Final Drainage Report

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

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Project #: 096302017

Prepared: November 12th, 2024

PCD File Number: N/A





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.

Date

Name of Developer

Authorized Signature

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.

Jennifer Irvine, P.E. County Engineer/ ECM Administrator Date

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**).

EXISTING SUB-BASIN DESCRIPTIONS

The south portion of the Site sheet flows east to a swale that conveys it to the sediment basin in the middle of the site, while the north portion of the Site flows directly to the sediment basin. The western portion of the Site flows directly into Fisher's Canyon Creek. Below is a description of each existing onsite sub-basins.

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.

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 Subbasin 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 Subbasin 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 Subbasin 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.

	SUMMARY - EXISTING RUNOFF TABLE						
DESIGN POINT	BASIN DESIGNATION	WEIGHTED I		CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100-YR RUNOFF (CFS)		
EX1	EX-1	9.63	9.63 0.00		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 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)		
	1	0	NSITE BASINS	1	L		
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

Kimley **»Horn**

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**.

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.

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.

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.



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).

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.

- <u>Drainage Fee/Impervious Acre = \$23,078 x 8.66 acres = \$199,855.48</u> **Total = \$199,855.48**

	S	ummary of F	ows Offsite					
	Existing Condition							
		0		5-Year	100-Year			
Sub-Basin		Area		Runoff	Runoff			
Designation	Design Points Contributing	(Acres)	Location Leaving Site	(CFS)	(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			
	5.19	38.66						
		Proposed C	ondition					
		-		5-Year	100-Year			
Sub-Basin		Area		Runoff	Runoff			
Designation	Design Points Contributing	(Acres)	Location Leaving Site	(CFS)	(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			

Table 3. Offsite Comparison

SUMMARY

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

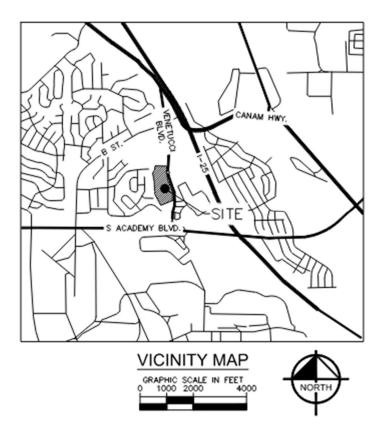


REFERENCES

- 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).

APPENDIX

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





United States Department of Agriculture

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



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.

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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.



	MAP L	EGEND		MAP INFORMATION
	terest (AOI) Area of Interest (AOI)	8	Spoil Area Stony Spot	The soil surveys that comprise your AOI were mapped at 1:24,000.
Soils	Soil Map Unit Polygons Soil Map Unit Lines	Ø V	Very Stony Spot Wet Spot	Warning: Soil Map may not be valid at this scale.
	Soil Map Unit Points Point Features		Other Special Line Features	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
ල හ	Blowout Borrow Pit	Water Fea	tures Streams and Canals	contrasting soils that could have been shown at a more detailed scale.
⊠ ₩ ◇	Clay Spot Closed Depression	Transport	Rails	Please rely on the bar scale on each map sheet for map measurements.
×	Gravel Pit Gravelly Spot	~	Interstate Highways US Routes	Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)
 Θ Λ.	Landfill Lava Flow	~	Major Roads Local Roads	Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts
人 小 次	Marsh or swamp Mine or Quarry	Backgrou	Aerial Photography	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.
0	Miscellaneous Water Perennial Water			This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.
~ +	Rock Outcrop Saline Spot			Soil Survey Area: El Paso County Area, Colorado Survey Area Data: Version 21, Aug 24, 2023
··· •·	Sandy Spot Severely Eroded Spot			Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.
 ۵	Sinkhole Slide or Slip			Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018
ji K	Sodic Spot			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:

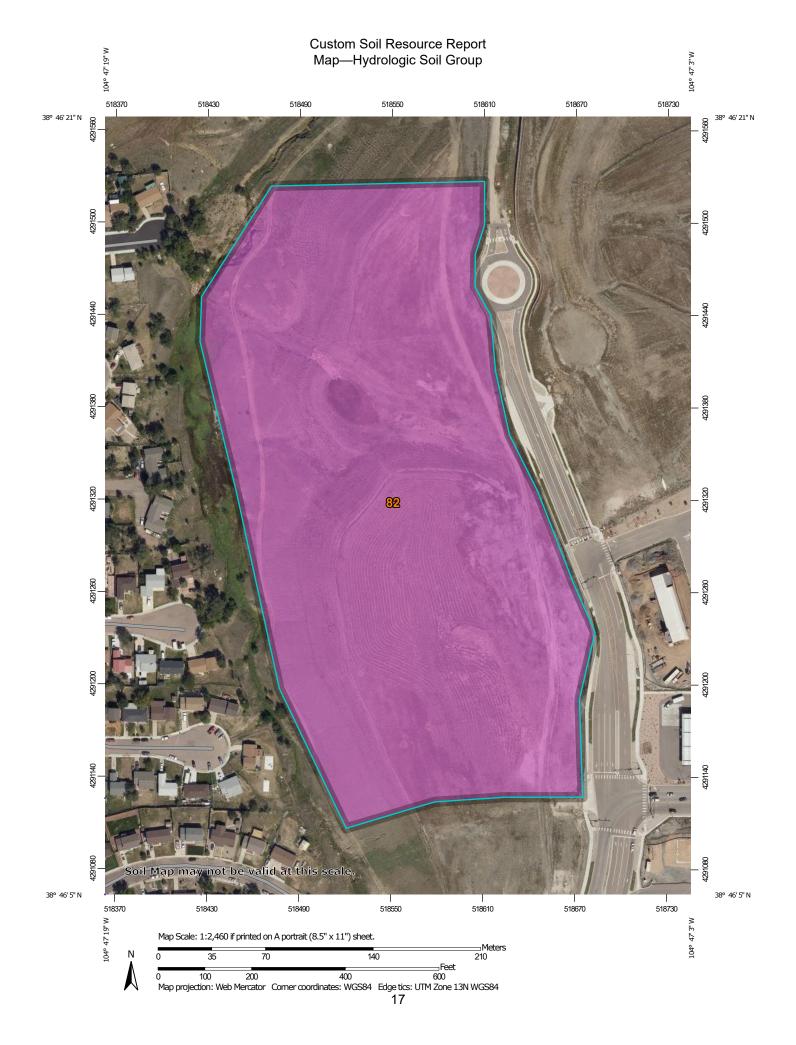
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

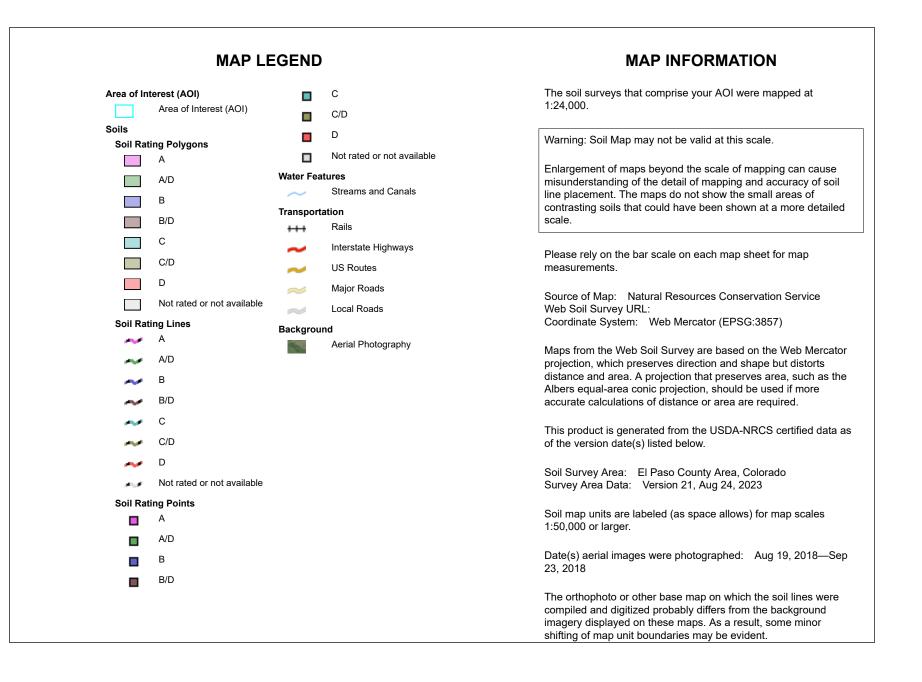
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.





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 Interes	st	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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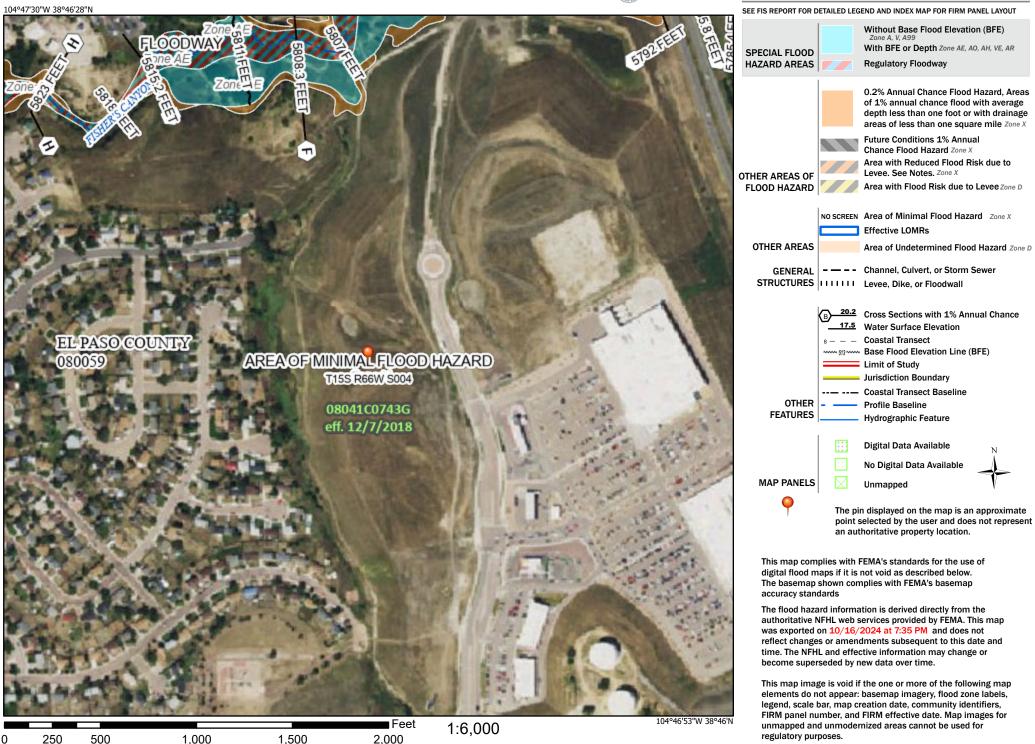
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National Flood Hazard Layer FIRMette



Legend



Basemap Imagery Source: USGS National Map 2023

APPENDIX B: HYDROLOGY

 $\begin{array}{l} \text{IDF Equations} \\ \mathbf{I}_{100} = -2.52 \, \ln(\mathrm{D}) + 12.735 \\ \mathbf{I}_{50} = -2.25 \, \ln(\mathrm{D}) + 11.375 \\ \mathbf{I}_{25} = -2.00 \, \ln(\mathrm{D}) + 10.111 \\ \mathbf{I}_{10} = -1.75 \, \ln(\mathrm{D}) + 8.847 \\ \mathbf{I}_{5} = -1.50 \, \ln(\mathrm{D}) + 7.583 \\ \mathbf{I}_{2} = -1.19 \, \ln(\mathrm{D}) + 6.035 \\ \text{Note: Values calculated by} \\ \text{equations may not precisely} \\ \text{duplicate values read from figure.} \end{array}$

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

	AREA	AREA	ROOF	ROOF		RO	OF		LANDSCAPE	LANDSCAPE		LAND	SCAPE		PAVEMENT	PAVEMENT		PAVE	MENT		WEIGHTED		WEIGHTED	COEFFICIEN	٢S
SUB-BASIN	(SF)	(Acres)	AREA	IMPERVIOUSNESS	C2	C5	C10	C100	AREA (Acres)	IMPERVIOUSNESS	C2	C5	C10	C100	AREA (Acres)	IMPERVIOUSNESS	C2	C5	C10	C100	IMPERVIOUSNESS	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 FLOW	/ING OFFSITE																								ļ
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 o	on Venetuco	ci - Final Dr	ainage Re	eport						Watercou	Irse Coeffic	ient				
Existing F	Runoff Calcu	Ilations			Heav	vy Meadow	2.50	Sł	nort Pastur	e & Lawns	7.00			Grasse	d Waterway	15.00
Time of C	oncentratio	on			Т	illage/Field	5.00		Nearly Ba	re Ground	10.00		Pave	ed Area & Pa	aved Swales	20.00
		SUB-BASIN DATA			INIT	IAL / OVERL TIME	AND	T	RAVEL TIN T(t)	1E			(URE	T(c) CHECK BANIZED BA		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

$$t_{t} = \frac{0.395(1.1 - C_{5})\sqrt{L_{t}}}{S_{o}^{0.33}} \qquad t_{t} = \frac{L_{t}}{60K\sqrt{S_{o}}} = \frac{L_{t}}{60V_{t}} \qquad t_{t} = (26 - 17i) + \frac{L_{t}}{60(14i + 9)\sqrt{S_{t}}}$$

Existing Ru	Venetucci - Fi noff Calculatic thod Procedure)		inage Rep	ort	Desi	gn Storm	5 Year					
B	ASIN INFORMATIO	ON			DIRECT	RUNOFF		С	UMULATI	VE RUNO	F	
DESIGN POINT	DRAIN BASIN	DRAIN AREA RUN			СхА	l in/hr	Q cfs	T(c) min	СхА	l in/hr	Q cfs	NOTES
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	

Existing	on Venetucci - Fi Runoff Calculatic Method Procedure)		inage Rep	oort	Des	ign Storm	100 Year					
E	BASIN INFORMATIO											
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	СхА	l in/hr	Q cfs	T(c) min	СхА	l in/hr	Q cfs	NOTES
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 RUN	OFF 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

1

Table 6-6. Runoff Coefficients for Rational Method

(Source: UDFCD 2001)

