

**Master Development Drainage Plan for
THE CREST AT WOODMEN
LOOART SUBDIVISION FILING NO. 6**
Campus Drive and Woodmen Road
Colorado Springs, Colorado

Developer:
Crest at Woodmen, LLC
431 North Weber
Colorado Springs, CO 80903

Prepared by:
Galloway & Company, Inc.
1755 Telstar Drive, Suite 107
Colorado Springs, CO 80920
Phone: 719.900.7220
Fax: 303.770.3636
John Radcliffe P.E.

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Table of Contents

Certification Statements.....	ii
I. Introduction	1
II. General Location and Description.....	1
III. Historic Drainage Patterns and Features	1
IV. Drainage Design Criteria	4
V. Proposed Drainage Plan.....	5
A. General Description.....	5
B. Proposed Basins.....	6
C. Detention and Water Quality.....	8
VI. Drainage and Bridge Fees.....	11
VII. Conclusions	11
VIII. References.....	11

Appendix A – Figures and Exhibits

Appendix B – Hydrologic Calculations

Appendix C – Pond Calculations

Appendix D – Existing and Proposed Drainage Map

CERTIFICATION STATEMENTS

This report and plan for the drainage design of The Crest at Woodmen - Looart Subdivision Filing No. 6 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 PE,
Registered Professional Engineer
State of Colorado No. 45900
Date
04/26/2018

Developer's Statement:

Crest at Woodmen, LLC hereby certifies that the drainage facilities for The Crest at Woodmen - Looart Subdivision Filing No. 6 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.

Crest AT Woodmen, LLC

Name of Developer

[Signature] 4/26/18

Authorized Signature Date

CASEY SCALE

Printed Name

Asst Manager

Title

900 Town & County Lane, Suite 210, Houston TX 77094
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.

[Signature]

For City Engineer

5/17/18

Date

Conditions:

I. INTRODUCTION

This document is the Master Development Drainage Plan (MDDP) for The Crest at Woodmen Project. The purpose of this MDDP is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site and to establish a post development drainage concept for the proposed development. This report will identify which types of drainage facilities will be needed and where they will be located. Potential drainage problems associated with the proposed development will also be discussed, as well as possible solutions.

II. GENERAL LOCATION AND DESCRIPTION

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 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.

The site covers an area of approximately 76.54 acres in size. The proposed development is intended to be zoned "PBC," Planned Business Center, for the construction of commercial/retail parcels.

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). The site is not within the Streamside Overlay Zone.

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. For the purposes of the proposed project, Basin W2 was further subdivided as documented below. Outfall 20 corresponds to the Cottonwood Creek Tributary. However, in the current condition, there are 2 different outfall locations (southeast corner of Basin W2 and southwest corner of Basin W2). A copy of the drainage map from the DBPS prepared by URS has been included for reference in Appendix A.

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. Runoff enters 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 drainage calculations were based on the City of Colorado Springs drainage criteria manual Figure 6-5 and IDF equations to determine the intensity, and are listed in Table 1 below.

Table 1 – Precipitation Data

Return Period	One Hour Depth (in.)	Intensity
5-year	1.44	5.17
100-year	2.42	8.68

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

The 100-year event was used as the major storm event for pipes and inlets. The 5-year event was used as the minor event and hydraulic results are shown in the appendix.

The full spectrum detention method (FSD) was used to size the proposed water quality/detention pond. This method attributes two design volumes; one being the Excess Urban Runoff Volume (EURV) and the other being 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 volume for those basins. Additionally Pond A will overdretain 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. These approximate outfall locations will remain. 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.

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 used where practical.

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

Basin A1 (7.52 AC, $Q_5 = 31.9$ cfs, $Q_{100} = 56.0$ 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 DP1. Flow will be routed to proposed Pond A.

Basin A2 (4.36 AC, $Q_5 = 18.1$ cfs, $Q_{100} = 31.8$ 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 DP2. Flow will be routed to proposed Pond A.

Basin A3 (2.15 AC, $Q_5 = 0.4$ cfs, $Q_{100} = 6.6$ cfs): a basin comprised of open space area. Runoff from this basin will sheet flow and enter Basins A2, A4 and A5 where it will enter the proposed storm sewer system and be routed to proposed Pond A.

Basin A4 (4.28 AC, $Q_5 = 17.8$ cfs, $Q_{100} = 31.2$ 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 DP4. Flow will be routed to proposed Pond A.

Basin A5 (8.72 AC, $Q_5 = 35.8$ cfs, $Q_{100} = 62.9$ 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 DP5. Flow will be routed to proposed Pond A.

Basin A6 (1.81 AC, $Q_5 = 7.9$ cfs, $Q_{100} = 14.1$ cfs): a basin comprised of building rooftop. Runoff

from this basin will be routed by the proposed storm sewer system where it will outfall into proposed Pond A.

Basin A7 (1.98 AC, $Q_5 = 8.6$ cfs, $Q_{100} = 15.5$ cfs): a basin comprised of building rooftop. Runoff from this basin will be routed by the proposed storm sewer system where it will outfall into proposed Pond A.

Basin A8 (9.54 AC, $Q_5 = 41.7$ cfs, $Q_{100} = 73.3$ 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 DP8. Flow will be routed to proposed Pond A.

Basin A9 (5.25 AC, $Q_5 = 21.2$ cfs, $Q_{100} = 37.2$ cfs): a basin comprised of open space area. Runoff from this basin will sheet flow and be routed to proposed Pond A.

Basin A10 (5.27 AC, $Q_5 = 0.9$ cfs, $Q_{100} = 15.4$ cfs): a basin comprised of proposed Pond A, 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, $Q_{100} = 210.3$ 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. 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 A.

Basin B1 (2.71 AC, $Q_5 = 3.5$ cfs, $Q_{100} = 12.3$ cfs): a basin defining the area of future commercial development as well as open space. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP11. Flow will be routed to proposed Pond B.

Basin B2 (1.29 AC, $Q_5 = 5.6$ cfs, $Q_{100} = 10.1$ cfs): a basin comprised of building rooftop. Runoff from this basin will be routed by the proposed storm sewer system where it will outfall into proposed Pond B.

Basin B3 (7.84 AC, $Q_5 = 24.0$ cfs, $Q_{100} = 46.4$ cfs): a basin defining the area of future commercial development as well as open space. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP13. Flow will be routed to proposed Pond B.

Basin B4 (3.21 AC, $Q_5 = 14.4$ cfs, $Q_{100} = 25.4$ cfs): a basin defining the area of future commercial development as well as open space. With future development, a storm sewer system will collect runoff from this basin and tie into the proposed storm inlet at DP14. Flow will be routed to proposed Pond B.

Basin B5 (0.90 AC, $Q_5 = 1.9$ cfs, $Q_{100} = 4.9$ cfs): a basin comprised of proposed roadway and open space area. Runoff from this basin will be collected in a storm inlet at DP15 and will be

routed to proposed Pond B.

Basin B6 (3.03 AC, $Q_5 = 13.2$ cfs, $Q_{100} = 23.7$ cfs): a basin comprised of building rooftop. Runoff from this basin will be routed by the proposed storm sewer system where it will outfall into proposed Pond B.

Basin B7 (8.69 AC, $Q_5 = 28.7$ cfs, $Q_{100} = 52.3$ cfs): a basin comprised of proposed roadway and open space area. Runoff from this basin will sheet flow into proposed Pond B.

Basin B8 (2.06 AC, $Q_5 = 6.7$ cfs, $Q_{100} = 14.0$ cfs): a basin containing the area of future commercial development as well as open space and proposed Pond B. Runoff from this basin will be collected in a storm inlet at DP18 and will be routed to proposed Pond B.

Basin OS1 (0.66 AC, $Q_5 = 1.9$ cfs, $Q_{100} = 4.1$ cfs): a basin comprised of proposed roadway and open space area. Runoff from this basin will be collected in a storm inlet at DP19 and will be routed to the existing storm sewer system within Woodmen Road.

Basin OS2 (0.73 AC, $Q_5 = 3.5$ cfs, $Q_{100} = 6.0$ cfs): a basin comprised of proposed roadway. Runoff from this basin will be collected in a storm inlet at DP20 and will be routed to the existing storm sewer system within Woodmen Road.

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 which 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). Flows from both Basins OS3 and OS4 will be rerouted through the proposed site. The existing storm sewer is larger than required therefore a smaller pipe will be used to route the flows. The flows will be routed to Detention 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.

The site redevelopment is being phased and at this time all of the phasing is unknown. Temporary/interim ponds may be provided with specific phases for ease of construction and to maintain functionality of existing portions of the site. The ponds will be built in their ultimate configuration when warranted by the phasing of the site. The temporary/interim ponds and ultimate buildout will be handled with preliminary and final drainage reports with the individual phases.

Pond A

This pond has approximately 50.88 acres of on-site basins tributary to it (Basins A1-A10). The pond 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 5.58 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 as they do not conform to the current DCM. 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 the Appendices.

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 29.73 acres of on-site basins tributary to it (Basins B1-B8). In addition the small offsite basins OS-3 and OS-4 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 80.61 acres of onsite basins. The offsite basins were left as a developed 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 42.37 cfs and 191.43 cfs in the minor and major events respectively. Pond B was sized to have a release of 8.78 cfs and 98.90 cfs in the minor and major events respectively. This gives a total release of 47.89 cfs in the minor storm, which is significantly less than the historic rate and 282.80 cfs in the major storm which is also significantly 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 8.74 ac-ft in Pond A and 3.05 ac-ft in Pond B. The ponds will have the required freeboard per the DCM.

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.

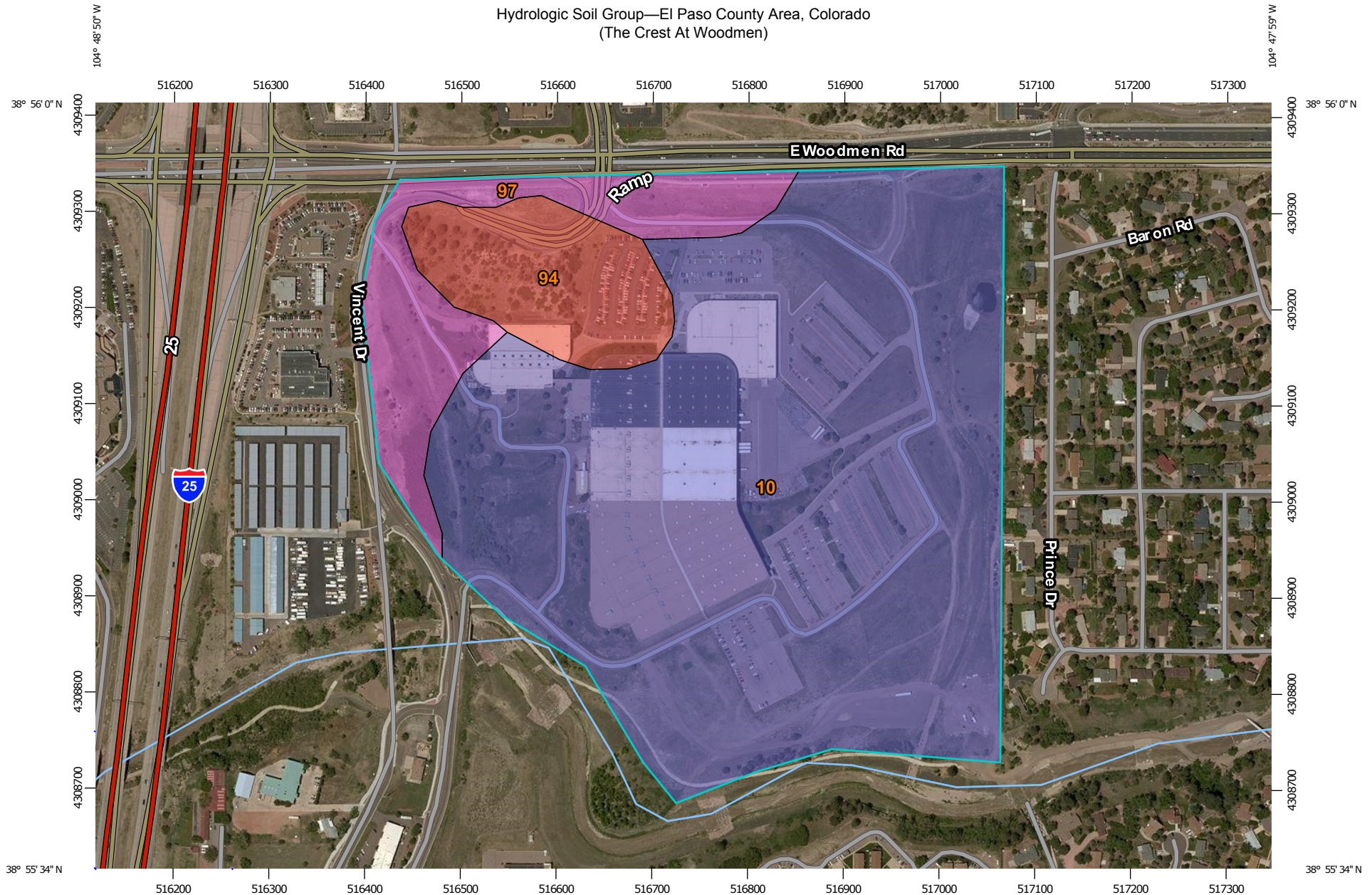
Appendix A

Figure and Exhibits

VICINITY MAP



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



Map Scale: 1:5,620 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet


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



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.

