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MDDP AMENDMENT/PRELIMINARY DRAINAGE PLAN & REPORT
FOR
THE CREST AT WOODMEN
PHASE 1 WEST, PHASE 2 EAST, PHASE 3 SOUTHEAST REDEVELOPMENT
LOOART SUBDIVISION FILING NO. 6

Campus Drive and Woodmen Road
Colorado Springs, Colorado

Developer:
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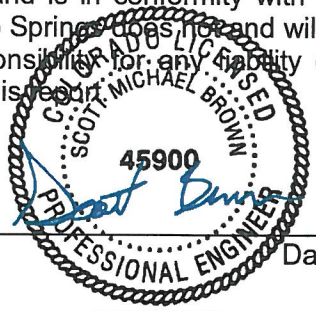
Prepared: September 2018
Revised: January 2019

Certification Statements:

This report and plan for the drainage design of The Crest at Woodmen Looart Subdivision Filing No. 6 Phases 1, 2, & 3 was prepared by me (of under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the *City of Colorado Springs Drainage Criteria Manual* and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.



Scott Brown
Registered Professional Engineer
State of Colorado No. 45900

01/30/2019
Date

Developer's Statement:

Crest at Woodment, LLC hereby certifies that the drainage facilities for The Crest at Woodmen Looart Subdivision Filing No. 6 - Phases 1, 2, & 3 shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of Crest at Woodmen, LLC, guarantee that final drainage design review will absolve Crest at Woodmen, LLC and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

REALM REALTY
Name of Developer

1/31/19
Authorized Signature Date

CASEY SEALE
Printed Name

ASSET MANAGER
Title

431 North Weber, Colorado Springs, CO 80903
Address:

CITY OF COLORADO SPRINGS:

Filed in accordance with Section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

Anna Bergmark
For City Engineer

02/11/2019
Date

Conditions:

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I. INTRODUCTION

This document is the Master Development Drainage Plan Amendment and Preliminary Drainage Report (MDDP/PDR) for The Crest at Woodmen - Phase 1 West, Phase 2 East, Phase 3 Southeast Project, which consists of redeveloping the property for commercial/retail uses.

The purpose of this report is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site and to identify drainage facility preliminary sizing and locations. An MDDP has been previously prepared for this site titled *Master Development Drainage Plan for the Crest at Woodmen – Looart Subdivision Filing No. 6* by Galloway & Company approved by the City on 5/17/18 (approved MDDP). This report will refine the conceptual design for the site since there is an updated site plan for the site. This report also discusses the changes from the approved MDDP, which entails including the proposed Campus Drive roadway and the location for Pond A moved from the southeast corner of the site to the southern end of the site.

II. GENERAL LOCATION AND DESCRIPTION

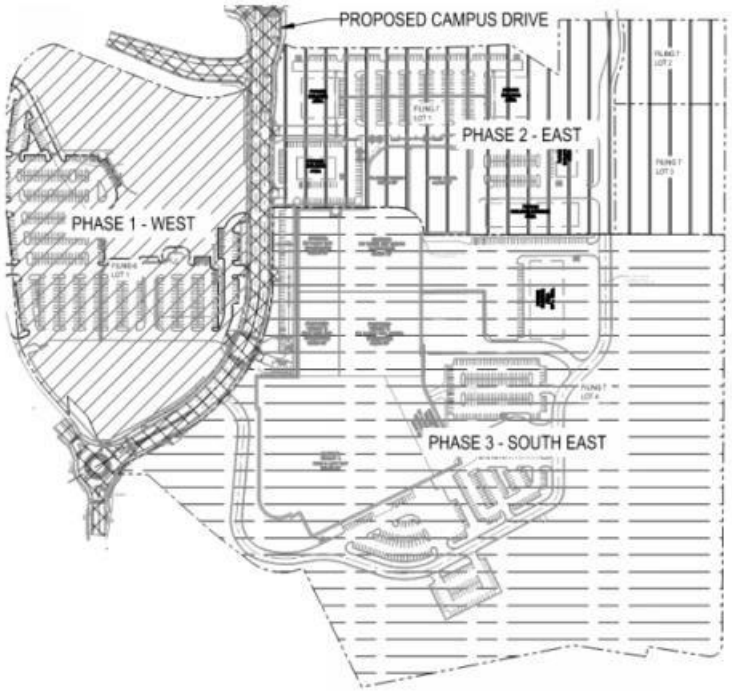
A. Location

The Crest at Woodmen project property is located in the southwest one-quarter of Sections 8, Township 13 South, Range 66 West of the 6th Principal Meridian, in the City of Colorado Springs, El Paso County, Colorado. The development site is located south of E. Woodmen Road at Campus Drive in Colorado Springs, Colorado. This site is bounded by Woodmen Road to the north, Vincent Drive to the west, Yorkshire Estates to the east and Cottonwood Creek to the south. The site itself is currently developed with office and warehouse buildings and associated drives, parking, landscape and utilities. See the Vicinity Map in Appendix A.

The site currently covers an area of approximately 76.8 acres in size (Lot 1 Block 1 Looart Subdivision Filing 5). The site will be redeveloped into 4 phases: Campus Drive; Phase 1 West, Phase 2 East, and Phase 3 Southeast. Campus Drive is a proposed public road that runs north to south through the property and consists of approximately 2.6 acres, creating Lot 1 (west of Campus Dr.) and Lot 2 (east of Campus Dr.) as referenced in the Looart Filing 6 Plat (not yet recorded). A Preliminary/Final Drainage Report has been approved by the City for Campus Drive titled *Preliminary/Final Drainage Plan and Report for Crest at Woodmen Campus Drive Looart Subdivision Filing No. 6* (Campus FDR) by Galloway & Company approved 5/15/18.

The Crest at Woodmen Phase 1 West area (Looart Filing 6 Lot 1) examines approximately 15.6 acres and is bounded to the north and west by Vincent Drive, to the east by Campus Drive. Phases 2 and 3 will split Filing 6 – Lot 2 into 4 separate lots (reference the Filing 7 plat, to be recorded after Filing 6). The Crest at Woodmen Phase 2 East area (Looart Filing 7 Lots 1,2, and 3) examines approximately 17.0 acres and is bounded by the north by Woodmen Rd, by the west by Campus Drive, and by existing residential development to the east. Phase 2 - East is intended to be rezoned “PBC,” Planned Business Center, for the construction of

commercial/retail parcels. The Crest at Woodmen Phase 3 Southeast area (Looart Filing 7 Lot 4) examines approximately 41.8 acres and is bounded by the east by existing residential development and to the south by Cottonwood Creek. Refer to the Phasing exhibit below and in Appendix A.



According to the U.S. Department of Agriculture Natural Resources Conservation Service Soil Survey of El Paso County, Colorado the primary (82.3%) soil found is Blendon sandy loam; the remaining soils are Travessilla-Rock (9.7%) and Truckton sandy loam (11.4%). Blendon sandy loam are classified as Soil Conservation Service (SCS) hydrologic soil group "B", Travessilla-Rock is classified as SCS hydrologic soil group "D" and Truckton sandy loam is classified as SCS hydrologic soil group "A". For the purpose of this report, the drainage calculations used Type "B" to estimate the proposed runoff. A copy of the soil map as well as more detailed information regarding the individual soil properties can be found in Appendix A.

The proposed site is located within Zone X, as referenced from FEMA Flood Insurance Rate Map (08041C0516F).

III. HISTORIC DRAINAGE PATTERNS AND FEATURES

The proposed project site is located within the Cottonwood Creek Drainage Basin as described in the Drainage Basin Planning Study (DBPS) prepared by URS in 1994. This study was later

modified by Ayres Associates in June of 2000. The study was modified to resolve high improvement costs associated with it and to address some unresolved issues.

For the purposes of this report historic refers to the pre-redeveloped state of the site. The pre-redeveloped state is depicted on the historic drainage map included in the appendices.

The proposed site is located in sub basin W2 of the Cottonwood Creek Basin per the DBPS. Subbasin W2 is approximately 79.7 acres in size.

The site is currently developed with multiple buildings and associated drives, parking and landscaping. There is a significant amount of trees and natural vegetation at the northwest corner of the site as well as along the west side of the site.

The topography of the site varies significantly across the property with the highest point of the site located in the northeast corner of the property. This high point, located at the northeast access (at Woodmen Road) is at an elevation of 6370. The existing drives and parking lots on site range in slopes from 2% to 7.4%. The open space areas range in slopes from 1% to 39%. The low point of the site is located at the southwest corner of the site where Vincent Drive crosses Cottonwood Creek.

In order to understand the existing hydrology, the project site was modeled in its current condition. The proposed project site comprises of portions of Basin W2 as identified in the Drainage Basin Planning Study prepared by URS. Outfall 20 corresponds to the Cottonwood Creek Tributary. For the purposes of the proposed project, Basin W2 was further subdivided as documented below, and shown on the Historic Drainage Map in Appendix E. However, in the current condition, there are 2 different outfall locations (southeast corner of Basin W2 and southwest corner of Basin W2, see Historic Drainage Map). A copy of the drainage map from the DBPS prepared by URS has been included for reference in Appendix B.

BASIN W2a is an 11.95 acre watershed which is comprised of open space and an existing water quality pond along the eastern edge of the site. This basin discharges via a grass swale at the southeast outfall of W2 (Q_5 = 2.8 cfs, Q_{100} = 29.2 cfs).

Basin OS-E is a 33.90 acre watershed (Q_5 = 151.1 cfs, Q_{100} = 210.3 cfs). This watershed covers the existing Yorkshire Estates Subdivision, portions of Woodmen Road, the existing Home Depot, REI, and other portions of the commercial development at the northwest corner of the Woodmen & Academy intersection. This basin is based upon information contained within the Woodmen Road Phase 1 improvements drainage report. This watershed outfalls into an existing water quality pond located on the subject property. Runoff in excess of the water quality volume overtops the pond and continues south through a stabilized channel to Cottonwood Creek.

BASIN W2b is a 2.56 acre watershed which is made up of portions of the existing parking lot on the north side of the site. Runoff from this basin enters the existing storm sewer system and ultimately discharges at the southeast outfall of W2 (Q_5 = 7.3 cfs, Q_{100} = 16.4 cfs).

BASIN W2c is a 1.56 acre watershed which is comprised of a portion of the existing building. Runoff generated from this basin enters the existing storm sewer system and ultimately discharges at the southeast outfall of W2 (Q_5 = 6.8 cfs, Q_{100} = 12.2 cfs).

BASIN W2d is a 5.07 acre watershed which is made up of a portion of the existing parking lot on the east side of the site. Stormwater generated from this basin enters the existing storm sewer system and ultimately discharges at the southeast outfall of W2 (Q_5 = 11.1 cfs, Q_{100} = 27.5 cfs).

BASIN W2e is a 4.23 acre watershed which contains a portion of the parking lot on the east side of the site. Renters the existing storm sewer system and ultimately discharges at the southeast outfall of W2 (Q_5 = 11.4 cfs, Q_{100} = 24.4 cfs).

BASIN W2f is a 4.76 acre watershed containing a portion of the existing building. Runoff from this basin enters the existing storm sewer system and ultimately discharges at the southeast outfall of W2 (Q_5 = 20.6 cfs, Q_{100} = 37.2 cfs).

BASIN W2g is a 10.13 acre watershed which contains a portion of the existing parking lot at the southeast corner of the site. Stormwater from this basin enters the existing storm sewer system and ultimately discharges at the southeast outfall of W2 (Q_5 = 19.7 cfs, Q_{100} = 52.3 cfs).

BASIN W2h is a 3.49 acre watershed located at the north end of the site which is comprised of open space and a portion of a private roadway. Runoff generated within the basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 3.39 cfs, Q_{100} = 10.3 cfs).

BASIN W2i is a 5.28 acre watershed on the northwest side of the site which is comprised of open space and a portion of the existing parking lot. Stormwater from this basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 11.8 cfs, Q_{100} = 29.4 cfs).

BASIN W2j is a 0.74 acre watershed which is made up of a portion of an existing building on the west side of the site. Runoff from this basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 3.2 cfs, Q_{100} = 5.8 cfs).

BASIN W2k is a 0.55 acre watershed which is made up of a portion of an existing building on the west side of the site. Runoff from this basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 2.4 cfs, Q_{100} = 4.3 cfs).

BASIN W2l is a 6.01 acre watershed which is made up of a portion of an existing building in the center of the site. Runoff from this basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 26.1 cfs, Q_{100} = 47.0 cfs).

BASIN W2m is a 10.49 acre watershed in the southwest corner of the site, and is comprised of open space, private roadways, and parking lot. Runoff generated from this basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 9.7 cfs, Q_{100} = 42.1 cfs).

BASIN W2n is a 10.27 acre watershed along the southern edge of the site, and is comprised of open space, private roadways, and parking lot. Runoff generated from this basin sheet flows and discharges at the southwest outfall of W2 (Q_5 = 9.0 cfs, Q_{100} = 35.8 cfs).

BASIN W2o is a 4.09 acre watershed is comprised of open space along the western edge of the site. Runoff from this basin sheet flows south and is collected in the existing storm sewer system and discharges at the southwest outfall of W2 (Q_5 = 0.8 cfs, Q_{100} = 12.8 cfs).

BASIN OS3 is a 2.12 acre watershed which sheet flows and is routed to an existing storm sewer inlet and outfalls into Basin W2m before ultimately discharging at the southwest outfall of W2 (Q_5 = 2.9 cfs, Q_{100} = 9.6 cfs).

BASIN OS4 is a 0.80 acre watershed located on the northwest side of Vincent Drive (northwest corner of the site). Runoff from this basin enters the existing storm sewer system and ultimately discharges at the southwest outfall of W2 (Q_5 = 3.2 cfs, Q_{100} = 6.0 cfs).

IV. DRAINAGE DESIGN CRITERIA

The analysis and design of the stormwater management system for this project was prepared in accordance with the criteria set forth in the City of Colorado Springs Drainage Criteria Manual (DCM) Volumes 1 & 2, dated May 2014.

The rational method was used to calculate peak flows as the tributary areas are less than 100 acres. The rational method has been proven to be accurate for basins of this size and is based on the following formula:

$Q = CIA$

Where:

Q = Peak Discharge (cfs)

C = Runoff Coefficient

I = Runoff intensity (inches/hour)

A = Drainage area (acres)

The rainfall intensity calculations are based on the DCM Figure 6-5 and IDF equations. The one hour point rainfall data for the design are listed in Table 1 below.

Table 1 - Precipitation Data

Return Period	One Hour Depth (in).	Intensity (in/hr)
5-year	1.50	5.17
100-year	2.52	8.68

Time of concentrations have been adapted from the equation 6-7 of The City of Colorado Springs Drainage Criteria Manual, Volume 1 which are as follows:

$Tc=T_i + T_t$

Where:

T_c = time of concentration (min)
T_i = overland (initial) flow time (min)
T_t = travel time in the ditch, channel, gutter, storm sewer, etc. (min)

Overland (Initial) Flow Time: from equations 6-8 from the City of Colorado Springs Drainage Criteria Manual, Volume 1.

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

Where:

T_i = overland (initial) flow
C_5 = runoff coefficient for 5-year frequency
L = length of overland flow (300 ft maximum for non-urban land uses, 100 ft maximum for urban land uses)
S = average basin slope

Travel Time

$V = C_v * S_w 0.5$

Where:

V = Velocity (ft/s)
C_v = conveyance coefficient
S_w = watercourse slope (ft/ft)

The runoff coefficients are calculated based on land use, percent imperviousness, and design storm for each basin, as shown in the DCM, (Table 6-6). The runoff coefficient for commercial impervious basins was 0.88 (100-year) and 0.81 (5-year) per the DCM. The appendix contains runoff coefficient calculations for basins that were not 100% impervious.

The 100-year event was used as the major storm event to show where inlets are necessary based on the capacity of the street and to estimate storm drain pipe sizes based on mannings equation. Inlets will be sized at the Final Drainage Report stage.

The full spectrum detention method (FSD) was used to size both of the proposed water quality/detention ponds. This method attributes two design volumes; one being the Excess Urban Runoff Volume (EURV) and the other bring the 100-year detention volume. This approach includes the Water Quality Capture Volume (WQCV) with the EURV; therefore, no additional volume for the WQCV is required. The equations contained within the DCM were utilized to

calculate the required EURV and WQCV values. The latest UD-Detention spreadsheet from UDFCD was not utilized as it contains different C values and allowable release rates than those contained within the DCM.

As will be discussed later in the report the hydraulics of the ponds is quite complex due to the accounting of water quality for offsite basins, but not EURV or 100-year flood volume for those basins. Additionally, Pond A will overdetain to allow a larger release from Pond B. To accurately account for the complex hydraulics of the ponds EPA SWMM 5.1.010 was utilized to both create hydrographs for the tributary basins and to route runoff through the ponds. EPA SWMM was also utilized to verify that the ponds WQ/EURV volume will drain in 72 hours while the straight WQCV for the pond does not drain faster than 40 hours. The UDFCD spreadsheet UD-Detention 2.34 was utilized to calculate the stage discharge curves for the ponds.

V. PROPOSED DRAINAGE PLAN

A. General Description

Historically, there are two outfall locations from the site; at the southeast corner of the site and the southwest corner of the site. The southwest outfall location will remain and an outfall will be provided at the southern portion of the site. There are two proposed detention ponds on the site. The purpose of the ponds is to provide water quality and detain developed runoff to at or below historic rates. The ponds will be discussed in more depth later in the report.

A future roadway has been designed to bisect the property, Campus Drive. A Preliminary/Final Drainage Report has been approved by the City for Campus Drive titled *Preliminary/Final Drainage Plan and Report for Crest at Woodmen Campus Drive Looart Subdivision Filing No. 6* (Campus FDR) by Galloway & Company approved 5/15/18. The detention pond shown in the Campus FDR for Campus Drive will be modified and enlarged and is now referenced as “Pond B” (see section V-D and the Proposed Drainage Map in Appendix D).

B. Four Step Process

The Four Step Process to minimize the adverse impacts of urbanization is vital component of developing a balanced, sustainable project. Below identifies the approach to the four step process:

1. Employ Runoff Reduction Practices

This step uses low impact development (LID) practices to reduce runoff at the source. Generally rather than creating point discharged that are directly connected to impervious areas runoff is routed through pervious areas to promote infiltration. Due to the existing site constraints and topography this is a difficult task. Grass buffers and swales are encouraged and used where practical. Runoff reduction plays a large role in the overall system design as detention volume and water quality control volume is minimized.

2. Implement BMPs That Provide a Water Quality Capture Volume with Slow Release

This step utilizes formalized water quality capture volume to slow the release of runoff from the site. Both proposed ponds (Pond A & Pond B) will provide EURV volume for

the new development which incorporates a 72 hour release. These ponds will also provide WQCV for the offsite tributary areas which will release in no less than 40 hours.

3. Stabilize Drainageways

This step implements stabilization to channels to accommodate developed flows while protecting infrastructure and controlling sediment loading from erosion in the drainageways. Improvements to Cottonwood Creek have recently been made. These improvements have already taken into account developed flows from the site (as the site was currently developed). With this project, these rates will be reduced back to pre-redevelopment values. Therefore, the recently completed channel improvements will be adequate for this development as they take into account the existing undetained site conditions.

4. Implement Site Specific and Other Source Control BMPs

This step is typically implemented at a detailed level when the site develops. Source control BMPs protect the release of pollutants from outdoor storage areas. Trash enclosures will be provided for the lots as they develop which will reduce trash from leaving the lots. This will be identified and implemented within future Final Drainage reports for the site.

C. Proposed Basins

The original DBPS prepared by URS identified one Basin for our project site, W2, as described previously. For the proposed drainage design, new basin designations were required as a result of the proposed improvements. The basin size and locations shown in the FDR for Campus Drive will stay the same.

The basins and their proposed size, shape and orientation can be seen on the proposed drainage map found in Appendix C.

Basin A1 (2.47 AC, Q_5 = 10.2 cfs, Q_{100} = 18.6 cfs): a basin defining the area of future commercial development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 50. Flow will be routed to proposed Pond A.

Basin A2 (2.48 AC, Q_5 = 3.4 cfs, Q_{100} = 8.4 cfs): a basin defining the area of future private roadway and future commercial for the Phase 2 development. A proposed storm sewer system will collect runoff from this basin and tie into the proposed inlet at DP 54A. Flow will be routed to proposed Pond A. Any bypassed flow will enter Basin A7 and will enter the storm system at the inlet at DP 60A.

Basin A3 (3.81 AC, Q_5 = 10.1 cfs, Q_{100} = 19.8 cfs): a basin defining the area of future commercial for the Phase 2 development. Flow will enter the system at the proposed inlet at DP 58 and will be routed to proposed Pond A.

Basin A4 (3.44 AC, Q_5 = 14.6 cfs, Q_{100} = 26.6 cfs): a basin defining the area of building rooftop and future commercial lot for the Phase 2 development. The proposed storm sewer storm sewer system will collect runoff from this basin and tie into the proposed inlet at DP 59A. Flow will be

routed to proposed Pond A.

Basin A5 (0.33 AC, Q_5 = 1.6 cfs, Q_{100} = 2.8 cfs): a basin defining the area of a future private roadway. The storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 54B. Flow will be routed to proposed Pond A.

Basin A6 (3.33 AC, Q_5 =14.0 cfs, Q_{100} = 25.4 cfs): a basin defining the area of a future commercial lot. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm system at DP 51A. Flow will be routed to proposed Pond A.

Basin A7 (2.86 AC, Q_5 = 11.7 cfs, Q_{100} = 21.4 cfs): a basin comprised of building rooftop and future commercial area for the Phase 3 development. An existing trench drain will remain in place and collect some of the runoff, with the rest entering the system at the inlet located at DP 60A.The proposed storm system will replace the existing storm sewer system and will collect runoff which will then be routed to Pond A.

Basin A8 (0.60 AC, Q_5 = 2.8 cfs, Q_{100} = 5.0 cfs): a basin comprised of future commercial for the Phase 3 development. A proposed inlet will collect runoff at DP 61A and tie into the proposed storm sewer system that is replacing the existing system. Flow will be routed to proposed Pond A.

Basin A9 (1.33 AC, Q_5 = 5.9 cfs, Q_{100} = 10.6 cfs): a basin comprised of a future commercial area for the Phase 3 development. With future development, a storm sewer system will collect runoff from this basin and tie into a future storm inlet at DP 55A. Flow will be routed to proposed Pond A.

Basin A10 (2.75 AC, Q_5 = 11.4 cfs, Q_{100} = 20.7 cfs): a basin comprised of building rooftop and future commercial area for the Phase 3 development. An existing trench drain will remain in place and collect some of the runoff, with the rest entering the system at the inlet located at DP 62A.The proposed storm system will replace the existing storm sewer system and will collect runoff which will then be routed to Pond A.

Basin A11 (3.80 AC, Q_5 = 15.7 cfs, Q_{100} = 29.0 cfs): a basin comprised of building rooftop and future commercial area for the Phase 3 development. Runoff will flow through the parking lot and enter the storm sewer system at the inlet at DP 56A. Flow will be routed to proposed Pond A.

Basin A12 (0.24 AC, Q_5 = 1.0 cfs, Q_{100} = 1.8 cfs): a basin defining the area of future private roadway. The storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 56B. Flow will be routed to proposed Pond A.

Basin A13 (5.00 AC, Q_5 =17.3 cfs, Q_{100} = 31.5 cfs): a basin defining the area of a future commercial development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 58C. Flow will be routed to proposed Pond A.

Basin A14 (0.05 AC, Q_5 = 0.2 cfs, Q_{100} = 0.4 cfs): a basin defining a small area of future commercial for the Phase 3 development. The inlets will tie into the storm sewer system at DP 63

and will be routed to Pond A.

Basin A15 (1.09 AC, Q_5 = 5.1 cfs, Q_{100} = 9.1 cfs): a basin defining future commercial area for the Phase 3 development. Runoff will be collected at DP 65A with an inlet and tied into the storm sewer system. Flow will be routed to proposed Pond A.

Basin A16 (1.21 AC, Q_5 = 5.6 cfs, Q_{100} = 10.1 cfs): a basin defining the private roadway along the south side of the Phase 3 development. The storm sewer system will collect runoff from this basin at DP 57A. Flow will be routed to proposed Pond A.

Basin A17 (5.24 AC, Q_5 = 19.8 cfs, Q_{100} = 36.1 cfs): a basin defining the area of future commercial development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 66A. Flow will be routed to proposed Pond A.

Basin A18 (4.12 AC, Q_5 = 16.9 cfs, Q_{100} = 30.9 cfs): a basin defining the area of future commercial development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 66B. Flow will be routed to proposed Pond A.

Basin A19 (0.69 AC, Q_5 = 3.2 cfs, Q_{100} = 5.7 cfs): a basin defining a future commercial area for the Phase 3 development. An inlet will collect runoff at DP 68A and into the storm sewer system to route the flow to Pond A.

Basin A20 (1.06 AC, Q_5 = 4.9 cfs, Q_{100} = 8.9 cfs): a basin defining future commercial area. An inlet will collect runoff at DP 67A and into the storm sewer system to route the flow to Pond A.

Basin A21 (0.45 AC, Q_5 = 2.1 cfs, Q_{100} = 3.7 cfs): a basin defining future commercial area. An inlet will collect runoff at DP 69A and into the storm sewer system to route the flow to Pond A.

Basin A22 (3.45 AC, Q_5 = 1.8 cfs, Q_{100} = 10.6 cfs): a basin defining the area of Pond A. Pond A is the confluence point for all 'A' basins. Released flow from Pond A will outfall into Cottonwood Creek.

Basin OSE is a 33.90 acre watershed (Q_5 = 151.1 cfs, Q_{100} = 259.4 cfs). This watershed covers the existing Yorkshire Estates Subdivision, portions of Woodmen Road, the existing Home Depot, REI, and other portions of the commercial development at the northwest corner of the Woodmen & Academy intersection. This basin is based upon information contained within the Woodmen Road Phase 1 improvements drainage report. The existing pipe will be extended through the proposed site to the proposed Pond A. An excerpt from the Woodmen Road Phase 1 improvements Drainage Report can be found in Appendix B.

Basin B1-1 (1.32 AC, Q_5 = 1.0 cfs, Q_{100} = 5.0 cfs): a basin consisting of steep terrain with shallow bedrock, has abundant vegetation and will remain undeveloped. Storm runoff will sheet flow to a proposed inlet west of Campus Drive at DP 1. This inlet is the start of the storm sewer system and will collect the flows and convey them to proposed Pond B.

Basin B1-2 (0.38 AC, Q_5 = 1.2 cfs, Q_{100} = 2.1 cfs): a basin comprised of building rooftop for the Phase 1 development. Flow will enter a roof drain which will tie into the proposed system at DP 1. Flow will be routed to Pond B.

Basin B2 (1.15 AC, Q_5 = 2.4 cfs, Q_{100} = 5.3 cfs): a basin consisting of Campus Drive half-street and walk areas. Runoff sheets flows from the street and walk areas and is conveyed in the proposed curb & gutter to the inlet at DP 7 and conveys the flow within the Campus Drive storm sewer system to proposed Pond B.

Basin B3-1 (7.34 AC, Q_5 = 17.7 cfs, Q_{100} = 34.7 cfs): a basin defining the area of future commercial for the Phase 1 development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 16. The storm sewer system will tie into the Campus Drive storm sewer system and flows will be routed to proposed Pond B.

Basin B3-2 (1.31 AC, Q_5 =4.8 cfs, Q_{100} = 8.9 cfs): a basin defining the area of future commercial for the Phase 1 development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 8A The storm sewer system will tie into the Campus Drive storm sewer system and flows will be routed to proposed Pond B.

Basin B3-3 (0.64 AC, Q_5 = 2.2 cfs, Q_{100} = 4.2 cfs): a basin defining the area of future commercial for the Phase 1 development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 8B The storm sewer system will tie into the Campus Drive storm sewer system and flows will be routed to proposed Pond B.

Basin B3-4 (0.92 AC, Q_5 = 2.8 cfs, Q_{100} = 5.2 cfs): a basin comprised of building rooftop for the Phase 1 development. Flow will enter a roof drain which will tie into the proposed system at DP 8A. Flow will be routed to Pond B.

Basin B4-1 (1.69 AC, Q_5 = 6.9 cfs, Q_{100} = 12.6 cfs): a basin defining the area of future commercial development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 13. The storm sewer system will tie into the Campus Drive storm sewer system and flows will be routed to proposed Pond B.

Basin B4-2 (0.87 AC, Q_5 = 3.6 cfs, Q_{100} = 6.7 cfs): a basin defining the area of future commercial development. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP 18. The storm sewer system will tie into the Campus Drive storm sewer system and flows will be routed to proposed Pond B.

Basin B5-1 (0.51 AC, Q_5 = 1.8 cfs, Q_{100} = 3.3 cfs): a basin consisting of Campus Drive half-street and walk areas. Runoff sheet flows from the street and walk areas and is conveyed in the proposed curb & gutter to the inlet at DP 11 and conveys the flow within the Campus Drive storm sewer system to proposed Pond B.

Basin B5-2 (0.55 AC, Q_5 = 1.9 cfs, Q_{100} = 3.6 cfs): a basin containing a portion of Campus Drive half-street, the roundabout and existing Vincent Drive half-street. Runoff from this basin will be collected in an existing storm inlet at DP 24 and will be routed to Cottonwood Creek in an existing storm sewer system. This basin flows to existing inlets within Vincent Dr. which discharges into Cottonwood Creek.

Basin B5-3 (0.16 AC, Q_5 = 0.6 cfs, Q_{100} = 1.1 cfs): a basin containing a portion of Campus Drive half-street, the roundabout and existing Vincent Drive half-street. Runoff from this basin will be collected at DP 25 and continue to flow southeasterly towards an existing inlet in Vincent Drive which will be routed to Cottonwood Creek in an existing storm sewer system. This basin flows to existing inlets within Vincent Dr. which discharges into Cottonwood Creek.

Basin B6 (3.03 AC, Q_5 = 11.4 cfs, Q_{100} = 21.3 cfs): a basin comprised of building rooftop for the Phase 3 development. Runoff will flow into Basin 7-1 and will enter the storm sewer system to be routed to Pond B.

Basin B7-1 (0.55 AC, Q_5 = 0.3 cfs, Q_{100} = 1.5 cfs): a basin comprised of commercial area for the Phase 3 development. Flow will enter the storm system at DP 27A and will be routed to Pond B.

Basin B7 (2.51 AC, Q_5 = 3.3 cfs, Q_{100} = 9.4 cfs): a basin comprised of a private drive that connects to Campus Drive. Flow will enter the storm system at DP 27 and will be routed to Pond B.

Basin B8 (0.90 AC, Q_5 = 2.5 cfs, Q_{100} = 5.0 cfs): a basin consisting of Campus Drive half-street and walk areas as well as a portion of a new local street and adjacent landscaping. Runoff sheet flows from the street and walk areas and is conveyed in the proposed curb & gutter to the inlet at DP 12 and conveys the flow within the Campus Drive storm sewer system to proposed Pond B

Basin B9-1 (0.72 AC, Q_5 = 2.7 cfs, Q_{100} = 5.0 cfs): a basin comprised of building rooftop for the Phase 3 development. Flow will enter a roof drain at DP 9A which will be routed to the Campus Drive storm sewer system to proposed Pond B.

Basin B9 (0.96 AC, Q_5 = 1.6 cfs, Q_{100} = 3.4 cfs): a basin comprised of future commercial area for the Phase 3 development. Runoff will enter the system at DP 9 which will tie into the Campus Drive storm system. Flow will be routed to Pond B.

Basin B10 (1.05 AC, Q_5 = 3.7 cfs, Q_{100} = 7.1 cfs): a basin consisting of Campus Drive half-street and walk areas. Runoff sheet flows from the street and walk areas and is conveyed in the proposed curb & gutter to the inlet at DP 4 and conveys the flow within the Campus Drive storm sewer system to proposed Pond B.

Basin B11-1 (2.00 AC, Q_5 = 0.8 cfs, Q_{100} = 5.4 cfs): a basin defining an open space area. Flow will enter the system at DP 2A and will be routed to proposed Pond B.

Basin B11 (1.65 AC, Q_5 = 4.3 cfs, Q_{100} = 8.7 cfs): a basin comprised of a future building rooftop and future commercial area for the Phase 2 development. Runoff will enter the system at DP 2B which will tie into the storm sewer system. Flow will be routed to Pond B through the Campus Drive storm system.

Basin B12-1 (0.69 AC, Q_5 = 2.6 cfs, Q_{100} = 4.9 cfs): a basin comprised of building rooftop for the Phase 3 development. Flow will enter a roof drain which will tie into the proposed system at DP 2. Flow will be routed to Pond B through the Campus Drive storm system.

Basin B12 (0.77 AC, Q_5 = 2.8 cfs, Q_{100} = 5.4 cfs): a basin comprised of a future building rooftop and future commercial area for the Phase 2 development. Runoff will enter the system at DP 2C

which will tie into the storm sewer system. Flow will be routed to Pond B through the Campus Drive storm system.

Basin OS1 (1.29 AC, Q_5 = 5.2 cfs, Q_{100} = 9.6 cfs): a basin comprised of proposed roadway and open space area. Runoff from this basin will be collected in a storm inlet at DP 21 and will be routed to the existing storm sewer system within Woodmen Road.

Basin OS2 (0.54 AC, Q_5 = 0.9 cfs, Q_{100} = 2.6 cfs): a basin comprised of reconstructed Vincent Drive southern half-street and adjacent area. Runoff from this basin will be collected in a storm inlet at DP 22 and will be routed to a new storm sewer system which ties into the existing storm sewer system as part of the Campus Drive Roadway improvements. The existing storm sewer system ties into an existing storm sewer system within Woodmen Road.

BASIN OS3 (0.76 AC, Q_5 = 1.7 cfs, Q_{100} = 3.9 cfs): a basin comprised of reconstructed Vincent Drive northern half-street and adjacent area. Runoff from this basin will be collected in a storm inlet at DP 23 and will be routed to a new storm sewer system which ties into the existing storm sewer system as part of the Campus Drive Roadway improvements. The existing storm sewer system ties into an existing storm sewer system within Woodmen Road.

BASIN OS4 (2.05 AC, Q_5 = 2.9 cfs, Q_{100} = 8.9 cfs): a basin consisting of a portion of existing Vincent Drive and steep terrain with shallow bedrock, has abundant vegetation and will remain undeveloped. Storm runoff will sheet flow to Vincent Drive to an existing inlet at DP 14. This inlet ties into an 60" existing storm sewer system which will tie into a new storm sewer system on the Phase 1 property. A portion of the existing 60" storm sewer system will be abandoned once the proposed storm sewer system is constructed along the west side of the Phase 1 property and conveys flows to proposed Pond B.

BASIN OS5 (0.80 AC, Q_5 = 3.3 cfs, Q_{100} = 6.1 cfs): an offsite basin from the Nissan Dealership property to the west consisting of parking lot and landscaping (Refer to the excerpts of the *Final Drainage Report and Plan for I-2 Nissan* dated February 2003 in Appendix B). This area flows into an inlet on the Nissan Dealership which ties into an existing 60" storm sewer which runs across Vincent Drive and into the Crest at Woodmen property. The flows will combine with basin OS4 flows at at inlet along Vincent Drive at DP 14. This inlet ties into an 60" existing storm sewer system which will tie into a new storm sewer system on the Phase 1 property. A portion of the existing 60" storm sewer system will be abandoned once the proposed storm sewer system is constructed along the west side of the Phase 1 property and conveys flows to proposed Pond B.

D. Detention and Water Quality

There are two ponds on the proposed site: Pond A, located at the southeast corner of the site and Pond B, located at the southwest corner of the site. The proposed basins delineated with the letter A are tributary to Pond A while the basins delineated with the letter B are tributary to Pond B. Pond A will be sized to overdetain and allow Pond B to release at a higher than existing flow rates. The total release from the site will be at or below existing values.

Per section 6.4.2 of the DCM the redevelopment of sites larger than 1 acre may require on-site detention to be provided if the downstream drainage system is shown to be inadequate to convey storm runoff for the entire site. The DBPS takes into account that the site is in a developed condition and has sized the downstream infrastructure as such. With the redevelopment of the site EURV will be provided for the full redeveloped site. This will reduce the higher probability storm runoff from the site which will improve the conditions on the downstream infrastructure and will fulfill the requirement of providing water quality for all redevelopment disturbing 1 acre or more. Historically basins OS3, OS4, and OSE drain through the site undetained. This developed flow rate has been accounted for in the allowable release from the site. The proposed detention ponds are sized such that the redeveloped release from the site will be at or below the existing rate. SWMM models for both the existing and proposed conditions have been prepared to show that this accomplished utilizing the proposed ponds.

In the existing conditions Basin OSE outfalls into the site through an existing 48" storm sewer. The pipe outfalls into an existing water quality pond. The pond at best has been sized for small portions of Woodmen Road as part of the widening project from 2009. This pond does not provide water quality for the entire tributary basin. The proposed Pond A has been sized to provide water quality for the entire Basin OS-E. This is a major improvement from the existing conditions.

In the existing conditions Basins OS-3 and OS-4 flow through the site without water quality being provided for them. The proposed Pond B has been sized to provide water quality for both basins. This is a major improvement from the existing conditions.

Pond A

This pond has approximately 49.80 acres of on-site basins tributary to it (Basins A1-A22). The pond is private and will provide full spectrum, EURV, detention for the proposed development. This volume was added to the required WQCV for the offsite basin to obtain a total first stage volume of 5.74 ac-ft. This first stage was designed to drain in 72 hours. A check was done utilizing SWMM to ensure that the total WQCV in Pond A does not drain in less than 40 hours. A check was also done to ensure that the pond releases within 72 hours. The latest Urban Drainage UD-Detention spreadsheets were not utilized in these calculations due to the fact that Pond A overdetains and Pond B underdetains. All EURV and WQCV volume calculations were completed using the equations provided in the DCM. The sizing of the EURV holes was done on a preliminary level using the UD-Detention spreadsheet (with some tweaking to obtain the correct volumes), but was then checked and finalized using EPA SWMM. The orifice sizing was completed in SWMM using a pond node that was given an initial volume equal to either the EURV + WQCV for the offsite basin or the total WQCV for the total tributary area and in both cases no inflow (it assumes the storm has completed). It was then allowed to be routed through the orifices and the depth of the pond was checked at either 40 (WQCV) or 72 (EURV) hours depending on the scenario to verify the holes are correctly sized. Assumptions made in the SWMM model are as follows:

- Kinematic Wave Method
- Horton's Infiltration Method
- Manning's n for impervious areas – 0.011

- Manning's n for pervious areas – 0.024
- Depression storage for impervious areas – 0.1"
- Depression storage for pervious areas – 0.35"

These results are all contained within Appendix C.

