# Amendment #1 to the FINAL DRAINAGE REPORT for "Cordera Filing No. 3A"

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# Amendment #1 to the MASTER DEVELOPMENT DRAINAGE PLAN for Cordera Filing No. 3

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# FINAL DRAINGE REPORT for "Cordera Filing No. 3F"

## Pine Creek Drainage Basin

Prepared for:
**City of Colorado Springs, Colorado**
**Engineering Division**

On Behalf of:
**High Valley Land Co., Inc.**
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Prepared by:

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October 2013
13.104.137

**Engineer's Statement:**

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin.

Richard Mulledy
Registered Professional Engineer 10/04/13
State of Colorado
No. 44542

SEAL


**Developer's Statement:**

I, the developer have read and will comply with all of the requirements specified in this drainage report and plan.

High Valley Land Co., Inc.
Business Name

By: _____
Thomas Taylor
Title: Director of Development Services
Address: 1755 Telstar Drive, Suite 211
Colorado Springs, CO 80920

**City of Colorado Springs:**

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

_____ _____
For the City Engineer Date 10/8/13

Conditions:

# TABLE OF CONTENTS

# I. INTRODUCTION

## *A. Background*

Cordera Filing No. 3 is a proposed 140-acre subdivision consisting of approximately 325 single family residential lots, open space tracts of land, and public right of way. The site is a part of the Cordera Master Plan, located in northeastern Colorado Springs, Colorado. The site will be platted in phases based upon market conditions. This study serves as an amendment to the previously approved *Final Drainage Report for "Cordera Filing No. 3A" & Master Development Drainage Plan Cordera Filing No. 3, Pine Creek & Kettle Creek Drainage Basins, October 2007.* There are no amendments to the original MDDP proposed for the area within the Kettle Creek Basin. The area of proposed amendment lies entirely within the Pine Creek Basin. As such, the information within this report will specifically address the areas of Cordera Filing No. 3 within the Pine Creek Basin.

Specifically, this amendment will address the relocation of proposed Pond 5 further south adjacent to Cordera Crest Avenue, the elimination of proposed Pond 7, and an update to the Final Drainage Report.

Cordera Filings 3A and 3F are the subject of the Amended Final Drainage Report within this study. Filing 3A is 13.5 acres in size and comprises of 40 single-family lots, open space, and right of way. Filing 3F is 10.6 acres in size and comprises of 33 single-family lots, open space, and right of way.


## *B. Project Location*

Cordera Filing No. 3 is located east of Powers Boulevard in northeastern Colorado Springs. Immediately to the south of the project is Briargate Crossing East. More specifically, the site is located as follows.

1. General Location. Northwest 1/4 of Section 26 and northeast 1/4 of Section 27, Township 12 South, Range 66 West of the 6th P.M. in the City of Colorado Springs, County of El Paso, State of Colorado.
2. Surrounding Streets. Union Boulevard/Milam Road has been proposed adjacent to the site to the southeast. Existing Powers Boulevard is located approximately 500 feet to the west. Cordera Crest Avenue runs along the boundary of the development to the west and south. Old Ranch Road borders the site at the northwest corner and is located approximately 1/4 mile to the north at the west end of the site.
3. Drainageway. The site is located in the Pine Creek and Kettle Creek Drainage Basins. The site currently drains to natural drainageways that direct runoff to the Pine Creek and Kettle Creek Drainage Basins.
4. Surrounding Developments. Development within the area is mostly in planning stages at this time or early phases of construction. The following are the existing or planned general land uses adjacent to the property.

   *North:* Unplatted vacant land exists to the north. The area is currently shown as low density single family lots within the Cordera Master Plan area.

*East:* Cordera Filing No. 2B, a single family development. The Bradley Ranch area will be developed as a future low density single family area.
*West:* Briargate Crossing East-1 and unplatted vacant land. This area will be developed for multiple uses. The area will be comprised of commercial, office industrial, office park, dedicated open space, regional drainage and high density multi-family residential and roadway right of ways.
*South:* Briargate Crossing East, commercial retail and multi-family development.

### *C. Property Description*

Filing 3 is undeveloped and partially platted at this time. Cordera Filings 1, 2A and 2B, located to the southeast, are constructed. Utility and roadway will be extended up to the site as part of the phased Cordera Crest Avenue construction as well as the development of multiple use areas located to the west of Filing 3.

1. Drainage Area. Filing 3 is approximately 140-acres in area. Upstream of the development is approximately 121 acres of undeveloped land formally used for grazing. A livestock pond is located to the north of the proposed development. The development of Filing 3 will not impact the upstream livestock pond.

2. Ground Cover. This site is covered primarily with native grasses. Clusters of scrub oak and some shrubs do exist at the site. As part of this development, areas of significant vegetation have been identified and open space areas planned to maintain the existing vegetation, to the extent possible, as an amenity for residents.

3. General Topography. The site drains to the southwest with average grades ranging from 1% to 4%.

4. General Soil Conditions. The *Soil Conservation Service of El Paso County Area, Colorado*, published by the United States Department of Agriculture, dated November 1991, has been utilized to investigate the existing general soil types within and tributary to the area impacting Cordera Filing No. 3. Four different soil types can be found in and around the study reach:

***Table 1.1***
***Soil Conservation Service Soil Survey for El Paso County***

| *Soil ID No.* | *Soil* | *Hydrologic Classification* | *Permeability* | *Erosion Hazard* |
|---|---|---|---|---|
| 8 | Blakeland loamy sand | A | Rapid | High |
| 68 | Peyton-Pring complex (3%-8% slope) | B | Rapid | Moderate to High |
| 69 | Peyton-Pring complex (8%-15% slope) | B | Rapid | Moderate to High |
| 71 | Pring coarse sandy loam | B | Rapid | Moderate |

Soils can be classified in four different hydrologic groups, A, B, C, or D to help predict stormwater runoff rates. Hydrologic group "A" is characterized by deep, well-drained coarse-grained soils with a rapid infiltration rate when thoroughly wet and having a low runoff potential. Group "D" typically has a clay layer at or near to the surface, or a very shallow depth to impervious bedrock and has a very slow infiltration rate and a high runoff potential. For the purposes of this Final Drainage Report, it has been assumed that hydrologic group "B" characteristics exists across the study area due to the fact the soil type dominates the area. Only a minor area of the Stapleton-Bernal sandy loam (partially hydrologic group "D") exists in the project area at downstream portions of the site.

5. Major Drainageways. The historic conditions split flow from Filing 3 to the north fork of Pine Creek and to Kettle Creek. Per the approved MDDP for Pine Creek and DPBS for Kettle Creek, flows from Filing 3 will be split and directed to either of these proposed detention ponds:
    a. The proposed pond in the north fork of the Pine Creek Basin is located at the northwest corner of Cordera Crest Avenue and Outlook Ridge.
    b. The proposed pond in the Kettle Creek Basin is located between Powers Boulevard and Cordera Crest Avenue, just north of the ridgeline between the Pine Creek and Kettle Creek basins.

    The detention ponds have been designed to mitigate the impacts of the additional tributary areas to the basins. The upstream portions of both the north fork of Pine Creek and Kettle Creek drainage ways exist within the limits of the development. The proposed conditions at the site will direct flows to storm sewers, which outfall to the aforementioned detention ponds located off of Cordera Crest Avenue.

6. Irrigation Facilities. No known functioning irrigation facilities are located on the site. A small pond formally used for livestock does exist to the north of the property; however, this pond will be removed in order to avoid standing water adjacent to the development.

7. Utilities and other Encumbrances. A gas line and easement owned and operated by Springs Utilities (SU) exist adjacent to the northeastern property line and south of Old Ranch Road. The easement will be incorporated into a future open space tract when the area to the north is developed. The design of the storm sewer system, as well as grading operations is being coordinated with SU.

# II. DRAINAGE BASINS AND SUB-BASINS

## *A. Major Basin Description*

Cordera Filing No. 3 is located within Pine Creek and Kettle Creek Drainage Basins. The Pine Creek and Kettle Creek Drainage Basins are located in the northern portion of the City of Colorado Springs. These basins are located north of Cottonwood Creek and south of the Elkhorn/Black Squirrel Creek Drainage Basins. The general drainage patterns of these basins decline to the southwest and ultimately feed into Monument Creek. The tributary areas that drain through the Cordera and Briargate East developments are largely undeveloped, are currently under construction, or consist of unplatted off-site single-family parcels that range from approximately 1 acre to about 10 acres in size.

## *B. Floodplain Statement*

Review of the ***Flood Insurance Rate Map (FIRM) 507 & 530 (08041CO507 F & 08041CO530 F)***, effective date March 17, 1997, published by the Federal Emergency Management Agency (FEMA) reveals that no portion of ***Cordera Filing No. 3*** lies within any designated 100-year floodplain. See Floodplain Map, Appendix.

# III. DRAINAGE DESIGN CRITERIA

## *A. Development Criteria*

This report has been prepared in accordance to the criteria set forth in the ***City of Colorado Springs & El Paso County Drainage Criteria Manual, Volumes I and II***, dated November 1991 including subsequent updates. In addition to the City Criteria Manual, the ***Urban Storm Drainage Criteria Manuals, Volumes 1-3***, published by the Urban Drainage and Flood Control District, latest update 2003, has also been used to supplement the City Criteria Manual.