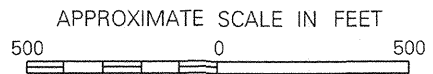
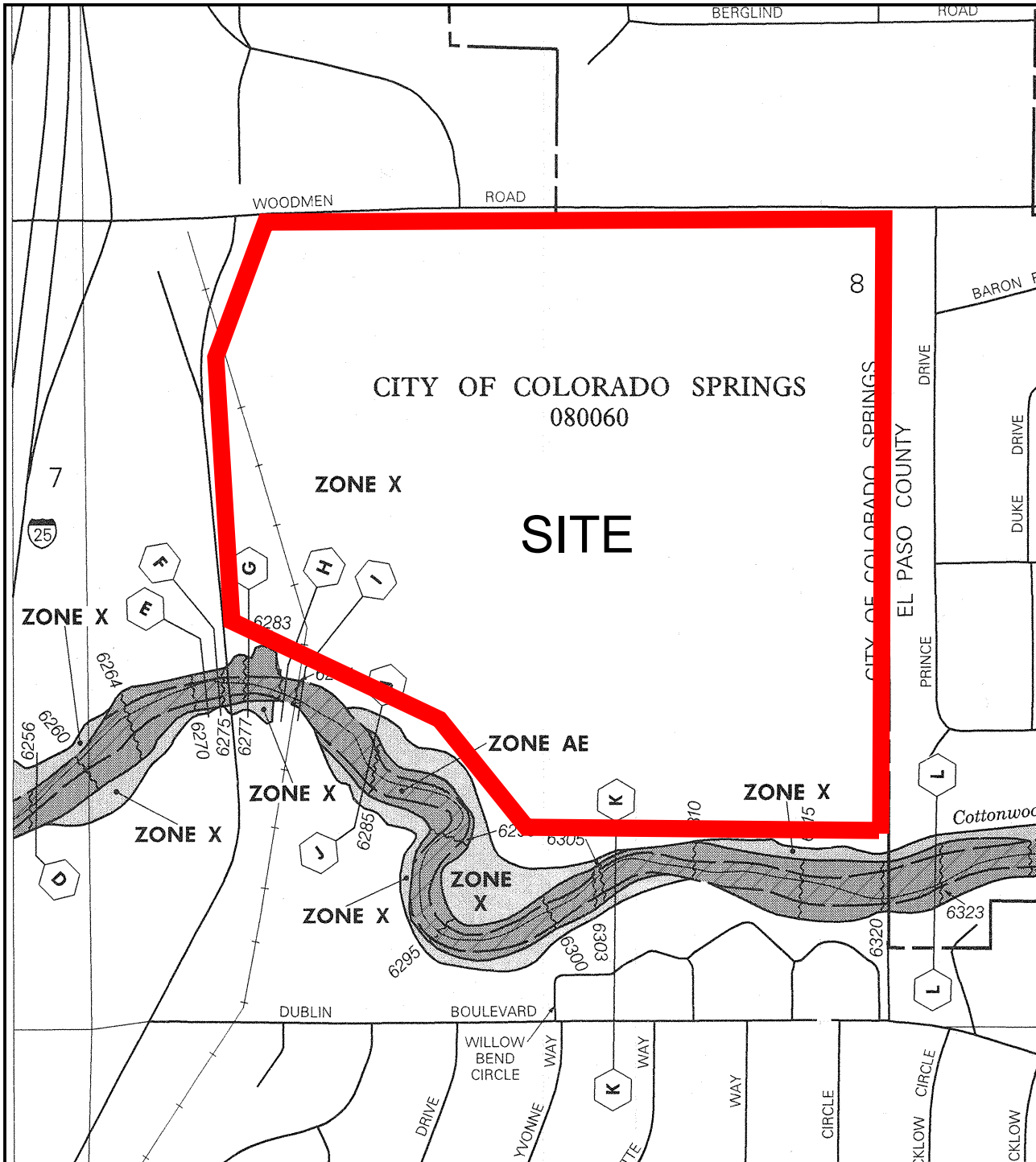
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY,
 COLORADO AND
 INCORPORATED AREAS

PANEL 516 OF 1300
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0516	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0516	F

MAP NUMBER
08041C0516 F

EFFECTIVE DATE:
MARCH 17, 1997



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

CITY ENGR. — CHECK OUT SET #4



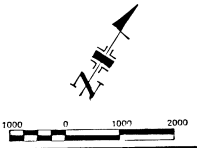
RECOMMENDED IMPROVEMENTS FOR DRAINAGE REACHES IN EL PASO COUNTY OUTSIDE (UPSTREAM) OF THE DETAILED AERIAL TOPOGRAPHICAL STUDY MAPPING.

REACH	REC-1 FLOW w/det. (CFS)	CHANNEL LENGTH (FT)	EXISTING IMPROVEMENT	TOTAL BOTTOM WIDTH (FT)	TOTAL DEPTH (FT)	RECOMMENDED IMPROVEMENT
7 TO DESIGN POINT 8	2,322	3,000	NATURAL	80	4.5	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
8 TO DESIGN POINT 7	1,715	3,500	NATURAL	80	5.0	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
7 TO DESIGN POINT 6	854	3,500	NATURAL	50	4.5	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 8 (BRIDGE)
6 TO DESIGN POINT 5	673	3,000	NATURAL	50	4.0	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
5 TO DESIGN POINT 4	870	3,000	VEG. LINING	50	4.0	BRIDGE CONTROL, 12 (BRIDGE)
4 TO DESIGN POINT 3	467	3,500	VEG. LINING	20	4.0	BRIDGE CONTROL, 12 (BRIDGE)
3 TO DESIGN POINT 2	335	3,500	VEG. LINING	20	4.5	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
2 TO DESIGN POINT 1	114	2,300	NATURAL	20	3.0	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 21 (BRIDGE)
1A TO DESIGN POINT 1B	577	2,500	NATURAL	48" RCP	N/A	OTHER BRIDGE
1A TO DESIGN POINT 1B	255	2,500	NATURAL	48" RCP	N/A	OTHER BRIDGE
1B TO DESIGN POINT 1C	592	4,800	NATURAL	48" RCP	N/A	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
1C TO DESIGN POINT 1D	594	4,000	NATURAL	60" RCP	N/A	NATURAL BOTTOM WITH BRUSH HUTTER/ROCK BARS & BRIDGE CONTROL, DITCH 21 (BRIDGE)
1D TO DESIGN POINT 1E	973	3,000	NATURAL	60" RCP	N/A	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 8 (BRIDGE)
1E TO DESIGN POINT 1F	552	4,000	NATURAL	60" RCP	N/A	OTHER BRIDGE
1F TO DESIGN POINT 1G	330	4,000	NATURAL	60" RCP	N/A	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
1G TO DESIGN POINT 1H	179	3,000	NATURAL	48" RCP	N/A	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
1H TO DESIGN POINT 1I	417	3,000	NATURAL	48" RCP	N/A	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)
1I TO DESIGN POINT 1J	138	3,900	NATURAL	48" RCP	N/A	NATURAL BOTTOM WITH GRAVEL/ROCK BARS & BRIDGE CONTROL, DITCH 12 (BRIDGE)

LOCATION	REC-1 FLOW w/det. (CFS)	BRIDGE LENGTH (FT)	EXISTING IMPROVEMENT	TOTAL BOTTOM WIDTH (FT)	TOTAL DEPTH (FT)	RECOMMENDED IMPROVEMENT
BRIARGATE PKWY (DP 8)	861	180	N/A	N/A	12	12" x 8" CONCRETE PIPE CULVERT
BRIARGATE PKWY (DP 5)	673	180	N/A	N/A	10	12" x 8" CONCRETE PIPE CULVERT
RESEARCH PKWY (DP 5)	870	180	N/A	N/A	12	12" x 8" CONCRETE PIPE CULVERT
FOREST ROAD (LANE DP 1)	60	60	HP - 2' x 8' 48"	12	9	12" x 8" CONCRETE PIPE CULVERT
WILSON ROAD (DP 3)	335	60	CRP - 36" 2872' RCP	N/A	N/A	12" x 8" CONCRETE PIPE CULVERT
WILSON ROAD (DP 3)	335	60	CRP - 48" 2872' RCP	N/A	N/A	12" x 8" CONCRETE PIPE CULVERT
WILSON ROAD (DP 3)	335	60	CRP - 48" 2872' RCP	N/A	N/A	48" REINFORCED CONCRETE PIPE
WILSON ROAD (DP 3)	335	60	CRP - 48" 2872' RCP	N/A	N/A	48" REINFORCED CONCRETE PIPE
WILSON ROAD (DP 3)	335	60	CRP - 48" 2872' RCP	N/A	N/A	48" REINFORCED CONCRETE PIPE
WILSON ROAD (DP 3)	335	60	CRP - 48" 2872' RCP	N/A	N/A	48" 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	REC-1 FLOW w/det. (CFS)	EXISTING IMPROVEMENT	PROPOSED IMPROVEMENT
CITY BRIDGES			
BRIARGATE PKWY (DP 8)	1,632	N/A	TRIPLE 18" x 8" CIRC
COUNTY BRIDGES			
BLACK FOREST ROAD (DP 7)	861	BRIDGE, 7'-45" x 20" x 17"	REPLACE FOR 3 LANE NATIONAL, 70' x 110'



LEGEND:

- A1 SUB-BASIN DESIGNATION
- ▲ DESIGN POINT
- MAJOR BASIN BOUNDARY
- - - SUB-BASIN BOUNDARY

SHEET INDEX:

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



Phase 1: Campus Drive to Stinson Road Drainage Report – 100%

February 17, 2009



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	On-Grade Curb Inlet	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 Flow	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 Flow	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 time	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	Existing Inlet flow adjusted for time	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 System	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 System	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 System	3.15561	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	Existing Grate Inlet	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 Inlet	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

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 (%)	Manning's n	Total Flow To Inlet (cfs)	Total Interceptor Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter 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												
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	O-4	2.00	0.013	2.48	2.48	0.00	100.0	7.32	0.23	
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	13-1	2.00	0.013	7.32	5.54	1.78	75.7	11.77	0.32	
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	5.81	5.81	0.00	100.0	25.32	0.51	
35-2	Generic Default 100%	Generic Inlet	6,468.00	6,467.70			2.00	false	2.00	0.00	In Sag				7.14	5.46	1.68	76.5	11.65	0.32	
36-2	Generic Default 100%	Generic Inlet	6,479.61	6,472.00			2.00	false	2.00	0.00	In Sag				18.89	18.89	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				0.00	0.00	0.00	100.0	0.00	0.00	
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				1.50	1.50	0.00	100.0	10.41	0.21	
DP-7B	Combination Denver No 16 Single	Combination Inlet	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	51.00	51.00	0.00	100.0	43.64	0.87	
DP-7C	Combination Denver No 16 Single	Combination Inlet	6,400.00	6,393.60	3.33	38.0	2.00	false	2.00	0.00	On Grade	HD-G1	0.01	0.013	0.75	0.75	0.00	100.0	23.05	0.55	
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				0.80	0.78	0.02	97.3	14.54	0.29	
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	1.33	0.013	0.32	0.32	0.00	100.0	2.12	0.13	
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	1.34	0.013	0.24	0.24	0.00	100.0	3.44	0.09	
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	05-2	1.35	0.013	2.32	2.26	0.05	97.8	8.65	0.19	
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	06-2	1.62	0.013	5.38	5.38	0.00	100.0	10.82	0.30	
VV-SW	Generic Default 100%	Generic Inlet	6,358.31	6,354.90			2.00	false	2.00	0.00	In Sag	06-3	1.90	0.013	0.29	0.29	0.01	98.1	3.51	0.09	
VV-SE	Generic Default 100%	Generic Inlet	6,359.09	6,355.00			2.00	false	2.00	0.00	In Sag				0.75	0.75	0.00	100.0	0.00	0.00	
VV-N	Generic Default 100%	Generic Inlet	6,360.84	6,357.60			2.00	false	2.00	0.00	In Sag				8.91	8.91	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	5.75	5.75	0.00	100.0	0.00	0.00	
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	0.97	0.97	0.00	100.0	7.40	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	1.86	0.12	
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	8.15	0.07	
DP-6	Combination Denver No 16 Single	Combination Inlet	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	10.40	0.11	
DP-7A	Combination Denver No 16 Single	Combination Inlet	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		50.0	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	
VV-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	
VV-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	11.80	0.23	
02-2	Combination Denver No 16 Double	Combination Inlet	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 Inlet	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 Inlet	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 Inlet	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	On Grade				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 Inlet	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	0.28	

Scenario: Five Year

Table C - Pipe Report

Label	Upstream Node	Downstream Node	Section Shape	Section Size	Material	Manning 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	6,461.80	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	25-1A	25-1	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	6,471.30	6,471.30	6,471.30	6,471.30	6,474.20	6,473.70	4.21	6.30	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-06-3	06-3	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-06-2	06-2	06-1	Circular	36 inch	Concrete	0.013	41.04	1.84	6,380.50	6,379.70	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-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	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	6,377.82	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-28-2	28-1	28-A	Circular	48 inch	Concrete	0.013	84.20	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	WV-SE	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	6,360.30	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	6,395.70	6,395.40	6,395.70	6,395.40	6,397.60	6,397.30	4.57	5.30	6,396.92	6,396.59	2.76	10.32	3.37
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	6,395.80	6,397.60	6,397.30	5.60	5.74	6,396.56	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	185.16	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	6,395.10	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-6	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	18 inch	Circular	18 inch	Concrete	0.013	87.91	6.48	6,398.70	6,398.00	6,398.70	6,398.00	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	4.60	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	6,396.90	6,398.25	6,397.65	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	6,395.90	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	6,394.55	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-6	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	6,397.30	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	6,383.51	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	6,384.82	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	6,356.11	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	6,353.77	6,353.69	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	6,363.83	6,365.97	6,365.69	1.53	1.96	6,365.16	6,364.87	4.26	7.87	3.29

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Project Engineer: Daniel Martinez
 StormCAD v5.5 [5.5006]
 Page 1 of 2

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	6,364.76	6,363.48	8.25	15.54	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	6,366.78	8.48	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	6,361.77	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	6,372.78	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	6,364.83	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	6,365.00	6,365.85	6,365.00	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	6,356.00	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	