Land Use or Surface	Percent						Runoff Co	oefficients					
Characteristics	Impervious	2-y	ear	5-γ	ear	10-1	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	1												
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		-	-		5					5			
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	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
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	-	OOF	GRAVEL	GRAVEL		GRA		LANDSCAPE	LANDSCAPE	LANDSCAPE	PAVEMENT	PAVEMENT	PAVEMENT	WEIGHTED		ITED COEF	
SOD-DASIN	(SF)	(AC)	AREA (AC)	IMPERVIOUSNESS		C10 C100	AREA (AC)	IMPERVIOUSNESS	C2		C10 C100	AREA (AC)	IMPERVIOUSNESS	C2 C5 C10 C100	AREA (AC)	IMPERVIOUSNESS		IMPERVIOUSNESS		C5 C10	
01	82554.44	1.895	0.00	90%	0.71 0.73		0.08	80%			0.63 0.70	1.78	0%	0.02 0.08 0.15 0.35	0.03		0.89 0.90 0.92 0.96	5%		0.12 0.13	
02	9830.71	0.226	0.00	9 0%	0.71 0.73		0.00	80%			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%		0.74 0.7	
03	13082.50	0.300	0.00	90%	0.71 0.73		0.00	80%			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%		0.68 0.72	
04	3184.87	0.073	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.01	0%	0.02 0.08 0.15 0.35	0.06		0.89 0.90 0.92 0.96	80%		0.73 0.70	
05	1391.86	0.032	0.00	90%	0.71 0.73		0.00	80%			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%		0.81 0.83	
06	14724.32	0.338	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.07	0%	0.02 0.08 0.15 0.35	0.27		0.89 0.90 0.92 0.96	79%		0.73 0.70	
07	10903.25	0.250	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.25	0%	0.02 0.08 0.15 0.35	0.00		0.89 0.90 0.92 0.96	1%		0.09 0.10	
08	8076.80	0.185	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.04	0%	0.02 0.08 0.15 0.35	0.15		0.89 0.90 0.92 0.96	79%		0.73 0.7	
09	6260.32	0.144	0.00	90%	0.71 0.73		0.00	80%			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%		0.77 0.80	
10	13472.93	0.309	0.00	90%	0.71 0.73		0.00	80%			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%		0.78 0.8	
11	15900.76	0.365	0.00	90%	0.71 0.73		0.00	80%			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%		0.08 0.1	
12	9093.58	0.209	0.00	90%	0.71 0.73		0.00				0.63 0.70	0.04	0%	0.02 0.08 0.15 0.35	0.17		0.89 0.90 0.92 0.96	82%		0.75 0.78	
13	9999.48	0.230	0.00	90%	0.71 0.73		0.00	80%			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%		0.81 0.83	
14	11215.56	0.257	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.06	0%	0.02 0.08 0.15 0.35	0.20		0.89 0.90 0.92 0.96	79%		0.72 0.7	
15	6328.38	0.145	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.02	0%	0.02 0.08 0.15 0.35	0.12		0.89 0.90 0.92 0.96	86%		0.78 0.8	
16	5769.99	0.132	0.00	90%	0.71 0.73		0.00	80%			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%		0.88 0.9	
17	1846.41	0.042	0.00	90%	0.71 0.73		0.00	80%			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%		0.90 0.92	
18	14621.66	0.336	0.00	90% 90%	0.71 0.73 0.71 0.73		0.00 0.00	80% 80%			0.63 0.70 0.63 0.70	0.08	0%	0.020.080.150.350.020.080.150.35	0.25	100% 100%	0.890.900.920.960.890.900.920.96	76%		0.70 0.73 0.08 0.1	
19	12107.43	0.278		90%	0.71 0.73		0.00				0.63 0.70	0.28	0% 0%	0.02 0.08 0.15 0.35	0.00		0.89 0.90 0.92 0.96	0% 84%		0.08 0.1	
20 21	12501.18 4925.14	0.287	0.00	90%	0.71 0.73		0.00	80% 80%			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%		0.77 0.8	
21	4925.14	0.113	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.02	0%	0.02 0.08 0.15 0.35	0.10		0.89 0.90 0.92 0.96	76%		0.79 0.8	
22	7686.10	0.112	0.00	90%	0.71 0.73		0.00	80%			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	80%		0.74 0.7	
23	10901.02	0.170	0.00	90%	0.71 0.73		0.00	80%			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	84%		0.77 0.7	
24	11868.69	0.230	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.04	0%	0.02 0.08 0.15 0.35	0.20	100%	0.89 0.90 0.92 0.96	74%		0.68 0.72	
26	4355.60	0.272	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.07	0%	0.02 0.08 0.15 0.35	0.08	100%	0.89 0.90 0.92 0.96	78%		0.72 0.7	
27	6964.98	0.160	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.02	0%	0.02 0.08 0.15 0.35	0.13	100%	0.89 0.90 0.92 0.96	82%		0.76 0.78	
28	8818.61	0.202	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.03	0%	0.02 0.08 0.15 0.35	0.13		0.89 0.90 0.92 0.96	82%		0.75 0.78	
29	9524.15	0.219	0.00	90%	0.71 0.73		0.00	80%			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%		0.72 0.7	
30	9202.82	0.211	0.00	90%	0.71 0.73		0.00	80%			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%		0.75 0.78	
31	13152.14	0.302	0.00	90%	0.71 0.73		0.00	80%			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%		0.08 0.1	
32	8599.62	0.197	0.00	90%	0.71 0.73		0.00	80%			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%		0.79 0.8	
33	9272.35	0.213	0.00	90%	0.71 0.73		0.00	80%			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%		0.80 0.82	
34	12649.63	0.290	0.00	90%	0.71 0.73		0.00	80%			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%		0.73 0.7	
35	7600.20	0.174	0.00	90%	0.71 0.73		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 0.78
36	8931.22	0.205	0.00	90%	0.71 0.73		0.00	80%			0.63 0.70	0.03	0%	0.02 0.08 0.15 0.35	0.17		0.89 0.90 0.92 0.96	85%		0.78 0.80	
37	4475.89	0.103	0.00	90%	0.71 0.73		0.00	80%			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%		0.70 0.73	
38	10102.16	0.232	0.00	9 0%	0.71 0.73	0.75 0.81	0.00	80%			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	3 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 0.1	5 0.35
40	9015.38	0.207	0.00	9 0%	0.71 0.73		0.00	80%			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%		0.08 0.1	
41	4175.02	0.096	0.00	9 0%	0.71 0.73		0.00	80%			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%		0.67 0.7	
R1-A	5101.62	0.117	0.12	90%	0.71 0.73		0.00	80%			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%		0.73 0.7	
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 0.7	5 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	5 0.81
R2-B	5869.14	0.135	0.13	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R3-A	7028.43	0.161	0.16	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R3-B	7028.43	0.161	0.16	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R4-A	6679.62	0.153	0.15	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R4-B	6679.62	0.153	0.15	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R5-A	7028.43	0.161	0.16	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R5-B	7028.43	0.161	0.16	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R6-A	6679.62	0.153	0.15	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R6-B	6679.62	0.153	0.15	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R7-A	5869.14	0.135	0.13	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R7-B	5869.14	0.135	0.13	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R8-A	5869.14	0.135	0.13	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
R8-B	5869.14	0.135	0.13	90%	0.71 0.73 0.75 0.81	0.00	80%			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	
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	5 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	5 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	5 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	5 0.81
R11	5174.04	0.119	0.12	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
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	5 0.81
G1	1933.18	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G2-A	1911.08	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	5 0.81
G2-B	1911.08	0.044	0.04	<mark>90</mark> %	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G3-A	1911.08	0.044	0.04	<mark>90</mark> %	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G3-B	1911.08	0.044	0.04	<mark>90</mark> %	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G4-A	1911.08	0.044	0.04	9 0%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G4-B	1911.08	0.044	0.04	<mark>90</mark> %	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G5-A	2001.93	0.046	0.05	<mark>90</mark> %	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G5-B	2001.93	0.046	0.05	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G6-A	1911.08	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G6-B	1911.08	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G7-A	1911.08	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G7-B	1911.08	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G8	1933.18	0.044	0.04	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
G9	1449.97	0.033	0.03	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.00	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	90%	0.71 0.73 0.75	
OF-1	6976.57	0.160	0.00	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.13	0%		0.08 0.15 0.35	0.03	100%	0.89 0.90 0.92 0.96	17%	0.17 0.22 0.28	
OF-2	70368.75	1.615	0.00	90%	0.71 0.73 0.75 0.81	0.10	80%			0.63 0.70		0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	5%	0.05 0.11 0.18	
OF-3	9097.46	0.209	0.00	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.18	0%		0.08 0.15 0.35	0.02	100%	0.89 0.90 0.92 0.96	12%	0.12 0.18 0.24	
OF-4	22781.08	0.523	0.00	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70		0%		0.08 0.15 0.35	0.05	100%	0.89 0.90 0.92 0.96	9%	0.10 0.16 0.22	
RW-1	7017.05	0.161	0.00	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.11	0%		0.08 0.15 0.35	0.05	100%	0.89 0.90 0.92 0.96	31%	0.29 0.33 0.39	
RW-2	1109.96	0.025	0.00	90%	0.71 0.73 0.75 0.81	0.00	80%			0.63 0.70	0.11	0%		0.08 0.15 0.35	0.00	100%	0.89 0.90 0.92 0.96	14%	0.21 0.48 0.79	
	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	5 0.66

Venture o	n Veneturc	I Final De														
			ainage Rep	oort						Watercou	rse Coeffic	ient				
	Runoff Cal					vy Meadow	2.50	SI	nort Pastur	e & Lawns	7.00			Grassed	d Waterway	15.00
Time of C	oncentratio					Fillage/Field	5.00		-	re Ground	10.00		Pave	ed Area & Pa	aved Swales	
		SUB-BASIN			INIT	TAL / OVERL	AND	Т	RAVEL TIN	1E			(1)5	T(c) CHECK		FINAL
DESIGN	DRAIN	DATA AREA	AREA	C(5)	Length	TIME Slope	T(i)	Length	T(t) Slope	Coeff.	Velocity	T(t)	(URI COMP.	BANIZED BAS	SINS) L/180+10	T(c)
POINT	BASIN	sq. ft.	ac.	0(3)	ft.	%	min	ft.	%	coen.	fps	min.	T(c)	LENGTH	L/ 100+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
01	01	9,831	0.23	0.72	99	0.6%	7.8	0	0.0%	20.0	0.0	0.0	7.8	99	10.4	7.8
02	02	13,083	0.23	0.74	121	1.8%	6.9	48	2.3%	20.0	3.0	0.0	7.0	169	10.5	7.2
03	03	3,185	0.07	0.00	49	2.0%	3.8	40	1.8%	20.0	2.7	0.3	5.0	94	10.9	5.0
04	04	1,392	0.07	0.73	52	2.0%	3.0	6	2.0%	20.0	2.7	0.0	5.0	58	10.3	5.0
05	05	1,392	0.03	0.01	52 2	2.0%	0.7	0 94	2.0%	20.0	2.0	0.0	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

2017						Mu	ılti-Family Final Drain	n Venetucci Developmi age Repor	ent							11/12/2 ated by:
Venture o	n Venetucc	i - Final Dra	ainage Re _l	port			El Paso Co	ounty, CO		Watercou	irse Coeffic	ient				
Proposed	Runoff Cal	culations			Hea	vy Meadow	2.50	SI	hort Pastur	e & Lawns	7.00			Grasse	d Waterway	15.00
Time of C	oncentratic					illage/Field				re Ground	10.00		Pave		aved Swales	20.00
		SUB-BASIN			INIT	IAL / OVERL	AND	T	RAVEL TIM	1E				T(c) CHECK		FINAL
DESIGN	DRAIN	DATA AREA	AREA	C(5)	Length	TIME	T(i)	Longth	T(t) Slope	Coeff.	Velocity	T(t)	(URE COMP.	BANIZED BA TOTAL	SINS) L/180+10	T(c)
25	25	11,869	0.27	0.68	67	Slope 4.8%	3.7	Length 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
20	20	6,965	0.10	0.72	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	0.10	0.75	87	3.3%	4.7	72	2.1%	20.0	3.0	0.4	5.0	161	10.9	5.0
20	20	9,524	0.20	0.73	100	1.8%	5.7	42	1.6%	20.0	2.5	0.4	6.0	143	10.9	6.0
30	30	9,203	0.22	0.72	58	4.2%	3.0	40	2.0%	20.0	2.3	0.3	5.0	98	10.5	5.0
31	30	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	0.20	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-B	R5-A R5-B	7,028 7,028	0.16 0.16	0.73 0.73	35 35	2.0% 2.0%	3.2 3.2	0	0.0%	20.0 20.0	0.0 0.0	0.0	5.0 5.0	35 35	10.2 10.2	5.0 5.0

Venture on Venetucci

Venture o	on Venetucci	i - Final Dra	ainage Rej	oort						Watercou	irse Coeffic	ient				
Proposed	l Runoff Cald	culations			Hear	vy Meadow	2.50	Sł	nort Pastur	e & Lawns	7.00			Grasse	d Waterway	15.00
Time of C	Concentratio	n			Т	illage/Field	5.00		Nearly Ba	re Ground	10.00		Pave	ed Area & Pa	aved Swales	20.00
		SUB-BASIN			INIT	IAL / OVERL	AND	Т	RAVEL TIM	IE				T(c) CHECK		FINAL
		DATA				TIME			T(t)				(URE	BANIZED BA	SINS)	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

	Venetucci - Fir		inage Rep	ort								
Proposed R	Runoff Calculati	ions			Desi	gn Storm	5 Year					
(Rational Me	thod Procedure)											
	ASIN INFORMATIC					RUNOFF				VE RUNO		
DESIGN	DRAIN	AREA	RUNOFF	T(c)	СхА		Q	T(c)	СхА		Q	NOTES
POINT	BASIN	ac.	COEFF	min	0.00	in/hr	cfs	min		in/hr	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	

Venture on Venetucci Multi-Family Development Final Drainage Report

El Paso County, CO Venture on Venetucci - Final Drainage Report Proposed Runoff Calculations Design Storm 5 Year (Rational Method Procedure) CUMULATIVE RUNOFF **BASIN INFORMATION** DIRECT RUNOFF DESIGN DRAIN AREA RUNOFF T(c) СхА Q T(c) СхА Q NOTES 25 0.27 5.0 0.19 0.96 0.96 25 0.68 5.17 26 0.10 0.72 0.07 0.37 26 5.0 5.17 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 0.79 6.4 0.32 0.15 5.17 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 0.21 30 0.75 5.0 0.16 5.17 0.82 5.0 0.31 5.17 1.62 Basin 32 & 30 31 0.30 11.3 0.02 3.95 0.10 11.3 0.2 3.95 Basin 31, R7-A, R8-B 31 0.08 0.87 32 0.20 0.80 32 0.79 5.0 0.16 5.17 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 0.17 0.60 5.0 35 0.66 5.0 0.12 5.17 0.35 5.17 1.79 Basin 37, 36, & 35 36 0.82 5.0 36 0.21 0.78 5.0 0.16 5.17 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 0.35 38 0.23 0.38 10.7 0.09 4.03 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 0.10 41 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 0.11 R4-A R4-A 0.15 0.73 5.0 5.17 0.58 0.58 R4-B 0.58 R4-B 0.15 0.73 5.0 0.11 5.17 0.58 R5-A R5-A 0.73 5.0 0.12 5.17 0.61 0.16 0.61 R5-B R5-B 0.16 0.73 5.0 0.12 5.17 0.61 0.61

roposed Ri	unoff Calcula	tions		ort	Desi	gn Storm	5 Year					
ational Met	hod Procedure)											
	SIN INFORMAT	ION			DIRECT	RUNOFF		C	UMULATI	VE RUNO	FF	
DESIGN	DRAIN	AREA	RUNOFF	T(c)	СхА	I	Q	T(c)	СхА		Q	NOTES
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	

