

MARCH 2013



VICINITY MAP
N.T.S.

EXISTING AREA DRAINAGE

BASIN	Q5 (CFS)	Q100 (CFS)
OS-1A	9	19
OS-1B	34	70
OS-2	24	59
OS-3	40	86
OS-4	9	20
OS-5	7	14
OS-6	22	46
OS-7	29	61
EX-A	13	34
EX-B	8	21
EX-C	6	15
EX-D	4	10
EX-E	6	15
EX-F	10	28
EX-G	11	30
EX-H	18	45
FC1	44	87
FC2	18	47
FC3	43	116
FC4	21	57
FC5	27	71
FC6	6	17
FC7	40	99
FC8	19	36

EXISTING DESIGN POINT SUMMARY

DESIGN POINT	Q5 (CFS)	Q100 (CFS)	DESCRIPTION
A	9.2	19.0	Existing 24" RCP
B	33.8	69.9	Existing 24" RCP (Direct Release)
C-1	64.0	142.4	Fisher's Canyon Tributary
C-2	104.7	232.1	Fisher's Canyon Tributary
C-3	113.8	253.4	Fisher's Canyon Tributary
C-4	119.1	265.7	Fisher's Canyon Tributary
C-5	135.3	301.1	Fisher's Canyon Tributary
C-6	162.2	361.0	Fisher's Canyon Tributary
D	154.5	346.7	Fisher's Canyon Tributary
EX1	21.5	57.2	Existing 36" RCP
EX2	26.8	71.5	Existing 24" RCP
EX3	6.4	17.0	Existing 30" RCP
EX4	39.7	99.0	Existing 36" RCP
8 - SITE	193.6	431.3	Site Runoff Into Fisher's Canyon Creek
9 - SITE	227.9	520.8	Site Runoff Into Fisher's Canyon Creek
21 - SITE	255.8	595.2	Total Outfall East of I-25

EXISTING DBPS DESIGN POINTS (PER DBPS STUDY)

DESIGN POINT	Q100 (CFS)
7	2,676
8	3,050
9	3,163

LEGEND

EXISTING GROUND CONTOUR (5820)

PROPOSED FINISHED CONTOUR 5820

OVERALL SITE BOUNDARY

EXISTING LOT LINE

PROPOSED BASIN BOUNDARY

MDDP BASIN BOUNDARY

PROP. DIRECTION OF DRAINAGE

EXISTING DIRECTION OF DRAINAGE

BASIN IDENTIFIER D

AREA IN ACRES 1.41

DESIGN POINT 1

200' 100' 0 200' 400'

SCALE: 1" = 200'

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS
1-800-922-1987
CITY OF COLORADO SPRINGS DEPT. OF UTILITIES
GAS, ELECTRIC, WATER AND WASTEWATER

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

NO.	REVISION	DATE

REVIEW:

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

KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE

CLASSIC CONSULTING ENGINEERS & SURVEYORS
6385 Corporate Drive, Suite 101
Colorado Springs, Colorado 80919
(719)785-0790
(719)785-0799 (Fax)

FINAL DRAINAGE REPORT
SOUTH ACADEMY HIGHLANDS FILING NO. 1
EXISTING CONDITIONS DRAINAGE MAP

DESIGNED BY MAL	SCALE	DATE 3/11/13
DRAWN BY MAL	(H) 1"= 200'	SHEET 1 OF 1
CHECKED BY	(V) 1"= N/A	JOB NO. 2184.80

BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
A	6.7	16.8
B	4.3	11.6
C	5.7	15.2
D	7.8	20.8
E	40.7	76.6
F	30.7	57.7
G	11.0	27.5
H	31.2	58.8
I	4.1	10.8
J	5.4	14.4
K	2.9	7.8
L	7.9	21.1
M	5.9	15.6
N	8.6	22.9
P	5.3	14.1
Q	5.4	14.3
R–1	5.6	12.4
R–2	2.0	3.8
R–3	5.7	10.6

BASIN RUNOFF SUMMARY (CONT'D)		
BASIN	Q5 (CFS)	Q100 (CFS)
R–4	3.4	6.3
R–7	4.9	9.2
R–8	4.7	8.8
S	3.1	7.0
T	4.0	9.1
U	4.8	12.9
V	23.1	43.5
W	12.9	34.4
Y	9.7	25.9
OS–1A	9.2	19.0
OS–1B	33.8	69.9
OS–2	10.8	27.3
OS–3	40.3	86.3
OS–4	9.4	19.6
OS–5	6.7	14.0
OS–6	22.1	45.9
OS–7	29.1	60.8
OS–8	1.3	3.4
FC7	22.3	53.5