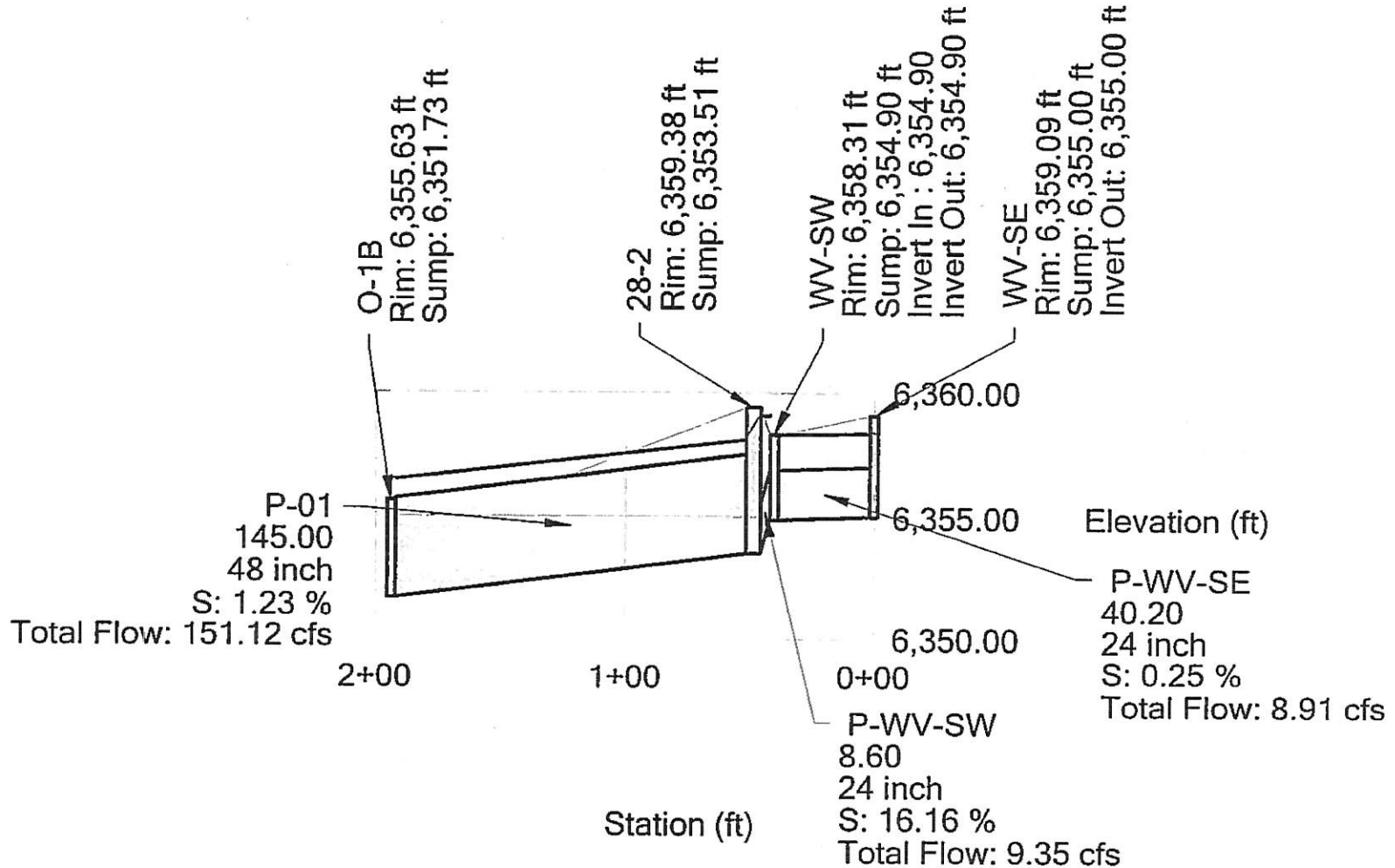
Scenario: Five Year

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	Existing Manhole Existing Manhole Existing Junction Existing Wye Pipe Connection Existing MH Connection to Existing Home Depot In	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		6.00	6,359.38	6,353.51	true	6,359.38	6,359.07	6,358.11	151.12
28-1		7.00	6,361.91	6,356.00	false	6,361.75	6,360.62	6,360.30	98.47
WV-4		4.00	6,377.50	6,371.37	false	6,377.50	6,374.51	6,374.30	93.42
WV-3		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		1.25	6,400.80	6,396.40	false	6,400.80	6,397.13	6,397.12	2.80
37-2		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		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	

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	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 Flow	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 Flow	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 time	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 System	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 System	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 System	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 Inlet	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 (%)	Read Cross Slope (%)	Depressed Gutter?	Gutter Cross Slope (%)	Gutter Width (ft)	Inlet Location	Bypass Target	Longitudinal Slope (%)	Manning's n	Total Flow To Inlet (cfs)	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter 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										
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										
13-3	Grate CDOT Type C	Grate Inlet	6,355.55	6,353.20		50.0	2.00	false	2.00	0.00	In Sag	13-1	2.00	0.013	13.75	7.80	5.95	56.7	15.20	0.39	
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										
35-2	Generic Default 100%	Generic Inlet	6,468.00	6,467.70			2.00	false	2.00	0.00	In Sag										
36-2	Generic Default 100%	Generic Inlet	6,479.61	6,472.00			2.00	false	2.00	0.00	In Sag										
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										
25-2	Grate Special Type D	Grate Inlet	6,478.41	6,471.80		50.0	2.00	false	2.00	0.00	In Sag										
DP-7B	Combination Denver No 16 Single	Combination Inlet	6,400.10	6,394.60	3.33		2.00	true	6.25	2.00	On Grade				200.70	200.70	0.00	100.0	141.83	2.84	
DP-7C	Combination Denver No 16 Single	Combination Inlet	6,400.00	6,393.90	3.33	38.0	2.00	false	2.00	0.00	On Grade	DP-7C	0.00	0.013	1.52	1.52	0.00	99.9	30.24	0.69	
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										
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	HD-G1	0.01	0.013	1.60	1.49	0.12	92.8	18.87	0.38	
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	1.33	0.013	1.28	1.23	0.05	95.4	5.82	0.20	
07-1	Curb Colo. Sprgs. D-10-R Inlet	Curb Inlet	6,397.20	6,392.90	20.00		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	
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	06-2	1.62	0.013	10.12	9.45	0.67	93.4	14.02	0.37	
WW-SW	Generic Default 100%	Generic Inlet	6,358.31	6,354.90			2.00	false	2.00	0.00	In Sag	05-3	1.90	0.013	0.55	0.46	0.10	82.4	4.56	0.11	
WW-SE	Generic Default 100%	Generic Inlet	6,359.09	6,355.00			2.00	false	2.00	0.00	In Sag				1.60	1.60	0.00	100.0	0.00	0.00	
WW-N	Generic Default 100%	Generic Inlet	6,360.84	6,357.60			2.00	false	2.00	0.00	In Sag				19.02	19.02	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				12.27	12.27	0.00	100.0	0.00	0.00	
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	10-1	2.03	0.013	1.83	1.72	0.10	94.3	9.50	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	2.80	0.013	0.70	0.70	0.00	99.9	2.79	0.15	
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	37-1	1.84	0.013	0.48	0.48	0.00	100.0	12.09	0.08	
DP-6	Combination Denver No 16 Single	Combination Inlet	6,402.50	6,396.70	3.33	20.0	2.00	true	6.25	2.00	In Sag	01-8	1.41	0.013	1.43	1.37	0.06	95.9	13.37	0.13	
DP-7A	Combination Denver No 16 Single	Combination Inlet	6,400.50	6,395.50	3.33	38.0	2.00	true	6.25	2.00	On Grade				3.60	3.60	0.00	100.0	10.26	0.29	
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	DP-7B	0.00	0.013	4.40	4.18	0.22	95.0	37.09	0.66	
HD-F1	Grate CDOT Type C	Grate Inlet	6,400.00	6,394.10		50.0	2.00	false	2.00	0.00	In Sag				2.50	2.50	0.00	100.0	13.55	0.27	
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	
WW-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	
WW-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 Inlet	6,367.67	6,363.89	7.08		38.0	2.00	true	6.25	2.00	On Grade				5.32	4.06	1.25	76.4	13.09	0.35
02-3	Combination Denver No 16 Double	Combination Inlet	6,367.50	6,364.47	7.08		50.0	2.00	false	2.00	In Sag				2.00	2.00	0.00	100.0	6.07	0.12	
05-1	Combination Denver No 16 Triple	Combination Inlet	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 Inlet	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	95.7	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 Inlet	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	6,363.36		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	6,358.41	6,349.17	13.61	11.82	24.05
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	6,349.92	6,354.50	6,350.29	0.85	2.03	6,359.95	6,356.93	7.32	8.90	12.93
P-38-2	38-2	38-1	Circular	18 inch	Concrete	0.013	19.82	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	11.32	7.70
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	6,349.86	6,348.18	7.08	12.72	7.68
P-35-2	35-2	35-1	Circular	24 inch	Concrete	0.013	133.95	0.00	6,457.70	6,451.80	6,457.70	6,461.80	6,469.70	6,463.80	-1.70	4.20	6,469.64	6,463.16	16.78	47.46	37.82
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	6,473.52	6,473.26	12.24	135.71	59.08
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	6,473.24	6,469.02	11.14	116.90	59.08
P-25-2	25-1A	25-1	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-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	6,476.78	6,474.76	13.56	99.97	200.70
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	6,359.80	6,359.38	19.08	98.12	239.72
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	6,380.83	6,383.83	6,383.80	13.81	13.37	6,383.50	6,383.39	6.23	26.41	44.07
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	6,380.50	6,383.83	6,383.80	13.67	13.37	6,382.70	6,382.42	10.97	73.62	45.58
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	6,379.70	6,382.70	6,381.70	13.67	6.18	6,382.06	6,380.75	10.36	65.90	52.66
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	6,392.90	6,394.40	6,393.40	2.80	2.97	6,394.09	6,392.75	9.85	16.94	9.45
P-08-1	08-1	06-3	Circular	18 inch	Concrete	0.013	85.69	91.21	6,394.00	6,392.90	6,394.00	6,392.90	6,395.50	6,394.40	3.34	2.77	6,394.25	6,393.11	3.12	11.26	0.46
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	6,378.60	6,376.92	20.35	223.17	67.87
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	6,376.89	6,375.54	12.44	127.72	119.67
P-WV-4	WV-4	28-1	Circular	48 inch	Concrete	0.013	844.20	38.83	6,371.37	6,366.00	6,371.37	6,366.00	6,375.37	6,360.00	2.13	1.91	6,374.96	6,361.91	17.22	193.81	149.71
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	6,361.90	6,360.05	12.07	183.65	160.47
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	6,358.59	6,358.31	6.05	11.28	19.02
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	6,359.45	6,359.36	6.38	90.94	20.04
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	6,362.05	6,361.91	3.91	41.47	12.27
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	6,396.40	6,399.20	6,397.90	4.57	5.30	6,397.01	6,396.81	3.33	10.32	0.70
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	6,395.80	6,399.20	6,397.90	5.60	5.74	6,396.74	6,396.30	5.94	13.11	2.87
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	6,396.40	6,399.20	6,397.90	4.03	5.30	6,396.96	6,396.76	2.81	9.47	0.48
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	6,383.13	6,378.61	9.33	169.46	6.87
P-08-4	08-4	06-3	Circular	18 inch	Concrete	0.013	233.21	95.09	6,386.20	6,382.00	6,386.20	6,382.00	6,387.70	6,383.50	7.45	13.67	6,386.64	6,383.37	5.06	14.10	1.37
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	6,381.13	6,382.96	6,382.63	16.81	15.01	6,391.23	6,383.90	11.79	8.85	41.68
P-DP-5	DP-5	37-2	Circular	30 inch	Concrete	0.013	325.18	115.80	6,395.70	6,384.11	6,395.70	6,384.11	6,399.20	6,386.61	2.30	13.16	6,395.02	6,391.79	5.47	77.43	1.00
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	6,384.11	6,395.10	6,386.11	5.60	13.66	6,395.50	6,391.91	12.95	56.93	40.68
P-DP-7C	DP-7C	DP-8	Circular	24 inch	Concrete	0.013	60.98	6.10	6,393.90	6,393.60	6,393.90	6,393.60	6,395.90	6,395.60	4.10	6.10	6,398.53	6,397.27	10.37	15.87	32.58
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	6,399.71	6,399.15	4.55	15.92	14.30
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	6,398.00	6,400.20	6,399.50	2.30	2.20	6,400.68	6,400.58	2.04	9.37	3.60
P-DP-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	6,400.54	6,400.40	2.74	16.20	8.60
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	6,400.33	6,399.76	4.07	15.98	12.78
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	6,400.98	6,400.80	2.04	4.53	2.50
P-HD-E1	HD-E1	DP-7	Circular	15 inch	Concrete	0.013	82.41	83.53	6,396.40	6,395.00	6,396.40	6,395.00	6,398.25	6,397.65	3.15	4.45	6,401.18	6,400.69	4.07	5.00	5.00
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	6,396.90	6,398.25	6,398.15	2.25	2.65	6,400.82	6,400.80	2.04	5.13	2.50
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	6,395.10	6,395.90	3.90	4.10	6,399.63	6,399.42	5.35	16.31	16.80
P-HD-C2	HD-C2	HD-C1	Circular	15 inch	Concrete	0.013	48.26	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-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	6,397.53	6,396.93	6.60	4.89	8.10
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	6,397.30	6,399.30	6,399.30	2.19	2.20	6,397.74	6,397.72	3.02	2.52	1.00
P-WV-2	WV-2	WV-4	Circular	24 inch	Concrete	0.013	073.00	93.47	6,392.00	6,371.37	6,392.00	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-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	6,407.26	6,378.64	19.74	28.34	62.00
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	6,385.98	6,385.24	5.55	42.33	4.33
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	6,385.08	6,384.86	6.72	55.68	4.29
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	6,384.85	6,383.13	9.08	85.47	4.29
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	6,361.22	6,356.50	20.61	159.14	259.04
P-40	01-00	28-A	Circular	48 inch	Concrete	0.013	23.00	31.52	6,353.77	6,353.69	6,353.77	6,353.69	6,357.77	6,357.69	1.47	1.03	6,360.61	6,360.53	6.41	84.71	80.53
P-02-3	02-3	02-2	Circular	18 inch	Concrete	0.013	49.65	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

Title: Woodmen Road and Academy Blvd Intersection
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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-01-6	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	26.88
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	6,367.35	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	6,365.85	6,365.99	6.44	41.86	63.71
P-01-2	01-2	01-1	Circular	42 inch	Concrete	0.013	146.06	91.93	6,362.78	6,361.67	6,362.78	6,355.20	6,366.28	6,365.17	2.39	4.46	6,365.28	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	7.65	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	6,365.30	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	6,356.00	6,352.96	6,361.01	6,358.51	1.62	0.73	6,362.01	6,359.24	6.28	77.24	81.27