Several drainage reports were found within the files of the City Subdivision Engineering Review Unit that have been completed for specific developments adjacent to and within the study area. The reports have been listed as references within this report.

## *B. Hydrologic Criteria*

Hydrologic analyses for the site have been completed utilizing a combination of methods. The design storms for each method are:

Initial Storm = 5-Year Storm
Major Storm = 100-Year Storm

**Soil Conservation Service Method:** To evaluate larger drainage areas that range in size between 100-acres and 10-square miles, the *Hydraulic Engineering Center's Hydrologic Modeling System (HEC-HMS)*, version 3.5 software, produced by the Unites States Army Corps of Engineers, has been used to develop hydrograph data of each basin. The same program also routes basin flows to design points and provides information to determine preliminary trunk storm sewer sizes and the required detention pond volumes for the major and minor storm event. Per City Criteria, the SCS hydrograph procedure is required for large drainage basins greater than 100 acres, but less than 10 square miles. Two storm distributions are provided within the City Criteria – the two-hour storm and the 24-hour time distribution for SCS Type IIa. For the purposes of this analysis, the 24-hour distribution has been selected because of the detention pond requirements, which will calculate a greater volume of runoff to be detained. Lag times for the modeling have been calculated as:

$$T(l) = 0.6*T(c)$$

Where

T(l) = Lag Time
T(c) = Time of Concentration.

Weighted Curve Numbers and associated percent imperiousness have been calculated based upon Tables 5-4 through 5-5 (ACM II) within the Drainage Criteria Manual.

**Rational Method:** The Rational Method has been used to evaluate smaller basins (under 100 acres), size the storm sewers, inlets and other drainage facilities.

### *C. Hydraulic Criteria*

A detailed hydraulic analysis of the roadways, storm sewers, swales, and inlets has been completed as part of this study to determine the required drainage facilities within the boundaries of Filings 3A, 3B(future) & 3F. The following City of Colorado Springs hydraulic criteria for roadways have been used to place and size drainage facilities.

*Table 3.2*
*Roadway Capacity Criteria*

| Street Type | Initial Storm Criteria | Major Storm Criteria |
|---|---|---|
| Residential Street (6" ramp curb) | Flow spread to crown; Maximum 20 cfs per side | 12" maximum depth at flowline; No adjacent flooding |
| Residential Street (8" vertical curb) | 6" allowable depth at flow line; Maximum 34 cfs per side | 12" maximum depth at flowline; No adjacent flooding |
| Collector Street (8" vertical curb) | 8" allowable depth at flow line; Maximum 34 cfs per side; No overtopping crown of road | 12" maximum depth at flowline; No adjacent flooding |
| Arterial Street (8" vertical curb) | 8" allowable depth at flowline; Maximum 34 cfs per side; No overtopping crown of road | 12" maximum depth at flowline; -or- 4" depth at crown (whichever is more restrictive) |

The above listed criteria for the major and minor storm events have been updated and adopted by the City of Colorado Springs in a resolution approved on October 11, 1994.

# IV. DRAINAGE FACILITY DESIGN

The existing conditions for Cordera Filing 3 have been studied under previous drainage reports. Interim developed conditions have been amended in this report because Cordera Filing 3 does not encompass the remaining undeveloped Cordera Master Plan area. Fully developed conditions are modeled to analyze future upstream development. Finally, since this drainage report is also an amended final drainage report for Cordera Filing 3A and a final drainage report for Cordera Filing 3F, the areas encompassing Cordera Filing 3A & 3F have been modeled and designed.

The storm sewer system and detention basins have been designed to accommodate all developed conditions examined within this report. The storm sewer and detention facilities are publicly owned and maintained, while all temporary diversion swales, water quality pond, amenities such as landscaping, and the graded depressed entrance condition are privately maintained by High Valley Land Co., Inc.

## *A. Existing Conditions (Pre-Development Conditions)*

The area is currently undeveloped and covered with native grasses, shrubs, scrub oak, and some trees. The historic conditions of the site were most recently studied within the ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***. Allowable discharge rates for developed conditions have been established under the previously approved reports and are referenced appropriately throughout this report.

***Pine Creek Drainage Basin (Existing Conditions)***

Per the approved ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***, the following table summarizes the historic hydrology for the site. The area evaluated was undeveloped with the exception of an existing Springs Utility gas main and associated easement, and large single-family parcels located to the northeast of the Cordera Master Plan area. The portions of the Cordera and Briargate Crossing East developments are partially constructed at this time.

***MDDP Existing Conditions Hydrology Summary***

| Basin ID | Area (ac) | Q(5) (cfs) | Q(100) (cfs) |
|---|---|---|---|
| PE-1 | 32.97 | 4.3 | 30.5 |
| PE-2 | 110.91 | 13.8 | 98.5 |
| PE-3 | 90.00 | 9.0 | 63.4 |
| PE-4 | 139.46 | 14.4 | 102.5 |
| PE-5 | 111.99 | 15.8 | 110.7 |
| PE-6 | 123.76 | 24.1 | 151.0 |
| PE-7 | 134.33 | 14.5 | 103.4 |
| PE-8 | 73.16 | 8.6 | 61.3 |

The limits of Filing 3 are located within sub-basins PE-7 and PE-8 as shown on the Existing Conditions Drainage Map found in the appendix of this report. The Pine Creek North Fork portion of the site drains toward an area just north of the intersection of Union Boulevard and Powers Boulevard, at design point P5. The total routed historic flows at this point have been previously calculated as Q(5) = 45.7 cfs and Q(100) = 304.2 cfs. At design point P5, drainage sub-basins PE-6, PE-7, and PE-8 are combined.

### *B. Interim Developed Conditions*

The development plan for Cordera Filing No. 3 encompasses only a portion of the remaining Cordera Master Plan area. For this reason, interim developed conditions are analyzed by this report.

Peak runoff rates for localized basins have been calculated using the Rational Method to size the minor storm sewer laterals and inlets. The design points for the project exceed 100 acres in tributary area, therefore, a HEC-HMS (SCS) model has been completed to determine the peak runoff rates at these points to size major storm sewer infrastructure.

Historic values for SCS curve numbers were utilized for all design points entering the site from the undeveloped area north of the existing gas main. Calculated flows at these locations are as follow. **Design Point 7,** (Q(5)=9.9 cfs, Q(100)=74.3 cfs). **Design Point 21,** (Q(5)=18.5 cfs, Q(100)=142.1 cfs). Proposed detention pond DF-5 has been designed to accommodate the additional capacity (overland flow) from the Future Cordera development located north of the gas main as well as the water quality requirements required to eliminate Pond DF-7 (over-detain) (see Appendix C of map ***for reference only***).

Side-lot and rear-lot swales will be used in residential areas to direct runoff away from individual residences en route to proposed storm sewer system infrastructure.

Interim conditions for the area within the Pine Creek Basin assume no upstream development (historic discharges).

***Pine Creek Drainage Basin (Interim Conditions)***

Within the Pine Creek Drainage Basin, runoff rates generated under the interim developed conditions are less than runoff generated under the fully developed conditions. The detention pond and supporting storm sewer system has been designed to accommodate flows from all developed conditions. The Detention pond, DF-5, has been placed in an open space area. Flows ultimately discharge into Pine Creek at peak flow rates in accordance with the ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***. The HMS input and results for each sub-basin are provided below in this Summary Table. This data is derived from the HEC-HMS Hydrology program using the SCS Method. These results are utilized in sizing major drainage facilities and detention basins. The smaller sub-basins in the proposed portions of this

development (Filings 3A & 3F) are analyzed with the Rational Method and are summarized later in this report in the *Filing 3A & 3F* section.

**Off-site Basin OP1** This basin encompasses approximately 18.2 acres and represents the northeast portion of the off-site drainage area north of Old Ranch Road. This basin drains to the southwest via sheet flow to an existing low point and crosses Old Ranch Road to the south via an existing 18-inch CMP and generates about 2.8/18.2 cfs in the Q5/Q100 storm events.

**Off-site Basin OP2** This basin encompasses approximately 120 acres and represents the northeast portion of the off-site drainage area. This basin drains to the southwest down an existing swale and generates about 16.7/129.6 cfs in the Q5/Q100 storm events.

**Design Point 21** is located at the south end of this basin that includes Off-Site Basin OP1 and OP2. **Design Point D21** is expected to have Q5/Q100 flows of 18.5/142.1 cfs in the existing condition. Flows here are captured by a 54-inch RCP that ultimately conveys runoff to proposed detention pond DF-5.