Proposed	on Venetucci - Fi d Runoff Calculat		inage Rep	oort	Des	ign Storm		ounty, oo				
	Method Procedure) BASIN INFORMATION	4		DIE	RECT RUN				CUMULATI		г	1
DESIGN	DRAIN	AREA	RUNOFF	T(c)			Q	T(c)	C x A		Q	NOTES
POINT	BASIN	ac.	COEFF	min		in/hr	cfs	min		in/hr	cfs	NOTES
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	

Venture on Venetucci Multi-Family Development Final Drainage Report

11/12/2024 Calculated by: CRA

	on Venetucci - Fi d Runoff Calculat		inage Rej	oort	Des	ign Storm		ounty, CO				
						0						
	Method Procedure) BASIN INFORMATION				RECT RUNG	JEE			CUMULATI		E	
DESIGN	DRAIN	AREA	RUNOFF	T(c)	CxA		Q	T(c)	CxA		Q	NOTES
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	

Venture o	n Venetucci - Fi	nal Dra	inage Rep	oort								
Proposed	Runoff Calculat	tions			Des	ign Storm	100 Year					
Rational Me	ethod Procedure)											
BA	SIN INFORMATION	N		DIF	RECT RUNG	DFF		(CUMULATI	VE RUNOF	F	
DESIGN	DRAIN	AREA	RUNOFF	T(c)	СхА		Q	T(c)	СхА		Q	NOTES
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	

							EI	Paso Col	inty, co			
			- Final D	0	•							
			ulations		Desig	ın Storm	10 Year					
(Rationa	l Method	Procedu	re)									
DACINI	INFORM	ΑΤΙΟΝ		חוח	ECT RUN			CU	MMULAT			1
DESIGN	DRAIN		RUNOFF	T(c)	CXA	UFF I	Q	T(c)	C x A		Q	NOTES
POINT	BASIN	ac.	COEFF	min		in/hr	cfs	min		in/hr	cfs	NOTES
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	

									age Repoi			Calcula
Ventur	e on Ve	netucci	- Final L	Drainag	je Repoi	t	EI	l Paso Co	unty, CO			
ropos	ed Rund	off Calc	ulations		Desig	n Storm	10 Year					
Rationa	l Method	l Procedu	ıre)									
BASIN	INFORM	ATION		DIR	ECT RUN	OFF		CU	MMULAT	IVE RUN	OFF	
DESIGN		AREA	RUNOFF	T(c)	СхА		Q	T(c)	СхА	I	Q	NOTES
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		I		0.73	

Ventur	e on Ve	netucci	- Final D	Drainad	e Repor	t						
			ulations	-			10 Year					
					Desig	11 5101111	To Tcar					
(Rationa	Γινιειποά	Procedu	re)									
DACINI	INFORM			חוס	ECT RUN			CU	MMULAT			
DESIGN	DRAIN		RUNOFF	T(c)			Q	T(c)	CXA		Q	NOTEO
R6-A	R6-A	0.153	0.75	5.0	0.12	6.03	0.69	1(0)	UXA	I	0.69	NOTES
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	0.12	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	

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	SI	JMMARY - Pr	OPOSED RU	INOFF TABLE	
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5-YR RUNOFF (CFS)	CUMULATIVE 100- YR RUNOFF (CFS)
		0	NSITE 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
R1-D	R1-D	0.12	90%	0.44	0.82
R2-A R2-B	R2-A R2-B	0.13	90% 90%	0.51	0.95
R3-A	R3-A	0.16	90%	0.61	1.13
R3-A R3-B	R3-A R3-B	0.16	90% 90%	0.61	1.13
			90% 90%	0.58	1.13
R4-A	R4-A	0.15			
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

Depth Increment =

100-YR EURV WOCV	ZONE 1		
PERMANENT	ZONE 1 AND 2 ORIFICES	100-YEAR ORIFICE	
POOL EX	ample Zone Configur	ration (Retention Pond)	

Watershed Information

ersneu 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 - Capit	tol 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.

the embedded Colorado Urban Hydro	ograph Procedu	ure.	Optional Use	
		-	Optional Use	7
Water Quality Capture Volume (WQCV) =	0.283	acre-feet		acre-fe
Excess Urban Runoff Volume (EURV) =	1.067	acre-feet		acre-fe
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	Geome	etry
		2	Zone 1	Volume	(WQ

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 (Smain) =	user	H:V
Basin Length-to-Width Ratio (R _{L/W}) =	user	

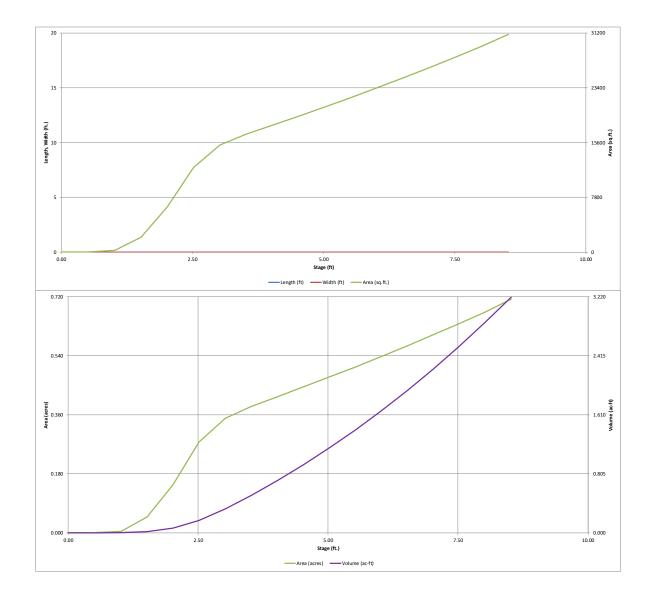
Initial Surcharge Area (A _{ISV}) =	user	ft ²
Surcharge Volume Length $(L_{ISV}) =$	user	ft
Surcharge Volume Width $(W_{ISV}) =$	user	ft
Depth of Basin Floor $(H_{FLOOR}) =$	user	ft
Length of Basin Floor $(L_{FLOOR}) =$	user	ft
Width of Basin Floor $(W_{FLOOR}) =$	user	ft
Area of Basin Floor (A _{FLOOR}) =	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 Optional				Optional			
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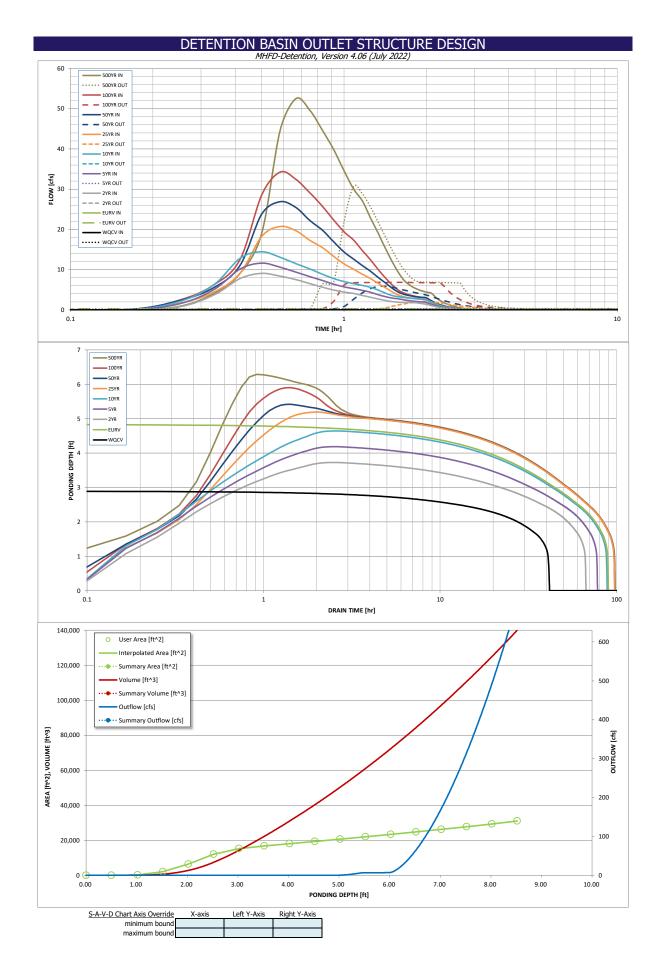
MHFD-Detention_v4-06.xlsm, Basin

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



	DE		BASIN OUT			SIGN			
Project:	Venture on Venetu		1HFD-Detention, V	ersion 4.06 (July .	2022)				
Basin ID:	Extended Detentio	on Basin							
ZONE 3				Estimated	Estimated				
100-YR				Stage (ft)	Volume (ac-ft)	Outlet Type			
VOLUME EURV WQCV	1		Zone 1 (WQCV)	2.89	0.283	Orifice Plate			
	100-YEAR		Zone 2 (EURV)		0.784	Orifice Plate			
ZONE 1 AND 2	ORIFICE		Zone 3 (100-year)		0.590	Weir&Pipe (Restrict)			
PERMANENT COMPANY	Configuration (Re	tention Pond)	2011e 3 (100-year)	Total (all zones)	1.657	Weildripe (Result)			
User Input: Orifice at Underdrain Outlet (typically	vused to drain WO	CV in a Filtration BN	AD)		1.057	1	Calculated Parame	ters for Underdrain	
Underdrain Orifice Invert Depth =	N/A		the filtration media	surface)	Under	drain Orifice Area =	N/A	ft ²	
Underdrain Orifice Diameter =	N/A	inches		,		n Orifice Centroid =	N/A	feet	
		1						-	
User Input: Orifice Plate with one or more orifice	es or Elliptical Slot V	Veir (typically used	to drain WQCV and	I/or EURV in a sedir	mentation BMP)		Calculated Parame	ters for Plate	
Centroid of Lowest Orifice =	0.00	ft (relative to basir	bottom at Stage =	• 0 ft)	WQ Orif	ice Area per Row =	7.708E-03	ft ²	
Depth at top of Zone using Orifice Plate =	5.00	ft (relative to basir	<pre>bottom at Stage =</pre>	• 0 ft)	Ell	iptical Half-Width =	N/A	feet	
Orifice Plate: Orifice Vertical Spacing =	N/A	inches			Ellipt	ical Slot Centroid =	N/A	feet	
Orifice Plate: Orifice Area per Row =	1.11	sq. inches (diamet	er = 1-3/16 inches)		E	Elliptical Slot Area =	N/A	ft ²	
	Daw (av. 1		-+>						
User Input: Stage and Total Area of Each Orifice		-		Dow 4 (and the	Dow 5 (cott)	Daw C (and a	Daw 7 (and "	David (cott)	1
	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)	1
Stage of Orifice Centroid (ft) Orifice Area (sq. inches)	0.00	1.70	2.50	3.00					1
UTITICE Area (sq. inches)	1.11	1.11	1.11	1.11					J
	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)	1
Stage of Orifice Centroid (ft)	.ton 5 (optional)		(optional)		.ton 15 (optional)	(optional)	(optional)	.ton to (optional)	1
Orifice Area (sq. inches)									1
User Input: Vertical Orifice (Circular or Rectangu	<u>ular)</u>						Calculated Parame	ters for Vertical Ori	fice
	Not Selected	Not Selected					Not Selected	Not Selected]
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin	bottom at Stage =	= 0 ft) Ve	rtical 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) Vertica	al Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches						-
User Input: Overflow Weir (Dronbox with Elat o	r Sloped Grate and	Outlet Pipe OR Rec	tangular/Trapezoida	al Weir and No Outl	et Pine)		Calculated Parame	ters for Overflow W	eir
User Input: Overflow Weir (Dropbox with Flat o			tangular/Trapezoida	al Weir and No Outl	et Pipe)			ters for Overflow W	'eir
	Zone 3 Weir	Not Selected				e Upper Edge, H _t =	Zone 3 Weir	Not Selected	
User Input: Overflow Weir (Dropbox with Flat or Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length =				al Weir and No Outl	:) Height of Grat	e Upper Edge, H _t = Veir Slope Length =			<u>'eir</u> feet feet
Overflow Weir Front Edge Height, Ho =	Zone 3 Weir 5.00	Not Selected N/A	ft (relative to basin b	oottom at Stage = 0 fl) Height of Grat Overflow V		Zone 3 Weir 5.00	Not Selected N/A	feet
Overflow Weir Front Edge Length =	Zone 3 Weir 5.00 3.44	Not Selected N/A N/A	ft (relative to basin b feet	oottom at Stage = 0 fl G) Height of Grat Overflow V	Veir Slope Length = 00-yr Orifice Area =	Zone 3 Weir 5.00 2.79	Not Selected N/A N/A	feet
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Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = New Hydrograph Nesults Design Storm Return Period = One-Hour Rainfall Depth (in) = CUHP Predevelopment Peak Q (cfs) = OPTIONAL Override Predevelopment Peak Q (cfs) = Peak Outflow Q (cfs) = Peak Outflow Q (cfs) = Ratio Peak Outflow Threak Flow, q (cfs)are) Max Velocity through Grate 1 (fps) = Max Velocity through Grate 2 (fps) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) =	Zone 3 Weir 5.00 3.44 0.00 2.79 Close Mesh Grate 50% Zone 3 Restrictor 2.00 18.00 6.00 Trapezoidal) 6.00 49.84 4.00 2.00 <i>Trapezoidal</i> N/A N/A N/A N/A N/A N/A N/A N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or R N/A N/A ft (relative to basir feet H:V feet ide the default CU// EURV N/A 1.067 N/A 1.067 N/A	ft (relative to basin to feet H:V feet % ectangular Orifice) ft (distance below basinches inches bottom at Stage = http://www.stage.org/stage 2 Year 0.625 0.625 0.625 0.625 0.00 9.1 0.2 N/A Plate N/A N/A N/A Stage 62 65	asin bottom at Stage = 0 ff G O asin bottom at Stage = Half-Cen 6 ft) 5 Year 1.24 0.819 0.1 11.6 0.2 2.5 Plate N/A N/A 71 75	 Height of Grat Overflow V rate Open Area / 11 verflow Grate Open Central Angle of Restrict Spillway D Stage at: Basin Area at: Basin Volume at: Basin Volume at: entering new value 1.024 1.024 0.2 0.01 14.4 0.2 1.6 Plate N/A N/A 80 85 	Veir Slope Length = 00-yr Orifice Area = A rea w/o Debris = an Area w/ Debris = alculated Parameters butlet Orifice Area = th Orifice Centroid = th Orifi	Zone 3 Weir 5.00 2.79 14.72 7.59 3.80 5 for Outlet Pipe w/ Zone 3 Restrictor 0.52 0.29 1.23 Calculated Parame 0.36 8.36 0.70 3.10 Fographs table (Col 50 Year 2.24 1.730 4.2 0.31 26.9 5.9 1.4 Overflow Weir 1 0.7 N/A 85 93	Not Selected N/A N/A N/A N/A N/A N/A N/A Elow Restriction Pl Not Selected N/A N/A N/A N/A N/A ters for Spillway feet feet acres acre-ft acres acre-ft 100 Year 2.61 2.150 7.8 0.57 34.2 6.8 0.9 Outlet Plate 1 0.9 N/A 83 92	feet feet ft ² ft ² ft ² feet radians 500 Year 3.62 3.290 17.7 1.29 5.2.5 30.6 1.7 \$pillway 0.9 N/A 78 89