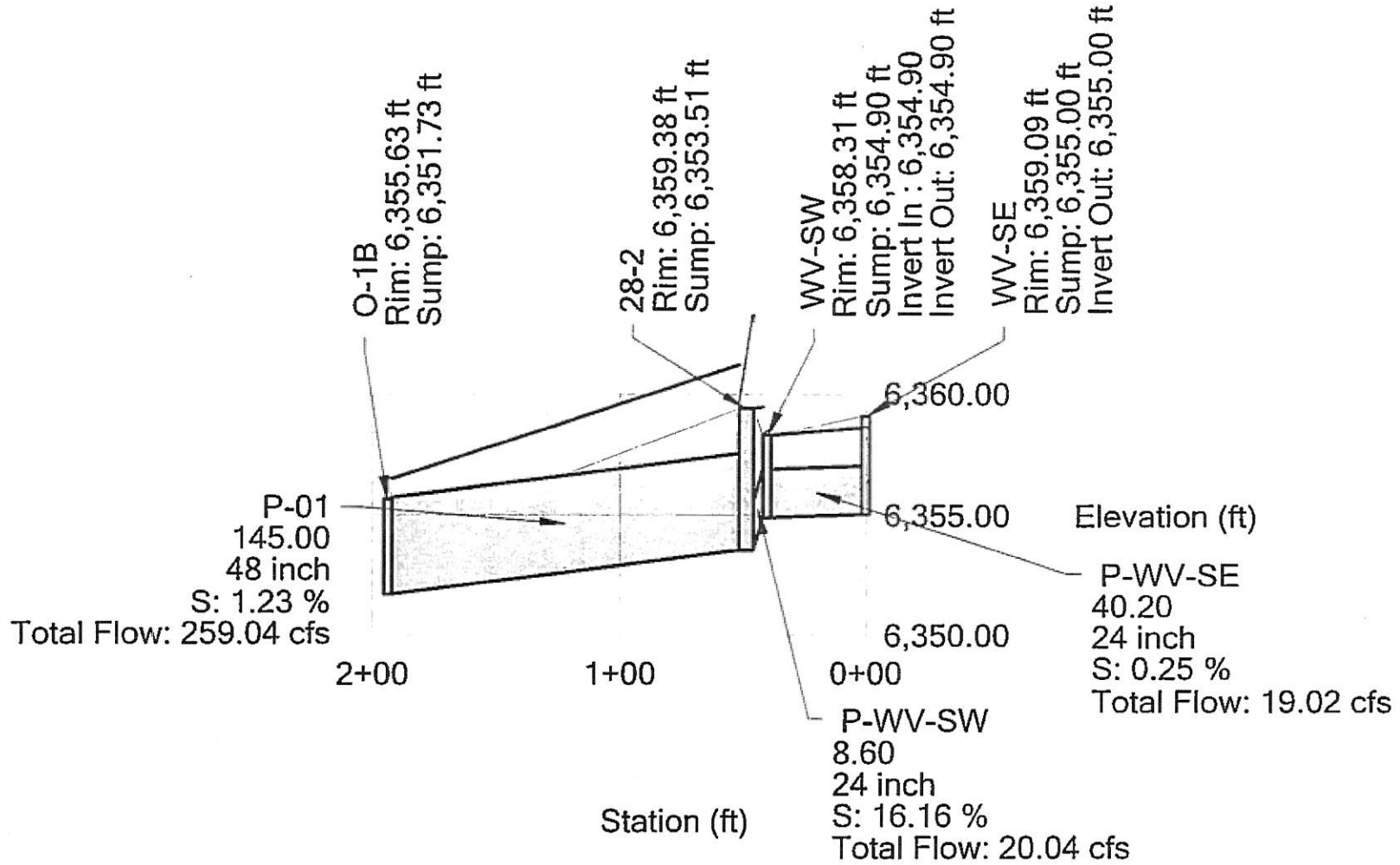
Scenario: One Hundred Year

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



Appendix B

Hydrologic Calculations

COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: Looart Subdivision No. 5
 Location: CO, Colorado Springs

Project Name: The Crest at Woodmen
 Project No.: RLM02
 Calculated By: SMB
 Checked By: JA
 Date: 7/25/16

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.	
A1	7.52	100	0.00	0.00	5	0.00	0.00	95	7.52	95.00	95.0
A2	3.96	100	0.00	0.00	5	0.00	0.00	95	3.96	95.00	95.0
A3	2.15	100	0.00	0.00	5	2.15	5.00	90	0.00	0.00	5.0
A4	4.28	100	0.00	0.00	5	0.00	0.00	95	4.28	95.00	95.0
A5	9.12	100	0.00	0.00	5	0.00	0.00	95	9.12	95.00	95.0
A6	1.81	100	0.00	0.00	5	0.00	0.00	90	1.81	90.00	90.0
A7	1.98	100	0.00	0.00	5	0.00	0.00	90	1.98	90.00	90.0
A8	9.54	100	0.00	0.00	5	0.00	0.00	95	9.54	95.00	95.0
A9	5.25	100	0.00	0.00	5	0.00	0.00	95	5.25	95.00	95.0
A10	5.27	100	0.00	0.00	5	5.27	5.00	90	0.00	0.00	5.0
B1	2.71	100	0.74	27.31	5	1.97	3.60	90	0.00	0.00	30.9
B2	1.29	100	0.00	0.00	5	0.00	0.00	90	1.29	90.00	90.0
B3	7.84	100	5.61	71.56	5	1.83	1.20	95	0.40	4.80	77.6
B4	3.21	100	0.00	0.00	5	0.00	0.00	95	3.21	95.00	95.0
B5	0.90	100	0.41	45.56	5	0.49	2.70	90	0.00	0.00	48.3
B6	3.03	100	0.00	0.00	5	0.00	0.00	90	3.03	90.00	90.0
B7	8.69	100	0.00	0.00	5	0.74	0.40	95	7.95	86.90	87.3
B8	2.06	100	1.38	66.99	5	0.68	1.70	90	0.00	0.00	68.7
OS1	0.66	100	0.42	63.64	5	0.24	1.80	90	0.00	0.00	65.4
OS2	0.73	100	0.73	100.00	5	0.00	0.00	90	0.00	0.00	100.0
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**

Subdivision: Looart Subdivion No. 5
Location: CO, Colorado Springs

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

SUB-BASIN DATA						INITIAL/OVERLAND (T _i)			TRAVEL TIME (T _t)					T _c CHECK (URBANIZED BASINS)			FINAL T _c (MIN)
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C ₁₀₀	C ₅	L (FT)	S (%)	T _i (MIN)	L (FT)	S (%)	C _v	VEL. (FPS)	T _t (MIN)	COMP. T _c (MIN)	TOTAL LENGTH(FT)	Urbanized T _c (MIN)	T _c (MIN)
A1	7.52	B	95.0	0.88	0.81	100	2.0	4.2	700	3.5	20.0	3.7	3.1	7.3	800.0	14.4	7.3
A2	3.96	B	95.0	0.88	0.81	100	2.0	4.2	600	2.0	20.0	2.8	3.5	7.8	700.0	13.9	7.8
A3	2.15	B	5.0	0.38	0.10	110	25.0	6.6	480	1.0	15.0	1.5	5.3	11.9	590.0	13.3	11.9
A4	4.28	B	95.0	0.88	0.81	100	2.0	4.2	610	2.0	20.0	2.8	3.6	7.8	710.0	13.9	7.8
A5	9.12	B	95.0	0.88	0.81	100	2.0	4.2	640	2.0	20.0	2.8	3.8	8.0	740.0	14.1	8.0
A6	1.81	B	90.0	0.81	0.73												5.0
A7	1.98	B	90.0	0.81	0.73												5.0
A8	9.54	B	95.0	0.88	0.81	200	2.0	6.0	200	2.0	20.0	2.8	1.2	7.1	400.0	12.2	7.1
A9	5.25	B	95.0	0.88	0.81	100	2.0	4.2	375	1.0	15.0	1.5	4.2	8.4	475.0	12.6	8.4
A10	5.27	B	5.0	0.38	0.10	130	25.0	7.1	575	1.0	15.0	1.5	6.4	13.5	705.0	13.9	13.5
B1	2.71	B	30.9	0.47	0.25	160	25.0	6.7	300	2.0	20.0	2.8	1.8	8.5	460.0	12.6	8.5
B2	1.29	B	90.0	0.81	0.73												5.0
B3	7.84	B	77.6	0.68	0.57	300	3.0	11.7	150	2.0	20.0	2.8	0.9	12.5	450.0	12.5	12.5
B4	3.21	B	95.0	0.88	0.81	150	2.0	5.2	150	1.0	20.0	2.0	1.3	6.4	300.0	11.7	6.4
B5	0.90	B	48.3	0.52	0.34	25	2.0	5.5	450	4.0	20.0	4.0	1.9	7.4	475.0	12.6	7.4
B6	3.03	B	90.0	0.81	0.73												5.0
B7	8.69	B	87.3	0.78	0.69	200	2.0	8.4	750	2.0	20.0	2.8	4.4	12.8	950.0	15.3	12.8
B8	2.06	B	68.7	0.61	0.48	25	2.0	4.5	450	4.0	20.0	4.0	1.9	6.4	475.0	12.6	6.4
OS1	0.66	B	65.4	0.59	0.45	70	2.0	7.9	150	4.5	20.0	4.2	0.6	8.5	220.0	11.2	8.5
OS2	0.73	B	100.0	0.96	0.90	25	2.0	1.5	250	3.5	20.0	3.7	1.1	2.6	275.0	11.5	5.0
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 $V = C_v * S^{0.5}$, S in ft/ft

$T_c \text{ Check} = 10 + L / 180$

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
(RATIONAL METHOD PROCEDURE)

Subdivision: Loart Subdivin No. 5
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

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)	
	1	A1	7.52	0.81	7.3	6.09	4.59	28.0													
	2	A2	3.96	0.81	7.8	3.21	4.51	14.5													
									7.8	9.30	4.51	41.9									Basins A1-A2
	3	A3	2.15	0.10	11.9	0.22	3.87	0.9													
	4	A4	4.28	0.81	7.8	3.47	4.50	15.6													
									11.9	12.99	3.87	50.3									Basins A1-A4
	5	A5	9.12	0.81	8.0	7.39	4.47	33.0													
									11.9	20.38	3.87	78.9									Basins A1-A5
	6	A6	1.81	0.73	5.0	1.32	5.17	6.8													
									11.9	21.70	3.87	84.0									Basins A1-A6
	7	A7	1.98	0.73	5.0	1.45	5.17	7.5													
									11.9	23.15	3.87	89.6									Basins A1-A7
	8	A8	9.54	0.81	7.1	7.73	4.63	35.8													
									11.9	30.88	3.87	119.5									Basins A1-A8
	9	A9	5.25	0.81	8.4	4.25	4.39	18.7													
	10	A10	5.27	0.10	13.5	0.53	3.68	2.0													
									13.5	35.66	3.68	131.2									Basins A1-A10
	19	OS1	0.66	0.45	8.5	0.30	4.37	1.3													
	20	OS2	0.73	0.90	5.0	0.66	5.17	3.4													
									8.5	0.96	4.37	4.2									Basins OS1-OS2
	11	B1	2.71	0.25	8.5	0.68	4.37	3.0													
	12	B2	1.29	0.73	5.0	0.94	5.17	4.9													
	13	B3	7.84	0.57	12.5	4.47	3.79	16.9													

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Loart Subdivin No. 5
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

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)	
								12.5	6.09	3.79	23.1									Basins B1-B3	
	14	B4	3.21	0.81	6.4	2.60	4.80	12.5													
								12.5	8.69	3.79	32.9									Basins B1-B4	
	15	B5	0.90	0.34	7.4	0.31	4.58	1.4													
								12.5	9.00	3.79	34.1									Basins B1-B5	
	16	B6	3.03	0.73	5.0	2.21	5.17	11.4													
	17	B7	8.69	0.69	12.8	6.00	3.75	22.5													
	18	B8	2.06	0.48	6.4	0.99	4.80	4.8													
								12.8	9.20	3.75	34.5									Basins B6-B8	
								12.8	18.20	3.75	68.3									Basins B1-B8	
	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
(RATIONAL METHOD PROCEDURE)

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

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

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
(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 5
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

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)	
	1	A1	7.52	0.88	7.3	6.62	7.71	51.0													
	2	A2	3.96	0.88	7.8	3.48	7.57	26.3													
									7.8	10.10	7.57	76.5									Basins A1-A2
	3	A3	2.15	0.38	11.9	0.82	6.49	5.3													
	4	A4	4.28	0.88	7.8	3.77	7.56	28.5													
									11.9	14.69	6.49	95.3									Basins A1-A4
	5	A5	9.12	0.88	8.0	8.03	7.50	60.2													
									11.9	22.72	6.49	147.5									Basins A1-A5
	6	A6	1.81	0.81	5.0	1.47	8.68	12.8													
									11.9	24.19	6.49	157.0									Basins A1-A6
	7	A7	1.98	0.81	5.0	1.60	8.68	13.9													
									11.9	25.79	6.49	167.4									Basins A1-A7
	8	A8	9.54	0.88	7.1	8.40	7.78	65.4													
									11.9	34.19	6.49	221.9									Basins A1-A8
	9	A9	5.25	0.88	8.4	4.62	7.38	34.1													
	10	A10	5.27	0.38	13.5	2.00	6.17	12.3													
									13.5	40.81	6.17	251.8									Basins A1-A10
	19	OS1	0.66	0.59	8.5	0.39	7.34	2.9													
	20	OS2	0.73	0.96	5.0	0.70	8.68	6.1													
									8.5	1.09	7.34	8.0									Basins OS1-OS2
	11	B1	2.71	0.47	8.5	1.27	7.34	9.3													
	12	B2	1.29	0.81	5.0	1.04	8.68	9.0													
	13	B3	7.84	0.68	12.5	5.33	6.37	34.0													

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 5
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

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)	
								12.5	7.64	8.28	33.2									Basins B1-B3	
	14	B4	3.21	0.88	6.4	2.82	8.05	22.7													
								12.5	10.46	6.37	66.6									Basins B1-B4	
	15	B5	0.90	0.52	7.4	0.47	7.69	3.6													
								12.5	10.93	6.37	69.6									Basins B1-B5	
	16	B6	3.03	0.81	5.0	2.45	8.68	21.3													
	17	B7	8.69	0.78	12.8	6.78	6.30	42.7													
	18	B8	2.06	0.61	6.4	1.26	8.06	10.2													
								12.8	10.49	6.30	66.1									Basins B6-B8	
								12.8	21.42	6.30	134.9									Basins B1-B8	
	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
(RATIONAL METHOD PROCEDURE)

Subdivision: Looart Subdivion No. 5
Location: CO, Colorado Springs
Design Storm: 100-Year