As was mentioned previously Pond A will overdetain to allow Pond B to discharge at a higher rate. The SWMM model prepared generalizes the basins identified on the Proposed Drainage Map into single basins for onsite and offsite, for Pond A the basins are Basin A and OS-East. A predevelopment model was also prepared for the basin to identify what the release from the site would have been prior to any development on site. Both offsite basins were maintained as developed in this model since detention is not provided for them. They will be allowed to directly pass through the ponds. Discussion on total volume and release will be provided after Pond B.

Pond B

This pond has approximately 31.7 acres of on-site basins tributary to it (Basins B1-B12). The pond is private and will provide full spectrum, EURV, detention for the proposed development. In addition, the small offsite basins OS-4 and OS-5 are tributary to this pond. The orifices for the first stage were sized in the same manner that was discussed with Pond A.

As was previously mentioned Pond B will release at a rate higher than historic in an effort to shrink its footprint and create a useable area in this portion of the site. To compensate for that Pond A will overdetain. No detention has been planned for the offsite runoff coming through the site. It will be allowed to pass through the pond.

Detention Sizing

To ensure that detention is being adequately provided for the site a predevelopment SWMM model was prepared for the entire 81.4 acres of onsite basins. The offsite basins were left as a developed condition as no detention will be provided for them. The historic model was run for both the 5-year and the 100-year events. There are two historic outfalls from the site, the east and the west. The east outfall has historic rates of 141.83 cfs and 279.90 cfs in the minor and major storms respectively. The west outfall has historic rates of 10.40 cfs and 27.14 cfs in the minor and major storms respectively. The total release from both outfalls in the historic condition is 152.23 cfs and 307.04 cfs in the minor and major storms respectively.

Pond A was sized to have a release of 107.8 cfs and 219.8 cfs in the minor and major events respectively. Pond B was sized to have a release of 8.9 cfs and 79.8 cfs in the minor and major events respectively. This gives a total release of 109.0 cfs in the minor storm, which is less than the historic rate and 299.7 cfs in the major storm which is also less than the historic rate. These flow rates are derived from the Historic SWMM model for the area prior to the existing development. This includes Basin A, Basin B, and the offsite tributary area. The required volumes for the ponds are 7.36 ac-ft in Pond A and 3.10 ac-ft in Pond B. The ponds will have the required freeboard per the DCM. At the time of final design, any variances will be requested with the final drainage report.

It should be noted that in its current condition there is no detention provided for the site and that runoff release from the site will significantly exceed the historic rates designed to. The improvements provided with this development will reduce direct runoff into Cottonwood Creek and will not have negative effects on the channel system.

VI. DRAINAGE AND BRIDGE FEES

The project is located within the Cottonwood Creek Drainage Basin. This site was previously platted; therefore no drainage and bridge fees are due at this time.

VII. CONCLUSIONS

This report for The Crest at Woodmen has been prepared using the criteria and methods as described in the City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2. The proposed ponds will adequately provide water quality for all tributary areas. They will also provide full spectrum detention for the onsite areas and ensure that the 100-year discharge from the site does not exceed the pre developed conditions in accordance with the DCM. The downstream facilities within Cottonwood Creek are adequate to protect the runoff proposed from the site. The site runoff will not adversely affect the downstream and surrounding developments.

VIII. REFERENCES

1. *Drainage Criteria Manual Volumes 1 & 2*, City of Colorado Springs, dated May 2014.

2. *Urban Storm Drainage Criteria Manual,* Urban Drainage and Flood Control District, latest revision.

3. Flood Insurance Rate Map (FIRM), El Paso County, Colorado and Incorporated Areas. Map Number 08041C0516F, March 17, 1997 (Federal Emergency Management Agency)

4. Soil Survey of El Paso County, Colorado, Natural Resource Conservation Service, Sept 22, 2015

5. “Cottonwood Creek Drainage Basin Planning Study (DBPS)”, June 9, 1994, URS Consultants.

6. “Cottonwood Creek Drainage Basin Planning Study (DBPS)”, June 2000, Ayres Associates.

7. “Looart Master Drainage Report and Looart Subdivision No. 2 Drainage Report”, April 1978, R. Keith Hook & Associates, Inc.

8. “Looart Subdivision No. 5 Drainage Plan and Report”, April 1985, R. Keith Hook & Associates, Inc.

9. “Final Drainage Report and Plan for 1-25 Nissan Pre-Owned Car Dealership American Furniture at Woodman Rd. Fil. No. 1”, February 2003, Leigh & Whitehead Associates, Inc.

10. “Woodmen Road Corridor Improvement Project – Phase 1: Campus Drive to Stinson Road Drainage Report -100%”, February 17, 2009, URS.

11. “Master Development Drainage Plan for The Crest At Woodmen”, April, 2018, Galloway & Company, Inc.

12. “Preliminary/Final Drainage Report for the Crest at Woodmen Campus Drive – Looart Subdivision Filing 6”, May 2018, Galloway & Company, Inc.

Appendix A

Figure and Exhibits

Galloway
Planning. Architecture. Engineering.

VICINITY MAP

PROPOSED CAMPUS DRIVE

PHASE 1 - WEST

PHASE 2 - EAST

PHASE 3 - SOUTH EAST

FILING 6
LOT 1

FILING 7
LOT 1

FILING 7
LOT 2

FILING 7
LOT 3

FILING 7
LOT 4

FUTURE BUILDING AREA

FUTURE BUILDING AREA

FUTURE BUILDING AREA

PLANET FITNESS
22,775 SF

FUTURE RETAIL
44,363 SF

FUTURE BUILDING/PARKING AREA

EXISTING
PH 1 LOW BAY
WAREHOUSE
30,838 SF

EXISTING
PH 1 HIGH BAY SOUTH
WAREHOUSE
60,828 SF

NEW AT GRADE ENTRANCE TO WAREHOUSE

RING ROAD ACCESS FOR INDUSTRIAL & WAREHOUSE FACILITIES

FUTURE BUILDING AREA FF = TBD.

PROPOSED
TENANT B
PH 2 LOW BAY
WAREHOUSE
31,438 SF

PROPOSED
TENANT B
PH 2 HIGH BAY NORTH
WAREHOUSE
62,160 SF

NEW AT GRADE ENTRANCE TO WAREHOUSE

PROPOSED
TENANT A
PH 3 HIGH BAY
WAREHOUSE
158,401 SF

EXISTING
TENANT A
HIGH & LOW BAY
158,401 SF

TEN 8 EXCL. PARKING

N

0 50 100 200

SCALE: 1"=200'

LOCATION MAP LEGEND

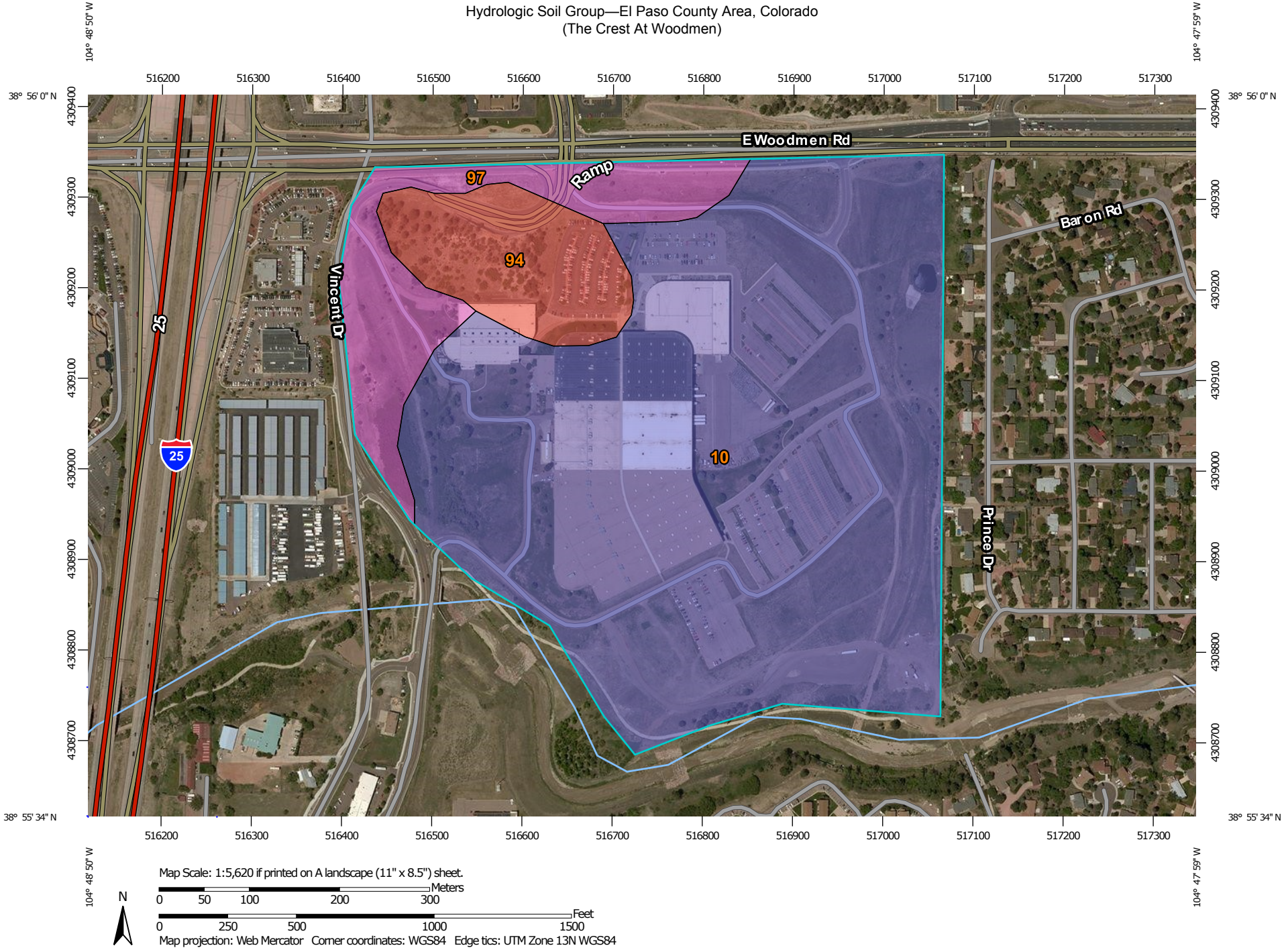
- PROPOSED CAMPUS DRIVE
- PHASE 1 WEST
- PHASE 2 EAST
- PHASE 3 SOUTH EAST
- PROPERTY BOUNDARY

Galloway
Planning. Architecture. Engineering.
1755 Telstar Drive, Suite 107
Colorado Springs, Co 80920
719.900.7220 O
www.gallowayUS.com

Project No: RLM 2.02
Drawn By: MBF
Checked By: SB
Date: 09/2018

CREST AT WOODMEN
PHASING PLAN: PHASE CAMPUS DR, 1, 2, & 3

Hydrologic Soil Group—El Paso County Area, Colorado
(The Crest At Woodmen)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 13, Sep 22, 2015

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

Date(s) aerial images were photographed: Jun 3, 2014—Jun 17, 2014

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — El Paso County Area, Colorado (CO625)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Blendon sandy loam, 0 to 3 percent slopes	B	70.5	78.9%
94	Travessilla-Rock outcrop complex, 8 to 90 percent slopes	D	8.6	9.7%
97	Truckton sandy loam, 3 to 9 percent slopes	A	10.2	11.4%
Totals for Area of Interest			**89.4**	**100.0%**

Description

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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

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

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

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

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

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

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

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

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

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

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

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

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

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

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

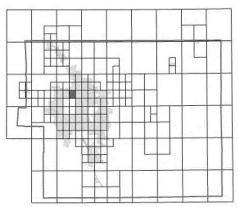
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

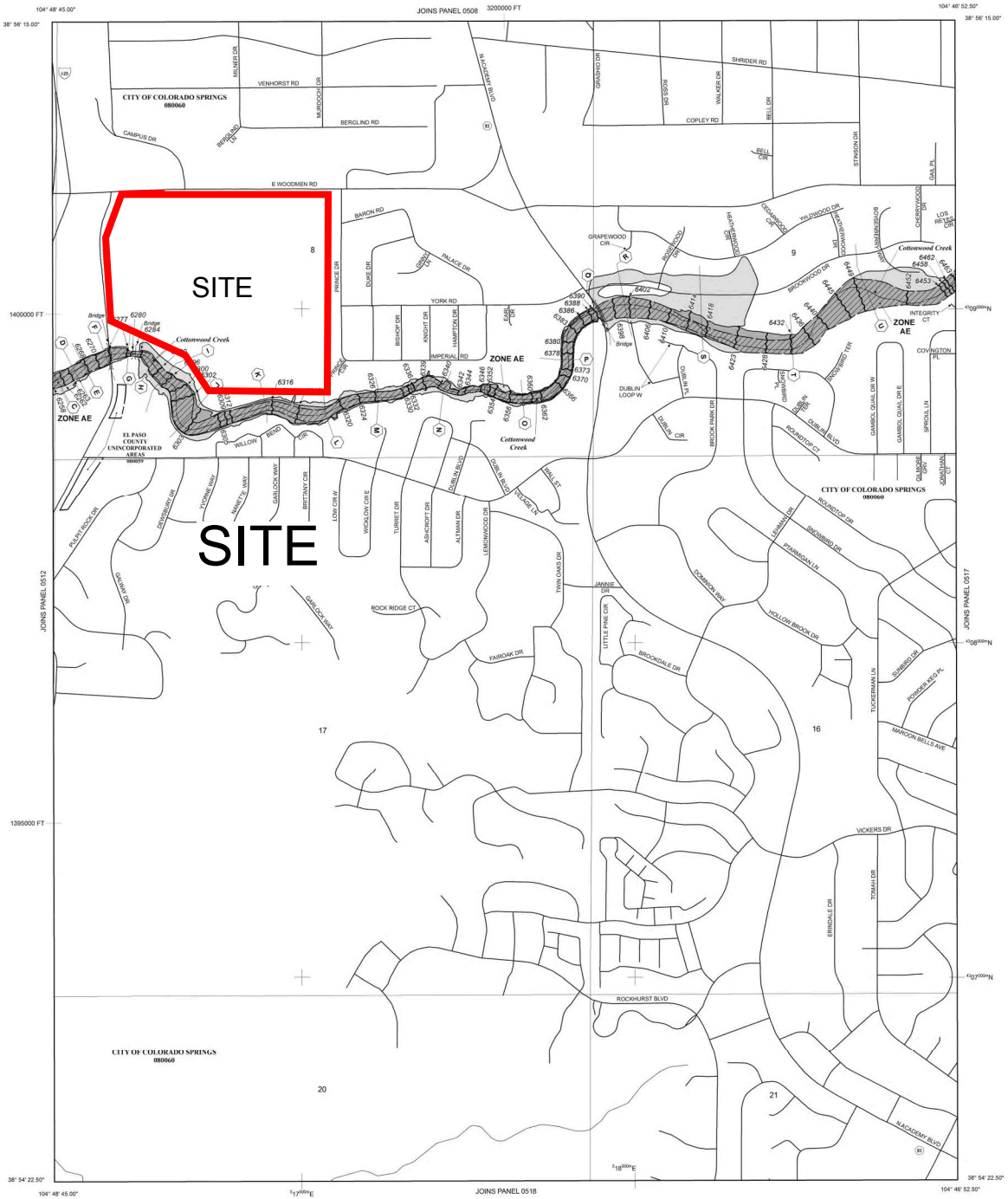
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



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

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



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 66 WEST.

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

Floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988 (NAVD 88)
A—A Cross section line
23—23 Transect line
97° 07' 30.00" / 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
AUGUST 23, 1999
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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

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

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0516G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 516 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0516	G
EL PASO COUNTY	080059	0516	G

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

MAP NUMBER
08041C0516G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

Appendix B

Previous Drainage Report Excerpts

1) Cottonwood Creek DBPS
2) Woodmen Rd
3) Nissan/American Furniture

[LIBRARY COPY
DO NOT REMOVE]

URS
CONSULTANTS
MAKING
TECHNOLOGY
WORK™

Cottonwood Creek
Drainage Basin Planning Study

City of Colorado Springs and El Paso County

JUNE 9, 1994

~~CITY ENGR. — CHECK OUT~~
SET #4

RECOMMENDED IMPROVEMENTS

FOR DRAINAGE REACHES IN EL PASO COUNTY OUTSIDE (UPSTREAM) OF THE DETAILED AERIAL TOPOGRAPHICAL STUDY MAPPING.

REACH	HEC-1 FLOW w/det. (CFS)	CHANNEL LENGTH(FT)	EXISTING IMPROVEMENT	TOTAL BOTTOM WIDTH(FT)	TOTAL DEPTH(FT)	RECOMMENDED IMPROVEMENT
9 TO DESIGN POINT 8	2,332	3,000	NATURAL	80	6.5	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 10 DROPS)
8 TO DESIGN POINT 7	1,715	3,500	NATURAL	80	5.0	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 12 DROPS)
7 TO DESIGN POINT 6	854	3,500	NATURAL	50	4.5	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 9 DROPS)
6 TO DESIGN POINT 5	673	7,000	NATURAL	50	4.0	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 12 DROPS)
5 TO DESIGN POINT 4	870	3,000	VEG. LINING	50	4.0	GRADE CONTROL (7 DROPS)
4 TO DESIGN POINT 3	467	3,500	VEG. LINING	20	4.5	GRADE CONTROL (12 DROPS)
3 TO DESIGN POINT 2	335	3,500	VEG. LINING	20	4.0	GRADE CONTROL (11 DROPS)
2 TO DESIGN POINT 1	114	2,300	NATURAL	20	3.0	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 5 DROPS)
9A TO DESIGN POINT 9B	577	6,800	NATURAL	50	3.5	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 27 DROPS)
C14 TO DESIGN POINT 9A	255	2,500	NATURAL	48" RCP	N/A	STORM SEWER
B5 TO DESIGN POINT 8H	592	4,800	NATURAL	60"/72" RCP	N/A	STORM SEWER
8G TO DESIGN POINT 8	555/overflow	4,000	NATURAL	50	3.5	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 13 DROPS)
C5 TO DESIGN POINT 8F	594	6,300	NATURAL	30	4.0	NATURAL BOTTOM WITH EROSION MATTING/GRASS BANKS & GRADE CONTROL (WITH 21 DROPS)
8E TO DESIGN POINT 8G	973	3,000	NATURAL	80	4.0	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 8 DROPS)
8C TO DESIGN POINT 8D	330	4,500	NATURAL	60" RCP	N/A	STORM SEWER
8A TO DESIGN POINT 8B	552	4,000	NATURAL	50	3.5	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 16 DROPS)
C2 TO DESIGN POINT 8A	179	3,000	NATURAL	36"/42" RCP	N/A	STORM SEWER
B2 TO DESIGN POINT 6A	417	3,000	NATURAL	30	4.0	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 12 DROPS)
5A TO DESIGN POINT 5	138	3,900	NATURAL	20	3.0	NATURAL BOTTOM WITH GRASS/SHRUB BANKS & GRADE CONTROL (WITH 10 DROPS)

LOCATION	HEC-1 FLOW w/det. (CFS)	BRIDGE LENGTH(FT)	EXISTING IMPROVEMENT	TOTAL BOTTOM WIDTH(FT)	TOTAL DEPTH(FT)	RECOMMENDED IMPROVEMENT
BRIARGATE PKWY (DP 8E)	861	180	N/A	12	9	12' X 9' CONCRETE BOX CULVERT
RESEARCH PKWY (DP 6)	673	180	N/A	10	8	10' X 8' CONCRETE BOX CULVERT
BRIARGATE PKWY (DP 5)	870	180	N/A	12	9	12' X 9' CONCRETE BOX CULVERT
TOBIN ROAD (ABOVE DP 5)	870	60	MP - 2 @ 48	12	9	12' X 9' CONCRETE BOX CULVERT
MCFERRAN ROAD (DP 3)	335	60	CMP - 36"	2@72" RCP	N/A	2 @ 72" REINFORCED CONCRETE PIPE
HUNGATE ROAD (ABOVE DP 3	335	60	CMP - 48"	2@72" RCP	N/A	2 @ 72" REINFORCED CONCRETE PIPE
BURGESS ROAD (DP 2)	114	70	N/A	48" RCP	N/A	48" REINFORCED CONCRETE PIPE
HERRING ROAD (DP 1)	81	60	N/A	42" RCP	N/A	42" REINFORCED CONCRETE PIPE

BASED ON THE REACHES/CULVERTS LISTED ON THIS SHEET, APPROXIMATELY 13.3 ACRES OF ENVIRONMENTALLY CLASSIFIED AREAS WILL BE DISTURBED OR DESTROYED AND REQUIRE MITIGATION.

LOCATION	HEC-1 FLOW w/det. (CFS)	EXISTING IMPROVEMENT	PROPOSED IMPROVEMENT
CITY BRIDGES			
RESEARCH PKWY (DP 8G)	1,632	N/A	TRIPLE 14' X 6' CBC
COUNTY BRIDGES			
BLACK FOREST ROAD (DP 7)	854	BRIDGE, T-40, B-26, D-17	REPLACE FOR 5 LANE ARTERIAL, 70' X 110'

LEGEND:	
A1	SUB-BASIN DESIGNATION
△	DESIGN POINT
— — —	MAJOR BASIN BOUNDARY
- - -	SUB-BASIN BOUNDARY

SHEET INDEX:

MAPPING: LANDMARK MAPPING

ENGINEER: URS CONSULTANTS
MAKING TECHNOLOGY WORK
1040 SOUTH EIGHTH STREET
COLORADO SPRINGS, CO. 80906
(719)634-6699

PROJECT:
COTTONWOOD CREEK DRAINAGE BASIN PLANNING STUDY
OVERALL BASIN MAP
SCALE 1"=1000' CONTOUR INTERVAL=2'
FIGURE 2 SHEET OF

8/1/94 - ADDED LIMITS OF FAIRFAX MDDP

JUNE 9, 1994

PIKES PEAK RURAL TRANSPORTATION AUTHORITY

PPRTA

Woodmen Road

Corridor Improvement Project

Phase 1: Campus Drive to Stinson Road

Drainage Report – 100%

February 17, 2009

CITY OF COLORADO SPRINGS

We Create Community

URS

30 S. Nevada Avenue
Colorado Springs, CO 80903
(719) 385-2489

Scenario: Five Year

Table A - Catchment Report

Label	Description	Area (acres)	Inlet C	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Carryover CA (acres)	Carryover Tc (min)	Carryover Rational Flow (cfs)	Carryover Additional Flow (cfs)	Total Inlet CA (acres)	Total Inlet Time of Concentration (min)	Total Flow To Inlet (cfs)
13-1	Existing On-Grade Curb Inlet□	0.15099	0.90	5.00	5.10	0.70	0.34577	5.00	1.78	0.00	0.48166	5.00	2.48
13-2	On-Grade Curb Inlet	1.58000	0.90	5.00	5.10	7.32	0.00000	0.00	0.00	0.00	1.42200	5.00	7.32
13-3		3.70000	0.40	11.41	3.90	5.81	0.00000	0.00	0.00	0.00	1.48000	11.41	5.81
38-2	On-Grade Curb Inlet	1.57000	0.90	5.37	5.01	7.14	0.00000	0.00	0.00	0.00	1.41300	5.37	7.14
35-2	Stinson Det Pond Outlet Low F	0.00000	0.00	41.99	0.00	0.00	0.00000	0.00	0.00	18.89	0.00000	41.99	18.89
36-2	Stinson Det Pond Outlet High F	0.00000	0.00	41.99	0.00	0.00	0.00000	0.00	0.00	0.00	0.00000	41.99	0.00
25-1A	Existing Inlet flow adjusted for t	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	1.50	0.00000	5.00	1.50
25-2		0.00000	0.00	23.38	0.00	0.00	0.00000	0.00	0.00	51.00	0.00000	23.38	51.00
DP-7B	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	5.00	0.00	0.75	0.00000	5.00	0.75
DP-7C	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	5.00	0.00	0.80	0.00000	5.00	0.80
06-2	On-Grade Curb Inlet	0.07000	0.90	5.00	5.10	0.32	0.00000	5.00	0.00	0.00	0.06300	5.00	0.32
06-3	Special On-Grade Curb Inlet	0.05000	0.90	5.00	5.10	0.23	0.00109	5.00	0.01	0.00	0.04609	5.00	0.24
37-1	On-Grade Curb Inlet	0.50000	0.90	5.00	5.10	2.32	0.00000	5.00	0.00	0.00	0.45000	5.00	2.32
07-1	On-Grade Curb Inlet	1.16276	0.90	5.00	5.10	5.38	0.00000	0.00	0.00	0.00	1.04649	5.00	5.38
08-1	Special On-Grade Curb Inlet	0.06357	0.90	5.00	5.10	0.29	0.00000	0.00	0.00	0.00	0.05721	5.00	0.29
WV-SW	Woodmen Valley Storm Systen	0.32160	0.50	7.06	4.63	0.75	0.00000	0.00	0.00	0.00	0.16080	7.06	0.75
WV-SE	Woodmen Valley Storm Systen	5.68283	0.50	18.80	3.11	8.91	0.00000	0.00	0.00	0.00	2.84141	18.80	8.91
WV-N	Woodmen Valley Storm Systen	3.15661	0.50	13.65	3.61	5.75	0.00000	0.00	0.00	0.00	1.57831	13.65	5.75
09-2	Special On-Grade Inlet	0.21000	0.90	5.00	5.10	0.97	0.00000	0.00	0.00	0.00	0.18900	5.00	0.97
09-3	On-Grade Curb Inlet	0.08000	0.90	5.00	5.10	0.37	0.00000	0.00	0.00	0.00	0.07200	5.00	0.37
10-1	Special On-Grade Curb Inlet	0.04373	0.90	5.00	5.10	0.20	0.00000	5.00	0.00	0.00	0.03936	5.00	0.20
06-4	On-Grade Curb Inlet	0.16389	0.90	5.00	5.10	0.76	0.00000	0.00	0.00	0.00	0.14750	5.00	0.76
DP-6	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	2.40	0.00000	5.00	2.40
DP-7A	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	2.30	0.00000	5.00	2.30
HD-E2	Existing grate inlet	0.00000	0.00	11.92	0.00	0.00	0.00000	0.00	0.00	1.40	0.00000	11.92	1.40
HD-F1	Existing grate inlet	0.00000	0.00	11.92	0.00	0.00	0.00000	0.00	0.00	1.40	0.00000	11.92	1.40
HD-D1	Existing Roof Drain	0.00000	0.00	8.07	0.00	0.00	0.00000	0.00	0.00	10.00	0.00000	8.07	10.00
HD-C1	Existing Grate Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	2.10	0.00000	5.00	2.10
HD-C2	Existing Grate Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	2.10	0.00000	5.00	2.10
HD-B1		0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	0.50	0.00000	5.00	0.50
WV-2	Existing No. 13 Grate Inlet	0.00000	0.00	13.00	0.00	0.00	0.00000	0.00	0.00	30.10	0.00000	13.00	30.10
WV-1	Existing 10' D-10-R Inlet	0.00000	0.00	11.00	0.00	0.00	0.00000	0.00	0.00	31.00	0.00000	11.00	31.00
21-3	Home Depot Sump Field FES	1.04203	0.40	7.07	4.63	1.94	0.00000	0.00	0.00	0.00	0.41681	7.07	1.94
02-2	Special Flanking Vane Grate In	0.39164	0.90	5.00	5.10	1.81	0.03857	5.00	0.20	0.00	0.39105	5.00	2.01
02-3	Special Sump Vane Grate Inlet	0.00000	0.00	0.00	0.00	0.00	0.06606	0.00	0.34	0.00	0.06606	0.00	0.34

Scenario: Five Year

Table A - Catchment Report

Label	Description	Area (acres)	Inlet C	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Carryover CA (acres)	Carryover Tc (min)	Carryover Rational Flow (cfs)	Carryover Additional Flow (cfs)	Total Inlet CA (acres)	Total Inlet Time of Concentration (min)	Total Flow To Inlet (cfs)
05-1	On-Grade Curb Inlet	0.11000	0.90	5.00	5.10	0.51	0.48566	5.00	2.50	0.00	0.58466	5.00	3.01
05-2	On-Grade Curb Inlet	2.05641	0.90	6.80	4.68	8.74	0.00981	6.80	0.05	0.00	1.86058	6.80	8.78
01-3	Flanking Curb Inlet	0.66000	0.90	5.00	5.10	3.06	0.00000	0.00	0.00	0.00	0.59400	5.00	3.06
01-4	Sump Curb Inlet	0.00000	0.00	5.00	0.00	0.00	0.85446	5.00	4.40	0.00	0.85446	5.00	4.40
01-5	Flanking Curb Inlet	2.68000	0.90	6.39	4.77	11.60	0.00000	6.39	0.00	0.00	2.41200	6.39	11.60
01-7	Special On-Grade Curb Inlet	0.18085	0.90	5.00	5.10	0.84	0.02891	5.00	0.15	0.00	0.19168	5.00	0.99
01-8	On-Grade Curb Inlet	1.37769	0.90	5.00	5.10	6.38	0.00000	5.00	0.00	0.00	1.23992	5.00	6.38
HD-G1	Home Depot Detention Pond	0.00000	0.00	16.50	0.00	0.00	0.00000	16.50	0.00	13.92	0.00000	16.50	13.92
03-1	Existing Type C Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	5.90	0.00000	5.00	5.90
02-4	Special Flanking Vane Grate In	0.68000	0.90	5.00	5.10	3.15	0.00000	0.00	0.00	0.00	0.61200	5.00	3.15
01-3a		1.31000	0.40	7.67	4.51	2.38	0.00000	0.00	0.00	0.00	0.52400	7.67	2.38

Scenario: Five Year

Table B - Inlet Report

Label	Inlet	Inlet Type	Ground Elevation (ft)	Sump Elevation (ft)	Curb Opening Length (ft)	Clogging Factor (%)	Road Cross Slope (%)	Depressed Gutter?	Gutter Cross Slope (%)	Gutter Width (ft)	Inlet Location	Bypass Target	Longitudinal Slope (%)	Mannings n	Total Flow To Inlet (cfs)	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Ditch Spread (ft)	Gutter Ditch Depth (ft)
13-1	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,354.81	6,349.92	18.00		2.00	true	6.25	2.00	On Grade	O-4	2.00	0.013	2.48	2.48	0.00	100.0	7.32	0.23
13-2	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,356.53	6,352.70	12.00		2.00	true	6.25	2.00	On Grade	13-1	2.00	0.013	7.32	5.54	1.78	75.7	11.77	0.32
13-3	Grate CDOT Type C	Grate Inlet	6,355.55	6,353.20		50.0	2.00	false	2.00	0.00	In Sag				5.81	5.81	0.00	100.0	25.32	0.51
38-2	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,355.72	6,349.06	12.00		2.00	true	6.25	2.00	On Grade	O-5	2.00	0.013	7.14	5.46	1.68	76.5	11.65	0.32
35-2	Generic Default 100%	Generic Inlet	6,468.00	6,467.70			2.00	false	2.00	0.00	In Sag				18.89	18.89	0.00	100.0	0.00	0.00
36-2	Generic Default 100%	Generic Inlet	6,479.61	6,472.00			2.00	false	2.00	0.00	In Sag				0.00	0.00	0.00	100.0	0.00	0.00
25-1A	Grate CDOT TYPE D	Grate Inlet	6,482.00	6,471.30		50.0	2.00	false	2.00	0.00	In Sag				1.50	1.50	0.00	100.0	10.41	0.21
25-2	Grate Special Type D Grate Inlet	Grate Inlet	6,478.41	6,471.80		50.0	2.00	false	2.00	0.00	In Sag				51.00	51.00	0.00	100.0	43.64	0.87
DP-7B	Combination Denver No 16 Single	Combination In	6,400.10	6,394.60	3.33	38.0	2.00	true	6.25	2.00	On Grade	DP-7C	0.00	0.013	0.75	0.75	0.00	100.0	23.05	0.55
DP-7C	Combination Denver No 16 Single	Combination In	6,400.00	6,393.90	3.33	38.0	2.00	false	2.00	0.00	On Grade	HD-G1	0.01	0.013	0.80	0.78	0.02	97.3	14.54	0.29
06-2	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,396.37	6,379.70	6.00		2.00	true	6.25	2.00	On Grade	05-2	1.33	0.013	0.32	0.32	0.00	100.0	2.12	0.13
06-3	Curb CDOT Type R	Curb Inlet	6,397.17	6,380.50	5.00		2.00	true	4.16	1.00	On Grade	05-2	1.34	0.013	0.24	0.24	0.00	100.0	3.44	0.09
37-1	Curb CDOT Type R	Curb Inlet	6,397.64	6,380.83	15.00		2.00	true	4.16	1.00	On Grade	05-2	1.35	0.013	2.32	2.26	0.05	97.8	8.55	0.19
07-1	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,397.20	6,392.90	20.00		2.00	true	6.25	2.00	On Grade	06-2	1.62	0.013	5.38	5.38	0.00	100.0	10.82	0.30
08-1	Curb CDOT Type R	Curb Inlet	6,398.84	6,394.00	5.00		2.00	true	4.16	1.00	On Grade	06-3	1.90	0.013	0.29	0.29	0.01	98.1	3.51	0.09
WV-SW	Generic Default 100%	Generic Inlet	6,358.31	6,354.90			2.00	false	2.00	0.00	In Sag				0.75	0.75	0.00	100.0	0.00	0.00
WV-SE	Generic Default 100%	Generic Inlet	6,359.09	6,355.00			2.00	false	2.00	0.00	In Sag				8.91	8.91	0.00	100.0	0.00	0.00
WV-N	Generic Default 100%	Generic Inlet	6,360.84	6,357.60			2.00	false	2.00	0.00	In Sag				5.75	5.75	0.00	100.0	0.00	0.00
09-2	Curb CDOT Type R	Curb Inlet	6,403.20	6,396.10	15.00		1.28	true	4.16	1.00	On Grade	10-1	2.03	0.013	0.97	0.97	0.00	100.0	7.40	0.12
09-3	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,402.77	6,396.70	6.00		2.80	true	6.25	2.00	On Grade	37-1	2.80	0.013	0.37	0.37	0.00	100.0	1.86	0.12
10-1	Curb CDOT Type R	Curb Inlet	6,402.23	6,396.70	15.00		0.38	true	4.16	1.00	On Grade	37-1	1.84	0.013	0.20	0.20	0.00	100.0	8.15	0.07
06-4	Curb CDOT Type R	Curb Inlet	6,395.15	6,386.20	15.00		0.71	true	4.16	1.00	On Grade	01-8	1.41	0.013	0.76	0.76	0.00	100.0	10.40	0.11
DP-6	Combination Denver No 16 Single	Combination In	6,402.50	6,398.70	3.33	20.0	2.00	true	6.25	2.00	In Sag				2.40	2.40	0.00	100.0	7.52	0.24
DP-7A	Combination Denver No 16 Single	Combination In	6,400.50	6,395.50	3.33	38.0	2.00	true	6.25	2.00	On Grade	DP-7B	0.00	0.013	2.30	2.25	0.05	97.9	29.00	0.66
HD-E2	Grate CDOT Type C	Grate Inlet	6,400.50	6,397.00		50.0	2.00	false	2.00	0.00	In Sag				1.40	1.40	0.00	100.0	9.93	0.20
HD-F1	Grate CDOT Type C	Grate Inlet	6,400.50	6,397.00		5.0	2.00	false	2.00	0.00	In Sag				1.40	1.40	0.00	100.0	8.41	0.17
HD-D1	Generic Default 100%	Generic Inlet	6,400.00	6,394.10			2.00	false	2.00	0.00	In Sag				10.00	10.00	0.00	100.0	0.00	0.00
HD-C1	Grate CDOT Type C	Grate Inlet	6,398.00	6,393.30		50.0	2.00	false	2.00	0.00	In Sag				2.10	2.10	0.00	100.0	12.31	0.25
HD-C2	Grate CDOT Type C	Grate Inlet	6,397.10	6,393.60		50.0	2.00	false	2.00	0.00	In Sag				2.10	2.10	0.00	100.0	12.31	0.25
HD-B1	Generic Default 100%	Generic Inlet	6,400.50	6,397.31			2.00	false	2.00	0.00	In Sag				0.50	0.50	0.00	100.0	0.00	0.00
WV-2	Generic Default 100%	Generic Inlet	6,386.00	6,382.00			2.00	false	2.00	0.00	In Sag				30.10	30.10	0.00	100.0	0.00	0.00
WV-1	Generic Default 100%	Generic Inlet	6,386.00	6,382.00			2.00	false	2.00	0.00	In Sag				31.00	31.00	0.00	100.0	0.00	0.00
21-3	Grate CDOT TYPE D	Grate Inlet	6,391.00	6,385.30		50.0	2.00	false	2.00	0.00	In Sag				1.94	1.94	0.00	100.0	11.60	0.23
02-2	Combination Denver No 16 Double	Combination In	6,367.67	6,363.89	7.08	38.0	2.00	true	6.25	2.00	On Grade	02-3	0.63	0.013	2.01	1.87	0.15	92.7	8.67	0.26
02-3	Combination Denver No 16 Double	Combination In	6,367.50	6,364.47	7.08	50.0	2.00	false	2.00	0.00	In Sag				0.34	0.34	0.00	100.0	1.94	0.03
05-1	Combination Denver No 16 Triple	Combination In	6,369.39	6,365.77	10.92	38.0	2.00	true	6.25	2.00	On Grade	02-2	2.00	0.013	3.01	2.81	0.20	93.4	8.01	0.25
05-2	Combination Denver Special No 16 Triple	Combination In	6,370.67	6,367.10	10.92	38.0	2.00	true	6.25	2.00	On Grade	05-1	2.57	0.013	8.78	6.49	2.29	73.9	12.05	0.33
01-3	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,368.39	6,364.31	20.00		2.00	true	6.25	2.00	On Grade	01-4	0.30	0.013	3.06	3.06	0.00	100.0	12.14	0.33
01-4	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,368.33	6,364.36	16.00		2.00	true	6.25	2.00	In Sag				4.40	4.40	0.00	100.0	9.99	0.28
01-5	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,368.50	6,364.48	10.00		2.00	true	6.25	2.00	On Grade	01-4	0.63	0.013	11.60	7.49	4.11	64.6	17.85	0.44
01-7	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,372.50	6,367.01	14.00		2.00	true	6.25	2.00	On Grade	01-5	3.02	0.013	0.99	0.99	0.00	100.0	3.90	0.16
01-8	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,374.09	6,367.83	20.00		2.00	true	6.25	2.00	On Grade	01-7	3.52	0.013	6.38	6.23	0.15	97.7	9.86	0.28
HD-G1	Generic Default 100%	Generic Inlet	6,379.56	6,372.79			0.00	false	0.00	0.00	In Sag				13.92	13.92	0.00	100.0	0.00	0.00
03-1	Grate CDOT Type C	Grate Inlet	6,379.55	6,366.00		50.0	2.00	false	2.00	0.00	In Sag				5.90	5.90	0.00	100.0	25.56	0.51
02-4	Combination Denver No 16 Double	Combination In	6,367.51	6,364.80	7.08	38.0	2.00	true	6.25	2.00	On Grade	02-3	0.10	0.013	3.15	2.96	0.19	93.9	15.35	0.39
01-3a	Grate CDOT Type C	Grate Inlet	6,367.38	6,363.38		50.0	2.00	false	2.00	0.00	In Sag				2.38	2.38	0.00	100.0	12.97	0.26