DETENTION BASIN OUTLET STRUCTURE DESIGN Outflow Hydrograph Workbook Filename:

I	SOURCE	CUHP	CUHP	CUHP	CUHP	h inflow hydrog CUHP	CUHP	CUHP	CUHP	CUHP
me Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]		25 Year [cfs]	50 Year [cfs]	100 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
	0:20:00	0.00	0.00	0.76 3.64	1.50 4.96	2.08	1.64 4.36	2.29 5.47	2.40 6.15	4.01 9.06
	0:25:00	0.00	0.00	7.78	4.96	12.81	9.12	11.05	12.52	9.06
	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 3.13	4.86 4.35	6.06 5.60	8.87 7.78	11.02 9.61	14.75 12.44	22.85 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
ĺ	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 2:20:00	0.00	0.00	0.60	0.79	1.05	1.08	1.27	1.24	1.72
·	2:25:00	0.00	0.00	0.45	0.59 0.43	0.78	0.80	0.95	0.93	1.28 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	0.21	0.30	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
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·	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
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ĺ	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
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ŀ	4:10:00 4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00 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 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
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	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
ŀ	5:45:00 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

user should graphically co	Stage	Area	Area	Volume	Volume	Total Outflow	
Stage - Storage Description	[ft]	[ft ²]	[acres]	[ft ³]	[ac-ft]	Outflow [cfs]	
							For best results, inclu
							stages of all grade sl changes (e.g. ISV an
							from the S-A-V table
							Sheet 'Basin'.
							Also include the inve
							outlets (e.g. vertical overflow grate, and s
							where applicable).
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DETENTION BASIN OUTLET STRUCTURE DESIGN MHFD-Detention, Version 4.06 (July 2022)

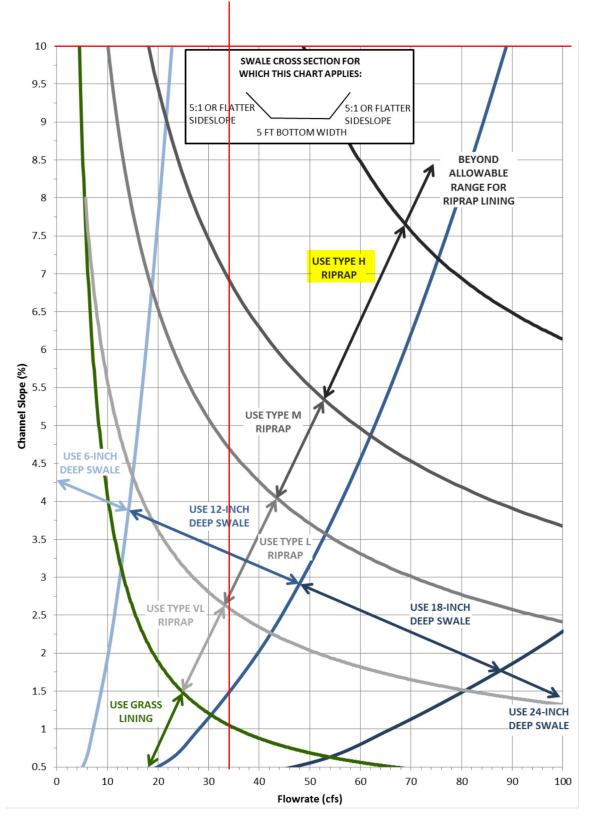
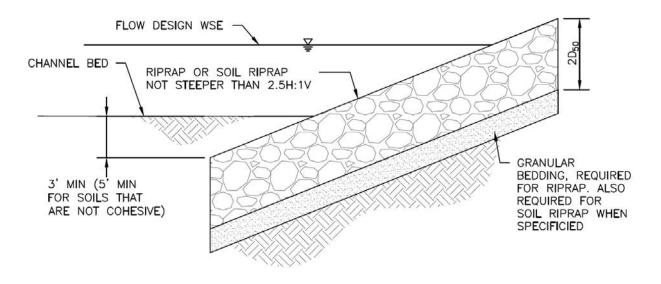


Figure 8-24. Swale stability chart: greater than 4-foot bottom width and side slopes between 5:1 and 10:1

(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	TYPE M TYPE M 70 - 100 50 - 70 35 - 50 2 - 10		12				
TYPE H	70 - 100 50 - 70 35 - 50 2 - 10	30 24 18 6	18				
*D ₅₀ = MEAN ROCK SIZ	*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 E	BURIED	WITH	TOPSOIL	SHALL	ΒE	REVIEWED	AND	APPROVED
	BY .	THE I	ENGINEER	PRIO	R T(O ANY	TOPSO	DIL PLACE	EMENT.				

	GRADATION FOR GRANULAR BEDDING							
U.S. STANDARD SIEVE SIZE	PERCENT	PERCENT PASSING BY WEIGHT						
	TYPE I CDOT SECT. 703.01	TYPE II CDOT SECT. 703.09 CLASS A						
3 INCHES	-	90 - 100						
1½ INCHES		-						
3/4 INCHES		20 - 90						
⅔ INCHES	100	Ч.						
#4	95 — 100	0 - 20						
#16	45 — 80	-						
# 50	10 — 30	Ţ						
#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							
	MINIM	IUM BEDDING THICKNESS	(INCHES)					
RIPRAP DESIGNATION	FINE-GRAIN	COARSE-GRAINED SOILS ²						
	TYPE I (LOWER LAYER)	TYPE II (UPPER LAYER)	TYPE II					
$VL (D_{50} = 6 IN)$	4	4	6					
$L (D_{50} = 9 \text{ IN})$	4	4	6					
$M (D_{50} = 12 \text{ IN})$	4	4	6					
H ($D_{50} = 18$ IN)	4	6	8					
$VH (D_{50} = 24 IN)$	4	6	8					

NOTES:

Open Channels

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)

Precipitation Frequency Data Server



Location name: Colorado Springs, Colorado, USA* Latitude: 38.7697°, Longitude: -104.786° Elevation: 5896 ft** * source: ESRI Maps ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

NOAA Atlas 14, Volume 8, Version 2

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

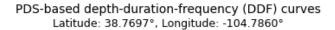
. 55	-based po				recurrence					
Duration	1	2	5	10	25	50	100	200	500	1000
5-min	0.242 (0.199-0.298)	0.291 (0.238-0.358)	0.375 (0.306-0.464)	0.451 (0.366-0.561)	0.564 (0.443-0.739)	0.658 (0.502-0.874)	0.757 (0.556-1.04)	0.864 (0.605-1.22)	1.01 (0.680-1.48)	1.13 (0.736-1.67)
10-min	0.355 (0.291-0.437)	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)	<mark>1.24</mark> (1.01-1.53)	1.50 (1.21-1.86)	<mark>1.89</mark> (1.50-2.50)	<mark>2.24</mark> (1.72-2.99)	<mark>2.61</mark> (1.92-3.59)	<mark>3.02</mark> (2.13-4.29)	3.62 (2.44-5.30)	<mark>4.11</mark> (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	15.2 (11.5-19.7)	16.7 (12.1-22.3)	17.7 (12.6-24.3)

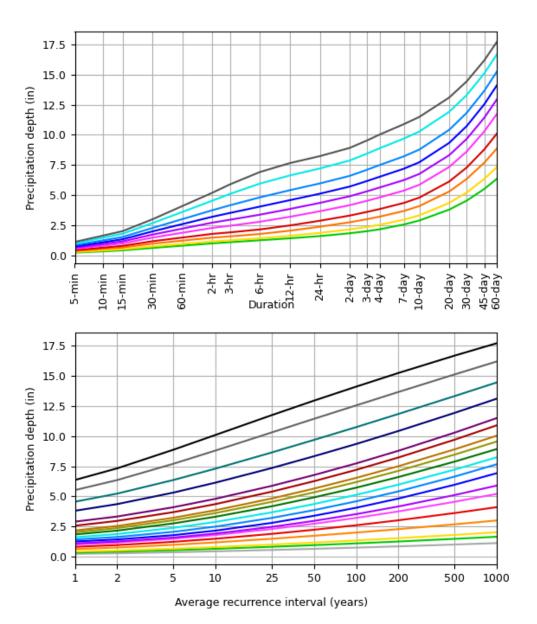
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

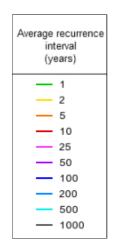
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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.

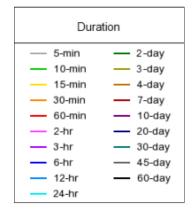
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PF graphical









NOAA Atlas 14, Volume 8, Version 2

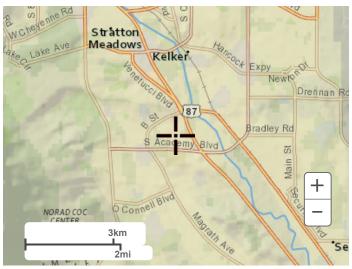
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Maps & aerials

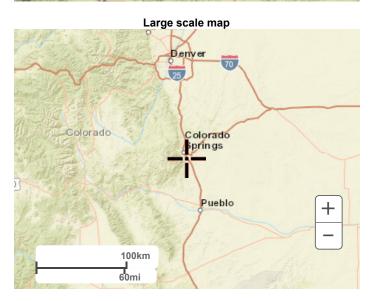
Small scale terrain

Precipitation Frequency Data Server



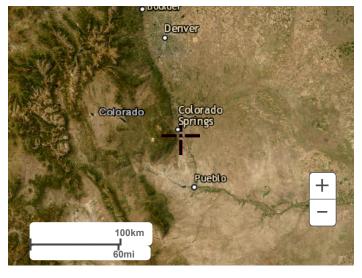
Large scale terrain





Large scale aerial

Precipitation Frequency Data Server



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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?: <u>HDSC.Questions@noaa.gov</u>

Disclaimer

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 ft ²	
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	

Worksheet for Emergency Spillway Conveyance Channel

Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

Kimley **»Horn**

Extended Detention B	asin (EDB) Struture Com	por	ent Calculations	Prepared By	MTH
Forebay Release and Configuration (Per MHFD Table 4-12)	Impervious Area to EDB (AC 8.66	<u>.)</u>	<u>Required</u> Size to drain in 4 to 5 minutes using equation 4-1		
Minimum Forebay Volume (Per MHFD Table 4-12)	1% of the WQCV		<u>WQCV</u> 0.283 acre-feet	<u>Forebay A</u> <u>Criteria (Using 18" depth)</u> 184.91	<u>Provided</u> 292.50
Forebay Depth (Per MHFD Table 4-12)	<u>For</u> <u>Required</u> 15 to 18 inches	rebay	r <u>A</u> <u>Provided</u> 18"]	
Trickle Channel Capacity	See seperate calculations.]		
Micropool	<u>Required Area</u> Area ≥ 10ft ²		Provided Area 40 ft ²		
Forebay Notch Calculation	ns]	
$w = 9.23 (A_{FB} / t) (1 / s)$ Where:	(h _{max})				
W = width of the rectangu A_{FB} = surface area of the f t = emptying time of the t h_{max} = maximum depth of	forebay (square feet) brim-full forebay (seconds)				
W _A			inches		
M _B A _{FBA} A _{FBB}		4.9 195 195	ft ²	- - - -	

300 seconds 300 seconds 1.50 feet

1.50 feet

Date

10/31/2024

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

Equation 4-1

Where:

n_{MAXA}

h_{MAXB}

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	WATERSHED IMPERVIOUS AREA (IA)								
CRITERIA	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,	Size to drain in 4 to 5 minutes using Equation 4-1							
Minimum Forebay Volume ¹	concrete pad with slotted metal edge,	1% of WQCV							
Forebay Depth ¹	or similar design	12 to 15 inches	15 to 18 inches	18 to 24 inches	24 to 30 inches				
Appropriate volume and d	epth should consider maintenand	ce and access needs. The v	alues provided are approxi	mate and provide a starting	g point for design.				

Project Description		
Friction Method	Manning	
FIICUOIT MELIIOU	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 ft ²	
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 Trickle Channel Capacity

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 ft ²
Velocity	2.32 ft/s
Wetted Perimeter	3.4 ft
Top Width	0.41 ft

Worksheet for Forebay Weir Flowrate for Trickle Channel Sizing

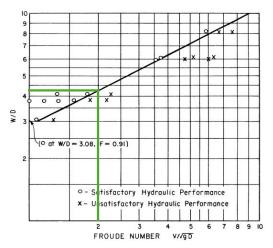
11/6/2024 Date:

PROJECT: Venetucci MF 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)
F 70		

W (ft)	5.70	
H (ft)	4.28	
L (ft)	13.30	Fre
a (ft)	2.85	
b (ft)	2.14	W=2.94D[7
c (ft)	2.85	V=VELOCIT
d (ft)	0.95	$D = (A)^{0.5}$
e (ft)	0.48	A=AREA OI
f (ft)	0.71	
t (ft)	0.48	

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



"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.