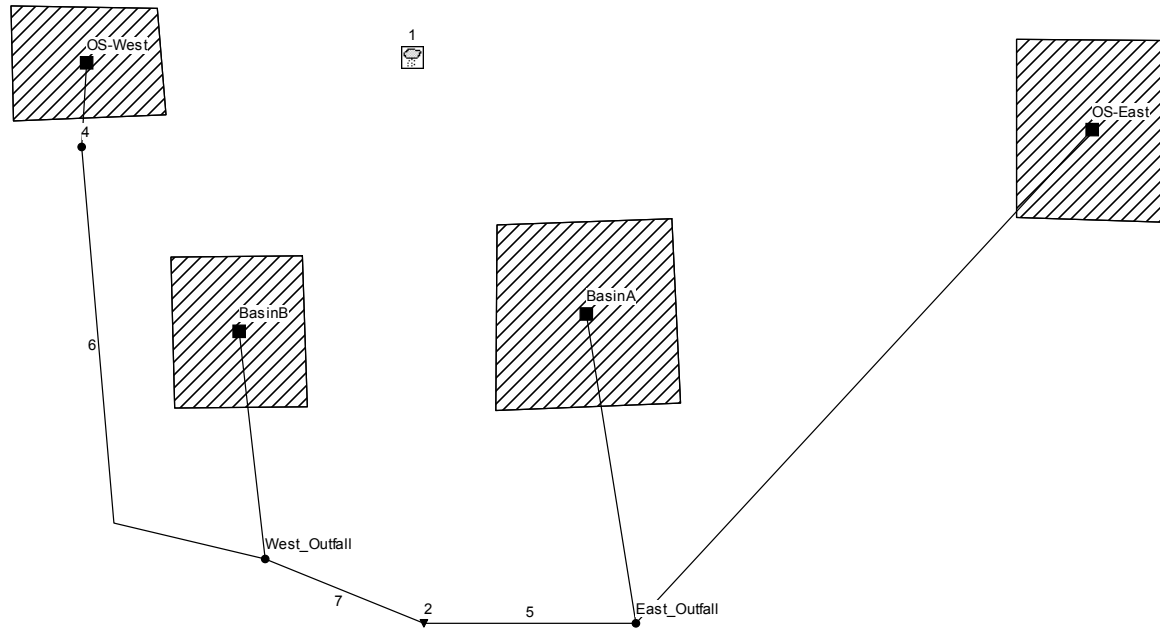
Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: SMB
Checked By: JA
Date: 7/25/16

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													

Appendix C

Pond Calculations

Historic Model



Historic Model - Input

[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]

Historic Model - Input

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
5	East_outfall	2	400	0.01	0	0
6	4	West_outfall	1320	0.035	0	0
7	West_outfall	2	400	0.01	0	0

[XSECTIONS]

Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels
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

Historic Model - Input

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

Historic Model - Input

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
```

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

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	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	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	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

Historic Model - 5-yr

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

Peak Runoff	Runoff Coeff	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff
Subcatchment		in	in	in	in	in	10^6 gal
CFS							
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

Flow Balance Error	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
0.000	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

Node Surge 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 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 Surge 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

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

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	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	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	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

Historic Model - 100-yr

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

Peak Runoff	Runoff Coeff	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff
Subcatchment		in	in	in	in	in	10^6 gal
CFS							
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

Flow Balance Error	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
0.000	East_outfall	279.90	279.90	0 00:45	2.69	2.69
0.000	4	14.27	14.27	0 00:45	0.137	0.137
0.000	West_outfall	14.60	27.14	0 00:45	0.375	0.511
0.000	2	0.00	307.04	0 00:45	0	3.2

Node Surge 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 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 Surge 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

Detention Pond Tributary Areas

Subdivision: Looart Subdivin No. 5
Location: CO, Colorado Springs

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: _____
Checked By: _____
Date: 7/25/16

Detention Pond #A

Basin	Area	% Imp
A1	7.52	95
A2	4.36	95
A3	2.15	5
A4	4.28	95
A5	8.72	95
A6	1.81	90
A7	1.98	90
A8	9.54	95
A9	5.25	95
A10	5.27	5
Total Onsite	50.88	82.0
Offsite East	33.9	77
Total	84.78	80.0

EURV Required For Onsite Basins

EURV = 1.11 in From Eqn 13-6
 EURV = **4.70** ac-ft

WQ Required For Onsite Basins

WQCV = 0.34 in From Eqn. 3-1
 WQCV = **1.45** 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 = 2.32 ac-ft

POND VOLUME CALCULATIONS

Subdivision Looart Subdivion No. 5
Location CO, Colorado Springs

Project Name: The Crest at Woodmen
Project No. RLM02
By: _____
Checked By: _____
Date: 7/25/16

Volume= $\frac{1}{3} \times \text{Depth} \times (A+B+(A*B)^{0.5})$
 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	6324.00	0	0	0	0.00
1.00	6325.00	15,014	5,005	5,005	0.11
2.00	6326.00	30,880	22,475	27,480	0.63
3.00	6327.00	48,410	39,318	66,798	1.53
4.00	6328.00	67,605	57,741	124,539	2.86
5.00	6329.00	88,465	77,802	202,341	4.65
6.00	6330.00	110,990	99,515	301,856	6.93
7.00	6331.00	117,516	114,237	416,093	9.55

Volume (acre feet)	Volume	Water Surface Elevation
Total WQ	2.32	6327.60
Onsite EURV + Offsite WQ	5.58	6329.41
100-Year Detention	8.74	6330.70

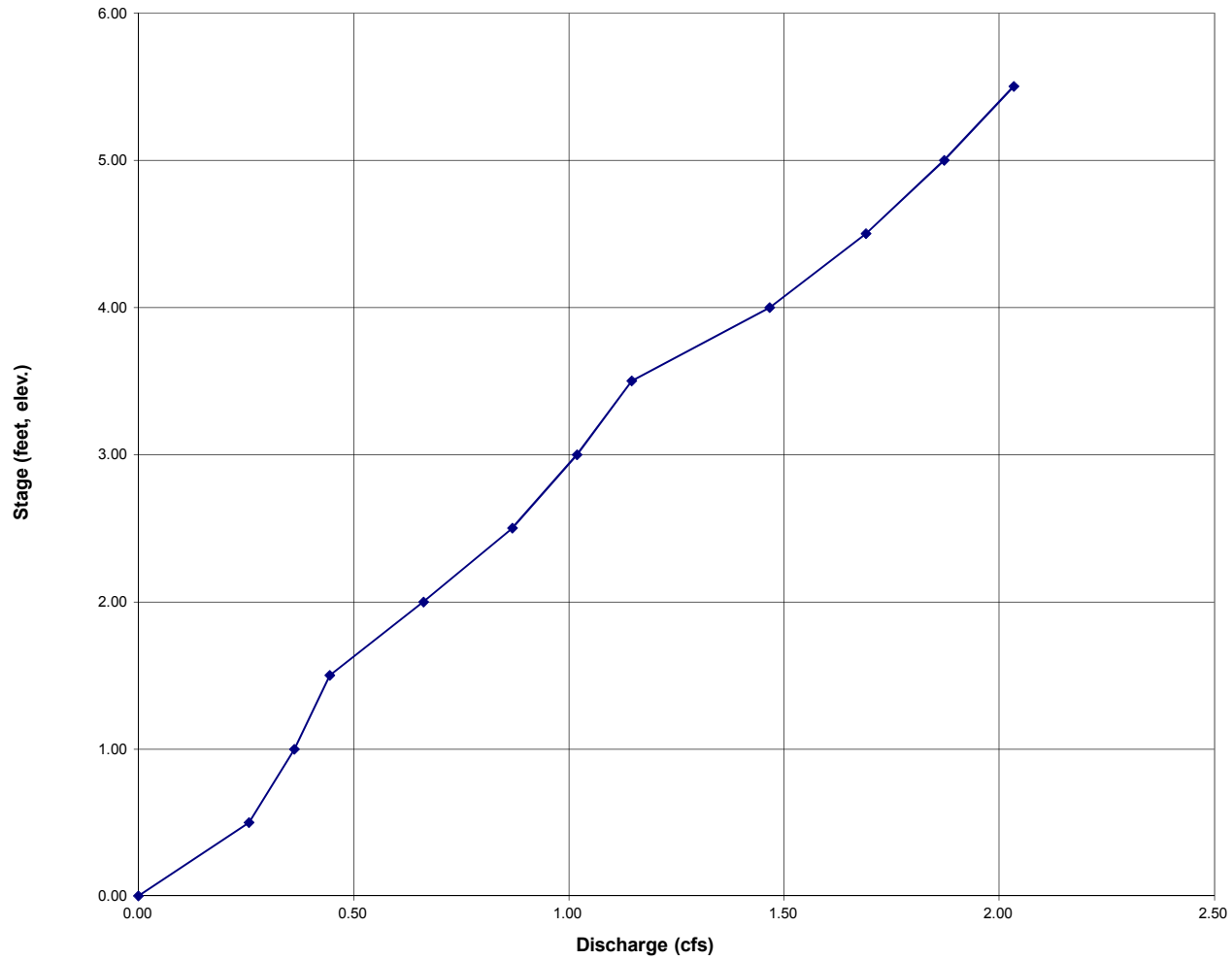
STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Worksheet Protected

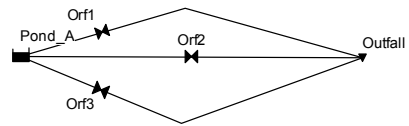
Project: **The Crest at Woodmen**

Basin ID: **Pond A**

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



Pond A Outlet Check



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

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 6324 7 3.6 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 1.83 0.65 NO 0
 orf3 Pond_A Outfall SIDE 3.67 0.65 NO 0

[XSECTIONS]
 ;;Link Shape Geom1 Geom2 Geom3 Geom4 Barrels
 Culvert

Pond A Outlet Check

```

;;-----
Orf1      RECT_CLOSED  0.16666      0.41666      0           0
Orf2      RECT_CLOSED  .1666         0.41666      0           0
Orf3      RECT_CLOSED  .1666         0.41666      0           0

[CURVES]
;;Name      Type      X-Value      Y-Value
;;-----
PondA_Volume  Storage  0.00         0
PondA_Volume  1.00     15014
PondA_Volume  2.00     30880
PondA_Volume  3.00     48410
PondA_Volume  4.00     67605
PondA_Volume  5.00     88465
PondA_Volume  6.00     110990
PondA_Volume  7.00     117516

[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
;;-----
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
    