**Off-site Basin OP3** This basin encompasses approximately 67.2 acres and represents the eastern portion of the off-site drainage area. This basin drains to the west via existing rills and a swale which generates about 9.9/74.4 cfs in the Q5/Q100 storm events. **Design Point 7** is located at the southwest end of this basin. The runoff generated by this basin will overtop the existing gas main and is captured by a graded depressed entrance condition. These flows enter into a 42-inch RCP that ultimately conveys runoff to proposed detention pond DF-5. The graded depressed entrance condition is a control element that will direct the existing flows from Off-Site Basin OP3 into the proposed storm sewer system that ultimately outfalls to the proposed detention pond DF-5. Should the graded depression clog or overflow, the overflow route will follow a swale to the southwest behind residences into pond DF-5.

**On-site Basin PP10** This basin encompasses approximately 1.28 acres and represents the eastern portion of the on-site drainage area. This basin sheet flows to the south to Union Boulevard and is captured by existing infrastructure in Union Boulevard and Grand Cordera Parkway. Basin PP10 generates about 1.7/4.3 cfs in the Q5/Q100 storm events. These flows do not outfall to pond DF-4.

**On-site Basin PP11** This basin encompasses approximately 5.76 acres and represents the frontage of properties along Coyote Ridge Terrace. This basin drains to the south-southwest via 50-foot ROW asphalt roadway with curb and gutter and generates about 7.5/15.3 cfs in the Q5/Q100 storm events. Runoff is captured at the south-southwest end of the cul-de-sac in a 10-foot sump inlet and is routed to existing infrastructure in Union Boulevard and Grand Cordera Parkway. These flows do not outfall to pond DF-4.

**On-site Basin PP20** This basin encompasses approximately 4.61 acres and represents the north half of Outlook Ridge Trail. This basin drains to the west via 50-foot ROW asphalt roadway with curb and gutter and generates about 5.5/14.5 cfs in the Q5/Q100 storm events.

**On-site Basin PP23** This basin encompasses approximately 2.10 acres and represents the rear portions of properties along Outlook Ridge Trail and Gunsight Pass Trail. The graded depressed entrance condition is located within this sub-basin. This basin drains to the graded depressed entrance condition then is captured by a 42-inch RCP that ultimately conveys runoff to proposed detention pond DF-5. This sub-basin generates about 2.7/6.9 cfs in the Q5/Q100 storm events.

**On-site Basin PP21** This basin encompasses approximately 1.11 acres and represents the rear portions of properties along Gunsight Pass Trail just north of Outlook Ridge Trail. This sub-basin drains to the southwest to the 50-foot ROW with asphalt roadway and curb & gutter. Runoff is captured by a 15-foot sump inlet then enters a 42-inch RCP that ultimately conveys runoff to proposed detention pond DF-5. This sub-basin generates about 1.4/3.6 cfs in the Q5/Q100 storm events.

**On-site Basin PP22** This basin encompasses approximately 0.68 acres and represents the frontage of properties along Gunsight Pass Trail. This sub-basin drains to the northeast into the 50-foot ROW asphalt roadway with curb and gutter and is captured by a 15-foot sump inlet. This sub-basin generates about 0.9/2.3 cfs in the Q5/Q100 storm events. Design Point 51B is located at the southwest end of this sub-basin that includes Design Point 7 and sub-basins PP20, PP21, PP22 and PP23. This **Design Point 51B** is expected to have Q5/Q100 flows of 13.2/91.1 cfs. Flows here are captured by a 48-inch RCP that ultimately conveys runoff to proposed detention pond DF-5.

**On-site Basin PP30** This basin encompasses approximately 4.30 acres and represents the frontage of properties along Outlook Ridge Trail immediately west of Coyote Ridge Terrace. This sub-basin drains to 50-foot ROW roadway then westward towards the intersection of Outlook Ridge Trail and Gunsight Pass Trail. This sub-basin generates about 5.2/13.6 cfs in the Q5/Q100 storm events.

**On-site Basin PP31** This basin encompasses approximately 2.27 acres and represents the north frontage of properties along Gunsight Pass Trail immediately east of Outlook Ridge Trail. This sub-basin drains to the 50-foot ROW and is conveyed via gurb & gutter to the west to the intersection of Gunsight Pass Trail & Outlook Ridge Trail. This sub-basin generates about 2.8/7.3 cfs in the Q5/Q100 storm events.

**On-site Basin PP32** This basin encompasses approximately 2.80 acres and represents the south frontage of properties along Gunsight Pass Trail immediately east of Outlook Ridge Trail. This sub-basin drains to the 50-foot ROW and is conveyed via gurb & gutter to the west to the intersection of Gunsight Pass Trail & Outlook Ridge Trail. This sub-basin generates about 3.5/9.0 cfs in the Q5/Q100 storm events.

**On-site Basin PP37** This basin encompasses approximately 0.64 acres and represents the eastern half of the 84-foot ROW along Cordera Crest Avenue just north of Union Boulevard. The runoff from this sub-basin is conveyed via gurb & gutter to the north where it combines with

runoff from sub-basin PP34. This sub-basin generates about 2.0/3.4 cfs in the Q5/Q100 storm events.

**On-site Basin PP24** This basin encompasses approximately 13.44 acres and represents future single family patio homes just north of Union Boulevard and east of Cordera Crest Avenue. The runoff from this sub-basin is conveyed via sheet flow to the west where it combines with runoff from sub-basins PP34 and PP37. This sub-basin generates about 17.2/44.3 cfs in the Q5/Q100 storm events.

**On-site Basin PP34** This basin encompasses approximately 1.22 acres and represents the eastern frontage of properties along Outlook Ridge Trail just south of Gunsight Pass Trail. This sub-basin drains to the 50-foot ROW and is conveyed via gurb & gutter to a proposed low point at about the midpoint of this sub-basin where runoff is captured by a 14-foot sump inlet. This sub-basin generates about 1.5/4.0 cfs in the Q5/Q100 storm events. Design Point 34 is located at the eastern midpoint of this sub-basin that includes sub-basins PP24, PP30, PP31, PP32 and PP37. This **Design Point 34** is expected to have Q5/Q100 flows of 31.8/81.2 cfs. Flows here are captured by a 14-foot sump inlet that directs flow to a 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**On-site Basin PP35** This basin encompasses approximately 0.82 acres and represents the northwestern half of the 50-foot ROW along Outlook Ridge Trail just north of Cordera Crest Avenue. The runoff from this sub-basin is conveyed via gurb & gutter to a proposed low point at the approximate midpoint of this sub-basin where runoff is captured by a 14-foot sump inlet. This sub-basin generates about 1.0/2.7 cfs in the Q5/Q100 storm events. Design Point 35 is located at the eastern midpoint of this sub-basin where flow is combined with runoff from sub-basins PP24, PP30, PP31, PP32, PP34 and PP37. This **Design Point 35** is expected to have Q5/Q100 flows of 33.4/84.9 cfs. Flows here are captured by a 14-foot sump inlet that directs flow to a 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**Design Point 51C** is located at the low point in Outlook Ridge Trail and includes Design Points 34 and 35. The expected Q5/Q100 flows are 38.7/79.5 cfs. A pair of 14-foot Type D10R sump inlets on either side of the roadway will be installed at this low point. The 100 year flow depth is expected to be about 1.00' deep at these inlets. A 24" RCP conveys this runoff to the proposed detention pond DF-5. The overtopping location for this low point is to the west, directly into pond DF-5.

**On-site Basin PP40** This basin encompasses approximately 3.37 acres and represents the north half of the western end of Gunsight Pass Trail. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to the east where it combines with runoff from sub-basins PP41 and PP42. This sub-basin generates about 4.2/11.0 cfs in the Q5/Q100 storm events.

**On-site Basin PP41** This basin encompasses approximately 0.39 acres and represents the southern frontage of properties along Gunsight Pass Trail between Edgemont Ranch Lane and Notch Trail. The runoff from this sub-basin is conveyed via sheet flow to the northwest

where it combines with runoff from sub-basins PP40 and PP42. This sub-basin generates about 0.5/1.3 cfs in the Q5/Q100 storm events. Design Point 41 is located at the northern end of Edgemont Ranch Lane where flow is combined with runoff from sub-basin PP40. This **Design Point 41** is expected to have Q5/Q100 flows of 7.4/15.2 cfs. Flows here are routed to the south via curb & gutter where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane where flows will be directed to 18-inch and 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**On-site Basin PP42** This basin encompasses approximately 0.78 acres and represents the southern frontage of properties of the western end of Gunsight Pass Trail. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to the east where it combines with runoff from sub-basins PP40 and PP41. This sub-basin generates about 1.0/2.5 cfs in the Q5/Q100 storm events.

**On-site Basin PP43** This basin encompasses approximately 1.62 acres and represents the northwestern portion of properties along Edgemont Ranch Lane and Horsethief Falls Lane. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter southward where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane where flows will be directed to 18-inch and 24-inch RCP that conveys runoff to proposed detention pond DF-5. This sub-basin generates about 2.2/5.5 cfs in the Q5/Q100 storm events.