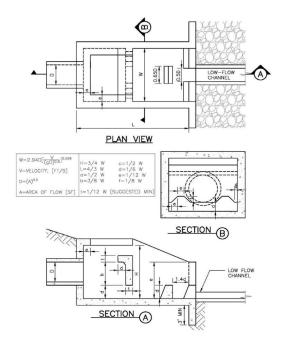
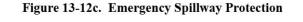


Figure 9-45. UDFCD modified USBR type VI impacts stilling basin (general design dimensions)





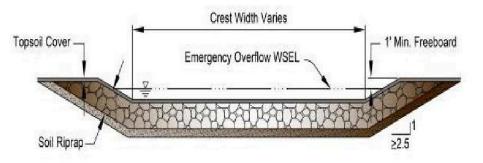
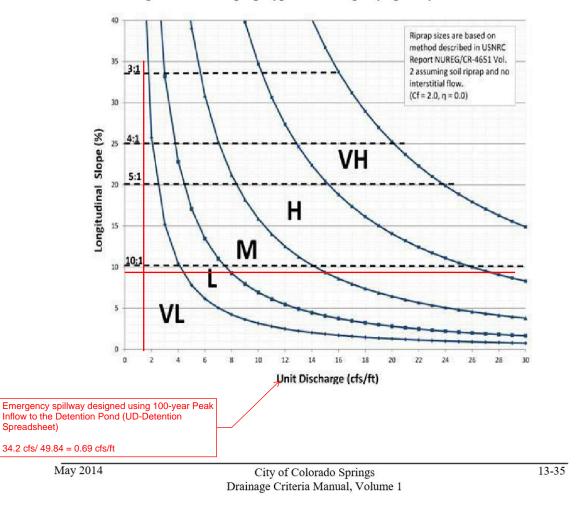


Figure 13-12d. Riprap Types for Emergency Spillway Protection



Outfall Protection Rip-Rap Calculation Rip Rap Downstream of Stilling Basin

Applicable Equations:

$L_{p} = (1/2 \tan \Theta)(A_{t}/Y_{t}-D)$	Equation 9-11 per USCDM
$A_t = Q/V$	Equation 9-12 per USDCM
$\Theta = \tan^{-1}(1/(2^*ExpansionFactor))$	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

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 Fig	ure 9-35 Q/D ^{2.5}	2.47
For Fig	ure 9-35 Y _t /D	0.43
For Fig	ure 9-38 Q/D ^{1.5}	3.70
For Fig	ure 9-38 Yt/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

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
Туре	-	L-
Thickness	Т	18 inches

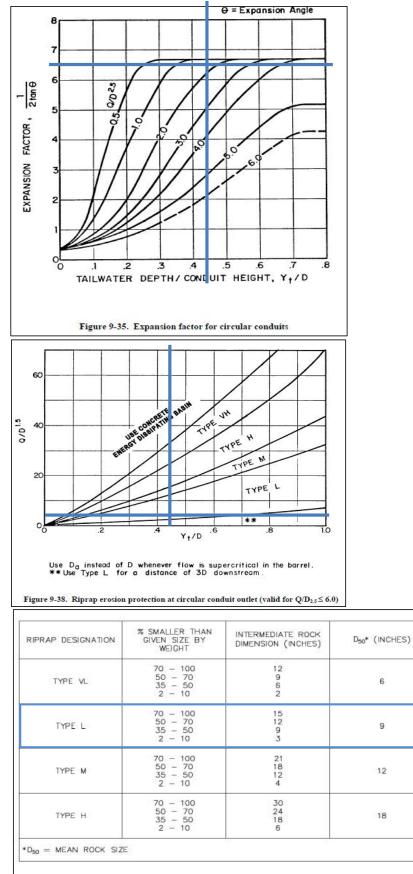


Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)

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 ft ²	
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	

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 ft ²	
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	

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 ft ²	
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	

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 ft ²	
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	

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 ft ²	
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	

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 ft ²	
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)

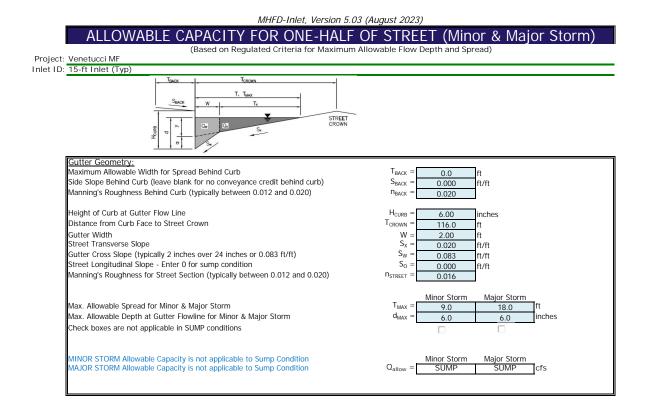
INLET MANAGEMENT

Worksheet Protected

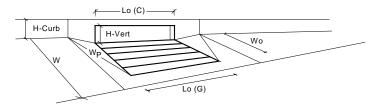
NLET NAME	<u>15-ft Inlet (Typ)</u>	<u>10-ft Inlet (Typ)</u>	<u>5-ft Inlet (Typ)</u>
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening
ER-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		eam (left) to downstream (right) in order	
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, Tr (years)			
Design Storm Return Feriou, 1 _r (years)			
One-Hour Precipitation, P ₁ (inches)			
5			
One-Hour Precipitation, P ₁ (inches)			
5			

CALCULATED OUTPUT

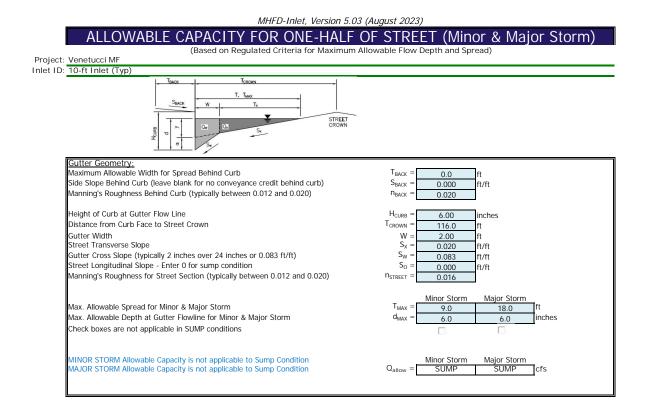
Minor Total Design Peak Flow, Q (cfs)	2.0	1.8	1.3
Major Total Design Peak Flow, Q (cfs)	3.7	2.5	1.5
Minor Flow Bypassed Downstream, Q _b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q _b (cfs)	N/A	N/A	N/A



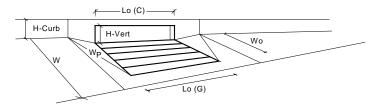
INLET IN A SUMP OR SAG LOCATION MHFD-Inlet, Version 5.03 (August 2023)



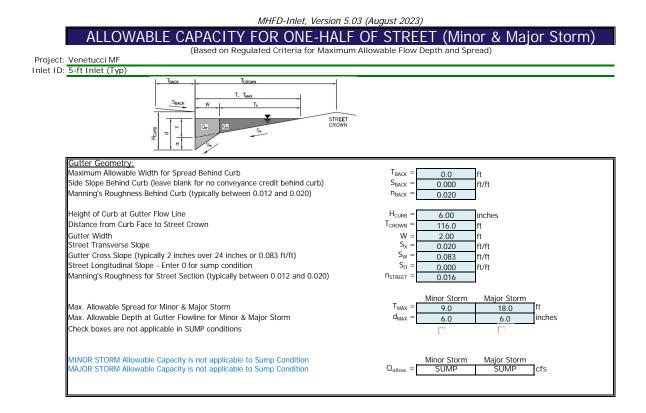
Design Information (Input)	-	MINOR	MAJOR	-
Type of Inlet	Type =		Curb Opening	1
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	1
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.7	5.8	inches
Grate Information	_	MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_0 (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	T
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_f(G) =$	N/A	N/A	Î.
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o(G) =$	N/A	N/A	1
Curb Opening Information	-	MINOR	MAJOR	-
Length of a Unit Curb Opening	$L_0(C) =$	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	1
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	1
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	υ ₀ (υ) =	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	1
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.61	0.78	1
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	N/A	N/A	1
	··· Combination -			4
	_	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



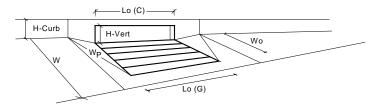
INLET IN A SUMP OR SAG LOCATION MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	-	MINOR	MAJOR	-
Type of Inlet	Type =		Curb Opening	1
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	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_0 (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	T
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_f(G) =$	N/A	N/A	Î.
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_0(G) =$	N/A	N/A	1
Curb Opening Information	-	MINOR	MAJOR	-
Length of a Unit Curb Opening	$L_0(C) =$	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	1
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	1
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	υ ₀ (υ) =	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	1
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.76	0.92	1
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	N/A	N/A	1
	···· Combination —			4
	_	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



INLET IN A SUMP OR SAG LOCATION MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	-	MINOR	MAJOR	-
Type of Inlet	Type =		Curb Opening	1
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	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_0 (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	T
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_f(G) =$	N/A	N/A	Î.
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_0(G) =$	N/A	N/A	1
Curb Opening Information	-	MINOR	MAJOR	-
Length of a Unit Curb Opening	$L_0(C) =$	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	1
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	1
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	υ ₀ (υ) =	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	4
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	1.00	1.00	4
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	N/A	N/A	1
	··· Combination –			4
	_	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

		51
Project Description		
Friation Mathed	Manning	
Friction Method	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 ft ²	
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	

Worksheet for Typical Curb Cut



Venetucci StormCAD.stsw 11/12/2024

Bentley Systems, Inc. Haestad Methods Solution Center 76 Watertown Road, Suite 2D Thomaston, CT 06787 USA +1-203-755-1666 StormCAD [10.04.00.158] Page 1 of 1

Venture on Venetucci

5-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculate d) (ft/ft)	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydrauli c 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

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5-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert	Invert	Length	Slope	Diameter	Material	Manning's	Flow	Velocity	Hydrauli	Hydraulic
	(Start)	(Stop)	(User	(Calculate	(in)		n	(cfs)	(ft/s)	c Grade	Grade
	(ft)	(ft)	Defined)	d)						Line (In)	Line
			(ft)	(ft/ft)						(ft)	(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	50.8	0.010	24.0	HDPE Pressure Pipe	0.010	11.47	8.71	5,870.03	5,809.94
30 31	5,870.27		118.8	0.010	24.0			5.57	5.61	5,870.79	
-		5,869.36				HDPE Pressure Pipe	0.010				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

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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

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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

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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

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5-YEAR

Label Outflow Area (User Flow (Total Runoff Time of Element Defined) Coefficient Concentration Out) (acres) (Rational) (min) (cfs) 02 120 (STRM) 0.230 0.740 7.800 0.77 03 CB-20 0.680 7.200 0.95 0.300 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 0.090 CB-20 0.250 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 CB-12 0.370 0.080 9.600 0.13 11 12 CB-19 0.82 0.210 0.750 5.000 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 0.780 0.150 5.000 0.61 16 CB-17 0.880 5.000 0.60 0.130 17 CB-17 0.900 5.000 0.19 0.040 18 CB-13 0.340 0.700 6.200 1.16 19 CB-22 0.280 0.080 11.500 0.09 20 0.290 0.770 5.000 CB-11 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 5.000 0.680 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 0.78 0.220 0.720 6.000 30 0.750 5.000 0.82 CB-3 0.210

Catchment Table - Time: 0.00 hours

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5-YEAR

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

Catchment Table - Time: 0.00 hours

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5-YEAR

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

Catchment Table - Time: 0.00 hours

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100-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculate d) (ft/ft)	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydrauli c 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

Venetucci StormCAD.stsw 11/7/2024

Bentley Systems, Inc. Haestad Methods Solution Center 76 Watertown Road, Suite 2D Thomaston, CT 06787 USA +1-203-755-1666

100-YEAR

Conduit Table - Time: 0.00 hours

Label	Invert (Start)	Invert (Stop)	Length (User	Slope (Calculate	Diameter (in)	Material	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydrauli c Grade	Hydraulic Grade
	(Start) (ft)	(3t0p) (ft)	Defined)	(Calculate d)	(11)		11	(015)	(17.5)	Line (In)	Line
	(14)	(14)	(ft)	(ft/ft)						(ft)	(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

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Bentley Systems, Inc. Haestad Methods Solution Center 76 Watertown Road, Suite 2D Thomaston, CT 06787 USA +1-203-755-1666

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

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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

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Bentley Systems, Inc. Haestad Methods Solution Center 76 Watertown Road, Suite 2D Thomaston, CT 06787 USA +1-203-755-1666

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

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Bentley Systems, Inc. Haestad Methods Solution Center 76 Watertown Road, Suite 2D Thomaston, CT 06787 USA +1-203-755-1666

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

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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

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100-YEAR

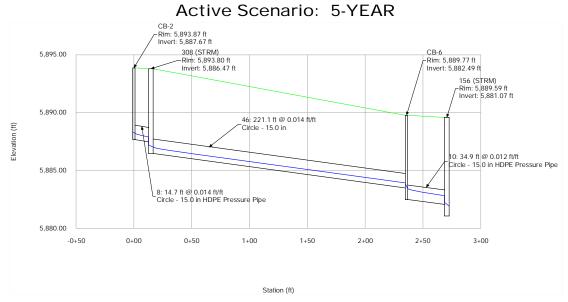
Catchment Table - Time: 0.00 hours

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

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



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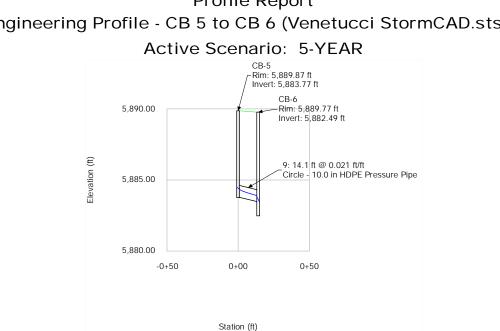
Station (ft)

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Profile Report Engineering Profile - CB 4 to CB 8 (Venetucci StormCAD.stsw) Active Scenario: 5-YEAR 5,895.00 T-5 / Invert: 5,883.82 ft 156 (STRM) - Rim: 5,889.59 ft Invert: 5,881.07 ft 155 (STRM) Rim: 5,888.02 ft Invert: 5,879.60 ft 5,890.00 364 (STRM) -Rim: 5,886 31 ft Invert: 5,880.57 ft CB-8 12: 87 9 ft @ 0.020 ft/ft Circle 10.0 in HDPE Pressure Pipe Rim: 5,884.35 ft Invert: 5,881.51 ft Elevation (ft) 5,885.00 22: 54.5 ft @ -0.012 ft/ft 5,880.00 Circle - 10.0 in HDPE Pressure Pipe 23: 59.2 ft @ 0.020 ft/ft Circle - 10.0 in HDPE Pressure Pipe 18: 58.2 ft @ -0.012 ft/ft Circle - 15.0 in HDPE Pressure Pipe CB-4 -Rim: 5,888.29 ft _11: 105.0 ft @ 0.010 ft/ft Circle - 15.0 in HDPE Pressure Pipe Invert: 5,885.01 ft 5,875.00 -0+50 0+00 0+50 1+00 1+50 2+00 2+50 3+00 3+50 4+00 Station (ft)

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Profile Report Engineering Profile - CB 5 to CB 6 (Venetucci StormCAD.stsw)