```

 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 SEP-02-2016 00:00:00
 Ending Date SEP-05-2016 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 30.00 sec

	volume acre-feet	volume 10 ⁶ gal
Flow Routing Continuity		
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	2.355	0.767
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	2.355	0.768
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	Pond A	Outlet	Check	-	WQ		
Pond_A	STORAGE	0.00	0.00	0.00	0	00:00	0.00	
		1.22	3.60	6327.60	0	00:00	3.60	

Node Inflow Summary

Flow	Balance	Error Node Percent	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
Outfall	0.000	0.017	OUTFALL	0.00	1.15	0 00:00	0	0.767
Pond_A			STORAGE	0.00	0.00	0 00:00	0	0.767

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
Pond_A	STORAGE	72.00	3.600	3.400

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum Outflow Storage Unit CFS	Average Volume 1000 ft3	Avg Pc Full	Evap Loss	Exfil Loss	Maximum Volume 1000 ft3	Max Pc Full	Time of Max Occurrence days hr:min
Pond_A	23.034	5	0	0	102.583	24	0 00:00

Outfall Loading Summary

Flow	Avg	Max	Total
------	-----	-----	-------

Outfall Node	Freq Pcmt	Pond A Flow CFS	Outlet Flow CFS	Check - WQ Volume 10^6 gal
outfall	63.45	0.62	1.15	0.767
System	63.45	0.62	1.15	0.767

Link Flow Summary

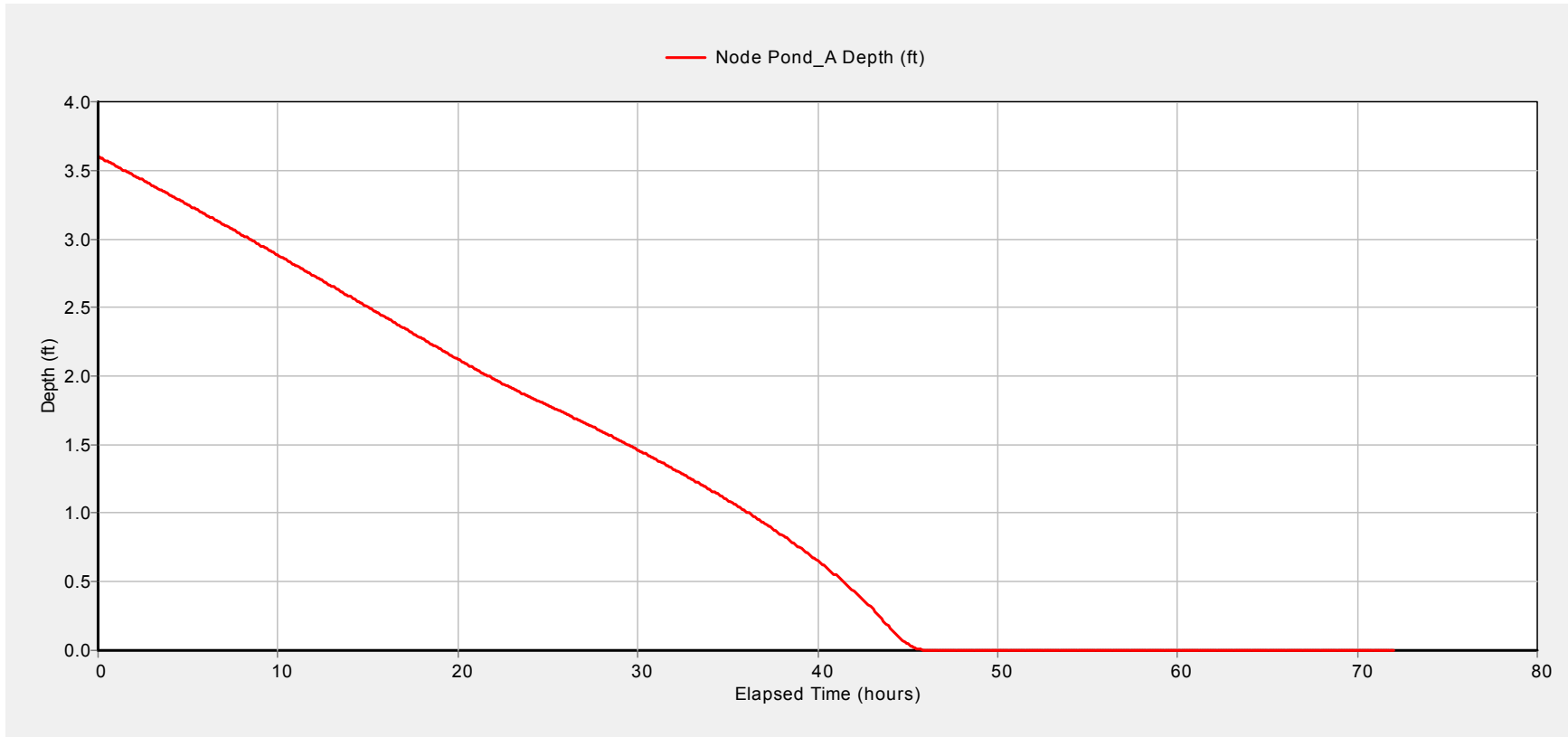
Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.68	0 00:00			0.00
Orf2	ORIFICE	0.47	0 00:00			0.00
Orf3	ORIFICE	0.00	0 00:00			0.00

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Sep 06 15:21:32 2016
Analysis ended on: Tue Sep 06 15:21:32 2016
Total elapsed time: < 1 sec

Pond A WQ Drain Time



 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 SEP-02-2016 00:00:00
 Ending Date SEP-05-2016 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 30.00 sec

	volume acre-feet	volume 10 ⁶ gal
Flow Routing Continuity		
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	5.812	1.894
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	5.812	1.894
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	Pond A Outlet Check - EURV			0	00:00	0.00
Pond_A	STORAGE	0.00	0.00	0.00	0	00:00	0.00
		2.83	5.50	6329.50	0	00:00	5.49

Node Inflow Summary

		Maximum	Maximum			Lateral	Total
Flow		Lateral	Total	Time of Max		Inflow	Inflow
Balance		Inflow	Inflow	Occurrence		Volume	Volume
Error Node Percent	Type	CFS	CFS	days hr:min		10^6 gal	10^6 gal
0.000	Outfall	0.00	2.01	0 00:00		0	1.89
0.012	Pond_A	0.00	0.00	0 00:00		0	1.89

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
Pond_A	STORAGE	72.00	5.500	1.500

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

		Average	Avg	Evap	Exfil	Maximum	Max	Time of Max
Maximum		Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence
Outflow Storage Unit		1000 ft3	Full	Loss	Loss	1000 ft3	Full	days hr:min
CFS								
2.01	Pond_A	83.732	20	0	0	253.160	60	0 00:00

Outfall Loading Summary

Flow	Avg	Max	Total
------	-----	-----	-------

Outfall Node	Freq Pcnt	Pond A Flow CFS	Outlet Check - EURV Flow CFS	Volume 10^6 gal
outfall	98.87	0.99	2.01	1.894
System	98.87	0.99	2.01	1.894

Link Flow Summary

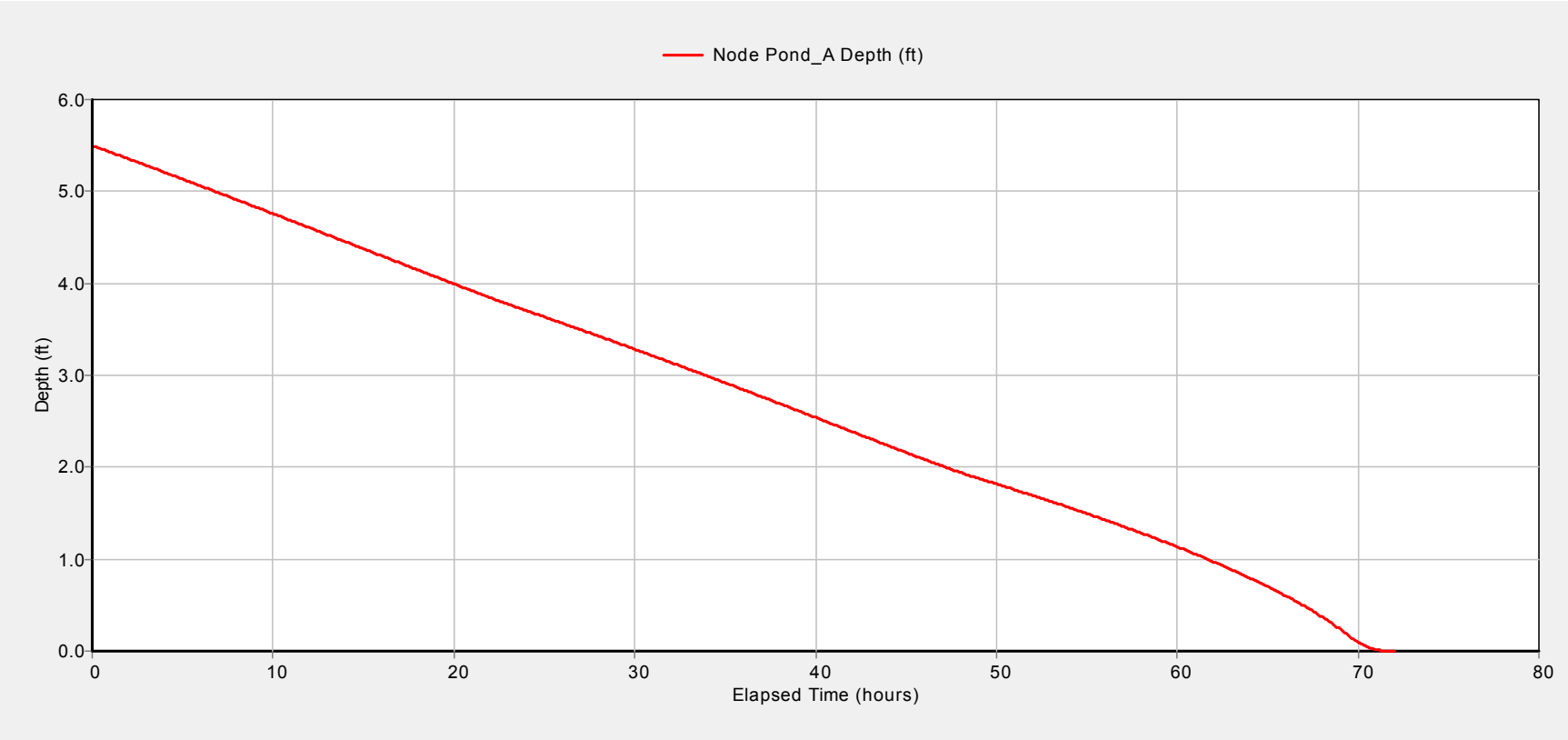
Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.84	0 00:00			0.00
Orf2	ORIFICE	0.69	0 00:00			0.00
Orf3	ORIFICE	0.48	0 00:00			0.00

Conduit Surcharge Summary

No conduits were surcharged.

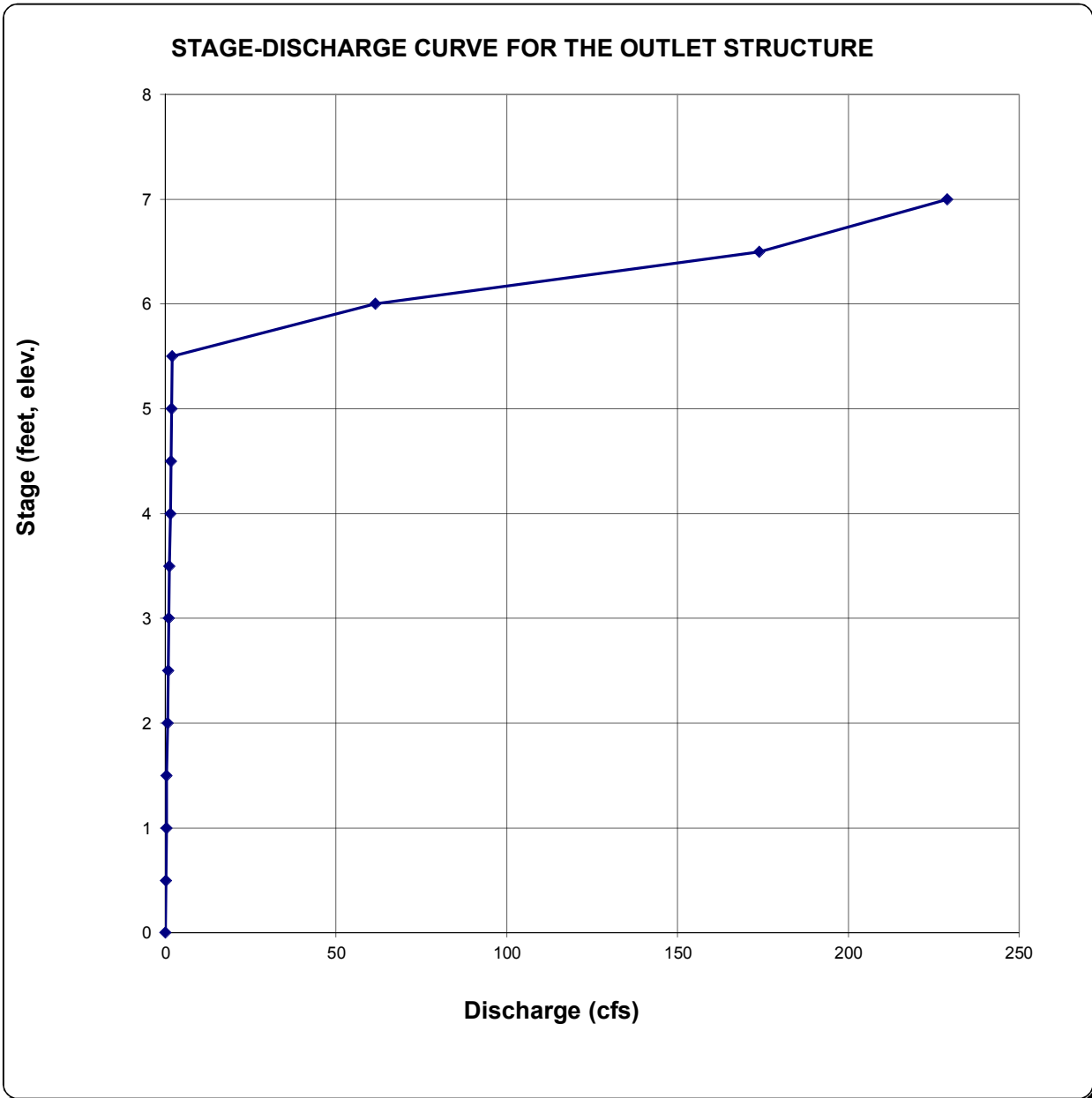
Analysis begun on: Tue Sep 06 15:25:08 2016
Analysis ended on: Tue Sep 06 15:25:08 2016
Total elapsed time: < 1 sec

Pond A EURV Drain Time



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

Project: Crest at Woodmen
Basin ID: Pond A



Detention Pond Tributary Areas

Subdivision: Looart Subdivin No. 5
Location: CO, Colorado Springs

Project Name: The Crest at Woodmen
Project No.: RLM02
Calculated By: _____
Checked By: _____
Date: 7/25/16

Detention Pond #B

Basin	Area	% Imp
B1	2.71	30.9
B2	1.29	90
B3	7.84	77.6
B4	3.21	95
B5	0.9	48.3
B6	3.03	90
B7	8.69	87.3
B8	2.06	68.7
Total Onsite	29.73	78.0
Offsite West	2.92	47.1
Total	32.65	75.2

EURV Required For Onsite Basins

EURV = 1.05 in From Eqn 13-6
 EURV = 2.61 ac-ft

WQ Required For Onsite Basins

WQCV = 0.32 in From Eqn. 3-1
 WQCV = 0.78 ac-ft

WQ Required For Offsite Basins

WQCV = 0.20 in From Eqn. 3-1
 WQCV = 0.05 ac-ft

Total Pond B Water Quality = 0.83 ac-ft

POND VOLUME CALCULATIONS

Subdivision Looart Subdivinon No. 5
Location CO, Colorado Springs

Project Name: The Crest at Woodmen
Project No. RLM02
By: _____
Checked By: _____
Date: 7/25/16

Volume= $\frac{1}{3}$ 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	6304.00	0	0	0	0.00
1.00	6305.00	5,422	1,807	1,807	0.04
2.00	6306.00	17,888	11,053	12,860	0.30
3.00	6307.00	17,888	17,888	30,748	0.71
4.00	6308.00	17,888	17,888	48,636	1.12
5.00	6309.00	17,888	17,888	66,524	1.53
6.00	6310.00	17,888	17,888	84,412	1.94
7.00	6311.00	17,888	17,888	102,300	2.35
8.00	6312.00	17,888	17,888	120,188	2.76
9.00	6313.00	17,888	17,888	138,076	3.17

Volume (acre feet)	Volume	Water Surface Elevation
Total WQ	0.83	6307.31
Onsite EURV + Offsite WQ	2.66	6311.76
100-Year Detention	3.05	6312.71

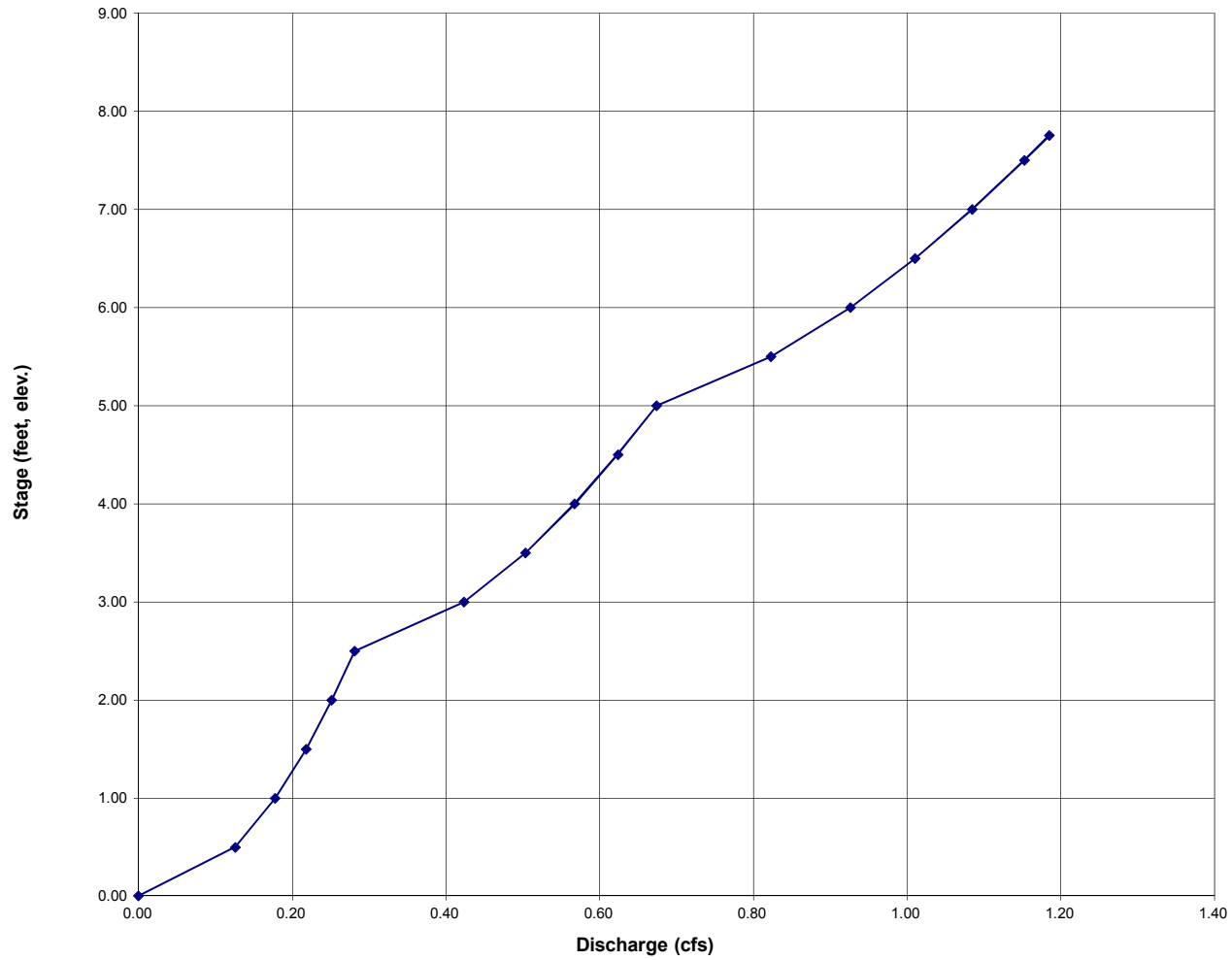
STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Worksheet Protected

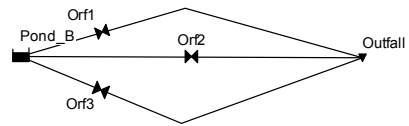
Project: **The Crest At Woodmen**

Basin ID: **Pond B**

STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



Pond B Outlet Check



Pond B Outlet Check Input

[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

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 6324 9 3.3 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 2.58 0.65 NO 0
 orf3 Pond_B Outfall SIDE 5.17 0.65 NO 0

[XSECTIONS]
 ;;Link Shape Geom1 Geom2 Geom3 Geom4 Barrels
 Culvert

Pond B Outlet Check Input