Scenario: Five Year

Table C - Pipe Report

Label	Upstream Node	Downstream Node	Section Shape	Section Size	Material	Mannings n	Length (ft)	Bend Angle (degrees)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Sump Elevation (ft)	Downstream Sump Elevation (ft)	Upstream Crown Elevation (ft)	Downstream Crown Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)	Full Capacity (cfs)	Total System Flow (cfs)
P-13-2	13-2	13-1	Circular	18 inch	Concrete	0.013	46.70	2.74	6,352.70	6,351.40	6,352.70	6,349.92	6,354.20	6,352.90	2.33	1.91	6,353.92	6,352.25	10.24	17.53	10.01
P-13-1	13-1	O-4	Circular	18 inch	Concrete	0.013	175.96	0.00	6,349.92	6,347.69	6,349.92	6,347.69	6,351.42	6,349.19	3.39	0.81	6,351.23	6,348.92	7.63	11.82	11.86
P-13-3	13-3	13-2	Circular	18 inch	Concrete	0.013	27.86	0.00	6,353.20	6,353.00	6,353.20	6,352.70	6,354.70	6,354.50	0.85	2.03	6,354.13	6,354.03	5.37	8.90	5.81
P-38-2	38-2	38-1	Circular	18 inch	Concrete	0.013	19.62	41.22	6,349.06	6,348.79	6,349.06	6,348.79	6,350.56	6,350.29	5.16	4.10	6,349.96	6,349.70	6.76	12.32	5.46
P-38-1	38-1	O-5	Circular	18 inch	Concrete	0.013	120.44	0.00	6,348.79	6,347.29	6,348.79	6,347.29	6,350.29	6,348.79	4.10	2.71	6,349.69	6,348.01	6.51	11.72	5.44
P-35-2	35-2	35-1	Circular	24 inch	Concrete	0.013	133.95	0.00	6,467.70	6,461.60	6,467.70	6,461.80	6,469.70	6,463.80	-1.70	4.20	6,469.26	6,462.68	14.25	47.48	18.89
P-36-2	36-2	36A	Horizontal El	24x38 inch	Concrete	0.013	12.21	41.25	6,472.00	6,471.72	6,472.00	6,471.72	6,474.00	6,473.72	5.61	0.76	6,472.00	6,471.72	0.00	135.71	0.00
P-36A	36A	36-1	Horizontal El	24x38 inch	Concrete	0.013	218.03	0.00	6,471.72	6,468.01	6,471.72	6,467.71	6,473.72	6,470.01	0.76	9.72	6,471.72	6,468.01	0.00	116.90	0.00
P-25-2	25-1	25-1A	Horizontal El	29x45 inch	Concrete	0.013	52.01	0.00	6,471.30	6,471.05	6,471.30	6,471.05	6,473.70	6,473.45	8.30	0.97	6,472.63	6,472.27	6.75	102.17	52.50
P-25-3	25-2	25-1A	Horizontal El	29x45 inch	Concrete	0.013	108.65	0.00	6,471.80	6,471.30	6,471.80	6,471.30	6,474.20	6,473.70	4.21	8.30	6,473.11	6,472.66	6.59	99.97	51.00
P-01-A	28-A	28-2	Circular	48 inch	Concrete	0.013	15.00	55.38	6,353.58	6,353.51	6,353.58	6,353.51	6,357.58	6,357.51	1.14	1.87	6,359.53	6,359.38	11.30	98.12	142.00
P-37-1	37-1	06-3	Circular	36 inch	Concrete	0.013	19.13	13.54	6,380.83	6,380.80	6,380.83	6,380.50	6,383.83	6,383.80	13.81	13.37	6,382.67	6,382.54	4.25	26.41	25.21
P-06-3	06-3	06-2	Circular	36 inch	Concrete	0.013	41.04	1.84	6,380.50	6,380.00	6,380.50	6,379.70	6,383.50	6,383.00	13.67	13.37	6,382.15	6,381.67	9.52	73.62	26.07
P-06-2	06-2	06-1	Circular	36 inch	Concrete	0.013	102.42	60.61	6,379.70	6,378.70	6,379.70	6,372.91	6,382.70	6,381.70	13.67	6.18	6,381.47	6,380.14	9.10	65.90	29.91
P-07-1	07-1	06-2	Circular	18 inch	Concrete	0.013	38.43	91.16	6,392.90	6,391.90	6,392.90	6,379.70	6,394.40	6,393.40	2.80	2.97	6,393.79	6,392.50	8.51	16.94	5.38
P-08-1	08-1	06-3	Circular	18 inch	Concrete	0.013	95.69	91.21	6,394.00	6,392.90	6,394.00	6,380.50	6,395.50	6,394.40	3.34	2.77	6,394.20	6,393.07	2.72	11.26	0.29
P-WV-3	WV-3	06-1	Circular	42 inch	Concrete	0.013	63.20	0.88	6,376.02	6,372.91	6,376.02	6,372.91	6,379.52	6,376.41	3.98	11.47	6,377.82	6,375.41	16.73	223.17	33.79
P-06-1	06-1	WV-4	Circular	42 inch	Concrete	0.013	95.55	14.85	6,372.91	6,371.37	6,372.91	6,371.37	6,376.41	6,374.87	11.47	2.63	6,375.41	6,374.60	13.25	127.72	63.35
P-WV-4	WV-4	28-1	Circular	48 inch	Concrete	0.013	844.20	38.83	6,371.37	6,356.00	6,371.37	6,356.00	6,375.37	6,360.00	2.13	1.91	6,374.30	6,360.80	15.28	193.81	93.42
P-28-2	28-1	28-A	Circular	48 inch	Concrete	0.013	148.04	2.20	6,356.00	6,353.58	6,356.00	6,353.58	6,360.00	6,357.58	1.91	1.14	6,360.30	6,359.60	7.84	183.65	98.47
P-WV-SE	WV-SE	WV-SW	Circular	24 inch	Concrete	0.013	40.20	13.13	6,355.00	6,354.90	6,355.00	6,354.90	6,357.00	6,356.90	2.09	1.41	6,358.37	6,358.31	2.83	11.28	8.91
P-WV-SW	WV-SW	28-2	Circular	24 inch	Concrete	0.013	8.60	20.28	6,354.90	6,353.51	6,354.90	6,353.51	6,356.90	6,355.51	1.41	3.87	6,359.09	6,359.07	2.98	90.94	9.35
P-WV-N	WV-N	28-1	Circular	24 inch	Concrete	0.013	47.60	47.61	6,357.60	6,356.00	6,357.60	6,356.00	6,359.60	6,358.00	1.24	3.91	6,360.65	6,360.62	1.83	41.47	5.75
P-09-3	09-3	09-2	Circular	18 inch	Concrete	0.013	31.07	46.51	6,396.70	6,396.40	6,396.70	6,396.10	6,398.20	6,397.90	4.57	5.30	6,396.92	6,396.59	2.76	10.32	0.37
P-09-2	09-2	09-1	Circular	18 inch	Concrete	0.013	19.26	57.63	6,396.10	6,395.80	6,396.10	6,382.34	6,397.60	6,397.30	5.60	5.74	6,396.55	6,396.15	4.96	13.11	1.52
P-10-1	10-1	09-2	Circular	18 inch	Concrete	0.013	36.94	87.32	6,396.70	6,396.40	6,396.70	6,396.10	6,398.20	6,397.90	4.03	5.30	6,396.87	6,396.57	2.16	9.47	0.20
P-09-1	09-1	WV-3	Circular	42 inch	Concrete	0.013	178.20	0.09	6,382.34	6,376.02	6,382.34	6,376.02	6,385.84	6,379.52	17.20	3.98	6,382.88	6,377.83	7.47	189.46	3.29
P-06-4	06-4	06-3	Circular	18 inch	Concrete	0.013	233.21	95.09	6,386.20	6,382.00	6,386.20	6,380.50	6,387.70	6,383.50	7.45	13.67	6,386.52	6,382.51	4.25	14.10	0.76
P-37-2	37-2	37-1	Circular	18 inch	Concrete	0.013	186.15	52.50	6,381.46	6,381.13	6,381.46	6,380.83	6,382.96	6,382.63	16.81	15.01	6,385.26	6,382.89	6.70	8.85	23.68
P-DP-5	DP-5	37-2	Circular	30 inch	Concrete	0.013	325.16	115.80	6,395.70	6,384.11	6,395.70	6,381.46	6,398.20	6,386.61	2.30	13.16	6,395.93	6,385.79	4.44	77.43	0.50
P-DP-8	DP-8	37-2	Circular	24 inch	Concrete	0.013	141.95	26.51	6,393.10	6,384.11	6,393.10	6,381.46	6,395.10	6,386.11	5.60	13.66	6,394.81	6,385.00	17.19	56.93	23.18
P-DP-7C	DP-7C	DP-8	Circular	24 inch	Concrete	0.013	60.88	6.10	6,393.90	6,393.60	6,393.90	6,393.10	6,395.90	6,395.60	4.10	5.10	6,395.75	6,395.17	6.04	15.87	18.98
P-DP-7B	DP-7B	DP-7C	Circular	24 inch	Concrete	0.013	141.26	5.41	6,394.60	6,393.90	6,394.60	6,393.90	6,396.60	6,395.90	3.50	4.10	6,395.99	6,395.88	5.11	15.92	8.20
P-DP-6	DP-6	DP-7	Circular	18 inch	Concrete	0.013	87.91	6.48	6,398.70	6,398.00	6,398.70	6,396.00	6,400.20	6,399.50	2.30	2.20	6,399.29	6,398.52	4.44	9.37	2.40
P-DP-7	DP-7	DP-7A	Circular	24 inch	Concrete	0.013	97.44	6.53	6,396.00	6,395.50	6,396.00	6,395.50	6,398.00	6,397.50	3.70	3.00	6,396.80	6,396.51	4.59	16.20	5.20
P-DP-7A	DP-7A	DP-7B	Circular	24 inch	Concrete	0.013	180.27	0.38	6,395.50	6,394.60	6,395.50	6,394.60	6,397.50	6,396.60	3.00	3.50	6,396.47	6,396.00	5.00	15.98	7.45
P-HD-E2	HD-E2	HD-E1	Circular	15 inch	Concrete	0.013	121.84	0.02	6,397.00	6,396.40	6,397.00	6,396.40	6,398.25	6,397.65	2.25	3.15	6,397.48	6,397.13	3.25	4.53	1.40
P-HD-E1	HD-E1	DP-7	Circular	15 inch	Concrete	0.013	82.41	83.53	6,396.40	6,396.00	6,396.40	6,396.00	6,397.65	6,397.25	3.15	4.45	6,397.12	6,396.94	3.87	4.50	2.80
P-HD-F1	HD-F1	HD-E1	Circular	15 inch	Concrete	0.013	15.85	90.11	6,397.00	6,396.90	6,397.00	6,396.40	6,398.25	6,398.15	2.25	2.65	6,397.47	6,397.35	3.56	5.13	1.40
P-HD-D1	HD-D1	DP-7C	Circular	24 inch	Concrete	0.013	38.48	96.66	6,394.10	6,393.90	6,394.10	6,393.90	6,396.10	6,395.90	3.90	4.10	6,396.01	6,395.94	5.45	16.31	10.00
P-HDC2	HD-C2	HD-C1	Circular	15 inch	Concrete	0.013	48.28	0.44	6,393.60	6,393.30	6,393.60	6,393.30	6,394.85	6,394.55	2.25	3.45	6,395.16	6,395.11	1.71	5.09	2.10
P-HD-C1	HD-C1	DP-8	Circular	15 inch	Concrete	0.013	37.98	89.64	6,393.30	6,393.10	6,393.30	6,393.10	6,394.55	6,394.35	3.45	6.35	6,395.07	6,394.91	3.42	4.69	4.20
P-HD-B	HD-B1	DP-5	Circular	12 inch	Concrete	0.013	2.00	89.40	6,397.31	6,397.30	6,397.31	6,395.70	6,398.31	6,398.30	2.19	2.20	6,397.61	6,397.59	2.50	2.52	0.50
P-WV-2	WV-2	WV-4	Circular	24 inch	Concrete	0.013	073.00	93.47	6,382.00	6,371.37	6,382.00	6,371.37	6,384.00	6,373.37	2.00	4.13	6,393.51	6,374.51	9.58	22.52	30.10
P-WV-1	WV-1	WV-3	Circular	24 inch	Concrete	0.013	381.00	48.83	6,382.00	6,376.02	6,382.00	6,376.02	6,384.00	6,378.02	2.00	5.48	6,385.06	6,377.90	9.87	28.34	31.00
P-21-3	21-3	21-2	Circular	30 inch	Concrete	0.013	56.33	15.83	6,385.30	6,384.70	6,385.30	6,384.40	6,387.80	6,387.20	3.20	16.85	6,385.75	6,385.06	4.38	42.33	1.94
P-30	21-2	21-1	Circular	30 inch	Concrete	0.013	12.48	39.73	6,384.40	6,384.17	6,384.40	6,384.17	6,386.90	6,386.67	17.15	17.26	6,384.85	6,384.62	5.30	55.68	1.93
P-31	21-1	09-1	Circular	30 inch	Concrete	0.013	42.14	0.24	6,384.17	6,382.34	6,384.17	6,382.34	6,386.67	6,384.84	17.26	18.20	6,384.62	6,382.88	7.14	85.47	1.92
P-01	28-2	O-1B	Circular	48 inch	Concrete	0.013	145.00	0.00	6,353.51	6,351.73	6,353.51	6,351.73	6,357.51	6,355.73	1.87	-1.73	6,358.11	6,356.50	12.03	159.14	151.12
P-40	01-00	28-A	Circular	48 inch	Concrete	0.013	23.00	31.52	6,353.77	6,353.69	6,352.96	6,353.58	6,357.77	6,357.69	1.47	1.03	6,359.78	6,359.75	3.54	84.71	44.47
P-02-3	02-3	02-2	Circular	18 inch	Concrete	0.013	49.85	0.91	6,364.47	6,364.19	6,364.47	6,363.89	6,365.97	6,365.69	1.53	1.98	6,365.16	6,364.87	4.26	7.87	3.29

Table C - Pipe Report

Label	Upstream Node	Downstream Node	Section Shape	Section Size	Material	Mannings n	Length (ft)	Bend Angle (degrees)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Sump Elevation (ft)	Downstream Sump Elevation (ft)	Upstream Crown Elevation (ft)	Downstream Crown Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)	Full Capacity (cfs)	Total System Flow (cfs)
P-02-2	02-2	02-1	Circular	18 inch	Concrete	0.013	76.19	91.91	6,363.89	6,362.00	6,363.89	6,361.39	6,365.39	6,363.50	2.28	5.32	6,364.76	6,363.48	8.25	16.54	5.11
P-05-2	05-2	05-1	Circular	18 inch	Concrete	0.013	46.06	0.63	6,367.10	6,366.07	6,367.10	6,365.77	6,368.60	6,367.57	2.07	1.82	6,368.09	6,366.76	8.46	15.70	6.49
P-05-1	05-1	02-1	Circular	18 inch	Concrete	0.013	45.63	88.78	6,365.77	6,364.85	6,365.77	6,361.39	6,367.27	6,366.35	2.12	2.47	6,366.93	6,365.72	8.84	14.91	9.03
P-02-1	02-1	01-1	Horizontal El	19x30 inch	Concrete	0.013	14.46	0.13	6,361.87	6,361.77	6,361.39	6,355.20	6,363.47	6,363.37	5.35	6.26	6,363.47	6,363.42	6.65	20.90	13.69
P-01-8	01-8	01-7	Circular	36 inch	Concrete	0.013	32.99	1.48	6,367.83	6,367.31	6,367.83	6,367.01	6,370.83	6,370.31	3.26	2.19	6,369.19	6,368.34	9.43	83.73	17.95
P-HD-G1	HD-G1	01-9	Circular	36 inch	Concrete	0.013	1.00	22.09	6,372.79	6,372.78	6,372.79	6,372.78	6,375.79	6,375.78	3.77	3.85	6,373.98	6,373.97	7.46	66.69	13.92
P-01-9	01-9	01-8	Circular	36 inch	Concrete	0.013	116.21	5.22	6,372.78	6,368.13	6,372.78	6,367.83	6,375.78	6,371.13	3.85	2.96	6,373.97	6,368.78	12.22	133.41	13.92
P-01-7	01-7	01-6	Circular	36 inch	Concrete	0.013	132.55	4.40	6,367.01	6,364.90	6,367.01	6,364.90	6,370.01	6,367.90	2.49	1.71	6,368.39	6,366.64	9.56	84.15	18.58
P-01-6	01-6	01-5	Circular	36 inch	Concrete	0.013	87.48	4.54	6,364.90	6,364.48	6,364.90	6,364.48	6,367.90	6,367.48	1.71	1.02	6,366.64	6,366.62	6.63	46.21	24.45
P-01-5	01-5	01-4	Circular	36 inch	Concrete	0.013	45.78	0.45	6,364.48	6,364.36	6,364.48	6,364.36	6,367.48	6,367.36	1.02	0.97	6,366.56	6,366.41	5.44	34.15	29.52
P-01-4	01-4	01-3	Circular	36 inch	Concrete	0.013	17.68	97.50	6,364.36	6,364.31	6,364.36	6,364.31	6,367.36	6,367.31	0.97	1.08	6,366.36	6,366.15	5.69	35.47	32.27
P-01-3	01-3	01-2	Horizontal El	19x30 inch	Concrete	0.013	120.04	81.59	6,364.31	6,363.94	6,364.31	6,362.78	6,365.91	6,365.54	2.48	3.13	6,365.44	6,365.02	4.72	41.86	35.89
P-01-2	01-2	01-1	Circular	42 inch	Concrete	0.013	148.06	91.93	6,362.78	6,361.67	6,362.78	6,355.20	6,366.28	6,365.17	2.39	4.46	6,364.63	6,363.59	8.60	87.11	35.71
P-03-1	03-1	01-6	Circular	18 inch	Concrete	0.013	26.87	61.98	6,366.00	6,365.85	6,366.00	6,364.90	6,367.50	6,367.35	12.05	2.26	6,366.97	6,366.79	4.88	7.85	5.90
P-02-4	02-4	02-3	Circular	18 inch	Concrete	0.013	4.67	1.51	6,364.80	6,364.77	6,364.80	6,364.47	6,366.30	6,366.27	1.21	1.23	6,365.45	6,365.39	4.35	8.42	2.96
P-36	01-3a	01-3	Circular	24 inch	Concrete	0.013	23.16	0.00	6,364.50	6,364.38	6,363.38	6,364.31	6,366.50	6,366.38	0.88	2.01	6,365.52	6,365.52	3.70	16.28	2.38
P-37	01-1	01-0	Circular	30 inch	Concrete	0.013	85.00	2.21	6,361.67	6,358.81	6,355.20	6,358.00	6,364.17	6,361.31	5.46	1.32	6,363.28	6,359.79	13.38	150.47	44.93
P-39	01-0	01-00	Circular	30 inch	Concrete	0.013	282.00	0.00	6,358.51	6,356.01	6,358.00	6,352.96	6,361.01	6,358.51	1.62	0.73	6,360.12	6,359.24	8.16	77.24	44.86

Scenario: Five Year

Table D - Junction Report

Label	Description	Structure Diameter (ft)	Ground Elevation (ft)	Sump Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total Flow (cfs)
38-1	Proposed Manhole Connection to Exis	6.00	6,354.39	6,348.79	true	6,354.39	6,349.70	6,349.69	5.44
36A		2.00	6,474.48	6,471.72	false	6,474.48	6,471.72	6,471.72	0.00
28-A		6.00	6,358.72	6,353.58	false	6,355.69	6,359.60	6,359.53	142.00
06-1		6.00	6,387.88	6,372.91	true	6,387.88	6,375.41	6,375.41	63.35
28-2	Existing Manhole	6.00	6,359.38	6,353.51	true	6,359.38	6,359.07	6,358.11	151.12
28-1	Existing Manhole	7.00	6,361.91	6,356.00	false	6,361.75	6,360.62	6,360.30	98.47
WV-4	Existing Junction	4.00	6,377.50	6,371.37	false	6,377.50	6,374.51	6,374.30	93.42
WV-3	Existing Wye	6.00	6,383.50	6,376.02	false	6,383.50	6,377.83	6,377.82	33.79
09-1		6.00	6,403.04	6,382.34	true	6,403.04	6,382.88	6,382.88	3.29
DP-7		4.00	6,401.70	6,396.00	false	6,401.70	6,396.83	6,396.80	5.20
DP-8		4.00	6,400.70	6,393.10	false	6,400.70	6,394.91	6,394.81	23.18
HD-E1	Pipe Connection	1.25	6,400.80	6,396.40	false	6,400.80	6,397.13	6,397.12	2.80
37-2	Existing MH	6.00	6,399.77	6,381.46	true	6,399.77	6,385.59	6,385.26	23.68
DP-5		4.00	6,400.50	6,395.70	false	6,400.50	6,395.94	6,395.93	0.50
21-1		5.00	6,403.93	6,384.17	false	6,403.93	6,384.62	6,384.62	1.92
21-2		5.00	6,404.05	6,384.40	true	6,404.05	6,384.85	6,384.85	1.93
01-00		10.00	6,359.24	6,352.96	true	6,359.24	6,359.25	6,359.24	44.47
01-0		10.00	6,362.63	6,358.00	true	6,362.63	6,360.13	6,360.12	44.86
01-1		7.00	6,369.63	6,355.20	true	6,369.63	6,363.42	6,363.28	44.93
01-2		6.00	6,368.67	6,362.78	true	6,368.67	6,365.02	6,364.63	35.71
01-6		7.00	6,369.61	6,364.90	true	6,369.61	6,366.64	6,366.64	24.45
01-9	Connection to Existing Home Depot In	5.00	6,379.63	6,372.78	true	6,379.63	6,373.97	6,373.97	13.92
02-1		4.00	6,368.82	6,361.39	true	6,368.82	6,363.48	6,363.47	13.69

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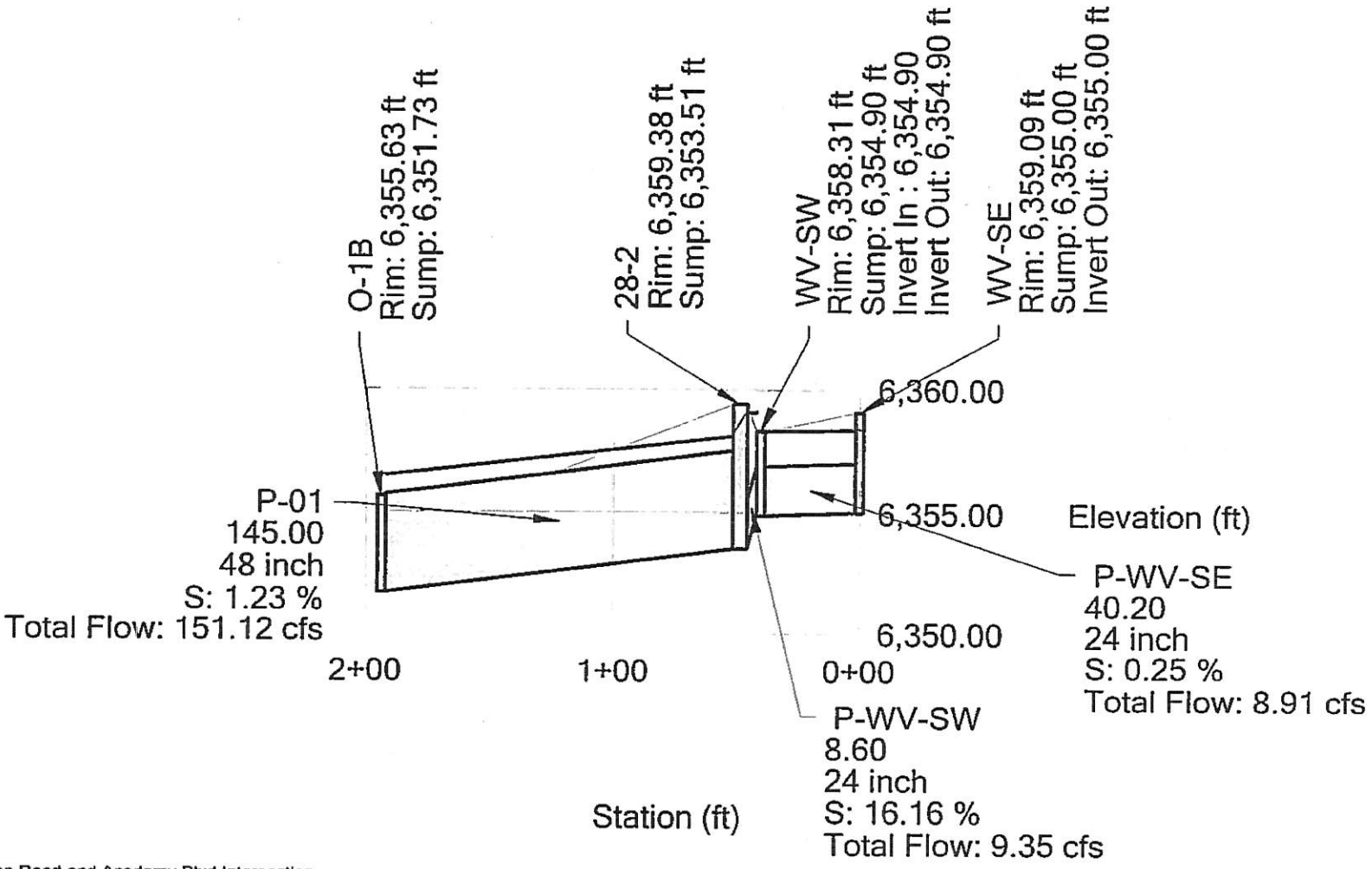
Profile: Prince Inlets

Scenario: Five Year



Scenario: One Hundred Year

Table A - Catchment Report

Label	Description	Area (acres)	Inlet C	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Carryover CA (acres)	Carryover Tc (min)	Carryover Rational Flow (cfs)	Carryover Additional Flow (cfs)	Total Inlet CA (acres)	Total Inlet Time of Concentration (min)	Total Flow To Inlet (cfs)
13-1	Existing On-Grade Curb Inlet□i	0.15000	0.95	5.00	9.09	1.31	0.64944	5.00	5.95	0.00	0.79194	5.00	7.25
13-2	On-Grade Curb Inlet	1.58000	0.95	5.00	9.09	13.75	0.00000	0.00	0.00	0.00	1.50100	5.00	13.75
13-3		3.70000	0.50	11.41	6.93	12.93	0.00000	0.00	0.00	0.00	1.85000	11.41	12.93
38-2	On-Grade Curb Inlet	1.57000	0.95	5.37	8.92	13.41	0.00000	0.00	0.00	0.00	1.49150	5.37	13.41
35-2	Stinson Det Pond Outlet Low F	0.00000	0.00	41.99	0.00	0.00	0.00000	0.00	0.00	37.82	0.00000	41.99	37.82
36-2	Stinson Det Pond Outlet High F	0.00000	0.00	41.99	0.00	0.00	0.00000	0.00	0.00	59.08	0.00000	41.99	59.08
25-1A	Existing Inlet flow adjusted for t	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	9.60	0.00000	5.00	9.60
25-2		0.00000	0.00	23.83	0.00	0.00	0.00000	0.00	0.00	200.70	0.00000	23.83	200.70
DP-7B	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	5.00	0.00	1.52	0.00000	5.00	1.52
DP-7C	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	5.00	0.00	1.60	0.00000	5.00	1.60
06-2	On-Grade Curb Inlet	0.07000	0.95	5.00	9.09	0.61	0.07276	5.00	0.67	0.00	0.13926	5.00	1.28
06-3	Special On-Grade Curb Inlet	0.05000	0.95	5.00	9.09	0.44	0.01064	5.00	0.10	0.00	0.05814	5.00	0.53
37-1	On-Grade Curb Inlet	0.50000	0.95	5.00	9.09	4.35	0.00007	5.00	0.00	0.00	0.47507	5.00	4.35
07-1	On-Grade Curb Inlet	1.16276	0.95	5.00	9.09	10.12	0.00000	0.00	0.00	0.00	1.10463	5.00	10.12
08-1	Special On-Grade Curb Inlet	0.06357	0.95	5.00	9.09	0.55	0.00000	0.00	0.00	0.00	0.06039	5.00	0.55
WV-SW	Woodmen Valley Storm Systen	0.32160	0.60	7.06	8.24	1.60	0.00000	0.00	0.00	0.00	0.19296	7.06	1.60
WV-SE	Woodmen Valley Storm Systen	5.68283	0.60	18.80	5.53	19.02	0.00000	0.00	0.00	0.00	3.40970	18.80	19.02
WV-N	Woodmen Valley Storm Systen	3.15661	0.60	13.65	6.43	12.27	0.00000	0.00	0.00	0.00	1.89397	13.65	12.27
09-2	Special On-Grade Inlet	0.21000	0.95	5.00	9.09	1.83	0.00000	0.00	0.00	0.00	0.19950	5.00	1.83
09-3	On-Grade Curb Inlet	0.08000	0.95	5.00	9.09	0.70	0.00000	0.00	0.00	0.00	0.07600	5.00	0.70
10-1	Special On-Grade Curb Inlet	0.04373	0.95	5.00	9.09	0.38	0.01130	5.00	0.10	0.00	0.05285	5.00	0.48
06-4	On-Grade Curb Inlet	0.16389	0.95	5.00	9.09	1.43	0.00000	0.00	0.00	0.00	0.15569	5.00	1.43
DP-6	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	3.60	0.00000	5.00	3.60
DP-7A	Existing 5' Combination Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	4.40	0.00000	5.00	4.40
HD-E2	Existing grate inlet	0.00000	0.00	11.92	0.00	0.00	0.00000	0.00	0.00	2.50	0.00000	11.92	2.50
HD-F1	Existing grate inlet	0.00000	0.00	11.92	0.00	0.00	0.00000	0.00	0.00	2.50	0.00000	11.92	2.50
HD-D1	Existing Roof Drain	0.00000	0.00	8.07	0.00	0.00	0.00000	0.00	0.00	16.80	0.00000	8.07	16.80
HD-C1	Existing Grate Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	4.05	0.00000	5.00	4.05
HD-C2	Existing Grate Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	4.05	0.00000	5.00	4.05
HD-B1		0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	1.00	0.00000	5.00	1.00
WV-2	Existing No. 13 Grate Inlet	0.00000	0.00	13.00	0.00	0.00	0.00000	0.00	0.00	30.10	0.00000	13.00	30.10
WV-1	Existing 10' D-10-R Inlet	0.00000	0.00	11.00	0.00	0.00	0.00000	0.00	0.00	31.00	0.00000	11.00	31.00
21-3	Home Depot Sump Field FES	1.04203	0.50	7.07	8.24	4.33	0.00000	0.00	0.00	0.00	0.52102	7.07	4.33
02-2	Special Flanking Vane Grate In	0.39164	0.95	5.00	9.09	3.41	0.20854	5.00	1.91	0.00	0.58060	5.00	5.32
02-3	Special Sump Vane Grate Inlet	0.00000	0.95	5.00	0.00	0.00	0.21858	5.00	2.00	0.00	0.21858	5.00	2.00

Scenario: One Hundred Year

Table A - Catchment Report

Label	Description	Area (acres)	Inlet C	Local Tc (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Carryover CA (acres)	Carryover Tc (min)	Carryover Rational Flow (cfs)	Carryover Additional Flow (cfs)	Total Inlet CA (acres)	Total Inlet Time of Concentration (min)	Total Flow To Inlet (cfs)
05-1	On-Grade Curb Inlet	0.11000	0.95	5.00	9.09	0.96	0.79634	5.00	7.29	0.00	0.90084	5.00	8.25
05-2	On-Grade Curb Inlet	2.05641	0.95	6.80	8.34	16.42	0.09649	6.80	0.81	0.00	2.05007	6.80	17.23
01-3	Flanking Curb Inlet	0.66000	0.95	5.00	9.09	5.74	0.00000	0.00	0.00	0.00	0.62700	5.00	5.74
01-4	Sump Curb Inlet	0.00000	0.00	5.00	0.00	0.00	1.34294	5.00	12.30	0.00	1.34294	5.00	12.30
01-5	Flanking Curb Inlet	2.68000	0.95	6.39	8.49	21.80	0.01432	6.39	0.12	0.00	2.56032	6.39	21.92
01-7	Special On-Grade Curb Inlet	0.18085	0.95	5.00	9.09	1.57	0.25654	5.00	2.35	0.00	0.42835	5.00	3.92
01-8	On-Grade Curb Inlet	1.37769	0.95	5.00	9.09	11.99	0.00634	5.00	0.06	0.00	1.31514	5.00	12.05
HD-G1	Home Depot Detention Pond	0.00000	0.00	16.50	0.00	0.00	0.00000	16.50	0.00	22.62	0.00000	16.50	22.62
03-1	Existing Type C Inlet	0.00000	0.00	5.00	0.00	0.00	0.00000	0.00	0.00	10.20	0.00000	5.00	10.20
02-4	Special Flanking Vane Grate In	0.68000	0.95	5.00	9.09	5.92	0.00000	0.00	0.00	0.00	0.64600	5.00	5.92
01-3a		1.31000	0.50	7.67	8.02	5.30	0.00000	0.00	0.00	0.00	0.65500	7.67	5.30

Table B - Inlet Report

Label	Inlet	Inlet Type	Ground Elevation (ft)	Sump Elevation (ft)	Curb Opening Length (ft)	Clogging Factor (%)	Road Cross Slope (%)	Depressed Gutter?	Gutter Cross Slope (%)	Gutter Width (ft)	Inlet Location	Bypass Target	Longitudinal Slope (%)	Mannings n	Total Flow To Inlet (cfs)	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Ditch Spread (ft)	Gutter Ditch Depth (ft)
13-1	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,354.81	6,349.92	18.00		2.00	true	6.25	2.00	On Grade	O-4	2.00	0.013	7.25	6.92	0.33	95.5	11.73	0.32
13-2	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,356.53	6,352.70	12.00		2.00	true	6.25	2.00	On Grade	13-1	2.00	0.013	13.75	7.80	5.95	56.7	15.20	0.39
13-3	Grate CDOT Type C	Grate Inlet	6,355.55	6,353.20		50.0	2.00	false	2.00	0.00	In Sag				12.93	12.93	0.00	100.0	41.65	0.83
38-2	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,355.72	6,349.06	12.00		2.00	true	6.25	2.00	On Grade	O-5	2.00	0.013	13.41	7.70	5.71	57.4	15.05	0.39
35-2	Generic Default 100%	Generic Inlet	6,468.00	6,467.70			2.00	false	2.00	0.00	In Sag				37.82	37.82	0.00	100.0	0.00	0.00
36-2	Generic Default 100%	Generic Inlet	6,479.61	6,472.00			2.00	false	2.00	0.00	In Sag				59.08	59.08	0.00	100.0	0.00	0.00
25-1A	Grate CDOT TYPE D	Grate Inlet	6,482.00	6,471.30		50.0	2.00	false	2.00	0.00	In Sag				9.60	9.60	0.00	100.0	25.74	0.51
25-2	Grate Special Type D Grate Inlet	Grate Inlet	6,478.41	6,471.80		50.0	2.00	false	2.00	0.00	In Sag				200.70	200.70	0.00	100.0	141.83	2.84
DP-7B	Combination Denver No 16 Single	Combination In	6,400.10	6,394.60	3.33	38.0	2.00	true	6.25	2.00	On Grade	DP-7C	0.00	0.013	1.52	1.52	0.00	99.9	30.24	0.69
DP-7C	Combination Denver No 16 Single	Combination In	6,400.00	6,393.90	3.33	38.0	2.00	false	2.00	0.00	On Grade	HD-G1	0.01	0.013	1.60	1.49	0.12	92.8	18.87	0.38
06-2	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,396.37	6,379.70	6.00		2.00	true	6.25	2.00	On Grade	05-2	1.33	0.013	1.28	1.23	0.05	95.4	5.82	0.20
06-3	Curb CDOT Type R	Curb Inlet	6,397.17	6,380.50	5.00		2.00	true	4.16	1.00	On Grade	05-2	1.34	0.013	0.53	0.47	0.07	87.4	4.81	0.12
37-1	Curb CDOT Type R	Curb Inlet	6,397.64	6,380.83	15.00		2.00	true	4.16	1.00	On Grade	05-2	1.35	0.013	4.35	3.58	0.77	82.3	10.88	0.24
07-1	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,397.20	6,392.90	20.00		2.00	true	6.25	2.00	On Grade	06-2	1.62	0.013	10.12	9.45	0.67	93.4	14.02	0.37
08-1	Curb CDOT Type R	Curb Inlet	6,398.84	6,394.00	5.00		2.00	true	4.16	1.00	On Grade	06-3	1.90	0.013	0.55	0.46	0.10	82.4	4.56	0.11
WV-SW	Generic Default 100%	Generic Inlet	6,358.31	6,354.90			2.00	false	2.00	0.00	In Sag				1.60	1.60	0.00	100.0	0.00	0.00
WV-SE	Generic Default 100%	Generic Inlet	6,359.09	6,355.00			2.00	false	2.00	0.00	In Sag				19.02	19.02	0.00	100.0	0.00	0.00
WV-N	Generic Default 100%	Generic Inlet	6,360.84	6,357.60			2.00	false	2.00	0.00	In Sag				12.27	12.27	0.00	100.0	0.00	0.00
09-2	Curb CDOT Type R	Curb Inlet	6,403.20	6,396.10	15.00		1.28	true	4.16	1.00	On Grade	10-1	2.03	0.013	1.83	1.72	0.10	94.3	9.50	0.15
09-3	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,402.77	6,395.70	6.00		2.80	true	6.25	2.00	On Grade	37-1	2.80	0.013	0.70	0.70	0.00	99.9	2.79	0.15
10-1	Curb CDOT Type R	Curb Inlet	6,402.23	6,396.70	15.00		0.38	true	4.16	1.00	On Grade	37-1	1.84	0.013	0.48	0.48	0.00	100.0	12.09	0.08
06-4	Curb CDOT Type R	Curb Inlet	6,395.15	6,386.20	15.00		0.71	true	4.16	1.00	On Grade	01-8	1.41	0.013	1.43	1.37	0.06	95.9	13.37	0.13
DP-6	Combination Denver No 16 Single	Combination In	6,402.50	6,396.70	3.33	20.0	2.00	true	6.25	2.00	In Sag				3.60	3.60	0.00	100.0	10.26	0.29
DP-7A	Combination Denver No 16 Single	Combination In	6,400.50	6,395.50	3.33	38.0	2.00	true	6.25	2.00	On Grade	DP-7B	0.00	0.013	4.40	4.18	0.22	95.0	37.09	0.66
HD-E2	Grate CDOT Type C	Grate Inlet	6,400.50	6,397.00		50.0	2.00	false	2.00	0.00	In Sag				2.50	2.50	0.00	100.0	13.55	0.27
HD-F1	Grate CDOT Type C	Grate Inlet	6,400.50	6,397.00		5.0	2.00	false	2.00	0.00	In Sag				2.50	2.50	0.00	100.0	11.41	0.23
HD-D1	Generic Default 100%	Generic Inlet	6,400.00	6,394.10			2.00	false	2.00	0.00	In Sag				16.80	16.80	0.00	100.0	0.00	0.00
HD-C1	Grate CDOT Type C	Grate Inlet	6,398.00	6,393.30		50.0	2.00	false	2.00	0.00	In Sag				4.05	4.05	0.00	100.0	17.83	0.36
HD-C2	Grate CDOT Type C	Grate Inlet	6,397.10	6,393.60		50.0	2.00	false	2.00	0.00	In Sag				4.05	4.05	0.00	100.0	17.83	0.36
HD-B1	Generic Default 100%	Generic Inlet	6,400.50	6,397.31			2.00	false	2.00	0.00	In Sag				1.00	1.00	0.00	100.0	0.00	0.00
WV-2	Generic Default 100%	Generic Inlet	6,386.00	6,382.00			2.00	false	2.00	0.00	In Sag				30.10	30.10	0.00	100.0	0.00	0.00
WV-1	Generic Default 100%	Generic Inlet	6,386.00	6,382.00			2.00	false	2.00	0.00	In Sag				31.00	31.00	0.00	100.0	0.00	0.00
21-3	Grate CDOT TYPE D	Grate Inlet	6,391.00	6,385.30		50.0	2.00	false	2.00	0.00	In Sag				4.33	4.33	0.00	100.0	16.85	0.34
02-2	Combination Denver No 16 Double	Combination In	6,367.67	6,363.89	7.08	38.0	2.00	true	6.25	2.00	On Grade	02-3	0.63	0.013	5.32	4.06	1.25	76.4	13.09	0.35
02-3	Combination Denver No 16 Double	Combination In	6,367.50	6,364.47	7.08	50.0	2.00	false	2.00	0.00	In Sag				2.00	2.00	0.00	100.0	6.07	0.12
05-1	Combination Denver No 16 Triple	Combination In	6,369.39	6,365.77	10.92	38.0	2.00	true	6.25	2.00	On Grade	02-2	2.00	0.013	8.25	6.34	1.91	76.9	12.37	0.33
05-2	Combination Denver Special No 16 Triple	Combination In	6,370.67	6,367.10	10.92	38.0	2.00	true	6.25	2.00	On Grade	05-1	2.57	0.013	17.23	10.54	6.69	61.2	15.82	0.40
01-3	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,368.39	6,364.31	20.00		2.00	true	6.25	2.00	On Grade	01-4	0.30	0.013	5.74	5.74	0.00	100.0	15.66	0.40
01-4	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,368.33	6,364.36	16.00		2.00	true	6.25	2.00	In Sag				12.30	12.30	0.00	100.0	19.84	0.48
01-5	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,368.50	6,364.48	10.00		2.00	true	6.25	2.00	On Grade	01-4	0.63	0.013	21.92	10.42	11.50	47.5	22.85	0.54
01-7	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,372.50	6,367.01	14.00		2.00	true	6.25	2.00	On Grade	01-5	3.02	0.013	3.92	3.79	0.13	96.7	8.23	0.25
01-8	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,374.09	6,367.83	20.00		2.00	true	6.25	2.00	On Grade	01-7	3.52	0.013	12.05	9.70	2.35	80.5	12.86	0.34
HD-G1	Generic Default 100%	Generic Inlet	6,379.56	6,372.79			0.00	false	0.00	0.00	In Sag				22.62	22.62	0.00	100.0	0.00	0.00
03-1	Grate CDOT Type C	Grate Inlet	6,379.55	6,366.00		50.0	2.00	false	2.00	0.00	In Sag				10.20	10.20	0.00	100.0	35.87	0.72
02-4	Combination Denver No 16 Double	Combination In	6,367.51	6,364.80	7.08	38.0	2.00	true	6.25	2.00	On Grade	02-3	0.10	0.013	5.92	5.17	0.75	87.3	19.66	0.48
01-3a	Grate CDOT Type C	Grate Inlet	6,367.38	6,363.38		50.0	2.00	false	2.00	0.00	In Sag				5.30	5.30	0.00	100.0	20.50	0.41