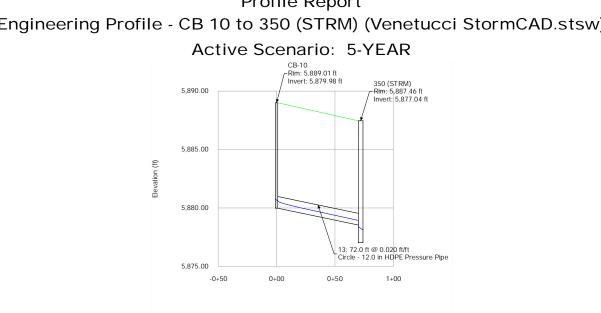
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Profile Report Engineering Profile - CB 7 to 120 (STRM) (Venetucci StormCAD.stsw) Active Scenario: 5-YEAR



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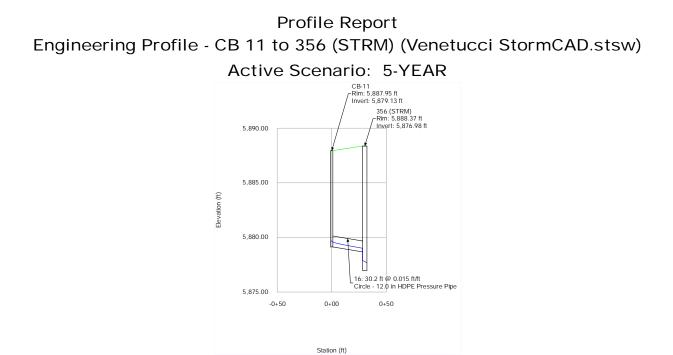


Profile Report Engineering Profile - CB 10 to 350 (STRM) (Venetucci StormCAD.stsw)

Station (ft)

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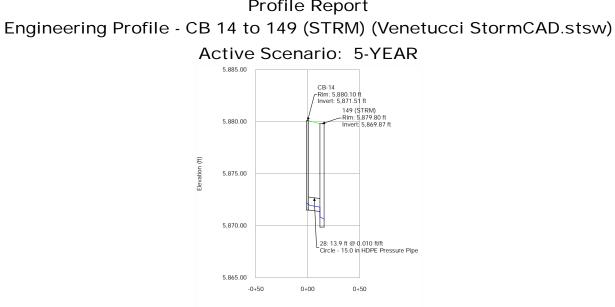


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Station (ft)

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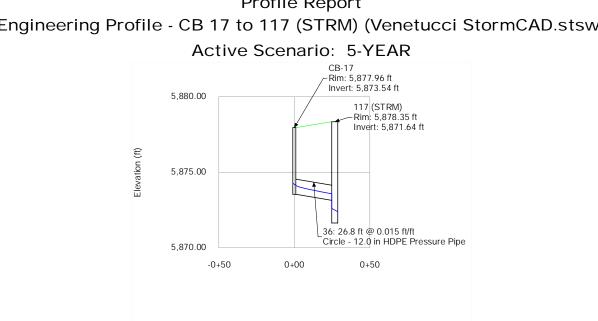


Station (ft)

Profile Report

Venetucci StormCAD.stsw 11/11/2024

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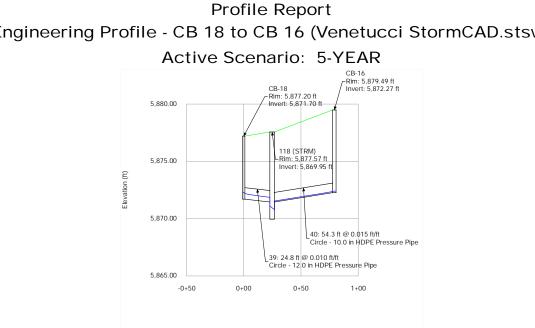


Station (ft)

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

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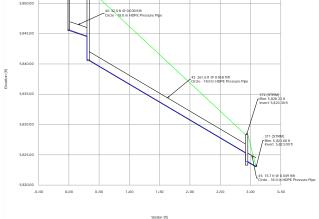
Engineering Profile - CB 18 to CB 16 (Venetucci StormCAD.stsw)

Station (ft)

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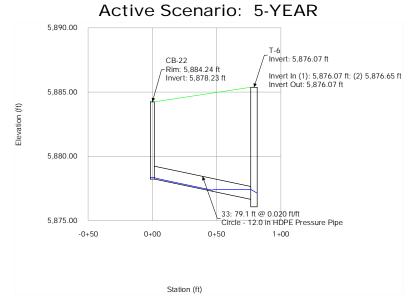
Profile Report Engineering Profile - CB 21 to Creek Outfall (Venetucci StormCAD.stsw) Active Scenario: 5-YEAR



Venetucci StormCAD.stsw 11/12/2024

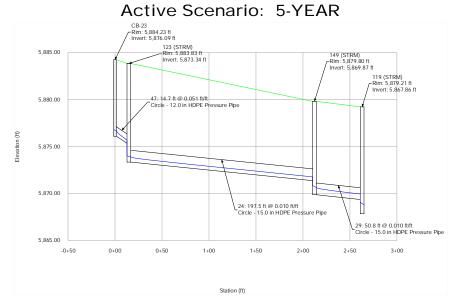
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Profile Report Engineering Profile - CB 22 to T 6 (Venetucci StormCAD.stsw)

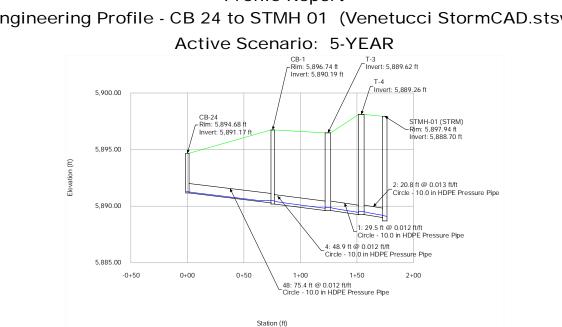


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Profile Report Engineering Profile - CB 23 to 119 (STRM) (Venetucci StormCAD.stsw)



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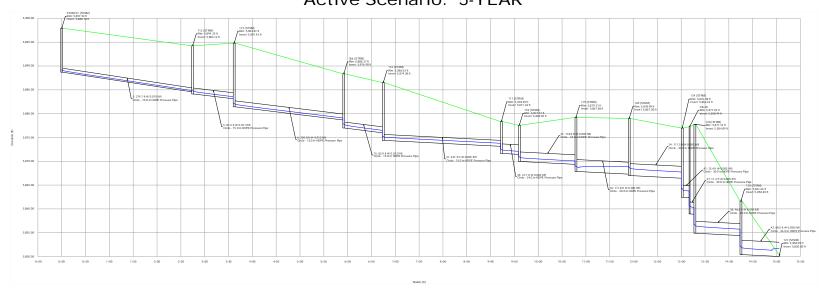


Profile Report Engineering Profile - CB 24 to STMH 01 (Venetucci StormCAD.stsw)

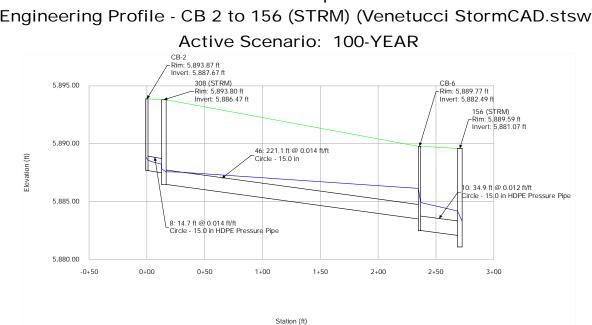
Venetucci StormCAD.stsw 11/11/2024

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



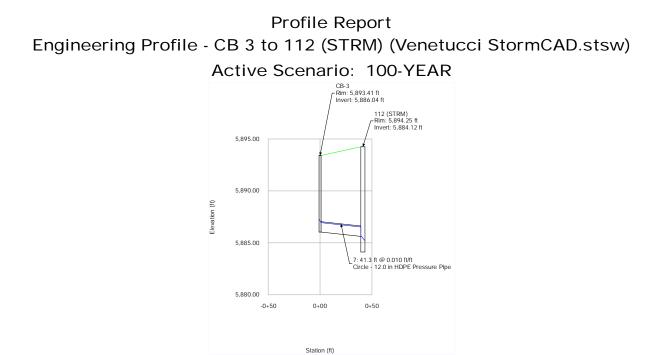
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Profile Report Engineering Profile - CB 2 to 156 (STRM) (Venetucci StormCAD.stsw)

Venetucci StormCAD.stsw 11/11/2024

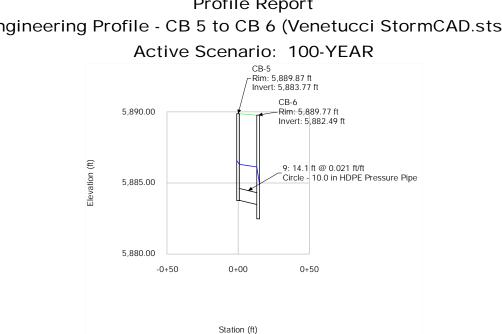
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Profile Report Engineering Profile - CB 4 to CB 8 (Venetucci StormCAD.stsw) Active Scenario: 100-YEAR 5,895.00 T-5 / Invert: 5,883.82 ft 156 (STRM) - Rim: 5,889.59 ft Invert: 5,881.07 ft 155 (STRM) Rim: 5,888.02 ft Invert: 5,879.60 ft 5,890.00 364 (STRM) -Rim: 5,886 31 ft Invert: 5,880.57 ft CB-8 12: 87 9 ft @ 0.020 ft/ft Circle 10.0 in HDPE Pressure Pipe Rim: 5,884.35 ft Invert: 5,881.51 ft Elevation (ft) 5,885.00 22: 54.5 ft @ -0.012 ft/ft 5,880.00 Circle - 10.0 in HDPE Pressure Pipe 23: 59.2 ft @ 0.020 ft/ft Circle - 10.0 in HDPE Pressure Pipe 18: 58.2 ft @ -0.012 ft/ft Circle - 15.0 in HDPE Pressure Pipe CB-4 -Rim: 5,888.29 ft 11: 105.0 ft @ 0.010 ft/ft Circle - 15.0 in HDPE Pressure Pipe Invert: 5,885.01 ft 5,875.00 -0+50 0+00 0+50 1+00 1+50 2+00 2+50 3+00 3+50 4+00 Station (ft)

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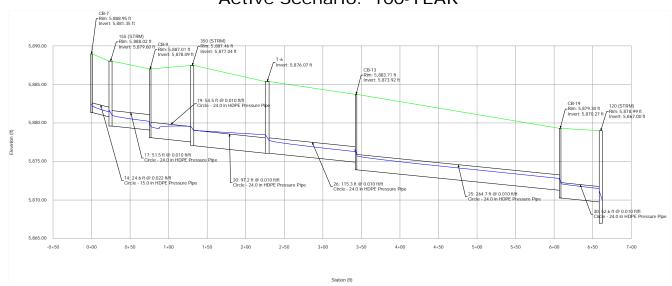


Profile Report Engineering Profile - CB 5 to CB 6 (Venetucci StormCAD.stsw)

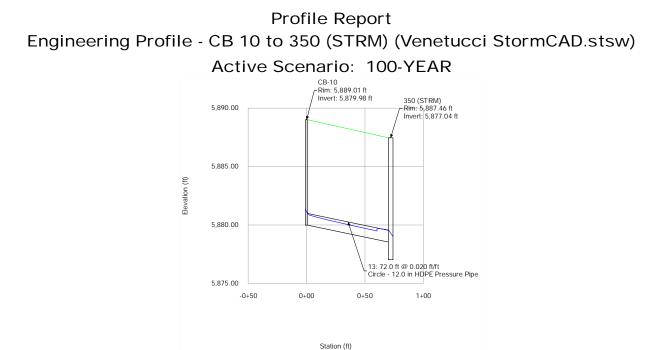
Venetucci StormCAD.stsw 11/11/2024

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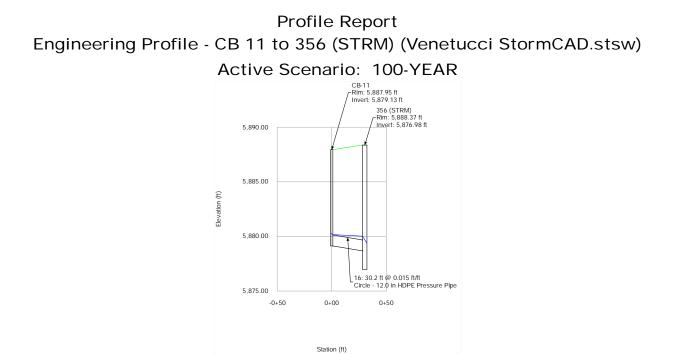
Profile Report Engineering Profile - CB 7 to 120 (STRM) (Venetucci StormCAD.stsw) Active Scenario: 100-YEAR



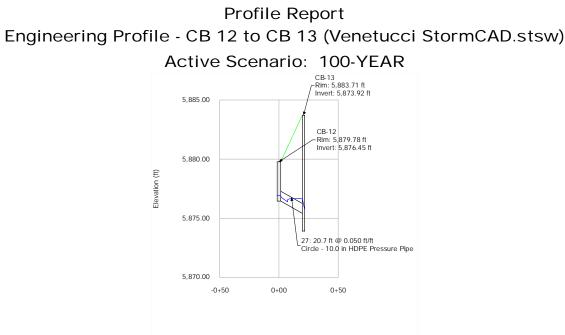
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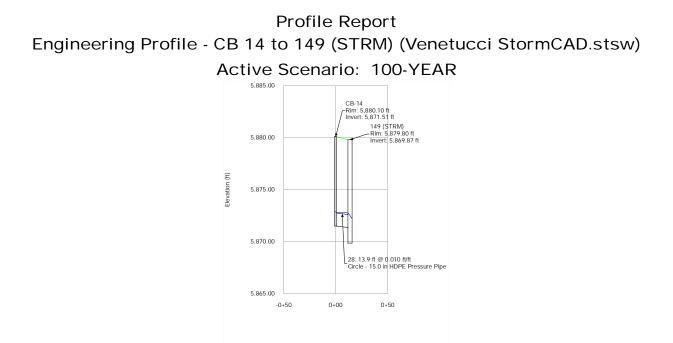


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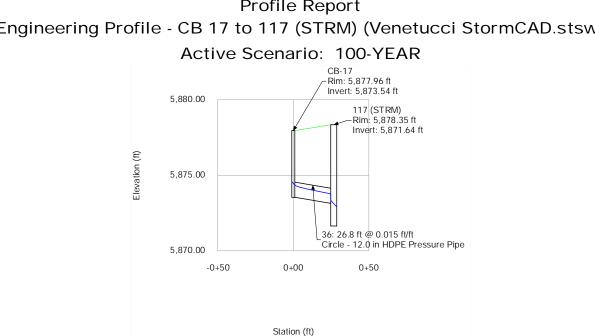
Venetucci StormCAD.stsw 11/11/2024