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	INLET SIZE
A	9.2	19.0	EXIST. 24" RCP
1	11.9	25.0	24" FES
B	33.8	69.9	EXIST. 24" RCP
2	40.4	86.5	36" FES
3	6.7	16.8	5' X 3' TYPE C
4	91.0	196.2	WESTERN TRIBUTARY CHANNEL
5	98.9	214.1	WESTERN TRIBUTARY CHANNEL
6	4.9	9.2	5' TYPE R SUMP INLET
7	2.0	3.8	5' TYPE R SUMP INLET
8	4.1	10.8	FUTURE STORM SYSTEM
9	11.0	27.5	FUTURE STORM SYSTEM
10	5.7	10.6	DUAL 5' SUMP INLETS
11	4.7	8.8	10' AT–GRADE INLET
12	5.7	15.2	FUTURE STORM SYSTEM
13	3.4	6.3	DUAL 5' SUMP INLETS
14	31.2	58.8	FUTURE STORM SYSTEM
15	7.8	20.8	FUTURE STORM SYSTEM
16	42.0	82.8	FUTURE STORM SYSTEM
17	23.1	43.5	FUTURE STORM SYSTEM
18	30.7	57.7	FUTURE STORM SYSTEM
19	21.8	58.2	TEMP. SEDIMENT BASIN 'H'
20	122.4	285.1	TEMP. PUBLIC POND 'T'
21	6.9	59.6	OVERALL SITE RUNOFF
22	4.2	11.0	5' TYPE R SUMP INLET
24a	3.1	7.0	EXISTING GRATED INLET
24b	5.6	12.4	15' TYPE R SUMP INLET

PIPE ROUTING (FIL. NO. 1)		
PIPE/SIZE	Q5 (CFS)	Q100 (CFS)
1 ~ 24"	11.9	25.0
2A ~ 42"	50.1	106.8
2B ~ 42"	54.4	117.6
4 ~ 18"	4.9	9.2
5 ~ 24"	6.9	13.0
6 ~ 36"	11.0	27.5
7 ~ 36"	16.4	37.5
8 ~ 30"	4.1	10.8
9 ~ 48"	20.7	47.1
10 ~ 18"	3.4	5.5
11 ~ 48"	22.2	48.9
12 ~ 36"	5.7	15.2
13 ~ 60"	76.8	151.9
14 ~ 24"	3.4	6.3
15 ~ 60"	98.9	193.2
16 ~ 36"	31.2	58.8
17 ~ 60"	99.5	194.1
18 ~ 36"	7.8	20.8
19 ~ 48"	49.1	101.8
20 ~ 36"	23.1	43.5
21 ~ 54"	62.2	125.4
22 ~ 36"	30.7	57.7
23 ~ 66"	122.9	251.0
24 ~ 24"	9.0	19.9
25 ~ 36"	30.7	57.7
26 ~ 48"	2.7	48.3