Scenario: One Hundred Year

Table C - Pipe Report

Label	Upstream Node	Downstream Node	Section Shape	Section Size	Material	Manning's n	Length (ft)	Bend Angle (degrees)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Sump Elevation (ft)	Downstream Sump Elevation (ft)	Upstream Crown Elevation (ft)	Downstream Crown Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)	Full Capacity (cfs)	Total System Flow (cfs)
P-13-2	13-2	13-1	Circular	18 inch	Concrete	0.013	46.70	2.74	6,352.70	6,351.40	6,352.70	6,349.92	6,354.20	6,352.90	2.33	1.91	6,356.31	6,354.81	10.66	17.53	18.84
P-13-1	13-1	O-4	Circular	18 inch	Concrete	0.013	175.96	0.00	6,349.92	6,347.69	6,349.92	6,347.69	6,351.42	6,349.19	3.39	0.81	6,356.41	6,349.17	13.61	11.82	24.05
P-38-2	38-2	38-1	Circular	18 inch	Concrete	0.013	27.86	0.00	6,353.20	6,353.00	6,353.20	6,352.70	6,354.70	6,354.50	0.85	2.03	6,356.95	6,356.53	7.32	8.90	12.93
P-38-1	38-1	O-5	Circular	18 inch	Concrete	0.013	19.62	41.22	6,349.06	6,348.79	6,349.06	6,348.79	6,350.56	6,350.29	5.16	4.10	6,350.14	6,349.88	7.36	12.32	7.70
P-35-2	35-2	35-1	Circular	24 inch	Concrete	0.013	120.44	0.00	6,348.79	6,347.29	6,348.79	6,347.29	6,350.29	6,348.79	4.10	2.71	6,349.86	6,348.18	7.08	11.72	7.68
P-36-2	36-2	36A	Horizontal El	24x38 inch	Concrete	0.013	133.95	0.00	6,467.70	6,461.80	6,467.70	6,461.80	6,469.70	6,463.80	-1.70	4.20	6,469.64	6,463.18	16.78	47.46	37.82
P-36A	36A	36-1	Horizontal El	24x38 inch	Concrete	0.013	12.21	41.25	6,472.00	6,471.72	6,472.00	6,471.72	6,474.00	6,473.72	5.61	0.76	6,473.52	6,473.26	12.24	135.71	59.08
P-25-2	25-1A	25-1	Horizontal El	29x45 inch	Concrete	0.013	218.03	0.00	6,471.72	6,468.01	6,471.72	6,467.71	6,473.72	6,470.01	0.76	9.72	6,473.24	6,469.02	11.14	116.90	59.08
P-25-3	25-2	25-1A	Horizontal El	29x45 inch	Concrete	0.013	52.01	0.00	6,471.30	6,471.05	6,471.30	6,471.05	6,473.70	6,473.45	8.30	0.97	6,474.49	6,473.39	14.21	102.17	210.30
P-01-A	28-A	28-2	Circular	48 inch	Concrete	0.013	108.65	0.00	6,471.80	6,471.30	6,471.80	6,471.30	6,474.20	6,473.70	4.21	8.30	6,476.78	6,474.76	13.56	99.97	200.70
P-37-1	37-1	06-3	Circular	36 inch	Concrete	0.013	15.00	55.38	6,353.56	6,353.51	6,353.58	6,353.51	6,357.58	6,357.51	1.14	1.87	6,359.80	6,359.38	19.08	98.12	239.72
P-06-3	06-3	06-2	Circular	36 inch	Concrete	0.013	19.13	13.54	6,380.83	6,380.80	6,380.83	6,380.50	6,383.83	6,383.80	13.81	13.37	6,383.50	6,383.39	6.23	26.41	44.07
P-06-2	06-2	06-1	Circular	36 inch	Concrete	0.013	41.04	1.84	6,380.50	6,380.00	6,380.50	6,379.70	6,383.50	6,383.00	13.67	13.37	6,382.70	6,382.42	10.97	73.62	45.58
P-07-1	07-1	06-2	Circular	18 inch	Concrete	0.013	102.42	60.61	6,379.70	6,378.70	6,379.70	6,372.91	6,382.70	6,381.70	13.67	6.18	6,382.06	6,380.75	10.36	65.90	52.66
P-08-1	08-1	06-3	Circular	18 inch	Concrete	0.013	38.43	91.16	6,392.90	6,391.90	6,392.90	6,379.70	6,394.40	6,393.40	2.80	2.97	6,394.09	6,392.75	9.85	16.94	9.45
P-WV-3	WV-3	06-1	Circular	42 inch	Concrete	0.013	95.69	91.21	6,394.00	6,392.90	6,394.00	6,380.50	6,395.50	6,394.40	3.34	2.77	6,394.25	6,393.11	3.12	11.26	0.46
P-06-1	06-1	WV-4	Circular	42 inch	Concrete	0.013	63.20	0.88	6,376.02	6,372.91	6,376.02	6,372.91	6,379.52	6,376.41	3.98	11.47	6,378.60	6,376.92	20.35	223.17	67.87
P-WV-4	WV-4	28-1	Circular	48 inch	Concrete	0.013	95.55	14.85	6,372.91	6,371.37	6,372.91	6,371.37	6,376.41	6,374.87	11.47	2.63	6,376.89	6,375.54	12.44	127.72	119.67
P-28-2	28-1	28-A	Circular	48 inch	Concrete	0.013	844.20	38.83	6,371.37	6,366.00	6,371.37	6,356.00	6,375.37	6,360.00	2.13	1.91	6,374.96	6,361.91	17.02	193.81	149.71
P-WV-SE	WV-SE	WV-SW	Circular	24 inch	Concrete	0.013	148.04	2.20	6,356.00	6,353.58	6,356.00	6,353.58	6,360.00	6,357.58	1.91	1.14	6,361.90	6,360.05	12.77	183.65	160.47
P-WV-SW	WV-SW	28-2	Circular	24 inch	Concrete	0.013	40.20	13.13	6,355.00	6,354.90	6,355.00	6,354.90	6,357.00	6,356.90	2.09	1.41	6,358.59	6,358.31	6.05	11.26	19.02
P-WV-N	WV-N	28-1	Circular	24 inch	Concrete	0.013	8.60	20.28	6,354.90	6,353.51	6,354.90	6,353.51	6,356.90	6,355.51	1.41	3.87	6,359.45	6,359.38	6.38	90.94	20.04
P-09-3	09-3	09-2	Circular	18 inch	Concrete	0.013	47.60	47.61	6,357.60	6,356.00	6,357.60	6,356.00	6,359.60	6,358.00	1.24	3.91	6,362.05	6,361.91	3.91	41.47	12.27
P-09-2	09-2	09-1	Circular	18 inch	Concrete	0.013	31.07	46.51	6,396.70	6,396.40	6,396.70	6,396.10	6,398.20	6,397.90	4.57	5.30	6,397.01	6,396.81	3.33	10.32	0.70
P-10-1	10-1	09-2	Circular	18 inch	Concrete	0.013	19.26	57.63	6,396.10	6,395.80	6,396.10	6,382.34	6,397.60	6,397.30	5.60	5.74	6,396.74	6,396.30	5.94	13.11	2.87
P-09-1	09-1	WV-3	Circular	42 inch	Concrete	0.013	36.94	87.32	6,396.70	6,396.40	6,396.70	6,396.10	6,398.20	6,397.90	4.03	5.30	6,396.96	6,396.76	2.81	9.47	0.48
P-06-4	06-4	06-3	Circular	18 inch	Concrete	0.013	178.20	0.09	6,382.34	6,376.02	6,382.34	6,376.02	6,385.84	6,379.52	17.20	3.98	6,383.13	6,378.61	9.33	169.46	6.87
P-37-2	37-2	37-1	Circular	18 inch	Concrete	0.013	233.21	95.09	6,386.20	6,382.00	6,386.20	6,380.50	6,387.70	6,383.50	7.45	13.67	6,386.64	6,383.37	5.06	14.10	1.37
P-DP-5	DP-5	37-2	Circular	30 inch	Concrete	0.013	186.15	52.50	6,381.46	6,381.13	6,381.46	6,380.83	6,382.96	6,382.63	16.81	15.01	6,391.23	6,383.90	11.79	8.85	41.68
P-DP-8	DP-8	37-2	Circular	24 inch	Concrete	0.013	325.16	115.80	6,395.70	6,384.11	6,395.70	6,381.46	6,398.20	6,386.61	2.30	13.16	6,396.02	6,391.79	5.47	77.43	1.00
P-DP-7C	DP-7C	DP-8	Circular	24 inch	Concrete	0.013	141.95	26.51	6,393.10	6,384.11	6,393.10	6,381.46	6,395.10	6,386.11	5.60	13.66	6,396.50	6,391.91	12.95	56.93	40.68
P-DP-7B	DP-7B	DP-7C	Circular	24 inch	Concrete	0.013	60.98	6.10	6,393.90	6,393.60	6,393.90	6,393.10	6,395.90	6,395.60	4.10	5.10	6,398.53	6,397.27	10.37	15.87	32.58
P-DP-6	DP-6	DP-7	Circular	18 inch	Concrete	0.013	141.26	5.41	6,394.60	6,393.90	6,394.60	6,393.90	6,396.60	6,395.90	3.50	4.10	6,399.71	6,399.15	4.55	15.92	14.30
P-DP-7	DP-7	DP-7A	Circular	24 inch	Concrete	0.013	87.91	6.48	6,398.70	6,398.00	6,398.70	6,396.00	6,400.20	6,399.50	2.30	2.20	6,400.68	6,400.58	2.04	9.37	3.60
P-DP-7A	DP-7A	DP-7B	Circular	24 inch	Concrete	0.013	97.44	6.53	6,396.00	6,395.50	6,396.00	6,395.50	6,398.00	6,397.50	3.70	3.00	6,400.54	6,400.40	2.74	16.20	8.60
P-HD-E2	HD-E2	HD-E1	Circular	15 inch	Concrete	0.013	180.27	0.38	6,395.50	6,394.60	6,395.50	6,394.60	6,397.50	6,396.60	3.00	3.50	6,400.33	6,399.76	4.07	15.98	12.78
P-HD-E1	HD-E1	DP-7	Circular	15 inch	Concrete	0.013	121.84	0.02	6,397.00	6,396.40	6,397.00	6,396.40	6,398.25	6,397.65	2.25	3.15	6,400.98	6,400.80	2.04	4.53	2.50
P-HD-F1	HD-F1	HD-E1	Circular	15 inch	Concrete	0.013	82.41	83.53	6,396.40	6,396.00	6,396.40	6,396.00	6,397.65	6,397.25	3.15	4.45	6,401.18	6,400.69	4.07	4.50	5.00
P-HD-D1	HD-D1	DP-7C	Circular	24 inch	Concrete	0.013	15.85	90.11	6,397.00	6,396.90	6,397.00	6,396.40	6,398.25	6,398.15	2.25	2.65	6,400.82	6,400.80	2.04	5.13	2.50
P-HDC2	HD-C2	HD-C1	Circular	15 inch	Concrete	0.013	38.48	96.66	6,394.10	6,393.90	6,394.10	6,393.90	6,396.10	6,395.90	3.90	4.10	6,399.63	6,399.42	5.35	16.31	16.80
P-HD-C1	HD-C1	DP-8	Circular	15 inch	Concrete	0.013	48.28	0.44	6,393.60	6,393.30	6,393.60	6,393.30	6,394.85	6,394.55	2.25	3.45	6,397.97	6,397.78	3.30	5.09	4.05
P-HD-B	HD-B1	DP-5	Circular	12 inch	Concrete	0.013	37.98	89.64	6,393.30	6,393.10	6,393.30	6,393.10	6,394.55	6,394.35	3.45	6.35	6,397.53	6,396.93	6.60	4.69	8.10
P-WV-2	WV-2	WV-4	Circular	24 inch	Concrete	0.013	2.00	89.40	6,397.31	6,397.30	6,397.31	6,395.70	6,398.31	6,398.30	2.19	2.20	6,397.74	6,397.72	3.02	2.52	1.00
P-WV-1	WV-1	WV-3	Circular	24 inch	Concrete	0.013	073.00	93.47	6,382.00	6,371.37	6,382.00	6,371.37	6,384.00	6,373.37	2.00	4.13	6,394.22	6,375.22	9.58	22.52	30.10
P-21-3	21-3	21-2	Circular	30 inch	Concrete	0.013	381.00	48.83	6,382.00	6,376.02	6,382.00	6,376.02	6,384.00	6,378.02	2.00	5.48	6,407.26	6,378.64	19.74	28.34	62.00
P-30	21-2	21-1	Circular	30 inch	Concrete	0.013	56.33	15.83	6,385.30	6,384.70	6,385.30	6,384.40	6,387.80	6,387.20	3.20	16.85	6,385.98	6,385.24	5.55	42.33	4.33
P-31	21-1	09-1	Circular	30 inch	Concrete	0.013	12.48	39.73	6,384.40	6,384.17	6,384.40	6,384.17	6,386.90	6,386.67	17.15	17.26	6,385.08	6,384.86	6.72	55.68	4.29
P-01	28-2	O-1B	Circular	48 inch	Concrete	0.013	42.14	0.24	6,384.17	6,382.34	6,384.17	6,382.34	6,386.67	6,384.84	17.26	18.20	6,384.85	6,383.13	9.08	85.47	4.29
P-40	01-00	28-A	Circular	48 inch	Concrete	0.013	145.00	0.00	6,353.51	6,351.73	6,353.51	6,351.73	6,357.51	6,355.73	1.87	-1.73	6,361.22	6,356.50	20.61	159.14	259.04
P-02-3	02-3	02-2	Circular	18 inch	Concrete	0.013	49.85	0.91	6,364.47	6,364.19	6,364.47	6,363.89	6,365.97	6,365.69	1.53	1.98	6,365.65	6,365.46	5.05	7.87	7.16

Table C - Pipe Report

Label	Upstream Node	Downstream Node	Section Shape	Section Size	Material	Manning's n	Length (ft)	Bend Angle (degrees)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Sump Elevation (ft)	Downstream Sump Elevation (ft)	Upstream Crown Elevation (ft)	Downstream Crown Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)	Full Capacity (cfs)	Total System Flow (cfs)
P-02-2	02-2	02-1	Circular	18 inch	Concrete	0.013	76.19	91.91	6,363.89	6,362.00	6,363.89	6,361.39	6,365.39	6,363.50	2.28	5.32	6,365.35	6,364.51	10.04	16.54	11.13
P-05-2	05-2	05-1	Circular	18 inch	Concrete	0.013	46.08	0.63	6,367.10	6,366.07	6,367.10	6,365.77	6,368.60	6,367.57	2.07	1.82	6,368.35	6,367.66	9.53	15.70	10.54
P-05-1	05-1	02-1	Circular	18 inch	Concrete	0.013	45.63	88.78	6,365.77	6,364.85	6,365.77	6,361.39	6,367.27	6,366.35	2.12	2.47	6,367.39	6,366.26	9.22	14.91	16.29
P-02-1	02-1	01-1	Horizontal El	19x30 inch	Concrete	0.013	14.46	0.13	6,361.87	6,361.77	6,361.39	6,355.20	6,363.47	6,363.37	5.35	6.26	6,364.28	6,364.12	8.02	20.90	26.46
P-01-8	01-8	01-7	Circular	36 inch	Concrete	0.013	32.99	1.48	6,367.83	6,367.31	6,367.83	6,367.01	6,370.83	6,370.31	3.26	2.19	6,369.57	6,368.67	10.75	83.73	28.88
P-HD-G1	HD-G1	01-9	Circular	36 inch	Concrete	0.013	1.00	22.09	6,372.79	6,372.78	6,372.79	6,372.78	6,375.79	6,375.78	3.77	3.85	6,374.32	6,374.32	8.53	66.69	22.62
P-01-9	01-9	01-8	Circular	36 inch	Concrete	0.013	116.21	5.22	6,372.78	6,368.13	6,372.76	6,367.83	6,375.76	6,371.13	3.85	2.96	6,374.31	6,368.98	14.06	133.41	22.62
P-01-7	01-7	01-6	Circular	36 inch	Concrete	0.013	132.55	4.40	6,367.01	6,364.90	6,367.01	6,364.90	6,370.01	6,367.90	2.49	1.71	6,368.83	6,368.34	11.03	84.15	31.32
P-01-6	01-6	01-5	Circular	36 inch	Concrete	0.013	87.48	4.54	6,364.90	6,364.48	6,364.90	6,364.48	6,367.90	6,367.48	1.71	1.02	6,368.33	6,367.99	5.87	46.21	41.47
P-01-5	01-5	01-4	Circular	36 inch	Concrete	0.013	45.78	0.45	6,364.48	6,364.36	6,364.48	6,364.36	6,367.48	6,367.36	1.02	0.97	6,367.88	6,367.63	6.86	34.15	48.52
P-01-4	01-4	01-3	Circular	36 inch	Concrete	0.013	17.68	97.50	6,364.36	6,364.31	6,364.36	6,364.31	6,367.36	6,367.31	0.97	1.08	6,367.53	6,367.41	7.96	35.47	56.28
P-01-3	01-3	01-2	Horizontal El	19x30 inch	Concrete	0.013	120.04	81.59	6,364.31	6,363.94	6,364.31	6,362.78	6,365.91	6,365.54	2.48	3.13	6,366.85	6,365.99	6.44	41.86	63.71
P-01-2	01-2	01-1	Circular	42 inch	Concrete	0.013	148.06	91.93	6,362.78	6,361.67	6,362.78	6,355.20	6,365.28	6,365.17	2.39	4.46	6,365.28	6,364.46	9.88	87.11	63.44
P-03-1	03-1	01-6	Circular	18 inch	Concrete	0.013	26.87	61.98	6,366.00	6,365.85	6,366.00	6,364.90	6,367.50	6,367.35	12.05	2.26	6,368.64	6,368.38	5.77	7.85	10.20
P-02-4	02-4	02-3	Circular	18 inch	Concrete	0.013	4.67	1.51	6,364.80	6,364.77	6,364.80	6,364.47	6,366.30	6,366.27	1.21	1.23	6,365.70	6,365.71	5.01	8.42	5.17
P-36	01-3a	01-3	Circular	24 inch	Concrete	0.013	23.16	0.00	6,364.50	6,364.38	6,363.38	6,364.31	6,366.50	6,366.38	0.88	2.01	6,367.09	6,367.08	1.69	16.28	5.30
P-37	01-1	01-0	Circular	30 inch	Concrete	0.013	85.00	2.21	6,361.67	6,358.81	6,355.20	6,358.00	6,364.17	6,361.31	5.46	1.32	6,363.61	6,362.07	15.63	150.47	81.39
P-39	01-0	01-00	Circular	30 inch	Concrete	0.013	282.00	0.00	6,358.51	6,356.01	6,358.00	6,352.96	6,361.01	6,358.51	1.62	0.73	6,362.01	6,359.24	8.28	77.24	81.27

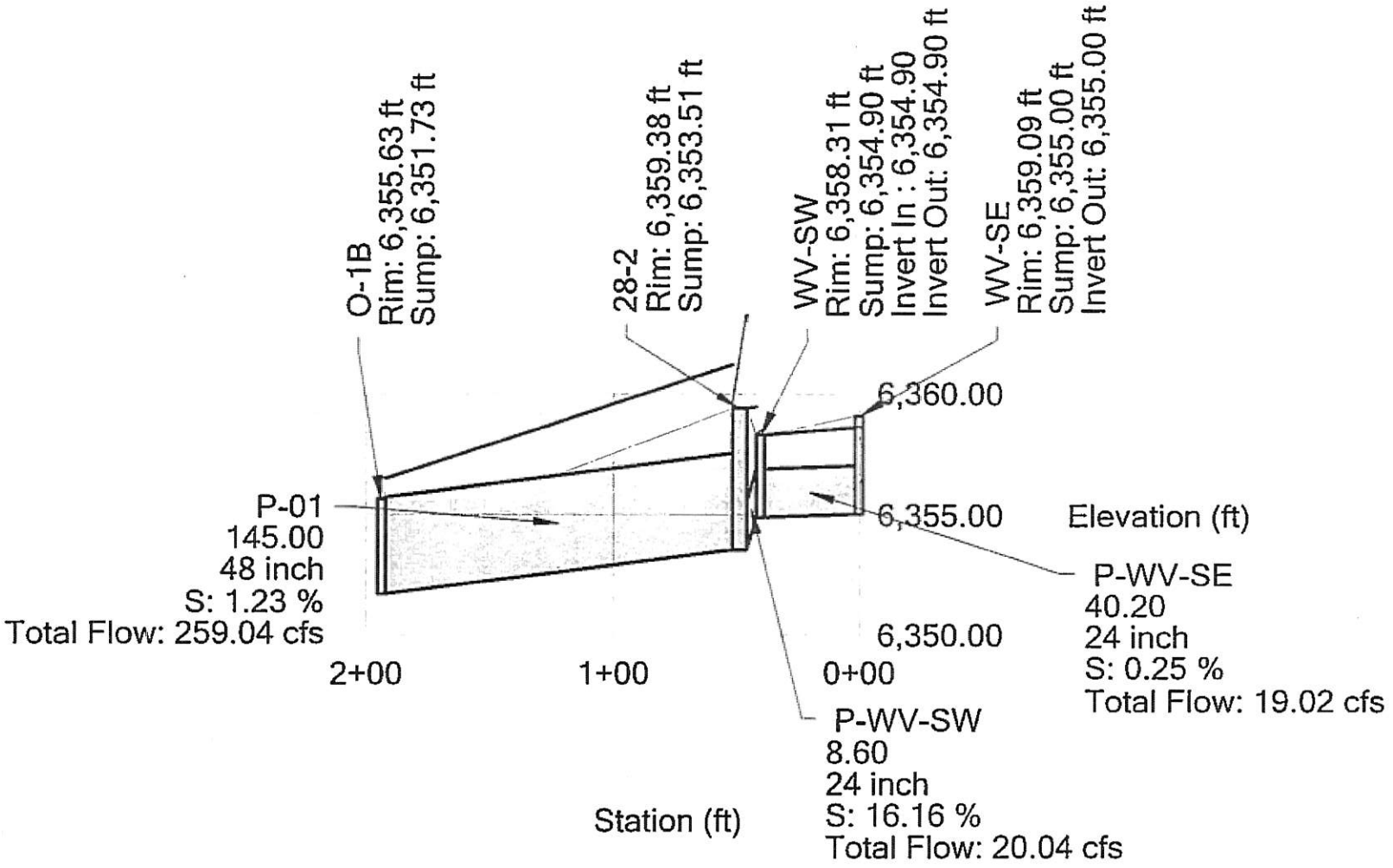
Scenario: One Hundred Year

Table D - Junction Report

Label	Description	Structure Diameter (ft)	Ground Elevation (ft)	Sump Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total Flow (cfs)
38-1	Proposed Manhole Connection to Exis	6.00	6,354.39	6,348.79	true	6,354.39	6,349.88	6,349.86	7.68
36A		2.00	6,474.48	6,471.72	false	6,474.48	6,473.26	6,473.24	59.08
28-A		6.00	6,358.72	6,353.58	false	6,355.69	6,360.05	6,359.80	239.72
06-1		6.00	6,387.88	6,372.91	true	6,387.88	6,376.92	6,376.89	119.67
28-2	Existing Manhole	6.00	6,359.38	6,353.51	true	6,359.38	6,363.25	6,359.38	259.04
28-1	Existing Manhole	7.00	6,361.91	6,356.00	false	6,361.75	6,362.93	6,361.90	160.47
WV-4	Existing Junction	4.00	6,377.50	6,371.37	false	6,377.50	6,375.22	6,374.96	149.71
WV-3	Existing Wye	6.00	6,383.50	6,376.02	false	6,383.50	6,378.61	6,378.60	67.87
09-1		6.00	6,403.04	6,382.34	true	6,403.04	6,383.13	6,383.13	6.87
DP-7		4.00	6,401.70	6,396.00	false	6,401.70	6,400.58	6,400.54	8.60
DP-8		4.00	6,400.70	6,393.10	false	6,400.70	6,396.93	6,396.50	40.68
HD-E1	Pipe Connection	1.25	6,400.80	6,396.40	false	6,400.80	6,400.84	6,400.80	5.00
37-2	Existing MH	6.00	6,399.77	6,381.46	true	6,399.77	6,391.79	6,391.23	41.68
DP-5		4.00	6,400.50	6,395.70	false	6,400.50	6,396.05	6,396.02	1.00
21-1		5.00	6,403.93	6,384.17	false	6,403.93	6,384.86	6,384.85	4.29
21-2		5.00	6,404.05	6,384.40	true	6,404.05	6,385.08	6,385.08	4.29
01-00		10.00	6,359.24	6,352.96	true	6,359.24	6,359.27	6,359.24	80.53
01-0		10.00	6,362.63	6,358.00	true	6,362.63	6,362.07	6,362.01	81.27
01-1		7.00	6,369.63	6,355.20	true	6,369.63	6,364.12	6,363.81	81.39
01-2		6.00	6,368.67	6,362.78	true	6,368.67	6,365.99	6,365.28	63.44
01-6		7.00	6,369.61	6,364.90	true	6,369.61	6,368.34	6,368.33	41.47
01-9	Connection to Existing Home Depot In	5.00	6,379.63	6,372.78	true	6,379.63	6,374.32	6,374.31	22.62
02-1		4.00	6,368.82	6,361.39	true	6,368.82	6,364.51	6,364.28	26.46

Profile: Prince Inlets

Scenario: One Hundred Year



FINAL
DRAINAGE REPORT AND PLAN
FOR
I-25 NISSAN PRE-OWNED CAR DEALERSHIP
AMERICAN FURNITURE AT WOODMAN RD. FIL. NO. 1

February, 2003

Leigh & Whitehead Associates, Inc.
CONSULTING CIVIL ENGINEERS & SURVEYORS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909-5061

LWA Project No. 03009.64

parking for prospective car purchasers along with a display area of pre-owned and some new vehicles. Basic improvements to the I-25 off-ramp and Woodmen Road along the north are currently in the process of being constructed by the Colorado Department of Highways. Anticipated completion is unknown at this time. Vincent Drive on the east, is an existing City of Colorado Springs street, and is currently fully developed. Runoff from the Woodmen Road and I-25 off-ramp will not enter this subdivision. This development will not impact the I-25 Woodmen Road improvements.

This building's roof drains will be routed underground through 8" under drain pipes that will outlet in the appropriate parking and drive area. The location of the underground pipes and release locations are shown on the attached Drainage Plan.

Basin Characteristics:

This site was divided into two major basins delineated on the attached Drainage Plan as Basin A and Basin B. Basin A is the easterly half of this site, and was divided into two sub-basins. Sub-basin OS-A-1 located east of this property between Woodmen Road and Vincent Drive is a small, landscaped grass area that directs runoff westerly to this property. Sub-Basin OS A-1 contains 0.13 acres and generates a peak flow of 0.1 cfs for the 5-year event and 0.4 cfs for the 100-year event. These flows are directed to this site via sheetflow to a proposed 5' D10R inlet in a sump condition. The location of this inlet is shown on the attached proposed drainage plan. Sub-Basin A-2 is the easterly half of this property and directs runoff easterly and northerly to the previously mentioned 5' D10R, located in a sump condition along the easterly edge of the parking area. Sub-Basin A-2 contains 0.67 acres and generates a peak flow of 3.1 cfs for the 5-year event and 5.7 cfs for the 100-year event. Basin A has a total area of 0.80 acres and generates a peak flow of 3.3 cfs for the 5-year event, and 6.1 cfs for the 100-year event. Runoff from this inlet is conveyed easterly to the existing 60" RCP via a proposed 18" RCP at a minimum of 1% slope. The end of the existing 60" RCP will have a Type I manhole constructed. This manhole will be 5½' wide by 7½' long. These flows will then be conveyed southeasterly under Vincent Road to an appropriate outlet point, and then to Cottonwood Creek,

located south of this property.

Basin B is the westerly half of this site and contains 0.75 acres. Peak runoff exiting Basin B is 3.5 cfs for the 5-year event and 6.4 cfs for the 100-year event. Runoff is directed westerly and southerly to a curb opening located at the southwest corner of the parking lot. Runoff will be conveyed southwesterly through a 9' wide curb opening to a proposed 9' wide x 1 ½' deep rock rip-rap "V" swale to the previously mentioned undefined existing swale within the I-25 off-ramp right- of- way, and west of the Loaf and Jug. Flows will then be conveyed southerly within this swale to an existing 24" RCP located in the southwesterly portion of Lot 4. Currently, this existing swale is undefined and initial observations indicate that runoff ponds south of this site. Proposed conditions for this swale would be to construct an asphalt swale 15' wide with a 2' wide concrete pan that will be routed southerly to an existing 24" RCP located on the north edge of the American Storage Subdivision. This asphalt swale will be located adjacent to the existing I-25 exit ramp retaining wall. This paved swale will be 15' wide with 12:1 side slopes and a 2' wide concrete pan located in the center of the swale. The swale will be 0.63' deep and peak flow exiting the Nissan site is 6.4 cfs for the 100-year event. This results in a water surface depth of 0.37'. This asphalt swale will be directed southerly to lots 3 and 4 of the American Furniture Subdivision. The exact details of this swale will be shown on the construction documents and drainage plan for the I-25 Nissan New Car Dealership, Lots 3 and 4, American Furniture at Woodmen Road, Filing No. 1. The proposed/existing grass swale along the west side of the Loaf and Jug is part of the requirements as outlined in the preliminary/final drainage report for Loaf and Jug prepared by ADP Inc., and accepted by the City of Colorado Springs in January, 2001. Currently, this swale is not functioning as designed. This could be related to the continued construction of the I-25 exit ramp. A portion of the proposed swale and its location is shown on the attached Proposed Drainage Plan for I-25 Nissan. If the I-25 Nissan New Car Dealership located on Lots 3 and 4 of this subdivision is not developed in a timely manner, and it appears that the runoff from the Pre-Owned Dealership is creating problems adjacent to the I-25 exit ramp, the improvements outlined in this report will be constructed in a timely manner to prevent possible erosion and undercutting of the existing I-25 exit ramp retaining wall. These

03009.WK4

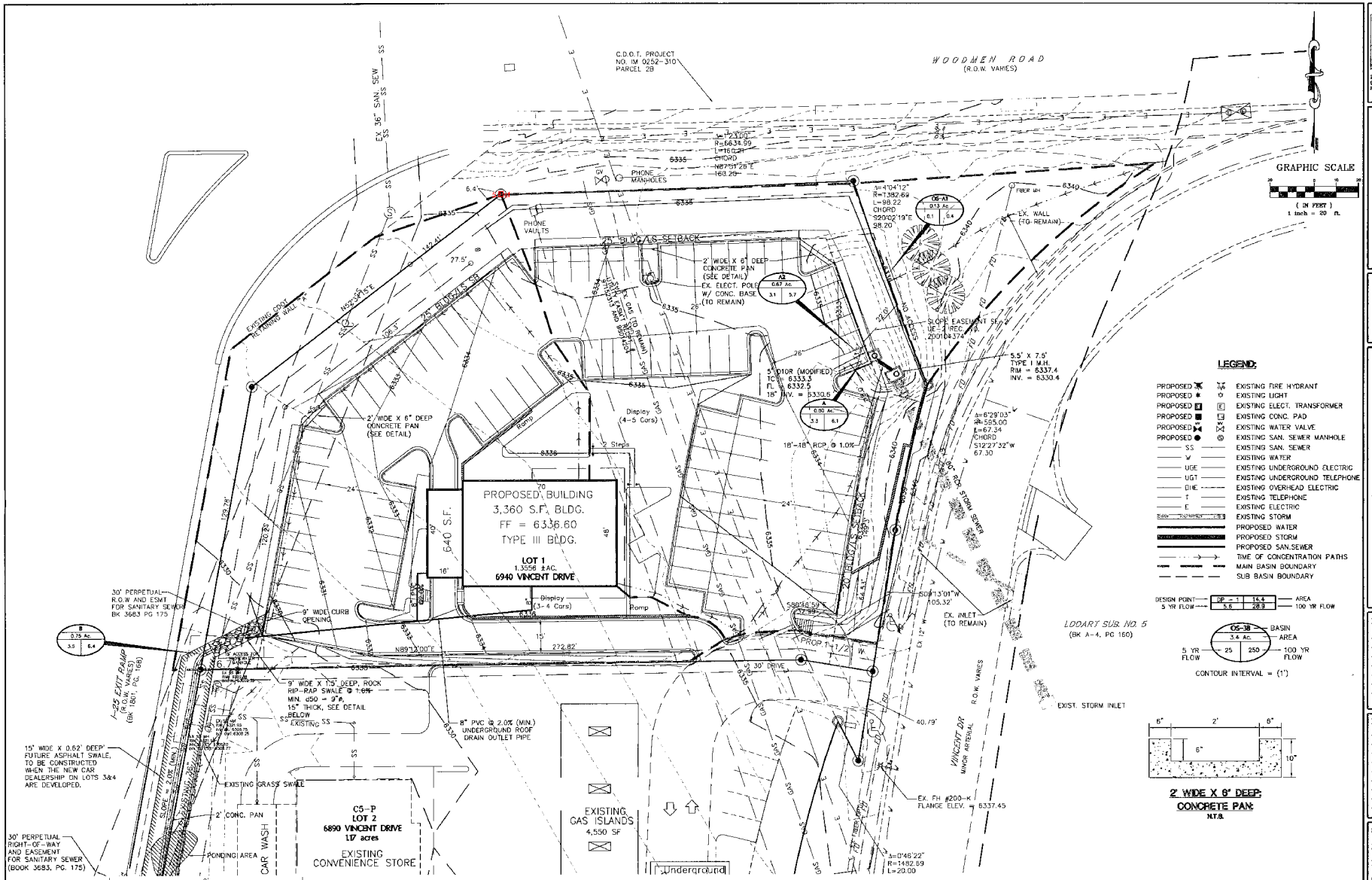
RUNOFF COMPUTATIONS RATIONAL METHOD

AMERICAN FURNITURE AT WOODMAN ROAD FI. NO. 1
I-25 NISSAN PRE-OWNED CAR DEALERSHIP
VINCENT DRIVE, WOODMAN ROAD & I-25
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES,INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A: LWA # 03009.64 06-Feb-2003
PROPOSED CONDITIONS

BASIN	AREA	SOIL TYPE	C 5 / C 100	GEOMETRY LENGTH / SLOPE	HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
OS - A1	0.13	B	0.25	160.0	28.4	7.78		7.78	4.47	0.1		
		97	0.35	17.75		6.87		6.87	8.17		0.4	
A2	0.67	B	0.90	10.0	0.2	0.94	4.44	1.94	5.20	3.1		
		97	0.95	2.00		0.71	1.00	1.71	9.00		5.7	
A	0.80	B	0.79	10.0	0.2	1.46	4.44	2.46	5.20	3.3		
		97	0.85	2.00		1.18	1.00	2.18	9.00		6.1	
B	0.75	B	0.90	10.0	0.2	0.94	4.75	2.40	5.20	3.5		
		97	0.95	2.00		0.71	1.46	2.17	9.00		6.4	



ENGINEERS
PLANNERS
SURVEYORS
LEIGH WHITEHEAD & ASSOCIATES
2729 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909
PHONE (719) 636-6178 • FAX (719) 636-6190

SHEET TITLE: PROPOSED DRAINAGE PLAN

PROJECT NAME: I-25 NISSAN PRE - OWNED CAR DEALERSHIP
WOODMAN RD. & VINCENT DR.