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Venetucci StormCAD.stsw 11/11/2024

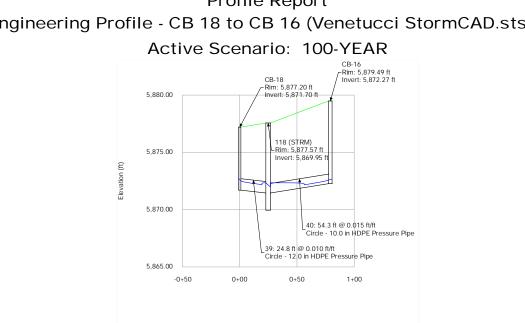
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Profile Report Engineering Profile - CB 17 to 117 (STRM) (Venetucci StormCAD.stsw)

Venetucci StormCAD.stsw 11/11/2024

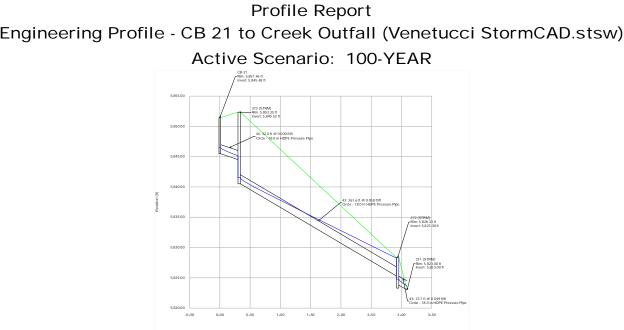
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Profile Report Engineering Profile - CB 18 to CB 16 (Venetucci StormCAD.stsw)

Venetucci StormCAD.stsw 11/11/2024

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

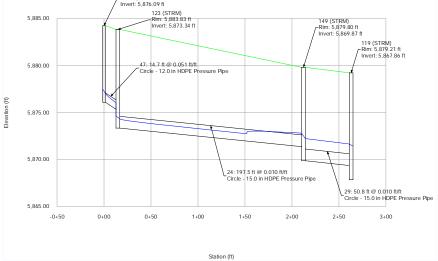
Venetucci StormCAD.stsw 11/12/2024

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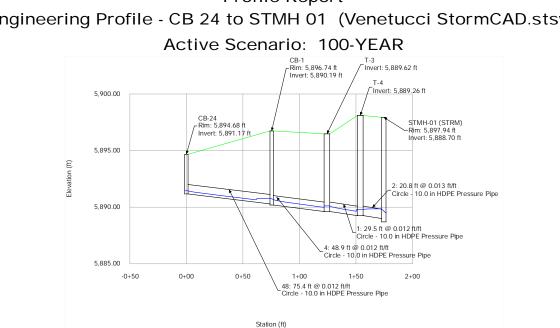
Profile Report Engineering Profile - CB 22 to T 6 (Venetucci StormCAD.stsw) Active Scenario: 100-YEAR 5,890.00 T-6 Invert: 5,876.07 ft CB-22 Rim: 5,884.24 ft Invert: 5,878.23 ft Invert In (1): 5,876.07 ft; (2) 5,876.65 ft Invert Out: 5,876.07 ft 5,885.00 Elevation (ft) 5,880.00 33: 79.1 ft @ 0.020 ft/ft 5,875.00 Circle - 12.0 in HDPE Pressure Pipe -0+50 0+00 0+50 1+00 Station (ft)

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



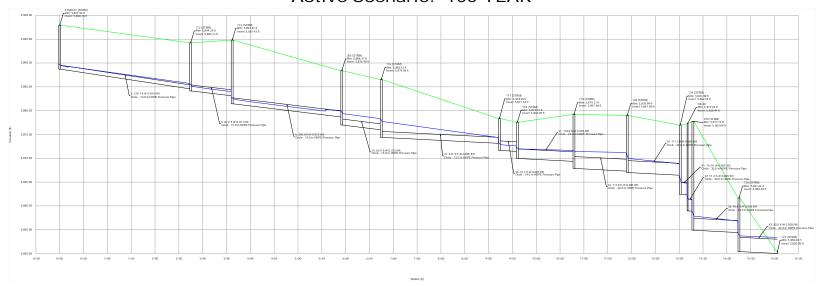
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Profile Report Engineering Profile - CB 24 to STMH 01 (Venetucci StormCAD.stsw)

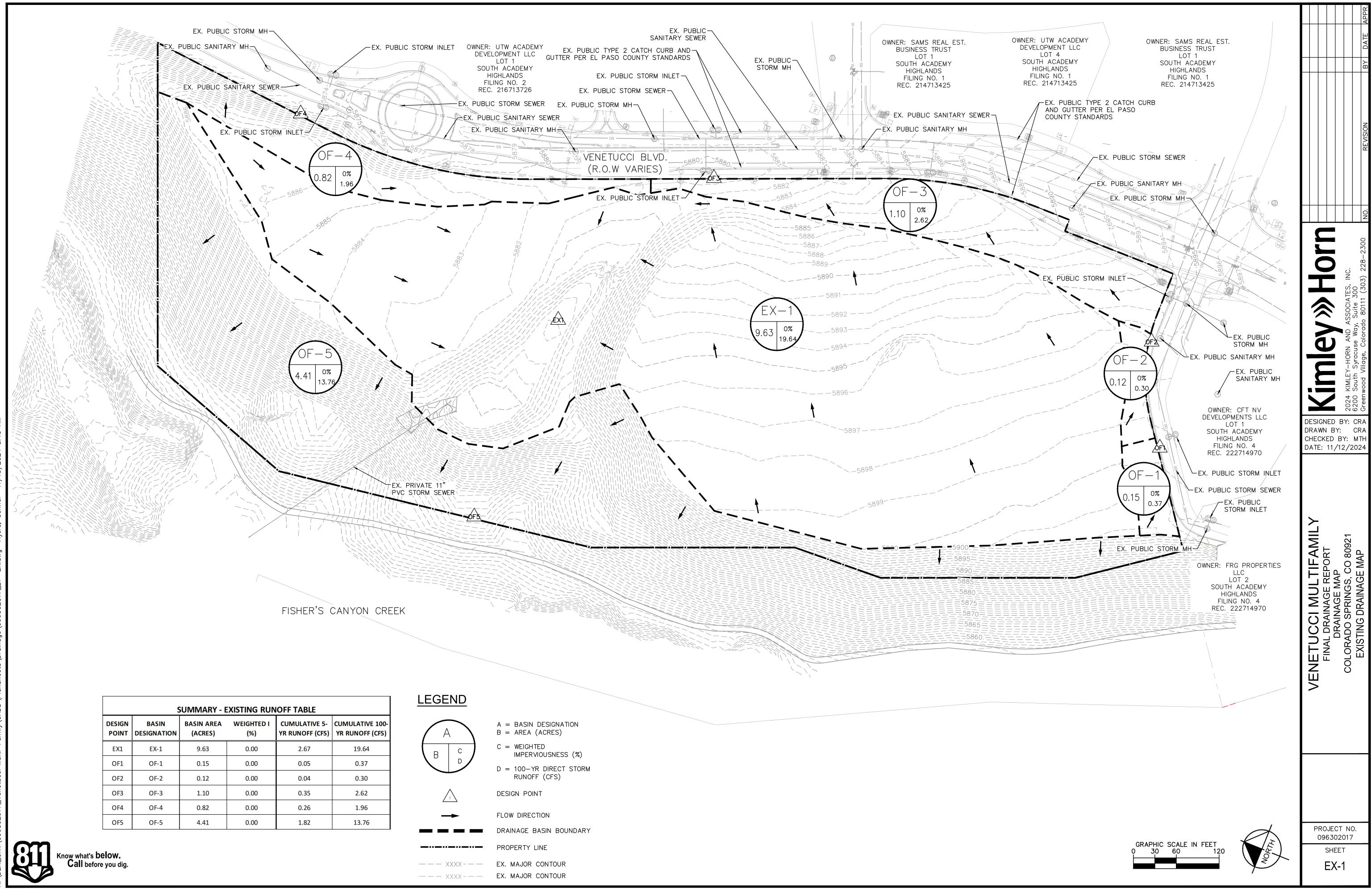
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Profile Report Engineering Profile - STMH 01 to Pond Outfall (Venetucci StormCAD.stsw) Active Scenario: 100-YEAR

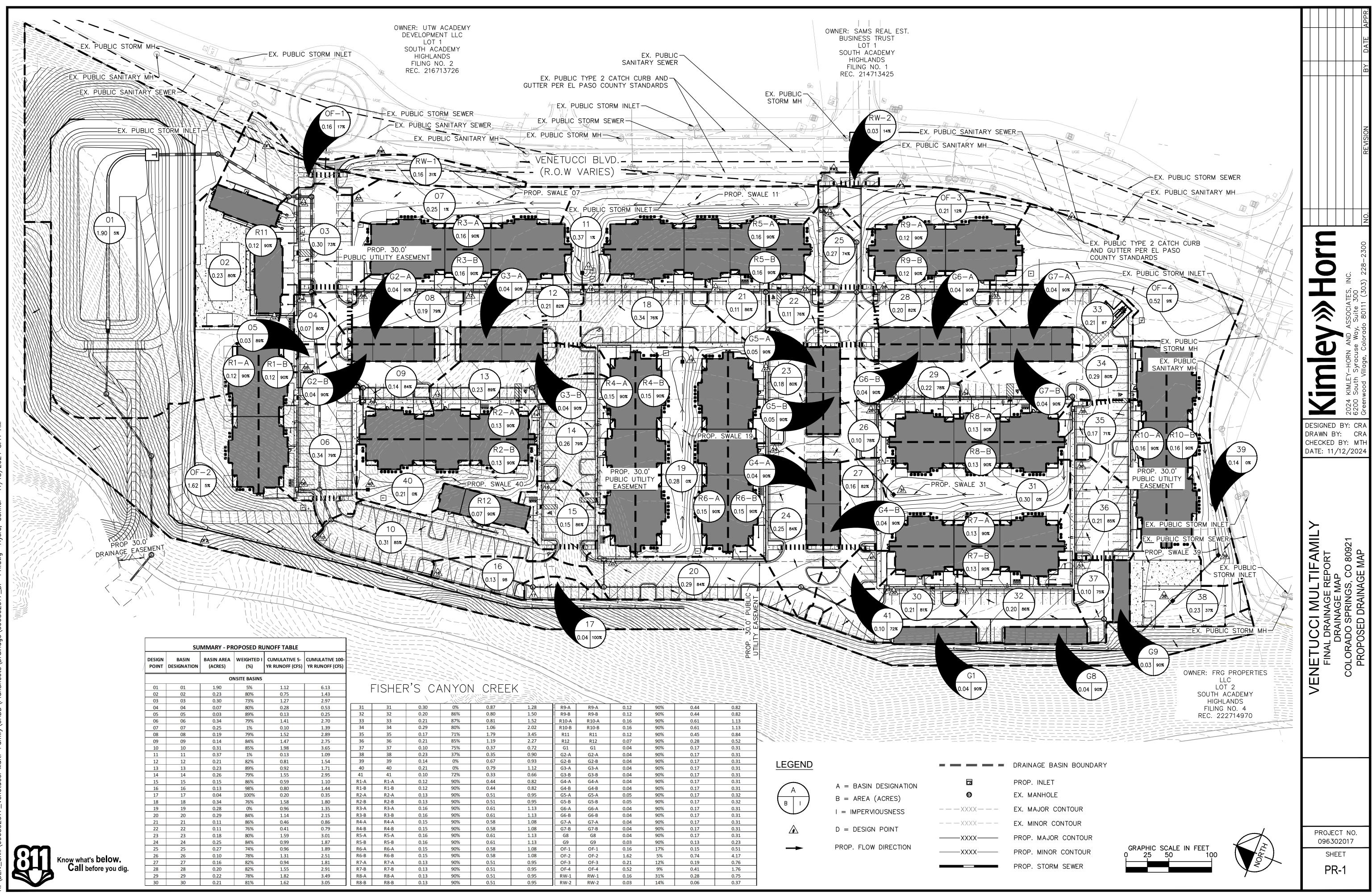


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APPENDIX D: DRAINAGE MAPS

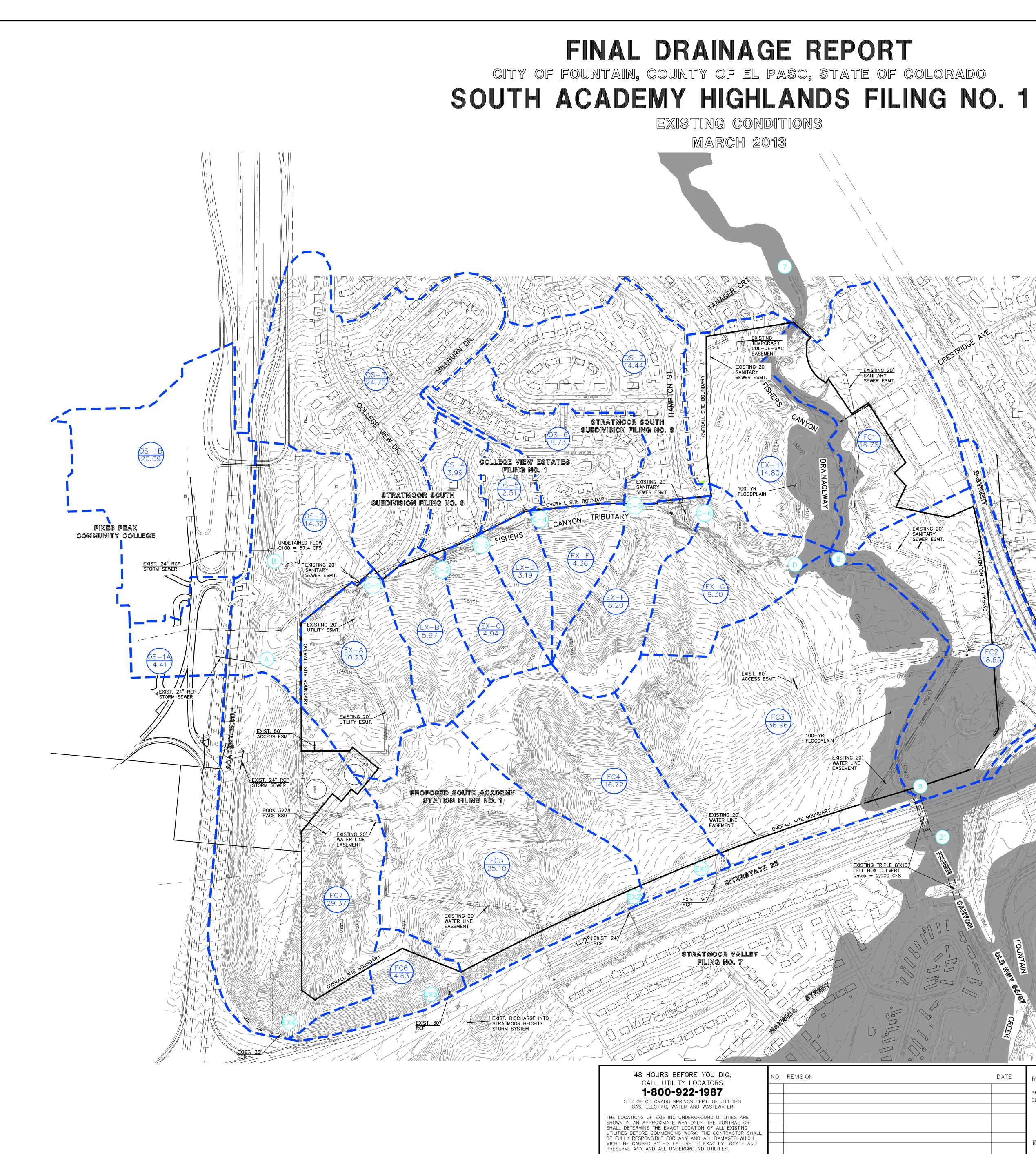


	SUMMARY - EXISTING RUNOFF TABLE												
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	WEIGHTED I (%)	CUMULATIVE 5- YR RUNOFF (CFS)	CUMULATIVE 100- YR RUNOFF (CFS)								
EX1	EX-1	9.63	0.00	2.67	19.64								
OF1	OF-1	0.15	0.00	0.05	0.37 0.30 2.62								
OF2	OF-2	0.12	0.00	0.04									
OF3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