CLASSIC CONSULTING ENGINEERS & SURVEYORS

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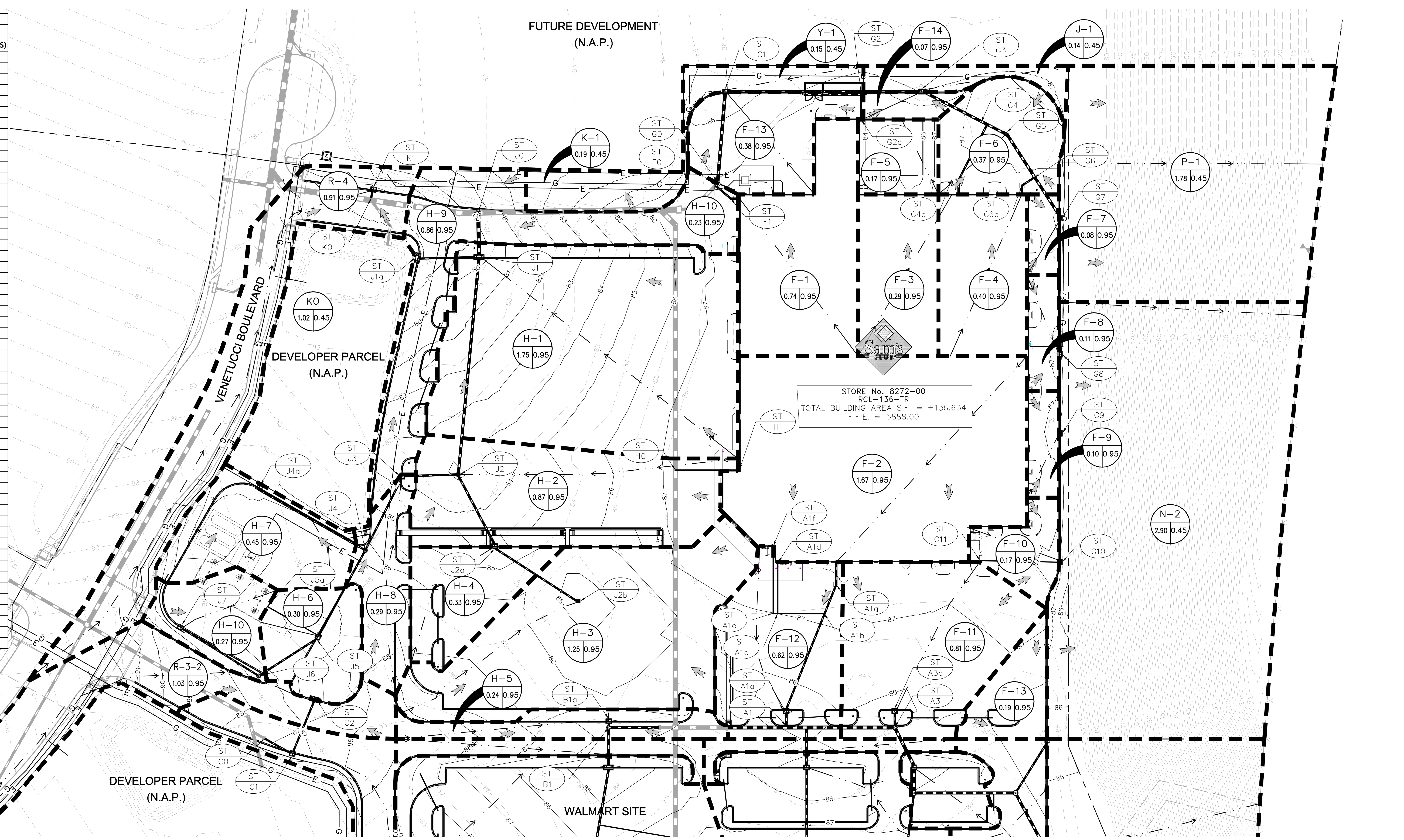
Colorado Springs, Colorado 80919
(719)785–0790
(719)785–0799 (Fax)

SOUTH ACADEMY HIGHLANDS
FILING NO. 1
PHASE 1 DEVELOPMENT
PROPOSED CONDITIONS

DESIGNED BY	MAL	SCALE	DATE 7/22/13
DRAWN BY	MAL	(H) 1"= 100'	SHEET 1 OF 1
CHECKED BY		(V) 1"= N/A	JOB NO. 2184.90

BASIN HYDROLOGIC SUMMARY						
INLET ID	AREA (AC)	T_C (MIN)	RATIONAL "C_5"	RATIONAL "C_{100}"	Q_5 (CFS)	Q_{100} (CFS)
A1a	0.6	5	0.9	0.95	2.9	5.4
A1g	1.7	5	0.9	0.95	7.7	14.5
A2a	0.1	5	0.9	0.95	0.5	1.0
A2b	0.6	5	0.9	0.95	2.7	5.1
A2c	0.9	5	0.9	0.95	4.1	7.6
A3a	0.8	5	0.9	0.95	3.8	7.0
A4	0.2	5	0.9	0.95	0.8	1.6
A5a	0.7	5	0.9	0.95	3.2	5.9
A6a	0.5	5	0.9	0.95	2.1	3.9
A7	0.1	5	0.9	0.95	0.6	1.0
A8a	0.1	5	0.9	0.95	0.3	0.6
A9a	0.1	5	0.9	0.95	0.3	0.6
A10	0.3	5	0.9	0.95	1.2	2.2
A11	0.3	5	0.9	0.95	1.3	2.5
A12	0.9	5	0.9	0.95	4.3	8.1
B1a	0.2	5	0.9	0.95	1.1	2.1
B2	0.2	5	0.9	0.95	0.8	1.5
B3	1.1	5	0.9	0.95	5.2	9.8
B5	0.8	5	0.89	0.94	3.7	7.0
B6	0.8	5	0.77	0.85	3.2	6.3
C1	0.4	5	0.9	0.95	1.8	3.3
C2	1.0	5	0.9	0.95	4.8	9.0
D1	1.8	5	0.7	0.78	6.3	12.6
D2	1.2	5	0.76	0.83	4.6	8.9
E0c	1.2	5	0.9	0.95	5.3	10.0
E1	1.2	5	0.6	0.7	3.8	7.8
E2	0.7	5	0.68	0.77	2.4	4.9
E3	1.2	5	0.66	0.77	3.4	7.1
E4	0.5	5	0.9	0.95	2.5	4.6
E5	0.7	5	0.9	0.95	3.3	6.3
E6	0.3	5	0.9	0.95	1.3	2.5
D	5.1	5	0.3	0.45	7.8	20.8
F1	0.7	5	0.9	0.95	3.4	6.4
G1	0.4	5	0.9	0.95	1.8	3.3
G2a	0.2	5	0.9	0.95	0.8	1.5
G3	0.1	5	0.9	0.95	0.3	0.6
G4a	1.0	5	0.9	0.95	1.3	2.5
G5	0.4	5	0.9	0.95	1.7	3.2
G6a	0.8	5	0.9	0.95	1.9	3.5
G7	0.1	5	0.9	0.95	0.4	0.7
G8	0.1	5	0.9	0.95	0.5	1.0
G9	0.1	5	0.9	0.95	0.5	0.9
G10	0.2	5	0.9	0.95	0.8	1.5
J1	1.8	5	0.9	0.95	8.1	15.2
J1a	0.9	5	0.9	0.95	4.0	7.5
J2	0.9	5	0.9	0.95	4.0	7.6
J2a	0.3	5	0.9	0.95	1.5	2.9
J2b	1.3	5	0.9	0.95	5.8	10.9
J3	0.6	5	0.9	0.95	2.7	5.1
J4a	0.5	5	0.9	0.95	2.1	3.9
J5	0.3	5	0.9	0.95	1.4	2.6
J7	0.3	5	0.9	0.95	1.3	2.4
K0	1.0	5	0.3	0.45	1.6	4.2
K1	0.9	5	0.9	0.95	4.2	7.9