**On-site Basin PP44** This basin encompasses approximately 0.80 acres and represents the southern frontage of properties along Horsethief Falls Lane immediately west of Edgemont Ranch Lane. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter eastward where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane. Design Point 44 is located at the eastern end of this sub-basin where flow is combined with runoff from sub-basins PP42, PP43, and PP44. This sub-basin generates about 1.0/2.6 cfs in the Q5/Q100 storm events. **Design Point 44** is expected to have Q5/Q100 flows of 6.3/12.9 cfs. Flows here are routed to the south via curb & gutter where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane where flows will be directed to 18-inch and 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**On-site Basin PP45** This basin encompasses approximately 1.11 acres and represents the rear portion of lots west of Edgemont Ranch Lane between Horsethief Falls Lane and Notch Trail. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter southward where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane. Design Point 45 is located at the southern end of this sub-basin where flow is combined with runoff from Design Point 44 and sub-basin PP45. This sub-basin generates about 1.4/3.6 cfs in the Q5/Q100 storm events. **Design Point 45** is expected to have Q5/Q100 flows of 8.0/16.4 cfs. Flows here are routed to the south via curb & gutter where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane where flows will be directed to 18-inch and 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**On-site Basin PP46** This basin encompasses approximately 1.00 acres and represents the frontage of lots along the Notch Trail cul-de-sac. The runoff from this sub-basin is conveyed

via sheet flow and curb & gutter eastward where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane. Design Point 46 is located at the eastern end of this sub-basin where flow is combined with runoff from Design Point 45 and sub-basin PP46. This sub-basin generates about 1.5/3.8 cfs in the Q5/Q100 storm events. **Design Point 46** is expected to have Q5/Q100 flows of 7.0/17.9 cfs. Flows here are routed to the south via curb & gutter where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane where flows will be directed to 18-inch and 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**On-site Basin PP47** This basin encompasses approximately 1.88 acres and represents the portion of area east of Edgemont Ranch Lane between Gunsight Pass Trail and Notch Trail. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter southward where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane. Design Point 47 is located at the southern end of this sub-basin where flow is combined with runoff from Design Point 41 and sub-basin PP47. This sub-basin generates about 2.3/6.0 cfs in the Q5/Q100 storm events. **Design Point 47** is expected to have Q5/Q100 flows of 13.9/36.1 cfs. Flows here are routed to the south via curb & gutter where flows will combine with runoff from other sub-basins along Edgemont Ranch Lane where flows will be directed to 18-inch and 24-inch RCP that conveys runoff to proposed detention pond DF-5.

**Design Point 51A** is located at the low point in Edgemont Ranch Lane and includes Design Points 46 and 47. The expected Q5/Q100 flows are 13.9/36.1 cfs. A pair of 15-foot Type D10R sump inlets on either side of the roadway will be installed at this low point. The 100 year flow depth is expected to get about 0.53' deep at this inlet. A 24" RCP conveys this runoff to the proposed detention pond DF-5. The overtopping area for this low point is to the east.

**On-site Basin PP50** This basin encompasses approximately 1.93 acres and represents the frontage of properties along the Notch Trail cul-de-sac. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter southward where flows will be captured in a 10-foot Type D10R sump inlet and combine with runoff directed from Design Point 21 and be directed to 54-inch RCP that conveys runoff to proposed detention pond DF-5. This sub-basin generates about 2.4/6.2 cfs in the Q5/Q100 storm events.

**On-site Basin PP51** This basin encompasses approximately 7.06 acres and represents the rear portion of properties surrounded by Edgemont Ranch Lane, Cordera Crest Avenue, and Outlook Ridge Trail. The runoff from this sub-basin is conveyed via sheet flow southward where flows will be combined in detention pond DF-5 with runoff from Design Points 51A, 51B, and 51C. This sub-basin generates about 7.7/20.8 cfs in the Q5/Q100 storm events. Design Point 51 is located at the southern end of this sub-basin. **Design Point 51** is expected to have Q5/Q100 flows of 68.9/122.5 cfs. Flows here are detained then released at historic rates to the southwest via 54-inch RCP where flows will directed to the dedicated open space south of Cordera Crest Avenue.

**On-site Basin PP55** This basin encompasses approximately 7.05 acres and represents the area north of Horsethief Falls Lane which includes New Santa Fe Trail and Navajo Park

Court. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to the south end of each of these streets where flow is collected in 10-foot Type D10R at grade inlets and is directed via 18-inch RCP southward towards sub-basin PP60. This sub-basin generates about 9.2/23.4 cfs in the Q5/Q100 storm events.

**On-site Basin PP56** This basin encompasses approximately 4.48 acres and represents the northern portion of development at the western most end of Horsethief Falls Lane. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to a proposed low point at the west end of Horsethief Falls Lane where runoff is collected in a Type D10R sump inlet. Runoff is directed via 24-inch RCP in a south then easterly direction towards sub-basin PP62 where the proposed water quality pond will have flows routed through. This sub-basin generates about 5.2/13.9 cfs in the Q5/Q100 storm events.

**On-site Basin PP57** This basin encompasses approximately 7.04 acres and represents the western most portion of development surrounded by Horsethief Falls Lane and Cordera Crest Avenue. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to a proposed low point in Cordera Crest Avenue located at the southeast end of the sub-basin where runoff is collected in a Type D10R sump inlet and combines with flow from sub-basins PP55, PP56, PP58, PP59, PP60, PP61, PP62, and PP63. Runoff is then directed via 42-inch RCP northward towards sub-basin PP62 where the proposed water quality pond will have flows routed through. This sub-basin generates about 9.0/23.3 cfs in the Q5/Q100 storm events.

**On-site Basin PP58** This basin encompasses approximately 1.28 acres and represents the southern half of 84-foot ROW along Cordera Crest Avenue from Horsethief Falls Lane to immediately south of the water quality pond. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to a proposed low point in Cordera Crest Avenue located at the east end of the sub-basin where runoff is collected in a Type D10R sump inlet and combines with flow from sub-basins PP55, PP56, PP57, PP59, PP60, PP61, PP62, and PP63. Runoff is directed via 42-inch RCP northward towards sub-basin PP62 where the proposed water quality pond will have flows routed through. This sub-basin generates about 4.0/6.8 cfs in the Q5/Q100 storm events.

**On-site Basin PP59** This basin encompasses approximately 2.56 acres and represents the rear portion of properties between Horsethief Falls Lane and Cordera Crest Avenue. The runoff from this sub-basin is conveyed via sheet flow to curb & gutter in Cordera Crest Avenue to a proposed low point. This sub-basin generates about 3.1/8.0 cfs in the Q5/Q100 storm events.

**On-site Basin PP60** This basin encompasses approximately 2.56 acres and represents the frontage of properties along the southern end of Navajo Park Court. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to the south end of Navajo Park Court where flow is collected in a 10-foot Type D10R sump inlet and combines with flow from sub-basin PP55 is directed via 18-inch RCP southward towards sub-basin PP60. This sub-basin generates about 3.4/8.7 cfs in the Q5/Q100 storm events.

**On-site Basin PP61** This basin encompasses approximately 1.92 acres and represents the southern half of 84-foot ROW along Cordera Crest Avenue from Union Boulevard to immediately south of the water quality pond. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter to a proposed low point in Cordera Crest Avenue located at the west end of the sub-basin where runoff is collected in a Type D10R sump inlet and combines with flow from sub-basins PP55, PP56, PP57, PP58, PP59, PP60, PP62, and PP63. Runoff is directed via 18-inch RCP northward towards sub-basin PP62 where the proposed water quality pond will have flows routed through. This sub-basin generates about 5.9/10.2 cfs in the Q5/Q100 storm events.

**On-site Basin PP63** This basin encompasses approximately 1.72 acres and represents the northern half of 84-foot ROW along Cordera Crest Avenue from Outlook Ridge Trail to immediately south of the water quality pond. The runoff from this sub-basin is conveyed via sheet flow and curb & gutter in Cordera Crest Avenue to a proposed low point. This sub-basin generates about 2.8/6.1 cfs in the Q5/Q100 storm events.

**On-site Basin PP62** This basin encompasses approximately 5.12 acres and represents the rear portion of properties just north of the proposed water quality pond. The runoff from this sub-basin is conveyed via sheet flow to the proposed water quality pond located at the south end of the sub-basin where runoff is combined with flow from sub-basins PP55, PP56, PP57, PP58, PP59, PP60, PP61, and PP63. This sub-basin generates about 7.0/17.7 cfs in the Q5/Q100 storm events.

**Design Point WQP** is located just north of the low point in Cordera Crest Avenue and includes sub-basins PP55, PP56, PP57, PP58, PP59, PP60, PP61, PP62, and PP63. The expected Q5/Q100 flows are 46.1/90.1 cfs. A 66-inch RCP conveys this runoff to the south of Cordera Crest Avenue. The overtopping area for this low point is to the south.

Per the previously approved ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***, development of the site requires that detention shall be provided to reduce the fully-developed flows from the site to historic levels. This requirement is due in part to the master planning of the area, as well as consideration of environmental impacts to the channels. In addition to providing detention for the area, the proposed facilities must provide for one-half the water quality control volume.

The previously approved MDDP called for Pond 5 and an additional pond, Pond 7, to be located off-site to the east. The need for Pond 7 will be eliminated by this study. Pond 5, also referred to as DF-5, has been re-designed to provide the detention and water quality control volume required to eliminate Pond 7.