;;-----

Orf1	CIRCULAR	0.20833	0	0	0
Orf2	CIRCULAR	0.20833	0	0	0
Orf3	CIRCULAR	0.20833	0	0	0

[CURVES]

;;Name	Type	X-Value	Y-Value
PondB_Volume	Storage	0.00	0
PondB_Volume		1.00	5422
PondB_Volume		2.00	17888
PondB_Volume		3.00	17888
PondB_Volume		4.00	17888
PondB_Volume		5.00	17888
PondB_Volume		6.00	17888
PondB_Volume		7.00	17888
PondB_Volume		8.00	17888
PondB_Volume		9.00	17888

[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
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

 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 SEP-02-2016 00:00:00
 Ending Date SEP-05-2016 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 30.00 sec

	volume acre-feet	volume 10 ⁶ gal
Flow Routing Continuity		
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	0.863	0.281
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.864	0.281
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.018	

 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	Pond B	Outlet	Check	-	WQ		
Pond_B	STORAGE	0.00	0.00	0.00	0	00:00	0.00	
		1.12	3.30	6327.30	0	00:00	3.29	

Node Inflow Summary

Flow	Balance	Error Node Percent	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
Outfall	0.000		OUTFALL	0.00	0.46	0 00:00	0	0.281
Pond_B	0.018		STORAGE	0.00	0.00	0 00:00	0	0.281

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
Pond_B	STORAGE	72.00	3.300	5.700

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum Outflow Storage Unit CFS	Average Volume 1000 ft3	Avg Full	Evap Loss	Exfil Loss	Maximum Volume 1000 ft3	Max Full	Time of Max Occurrence days hr:min
Pond_B	8.884	6	0	0	37.614	27	0 00:00

Outfall Loading Summary

Flow	Avg	Max	Total
------	-----	-----	-------

Outfall Node	Freq Pcmt	Pond B Flow CFS	Outlet Flow CFS	Check - WQ Volume 10^6 gal
outfall	59.85	0.24	0.46	0.281
System	59.85	0.24	0.46	0.281

 Link Flow Summary

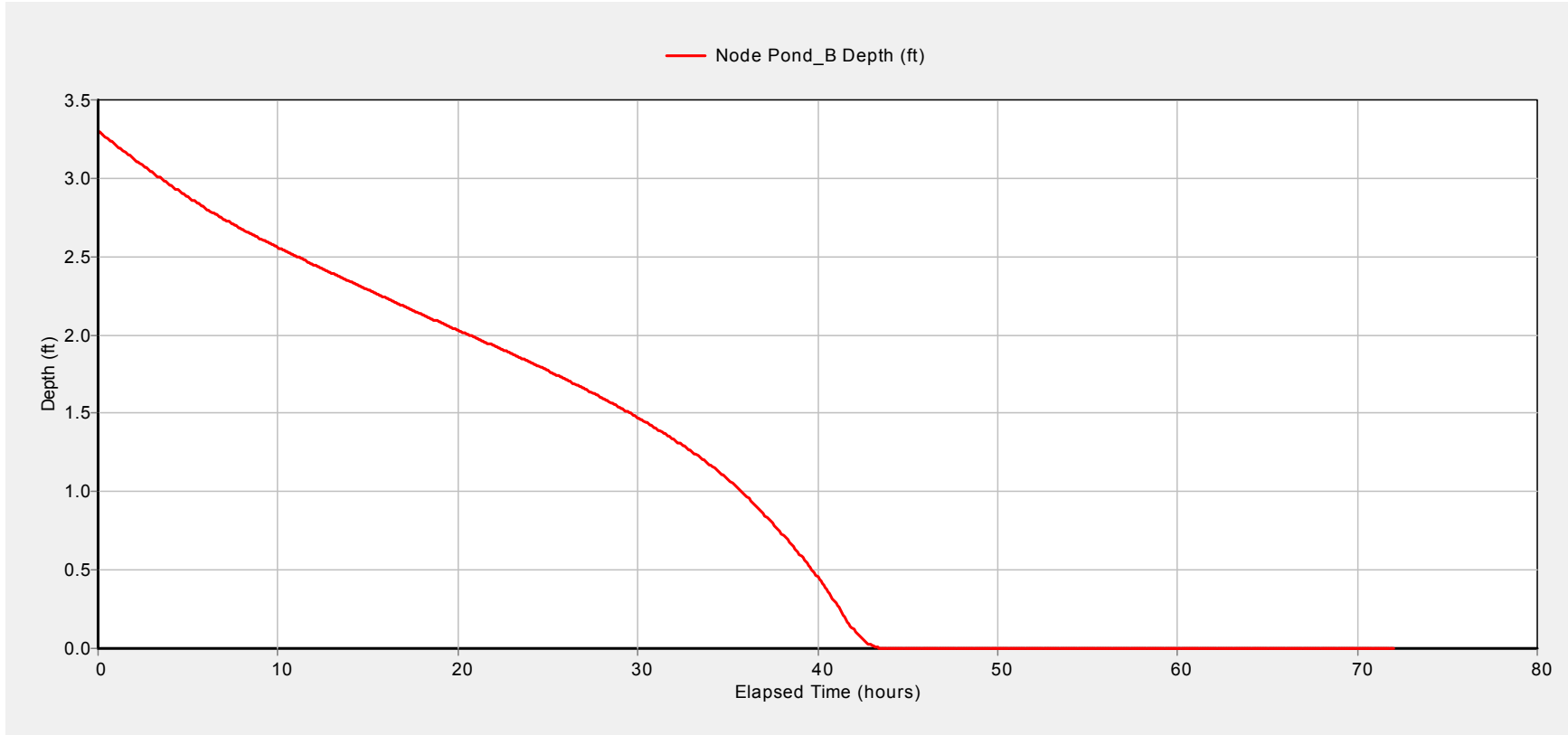
Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.32	0 00:00			0.00
Orf2	ORIFICE	0.14	0 00:00			0.00
Orf3	ORIFICE	0.00	0 00:00			0.00

 Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Sep 06 15:27:14 2016
 Analysis ended on: Tue Sep 06 15:27:14 2016
 Total elapsed time: < 1 sec

Pond B WQ Drain Time



 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 SEP-02-2016 00:00:00
 Ending Date SEP-05-2016 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 30.00 sec

	volume acre-feet	volume 10 ⁶ gal
Flow Routing Continuity		
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	2.690	0.877
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	2.691	0.877
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.015	

 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	Pond B	Outlet	Check - EURV				
Pond_B	STORAGE	0.00	0.00	0.00	0	00:00	0.00	
		3.25	7.75	6331.75	0	00:00	7.73	

Node Inflow Summary

Flow	Balance	Error Node Percent	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
Outfall	0.000		OUTFALL	0.00	1.17	0 00:00	0	0.877
Pond_B	0.015		STORAGE	0.00	0.00	0 00:00	0	0.877

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
Pond_B	STORAGE	72.00	7.749	1.251

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum Outflow Storage Unit CFS	Average Volume 1000 ft3	Avg Full	Evap Loss	Exfil Loss	Maximum Volume 1000 ft3	Max Full	Time of Max Occurrence days hr:min
Pond_B	38.180	27	0	0	117.204	84	0 00:00

Outfall Loading Summary

Flow	Avg	Max	Total
------	-----	-----	-------

Outfall Node	Freq Pcnt	Pond B Flow CFS	Outlet Flow CFS	Check - EURV Volume 10^6 gal
outfall	100.00	0.45	1.17	0.877
System	100.00	0.45	1.17	0.877

 Link Flow Summary

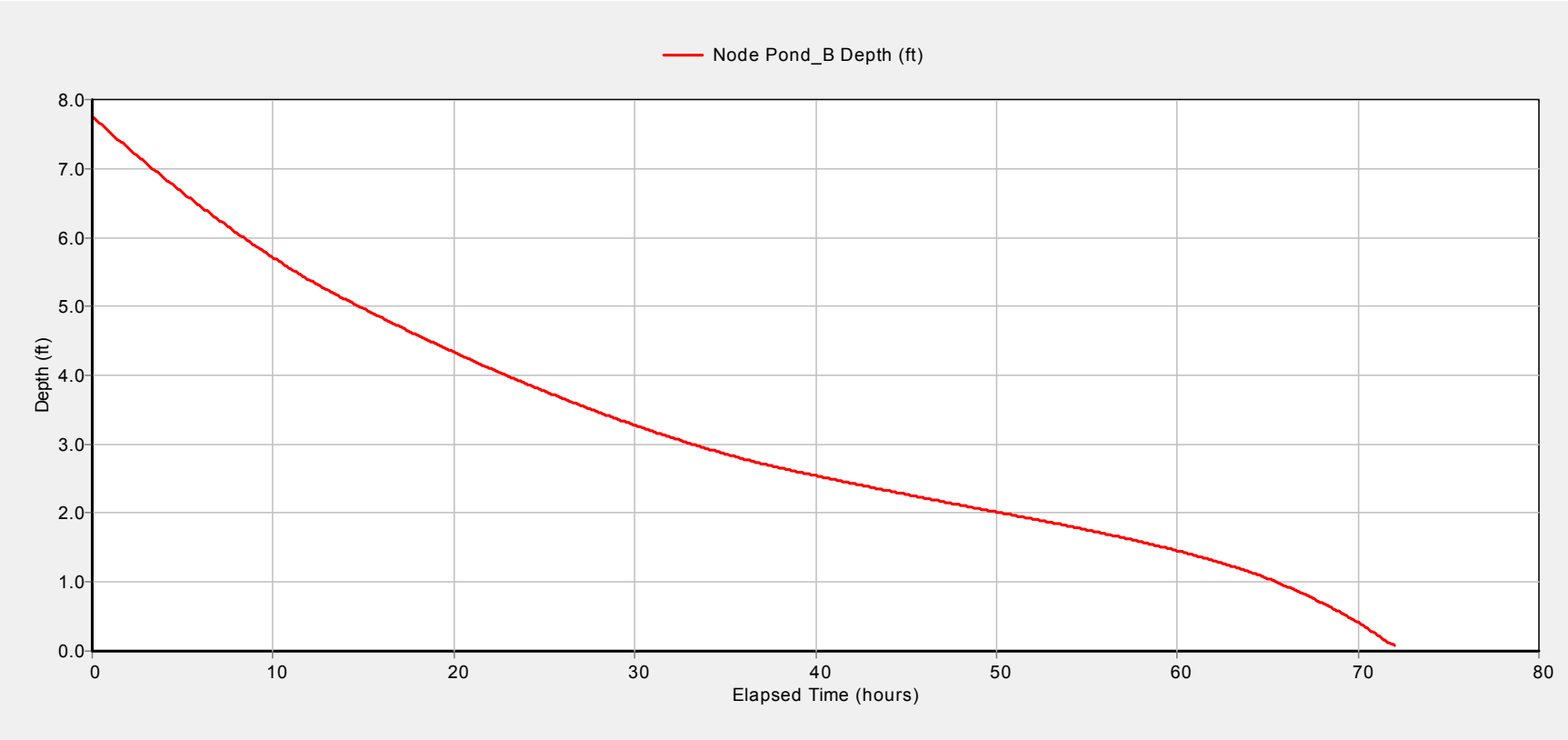
Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
Orf1	ORIFICE	0.49	0 00:00			0.00
Orf2	ORIFICE	0.40	0 00:00			0.00
Orf3	ORIFICE	0.28	0 00:00			0.00

 Conduit Surcharge Summary

No conduits were surcharged.

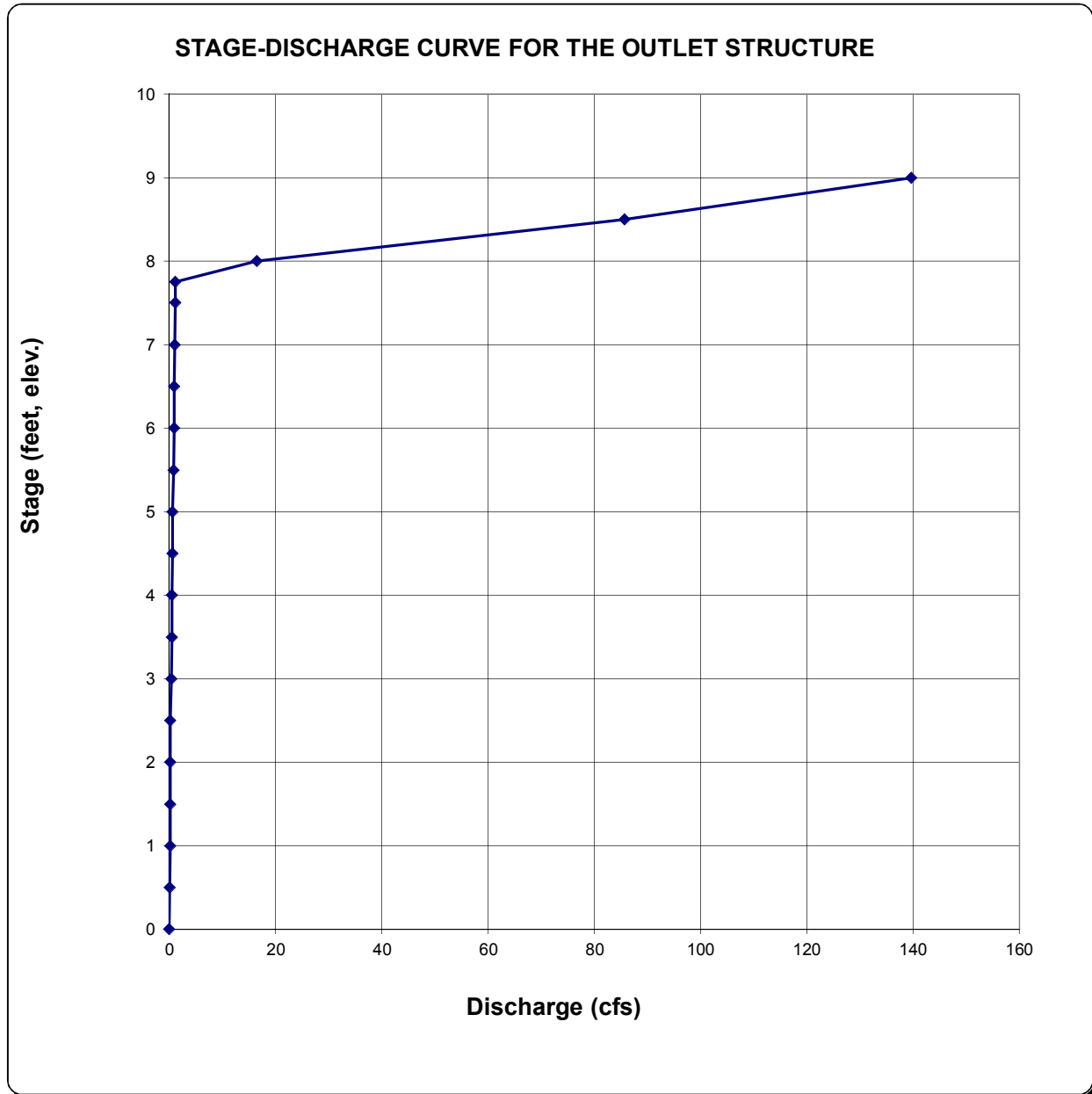
Analysis begun on: Tue Sep 06 15:31:27 2016
 Analysis ended on: Tue Sep 06 15:31:27 2016
 Total elapsed time: < 1 sec

Pond B EURV Drain Time

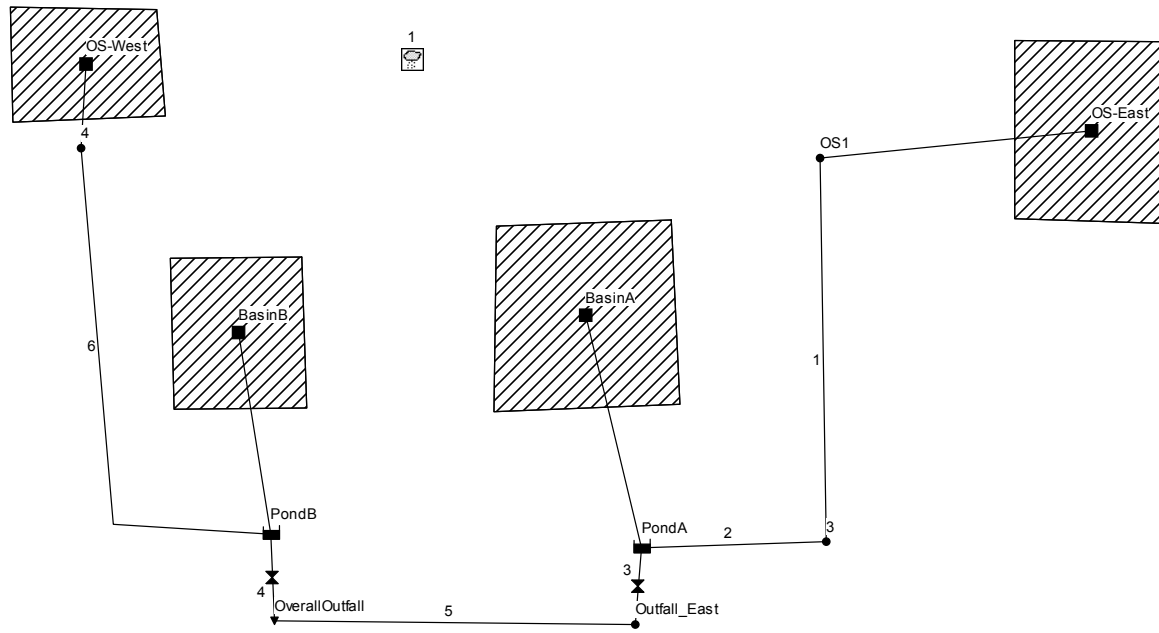


STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Crest at Woodmen
Basin ID: Pond B



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

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	50.88	81.5	1500	1	0
BasinB	1	PondB	29.73	78.4	800	3	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	Proposed Decay	Model 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
3	6335	18	0	0	0
Outfall_East	6324	0	0	0	0
4	6327	5	0	0	0

[OUTFALLS]

Name	Elevation	Type	Stage Data	Gated	Route To
Overalloutfall	6304	FREE		NO	

[STORAGE]

Name	Elev.	MaxDepth	InitDepth	Shape	Curve Name/Params	N/A
Fevap	Ksat	IMD				
PondA	6324	7	0	TABULAR	PondA_Vol	0
PondB	6304	9	0	TABULAR	PondB_Vol	0

[CONDUITS]

Name	From Node	To Node	Length	Roughness	InOffset	OutOffset
InitFlow	MaxFlow					
1	0	OS1	3	880	0.035	0
2	0	3	PondA	100	0.013	4
5	0	Outfall_East	Overalloutfall	400	0.01	0
6	0	4	PondB	1320	0.013	0

[OUTLETS]

Name	From Node	To Node	Offset	Type	QTable/Qcoeff	
Qexpon	Gated					
3	NO	PondA	Outfall_East	0	TABULAR/DEPTH	PondA_Outlet
4	NO	PondB	Overalloutfall	0	TABULAR/DEPTH	PondB_Outlet

[XSECTIONS]

Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels
Culvert						
1	TRAPEZOIDAL	4	5	4	4	1
2	CIRCULAR	4	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
2	0.5	1	0	NO	0
6	0.5	1	0	NO	0

Proposed Model

[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	61.52
PondA_Outlet		6.50	174.00
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	139.71
;			
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

		Proposed Model
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
;;-----
OS1         4377.753     7411.894
3           4432.819     3722.467
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