LEGEND

- \# = BASIN DESIGNATION
- AC = AREA IN ACRES
- I(100) = WEIGHTED BASIN IMPERVIOUSNESS (C100)
- STRUCTURE NUMBER
- EXISTING DRAINAGE PATTERN
- EXISTING BASIN BOUNDARY

NORTH

GRAPHIC SCALE IN FEET
0 30 60 120

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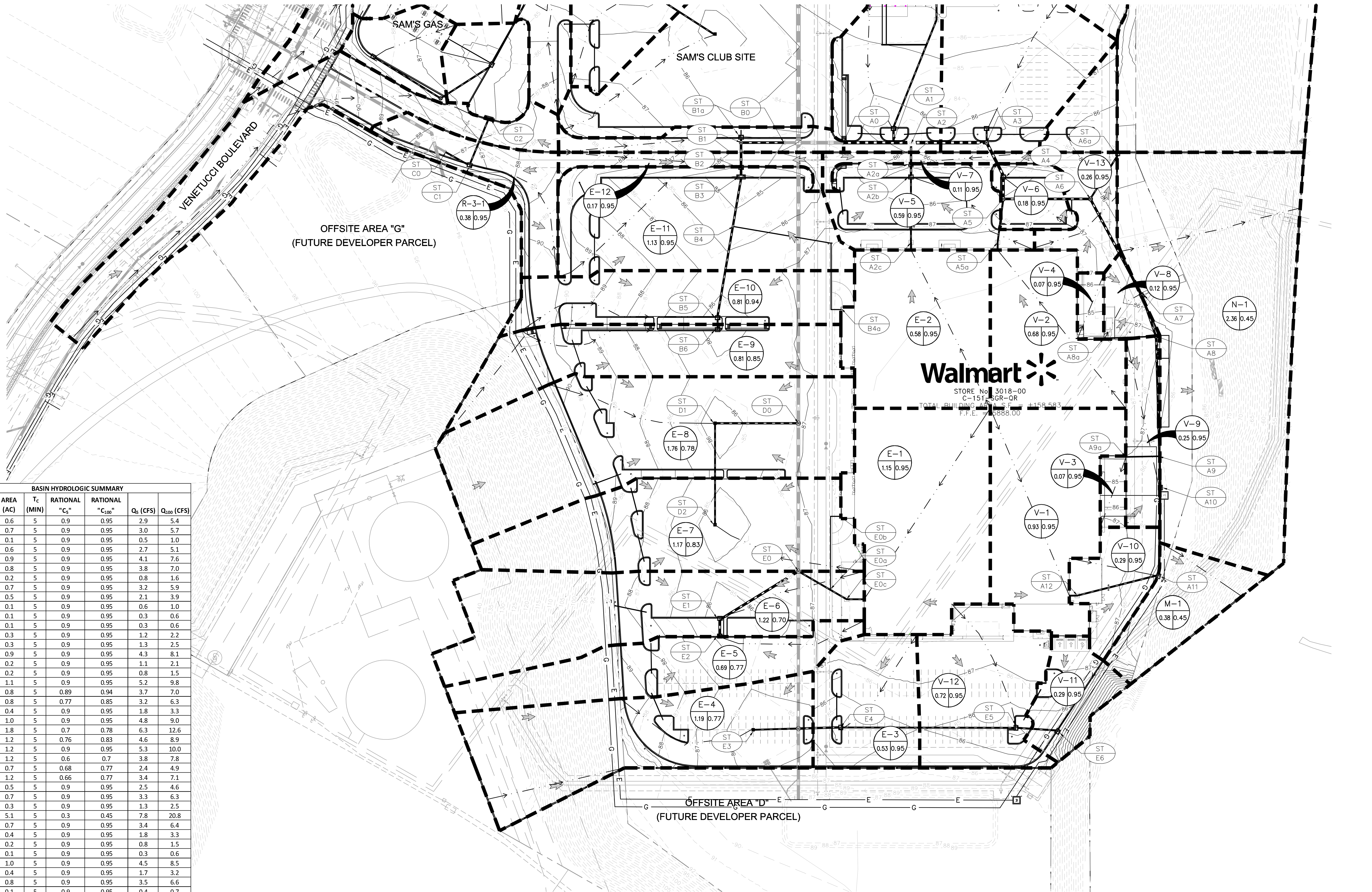
990 SOUTH BROADWAY, SUITE 200, DENVER, CO 80209
PHONE: 303-228-2300
WWW.KIMLEY-HORN.COM