Detention pond DF-5 will be publicly maintained and constructed as part of the first phase of development. Detention pond sizing and control structure design have been completed as part of this study (see UDFCD spreadsheets in Appendix B). Detention Pond DF-5 will be platted within

Filing 3A. The following table summarizes the flows for this pond and detention volume required during the interim conditions.

Although the majority of drainage from the development within the Pine Creek Basin will be directed to Pond 5, a small portion of the site will drain to a proposed water quality pond (WQP) in the fully developed and interim developed conditions. This proposed water quality pond will be privately maintained and provide treatment to approximately 31 acres of developed land, but will provide no storage for any major or minor event. Pond 5 has been designed to accommodate the additional capacity required to eliminate Pond 7 (over-detain) as well as to compensate for the 31 acres of minor and major peak flows. The peak flow from the 31 acres will pass through and be treated at the WQP before being released at developed rates into the proposed storm sewer system and ultimately to North Pine Creek. This release should have no negative impacts to the downstream channel infrastruture.

Stormwater from the site will be treated for water quality within the proposed Pond 5, as well as, the previously mentioned water quality pond. The Water Quality Capture Volume is comprised of an Extended Detention Basin, where the "initial flush" of storm water will be drained over a 40-hour time period.

## *Pine Creek Detention Pond DF-5*
## *Interim Developed Conditions*

| *Storm Event* | *Proposed Interim Release Rate (cfs)* | *Required Detention Storage (ac-ft)* |
|---|---|---|
| *5-Year* | 6.8 | 3.3 |
| *100-Year* | 122.5 | 9.3 |

**Interim Condition - HMS input/Hydrologic Results**

| Basin Name | Area ($mi^2$) | Area (acres) | Lag Time | % Impervious | Weighted CN | 5-yr Peak (cfs) | 100-yr Peak (cfs) |
|---|---|---|---|---|---|---|---|
| OP1 | 0.0190 | 12.16 | 6.6 | 0 | 61 | 2.8 | 18.2 |
| OP10 | 0.0050 | 3.20 | 3.9 | 95 | 98 | 9.9 | 16.9 |
| OP11 | 0.0470 | 30.08 | 10.2 | 0 | 61 | 5.1 | 37.6 |
| OP12 | 0.0050 | 3.20 | 5.7 | 72 | 88 | 7.1 | 14.4 |
| OP2 | 0.1880 | 120.32 | 6.3 | 5 | 61 | 16.7 | 129.6 |
| OP3 | 0.0980 | 62.72 | 5.5 | 0 | 61 | 9.9 | 74.4 |
| OP5 | 0.0320 | 20.48 | 8.9 | 0 | 61 | 3.8 | 27.3 |
| PP-10 | 0.0020 | 1.28 | 5.7 | 25 | 78 | 1.7 | 4.3 |
| PP-11 | 0.0090 | 5.76 | 6.4 | 25 | 78 | 7.5 | 19.1 |
| PP-20 | 0.0072 | 4.61 | 8.22 | 25 | 78 | 5.5 | 14.5 |
| PP-21 | 0.0017 | 1.11 | 7.56 | 25 | 78 | 1.4 | 3.6 |
| PP-22 | 0.0011 | 0.68 | 6.24 | 25 | 78 | 0.9 | 2.3 |
| PP-23 | 0.0033 | 2.09 | 6.42 | 25 | 78 | 2.7 | 6.9 |
| PP-24 | 0.0210 | 13.44 | 6.7 | 25 | 78 | 17.2 | 44.3 |
| PP-30 | 0.0067 | 4.30 | 8.1 | 25 | 78 | 5.2 | 13.6 |
| PP-31 | 0.0035 | 2.27 | 7.44 | 25 | 78 | 2.8 | 7.3 |
| PP-32 | 0.0044 | 2.80 | 7.44 | 25 | 78 | 3.5 | 9 |
| PP-34 | 0.0019 | 1.22 | 6.96 | 55 | 78 | 1.5 | 4 |
| PP-34a | 0.0004 | 0.26 | 2.7 | 85 | 98 | 0.8 | 1.4 |
| PP-35 | 0.0013 | 0.82 | 7.38 | 55 | 78 | 1 | 2.7 |
| PP-37 | 0.0010 | 0.64 | 3.1 | 85 | 98 | 2 | 3.4 |
| PP-40 | 0.0053 | 3.37 | 7.2 | 25 | 78 | 4.2 | 11 |
| PP-41 | 0.0006 | 0.39 | 7.26 | 25 | 78 | 0.5 | 1.3 |
| PP-42 | 0.0012 | 0.77 | 7.14 | 25 | 78 | 1 | 2.5 |
| PP-43 | 0.0025 | 1.62 | 5.64 | 25 | 78 | 2.2 | 5.5 |
| PP-44 | 0.0013 | 0.80 | 7.26 | 25 | 78 | 1 | 2.6 |
| PP-45 | 0.0017 | 1.11 | 7.2 | 25 | 78 | 1.4 | 3.6 |
| PP-46 | 0.0018 | 1.16 | 7.14 | 25 | 78 | 1.5 | 3.8 |
| PP-47 | 0.0029 | 1.88 | 8.1 | 25 | 78 | 2.3 | 6 |
| PP-50 | 0.0030 | 1.93 | 7.86 | 25 | 78 | 2.4 | 6.2 |
| PP-51 | 0.0110 | 7.06 | 10.56 | 25 | 78 | 7.7 | 20.8 |
| PP-55 | 0.0110 | 7.04 | 6.3 | 25 | 78 | 9.2 | 23.4 |
| PP-56 | 0.0070 | 4.48 | 8.9 | 25 | 78 | 5.2 | 13.9 |
| PP-57 | 0.0110 | 7.04 | 6.6 | 25 | 78 | 9 | 23.3 |
| PP-58 | 0.0020 | 1.28 | 5 | 85 | 98 | 4 | 6.8 |
| PP-59 | 0.0040 | 2.56 | 8.4 | 25 | 78 | 3.1 | 8 |
| PP-60 | 0.0040 | 2.56 | 5.7 | 25 | 78 | 3.4 | 8.7 |
| PP-61 | 0.0030 | 1.92 | 5 | 85 | 98 | 5.9 | 10.2 |
| PP-62 | 0.0080 | 5.12 | 5 | 25 | 78 | 7 | 17.7 |

### *C. Fully Developed Conditions*

In anticipation of future development within the Cordera Master Plan area and its neighboring properties, fully developed conditions have been modeled to properly size all detention ponds and respective storm sewer systems within Cordera Filing No. 3. A development plan has not been created for the area northeast of the Springs Utilities gas main; however, future land-uses are used in the model. This preliminary concept plan proposes large, single-family lots and areas of open space. A sub-basin layout has been designed based upon this conceptual plan. In addition, the property to the northeast, known as Bradley Ranch, is assumed to be fully developed. If upstream development occurs in these areas, the flows shall be limited to historic rates and treated for water quality prior to entering the Cordera Development (see map DP03).

***Pine Creek Drainage Basin (Fully Developed Conditions)***

The development detains runoff to the historic flow rate in accordance with the ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***. Within the Pine Creek Drainage Basin, the detention pond and supporting storm sewer system has been designed to accommodate flows from all developed conditions.

Runoff flows collected in the detention pond DF-5 will leave via an outlet structure (see UDFCD spreadsheets in Appendix B) into a proposed 72-inch RCP which will convey flow in a southwest direction and daylight into the North Fork Pine Creek Drainage Basin with outlet protection.

Runoff flows that are routed through the water quality pond (WQP) will exit via an outlet structure (to be designed under a separate document) into a 66-inch RCP which will direct flow in a southeast direction and daylight into the North Fork Pine Creek Drainage Basin with outlet protection.

Peak runoff rates for localized basin have been calculated using the Rational Method to size the minor storm sewer laterals and inlets. Since the design points for the project exceed 100 acres in tributary area, a HEC-HMS (SCS) model has been completed to determine the peak runoff rates at these points to size the major storm sewer infrastructure.