BENCHMARK:
TOP OF CAP, SOUTHWEST CORNER, LOT 1,
ELEV. = 6327.96

REVISIONS:

SCALE: 1" =20'
DATE: 02/25/03
DRAWN BY: KEM
CHECKED BY: CMB/SCJ

SHEET NO:
1 OF 1

PROJECT NO: 03009
DRAWING NAME: NISSAN
VIEW: PP-DRAINAGE

Projects\03009\dwg\NISSAN.dwg, 02/27/03 02:40:01 PM

DrainPlan4

Appendix C

Hydrologic Calculations

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

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer: Casey Visscher
Company: Galloway & Co.
Date: December 20, 2018
Project: Crest at Woodmen - MDDP Amendment
Location: Colorado Springs, CO

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
Receiving Pervious Area Soil Type	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	2.470	2.480	3.810	3.440	0.330	3.330	2.860	0.600	1.330	2.750	3.800	0.240	5.000	0.050
Directly Connected Impervious Area (DCIA, acres)	2.347	1.334	3.139	3.296	0.330	3.164	2.720	0.600	1.305	2.607	3.606	0.240	4.750	0.050
Unconnected Impervious Area (UIA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.000	0.000
Separate Pervious Area (SPA, acres)	0.124	1.146	0.671	0.144	0.000	0.167	0.140	0.000	0.025	0.143	0.178	(0.016)	0.250	0.000
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V	V	V	V	V	V	V	V	V	V	V	V

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	2.470	2.480	3.810	3.440	0.330	3.330	2.860	0.600	1.330	2.750	3.800	0.240	5.000	0.050
Directly Connected Impervious Area (DCIA, %)	95.0%	53.8%	82.4%	95.8%	100.0%	95.0%	95.1%	100.0%	98.1%	94.8%	94.9%	100.0%	95.0%	100.0%
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	6.7%	0.0%	0.0%
Separate Pervious Area (SPA, %)	5.0%	46.2%	17.6%	4.2%	0.0%	5.0%	4.9%	0.0%	1.9%	5.2%	4.7%	-6.7%	5.0%	0.0%
A_R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
I_a Check	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
f / I for WQCV Event:	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
f / I for 5-Year Event:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
f / I for 100-Year Event:	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRF for 5-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	95.0%	53.8%	82.4%	95.8%	100.0%	95.0%	95.1%	100.0%	98.1%	94.8%	94.9%	100.0%	95.0%	100.0%
Effective Imperviousness for WQCV Event:	95.0%	53.8%	82.4%	95.8%	100.0%	95.0%	95.1%	100.0%	98.1%	94.8%	94.9%	100.0%	95.0%	100.0%
Effective Imperviousness for 5-Year Event:	95.0%	53.8%	82.4%	95.8%	100.0%	95.0%	95.1%	100.0%	98.1%	94.8%	94.9%	100.0%	95.0%	100.0%
Effective Imperviousness for 100-Year Event:	95.0%	53.8%	82.4%	95.8%	100.0%	95.0%	95.1%	100.0%	98.1%	94.8%	94.9%	100.0%	95.0%	100.0%
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.5%
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	90.8%
Total Site Effective Imperviousness for WQCV Event:	90.8%
Total Site Effective Imperviousness for 5-Year Event:	90.8%
Total Site Effective Imperviousness for 100-Year Event:	90.8%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

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

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer: Casey Visscher
Company: Galloway & Co.
Date: December 20, 2018
Project: Crest at Woodmen - MDDP Amendment
Location: Colorado Springs, CO

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	A15	A16	A17	A18	A19	A20	A21	A22	B1-1	B1-2	B2	B3-1	B3-2	B3-3
Receiving Pervious Area Soil Type	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Sandy Clay Loam	Loamy Sand	Loamy Sand	Sand	Loamy Sand	Loamy Sand
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	1.090	1.210	5.240	4.120	0.690	1.060	0.450	3.450	1.320	0.380	1.150	7.340	1.310	0.640
Directly Connected Impervious Area (DCIA, acres)	1.090	1.210	4.978	3.914	0.690	1.060	0.450	0.221	0.066	0.342	0.769	5.711	1.151	0.545
Unconnected Impervious Area (UIA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.000	0.000
Separate Pervious Area (SPA, acres)	0.000	0.000	0.262	0.206	0.000	0.000	0.000	3.229	1.254	0.038	0.365	1.613	0.159	0.095
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V	V	V	V	V	V	V	V	V	V	V	V

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	1.090	1.210	5.240	4.120	0.690	1.060	0.450	3.450	1.320	0.380	1.150	7.340	1.310	0.640
Directly Connected Impervious Area (DCIA, %)	100.0%	100.0%	95.0%	95.0%	100.0%	100.0%	100.0%	6.4%	5.0%	90.0%	66.9%	77.8%	87.9%	85.2%
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.2%	0.0%	0.0%
Separate Pervious Area (SPA, %)	0.0%	0.0%	5.0%	5.0%	0.0%	0.0%	0.0%	93.6%	95.0%	10.0%	31.7%	22.0%	12.1%	14.8%
A_R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
I_a Check	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
f / I for WQCV Event:	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	0.6	3.2	3.2	9.8	3.2	3.2
f / I for 5-Year Event:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.6	0.5	0.5
f / I for 100-Year Event:	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.4	0.4	0.6	0.4	0.4
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRF for 5-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	100.0%	100.0%	95.0%	95.0%	100.0%	100.0%	100.0%	6.4%	5.0%	90.0%	66.9%	77.8%	87.9%	85.2%
Effective Imperviousness for WQCV Event:	100.0%	100.0%	95.0%	95.0%	100.0%	100.0%	100.0%	6.4%	5.0%	90.0%	66.9%	77.8%	87.9%	85.2%
Effective Imperviousness for 5-Year Event:	100.0%	100.0%	95.0%	95.0%	100.0%	100.0%	100.0%	6.4%	5.0%	90.0%	66.9%	77.8%	87.9%	85.2%
Effective Imperviousness for 100-Year Event:	100.0%	100.0%	95.0%	95.0%	100.0%	100.0%	100.0%	6.4%	5.0%	90.0%	66.9%	77.8%	87.9%	85.2%
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	75.4%
Total Site Effective Imperviousness for WQCV Event:	75.4%
Total Site Effective Imperviousness for 5-Year Event:	75.4%
Total Site Effective Imperviousness for 100-Year Event:	75.4%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

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

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer: Scott Brown
Company: Galloway & Co.
Date: December 20, 2018
Project: Crest at Woodmen - MDDP Amendment
Location: Colorado Springs, CO

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	B3-4	B4-1	B4-2	B5-1	B5-2	B5-3	B6	B7	B7-1	B8	B9	B9-1	B10	B11
Receiving Pervious Area Soil Type	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Sand	Loamy Sand	Loamy Sand	Loamy Sand
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.920	1.690	0.870	0.510	0.550	0.160	3.030	2.510	0.550	0.900	0.960	0.720	1.050	1.650
Directly Connected Impervious Area (DCIA, acres)	0.828	1.606	0.827	0.434	0.474	0.141	2.727	0.961	0.028	0.683	0.684	0.648	0.918	1.290
Unconnected Impervious Area (UIA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.000	0.000
Separate Pervious Area (SPA, acres)	0.092	0.085	0.044	0.076	0.076	0.019	0.303	1.549	0.523	0.217	0.260	0.056	0.132	0.360
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V	V	V	V	V	V	V	V	V	V	V	V

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0.920	1.690	0.870	0.510	0.550	0.160	3.030	2.510	0.550	0.900	0.960	0.720	1.050	1.650
Directly Connected Impervious Area (DCIA, %)	90.0%	95.0%	95.0%	85.1%	86.2%	88.1%	90.0%	38.3%	5.0%	75.9%	71.3%	90.0%	87.4%	78.2%
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	2.2%	0.0%	0.0%
Separate Pervious Area (SPA, %)	10.0%	5.0%	5.0%	14.9%	13.8%	11.9%	10.0%	61.7%	95.0%	24.1%	27.0%	7.8%	12.6%	21.8%
A_R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
I_a Check	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
f / I for WQCV Event:	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	9.8	3.2	3.2	3.2
f / I for 5-Year Event:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5
f / I for 100-Year Event:	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.4	0.4
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRF for 5-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	90.0%	95.0%	95.0%	85.1%	86.2%	88.1%	90.0%	38.3%	5.0%	75.9%	71.3%	90.0%	87.4%	78.2%
Effective Imperviousness for WQCV Event:	90.0%	95.0%	95.0%	85.1%	86.2%	88.1%	90.0%	38.3%	5.0%	75.9%	71.3%	90.0%	87.4%	78.2%
Effective Imperviousness for 5-Year Event:	90.0%	95.0%	95.0%	85.1%	86.2%	88.1%	90.0%	38.3%	5.0%	75.9%	71.3%	90.0%	87.4%	78.2%
Effective Imperviousness for 100-Year Event:	90.0%	95.0%	95.0%	85.1%	86.2%	88.1%	90.0%	38.3%	5.0%	75.9%	71.3%	90.0%	87.4%	78.2%
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.0%	0.0%	1.4%	0.0%	0.1%	0.0%	0.0%	0.0%
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	76.2%
Total Site Effective Imperviousness for WQCV Event:	76.2%
Total Site Effective Imperviousness for 5-Year Event:	76.2%
Total Site Effective Imperviousness for 100-Year Event:	76.2%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

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

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

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

Worksheet Protected

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

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer: Scott Brown
Company: Galloway & Co.
Date: December 20, 2018
Project: Crest at Woodmen - MDDP Amendment
Location: Colorado Springs, CO

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	B11-1	B12	B12-1	OS1	OS2	OS3	OS4							
Receiving Pervious Area Soil Type	Loamy Sand	Loamy Sand	Loamy Sand	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Loamy Sand	Loamy Sand	Loamy Sand	Sand	Loamy Sand	Loamy Sand	Loamy Sand
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	2.000	0.770	0.690	1.290	0.540	0.760	2.050							
Directly Connected Impervious Area (DCIA, acres)	0.100	0.687	0.621	1.196	0.217	0.447	0.654	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Unconnected Impervious Area (UIA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016	0.000	0.000
Separate Pervious Area (SPA, acres)	1.900	0.083	0.069	0.094	0.323	0.313	1.396	0.000	0.000	0.000	(0.016)	(0.016)	0.000	0.000
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V	V	V	V	V	V	V	V	V	V	V	V
								MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	2.000	0.770	0.690	1.290	0.540	0.760	2.050							
Directly Connected Impervious Area (DCIA, %)	5.0%	89.2%	90.0%	92.7%	40.1%	58.8%	31.9%							
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%							
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%							
Separate Pervious Area (SPA, %)	95.0%	10.8%	10.0%	7.3%	59.9%	41.2%	68.1%							
A_R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
I_a Check	1.000	1.000	1.000	1.000	1.000	1.000	1.000							
f / I for WQCV Event:	3.2	3.2	3.2	0.6	0.6	0.6	0.6							
f / I for 5-Year Event:	0.5	0.5	0.5	0.3	0.3	0.3	0.3							
f / I for 100-Year Event:	0.4	0.4	0.4	0.2	0.2	0.2	0.2							
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
IRF for 5-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	5.0%	89.2%	90.0%	92.7%	40.1%	58.8%	31.9%							
Effective Imperviousness for WQCV Event:	5.0%	89.2%	90.0%	92.7%	40.1%	58.8%	31.9%							
Effective Imperviousness for 5-Year Event:	5.0%	89.2%	90.0%	92.7%	40.1%	58.8%	31.9%							
Effective Imperviousness for 100-Year Event:	5.0%	89.2%	90.0%	92.7%	40.1%	58.8%	31.9%							
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A							
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A							
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%							
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	48.4%
Total Site Effective Imperviousness for WQCV Event:	48.4%
Total Site Effective Imperviousness for 5-Year Event:	48.4%
Total Site Effective Imperviousness for 100-Year Event:	48.4%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

COMPOSITE % IMPERVIOUS CALCULATIONS - HISTORIC

Subdivision: Looart Subdivion No. 6
Location: CO, Colorado Springs

Project Name: The Crest at Woodmen - MDDP Amendment
Project No.: RLM02.02
Calculated By: SMB
Checked By: JA
Date: 9/12/18

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs/Commercial			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
Historic											
W2a	11.95	100	0.42	3.56	5	11.52	4.80	90	0.00	0.00	8.4
W2b	2.56	100	1.45	56.90	5	1.10	2.20	90	0.00	0.00	59.1
W2c	1.56	100	0.00	0.00	5	0.00	0.00	90	1.56	90.00	90.0
W2d	5.07	100	2.50	49.35	5	2.57	2.50	90	0.00	0.00	51.9
W2e	4.23	100	2.71	64.09	5	1.52	1.80	90	0.00	0.00	65.9
W2f	4.76	100	0.00	0.00	5	0.00	0.00	90	4.76	90.00	90.0
W2g	10.13	100	4.34	42.87	5	5.79	2.90	90	0.00	0.00	45.8
W2h	3.49	100	0.34	9.76	5	3.15	4.50	90	0.00	0.00	14.3
W2i	5.28	100	2.59	49.07	5	2.69	2.50	90	0.00	0.00	51.6
W2j	0.74	100	0.00	0.00	5	0.00	0.00	90	0.74	90.00	90.0
W2k	0.55	100	0.00	0.00	5	0.00	0.00	90	0.55	90.00	90.0
W2l	6.01	100	0.00	0.00	5	0.00	0.00	90	6.01	90.00	90.0
W2m	10.49	100	2.03	19.35	5	8.46	4.00	90	0.00	0.00	23.4
W2n	10.27	100	2.38	23.22	5	7.88	3.80	90	0.00	0.00	27.0
W2o	4.09	100	0.00	0.00	5	4.09	5.00	90	0.00	0.00	5.0
OS3	2.12	100	0.63	29.72	5	1.49	3.50	90	0.00	0.00	33.2

STANDARD FORM SF-2
TIME OF CONCENTRATION - HISTORIC

Subdivision: Looart Subdivion No. 6
Location: CO, Colorado Springs

Project Name: The Crest at Woodmen - MDDP Amendment
Project No.: RLM02.02
Calculated By: SMB
Checked By: JA
Date: 9/12/18

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
W2a	11.95	B	8.4	0.40	0.13	240	6.0	15.1	2005	1.8	15.0	2.0	16.8	32.0	2245.0	22.5	22.5
W2b	2.56	B	59.1	0.56	0.41	20	18.0	2.2	465	2.7	20.0	3.3	2.4	4.5	485.0	12.7	5.0
W2c	1.56	B	90.0	0.81	0.73												5.0
W2d	5.07	B	51.9	0.53	0.36	75	6.0	6.5	475	3.4	20.0	3.7	2.1	8.6	550.0	13.1	8.6
W2e	4.23	B	65.9	0.60	0.46	75	5.0	5.9	765	2.8	20.0	3.3	3.8	9.7	840.0	14.7	9.7
W2f	4.76	B	90.0	0.81	0.73												5.0
W2g	10.13	B	45.8	0.51	0.33	25	10.0	3.3	920	2.5	20.0	3.2	4.8	8.1	945.0	15.3	8.1
W2h	3.49	B	14.3	0.42	0.16	165	7.4	11.4	990	2.0	15.0	2.1	7.8	19.1	1155.0	16.4	16.4
W2i	5.28	B	51.6	0.53	0.36	195	24.0	6.6	240	3.3	15.0	2.7	1.5	8.0	435.0	12.4	8.0
W2j	0.74	B	90.0	0.81	0.73												5.0
W2k	0.55	B	90.0	0.81	0.73												5.0
W2l	6.01	B	90.0	0.81	0.73												5.0
W2m	10.49	B	23.4	0.45	0.22	40	14.0	4.2	965	4.0	15.0	3.0	5.4	9.6	1005.0	15.6	9.6
W2n	10.27	B	27.0	0.46	0.23	580	2.7	27.6	320	2.2	15.0	2.2	2.4	30.0	900.0	15.0	15.0
W2o	4.09	B	5.0	0.38	0.10	60	22.0	5.1	1000	3.0	15.0	2.6	6.4	11.5	1060.0	15.9	11.5
OS3	2.12	B	33.2	0.48	0.26	150	25.0	6.4	530	3.0	20.0	3.5	2.5	9.0	680.0	13.8	9.0
OS4	0.80	B	83.8	0.74	0.64												5.0
			47.05														

NOTES:

$T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33)$, S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - HISTORIC

(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 6
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: The Crest at Woodmen - MDDP Amendment
Project No.: RLM02.02
Calculated By: SMB
Checked By: JA
Date: 9/12/18

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	a	W2a	11.95	0.13	22.5	1.55	2.91	4.5													
	b	W2b	2.56	0.41	5.0	1.05	5.17	5.4													
	c	W2c	1.56	0.73	5.0	1.14	5.17	5.9													
	d	W2d	5.07	0.36	8.6	1.82	4.35	7.9													
	e	W2e	4.23	0.46	9.7	1.95	4.17	8.1													
	f	W2f	4.76	0.73	5.0	3.47	5.17	17.9													
	g	W2g	10.13	0.33	8.1	3.34	4.44	14.8	22.5	14.32	2.91	41.7									Basins W2a-W2g
	h	W2h	3.49	0.16	16.4	0.56	3.39	1.9													
	i	W2i	5.28	0.36	8.0	1.90	4.46	8.5													
	j	W2j	0.74	0.73	5.0	0.54	5.17	2.8													
	k	W2k	0.55	0.73	5.0	0.40	5.17	2.1													
	l	W2l	6.01	0.73	5.0	4.39	5.17	22.7													
		OS3	2.12	0.26	9.0	0.55	4.29	2.4													
		OS4	0.80	0.64	5.0	0.51	5.17	2.6	9.0	1.06	4.29	4.5									Basins OS3-OS4

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - HISTORIC

(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 6
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: The Crest at Woodmen - MDDP Amendment
Project No.: RLM02.02
Calculated By: SMB
Checked By: JA
Date: 9/12/18

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	m	W2m	10.49	0.22	9.6	2.31	4.19	9.7													
	n	W2n	10.27	0.23	15.0	2.36	3.52	8.3	16.4	13.52	3.39	45.8									Basins W2a-W2n, OS3-OS4
	o	W2o	4.09	0.10	11.5	0.41	3.92	1.6													

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - HISTORIC

(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 6
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: The Crest at Woodmen - MDDP Amendment
Project No.: RLM02.02
Calculated By: SMB
Checked By: JA
Date: 9/12/18

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	a	W2a	11.95	0.40	22.5	4.78	4.89	23.4													
	b	W2b	2.56	0.56	5.0	1.43	8.68	12.4													
	c	W2c	1.56	0.81	5.0	1.27	8.68	11.0													
	d	W2d	5.07	0.53	8.6	2.69	7.31	19.7													
	e	W2e	4.23	0.60	9.7	2.54	7.00	17.8													
	f	W2f	4.76	0.81	5.0	3.85	8.68	33.4													
	g	W2g	10.13	0.51	8.1	5.17	7.46	38.6	22.5	21.73	4.89	106.3									Basins W2a-W2g
	h	W2h	3.49	0.42	16.4	1.47	5.68	8.3													
	i	W2i	5.28	0.53	8.0	2.80	7.48	20.9													
	j	W2j	0.74	0.81	5.0	0.60	8.68	5.2													
	k	W2k	0.55	0.81	5.0	0.45	8.68	3.9													
	l	W2l	6.01	0.81	5.0	4.87	8.68	42.3													
		OS3	2.12	0.48	9.0	1.02	7.20	7.3													
		OS4	0.80	0.74	5.0	0.59	8.68	5.1	9.0	1.61	7.20	11.6									Basins OS3-OS4

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - HISTORIC

(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 6
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: The Crest at Woodmen - MDDP Amendment
Project No.: RLM02.02
Calculated By: SMB
Checked By: JA
Date: 9/12/18

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	m	W2m	10.49	0.45	9.6	4.72	7.04	33.2													
	n	W2n	10.27	0.46	15.0	4.72	5.91	27.9	16.4	21.24	5.68	120.6									Basins W2a-W2n, OS3-OS4
	o	W2o	4.09	0.38	11.5	1.55	6.58	10.2													

COMPOSITE % IMPERVIOUS CALCULATIONS - PROPOSED

Subdivision: Realm Realty
Location: CO, Colorado Springs

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs/Commercial			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
B1-1	1.32	100	0.00	0.0	5	1.32	5.0	90	0.00	0.0	5.0
B1-2	0.38	100	0.00	0.0	5	0.00	0.0	90	0.38	90.0	90.0
B2	1.15	100	0.75	65.2	5	0.40	1.7	90	0.00	0.0	66.9
B3-1	7.34	100	5.62	76.6	5	1.72	1.2	90	0.00	0.0	77.8
B3-2	1.31	100	1.14	87.3	5	0.17	0.6	90	0.00	0.0	87.9
B3-3	0.64	100	0.54	84.4	5	0.10	0.8	90	0.00	0.0	85.2
B3-4	0.92	100	0.00	0.0	5	0.00	0.0	90	0.92	90.0	90.0
B4-1	1.69	100	0.00	0.0	5	0.00	0.0	95	1.69	95.0	95.0
B4-2	0.87	100	0.00	0.0	5	0.00	0.0	95	0.87	95.0	95.0
B5-1	0.51	100	0.43	84.3	5	0.08	0.8	90	0.00	0.0	85.1
B5-2	0.55	100	0.47	85.5	5	0.08	0.7	90	0.00	0.0	86.2
B5-3	0.16	100	0.14	87.5	5	0.02	0.6	90	0.00	0.0	88.1
B6	3.03	100	0.00	0.0	5	0.00	0.0	90	3.03	90.0	90.0
B7	2.51	100	0.88	35.1	5	1.63	3.2	90	0.00	0.0	38.3
B7-1	0.55	100	0.00	0.0	5	0.55	5.0	90	0.00	0.0	5.0
B8	0.90	100	0.67	74.4	6	0.23	1.5	90	0.00	0.0	75.9
B9	0.96	100	0.67	69.8	5	0.29	1.5	90	0.00	0.0	71.3
B9-1	0.72	100	0.00	0.0	5	0.00	0.0	90	0.72	90.0	90.0
B10	1.05	100	0.91	86.7	5	0.14	0.7	90	0.00	0.0	87.4
B11	1.65	100	1.03	62.4	5	0.35	1.1	90	0.27	14.7	78.2
B11-1	2.00	100	0.00	0.0	5	2.00	5.0	90	0.00	0.0	5.0
B12	0.77	100	0.53	68.8	5	0.07	0.5	90	0.17	19.9	89.2
B12-1	0.69	100	0.00	0.0	5	0.00	0.0	90	0.69	90.0	90.0
OS1	1.29	100	1.19	92.3	5	0.10	0.4	90	0.00	0.0	92.7
OS2	0.54	100	0.20	37.0	5	0.34	3.1	90	0.00	0.0	40.1
OS3	0.76	100	0.43	56.6	5	0.33	2.2	90	0.00	0.0	58.8
OS4	2.05	100	0.58	28.3	5	1.47	3.6	90	0.00	0.0	31.9
A1	2.47	100	0.00	0.0	5	0.00	0.0	95	2.47	95.0	95.0

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs/Commercial			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A2	2.48	100	1.13	45.6	5	1.19	2.4	90	0.16	5.8	53.8
A3	3.81	100	2.86	75.1	5	0.68	0.9	90	0.27	6.4	82.4
A4	3.44	100	2.01	58.4	5	0.00	0.0	90	1.43	37.4	95.8
A5	0.33	100	0.33	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A6	3.33	100	0.00	0.0	5	0.00	0.0	95	3.33	95.0	95.0
A7	2.86	100	1.44	50.4	5	0.00	0.0	90	1.42	44.7	95.1
A8	0.60	100	0.60	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A9	1.33	100	0.80	60.2	5	0.00	0.0	95	0.53	37.9	98.1
A10	2.75	100	1.32	48.0	5	0.00	0.0	90	1.43	46.8	94.8
A11	3.80	100	1.83	48.2	5	0.00	0.0	90	1.97	46.7	94.9
A12	0.24	100	0.24	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A13	5.00	100	0.00	0.0	5	0.00	0.0	95	5.00	95.0	95.0
A14	0.05	100	0.05	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A15	1.09	100	1.09	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A16	1.21	100	1.21	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A17	5.24	100	0.00	0.0	5	0.00	0.0	95	5.24	95.0	95.0
A18	4.12	100	0.00	0.0	5	0.00	0.0	95	4.12	95.0	95.0
A19	0.69	100	0.69	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A20	1.06	100	1.06	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A21	0.45	100	0.45	100.0	5	0.00	0.0	90	0.00	0.0	100.0
A22	3.45	100	0.05	1.5	5	3.40	4.9	90	0.00	0.0	6.4

STANDARD FORM SF-2
TIME OF CONCENTRATION - PROPOSED

Subdivision: Realm Realty
Location: CO, Colorado Springs

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
B1-1	1.32	D	5.0	0.52	0.18	80	8.0	7.5	300	5.0	15.0	3.4	1.5	9.0	380.0	12.1	9.0
B1-2	0.38	B	90.0	0.81	0.73												10.0
B2	1.15	B	66.9	0.60	0.46	50	8.0	4.1	700	3.5	20.0	3.7	3.1	7.3	750.0	14.2	7.3
B3-1	7.34	A	77.8	0.63	0.54	100	25.0	3.5	750	2.0	20.0	2.8	4.4	7.9	850.0	14.7	7.9
B3-2	1.31	B	87.9	0.78	0.70	50	2.0	4.1	200	4.0	20.0	4.0	0.8	4.9	250.0	11.4	5.0
B3-3	0.64	B	85.2	0.75	0.66	50	25.0	1.9	150	4.0	20.0	4.0	0.6	2.6	200.0	11.1	5.0
B3-4	0.92	B	90.0	0.81	0.73												10.0
B4-1	1.69	B	95.0	0.88	0.81	80	2.0	3.8	280	2.0	20.0	2.8	1.6	5.4	360.0	12.0	5.4
B4-2	0.87	B	95.0	0.88	0.81	25	2.0	2.1	475	2.0	20.0	2.8	2.8	4.9	500.0	12.8	5.0
B5-1	0.51	B	85.1	0.75	0.66	20	2.0	2.9	500	4.2	20.0	4.1	2.0	4.9	520.0	12.9	5.0
B5-2	0.55	B	86.2	0.76	0.67	10	2.0	2.0	250	2.0	20.0	2.8	1.5	3.4	260.0	11.4	5.0
B5-3	0.16	B	88.1	0.79	0.70	10	2.0	1.8	140	2.0	20.0	2.8	0.8	2.7	150.0	10.8	5.0
B6	3.03	B	90.0	0.81	0.73												5.0
B7	2.51	B	38.3	0.49	0.29	25	2.0	5.9	360	3.0	20.0	3.5	1.7	7.6	385.0	12.1	7.6
B7-1	0.55	B	5.0	0.38	0.10	90	10.0	8.1	130	2.5	20.0	3.2	0.7	8.8	220.0	11.2	8.8
B8	0.90	B	75.9	0.66	0.55	20	2.0	3.6	500	4.2	20.0	4.1	2.0	5.6	520.0	12.9	5.6
B9	0.96	B	71.3	0.63	0.50	100	1.5	9.6	570	0.5	20.0	1.4	6.7	16.3	670.0	13.7	13.7
B9-1	0.72	B	90.0	0.81	0.73												5.0
B10	1.05	B	87.4	0.78	0.69	15	2.0	2.3	450	3.0	20.0	3.5	2.2	4.5	465.0	12.6	5.0
B11	1.65	B	78.2	0.68	0.57	50	2.0	5.4	380	3.0	20.0	3.5	1.8	7.3	430.0	12.4	7.3
B11-1	2.00	B	5.0	0.38	0.10	85	8.0	8.4	220	3.0	20.0	3.5	1.1	9.5	305.0	11.7	9.5
B12	0.77	B	89.2	0.80	0.72	10	1.0	2.2	325	3.0	20.0	3.5	1.6	3.8	335.0	11.9	5.0
B12-1	0.69	B	90.0	0.81	0.73												5.0
OS1	1.29	D	92.7	0.86	0.78	100	20.0	2.2	300	5.0	20.0	4.5	1.1	3.3	400.0	12.2	5.0
OS2	0.54	D	40.1	0.58	0.35	20	2.0	4.9	280	4.5	20.0	4.2	1.1	6.0	300.0	11.7	6.0
OS3	0.76	D	58.8	0.63	0.45	100	18.0	4.5	400	5.0	20.0	4.5	1.5	6.0	500.0	12.8	6.0
OS4	2.05	D	31.9	0.57	0.31	100	25.0	5.0	560	3.0	20.0	3.5	2.7	7.6	660.0	13.7	7.6
OS5	0.80	B	95.0	0.88	0.81												5.0
A1	2.47	B	95.0	0.88	0.81	100	5.0	3.1	440	3.0	20.0	3.5	2.1	5.2	540.0	13.0	5.2
A2	2.48	B	53.8	0.54	0.37	100	2.0	10.6	660	5.0	20.0	4.5	2.5	13.1	760.0	14.2	13.1
A3	3.81	B	82.4	0.72	0.62	90	6.0	4.6	525	1.0	20.0	2.0	4.4	9.0	615.0	13.4	9.0
A4	3.44	B	95.8	0.89	0.82	60	20.0	1.5	490	4.0	20.0	4.0	2.0	3.5	550.0	13.1	5.0
A5	0.33	B	100.0	0.96	0.90	10	1.0	1.2	700	3.0	20.0	3.5	3.4	4.5	710.0	13.9	5.0
A6	3.33	B	95.0	0.88	0.81	10	2.0	1.3	250	4.0	20.0	4.0	1.0	2.4	260.0	11.4	5.0
A7	2.86	B	95.1	0.88	0.81	10	1.0	1.7	550	1.5	20.0	2.4	3.7	5.4	560.0	13.1	5.4
A8	0.60	B	100.0	0.96	0.90	10	1.0	1.2	300	1.2	20.0	2.2	2.3	3.4	310.0	11.7	5.0
A9	1.33	B	98.1	0.92	0.86	10	1.0	1.4	250	0.5	20.0	1.4	2.9	4.3	260.0	11.4	5.0
A10	2.75	B	94.8	0.87	0.80	10	1.0	1.7	460	2.0	20.0	2.8	2.7	4.4	470.0	12.6	5.0
A11	3.80	B	94.9	0.88	0.80	10	1.0	1.7	350	2.2	20.0	3.0	2.0	3.7	360.0	12.0	5.0
A12	0.24	B	100.0	0.96	0.90	100	1.0	3.7	580	1.5	20.0	2.4	3.9	7.6	680.0	13.8	7.6
A13	5.00	B	95.0	0.88	0.81	100	1.0	5.3	650	2.0	20.0	2.8	3.8	9.1	750.0	14.2	9.1
A14	0.05	B	100.0	0.96	0.90	10	1.0	1.2	20	0.5	20.0	1.4	0.2	1.4	30.0	10.2	5.0
A15	1.09	B	100.0	0.96	0.90	30	1.0	2.0	275	4.0	20.0	4.0	1.1	3.2	305.0	11.7	5.0

STANDARD FORM SF-2
TIME OF CONCENTRATION - PROPOSED

Subdivision: Realm Realty
Location: CO, Colorado Springs

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
A16	1.21	B	100.0	0.96	0.90	10	1.0	1.2	535	1.5	20.0	2.4	3.6	4.8	545.0	13.0	5.0
A17	5.24	B	95.0	0.88	0.81	100	4.0	3.3	620	2.0	20.0	2.8	3.7	7.0	720.0	14.0	7.0
A18	4.12	B	95.0	0.88	0.81	10	1.0	1.7	625	2.0	20.0	2.8	3.7	5.4	635.0	13.5	5.4
A19	0.69	B	100.0	0.96	0.90	10	1.0	1.2	90	2.0	20.0	2.8	0.5	1.7	100.0	10.6	5.0
A20	1.06	B	100.0	0.96	0.90	10	1.0	1.2	255	2.3	20.0	3.0	1.4	2.6	265.0	11.5	5.0
A21	0.45	B	100.0	0.96	0.90	10	1.0	1.2	180	1.5	20.0	2.4	1.2	2.4	190.0	11.1	5.0
A22	3.45	B	6.35	0.39	0.11	50	25.0	4.4	450	2.0	20.0	2.8	2.7	7.0	500.0	12.8	7.0

NOTES:

$T_i = (0.395*(1.1 - C_5)*(L)^{0.5})/((S)^{0.33})$, S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Subdivision: Realm Realty
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	1A	B1-2	0.38	0.73	10.0	0.28	4.13	1.2													Runoff from roof - flows to Campus Dr. Stm inlet #8
	1B	B1-1	1.32	0.18	9.0	0.24	4.28	1.0													Flow to Campus Dr. - Stm inlet #8
									10.0	0.52	4.13	2.1									(DP 1A & 1B)
	2A	B11-1	2.00	0.10	9.5	0.20	4.21	0.8													Flow to Phase 2/3 East - Stm inlet 2A
	2B	B11	1.65	0.57	7.3	0.94	4.61	4.3													Flow to Phase 2/3 East - Stm inlet 2B
East MH-28									9.5	1.14	4.21	4.8									(DP 2A & 2B)
	2C	B12	0.77	0.72	5.0	0.55	5.17	2.8													Flow to Phase 2/3 East - Stm inlet 2C
East MH-25									9.5	1.69	4.21	7.1									DP 2B & 2C
	2	B12-1	0.69	0.73	5.0	0.50	5.17	2.6													Roof drain enters at DP 2
									9.5	2.19	4.21	9.2									DP 2C & 2
Campus - MH 12	3								10.0	2.71	4.13	11.2									(DP 1B & 2)
	4	B10	1.05	0.69	5.0	0.72	5.17	3.7													Campus Dr. - Stm inlet #5
	5	B2	1.15	0.46	7.3	0.53	4.61	2.4													Campus Dr. - Stm inlet #4 (includes DP2 & 3)
Campus - MH 14	6								10.0	3.96	4.13	16.4									(DP 1, 2, 3, 4, 5)
	7A	B9-1	0.72	0.73	5.0	0.53	5.17	2.7													Roof drain
	7B	B9	0.96	0.50	13.7	0.48	3.65	1.8													Flow to Phase 2/3 East - Stm inlet 9
East Stm Inlet 9 total Flow									13.7	1.01	3.65	3.7									(DP 7A & 7B)
Campus MH 38	7								13.7	4.97	3.65	18.1									(DP 6 & 7B)
	8	B3-4	0.92	0.73	10.0	0.67	4.13	2.8													Roof drain
	8A	B3-2	1.31	0.70	5.0	0.92	5.17	4.8													Flows to Phase 1 West - Stm inlet #4A
West Stm Inlet 4A total flow									10.0	1.59	4.13	6.6									(DP 8 &8A)
	8B	B3-3	0.64	0.66	5.0	0.42	5.17	2.2													Flows to Phase 1 West - Stm inlet #4B
West MH 9	9								10.0	2.01	4.13	8.3									(DP 8A, 8B)
Campus MH 15	10								13.7	6.98	3.65	25.5									(DP 7 & 9)
	14	OS4	2.05	0.31	7.6	0.64	4.53	2.9													Flows to Stm West MH 1
		OS5	0.80	0.81	5.0	0.65	5.17	3.4													In Ex. 60" Storm Pipe coming from Nissan Dealership

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Subdivision: Realm Realty
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
West MH 1	15								7.6	1.29	4.53	5.8									(DP 14 & OS5)
	16	B3-1	7.34	0.54	7.9	3.96	4.48	17.7													Flows to Phase 1 West - Stm inlet 16
West MH 5	17								7.9	5.25	4.48	23.5									(DP 15 & 16)
	18	B4-2	0.87	0.81	5.0	0.70	5.17	3.6													
West MH 3									7.9	5.95	4.48	26.7									(DP 17 & 18)
	11	B5-1	0.51	0.66	5.0	0.34	5.17	1.8													Flows to Campus Stm inlet 6
Campus Stm Inlet 6 total Flow									7.9	6.29	4.48	28.2									(DP 19 & 11)
	12	B8	0.90	0.55	5.6	0.50	5.00	2.5													Flows to Campus Stm inlet 7
Campus Stm inlet 7 total flow									7.9	6.79	4.48	30.4									(DP 11 & 12)
	13	B4-1	1.69	0.81	5.4	1.37	5.05	6.9													Flows to Campus storm stub
Campus - MH 17	19								13.7	15.14	3.65	55.3									Flows to Pond B (DP 10, 12, 13)
	20	OS1	1.29	0.78	5.0	1.01	5.17	5.2													Flows to ex. Woodmen Rd inlet
	21	OS2	0.54	0.35	6.0	0.19	4.90	0.9													Flows to Campus Stm inlet 3
	22	OS3	0.76	0.45	6.0	0.34	4.89	1.7													Flows to Campus Stm inlet 1
Ex. Stm MH V10									6.0	1.54	4.89	7.5									
	23	B5-2	0.55	0.67	5.0	0.37	5.17	1.9													Flows to Ex. Inlet in Vincent northwest of Campus/Vincent Roundabout
	24	B5-3	0.16	0.70	5.0	0.11	5.17	0.6													Flows to Ex. Inlet in Vincent southeast of Campus/Vincent Roundabout
	25	B6	3.03	0.73	5.0	2.21	5.17	11.4													
	26A	B7-1	0.55	0.10	8.8	0.06	4.33	0.3													Flows to Phase 2/3 East - Stm inlet 27A
East Stm Inlet 27A total Flow									8.8	2.27	4.33	9.8									(DP 26 & 27A)
	26	B7	2.51	0.29	7.6	0.73	4.54	3.3													Flows to Phase 2/3 East - Stm inlet 27
East Stm Inlet 27 total Flow									8.8	3.00	4.33	13.0									Flows to Pond B (DP 27A & 27)