SCALE AS NOTED
DESIGNED BY RSC
DRAWN BY RSC
CHECKED BY DLS

POST-DEVELOPMENT DA MAP: LOT 1

SAM'S CLUB STORE #8272-08
SOUTH ACADEMY HIGHLANDS - LOT 1
SAM'S REAL ESTATE BUSINESS TRUST
FOUNTAIN COLORADO

DATE 3/4/2014
PROJECT NO. 067811100
SHEET NUMBER 6030



BASIN HYDROLOGIC SUMMARY						
INLET ID	AREA (AC)	T_C (MIN)	RATIONAL "C_5"	RATIONAL "C_{100}"	Q_5 (CFS)	Q_{100} (CFS)
A1a	0.6	5	0.9	0.95	2.9	5.4
A1g	0.7	5	0.9	0.95	3.0	5.7
A2a	0.1	5	0.9	0.95	0.5	1.0
A2b	0.6	5	0.9	0.95	2.7	5.1
A2c	0.9	5	0.9	0.95	4.1	7.6
A3a	0.8	5	0.9	0.95	3.8	7.0
A4	0.2	5	0.9	0.95	0.8	1.6
A5a	0.7	5	0.9	0.95	3.2	5.9
A6a	0.5	5	0.9	0.95	2.1	3.9
A7	0.1	5	0.9	0.95	0.6	1.0
A8a	0.1	5	0.9	0.95	0.3	0.6
A9a	0.1	5	0.9	0.95	0.3	0.6
A10	0.3	5	0.9	0.95	1.2	2.2
A11	0.3	5	0.9	0.95	1.3	2.5
A12	0.9	5	0.9	0.95	4.3	8.1
B1a	0.2	5	0.9	0.95	1.1	2.1
B2	0.2	5	0.9	0.95	0.8	1.5
B3	1.1	5	0.9	0.95	5.2	9.8
B5	0.8	5	0.89	0.94	3.7	7.0
B6	0.8	5	0.77	0.85	3.2	6.3
C1	0.4	5	0.9	0.95	1.8	3.3
C2	1.0	5	0.9	0.95	4.8	9.0
D1	1.8	5	0.7	0.78	6.3	12.6
D2	1.2	5	0.76	0.83	4.6	8.9
E0c	1.2	5	0.9	0.95	5.3	10.0
E1	1.2	5	0.6	0.7	3.8	7.8
E2	0.7	5	0.68	0.77	2.4	4.9
E3	1.2	5	0.66	0.77	3.4	7.1
E4	0.5	5	0.9	0.95	2.5	4.6
E5	0.7	5	0.9	0.95	3.3	6.3
E6	0.3	5	0.9	0.95	1.3	2.5
D	5.1	5	0.3	0.45	7.8	20.8
F1	0.7	5	0.9	0.95	3.4	6.4
G1	0.4	5	0.9	0.95	1.8	3.3
G2a	0.2	5	0.9	0.95	0.8	1.5
G3	0.1	5	0.9	0.95	0.3	0.6
G4a	1.0	5	0.9	0.95	4.5	8.5
G5	0.4	5	0.9	0.95	1.7	3.2
G6a	0.8	5	0.9	0.95	3.5	6.6
G7	0.1	5	0.9	0.95	0.4	0.7
G8	0.1	5	0.9	0.95	0.5	1.0
G9	0.1	5	0.9	0.95	0.5	0.9
G10	0.2	5	0.9	0.95	0.8	1.5
J1	1.8	5	0.9	0.95	8.1	15.2
J1a	0.9	5	0.9	0.95	4.0	7.5
J2	0.9	5	0.9	0.95	4.0	7.6
J2a	0.3	5	0.9	0.95	1.5	2.9
J2b	1.3	5	0.9	0.95	5.8	10.9
J3	0.6	5	0.9	0.95	2.7	5.1
J4a	0.5	5	0.9	0.95	2.1	3.9
J5	0.3	5	0.9	0.95	1.4	2.6
J7	0.3	5	0.9	0.95	1.3	2.4
K0	1.0	5	0.3	0.45	1.6	4.2
K1	0.9	5	0.9	0.95	4.2	7.9