**Fully Developed Condition - HMS input/Hydrologic Results**

| Basin Name | Area ($mi^2$) | Area (acres) | Lag Time | % Impervious | Weighted CN | 5-yr Peak (cfs) | 100-yr Peak (cfs) |
|---|---|---|---|---|---|---|---|
| OP1 | 0.0190 | 12.16 | 6.6 | 0 | 61 | 2.8 | 18.2 |
| OP10 | 0.0050 | 3.20 | 3.9 | 95 | 98 | 9.9 | 16.9 |
| OP11 | 0.0470 | 30.08 | 10.2 | 0 | 61 | 5.1 | 37.6 |
| OP12 | 0.0050 | 3.20 | 5.7 | 72 | 88 | 7.1 | 14.4 |
| OP2 | 0.1200 | 76.80 | 6.3 | 5 | 61 | 20.5 | 116.6 |
| OP3 | 0.1420 | 90.88 | 5.5 | 0 | 61 | 28.3 | 144.1 |
| OP5 | 0.0320 | 20.48 | 8.9 | 0 | 61 | 3.8 | 27.3 |
| OP6 | 0.0030 | 1.92 | 3.4 | 85 | 98 | 6 | 10.2 |
| OP7 | 0.0030 | 1.92 | 3.4 | 85 | 98 | 6 | 10.2 |
| OP8 | 0.0020 | 1.28 | 3 | 85 | 98 | 4 | 6.8 |
| OP9 | 0.0020 | 1.28 | 3 | 85 | 98 | 4 | 6.8 |
| PP-1 | 0.0120 | 7.68 | 8.5 | 20 | 68 | 4 | 15.7 |
| PP-10 | 0.0020 | 1.28 | 5.7 | 25 | 78 | 1.1 | 3.5 |
| PP-11 | 0.0090 | 5.76 | 6.4 | 25 | 78 | 4.9 | 15.3 |
| PP-11a | 0.0020 | 1.28 | 3.2 | 20 | 98 | 4 | 6.8 |
| PP-12 | 0.0110 | 7.04 | 6.1 | 20 | 70 | 5.2 | 17.4 |
| PP-13 | 0.0080 | 5.12 | 6.5 | 20 | 70 | 3.7 | 12.4 |
| PP-13a | 0.0060 | 3.84 | 5.7 | 20 | 70 | 2.9 | 9.6 |
| PP-2 | 0.0070 | 4.48 | 8.5 | 20 | 68 | 2.4 | 9.1 |
| PP-20 | 0.0072 | 4.61 | 8.22 | 25 | 78 | 5.5 | 14.5 |
| PP-21 | 0.0017 | 1.11 | 7.56 | 25 | 78 | 1.4 | 3.6 |
| PP-22 | 0.0011 | 0.68 | 6.24 | 25 | 78 | 0.9 | 2.3 |
| PP-23 | 0.0033 | 2.09 | 6.42 | 25 | 78 | 2.7 | 6.9 |
| PP-24 | 0.0210 | 13.44 | 6.7 | 25 | 78 | 17.2 | 44.3 |
| PP-3 | 0.0080 | 5.12 | 6.4 | 20 | 68 | 3.1 | 11.4 |
| PP-30 | 0.0067 | 4.30 | 8.1 | 25 | 78 | 5.2 | 13.6 |
| PP-31 | 0.0035 | 2.27 | 7.44 | 25 | 78 | 2.8 | 7.3 |
| PP-32 | 0.0044 | 2.80 | 7.44 | 25 | 78 | 3.5 | 9 |
| PP-34 | 0.0019 | 1.22 | 6.96 | 55 | 78 | 1.5 | 4 |
| PP-34a | 0.0004 | 0.26 | 2.7 | 85 | 98 | 0.8 | 1.4 |
| PP-35 | 0.0013 | 0.82 | 7.38 | 55 | 78 | 1 | 2.7 |
| PP-37 | 0.0010 | 0.64 | 3.1 | 85 | 98 | 2 | 3.4 |
| PP-4 | 0.0170 | 10.88 | 6.4 | 20 | 70 | 7.9 | 26.5 |
| PP-40 | 0.0053 | 3.37 | 7.2 | 25 | 78 | 4.2 | 11 |
| PP-41 | 0.0006 | 0.39 | 7.26 | 25 | 78 | 0.5 | 1.3 |
| PP-42 | 0.0012 | 0.77 | 7.14 | 25 | 78 | 1 | 2.5 |
| PP-43 | 0.0025 | 1.62 | 5.64 | 25 | 78 | 2.2 | 5.5 |
| PP-44 | 0.0013 | 0.80 | 7.26 | 25 | 78 | 1 | 2.6 |
| PP-45 | 0.0017 | 1.11 | 7.2 | 25 | 78 | 1.4 | 3.6 |
| PP-46 | 0.0018 | 1.16 | 7.14 | 25 | 78 | 1.5 | 3.8 |
| PP-47 | 0.0029 | 1.88 | 8.1 | 25 | 78 | 2.3 | 6 |
| PP-5 | 0.0040 | 2.56 | 6.1 | 20 | 70 | 1.9 | 6.3 |
| PP-50 | 0.0030 | 1.93 | 7.86 | 25 | 78 | 2.4 | 6.2 |
| PP-51 | 0.0110 | 7.06 | 10.56 | 25 | 78 | 7.7 | 20.8 |
| PP-55 | 0.0110 | 7.04 | 6.3 | 25 | 78 | 6 | 18.8 |
| PP-56 | 0.0070 | 4.48 | 8.9 | 25 | 78 | 5.2 | 13.9 |
| PP-57 | 0.0110 | 7.04 | 6.6 | 25 | 78 | 9 | 23.3 |
| PP-58 | 0.0020 | 1.28 | 5 | 85 | 98 | 4 | 6.8 |
| PP-59 | 0.0040 | 2.56 | 8.4 | 25 | 78 | 3.1 | 8 |
| PP-6 | 0.0100 | 6.40 | 6.6 | 20 | 70 | 4.6 | 15.5 |
| PP-60 | 0.0040 | 2.56 | 5.7 | 25 | 78 | 3.4 | 8.7 |
| PP-61 | 0.0030 | 1.92 | 5 | 85 | 98 | 5.9 | 10.2 |
| PP-62 | 0.0080 | 5.12 | 5 | 25 | 78 | 7 | 17.7 |
| PP-7 | 0.0110 | 7.04 | 6.8 | 20 | 70 | 5 | 16.9 |
| PP-8 | 0.0030 | 1.92 | 5.8 | 20 | 70 | 1.4 | 4.8 |
| PP-9 | 0.0030 | 1.92 | 5.7 | 20 | 70 | 1.4 | 4.8 |

### *D. Filling 3A, 3B(Future) & 3F*

***Filings 3A, 3B(Future) & 3F - Hydrology:***
Both the SCS and Rational Method are used to determine peak runoff rates from proposed basins within these three filings. Filing 3B will be located adjacent to and northwest of Filing 3A (see drainage map DP04).

The SCS method is used to ensure proper pond sizing and outlet design. The Rational Method hydrology is used to analyze street capacities, locate cross pans and size storm drain inlets where necessary. Inlets are provided at all low points and where flows exceed allowable street capacities. Cross pans are located to direct street runoff away from inundated areas and toward available storm drain systems. Following is a summary of Basin flows and Design Points for the Rational Method calculations; see the appendix of this report for the SCS model calculations and results:

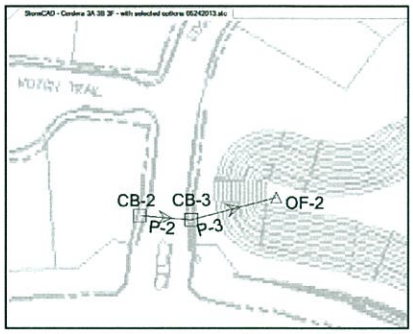
## HYDROLOGY SUMMARY
## Cordera Filings 3A, 3B & 3F - May 2013
### El Paso County

| BASIN No. | AREA Ac. | PEAK FLOW (CFS) Q5 Year | Q100 Year |
|---|---|---|---|
| EXISTING: | | | |
| | | | |
| DEVELOPED: | | | |
| Basins: | | | |
| 10 | 3.61 | 6.42 | 13.18 |
| 11 | 2.22 | 4.27 | 8.77 |
| | | | |
| 20 | 4.61 | 8.59 | 17.64 |
| 21 | 1.11 | 2.15 | 4.41 |
| 22 | 0.68 | 1.43 | 2.93 |
| 23 | 2.09 | 3.18 | 6.99 |
| | | | |
| 30 | 4.30 | 8.06 | 16.56 |
| 31 | 2.27 | 4.42 | 9.08 |
| 32 | 2.80 | 5.45 | 11.19 |
| 34 | 1.22 | 2.44 | 5.02 |
| 35 | 0.82 | 1.60 | 3.29 |
| JRDP2 | 10.56 | 20.00 | 41.08 |
| | | | |
| 40 | 3.37 | 6.65 | 13.66 |
| 41 | 0.39 | 0.77 | 1.57 |
| 42 | 0.78 | 1.54 | 3.16 |
| 43 | 1.62 | 3.51 | 7.22 |
| 44 | 0.80 | 1.57 | 3.22 |
| 45 | 1.11 | 2.19 | 4.49 |
| 46 | 1.16 | 2.30 | 4.72 |
| 47 | 1.88 | 3.52 | 7.23 |
| | | | |
| 50 | 1.93 | 3.66 | 7.52 |
| 51 | 7.06 | 8.11 | 17.86 |
| | | | |
| Design Points: | | | |
| 21 | 5.72 | 10.66 | 21.89 |
| 32 | 9.37 | 17.57 | 36.08 |
| 34 | 21.15 | 37.35 | 76.71 |
| 41 | 3.76 | 7.42 | 15.24 |
| 44 | 3.20 | 6.28 | 12.90 |
| 45 | 4.31 | 8.00 | 16.44 |
| 46 | 5.47 | 9.87 | 20.28 |
| 47 | 5.64 | 9.42 | 19.34 |
| 51A | 11.11 | 18.47 | 37.93 |
| 51B | 8.49 | 15.23 | 31.52 |
| 51C | 21.97 | 38.70 | 79.49 |
| 51 | 48.63 | 74.06 | 152.89 |
| | | | |

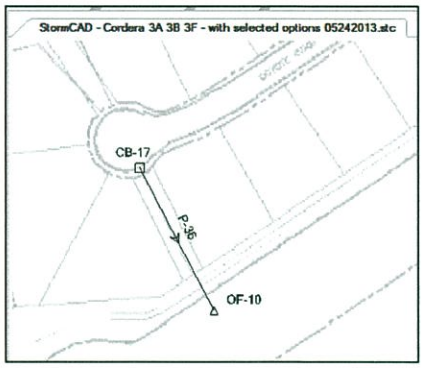
***Filings 3A, 3B(Future) & 3F - Hydraulics:***

Following is a narrative summarizing the proposed storm drain systems for these filings. Filing 3B will be located adjacent to and northwest of Filing 3A (see the Drainage Maps). Filing 3B will contain the proposed Detention Pond #5 and the following Storm Drain Systems 1, 3 and 4. See the StormCAD plan and profiles in the Appendix.