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Subdivision: Realm Realty
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	50	A1	2.47	0.81	5.2	2.00	5.10	10.2													Flows to future Stm inlet
	51A	A6	3.33	0.81	5.0	2.70	5.17	14.0													Flows to future Stm inlet
	51								5.2	4.70	5.1	24									(DP 50 & 51A)
	52											151.1									Offsite Flow of 151.1 cfs
Stm East MH 4	53								5.2	4.7	5.1	175.1									(DP 51 & 52)
	54A	A2	2.48	0.37	13.1	0.92	3.73	3.4					1.5	0.1	3.3	0.5	18	550	2.45	3.742	Bypass to DP 60A Flows to inlet 54A
	54B	A5	0.33	0.90	5.0	0.30	5.17	1.6													Flows to inlet 54B
	54								13.1	5.58	3.73	171.9									(DP 53, 54A, 54B)
	55A	A9	1.33	0.86	5.0	1.14	5.17	5.9													Flows to future Stm inlet
	55								13.1	6.72	3.73	176.2									(DP 54 & 55A)
	56A	A11	3.80	0.80	5.0	3.04	5.17	15.7													Flows to inlet 56A
	56B	A12	0.24	0.90	7.6	0.22	4.54	1.0													Flow to inlet 56B
	56C	A13	5.00	0.81	9.1	4.05	4.26	17.3													Flows to future Stm inlet
Stm East MH 7	56								13.1	13.81	3.73	202.6									(DP 55, 56A, 56B, & 56C)
	57A	A16	1.21	0.90	5.0	1.09	5.17	5.6													Flows to inlet 57A
	57								13.1	14.905	3.73	206.7									(DP 56 & 57A)
	58	A3	3.81	0.62	9.0	2.36	4.29	10.1													Flows to inlet 58
	59A	A4	3.44	0.82	5.0	2.82	5.17	14.6													Flows to inlet 59A
	59								9.0	5.18	4.29	22.2									(DP 58 & 59A)
	60A	A7	2.86	0.81	5.4	2.32	5.05	11.7													Flows to inlet 60A
	60								16.8	7.54	3.35	25.2									(DP 59 & 60A)
	61A	A8	0.60	0.90	5.0	0.54	5.17	2.8													Flows to inlet 61A
Stm East MH 11	61								16.8	8.08	3.35	27.1									(DP 60 & 61A)
	62A	A10	2.75	0.80	5.0	2.20	5.17	11.4													Flows to inlet 62A
	62								16.8	10.28	3.35	34.4									(DP 61 & 62A)
	63A	A14	0.05	0.90	5.0	0.04	5.17	0.2													Flows into inlets 63A & 63B

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Subdivision: Realm Realty
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	63								16.8	10.32	3.35	34.6									(DP 62 & 63A)
	64								16.8	25.22	3.35	235.6									(DP 57 & 63)
	65A	A15	1.09	0.90	5.0	0.98	5.17	5.1													Flows to inlet 65A
	65								16.8	26.20	3.35	238.9									(DP 64 & 65A)
	66A	A17	5.24	0.81	7.0	4.24	4.66	19.8													Flows to future Stm inlet
	66B	A18	4.12	0.81	5.4	3.34	5.06	16.9													Flows to future Stm inlet
Future Stm MH	66C								7.0	7.58	4.66	35.3									(DP 66A & 66B)
Stm East MH 15	66								16.8	33.78	3.35	264.3									(DP 65 & 66C)
	67A	A20	1.06	0.90	5.0	0.95	5.17	4.9													Flows to inlet 67A
	67								16.8	34.73	3.35	267.4									(DP 66 & 67A)
	68A	A19	0.69	0.90	5.0	0.62	5.17	3.2													Flows to inlet 68A
Stm East MH 16	68								16.8	35.35	3.35	269.5									(DP 67, 68A)
	69A	A21	0.45	0.90	5.0	0.40	5.17	2.1													Flows to inlet 69A
Stm East MH 16	69								16.8	35.75	3.35	270.9									(DP 68 & 69A)
	70	A22	3.45	0.11	7.0	0.38	4.66	1.8	16.8	36.13	3.35	272.1									Pond A

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

Subdivision: Realm Realty
Location: CO, Colorado Springs
Design Storm: 100-Year

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	1A	B1-2	0.38	0.81	10.0	0.31	6.93	2.1													Runoff from roof - flows to Campus Dr. Stm inlet #8
	1B	B1-1	1.32	0.52	9.0	0.69	7.19	5.0													Flow to Campus Dr. - Stm inlet #8
									10.0	1.00	6.93	6.9									(DP 1A & 1B)
	2A	B11-1	2.00	0.38	9.5	0.76	7.06	5.4													Flow to Phase 2/3 East - Stm inlet 2A
	2B	B11	1.65	0.68	7.3	1.12	7.73	8.7													Flow to Phase 2/3 East - Stm inlet 2B
Stm MH-28									9.5	1.88	7.06	13.3									(DP 2A & 2B)
	2C	B12	0.77	0.80	5.0	0.62	8.68	5.4													Flow to Phase 2/3 East - Stm inlet 2C
Stm MH-25									9.5	2.50	7.06	17.7									DP 2B & 2C
	2	B12-1	0.69	0.81	5.0	0.56	8.68	4.9													Roof drain enters at DP 2
									9.5	3.06	7.06	21.6									DP 2C & 2
Campus - MH 12	3								10.0	4.06	6.93	28.1									(DP 1B & 2)
	4	B10	1.05	0.78	5.0	0.82	8.68	7.1													Campus Dr. - Stm inlet #5
	5	B2	1.15	0.60	7.3	0.69	7.74	5.3													Campus Dr. - Stm inlet #4 (includes DP2 & 3)
Campus - MH 14	6								10.0	5.57	6.93	38.6									(DP 1, 2, 3, 4, 5)
	7A	B9-1	0.72	0.81	5.0	0.58	8.68	5.0													Roof drain
	7B	B9	0.96	0.63	13.7	0.60	6.14	3.7													Flow to Phase 2/3 East - Stm inlet 9
East Stm Inlet 9 total Flow									13.7	1.18	6.14	7.2									(DP 7A & 7B)
Campus MH 38	7								13.7	6.75	6.14	41.4									(DP 6 & 7B)
	8	B3-4	0.92	0.81	10.0	0.75	6.93	5.2													Roof drain
	8A	B3-2	1.31	0.78	5.0	1.02	8.68	8.9													Flows to Phase 1 West - Stm inlet #4A
									10.0	1.77	6.93	12.3									(DP 8 &8A)
	8B	B3-3	0.64	0.75	5.0	0.48	8.68	4.2													Flows to Phase 1 West - Stm inlet #4B
West MH 9	9								10.0	2.25	6.93	15.6									(DP 8A, 8B)
Campus MH 15	10								13.7	9.00	6.14	55.3									(DP 7 & 9)

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Project Name: Crest at Woodmen - MDDP AMENDMENT
Subdivision: Realm Realty
Project No.: RLM 2.02
Location: CO, Colorado Springs
Calculated By: CMV
Design Storm: 100-Year
Checked By: SMB
Date: 1/11/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	14	OS4	2.05	0.57	7.6	1.17	7.61	8.9													Flows to Stm West MH 1
		OS5	0.80	0.88	5.0	0.70	8.68	6.1													In Ex. 60" Storm Pipe coming from Nissan Dealership
West MH 1	15								7.6	1.87	7.61	14.2									(DP 14 & OS5)
	16	B3-1	7.34	0.63	7.9	4.62	7.52	34.7													Flows to Phase 1 West - Stm inlet 16
West MH 5	17								7.9	6.49	7.52	48.8									(DP 15 & 16)
	18	B4-2	0.87	0.88	5.0	0.77	8.68	6.7													
West MH 3									7.9	7.26	7.52	54.6									(DP 17 & 18)
	11	B5-1	0.51	0.75	5.0	0.38	8.68	3.3													Flows to Campus Stm inlet 6
Campus Stm Inlet 6 total Flow									7.9	7.64	7.52	57.5									(DP 19 & 11)
	12	B8	0.90	0.66	5.6	0.59	8.39	5.0													Flows to Campus Stm inlet 7
Campus Stm inlet 7 total flow									7.9	8.23	7.52	61.9									(DP 11 & 12)
	13	B4-1	1.69	0.88	5.4	1.49	8.48	12.6													Flows to Campus storm stub
Campus - MH 17	19								13.7	18.72	6.14	114.9									Flows to Pond B (DP 10, 12, 13)
	20	OS1	1.29	0.86	5.0	1.11	8.68	9.6													Flows to ex. Woodmen Rd inlet
	21	OS2	0.54	0.58	6.0	0.31	8.23	2.6													Flows to Campus Stm inlet 3
	22	OS3	0.76	0.63	6.0	0.48	8.20	3.9													Flows to Campus Stm inlet 1
Ex. Stm MH V10									6.0	1.90	8.20	15.6									
	23	B5-2	0.55	0.76	5.0	0.42	8.68	3.6													Flows to Ex. Inlet in Vincent northwest of Campus/Vincent Roundabout
	24	B5-3	0.16	0.79	5.0	0.13	8.68	1.1													Flows to Ex. Inlet in Vincent southeast of Campus/Vincent Roundabout
	25	B6	3.03	0.81	5.0	2.45	8.68	21.3													
	26A	B7-1	0.55	0.38	8.8	0.21	7.27	1.5													Flows to Phase 2/3 East - Stm inlet 27A
East Stm Inlet 27A total Flow									8.8	2.66	7.27	19.3									(DP 26 & 27A)
	26	B7	2.51	0.49	7.6	1.23	7.62	9.4													Flows to Phase 2/3 East - Stm inlet 27
East Stm Inlet 27 total Flow									8.8	3.89	7.27	28.3									Flows to Pond B (DP 27A & 27)

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Subdivision: Realm Realty
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 1/11/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	50	A1	2.47	0.88	5.2	2.17	8.57	18.6													Flows to future Stm inlet
	51A	A6	3.33	0.88	5.0	2.93	8.68	25.4													Flows to future Stm inlet
	51								5.2	5.10	8.57	43.7									(DP 50 & 51A)
	52											259.4									Offsite Flow of 259.4 cfs
	54A	A2	2.48	0.54	13.1	1.34	6.26	8.4					1.5	3.7	4.7	0.5	18	550	2.45	3.742	Bypass to DP 60A Flows to inlet 54A
	54B	A5	0.33	0.96	5.0	0.32	8.68	2.8					1.5	0.5	2.3	0.5	18	580	2.45	3.946	Bypass to inlet 56B Flows to inlet 54B
	54								13.1	6.12	6.26	297.7									(DP 53, 54A, 54B)
	55A	A9	1.33	0.92	5.0	1.22	8.68	10.6													Flows to future Stm inlet
	55								13.1	7.34	6.26	305.3									(DP 54 & 55A)
	56A	A11	3.8	0.88	5.0	3.34	8.68	29.0													Flows to inlet 56A
	56B	A12	0.24	0.96	7.6	0.23	7.62	1.8	8.9	0.29	7.21	2.1									Flow to inlet 56B
	56C	A13	5	0.88	9.1	4.4	7.16	31.5													Flows to future Stm inlet
Stm East MH 7	56								13.1	15.36	6.26	355.6									(DP 55, 56A, 56B, & 56C)
	57A	A16	1.21	0.96	5.0	1.16	8.68	10.1													Flows to inlet 57A
	57								13.1	16.52	6.26	362.8									(DP 56 & 57A)
	58	A3	3.81	0.72	9.0	2.74	7.21	19.8													Flows to inlet 58
	59A	A4	3.44	0.89	5.0	3.06	8.68	26.6													Flows to inlet 59A
	59								9.0	5.80	7.21	41.8									(DP 58 & 59A)
	60A	A7	2.86	0.88	5.4	2.52	8.48	21.4													Flows to inlet 60A
	60								16.8	8.91	5.62	50.1									(DP 59 & 60A)
	61A	A8	0.6	0.96	5.0	0.58	8.68	5.0													Flows to inlet 61A
Stm East MH 12	61								16.8	9.49	5.62	53.3									(DP 60 & 61A)
	62A	A10	2.75	0.87	5.0	2.39	8.68	20.7													Flows to inlet 62A
	62								16.8	11.88	5.62	66.8									(DP 61 & 62A)

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN - PROPOSED

(RATIONAL METHOD PROCEDURE)

Project Name: Crest at Woodmen - MDDP AMENDMENT
Subdivision: Realm Realty
Project No.: RLM 2.02
Location: CO, Colorado Springs
Calculated By: CMV
Design Storm: 100-Year
Checked By: SMB
Date: 1/11/19

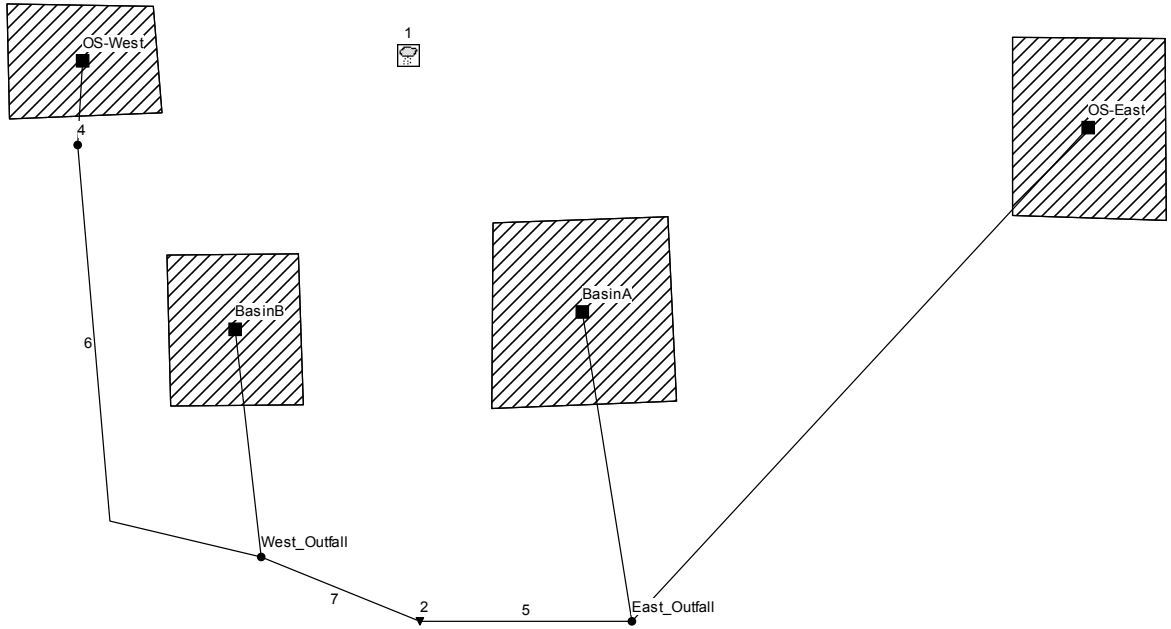
		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	63A	A14	0.05	0.96	5.0	0.05	8.68	0.4													Flows into inlets 63A & 63B
	63								16.8	11.93	5.62	67									(DP 62 & 63A)
	64								16.8	28.45	5.62	419.3									(DP 57 & 63)
	65A	A15	1.09	0.96	5.0	1.05	8.68	9.1													Flows to inlet 65A
	65								16.8	29.50	5.62	425.2									(DP 64 & 65A)
	66A	A17	5.24	0.88	7.0	4.61	7.83	36.1													Flows to future Stm inlet
	66B	A18	4.12	0.88	5.4	3.63	8.5	30.9													Flows to future Stm inlet
Future Stm MH	66C								7.0	8.24	7.83	64.5									(DP 66A & 66B)
Stm East MH 15	66								16.8	37.74	5.62	471.5									(DP 65 & 66C)
	67A	A20	1.06	0.96	5.0	1.02	8.68	8.9													Flows to inlet 67A
	67								16.8	38.76	5.62	477.2									(DP 66 & 67A)
	68A	A19	0.69	0.96	5.0	0.66	8.68	5.7													Flows to inlet 68A
Stm East MH 16	68								16.8	39.42	5.62	480.9									(DP 67, 68A)
	69A	A21	0.45	0.96	5.0	0.43	8.68	3.7													Flows to inlet 69A
Stm East MH 16	69								16.8	39.85	5.62	483.4									(DP 68 & 69A)
	70	A22	3.45	0.39	7.0	1.35	7.82	10.6	16.8	41.20	5.62	490.9									Pond A

Appendix D

Pond Calculations

SWMM MODEL – EXISTING CONDITIONS

Historic Model



```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/24/2016
START_TIME           00:00:00
REPORT_START_DATE    08/24/2016
REPORT_START_TIME    00:00:00
END_DATE             08/24/2016
END_TIME             02:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         0:00:30

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
1                CUMULATIVE 0:05     1.0      TIMESERIES CS_100-yr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen
SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
----------------
OS-East          1                East_Outfall     33.9     77       6000     2.5      0

BasinA           1                East_Outfall     50.88    2        1500     2        0

BasinB           1                west_outfall     29.73    2        800      4        0

OS-West          1                4                2.92     47.05    500      1        0


[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
OS-East          0.011      0.24       0.1        0.35       25         OUTLET
BasinA           0.011      0.24       0.1        0.35       25         OUTLET
BasinB           0.011      0.24       0.1        0.35       25         OUTLET
OS-West          0.011      0.24       0.1        0.35       25         OUTLET

[INFILTRATION]
```

```
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
OS-East          4.5        0.6        6.48       7          0
BasinA           4.5        0.6        6.48       7          0
BasinB           4.5        0.6        6.48       7          0
OS-West          4.5        .6         6.48       7          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
East_Outfall     6324       0          0          0          0
4                6327       5          0          0          0
West_Outfall     0          0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
2                6304       FREE                        NO

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset
InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ----------
---------- ----------
5                East_Outfall     2                400        0.01       0          0          0
         0
6                4                West_Outfall     1320       0.035      0          0          0
         0
7                West_Outfall     2                400        0.01       0          0          0
         0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
5                DUMMY        0                0          0          0          1

6                DUMMY        0                0          0          0          1

7                DUMMY        0                0          0          0          1


[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
6                0.5        1          0          NO         0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
PondA_Outlet     Rating     0.00       0.00
PondA_Outlet                0.50       0.26
PondA_Outlet                1.00       0.36
PondA_Outlet                1.50       0.44
PondA_Outlet                2.00       0.66
PondA_Outlet                2.50       0.87
PondA_Outlet                3.00       1.02
PondA_Outlet                3.50       1.15
PondA_Outlet                4.00       1.47
PondA_Outlet                4.50       1.69
PondA_Outlet                5.00       1.87
PondA_Outlet                5.50       2.03
PondA_Outlet                6.00       46.67
PondA_Outlet                6.50       132.00
PondA_Outlet                7.00       229.02
;
PondB_Outlet     Rating     0.00       0.00
PondB_Outlet                0.50       0.13
PondB_Outlet                1.00       0.18
PondB_Outlet                1.50       0.22
PondB_Outlet                2.00       0.25
PondB_Outlet                2.50       0.28
PondB_Outlet                3.00       0.42
```

```
PondB_Outlet                3.50       0.50
PondB_Outlet                4.00       0.57
PondB_Outlet                4.50       0.62
PondB_Outlet                5.00       0.67
PondB_Outlet                5.50       0.82
PondB_Outlet                6.00       0.93
PondB_Outlet                6.50       1.01
PondB_Outlet                7.00       1.08
PondB_Outlet                7.50       1.15
PondB_Outlet                7.75       1.18
PondB_Outlet                8.00       16.50
PondB_Outlet                8.50       85.74
PondB_Outlet                9.00       179.51
;
PondA_Vol         Storage   0          0
PondA_Vol                   1          15014
PondA_Vol                   2          30880
PondA_Vol                   3          48410
PondA_Vol                   4          67605
PondA_Vol                   5          88465
PondA_Vol                   6          110990
PondA_Vol                   7          117516
;
PondB_Vol         Storage   0.00       0
PondB_Vol                   1.00       5422
PondB_Vol                   2.00       17888
PondB_Vol                   3.00       17888
PondB_Vol                   4.00       17888
PondB_Vol                   5.00       17888
PondB_Vol                   6.00       17888
PondB_Vol                   7.00       17888
PondB_Vol                   8.00       17888
PondB_Vol                   9.00       17888

[TIMESERIES]
;;Name            Date       Time       Value
;;--------------- ---------- ---------- ----------
CS_100-yr                   0          0
CS_100-yr                   0:05       0.03528
CS_100-yr                   0:10       0.11592
CS_100-yr                   0:15       0.19908
CS_100-yr                   0:20       0.3024
CS_100-yr                   0:25       0.45108
CS_100-yr                   0:30       0.65016
CS_100-yr                   0:35       1.06092
CS_100-yr                   0:40       1.79424
CS_100-yr                   0:45       2.07648
CS_100-yr                   0:50       2.24784
CS_100-yr                   0:55       2.3562
CS_100-yr                   1:00       2.44944
CS_100-yr                   1:05       2.53008
CS_100-yr                   1:10       2.56536
CS_100-yr                   1:15       2.5956
CS_100-yr                   1:20       2.62332
CS_100-yr                   1:25       2.65104
CS_100-yr                   1:30       2.67876
CS_100-yr                   1:35       2.70144
CS_100-yr                   1:40       2.72664
CS_100-yr                   1:45       2.74932
CS_100-yr                   1:50       2.772
CS_100-yr                   1:55       2.79468
CS_100-yr                   2:00       2.81988
;
CS_5-yr                     0          0
CS_5-yr                     0:05       0.021
CS_5-yr                     0:10       0.069
CS_5-yr                     0:15       0.1185
CS_5-yr                     0:20       0.18
CS_5-yr                     0:25       0.2685
CS_5-yr                     0:30       0.387
CS_5-yr                     0:35       0.6315
CS_5-yr                     0:40       1.068
CS_5-yr                     0:45       1.236
CS_5-yr                     0:50       1.338
```

```
CS_5-yr                 0:55       1.4025
CS_5-yr                 1:00       1.458
CS_5-yr                 1:05       1.506
CS_5-yr                 1:10       1.527
CS_5-yr                 1:15       1.545
CS_5-yr                 1:20       1.5615
CS_5-yr                 1:25       1.578
CS_5-yr                 1:30       1.5945
CS_5-yr                 1:35       1.608
CS_5-yr                 1:40       1.623
CS_5-yr                 1:45       1.6365
CS_5-yr                 1:50       1.65
CS_5-yr                 1:55       1.6635
CS_5-yr                 2:00       1.6785

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
East_Outfall     2604.626           2929.515
4                -2725.771          7511.013
West_Outfall     -954.198           3549.618
2                559.796            2926.209

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
6                -2406.388          3887.665

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OS-East          7714.758           8535.242
OS-East          7736.784           6784.141
OS-East          6250.000           6828.194
OS-East          6250.000           8546.256
BasinA           2946.035           6817.181
BasinA           3034.141           5044.053
BasinA           1250.000           4977.974
BasinA           1272.026           6762.115
BasinB           -600.220           6464.758
BasinB           -556.167           5011.013
BasinB           -1822.687          5000.000
BasinB           -1866.740          6453.744
OS-West          -1993.392          8846.366
OS-West          -1916.300          7822.137
OS-West          -3370.044          7767.070
OS-West          -3403.084          8868.392

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
1                468.062            8359.031

[LABELS]
;;X-Coord          Y-Coord            Label
82.599             9669.604           "Historic Model" "" "Arial" 10 0 0
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)

WARNING 08: elevation drop exceeds length for Conduit 6
WARNING 08: elevation drop exceeds length for Conduit 7

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... KINWAVE
Starting Date AUG-24-2016 00:00:00
Ending Date AUG-24-2016 02:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	27.348	2.795
Evaporation Loss	0.000	0.000
Infiltration Loss	11.691	1.195
Surface Runoff	9.890	1.011
Final Storage	5.914	0.604
Continuity Error (%)	-0.538	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	9.813	3.198
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	9.813	3.198
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec

```
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00
```

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
OS-East	2.79	0.00	0.00	0.37	2.33	2.14	260.74	0.833
BasinA	2.79	0.00	0.00	1.56	0.41	0.56	20.33	0.146
BasinB	2.79	0.00	0.00	1.56	0.47	0.38	14.60	0.169
OS-West	2.79	0.00	0.00	0.84	1.73	0.14	14.27	0.619

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
East_Outfall	JUNCTION	0.00	0.00	6324.00	0 00:00	0.00
4	JUNCTION	0.00	0.00	6327.00	0 00:00	0.00
West_Outfall	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
2	OUTFALL	0.00	0.00	6304.00	0 00:00	0.00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
East_Outfall	JUNCTION	279.90	279.90	0 00:45	2.69	2.69	0.000
4	JUNCTION	14.27	14.27	0 00:45	0.137	0.137	0.000
West_Outfall	JUNCTION	14.60	27.14	0 00:45	0.375	0.511	0.000
2	OUTFALL	0.00	307.04	0 00:45	0	3.2	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
East_Outfall	JUNCTION	2.00	0.000	0.000
4	JUNCTION	2.00	0.000	5.000
West_Outfall	JUNCTION	2.00	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
2	95.42	62.26	307.04	3.197
System	95.42	62.26	307.04	3.197

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	279.90	0	00:45			
6	DUMMY	14.27	0	00:45			
7	DUMMY	27.14	0	00:45			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Sep 06 15:06:27 2016
Analysis ended on: Tue Sep 06 15:06:27 2016
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)

WARNING 08: elevation drop exceeds length for Conduit 6
WARNING 08: elevation drop exceeds length for Conduit 7

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... KINWAVE
Starting Date AUG-24-2016 00:00:00
Ending Date AUG-24-2016 02:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	16.279	1.664
Evaporation Loss	0.000	0.000
Infiltration Loss	11.199	1.144
Surface Runoff	3.962	0.405
Final Storage	1.167	0.119
Continuity Error (%)	-0.305	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	3.943	1.285
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	3.943	1.285
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec

```
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00
```

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
OS-East	1.66	0.00	0.00	0.35	1.24	1.14	136.34	0.745
BasinA	1.66	0.00	0.00	1.49	0.04	0.05	5.49	0.024
BasinB	1.66	0.00	0.00	1.49	0.04	0.03	3.22	0.025
OS-West	1.66	0.00	0.00	0.81	0.77	0.06	7.18	0.462

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
East_Outfall	JUNCTION	0.00	0.00	6324.00	0 00:00	0.00
4	JUNCTION	0.00	0.00	6327.00	0 00:00	0.00
West_Outfall	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
2	OUTFALL	0.00	0.00	6304.00	0 00:00	0.00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
East_Outfall	JUNCTION	141.83	141.83	0 00:45	1.19	1.19	0.000
4	JUNCTION	7.18	7.18	0 00:45	0.0606	0.0606	0.000
West_Outfall	JUNCTION	3.22	10.40	0 00:45	0.0337	0.0943	0.000
2	OUTFALL	0.00	152.23	0 00:45	0	1.28	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
East_Outfall	JUNCTION	2.00	0.000	0.000
4	JUNCTION	2.00	0.000	5.000
West_Outfall	JUNCTION	2.00	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
2	95.42	25.01	152.23	1.285
System	95.42	25.01	152.23	1.285

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	141.83	0	00:45			
6	DUMMY	7.18	0	00:45			
7	DUMMY	10.40	0	00:45			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Sep 06 15:05:20 2016
Analysis ended on: Tue Sep 06 15:05:20 2016
Total elapsed time: < 1 sec

POND A DESIGN INFO

A) Spreadsheets
B) SWMM Model to verify WQCV/EURV Drain Times

Detention Pond Tributary Areas

Subdivision: Realm Realty
Location: CO, Colorado Springs

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No.: RLM 2.02
Calculated By: CMV
Checked By: SMB
Date: 12/21/18

Detention Pond #A

Basin	Area	% Imp
A1	2.47	95
A2	2.48	53.76
A3	3.81	82.37
A4	3.44	95.83
A5	0.33	100
A6	3.33	95
A7	2.86	95.05
A8	0.60	100
A9	1.33	98.05
A10	2.75	94.8
A11	3.80	94.86
A12	0.24	100
A13	5.00	95
A14	0.05	100
A15	1.09	100
A16	1.21	100
A17	5.24	95
A18	4.12	95
A19	0.69	100
A20	1.06	100
A21	0.45	100
A22	3.45	6.35
Total	**49.80**	**86.5**
Offsite East	33.9	77
Total	**83.7**	**83.0**

EURV Required For Onsite & Offsite Basins

EURV =	1.17	in	From Eqn 13-6
EURV =	**4.86**	**ac-ft**	

WQ Required For Onsite Basins

WQCV =	0.37	in	From Eqn. 3-1
WQCV =	**1.55**	**ac-ft**	

WQ Required For Offsite Basins

WQCV =	0.31	in	From Eqn. 3-1
WQCV =	**0.88**	**ac-ft**	

Total Pond A Water Quality =	0.35	in
Total Pond A Water Quality =	**2.43**	**ac-ft**

POND VOLUME CALCULATIONS

Subdivision Realm Realty
Location CO, Colorado Springs

Project Name: Crest at Woodmen - Phase 2 East and Phase 3 Southeast
Project No. RLM 2.03
By: CMV
Checked By: SMB
Date: 12/21/18

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

Pond A

Stage	Stage Elevation	Stage Surface Area (square feet)	Stage Volume (cubic feet)	Cumulative Volume (cubic feet)	Cumulative Volume (acre feet)
0.00	6310.00	272	0	0	0.00
1.00	6311.00	2,591	1,234	1,234	0.03
2.00	6312.00	10,979	6,301	7,535	0.17
3.00	6313.00	28,075	18,870	26,405	0.61
4.00	6314.00	43,259	35,395	61,800	1.42
5.00	6315.00	48,157	45,686	107,486	2.47
6.00	6316.00	52,238	50,184	157,670	3.62
7.00	6317.00	56,387	54,300	211,970	4.87
8.00	6318.00	60,626	58,494	270,464	6.21
9.00	6319.00	64,959	62,780	333,244	7.65
10.00	6320.00	69,377	67,156	400,400	9.19
11.00	6321.00	73,891	71,622	472,022	10.84
12.00	6322.00	78,503	76,185	548,207	12.59

Volume (acre feet)	Volume	Water Surface Elevation	Stage	
Total WQ	2.43	6314.97	4.97	(Per Pond Tributary spreadsheet)
Onsite EURV + Offsite WQ	5.74	6317.66	7.66	(Per Pond Tributary spreadsheet)
100-Year Detention	7.36	6318.80	8.80	(Per SWMM model)

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

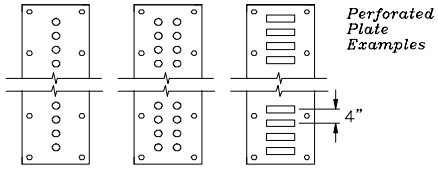
Project: The Crest at Woodmen
Basin ID: Pond A

WQCV Design Volume (Input):

Catchment Imperviousness, I_a =	83.0	percent			
Catchment Area, A =	83.70	acres	Diameter of holes, D =		inches
Depth at WQCV outlet above lowest perforation, H =	6.1	feet	Number of holes per row, N =		
Vertical distance between rows, h =	30.00	inches		**OR**	
Number of rows, NL =	3.00				
Orifice discharge coefficient, C_o =	0.65		Height of slot, H =	1.50	inches
Slope of Basin Trickle Channel, S =	0.010	ft / ft	Width of slot, W =	5.50	inches
Time to Drain the Pond =	40	hours			

Watershed Design Information (Input):

Percent Soil Type A =	0	%
Percent Soil Type B =	100	%
Percent Soil Type C/D =		%



Outlet Design Information (Output):

Water Quality Capture Volume, WQCV =	0.35	watershed inches
Water Quality Capture Volume (WQCV) =	2.427	acre-feet
Design Volume (WQCV / 12 * Area * 1.2) Vol =	**2.912**	**acre-feet**
Outlet area per row, Ao =	15.79	square inches
Total opening area at each row based on user-input above, Ao =	8.25	square inches
Total opening area at each row based on user-input above, Ao =	0.057	square feet

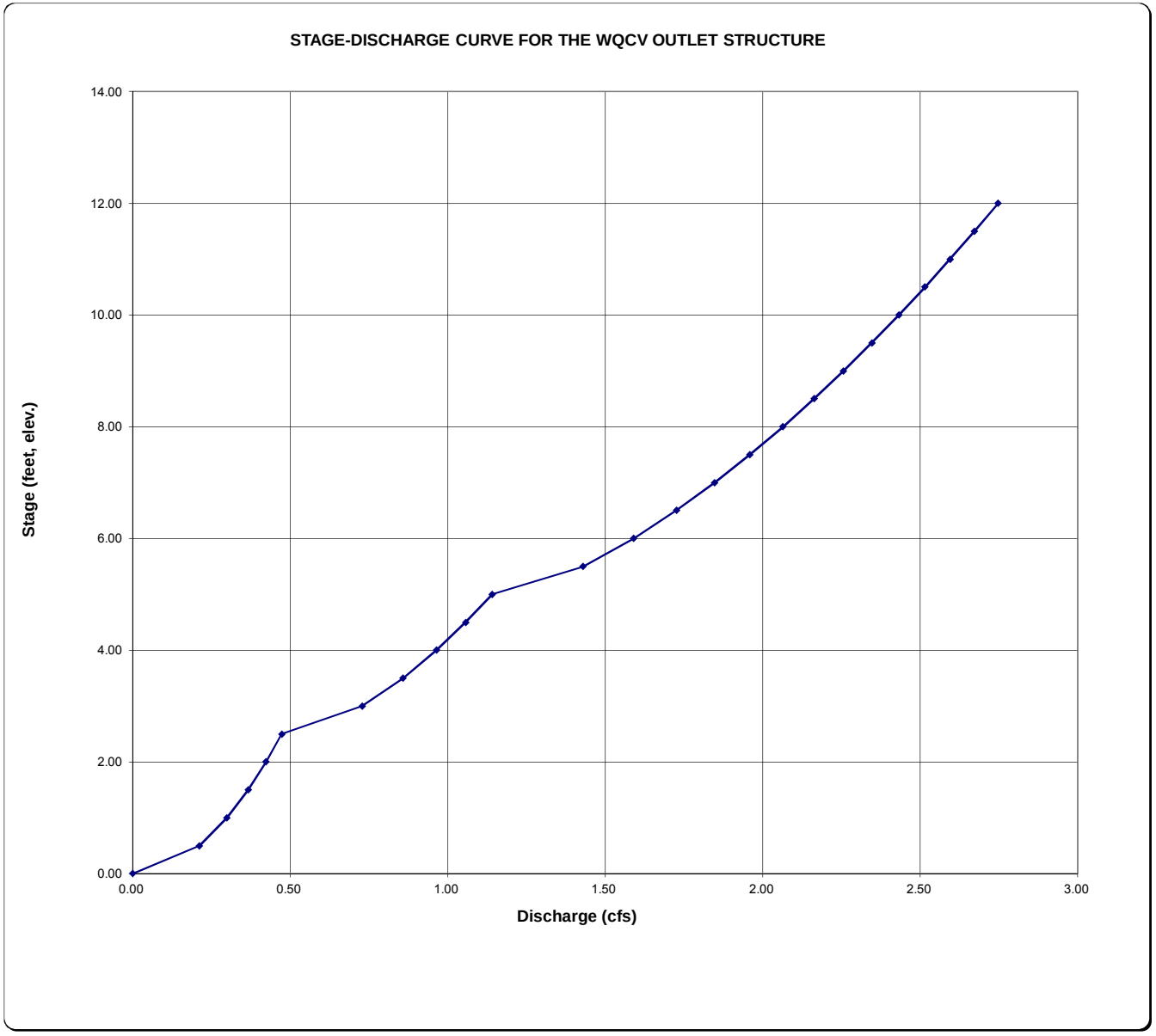
3

	Central Elevations of Rows of Holes in feet																								Σ
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20	Row 21	Row 22	Row 23	Row 23	Flow
	0.00	2.50	5.00																						
	Collection Capacity for Each Row of Holes in cfs																								
0.00	0.0000	0.0000	0.0000																						**0.00**
0.50	0.2113	0.0000	0.0000																						**0.21**
1.00	0.2988	0.0000	0.0000																						**0.30**
1.50	0.3660	0.0000	0.0000																						**0.37**
2.00	0.4226	0.0000	0.0000																						**0.42**
2.50	0.4725	0.0000	0.0000																						**0.47**
3.00	0.5176	0.2113	0.0000																						**0.73**
3.50	0.5591	0.2988	0.0000																						**0.86**
4.00	0.5977	0.3660	0.0000																						**0.96**
4.50	0.6339	0.4226	0.0000																						**1.06**
5.00	0.6682	0.4725	0.0000																						**1.14**
5.50	0.7009	0.5176	0.2113																						**1.43**
6.00	0.7320	0.5591	0.2988																						**1.59**
6.50	0.7619	0.5977	0.3660																						**1.73**
7.00	0.7907	0.6339	0.4226																						**1.85**
7.50	0.8184	0.6682	0.4725																						**1.96**
8.00	0.8453	0.7009	0.5176																						**2.06**
8.50	0.8713	0.7320	0.5591																						**2.16**
9.00	0.8965	0.7619	0.5977																						**2.26**
9.50	0.9211	0.7907	0.6339																						**2.35**
10.00	0.9450	0.8184	0.6682																						**2.43**
10.50	0.9684	0.8453	0.7009																						**2.51**
11.00	0.9912	0.8713	0.7320																						**2.59**
11.50	1.0134	0.8965	0.7619																						**2.67**
12.00	1.0352	0.9211	0.7907																						**2.75**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	Override Area Row 1	Override Area Row 2	Override Area Row 3	Override Area Row 4	Override Area Row 5	Override Area Row 6	Override Area Row 7	Override Area Row 8	Override Area Row 9	Override Area Row 10	Override Area Row 11	Override Area Row 12	Override Area Row 13	Override Area Row 14	Override Area Row 15	Override Area Row 16	Override Area Row 17	Override Area Row 18	Override Area Row 19	Override Area Row 20	Override Area Row 21	Override Area Row 22	Override Area Row 23	Override Area Row 24	

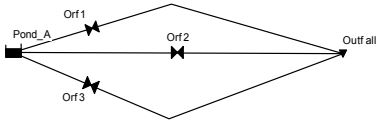
STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Worksheet Protected

Project: The Crest at Woodmen
Basin ID: Pond A



Pond A Outlet Check



```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           09/02/2016
START_TIME           00:00:00
REPORT_START_DATE    09/02/2016
REPORT_START_TIME    00:00:00
END_DATE             09/05/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Outfall          0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
```