LEGEND

# = BASIN DESIGNATION
AC = AREA IN ACRES
I(100) = WEIGHTED BASIN IMPERVIOUSNESS (C100)
STRUCTURE NUMBER
PROPOSED DRAINAGE PATTERN
PROPOSED BASIN BOUNDARY

NORTH

GRAPHIC SCALE IN FEET
0 30 60 120

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WWW.KIMLEY-HORN.COM

SCALE AS NOTED
DESIGNED BY RSC
DRAWN BY RSC
CHECKED BY DLS

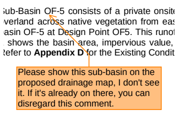
POST-DEVELOPMENT
DA MAP: LOT 2

Walmart STORE #3018-00
SOUTH ACADEMY HIGHLANDS - LOT 2
WAL-MART REAL ESTATE BUSINESS TRUST
FOUNTAIN COLORADO

DATE 3/28/2014
PROJECT NO. 067811099
SHEET NUMBER
6030

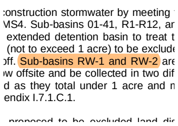
V1_Drainage Report - Final eng only Stormwater will upload addtional comments.pdf Markup Summary

Glenn Reese - EPC Stormwater (29)



Subject: SW - Textbox with Arrow
Page Label: 5
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 4:32:12 PM
Status:
Color: ■
Layer:
Space:

Please show this sub-basin on the proposed drainage map, I don't see it. If it's already on there, you can disregard this comment.



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Page Label: 17
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:14:10 PM
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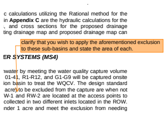
Sub-basins RW-1 and RW-2



Subject: SW - Textbox with Arrow
Page Label: 17
Author: Glenn Reese - EPC Stormwater
Date: 12/19/2024 5:27:27 PM
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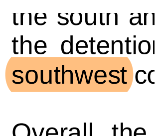
clarify that you wish to apply the aforementioned exclusion to these sub-basins and state the area of each.



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Date: 12/12/2024 5:15:32 PM
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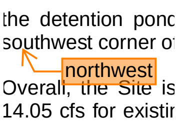
southwest



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Page Label: 17
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:15:40 PM
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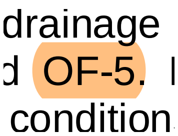
northwest



Subject: SW - Highlight
Page Label: 17
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:16:03 PM
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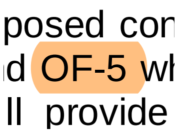
OF-5



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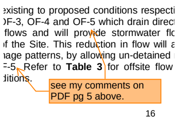
OF-5



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Page Label: 17
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:16:41 PM
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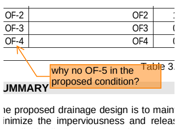
see my comments on PDF pg 5 above.



Subject: SW - Textbox with Arrow
Page Label: 18
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:17:18 PM
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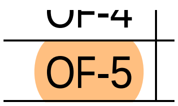
Color:
Layer:
Space:

why no OF-5 in the proposed condition?



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Page Label: 18
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:16:57 PM
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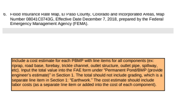
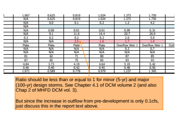
Layer:
Space:

OF-5



Subject: SW - Textbox
Page Label: 19
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:20:29 PM
Status:
Color:
Layer:
Space:

Include a cost estimate for each PBMP with line items for all components (ex: riprap, road base, forebay, trickle channel, outlet structure, outlet pipe, spillway, etc). Input the total value into the FAE form under “Permanent Pond/BMP (provide engineer’s estimate)” in Section 1. The total should not include grading, which is a separate line item in Section 1: “Earthwork.” The cost estimate should include labor costs (as a separate line item or added into the cost of each component).