```

Proposed Model

	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

 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

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation	16.279	1.664
Evaporation Loss	0.000	0.000
Infiltration Loss	3.192	0.326
Surface Runoff	11.858	1.212
Final Storage	1.375	0.141
Continuity Error (%)	-0.901	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10 ⁶ gal
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	11.786	3.841
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.920	0.951
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	8.861	2.887
Continuity Error (%)	0.047	

 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

Proposed Model - 5-yr

Percent in Steady State : 0.00
 Average Iterations per Step : 1.78
 Percent Not Converging : 0.00

 Subcatchment Runoff Summary

Peak Runoff	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff
Runoff Coeff	in	in	in	in	in	10^6 gal
Subcatchment CFS						
OS-East 136.34 0.745	1.66	0.00	0.00	0.35	1.24	1.14
BasinA 141.51 0.734	1.66	0.00	0.00	0.28	1.22	1.69
BasinB 94.88 0.725	1.66	0.00	0.00	0.33	1.21	0.97
OS-West 7.18 0.462	1.66	0.00	0.00	0.81	0.77	0.06

 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	0.59	1.84	6351.84	0 00:45	1.80
3	JUNCTION	0.57	1.78	6336.78	0 00:47	1.64
Outfall_East	JUNCTION	0.00	0.00	6324.00	0 00:00	0.00
4	JUNCTION	0.24	0.77	6327.77	0 00:45	0.74
Overalloutfall	OUTFALL	0.00	0.00	6304.00	0 00:00	0.00
PondA	STORAGE	3.81	5.84	6329.84	0 01:16	5.84
PondB	STORAGE	4.85	7.87	6311.87	0 01:25	7.87

 Node Inflow Summary

Flow Balance Error Node Percent	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
OS1 0.000	JUNCTION	136.34	136.34	0 00:45	1.14	1.14
3 0.000	JUNCTION	0.00	127.70	0 00:47	0	1.12
Outfall_East 0.000	JUNCTION	0.00	42.37	0 01:16	0	0.809
4	JUNCTION	7.18	7.18	0 00:45	0.0606	0.0606

Proposed Model - 5-yr

0.000	OverallOutfall	OUTFALL	0.00	47.89	0	01:20	0	0.951
0.000	PondA	STORAGE	141.51	262.89	0	00:46	1.68	2.8
0.052	PondB	STORAGE	94.88	100.62	0	00:45	0.968	1.03
0.006								

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
OS1	JUNCTION	2.00	1.839	6.161
3	JUNCTION	2.00	1.784	16.216
Outfall_East	JUNCTION	2.00	0.000	0.000
4	JUNCTION	2.00	0.766	4.234
PondA	STORAGE	2.00	5.839	1.161
PondB	STORAGE	2.00	7.874	1.126

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Maximum Outflow Storage Unit	Average Volume	Avg Pcmt Full	Evap Loss	Exfil Loss	Maximum Volume	Max Pcmt Full	Time of Max Occurrence
CFS	1000 ft3				1000 ft3		days hr:min
PondA	168.140	40	0	0	288.333	69	0 01:15
42.37							
PondB	69.413	50	0	0	119.448	86	0 01:25
8.78							

Outfall Loading Summary

Outfall Node	Flow Freq Pcmt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
OverallOutfall	95.42	18.56	47.89	0.951
System	95.42	18.56	47.89	0.951

Link Flow Summary

Proposed Model - 5-yr

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	CONDUIT	127.70	0 00:47	6.28	0.16	0.44
2	CONDUIT	127.84	0 00:47	27.30	0.34	0.40
5	DUMMY	42.37	0 01:16			
6	CONDUIT	6.68	0 00:47	8.35	0.48	0.48
3	DUMMY	42.37	0 01:16			
4	DUMMY	8.78	0 01:25			

 Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Sep 06 15:14:18 2016
 Analysis ended on: Tue Sep 06 15:14:18 2016
 Total elapsed time: < 1 sec

 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

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation	27.348	2.795
Evaporation Loss	0.000	0.000
Infiltration Loss	3.332	0.340
Surface Runoff	22.106	2.259
Final Storage	2.186	0.223
Continuity Error (%)	-1.009	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10 ⁶ gal
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	21.988	7.165
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	12.819	4.177
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	9.138	2.978
Continuity Error (%)	0.136	

 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

Proposed Model - 100-yr
 Percent in Steady State : 0.00
 Average Iterations per Step : 1.94
 Percent Not Converging : 0.00

 Subcatchment Runoff Summary

Peak Runoff	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff
Runoff Coeff	in	in	in	in	in	10^6 gal
Subcatchment CFS						
OS-East 260.74 0.833	2.79	0.00	0.00	0.37	2.33	2.14
BasinA 278.90 0.806	2.79	0.00	0.00	0.29	2.25	3.11
BasinB 180.39 0.803	2.79	0.00	0.00	0.34	2.24	1.81
OS-West 14.27 0.619	2.79	0.00	0.00	0.84	1.73	0.14

 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	0.81	2.47	6352.47	0 00:45	2.41
3	JUNCTION	0.80	2.40	6337.40	0 00:46	2.21
Outfall_East	JUNCTION	0.00	0.00	6324.00	0 00:00	0.00
4	JUNCTION	0.41	5.00	6332.00	0 00:45	1.20
Overalloutfall	OUTFALL	0.00	0.00	6304.00	0 00:00	0.00
PondA	STORAGE	4.36	6.66	6330.66	0 00:58	6.65
PondB	STORAGE	5.57	8.62	6312.62	0 00:54	8.60

 Node Inflow Summary

Flow Balance Error Node Percent	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
OS1 0.000	JUNCTION	260.74	260.74	0 00:45	2.13	2.13
3 0.000	JUNCTION	0.00	245.36	0 00:46	0	2.12
Outfall_East 0.000	JUNCTION	0.00	191.43	0 00:58	0	3.14
4	JUNCTION	14.27	14.27	0 00:45	0.137	0.137

Proposed Model - 100-yr

0.000	OverallOutfall	OUTFALL	0.00	282.80	0	00:55	0	4.18
0.000	PondA	STORAGE	278.90	509.23	0	00:46	3.1	5.21
0.118	PondB	STORAGE	180.39	190.47	0	00:45	1.8	1.94
0.190								

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
OS1	JUNCTION	2.00	2.469	5.531
3	JUNCTION	2.00	2.403	15.597
Outfall_East	JUNCTION	2.00	0.000	0.000
4	JUNCTION	2.00	5.000	0.000
PondA	STORAGE	2.00	6.658	0.342
PondB	STORAGE	2.00	8.622	0.378

Node Flooding Summary

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

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Poned Volume 1000 ft3
4	0.02	0.20	0 00:45	0.000	0.000

Storage Volume Summary

Maximum Outflow Storage Unit CFS	Average Volume 1000 ft3	Avg Pc Full	Evap Loss	Exfil Loss	Maximum Volume 1000 ft3	Max Pc Full	Time of Max Occurrence days hr:min
PondA	211.412	50	0	0	380.507	91	0 00:58
191.43 PondB	81.523	58	0	0	132.874	95	0 00:53
98.90							

Outfall Loading Summary

Outfall Node	Flow Freq Pc	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
OverallOutfall	95.42	81.37	282.80	4.177

System 95.42 Proposed Model - 100-yr
 81.37 282.80 4.177

 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	CONDUIT	245.36	0 00:46	7.34	0.31	0.60
2	CONDUIT	245.56	0 00:46	32.17	0.65	0.58
5	DUMMY	191.43	0 00:58			
6	CONDUIT	13.34	0 00:47	9.63	0.96	0.82
3	DUMMY	191.43	0 00:58			
4	DUMMY	98.90	0 00:54			

 Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
6	0.01	0.01	0.01	0.01	0.01

Analysis begun on: Tue Sep 06 15:15:09 2016
 Analysis ended on: Tue Sep 06 15:15:09 2016
 Total elapsed time: < 1 sec

Appendix D

Drainage Maps