**Storm Drain System 1 (Future):**



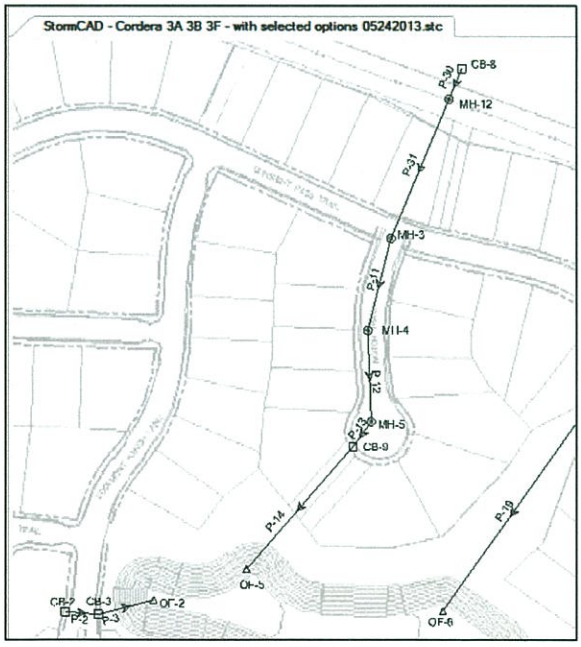

This system is in the low point of Edgemont Ranch Lane (minor residential street) located approximately 1,000 feet northwest of the intersection of Union Boulevard and Cordera Crest Avenue in future Filing 3B. This system is in Basins PP46 and PP47, at Design Points 46 & 47 (see drainage map DP03). DP-46 collects a surface flow of 9.9/20.3 cfs in the Q5/Q100 storm events. A 15' D-10-R inlet will capture this flow with no overtopping to DP-47. An 18" RCP will convey this 100 year flow to DP-47. DP-47 collects a surface flow of 9.4/19.3 cfs (Q5/Q100). A 15' D-10-R inlet will capture this 100 year flow with no overtopping. A 24" RCP will convey the combined runoff (DP-51A, 18.5/37.9 cfs) to the proposed Detention Pond DF-5. The 100 year tail water in the pond will surcharge this system during the 100-year event and create ponding in the street. This ponding depth is below the allowable 12" depth at the street flow line.




**Storm Drain System 2:**

This system is in the low point (west end) of Coyote Ridge Terrace (minor residential street) located approximately 370 feet north of the intersection of Union Boulevard and Grand Cordera Parkway in Filing 3F. This system is in Basin 10 which collects a surface flow of 6.4/13.2 cfs in the Q5/Q100 storm events. A 10' D-10-R inlet will capture this 100 year flow with no overtopping. An 18" RCP will convey this 100 year flow to the existing system in Union Boulevard, as proposed in the previously approved MDDP. Potential overtopping will be conveyed down a 50' drainage & utility easement to Union Boulevard.

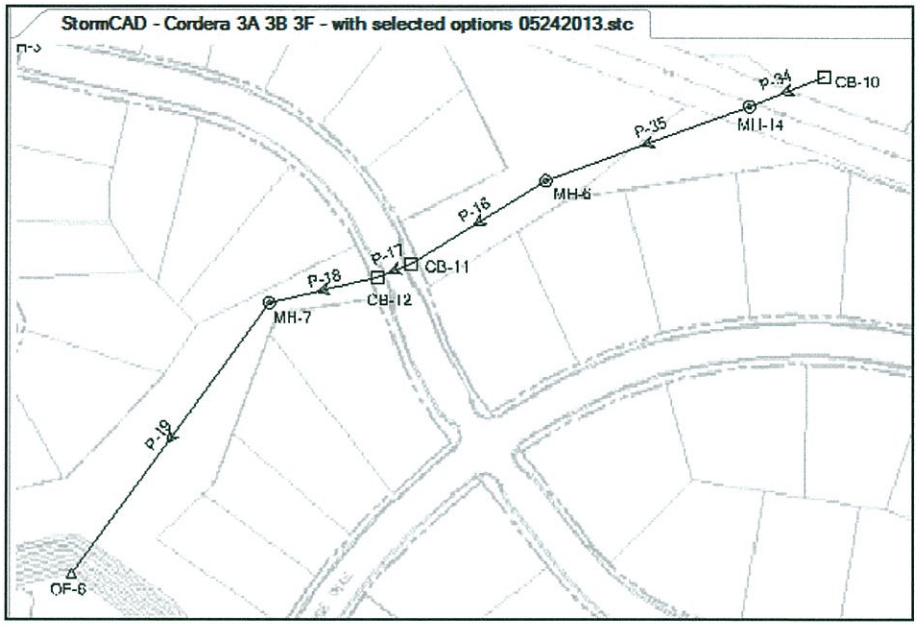
**Storm Drain System 3 (Future):**




This system is in Filing 3B and conveys runoff from the offsite areas to the northeast to the proposed Detention Pond DF-5. This system captures the future developed flow at Design Point SCS21 (estimated at 310 cfs, 138.5 ac) and is in Basins PP40, PP50, and PP51 (see drainage map DP03) and conveys it in a 54" RCP through an easement and then down Notch Trail (minor residential street) located approximately 1,370 feet north of the intersection of Union Boulevard and Cordera Crest Avenue. It combines with Basin 50

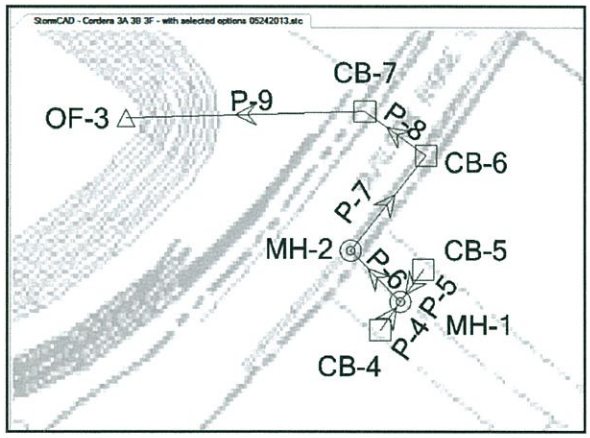
at a 5' D-10-R sump inlet (3.7/7.5 cfs in the Q5/Q100). This combined flow of 74/153 cfs (DP-51) is then conveyed through a 60" RCP to the pond. Tail water is not a factor in this system.

**Storm Drain System 4:**




This system is located in the open space drainage tract between Filing 3A and Filing 3B crossing Gunsight Pass Trail (minor residential street) approximately 210 feet north-northwest from the intersection of Gunsight Pass Trail and Outlook Ridge Trail (see drainage map DP03). This system is located within Basins PP23 and PP51. This system conveys runoff from the offsite areas to the proposed Detention Pond #5. This system captures flow at Design Point SCS7 (200 cfs) within a graded depressed entrance condition that will be graded over once development on the north side of the existing gas main takes place, and conveys it in a 42" RCP to Gunsight Pass where it combines with DP-21 at a 15' D-10-R sump inlet (10.7/21.9 cfs in the Q5/Q100). At this Design Point during the 100-year event, 4.8 cfs overtops the crown and drains into Basin 22. A 5' D-10-R inlet in Basin 22 captures this 4.8 cfs overflow. From here, a 48" RCP conveys the runoff to the proposed Detention Pond #5. Tail water is not a controlling factor in this system.