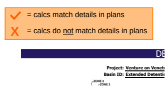


Subject: SW - Textbox with Arrow
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:41:27 PM
Status:
Color:
Layer:
Space:

Ratio should be less than or equal to 1 for minor (5-yr) and major (100-yr) design storms. See Chapter 4.1 of DCM volume 2 (and also Chap 2 of MHFD DCM vol. 3).

But since the increase in outflow from pre-development is only 0.1cfs, just discuss this in the report text above.

Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:42:54 PM
Status:
Color:
Layer:
Space:



Subject: MHFD Calcs
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:42:59 PM
Status:
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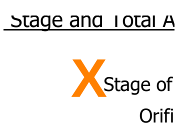
Layer:
Space:



Subject: Text Box
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:43:51 PM
Status:
Color:
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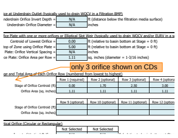
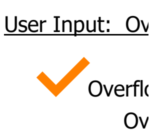
X



Subject: SW - Textbox with Arrow
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:44:06 PM
Status:
Color:
Layer:
Space:

only 3 orifice shown on CDs



Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:48:03 PM
Status:
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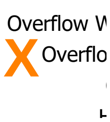

Subject: Text Box
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:48:51 PM
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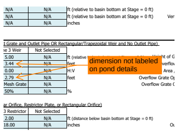
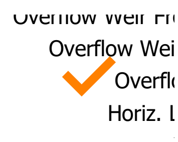


Subject: SW - Textbox with Arrow
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:50:15 PM
Status:
Color:
Layer:
Space:

dimension not labeled on pond details



Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:49:54 PM
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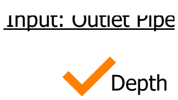

Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:50:28 PM
Status:
Color:
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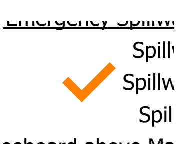
Space:

Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 2:50:30 PM
Status:
Color:
Layer:
Space:



Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:04:33 PM
Status:
Color:
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Space:

Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:04:39 PM
Status:
Color:
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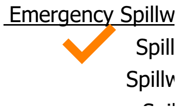
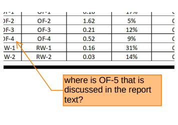
Space:



Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:04:44 PM
Status:
Color:
Layer:
Space:

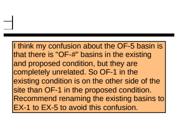
Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:04:57 PM
Status:
Color:
Layer:
Space:

Subject: Checkmark
Page Label: 73
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:05:08 PM
Status:
Color:
Layer:
Space:



Subject: SW - Textbox with Arrow
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:17:33 PM
Status:
Color:
Layer:
Space:

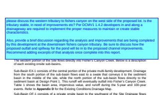
where is OF-5 that is discussed in the report text?



Subject: SW - Textbox
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Glenn Reese - EPC Stormwater
Date: 12/12/2024 5:19:33 PM
Status:
Color:
Layer:
Space:

I think my confusion about the OF-5 basin is that there is "OF-#" basins in the existing and proposed condition, but they are completely unrelated. So OF-1 in the existing condition is on the other side of the site than OF-1 in the proposed condition. Recommend renaming the existing basins to EX-1 to EX-5 to avoid this confusion.

Daniel Torres (12)



Subject: Text Box
Page Label: 5
Author: Daniel Torres
Date: 12/19/2024 3:51:22 PM
Status:
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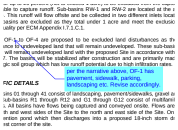
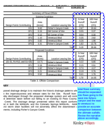
please discuss the western tributary to fishers canyon on the west side of the proposed lot. Is the tributary stable, in need of improvements etc? Per DCMV1 1.4.2 developers in and along a drainageway are required to implement the proper measures to maintain or create stable characteristics.

Also, provide a brief discussion regarding the analysis and improvements that are being completed by this development at the downstream fishers canyon tributary. Be sure to discuss how the proposed outfall and spillway for the pond will tie in to the proposed channel improvements. Recommend adding excerpts of that analysis once complete into this report.



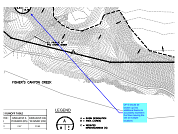
Subject: Callout
Page Label: 17
Author: Daniel Torres
Date: 12/19/2024 2:16:44 PM
Status:
Color:
Layer:
Space:

per the narrative above, OF-1 has pavement, sidewalk, parking, landscaping etc. Revise accordingly.