```
;;-------------- -------- ---------- ----------- ---------- --------------------------
-------- --------          -------- --------
Pond_A           6310     12         4.97       TABULAR    PondA_Volume                 0
      0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ----------
-------- ----------
Orf1             Pond_A           Outfall          SIDE         0          0.65       NO
    0
Orf2             Pond_A           Outfall          SIDE         2.5        0.65       NO
    0
Orf3             Pond_A           Outfall          SIDE         5          0.65       NO
    0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
Orf1             RECT_CLOSED  .125             0.458333   0          0
Orf2             RECT_CLOSED  .125             .458333    0          0
Orf3             RECT_CLOSED  .125             .458333    0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
PondA_Volume     Storage    0.00       272
PondA_Volume                1.00       2591
PondA_Volume                2.00       10979
PondA_Volume                3.00       28075
PondA_Volume                4.00       43259
PondA_Volume                5.00       48157
PondA_Volume                6.00       52238
PondA_Volume                7.00       56387
PondA_Volume                8.00       60626
PondA_Volume                9.00       64959
PondA_Volume                10.00      69377
PondA_Volume                11.00      73891
PondA_Volume                12.00      78503

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

```
[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Outfall          5747.191           5797.753
Pond_A           2455.056           5808.989

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Orf1             4036.344           6277.533
Orf3             4003.304           5165.198

[LABELS]
;;X-Coord          Y-Coord            Label
2982.143           7690.476           "Pond A Outlet Check" "" "Arial" 10 0 0
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 09/02/2016 00:00:00
Ending Date 09/05/2016 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.471	0.805
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	2.472	0.805
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.016	

****
Highest Flow Instability Indexes
****
All links are stable.

****

Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
Outfall	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Pond_A	STORAGE	1.80	4.97	6314.97	0 00:00	4.96

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Outfall	OUTFALL	0.00	1.13	0 00:00	0	0.805	0.000
Pond_A	STORAGE	0.00	0.00	0 00:00	0	0.805	0.016

****
Node Flooding Summary
****

No nodes were flooded.

****

Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Pond_A	24.008	4	0	0	107.659	20	0 00:00	1.13

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall	57.99	0.72	1.13	0.805
System	57.99	0.72	1.13	0.805

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.66	0 00:00			0.00
Orf2	ORIFICE	0.46	0 00:00			0.00
Orf3	ORIFICE	0.00	0 00:00			0.00

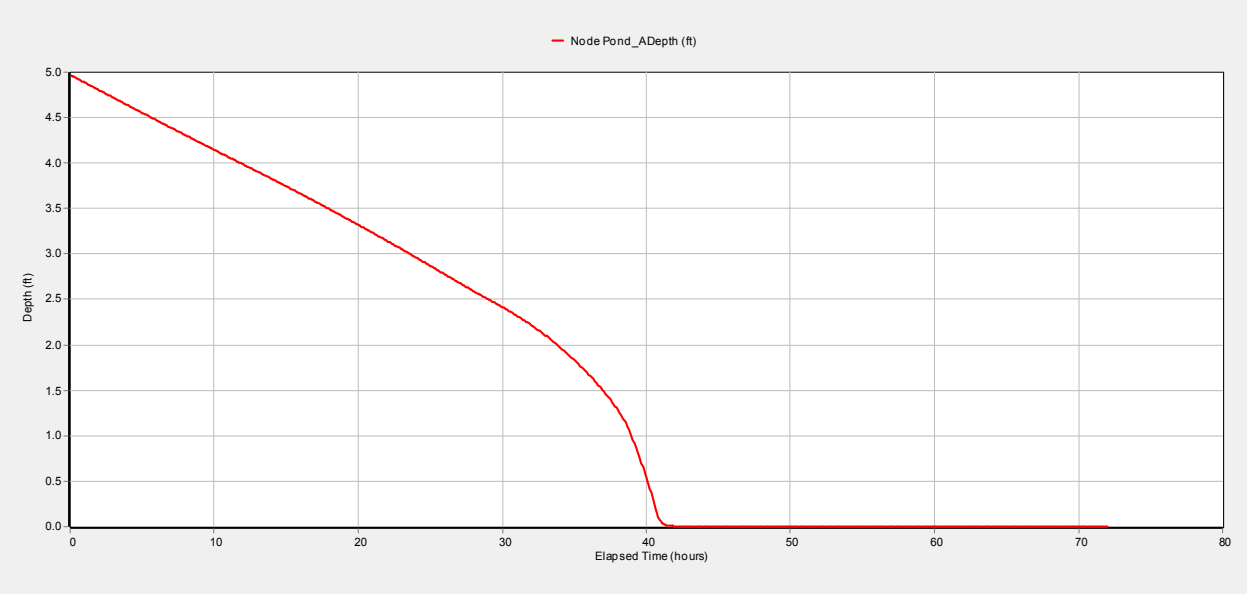
****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Wed Dec 19 12:21:44 2018

Analysis ended on: Wed Dec 19 12:21:44 2018
Total elapsed time: < 1 sec

Total WQ


Node Pond_ADepth (ft)
Depth (ft)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
10
20
30
40
50
60
70
80
Elapsed Time (hours)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           09/02/2016
START_TIME           00:00:00
REPORT_START_DATE    09/02/2016
REPORT_START_TIME    00:00:00
END_DATE             09/05/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Outfall          0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
```

```
;;-------------- -------- ---------- ----------- ---------- --------------------------
-------- --------          -------- --------
Pond_A           6310     12         7.66       TABULAR    PondA_Volume                 0
      0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ----------
-------- ----------
Orf1             Pond_A           Outfall          SIDE         0          0.65       NO
    0
Orf2             Pond_A           Outfall          SIDE         2.5        0.65       NO
    0
Orf3             Pond_A           Outfall          SIDE         5          0.65       NO
    0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
Orf1             RECT_CLOSED  .125             0.458333   0          0
Orf2             RECT_CLOSED  .125             .458333    0          0
Orf3             RECT_CLOSED  .125             .458333    0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
PondA_Volume     Storage    0.00       272
PondA_Volume                1.00       2591
PondA_Volume                2.00       10979
PondA_Volume                3.00       28075
PondA_Volume                4.00       43259
PondA_Volume                5.00       48157
PondA_Volume                6.00       52238
PondA_Volume                7.00       56387
PondA_Volume                8.00       60626
PondA_Volume                9.00       64959
PondA_Volume                10.00      69377
PondA_Volume                11.00      73891
PondA_Volume                12.00      78503

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

Pond A Outlet Input - EURV + Offsite WQ

```
[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Outfall          5747.191           5797.753
Pond_A           2455.056           5808.989

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Orf1             4036.344           6277.533
Orf3             4003.304           5165.198

[LABELS]
;;X-Coord          Y-Coord            Label
2982.143           7690.476           "Pond A Outlet Check" "" "Arial" 10 0 0
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 09/02/2016 00:00:00
Ending Date 09/05/2016 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	5.779	1.883
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	5.780	1.883
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.012	

****
Highest Flow Instability Indexes
****
All links are stable.

****

Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
Outfall	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Pond_A	STORAGE	3.95	7.66	6317.66	0 00:00	7.65

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Outfall	OUTFALL	0.00	1.98	0 00:00	0	1.88	0.000
Pond_A	STORAGE	0.00	0.00	0 00:00	0	1.88	0.012

****
Node Flooding Summary
****

No nodes were flooded.

****

Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Pond_A	83.925	15	0	0	251.737	46	0 00:00	1.98

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall	92.50	1.05	1.98	1.883
System	92.50	1.05	1.98	1.883

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.82	0 00:00			0.00
Orf2	ORIFICE	0.67	0 00:00			0.00
Orf3	ORIFICE	0.48	0 00:00			0.00

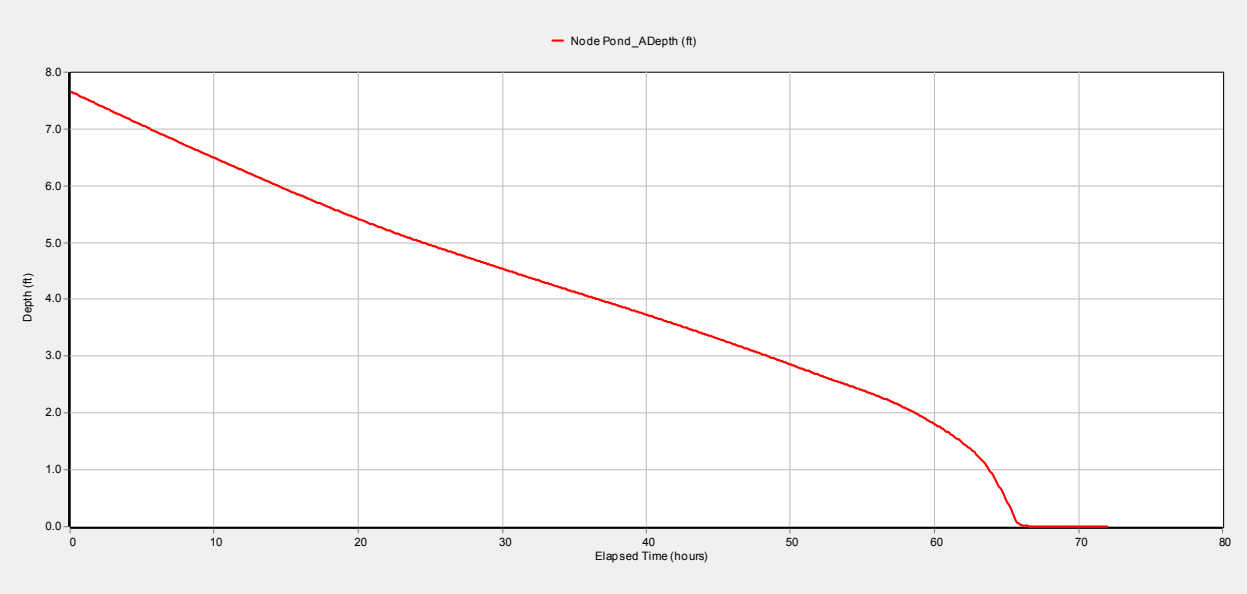
****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Wed Dec 19 12:18:38 2018

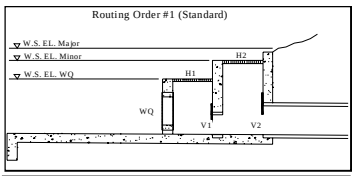
Analysis ended on: Wed Dec 19 12:18:38 2018
Total elapsed time: < 1 sec

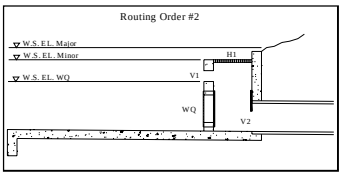
Onsite EURV + Offsite WQ

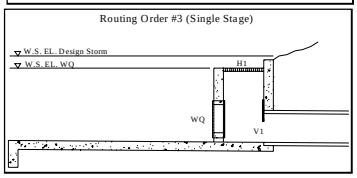


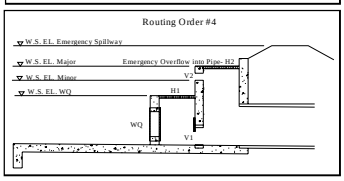
STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: **Crest at Woodmen**
Basin ID: **Pond A**


Routing Order #1 (Standard)


Routing Order #2


Routing Order #3 (Single Stage)


Routing Order #4

Current Routing Order is #3

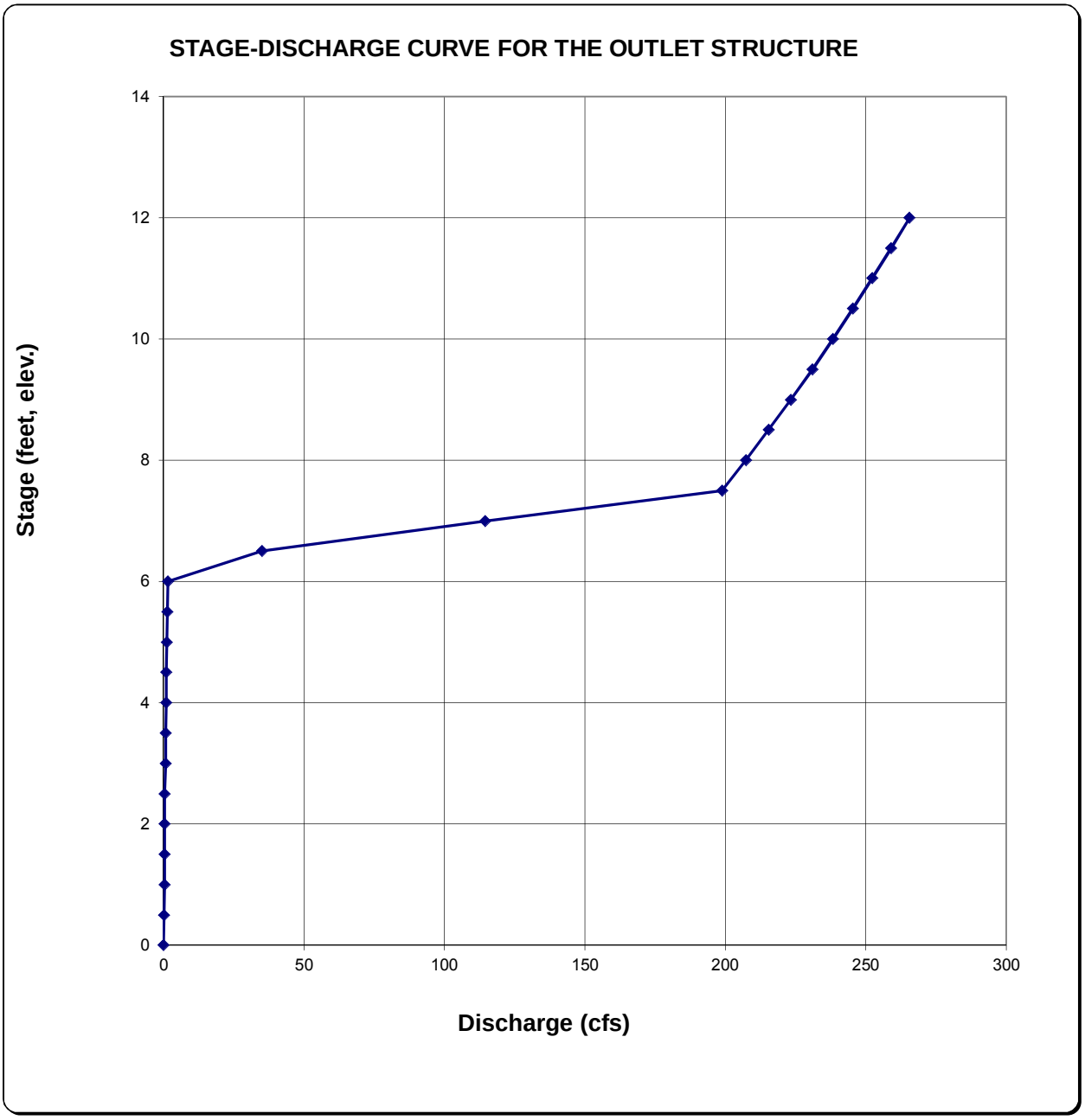
Design Information (Input):			#1 Horiz.	#2 Horiz.	#1 Vert.	#2 Vert.	
Circular Opening:	Diameter in Inches	Dia. =			54.00		inches
OR							
Rectangular Opening:	Width in Feet	W =	20.00				ft.
	Length (Height for Vertical)	L or H =	8.00				ft.
	Percentage of Open Area After Trash Rack Reduction	% open =	70		100		%
	Orifice Coefficient	C_o =	0.65		0.65		
	Weir Coefficient	C_w =	3.00				
	Orifice Elevation (Bottom for Vertical)	E_o =	6.10		-0.50		ft.
Calculation of Collection Capacity:							
	Net Opening Area (after Trash Rack Reduction)	A_o =	112.00		15.90		sq. ft.
	OPTIONAL: User-Overide Net Opening Area	A_o =					sq. ft.
	Perimeter as Weir Length	L_w =	44.00		ft.		
	OPTIONAL: User-Overide Weir Length	L_w =			ft.		
	Top Elevation of Vertical Orifice Opening, Top =				4.00		ft.
	Center Elevation of Vertical Orifice Opening, Cen =				1.75		ft.

Routing 3: Single Stage - Water flows through WQCV plate and #1 horizontal opening into #1 vertical opening. This flow will be applied to culvert sheet (#2 vertical & horizontal openings is not used).

			Horizontal Orifices				**Vertical Orifices**			
Labels for WQCV, Minor, & Major Storage W.S. Elevations (input)	Water Surface Elevation ft (linked)	WQCV Plate/Riser Flow cfs (User-linked)	#1 Horiz. Weir Flow cfs (output)	#1 Horiz. Orifice Flow cfs (output)	#2 Horiz. Weir Flow cfs (output)	#2 Horiz. Orifice Flow cfs (output)	#1 Vert. Collection Capacity cfs (output)	#2 Vert. Collection Capacity cfs (output)	**Total Collection Capacity cfs (output)**	Target Volumes for WQCV, Minor, & Major Storage Volumes (link for goal seek)
	0.00	0.00	0.00	0.00	0.00	0.00	4.61	0.00	**0.0**	
	0.50	0.21	0.00	0.00	0.00	0.00	13.04	0.00	**0.2**	
	1.00	0.30	0.00	0.00	0.00	0.00	23.95	0.00	**0.3**	
	1.50	0.37	0.00	0.00	0.00	0.00	36.87	0.00	**0.4**	
	2.00	0.42	0.00	0.00	0.00	0.00	51.53	0.00	**0.4**	
	2.50	0.47	0.00	0.00	0.00	0.00	67.74	0.00	**0.5**	
	3.00	0.73	0.00	0.00	0.00	0.00	85.36	0.00	**0.7**	
	3.50	0.86	0.00	0.00	0.00	0.00	104.29	0.00	**0.9**	
	4.00	0.96	0.00	0.00	0.00	0.00	124.44	0.00	**1.0**	
	4.50	1.06	0.00	0.00	0.00	0.00	137.57	0.00	**1.1**	
	5.00	1.14	0.00	0.00	0.00	0.00	149.56	0.00	**1.1**	
	5.50	1.43	0.00	0.00	0.00	0.00	160.65	0.00	**1.4**	
	6.00	1.59	0.00	0.00	0.00	0.00	171.03	0.00	**1.6**	
	6.50	1.73	33.39	369.49	0.00	0.00	180.81	0.00	**35.1**	
	7.00	1.85	112.70	554.24	0.00	0.00	190.09	0.00	**114.6**	
	7.50	1.96	218.66	691.26	0.00	0.00	198.93	0.00	**198.9**	
	8.00	2.06	345.70	805.29	0.00	0.00	207.40	0.00	**207.4**	
	8.50	2.16	490.78	905.07	0.00	0.00	215.54	0.00	**215.5**	
	9.00	2.26	651.88	994.89	0.00	0.00	223.38	0.00	**223.4**	
	9.50	2.35	827.55	1077.24	0.00	0.00	230.95	0.00	**231.0**	
	10.00	2.43	1016.65	1153.74	0.00	0.00	238.29	0.00	**238.3**	
	10.50	2.51	1218.30	1225.46	0.00	0.00	245.40	0.00	**245.4**	
	11.00	2.59	1431.75	1293.22	0.00	0.00	252.31	0.00	**252.3**	
	11.50	2.67	1656.40	1357.60	0.00	0.00	259.04	0.00	**259.0**	
	12.00	2.75	1891.70	1419.06	0.00	0.00	265.60	0.00	**265.6**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	

STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Crest at Woodmen
Basin ID: Pond A



POND B DESIGN INFO

A) Spreadsheets
B) SWMM Model to verify WQCV/EURV Drain Times

Detention Pond #B

Basin	Area	% Imp	
B1-1	1.32	5	
B1-2	0.38	90	
B2	1.15	66.92	
B3-1	7.34	77.77	
B3-2	1.31	87.94	
B3-3	0.64	85.18	
B3-4	0.92	90	
B4-1	1.69	95	
B4-2	0.87	95	
B5-1	0.51	85.11	
B5-2	0.55	86.15	
B5-3	0.16	88.1	
B6	3.03	90	
B7	2.51	38.26	
B7-1	0.55	5	
B8	0.90	75.94	
B9	0.96	71.29	
B9-1	0.72	90	
B10	1.05	87.37	
B11	1.65	78.22	
B11-1	2.00	5	
B12	0.77	89.23	
B12-1	0.69	90	
Total Onsite	**31.67**	**70.0**	
Offsite OS 4	2.05	31.9	
Offsite OS 5	0.80	95.0	
Offsite West	**2.9**	**50.0**	
Total	**34.52**	**68.3**	From Eqn 13-6

EURV Required For Onsite Basins

EURV =	0.94	in	
EURV =	**2.48**	**ac-ft**	From Eqn. 3-1

WQ Required For Onsite Basins

WQCV =	0.28	in	
WQCV =	**0.73**	**ac-ft**	From Eqn. 3-1

WQ Required For Offsite Basins

WQCV =	0.21	in
WQCV =	**0.05**	**ac-ft**

Total Pond B Water Quality =	0.27	in
Total Pond B Water Quality =	**0.77**	**ac-ft**

Total Pond B EURV+WQ =	1.42	in
Total Pond B EURV+WQ =	**2.53**	**ac-ft**

POND VOLUME CALCULATIONS

Subdivision Realm Realty
Location CO, Colorado Springs

Project Name: Crest at Woodmen - MDDP AMENDMENT
Project No. RLM 2.02
By: CMV
Checked By: SMB
Date: 1/11/19

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

Pond B

Stage	Stage Elevation	Stage Surface Area (square feet)	Stage Volume (cubic feet)	Cumulative Volume (cubic feet)	Cumulative Volume (acre feet)
0.00	6303.00	1,722	0	0	0.00
1.00	6304.00	12,437	6,262	6,262	0.14
2.00	6305.00	24,225	18,007	24,269	0.56
3.00	6306.00	26,327	25,269	49,538	1.14
4.00	6307.00	28,436	27,375	76,913	1.77
5.00	6308.00	31,013	29,715	106,628	2.45
6.00	6309.00	33,247	32,123	138,751	3.19
7.00	6310.00	35,432	34,333	173,084	3.97
8.00	6311.00	37,548	36,485	209,569	4.81
9.00	6312.00	39,752	38,645	248,214	5.70

Volume (acre feet)	Volume	Water Surface Elevation	Stage	
Total WQ	0.77	6305.37	2.37	(Per Pond Tributary spreadsheet)
Onsite EURV + Offsite WQ	2.53	6308.12	5.12	(Per Pond Tributary spreadsheet)
100-Year Detention	3.10	6308.89	5.89	(Per SWMM model)

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: The Crest At Woodmen

Basin ID: Pond B

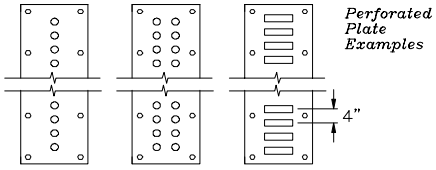
WQCV Design Volume (Input):

Catchment Imperviousness, I_a = 68.3 percent
Catchment Area, A = 34.52 acres
Depth at WQCV outlet above lowest perforation, H = 2.6 feet
Vertical distance between rows, h = 18.00 inches
Number of rows, NL = 3.00
Orifice discharge coefficient, C_o = 0.65
Slope of Basin Trickle Channel, S = 0.010 ft / ft
Time to Drain the Pond = 40 hours

Diameter of holes, D = 2.875 inches
Number of holes per row, N = 1

OR

Height of slot, H = inches
Width of slot, W = inches



Watershed Design Information (Input):

Percent Soil Type A = %
Percent Soil Type B = 100 %
Percent Soil Type C/D = %

Outlet Design Information (Output):

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') 0.27 watershed inches
N/A
Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') 2.632 acre-feet
Outlet area per row, Ao = 18.74 square inches
Total opening area at each row based on user-input above, Ao = 6.49 square inches
Total opening area at each row based on user-input above, Ao = 0.045 square feet

3

	Central Elevations of Rows of Holes in feet																								
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20	Row 21	Row 22	Row 23	Row 23	Σ Flow
	0.00	1.50	3.00																						
	Collection Capacity for Each Row of Holes in cfs																								
0.00	0.0000	0.0000	0.0000																						**0.00**
1.00	0.2352	0.0000	0.0000																						**0.24**
2.00	0.3326	0.1663	0.0000																						**0.50**
3.00	0.4073	0.2880	0.0000																						**0.70**
4.00	0.4703	0.3718	0.2352																						**1.08**
5.00	0.5258	0.4399	0.3326																						**1.30**
5.12	0.5321	0.4474	0.3424																						**1.32**
6.00	0.5760	0.4988	0.4073																						**1.48**
7.00	0.6222	0.5515	0.4703																						**1.64**
8.00	0.6651	0.5995	0.5258																						**1.79**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	#N/A	#N/A	#N/A																						**#N/A**
	Override Area Row 1	Override Area Row 2	Override Area Row 3	Override Area Row 4	Override Area Row 5	Override Area Row 6	Override Area Row 7	Override Area Row 8	Override Area Row 9	Override Area Row 10	Override Area Row 11	Override Area Row 12	Override Area Row 13	Override Area Row 14	Override Area Row 15	Override Area Row 16	Override Area Row 17	Override Area Row 18	Override Area Row 19	Override Area Row 20	Override Area Row 21	Override Area Row 22	Override Area Row 23	Override Area Row 24	

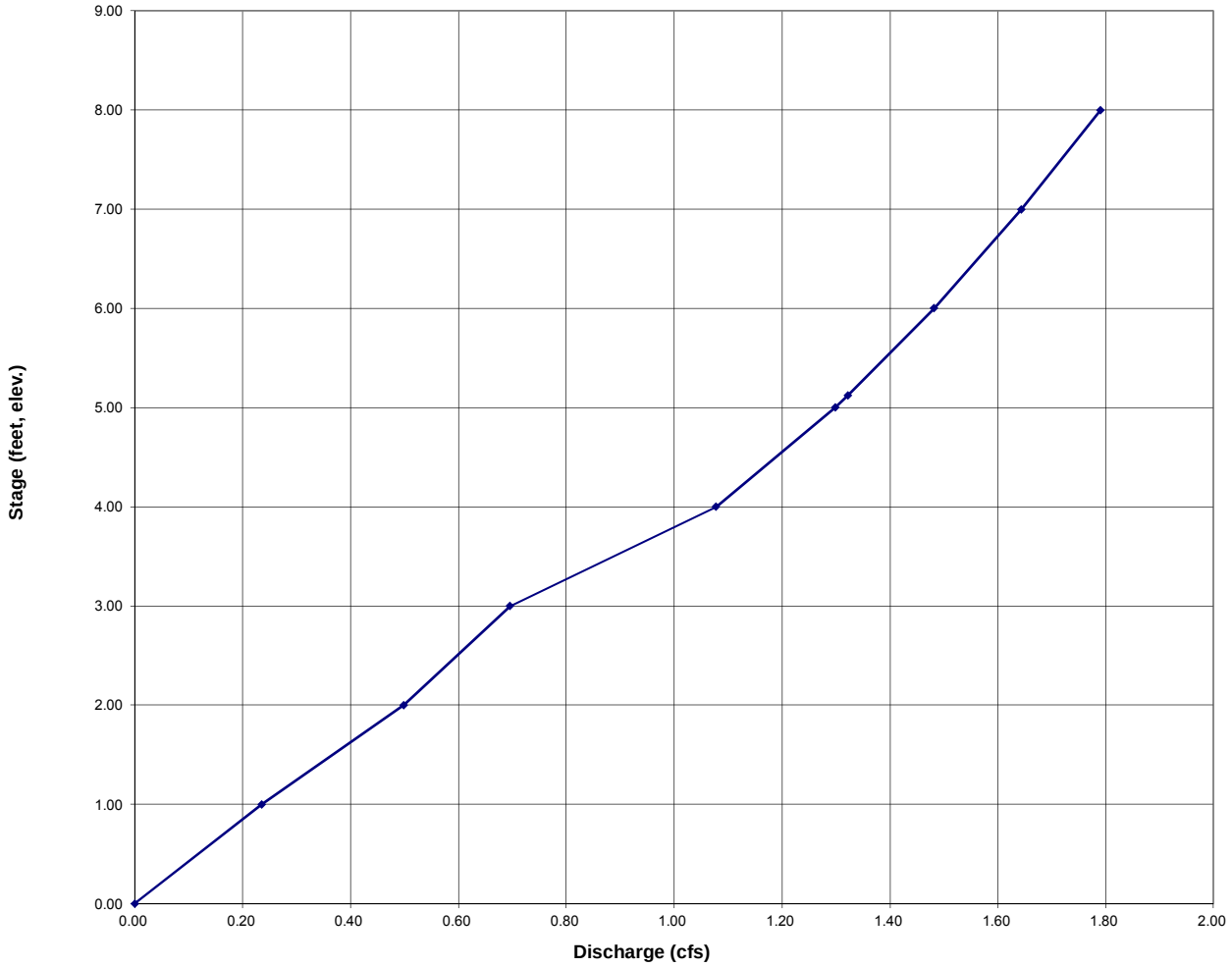
STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Worksheet Protected