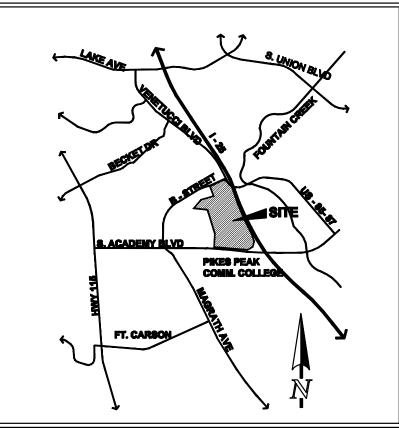


APPENDIX E: EXCERPTS FROM ADJACENT PROPERTY DRAINAGE REPORTS





SANITARY



VICINITY MAP

<u>EXISTIN</u>	G AREA DRA	AINAGE
BASIN	Q5 (CFS)	Q100 (CFS
OS-1A	9	19
OS-1B	34	70
0S-2	24	59
0S-3	40	86
0S-4	9	20
0S-5	7	14
0S-6	22	46
0S-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							
Α	9.2	19.0	Existing 24" RCP							
В	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							

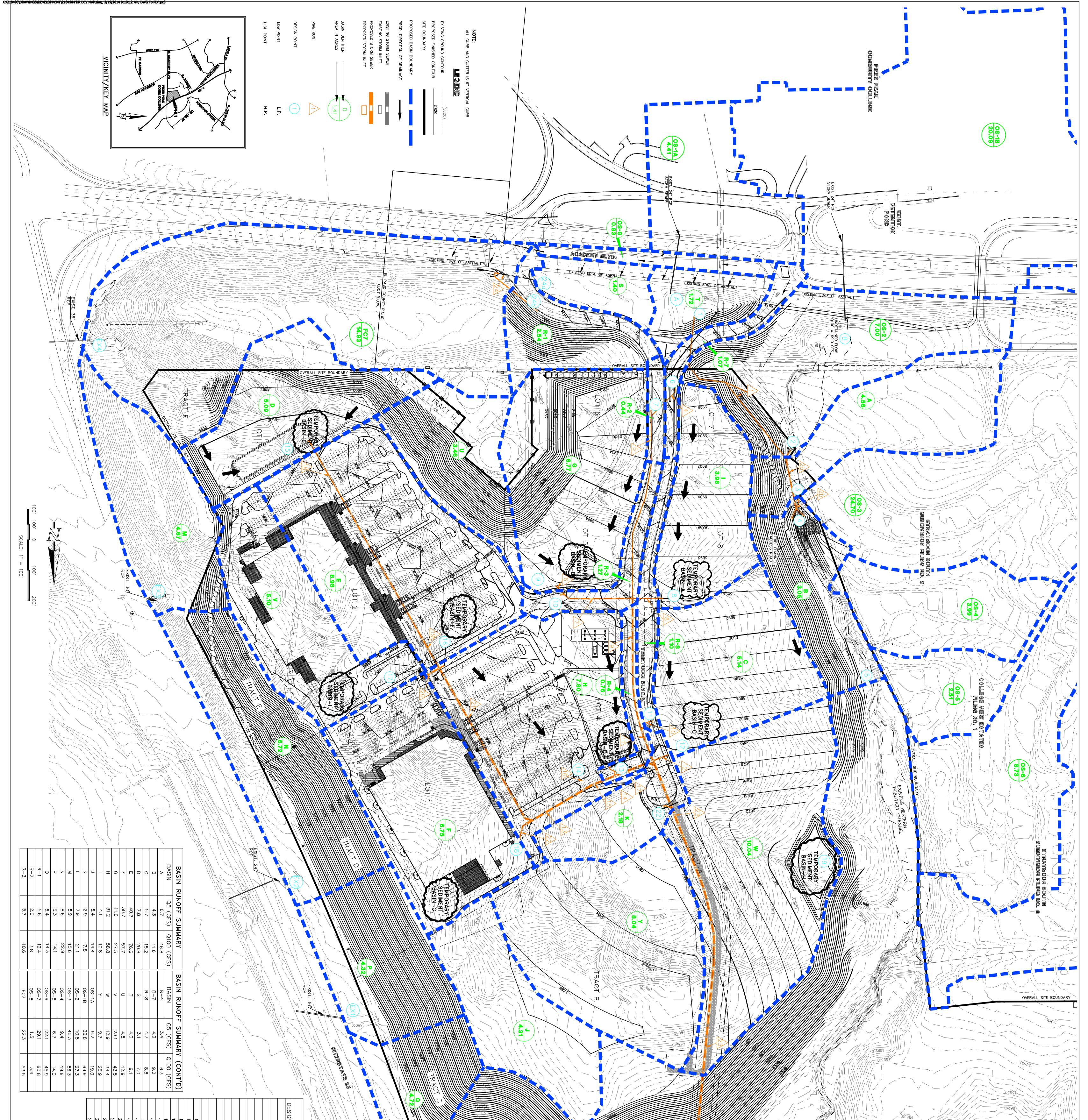
EXISTING DBPS DESIG	N POINTS (PER DBPS STUDY)
DESIGN POINT	Q100 (CFS)
7	2,676
8	3,050
9	3,163

LEGEND

	EXISTING GROUND CONTOUR PROPOSED FINISHED CONTOUR OVERALL SITE BOUNDARY EXISTING LOT LINE —	(5820) 5820
	PROPOSED BASIN BOUNDARY MDDP BASIN BOUNDARY PROP. DIRECTION OF DRAINAGE EXISTING DIRECTION OF DRAINAGE	
	BASIN IDENTIFIER	D 1.41
	DESIGN POINT	
	200' 100' 0 200' SCALE: 1" = 200'	400'
REVIEW: PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC	CLASSIC SM SOUTH	DRAINAGE REPORT ACADEMY HIGHLANDS FILING NO. 1 G CONDITIONS DRAINAGE MAP
KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE	CONSULTING ENGINEERS & SURVEYORSDESIGNE6385 Corporate Drive, Suite 101 Colorado Springs, Colorado 80919(719)785–0790 (719)785–0799CHECKE	BY MAL (H) 1"= 200' SHEET 1 OF 1

DATE

EXIST. VEGETATED SWALE



	24b	22 24a	20	19 18	16 17	13 14	11	8 0 0 0	7 6 J	4 3 1	S ₪ →	IGN POINT		
	5.6	4.2 3.1	122.4 6.9	21.8	42.0 23.1	3.4 31.2	5.7	4.1	98.9 4.9 2.0	6.7 91.0	11.9 33.8 40.4	9.2	DESIGN (0189)	
6385 Corporat Colorado Sprin	12.4	11.0 7.0	285.1 59.6	57.7	43.5	6.3 58.8	10.6 8.8 15.2	10.8 27.5	214.1 9.2 3.8	16.8 196.2	86 5 86 5	Q100 (CFS) 19.0	TONT S	
E Drive, Suite 101 gs, Colorado 80919 (719)785-0790 (719)785-0799 (Fax)		5' TYPE R SUMP INLET EXISTING GRATED INLET	TEMP. PUBLIC POND 'T' OVERALL SITE RUNOFF	FUTURE STORM SYSTEM TEMP. SEDIMENT BASIN 'H'	FUTURE STORM SYSTEM	FUTURE STORM SYSTEM	10' AT-GRADE INLET FUTURE STORM SYSTEM	FUTURE STORM SYSTEM	5' TYPE R SUMP INLET	WESTERN TRIBUTARY CHANNEL	24" FES EXIST. 24" RCP	EXIST. 24" RCP		(07.85)
SOUTH ACADEMY HIGH FILING NO. 1 PHASE 1 DEVELOPMENT PROPOSED CONDITIONS DESIGNED BY MAL SCA DRAWN BY MAL (H) CHECKED BY (V)	<u>26</u> ~ 48"	24 ~ 24" 25 ~ 36"	22 ~ 36" 23 ~ 66"	20 ~ 36" 21 ~ 54"	18 ~ 36" 19 ~ 48"	15 ~ 60"	12 ~ 30 13 ~ 60" 14 ~ 24"	$10 \sim 18^{"}$ $11 \sim 48^{"}$	7 ~ 36" 9 ~ 48"	6 ~ 24 ["]	$2A \sim 42^{"}$ $2B \sim 42^{"}$ $4 \sim 18^{"}$	$\frac{\text{PIPE/SIZE}}{1 \sim 24^{"}}$	PIPE RO	
ILANDS 1"= 100' SH 1"= N/A JOE							5. / 76.8 3.4		16.4 4.1 20.7	6.9 11.0	50.1 54.4	1114G (FIL- Q5 (CFS) 11.9	NEL STERAL STERA	
B NO. 2184.90 HEET 1 2184.90 HEET 1 CLASSIC CONSULTING ENGINEERS & SURVEYORS	48.3	19.9 57.7	57.7 251.0	43.5 125.4	101.8	193.2 58.8	151.9 6.3	48.9	37.5 10.8 47.1	13.0 27.5	106.8 117.6 9.2	Q100 (CFS) 25.0		

		1		2	2	3			4	5			6	7
	is, Inc.			BASI		IC SUMMARY	<u> </u>	~		·	`		/	
	Associates,		AREA	T _c	RATIONAL	RATIONAL				````		~~~	75	
A		INLET ID A1a	(AC) 0.6	(MIN) 5	" C₅" 0.9	"C ₁₀₀ " 0.95	Q₅ (CFS) 2.9	Q ₁₀₀ (CFS) 5.4			_	``\		
	Horn and	A1g	1.7	5	0.9	0.95	7.7	14.5	· / .			`	-76	_76.
		A2a A2b	0.1	5	0.9 0.9	0.95	0.5	1.0 5.1		·	<u> </u>		77	
	Kimley	A2c	0.9	5	0.9	0.95	4.1	7.6				```		-11-
Б	lity to	A3a A4	0.8 0.2	5 5	0.9 0.9	0.95 0.95	3.8 0.8	7.0 1.6		``	````		°- — — _	
В	t liability	A5a A6a	0.7	5	0.9 0.9	0.95	3.2 2.1	5.9 3.9		· - `- <u></u>				18
	without	A7	0.1	5	0.9	0.95	0.6	1.0				,		1
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С	es, Inc	A12	0.9	5	0.9	0.95	4.3	8.1				81	H	-80.
C	Associates,	B1a B2	0.2	5 5	0.9 0.9	0.95 0.95	1.1 0.8	2.1 1.5		````	~ ~			
		B3 B5	1.1 0.8	5	0.9 0.89	0.95 0.94	5.2 3.7	9.8 7.0			~	-82		8 PM
	Horn and	B6	0.8	5	0.77	0.85	3.2	6.3		`	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	3		
	ey-Ho	C1 C2	0.4	5	0.9 0.9	0.95	1.8 4.8	3.3 9.0					82	2
D	Kimle	D1	1.8	5	0.7	0.78	6.3	12.6			84	`		DEV
D	on by	D2 E0c	1.2 1.2	5 5	0.76 0.9	0.83 0.95	4.6 5.3	8.9 10.0			85		,83-	3
	adaptation	E1 E2	1.2 0.7	5	0.6 0.68	0.7	3.8 2.4	7.8 4.9	<pre>/ _</pre>			~ 1		B B C B C B C B C B C B C B C B C B C B
	and ad	E3	1.2	5	0.66	0.77	3.4	7.1		3- `	36		8A	
		E4 E5	0.5 0.7	5 5	0.9 0.9	0.95 0.95	2.5 3.3	4.6 6.3		87				
Е	authorization	E6 D	0.3	5	0.9 0.3	0.95 0.45	1.3 7.8	2.5 20.8						7
_		F1	0.7	5	0.9	0.95	3.4	6.4		88		-86-1		
	written	G1 G2a	0.4	5	0.9 0.9	0.95	1.8 0.8	3.3 1.5	`~	/ //			X IM	
	without	G3 G4a	0.1 1.0	5 5	0.9 0.9	0.95 0.95	0.3 1.3	0.6 2.5			$\mathcal{H}_{\mathcal{A}}$	87-7.1	1 11	I 86
	Ļ	G5	0.4	5	0.9	0.95	1.7	3.2		- 90 <u>-</u> /				
F	documen	G6a G7	0.8	5	0.9 0.9	0.95	1.9 0.4	3.5 0.7	7		88 _			
	this do	G8	0.1	5	0.9	0.95	0.5	1.0	<			H H		
	uo	G9 G10	0.1	5 5	0.9 0.9	0.95 0.95	0.5 0.8	0.9 1.5	< 、 、 、 、 、	//8	9			H-7
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		J2	0.9	5	0.9	0.95	4.0	7.6		H90				
G	improper	J2a J2b	0.3 1.3	5 5	0.9 0.9	0.95 0.95	1.5 5.8	2.9 10.9		91-	15			
	and	J3 J4a	0.6 0.5	5	0.9 0.9	0.95 0.95	2.7 2.1	5.1 3.9					ST J7	
	use of	J5	0.3	5	0.9	0.95	1.4	2.6	×					
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