Subject: Cloud+
Page Label: 18
Author: Daniel Torres
Date: 12/19/2024 2:36:18 PM
Status:
Color:
Layer:
Space:

total flows summary should be separated into flows going to the west into fishers canyon and the east to venetucci to provide an accurate comparison between the ultimate outfalls. Revise the narrative above accordingly.



Subject: Callout
Page Label: [1] EXISTING DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 1:32:41 PM
Status:
Color:
Layer:
Space:

OF-5 should be broken up into additional basins to accurately represent the flows leaving the site at multiple locations

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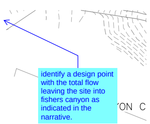

Subject: Callout
Page Label: [1] EXISTING DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 4:09:23 PM
Status:
Color:
Layer:
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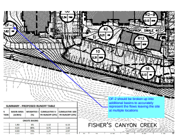
identify a design point with the total flow leaving the site into fishers canyon as indicated in the narrative.



Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 3:21:01 PM
Status:
Color:
Layer:
Space:

OF-2 should be broken up into additional basins to accurately represent the flows leaving the site at multiple locations

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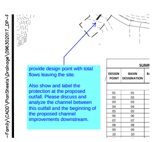

Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 3:40:36 PM
Status:
Color:
Layer:
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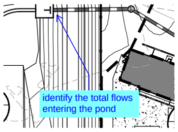
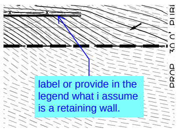
provide design point with total flows leaving the site.

Also show and label the protection at the proposed outfall. Please discuss and analyze the channel between this outfall and the beginning of the proposed channel improvements downstream.



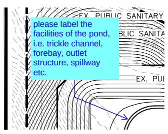
Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 2:23:15 PM
Status:
Color:
Layer:
Space:

identify the total flows entering the pond



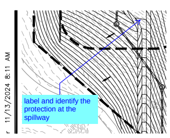
Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 2:41:32 PM
Status:
Color:
Layer:
Space:

label or provide in the legend what i assume is a retaining wall.



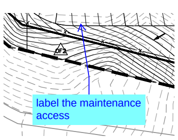
Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 2:47:04 PM
Status:
Color:
Layer:
Space:

please label the facilities of the pond, i.e. trickle channel, forebay, outlet structure, spillway etc.



Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 3:35:07 PM
Status:
Color:
Layer:
Space:

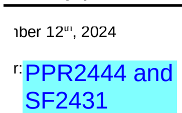
label and identify the protection at the spillway



Subject: Callout
Page Label: [1] PROPOSED DRAINAGE MAP
Author: Daniel Torres
Date: 12/19/2024 3:34:47 PM
Status:
Color:
Layer:
Space:

label the maintenance access

Bret (9)



Subject: Engineer
Page Label: 1
Author: Bret
Date: 12/13/2024 12:21:33 PM
Status:
Color:
Layer:
Space:

PPR2444 and SF2431

Subject: Drainage Report - County
Page Label: 2
Author: Bret
Date: 12/13/2024 12:21:44 PM
Status:
Color:
Layer:
Space:

El Paso County:

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

____
_ ____________
Joshua Palmer, P.E.
Date
County Engineer / ECM Administrator

Conditions:

Subject: Engineer
Page Label: 5
Author: Bret
Date: 12/13/2024 12:22:14 PM
Status:
Color:
Layer:
Space:

Please include area, Q5, and Q100 with each basin description throughout the report

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Subject: Engineer
Page Label: 5
Author: Bret
Date: 12/13/2024 12:22:28 PM
Status:
Color:
Layer:
Space:

add street name

Subject: Engineer
Page Label: 5
Author: Bret
Date: 12/13/2024 12:22:37 PM
Status:
Color:
Layer:
Space:

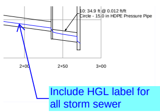
add street name

Subject: Engineer
Page Label: 5
Author: Bret
Date: 12/13/2024 12:22:41 PM
Status:
Color:
Layer:
Space:

add street name

Subject: Engineer
Page Label: 18
Author: Bret
Date: 12/13/2024 12:23:16 PM
Status:
Color:
Layer:
Space:

Please update to the 2024 fee schedule



Subject: Engineer
Page Label: 124
Author: Bret
Date: 12/13/2024 12:24:55 PM
Status:
Color:
Layer:
Space:

Include HGL label for all storm sewer

Please move this to the end of the report

Subject: Engineer
Page Label: 156
Author: Bret
Date: 12/13/2024 12:25:39 PM
Status:
Color:
Layer:
Space:

Please move this to the end of the report