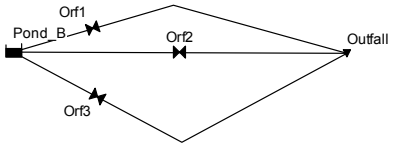
Project: The Crest At Woodmen

Basin ID: Pond B

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



Pond B Outlet Check



```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           09/02/2016
START_TIME           00:00:00
REPORT_START_DATE    09/02/2016
REPORT_START_TIME    00:00:00
END_DATE             09/05/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Outfall          0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
```

```
;;-------------- -------- ---------- ----------- ---------- --------------------------
-------- --------          -------- --------
Pond_B           6305     5          1.98       TABULAR    PondB_Volume                 0
      0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ----------
-------- ----------
Orf1             Pond_B           Outfall          SIDE         0          0.65       NO
    0
Orf2             Pond_B           Outfall          SIDE         1.5        0.65       NO
    0
Orf3             Pond_B           Outfall          SIDE         3.0        0.65       NO
    0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
Orf1             CIRCULAR     .270833          0          0          0
Orf2             CIRCULAR     .270833          0          0          0
Orf3             CIRCULAR     .270833          0          0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
PondB_Volume     Storage    0.00       0.00
PondB_Volume                1.00       24217
PondB_Volume                2.00       26279
PondB_Volume                3.00       28406
PondB_Volume                4.00       30812
PondB_Volume                5.00       32909
PondB_Volume                6.00       34926

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Outfall          5747.191           5797.753
Pond_B           2455.056           5808.989
```

```
[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Orf1             4036.344           6277.533
Orf3             4003.304           5165.198

[LABELS]
;;X-Coord          Y-Coord            Label
2779.762           8023.810           "Pond B Outlet Check" "" "Arial" 10 0 0
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 09/02/2016 00:00:00
Ending Date 09/05/2016 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.792	0.258
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.792	0.258
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.024	

****
Highest Flow Instability Indexes
****
All links are stable.

****

Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
Outfall	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Pond_B	STORAGE	0.60	2.37	6305.37	0 00:00	2.36

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Outfall	OUTFALL	0.00	0.56	0 00:00	0	0.258	0.000
Pond_B	STORAGE	0.00	0.00	0 00:00	0	0.258	0.024

****
Node Flooding Summary
****

No nodes were flooded.

****

Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Pond_B	6.039	2	0	0	34.509	14	0 00:00	0.56

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall	62.25	0.21	0.56	0.258
System	62.25	0.21	0.56	0.258

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.35	0 00:00			0.00
Orf2	ORIFICE	0.20	0 00:00			0.00
Orf3	ORIFICE	0.00	0 00:00			0.00

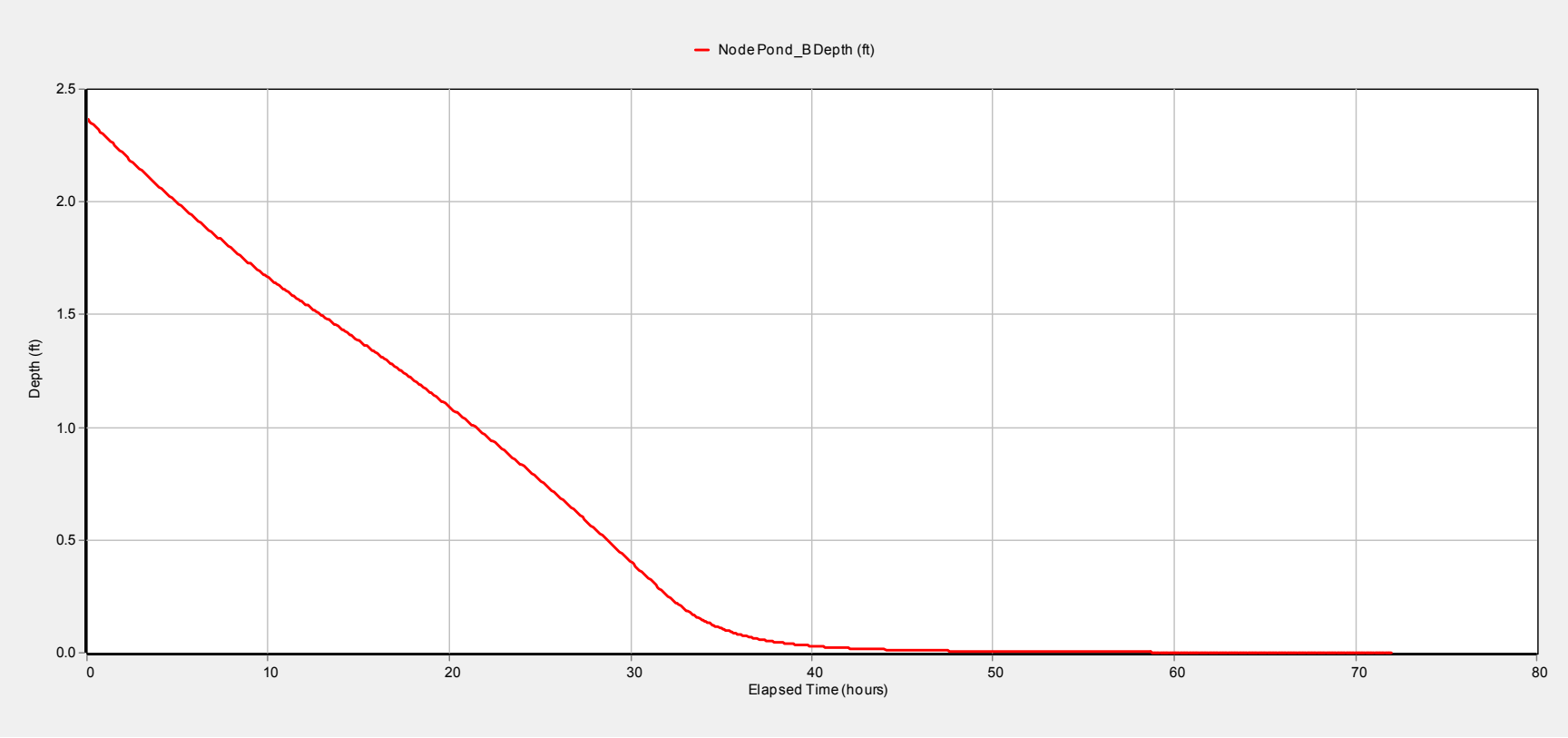
****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Jan 11 10:29:49 2019

Analysis ended on: Fri Jan 11 10:29:49 2019
Total elapsed time: < 1 sec

Total WQ


Node Pond_B Depth (ft)
Depth (ft)
2.5
2.0
1.5
1.0
0.5
0.0
0
10
20
30
40
50
60
70
80
Elapsed Time (hours)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           09/02/2016
START_TIME           00:00:00
REPORT_START_DATE    09/02/2016
REPORT_START_TIME    00:00:00
END_DATE             09/05/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Outfall          0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
```

```
;;-------------- -------- ---------- ----------- ---------- --------------------------
-------- --------          -------- --------
Pond_B           6303     9          5.12       TABULAR    PondB_Volume                 0
      0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ----------
-------- ----------
Orf1             Pond_B           Outfall          SIDE         0          0.65       NO
    0
Orf2             Pond_B           Outfall          SIDE         1.5        0.65       NO
    0
Orf3             Pond_B           Outfall          SIDE         3.0        0.65       NO
    0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
Orf1             CIRCULAR     0.23958333       0          0          0
Orf2             CIRCULAR     0.23958333       0          0          0
Orf3             CIRCULAR     0.23958333       0          0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
PondB_Volume     Storage    0.00       1722
PondB_Volume                1.00       12437
PondB_Volume                2.00       24225
PondB_Volume                3.00       26327
PondB_Volume                4.00       28436
PondB_Volume                5.00       31013
PondB_Volume                6.00       33247
PondB_Volume                7.00       35432
PondB_Volume                8.00       37548
PondB_Volume                9.00       39752

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
Outfall          5747.191          5797.753
Pond_B           2455.056          5808.989

[VERTICES]
;;Link           X-Coord           Y-Coord
;;-------------- ----------------- -----------------
Orf1             4036.344          6277.533
Orf3             4003.304          5165.198

[LABELS]
;;X-Coord          Y-Coord            Label
2779.762           8023.810           "Pond B Outlet Check" "" "Arial" 10 0 0
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 09/02/2016 00:00:00
Ending Date 09/05/2016 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.560	0.834
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	2.560	0.834
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.017	

****
Highest Flow Instability Indexes
****
All links are stable.

****

Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
Outfall	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Pond_B	STORAGE	1.79	5.12	6308.12	0 00:00	5.11

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Outfall	OUTFALL	0.00	1.30	0 00:00	0	0.834	0.000
Pond_B	STORAGE	0.00	0.00	0 00:00	0	0.834	0.017

****
Node Flooding Summary
****

No nodes were flooded.

****

Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Pond_B	28.328	11	0	0	111.511	45	0 00:00	1.30

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall	95.44	0.45	1.30	0.834
System	95.44	0.45	1.30	0.834

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.53	0 00:00			0.00
Orf2	ORIFICE	0.44	0 00:00			0.00
Orf3	ORIFICE	0.33	0 00:00			0.00

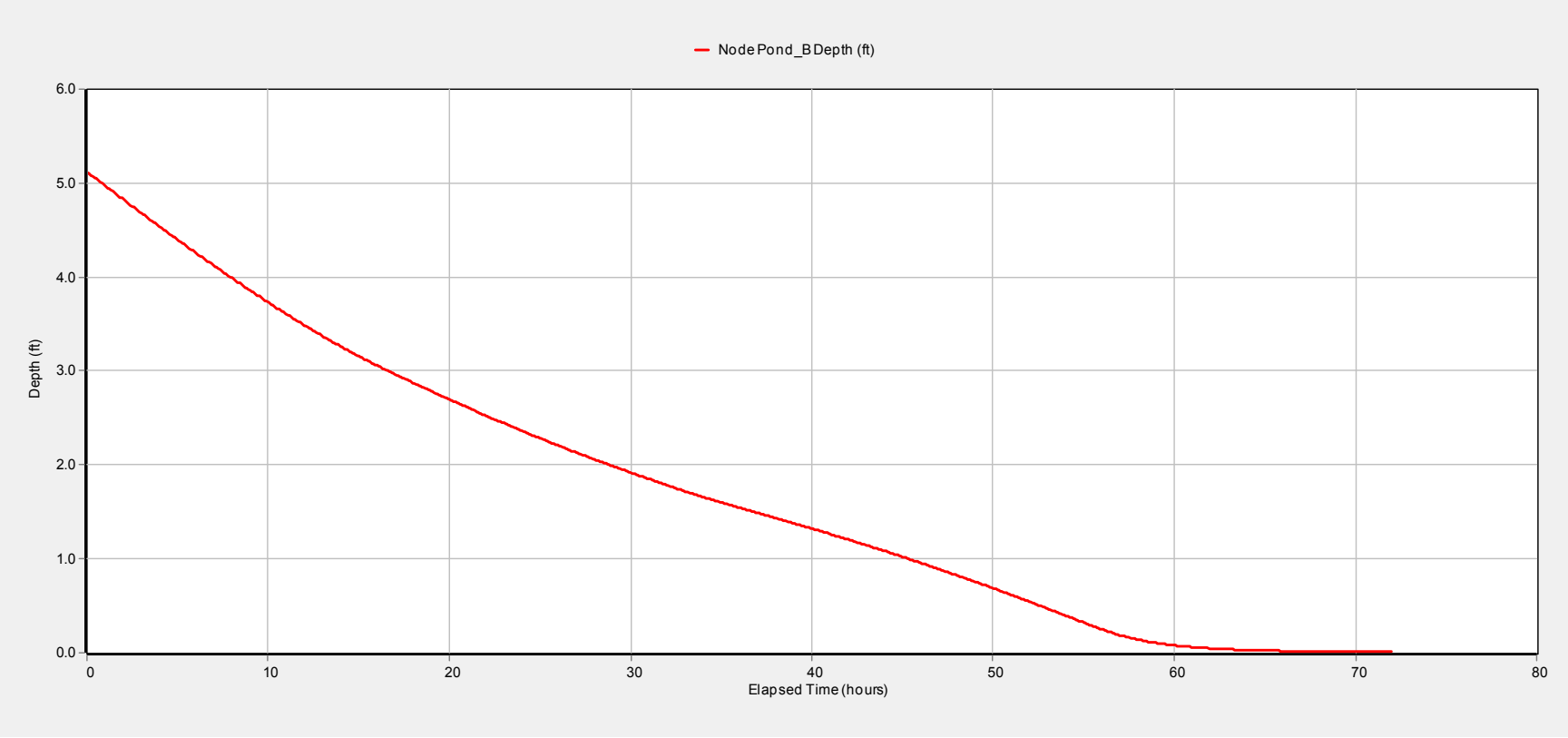
****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Jan 11 10:33:38 2019

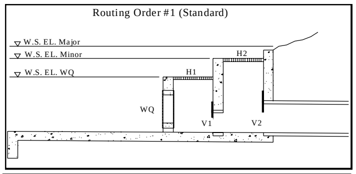
Analysis ended on: Fri Jan 11 10:33:38 2019
Total elapsed time: < 1 sec

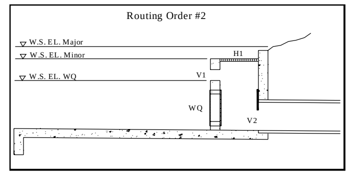
EURV + OFFSITE WQ

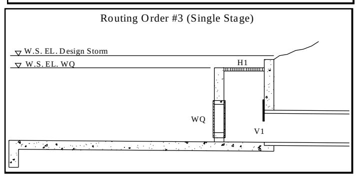


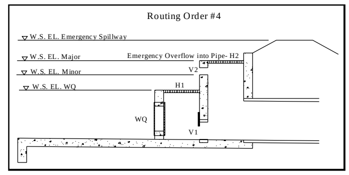
STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Crest at Woodmen
Basin ID: Pond B









Current Routing Order is #3

Design Information (Input):

			#1 Horiz.	#2 Horiz.	#1 Vert.	#2 Vert.	
Circular Opening:	Diameter in Inches	Dia. =			54.00		inches
OR							
Rectangular Opening:	Width in Feet	W =	16.00				ft.
	Length (Height for Vertical)	L or H =	8.00				ft.
	Percentage of Open Area After Trash Rack Reduction	% open =	70		100		%
	Orifice Coefficient	C_o =	0.65		0.65		
	Weir Coefficient	C_w =	3.00				
	Orifice Elevation (Bottom for Vertical)	E_o =	5.12		-0.50		ft.

Calculation of Collection Capacity:

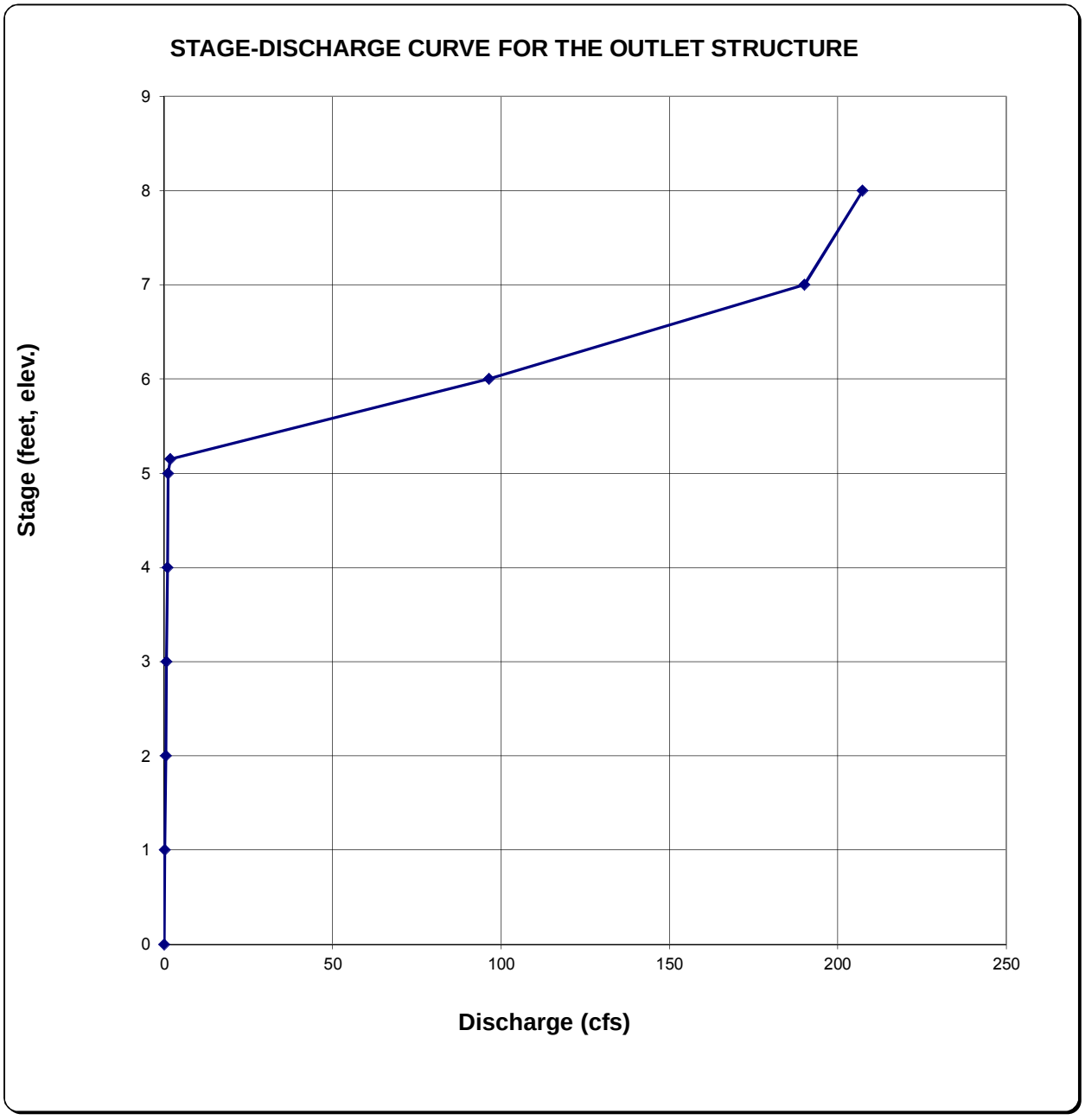
		#1 Horiz.	#2 Horiz.	#1 Vert.	#2 Vert.	
Net Opening Area (after Trash Rack Reduction)	A_o =	89.60		15.90		sq. ft.
OPTIONAL: User-Overide Net Opening Area	A_o =					sq. ft.
Perimeter as Weir Length	L_w =	38.40	ft.			
OPTIONAL: User-Overide Weir Length	L_w =		ft.			
Top Elevation of Vertical Orifice Opening, Top =				4.00		ft.
Center Elevation of Vertical Orifice Opening, Cen =				1.75		ft.

Routing 3: Single Stage - Water flows through WQCV plate and #1 horizontal opening into #1 vertical opening. This flow will be applied to culvert sheet (#2 vertical & horizontal openings is not used).

			Horizontal Orifices				Vertical Orifices			
Labels for WQCV, Minor, & Major Storage W.S. Elevations (input)	Water Surface Elevation ft (linked)	WQCV Plate/Riser Flow cfs (User-linked)	#1 Horiz. Weir Flow cfs (output)	#1 Horiz. Orifice Flow cfs (output)	#2 Horiz. Weir Flow cfs (output)	#2 Horiz. Orifice Flow cfs (output)	#1 Vert. Collection Capacity cfs (output)	#2 Vert. Collection Capacity cfs (output)	**Total Collection Capacity cfs (output)**	Target Volumes for WQCV, Minor, & Major Storage Volumes (link for goal seek)
	0.00	0.00	0.00	0.00	0.00	0.00	4.61	0.00	**0.0**	
	1.00	0.24	0.00	0.00	0.00	0.00	23.95	0.00	**0.2**	
	2.00	0.50	0.00	0.00	0.00	0.00	51.53	0.00	**0.5**	
	3.00	0.70	0.00	0.00	0.00	0.00	85.36	0.00	**0.7**	
	4.00	1.08	0.00	0.00	0.00	0.00	124.44	0.00	**1.1**	
	5.00	1.30	0.00	0.00	0.00	0.00	149.56	0.00	**1.3**	
	5.12	1.32	0.00	0.00	0.00	0.00	152.30	0.00	**1.3**	
	6.00	1.48	95.10	438.44	0.00	0.00	171.03	0.00	**96.6**	
	7.00	1.64	296.95	640.83	0.00	0.00	190.09	0.00	**190.1**	
	8.00	1.79	563.04	793.16	0.00	0.00	207.40	0.00	**207.4**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	
			#N/A	#N/A	#N/A	#N/A	#N/A	0.00	**#N/A**	

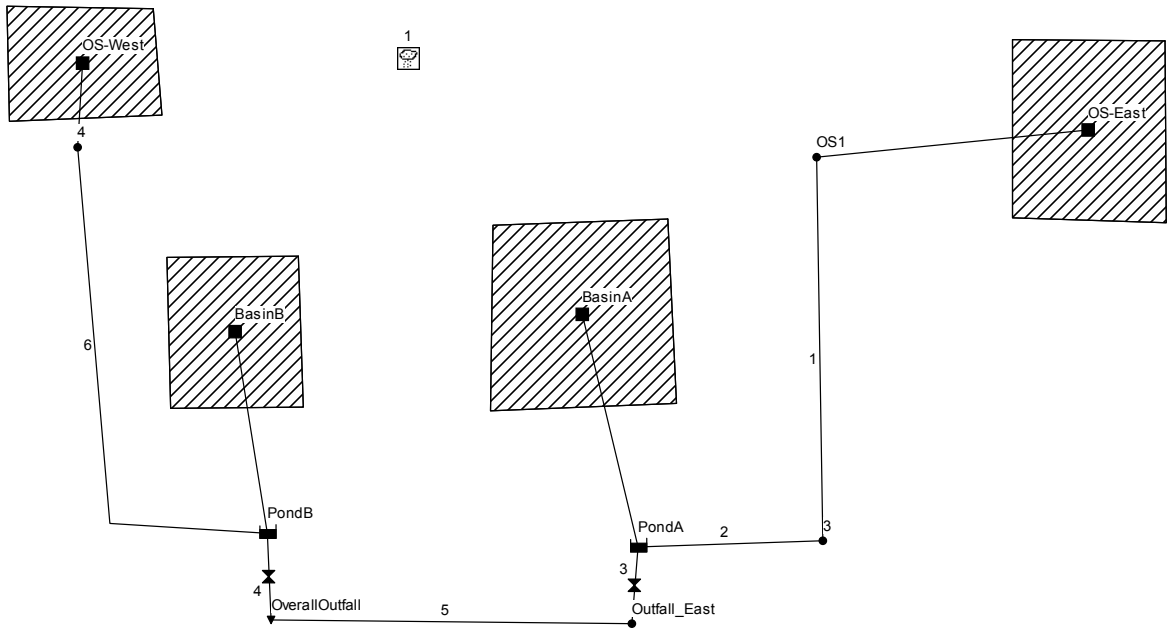
STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Crest at Woodmen
Basin ID: Pond B



SWMM MODEL – Proposed CONDITIONS

Proposed Model



```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/24/2016
START_TIME           00:00:00
REPORT_START_DATE    08/24/2016
REPORT_START_TIME    00:00:00
END_DATE             08/24/2016
END_TIME             02:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
1                CUMULATIVE 0:05     1.0      TIMESERIES CS_100-yr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
CurbLen  SnowPack
```

```
;;-------------- ---------------- ---------------- -------- -------- -------- --------
-------- ----------------
OS-East          1                OS1              33.9     77       6000     2.5      0

BasinA           1                PondA            49.8     86.5     1500     1        0

BasinB           1                PondB            31.67    70       800      3        0

OS-West          1                4                2.92     50       500      1        0


[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
OS-East          0.011      0.24       0.1        0.35       25         OUTLET
BasinA           0.011      0.24       0.1        0.35       25         OUTLET
BasinB           0.011      0.24       0.1        0.35       25         OUTLET
OS-West          0.011      0.24       0.1        0.35       25         OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
OS-East          4.5        0.6        6.48       7          0
BasinA           4.5        0.6        6.48       7          0
BasinB           4.5        0.6        6.48       7          0
OS-West          4.5        .6         6.48       7          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
OS1              6350       8          0          0          0
Outfall_East     6312       0          0          0          0
4                6324.5     5          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OverallOutfall   6303       FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ---------- ----------------------------
-------- --------          -------- --------
PondA            6310     10         0          TABULAR    PondA_Vol                    0
      0
PondB            6303     8          0          TABULAR    PondB_Vol                    0
      0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
```

```
---------- ---------- ----------
1                 OS1              PondA            880        0.035      0          0
    0          0
5                 Outfall_East     OverallOutfall   400        0.01       0          0
    0          0
6                 4                PondB            1330       0.013      0          0
    0          0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------
---------------- ---------- --------
3                 PondA            Outfall_East     0          TABULAR/DEPTH   PondA_Outlet
               NO
4                 PondB            OverallOutfall   0          TABULAR/DEPTH   PondB_Outlet
               NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
1                 DUMMY        0                0          0          0          1

5                 DUMMY        0                0          0          0          1

6                 CIRCULAR     1.5              0          0          0          1


[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
1                 0.5        1          0          NO         0
6                 0.5        1          0          NO         0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
PondA_Outlet      Rating     0.00       0.0
PondA_Outlet                 0.50       0.2
PondA_Outlet                 1.00       0.3
PondA_Outlet                 1.50       0.4
PondA_Outlet                 2.00       0.4
PondA_Outlet                 2.50       0.5
PondA_Outlet                 3.00       0.7
PondA_Outlet                 3.50       0.9
PondA_Outlet                 4.00       1.0
PondA_Outlet                 4.50       1.1
PondA_Outlet                 5.00       1.1
PondA_Outlet                 5.50       1.4
PondA_Outlet                 6.00       1.6
PondA_Outlet                 6.50       35.1
PondA_Outlet                 7.00       114.6
PondA_Outlet                 7.5        198.9
```

```
PondA_Outlet                8          207.4
PondA_Outlet                8.5        215.5
PondA_Outlet                9          223.4
PondA_Outlet                9.5        231.0
PondA_Outlet                10         238.3
PondA_Outlet                10.5       245.4
PondA_Outlet                11         252.3
PondA_Outlet                11.5       259.0
PondA_Outlet                12         265.6
;
PondB_Outlet     Rating     0.00       0.0
PondB_Outlet                1.00       0.2
PondB_Outlet                2.00       0.5
PondB_Outlet                3.00       0.7
PondB_Outlet                4.00       1.1
PondB_Outlet                5.00       1.3
PondB_Outlet                5.12       1.3
PondB_Outlet                6.00       96.6
PondB_Outlet                7.00       190.1
PondB_Outlet                8.00       207.4
;
PondA_Vol        Storage    0.00       272
PondA_Vol                   1.00       2591
PondA_Vol                   2.00       10979
PondA_Vol                   3.00       28075
PondA_Vol                   4.00       43259
PondA_Vol                   5.00       48157
PondA_Vol                   6.00       52238
PondA_Vol                   7.00       56387
PondA_Vol                   8.00       60626
PondA_Vol                   9.00       64959
PondA_Vol                   10.00      69377
PondA_Vol                   11.00      73891
PondA_Vol                   12.00      78503
;
PondB_Vol        Storage    0.00       1722
PondB_Vol                   1.00       12437
PondB_Vol                   2.00       24225
PondB_Vol                   3.00       26327
PondB_Vol                   4.00       28436
PondB_Vol                   5.00       31013
PondB_Vol                   6.00       33247
PondB_Vol                   7.00       35432
PondB_Vol                   8.00       37548
PondB_Vol                   9.00       39752

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
CS_100-yr                   0          0
CS_100-yr                   0:05       0.03528
CS_100-yr                   0:10       0.11592
CS_100-yr                   0:15       0.19908
CS_100-yr                   0:20       0.3024
CS_100-yr                   0:25       0.45108
```

```
CS_100-yr                0:30       0.65016
CS_100-yr                0:35       1.06092
CS_100-yr                0:40       1.79424
CS_100-yr                0:45       2.07648
CS_100-yr                0:50       2.24784
CS_100-yr                0:55       2.3562
CS_100-yr                1:00       2.44944
CS_100-yr                1:05       2.53008
CS_100-yr                1:10       2.56536
CS_100-yr                1:15       2.5956
CS_100-yr                1:20       2.62332
CS_100-yr                1:25       2.65104
CS_100-yr                1:30       2.67876
CS_100-yr                1:35       2.70144
CS_100-yr                1:40       2.72664
CS_100-yr                1:45       2.74932
CS_100-yr                1:50       2.772
CS_100-yr                1:55       2.79468
CS_100-yr                2:00       2.81988
;
CS_5-yr                  0          0
CS_5-yr                  0:05       0.021
CS_5-yr                  0:10       0.069
CS_5-yr                  0:15       0.1185
CS_5-yr                  0:20       0.18
CS_5-yr                  0:25       0.2685
CS_5-yr                  0:30       0.387
CS_5-yr                  0:35       0.6315
CS_5-yr                  0:40       1.068
CS_5-yr                  0:45       1.236
CS_5-yr                  0:50       1.338
CS_5-yr                  0:55       1.4025
CS_5-yr                  1:00       1.458
CS_5-yr                  1:05       1.506
CS_5-yr                  1:10       1.527
CS_5-yr                  1:15       1.545
CS_5-yr                  1:20       1.5615
CS_5-yr                  1:25       1.578
CS_5-yr                  1:30       1.5945
CS_5-yr                  1:35       1.608
CS_5-yr                  1:40       1.623
CS_5-yr                  1:45       1.6365
CS_5-yr                  1:50       1.65
CS_5-yr                  1:55       1.6635
CS_5-yr                  2:00       1.6785

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
```

```
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OS1              4377.753           7411.894
Outfall_East     2604.626           2929.515
4                -2725.771          7511.013
OverallOutfall   -864.537           2962.555
PondA            2659.692           3667.401
PondB            -897.577           3799.559

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
6                -2406.388          3887.665

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OS-East          7714.758           8535.242
OS-East          7736.784           6784.141
OS-East          6250.000           6828.194
OS-East          6250.000           8546.256
BasinA           2916.116           6855.457
BasinA           3004.222           5082.329
BasinA           1220.081           5016.250
BasinA           1242.107           6800.391
BasinB           -600.220           6464.758
BasinB           -556.167           5011.013
BasinB           -1822.687          5000.000
BasinB           -1866.740          6453.744
OS-West          -1993.392          8846.366
OS-West          -1916.300          7822.137
OS-West          -3370.044          7767.070
OS-West          -3403.084          8868.392

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
1                468.062            8359.031

[LABELS]
;;X-Coord          Y-Coord            Label
-505.952           9476.190           "Proposed Model" "" "Arial" 10 0 0
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

WARNING 10: crest elevation is below downstream invert for regulator Link 3

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... KINWAVE
Starting Date 08/24/2016 00:00:00
Ending Date 08/24/2016 02:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	16.398	1.663
Evaporation Loss	0.000	0.000
Infiltration Loss	3.230	0.328
Surface Runoff	11.917	1.209
Final Storage	1.398	0.142
Continuity Error (%)	-0.899	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	11.844	3.860
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	5.319	1.733

Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	6.514	2.123
Continuity Error (%)	0.099	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.32
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
OS-East	1.66	0.00	0.00	0.35	1.22	0.02	1.24	1.14	136.34	0.745
BasinA	1.66	0.00	0.00	0.21	1.29	0.00	1.29	1.75	144.64	0.777
BasinB	1.66	0.00	0.00	0.46	1.07	0.01	1.08	0.93	91.54	0.649
OS-West	1.66	0.00	0.00	0.76	0.79	0.02	0.81	0.06	7.61	0.489

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
OS1	JUNCTION	0.00	0.00	6350.00	0 00:00	0.00
Outfall_East	JUNCTION	0.00	0.00	6312.00	0 00:00	0.00
4	JUNCTION	0.25	0.81	6325.31	0 00:45	0.79
OverallOutfall	OUTFALL	0.00	0.00	6303.00	0 00:00	0.00
PondA	STORAGE	4.73	6.96	6316.96	0 00:58	6.94
PondB	STORAGE	3.24	5.19	6308.19	0 01:24	5.19

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
OS1	JUNCTION	136.34	136.34	0 00:45	1.14	1.14	0.000
Outfall_East	JUNCTION	0.00	107.78	0 00:58	0	1.59	0.000
4	JUNCTION	7.61	7.61	0 00:45	0.0642	0.0642	0.000
OverallOutfall	OUTFALL	0.00	108.95	0 00:58	0	1.73	0.000
PondA	STORAGE	144.64	280.98	0 00:45	1.74	2.87	0.124
PondB	STORAGE	91.54	97.59	0 00:45	0.923	0.986	-0.001

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondA	123.514	31	0	0	211.270	53	0 00:58	107.78
PondB	66.418	32	0	0	113.730	54	0 01:23	8.88

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
OverallOutfall	95.00	33.92	108.95	1.733
System	95.00	33.92	108.95	1.733

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	136.34	0 00:45			
5	DUMMY	107.78	0 00:58			
6	CONDUIT	7.07	0 00:47	8.26	0.53	0.51
3	DUMMY	107.78	0 00:58			
4	DUMMY	8.88	0 01:24			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Jan 11 10:45:27 2019
Analysis ended on: Fri Jan 11 10:45:27 2019
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

WARNING 10: crest elevation is below downstream invert for regulator Link 3

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... KINWAVE
Starting Date 08/24/2016 00:00:00
Ending Date 08/24/2016 02:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	27.549	2.795
Evaporation Loss	0.000	0.000
Infiltration Loss	3.372	0.342
Surface Runoff	22.221	2.254
Final Storage	2.233	0.227
Continuity Error (%)	-1.007	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	22.101	7.202
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	15.375	5.010

Flooding Loss	0.003	0.001
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	6.703	2.184
Continuity Error (%)	0.095	

****
Highest Flow Instability Indexes
****
Link 6 (3)
Link 1 (2)

****
Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.39
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
OS-East	2.79	0.00	0.00	0.37	2.09	0.24	2.33	2.14	260.74	0.833
BasinA	2.79	0.00	0.00	0.21	2.25	0.11	2.35	3.18	285.86	0.842
BasinB	2.79	0.00	0.00	0.48	1.86	0.21	2.06	1.77	173.76	0.738
OS-West	2.79	0.00	0.00	0.79	1.36	0.43	1.79	0.14	15.00	0.640

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
OS1	JUNCTION	0.00	0.00	6350.00	0 00:00	0.00
Outfall_East	JUNCTION	0.00	0.00	6312.00	0 00:00	0.00
4	JUNCTION	0.49	5.00	6329.50	0 00:44	5.00
OverallOutfall	OUTFALL	0.00	0.00	6303.00	0 00:00	0.00
PondA	STORAGE	5.45	8.77	6318.77	0 00:56	8.77
PondB	STORAGE	3.74	5.85	6308.85	0 00:56	5.84

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
OS1	JUNCTION	260.74	260.74	0 00:45	2.13	2.13	0.000
Outfall_East	JUNCTION	0.00	219.83	0 00:56	0	3.96	0.000
4	JUNCTION	15.00	15.00	0 00:45	0.141	0.141	0.000
OverallOutfall	OUTFALL	0.00	299.67	0 00:56	0	5.01	0.000
PondA	STORAGE	285.86	546.60	0 00:45	3.16	5.3	0.075
PondB	STORAGE	173.76	185.40	0 00:45	1.76	1.9	0.164

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours	Maximum Rate	Time of Max Occurrence	Total Flood Volume	Maximum Ponded Volume

Node	Flooded	CFS	days hr:min	10^6 gal	1000 ft3
4	0.05	1.29	0 00:46	0.001	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondA	158.339	39	0	0	320.471	80	0 00:55	219.83
PondB	79.699	38	0	0	134.841	64	0 00:55	79.84

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
OverallOutfall	95.42	97.57	299.67	5.010
System	95.42	97.57	299.67	5.010

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	260.74	0 00:45			
5	DUMMY	219.83	0 00:56			
6	CONDUIT	14.03	0 00:47	9.50	1.05	0.89
3	DUMMY	219.83	0 00:56			
4	DUMMY	79.84	0 00:56			

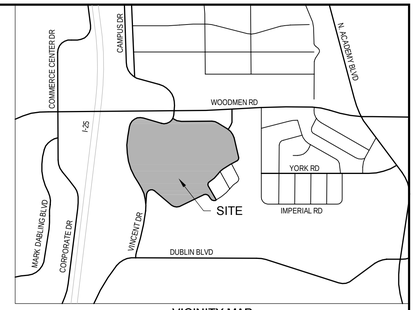
****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
6	0.04	0.04	0.04	0.03	0.04

Analysis begun on: Fri Jan 11 10:45:13 2019
Analysis ended on: Fri Jan 11 10:45:13 2019
Total elapsed time: < 1 sec

Appendix E

Drainage Maps



VICINITY MAP
1"=2000'

N

0 20 50 100
SCALE: 1"=100'

DRAINAGE LEGEND

4850	EXISTING CONTOUR
6485	PROPOSED CONTOUR
	MAJOR BASIN BOUNDARY LINE
E3 / 3.68 / 65%	BASIN DESIGNATION / BASIN PERCENT IMPERVIOUS / BASIN AREA IN ACRES
	PROPOSED STORM SEWER
1	DESIGN POINT / DESIGN POINT LABEL
	DRAINAGE ARROW / PROPOSED FLOW DIRECTION ARROW

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
OS1	0.66	0.45	0.59	8.49	1.3	2.9
OS2	0.73	0.90	0.96	5.00	3.4	6.1
W2a	11.95	0.13	0.40	22.47	4.5	23.4
W2b	2.56	0.41	0.56	5.00	5.4	12.4
W2c	1.56	0.73	0.81	5.00	5.9	11.0
W2d	5.07	0.36	0.53	8.61	7.9	19.6
W2e	4.23	0.46	0.60	9.75	8.1	17.8
W2f	4.76	0.73	0.81	5.00	17.9	33.4
W2g	10.13	0.33	0.51	8.12	14.8	38.5
W2h	3.49	0.16	0.42	16.42	1.9	8.3
W2i	5.28	0.36	0.53	8.03	8.5	20.9
W2j	0.74	0.73	0.81	5.00	2.8	5.2
W2k	0.55	0.73	0.81	5.00	2.1	3.9
W2l	6.01	0.73	0.81	5.00	22.7	42.2
W2m	10.49	0.22	0.45	9.59	9.7	33.2
W2n	10.27	0.23	0.46	15.00	8.3	27.9
W2o	4.09	0.10	0.38	11.48	1.6	10.2
OS3	2.12	0.26	0.48	9.00	2.4	7.3
OS4	0.80	0.64	0.74	5.00	2.6	5.1

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SCOTT MICHAEL BROWN
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PROFESSIONAL ENGINEER
01/30/2019

THE CREST AT WOODMAN MDDP

REALM REALTY

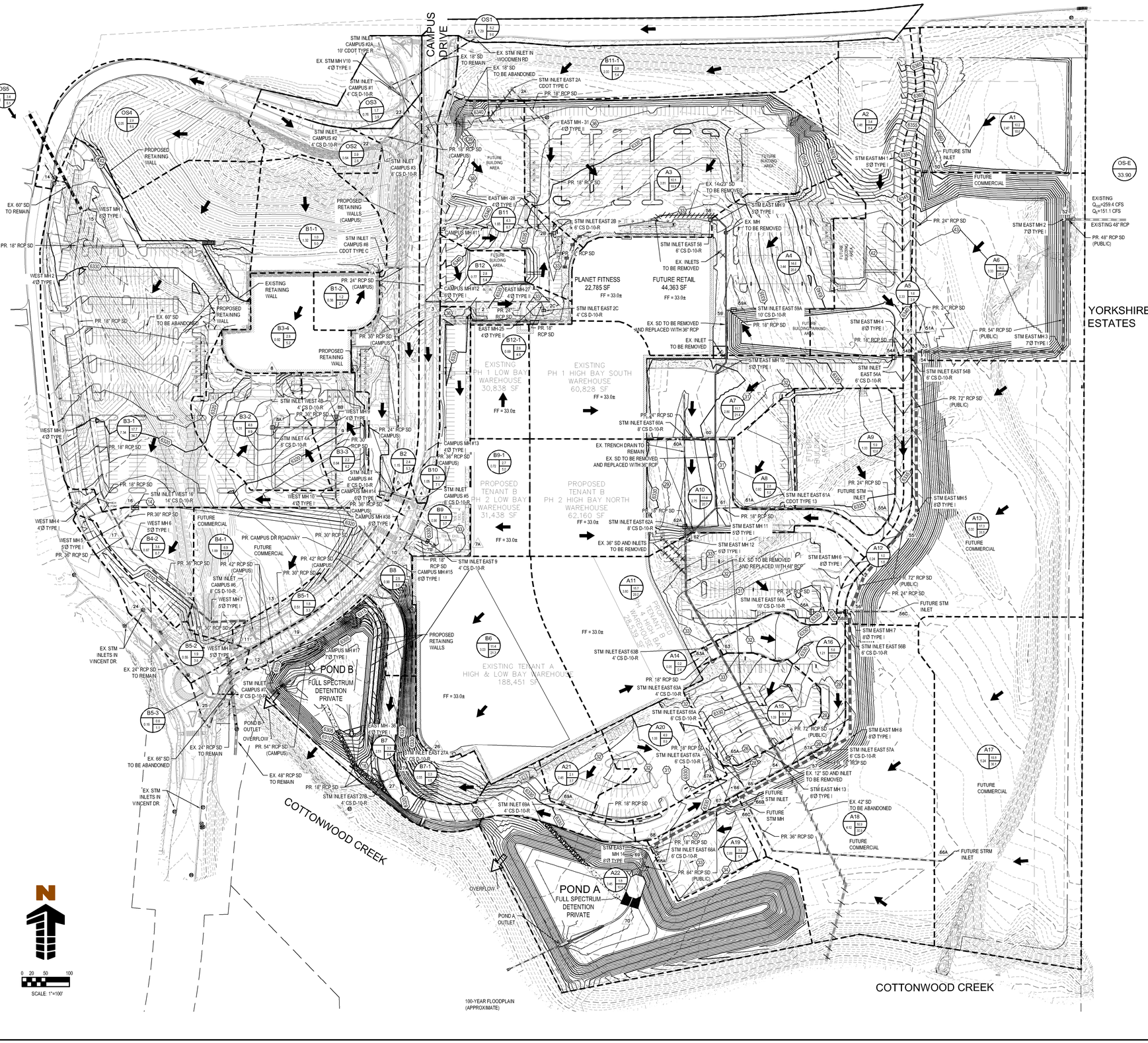
E. WOODMEN RD. & VINCENT DR.
COLORADO SPRINGS, CO

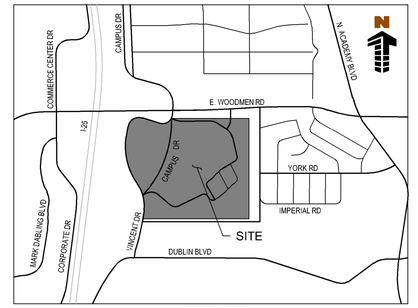
#	Date	Issue / Description	Init.

Project No:	RLM002
Drawn By:	SMB
Checked By:	SMB
Date:	7/22/16

HISTORIC DRAINAGE MAP

1





VICINITY MAP
1"=2000'

DRAINAGE LEGEND

- DESIGN POINT/COMBINE NODE
- DRAINAGE BASIN DESIGNATION
- 5–YEAR RUNOFF (CFS)
- 100–YEAR RUNOFF (CFS)
- DRAINAGE BASIN ACRES
- DEVELOPED BASIN BOUNDARIES
- DIRECTION OF RUNOFF

SITE LEGEND

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- ROADWAY CENTERLINE
- RIGHT-OF WAY LINE / BOUNDARY
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED EASEMENT
- EXISTING CATCH CURB & GUTTER
- PROPOSED CURB AND GUTTER
- EXISTING SIDEWALK
- PROPOSED WALK & TRAIL
- EXISTING STORM SEWER
- EXISTING STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED INLET
- ESMT EASMENT
- EX EXISTING

NOTES

1. ALL STORM DRAIN PRIVATE WITH THE EXCEPTION OF PIPES LABELED "CAMPUS" AND IF OTHERWISE NOTED.

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
B1-1	1.32	0.18	0.52	9.03	1.0	4.9
B1-2	0.38	0.73	0.81	10.00	1.1	2.1
B2	1.15	0.46	0.60	7.26	2.4	5.3
B3-1	7.34	0.54	0.63	7.93	17.8	34.8
B3-2	1.31	0.70	0.78	5.00	4.7	8.9
B3-3	0.64	0.66	0.75	5.00	2.2	4.2
B3-4	0.92	0.73	0.81	10.00	2.8	5.2
B4-1	1.69	0.81	0.88	5.42	6.9	12.6
B4-2	0.87	0.81	0.88	5.00	3.6	6.6
B5-1	0.51	0.66	0.75	5.00	1.7	3.3
B5-2	0.55	0.67	0.76	5.00	1.9	3.6
B5-3	0.16	0.70	0.79	5.00	0.6	1.1
B6	3.03	0.73	0.81	5.00	11.4	21.3
B7	2.51	0.29	0.49	7.62	3.3	9.4
B7-1	0.55	0.10	0.38	8.75	0.2	1.5
B8	0.90	0.55	0.66	5.61	2.5	5.0
B9	0.96	0.46	0.57	13.72	1.6	3.4
B9-1	0.72	0.73	0.81	5.00	2.7	5.1
B10	1.05	0.69	0.78	5.00	3.7	7.1
B11	1.65	0.57	0.68	7.27	4.3	8.7
B11-1	2.00	0.10	0.38	9.50	0.8	5.4
B12	0.77	0.72	0.80	5.00	2.9	5.3
B12-1	0.69	0.73	0.81	5.00	2.6	4.9
OS1	1.29	0.78	0.86	5.00	5.2	9.6
OS2	0.54	0.35	0.58	5.97	0.9	2.6
OS3	0.76	0.45	0.63	6.04	1.7	3.9
OS4	2.05	0.31	0.57	7.65	2.9	8.9
OS5	0.80	0.81	0.88	5.00	3.4	6.1
A1	2.47	0.81	0.88	5.22	10.2	18.6
A2	2.48	0.37	0.54	13.07	3.4	8.4
A3	3.81	0.62	0.72	8.97	10.1	19.8
A4	3.44	0.82	0.89	5.00	14.6	26.6
A5	0.33	0.90	0.96	5.00	1.5	2.7
A6	3.33	0.81	0.88	5.00	13.9	25.4
A7	2.86	0.81	0.88	5.42	11.7	21.3
A8	0.60	0.90	0.96	5.00	2.8	5.0
A9	1.33	0.86	0.92	5.00	5.9	10.6
A10	2.75	0.80	0.87	5.00	11.4	20.8
A11	3.80	0.80	0.88	5.00	15.7	29.0
A12	0.24	0.90	0.96	7.61	1.0	1.8
A13	5.00	0.81	0.88	9.14	17.3	31.5
A14	0.05	0.90	0.96	5.00	0.2	0.4
A15	1.09	0.90	0.96	5.00	5.1	9.1
A16	1.21	0.90	0.96	5.00	5.6	10.1
A17	5.24	0.81	0.88	7.00	19.8	36.1
A18	4.12	0.81	0.88	5.36	16.9	30.8
A19	0.69	0.90	0.96	5.00	3.2	5.7
A20	1.06	0.90	0.96	5.00	4.9	8.8
A21	0.45	0.90	0.96	5.00	2.1	3.7
A22	3.45	0.11	0.39	7.04	1.8	10.5

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PROFESSIONAL ENGINEER
01/30/2019

CREST AT WOODMEN MDDP AMENDMENT PRELIMINARY DRAINAGE REPORT PHASES 1, 2, & 3

1005 E. WOODMEN ROAD
COLORADO SPRINGS, CO 80920

#	Date	Issue / Description	Init.

Project No:	RLM2.02
Drawn By:	CMV
Checked By:	SMB
Date:	01/09/2019

DRAINAGE MAP

D1

H:\Realm Realty\CO\ Colorado Springs, EL\#0000\02 CD\ Phase 3\Hydro\3 Permit Cond\Grad\04 Grad Drain\Grd 2 Proposed Drainage Rev\preliminary Drainage Report - 4Design\PLMD2.02_Plots - Drainage Plan.dwg, - Kurt Brown - 1/11/2019