**Storm Drain System 5:**




This system is in the low point of Outlook Ridge Trail, east of Cordera Crest Avenue, in future Filing 3A. This system is in Basins PP34 and PP35, at Design Points 34 & 51C. This system also collects runoff from Cordera filing 3C (represented by Design Point JRDP2). There are 2-8' D-10-R curb opening inlets in Cordera filing 3C. These inlets drain into a proposed 18" RCP. This system drains into Basin 34 and combines at Design Point 34. Here a proposed 14' D-10-R sump inlet collects 15/25 cfs. During the 100-year event, about 12/36 cfs overtop the crown and drain into Basin 35. Basin 35 has a 14' D-10-R sump inlet that captures 15/25 cfs. The remaining 100 year street flow (27 cfs) overtops the curb and drains directly into the proposed Detention Pond #5. The 100 year tail water in the pond will not surcharge this system or create ponding in the street. The ponding depth at this low

point in Outlook Ridge Trail is below the allowable 12" depth at the street flow line. A 24" RCP will drain these inlets into the detention pond.

### *E. Detention and Water Quality*

Per the previously approved ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***, development of the site requires that detention shall be provided to reduce the fully-developed flows from the site to historic levels. This requirement is due in part to the master planning of the area, as well as consideration of environmental impacts to the channels. In addition to providing detention for the area, the proposed facilities will provide for water quality.

The previously approved MDDP called for Pond DF-5 and an additional pond, Pond DF-7, which was to be located to the north of Filing No. 3 where future storm system number 3 is proposed to be located (Design Point SCS21). The need for Pond DF-7 will be eliminated by this study. Pond 5, also referred to as DF-5, has been re-designed to provide the detention and water quality control volume required to eliminate Pond DF-7 (11"x17" of this map can be found in Appendix A ***for reference only***).

Detention Pond DF-5 will be constructed with Filings No. 3A and 3F as those two Filings will be constructed first. Detention pond DF-5 will be publicly maintained and constructed as part of the first phase of development. Initial detention pond sizing and control structure design has been completed as part of this study. Final sizing of the outlet structure, emergency spillway, forebay, and placement of appropriate erosion protection (i.e. riprap, energy dissapator(s)) will be completed under a separate document and submitted to the City for approval. Detention Pond DF-5 will be platted within Filing 3A. The following table summarizes the flows for this pond and detention volume required during the interim conditions.

Although the majority of drainage from the development within the Pine Creek Basin will be directed to Pond 5, a small portion of the site will drain to a proposed water quality pond (WQP) in the fully developed and interim developed conditions. This proposed water quality pond will privately maintained and provide treatment to approximately 31 acres of developed land, but will provide no storage for any major or minor event. Pond DF-5 has been designed to accommodate the additional capacity required to eliminate Pond 7, as well as, to compensate for the 31 acres of minor and major peak flows. Pond DF-5 is to be a permanent facility within Cordera Filing No. 3. The over-detention for pond DF-5 and the release of developed flow from the western 31 acres will not adversely impact downstream facilities.

Stormwater from the site will be treated for water quality within the proposed Pond DF-5, as well as, the previously mentioned water quality pond. The Water Quality Capture Volume is comprised of an Extended Detention Basin, where the "initial flush" of storm water will be drained over a 40-hour time period.

***Pine Creek Detention Pond DF-5***
***Interim Developed Conditions***

| *Storm Event* | *Proposed Interim Release Rate (cfs)* | *Required Detention Storage (ac-ft)* |
|---|---|---|
| *5-Year* | 6.8 | 3.3 |
| *100-Year* | 122.5 | 9.3 |

Pond DF-5 will be constructed as an extended detention basin (EDB) with a forebay and micropool. Runoff flows collected in detention pond DF-5 will leave via an outlet structure (see UDFCD spreadsheets in Appendix B) into a proposed 72-inch RCP which will convey flow in a southwest direction and daylight into the North Pine Creek Drainage Basin with outlet protection. These calculated flows are in conformance with prior drainage reports.

Runoff flows that are routed through the private WQP will exit via an outlet structure (to be designed under a separate document) into a 66-inch RCP which will direct flow in a southeast direction and daylight into the North Pine Creek Drainage Basin with outlet protection. An operations and maintenance (O & M) manual/plan will be needed for the WQP.

The full-build out conditions for the site have also been evaluated. Full-build out will be considered when development north of the existing gas line and south of Old Ranch Road is constructed. In accordance with the Pine Creek DBPS and Kettle Creek DBPS, all upstream off-site flows entering Cordera will be accepted at historic flow rates. Off-site areas are defined to be east of Union Boulevard/Milam Road and north of Old Ranch Road. If development upstream of Union Boulevard/Milam Road and Old Ranch Road occurs, the flows shall be limited to historic rates and treated for water quality prior to entering the Cordera Development. The following table summarizes the fully developed flows from the detention ponds.

***Pine Creek Detention Ponds DF-5***
***Fully Developed Conditions***

| *Storm Event* | *Proposed Dev. Release Rates (cfs)* | *Required Detention Storage (ac-ft)* |
|---|---|---|
| *5-Year* | *13* | *5.1* |
| *100-Year* | *178.2* | *13.7* |

As stated above, DF-5 and the proposed water quality pond (WQP) have been evaluated for water quality requirements. The Water Quality Capture Volume (WQCV) has been calculated assuming full development at the site. The total percent impervious area for each area within the site has been calculated based upon planning documents. The WQCV has been based upon the Urban Drainage Criteria, which drains the "initial flush" of stormwater over a 40-hour period. The following is a summary of the required storage volume.

***Pine Creek WQCV***
***Fully Developed Conditions***

| *Pond* | *Site Tributary Area (acres)* | *Percent Impervious (%)* | *WQCV (ac-ft)* |
|---|---|---|---|

| | | | |
|---|---|---|---|
| *DF-5* | 336 | 25% | 2.265 |
| *WQP* | 31 | 25% | 0.209 |
| | | | |

Preliminary emergency overflow locations have been addressed for DF-5 and the proposed water quality pond (see drainage map DP03). Detention pond DF-5 will incorporate an emergency spillway on the southwest end of the detention pond that will discharge onto Cordera Crest Avenue and spill into Pine Creek at the low point in Cordera Crest Avenue. The water quality pond will incorporate an emergency spillway on the south side end of the pond that will also discharge onto Cordera Crest Avenue and spill into Pine Creek at the low point in Cordera Crest Avenue.

### *F. Cost Estimate*

The proposed drainage system to be constructed as part of Filing 3A & Filing 3F will be publicly owned and maintained by the City of Colorado Springs. The developer will be responsible for constructing the proposed improvements.

An engineer's estimate of probable construction costs has been provided for the proposed improvements for Cordera Filing 3A & 3F. The storm sewer system and detention pond will be located in the Pine Creek Drainage Basins. The construction cost for the improvements are not eligible for reimbursement.

The WQP will be privately owned and maintained. The designs for the WQP and proposed detention pond DF-5 will be shown on a separate grading, erosion, and stormwater quality control plans.

***Table 4.10***
***Engineer's Estimate of Probable Construction Costs***
***Cordera Filing 3A & 3F - Pine Creek Drainage Basin***
***Non-Reimbursable Public Improvements***

| Item | Unit | Quanitity | Unit Cost | Total |
|---|---|---|---|---|
| 18" RCP | LF | 543 | $50.00 | $27,150.00 |
| 24" RCP | LF | 439 | $58.00 | $25,462.00 |
| 42" RCP | LF | 240 | $100.00 | $24,000.00 |
| 48" RCP | LF | 479 | $150.00 | $71,850.00 |
| 54" RCP | LF | 880 | $180.00 | $158,400.00 |
| 72" RCP | LF | 190 | $230.00 | $43,700.00 |
| Storm Manholes | EA | 5 | $3,500.00 | $17,500.00 |
| Type C Inlet | EA | 4 | $2,500.00 | $10,000.00 |
| 5' D10R Inlet | EA | 2 | $4,500.00 | $9,000.00 |
| 15' D10R Inlet | EA | 3 | $6,300.00 | $18,900.00 |
| 20' D10R Inlet | EA | 2 | $6,700.00 | $13,400.00 |
| FES | EA | 2 | $1,200.00 | $2,400.00 |
| Pond Outfall Structure | EA | 1 | $30,000.00 | $30,000.00 |
| | | | Sub-Total = | $451,762.00 |
| | | | 15% Contingencies = | $67,764.30 |
| | | | **Total =** | **$519,526.30** |

Since the engineer has no control over the cost of labor, materials, equipment or services furnished by others; over the contactor's method of determining prices; or over the competitive bidding or market conditions, the opinion of probable construction costs provided herein are made on the basis of the engineer's experience and qualifications and represents the best judgment as an experienced and qualified professional familiar with the construction industry. The engineer cannot, and does not, guarantee that proposals, bid, or actual construction costs will not vary from the opinion of probable costs.

### *G. Drainage and Bridge Fees*

Cordera Filing No. 3A is currently being re-platted. Cordera Filing No. 3F has not been previously platted. The sites are located entirely within the Pine Creek Drainage Fee Basin. The Pine Creek Drainage Fee Basin has been established as a "closed basin", meaning that no drainage, bridge, or pond fees will be assessed to the development at the time of platting. All public infrastructure improvements completed for the filing will be at the developer's expense and no reimbursement is possible for the construction of public facilities.

The portion of Cordera Filing No. 3 that lies within the Kettle Creek Drainage Fee Basin, located to the west of Filings 3A and 3F, will have fees applied at the time of platting.

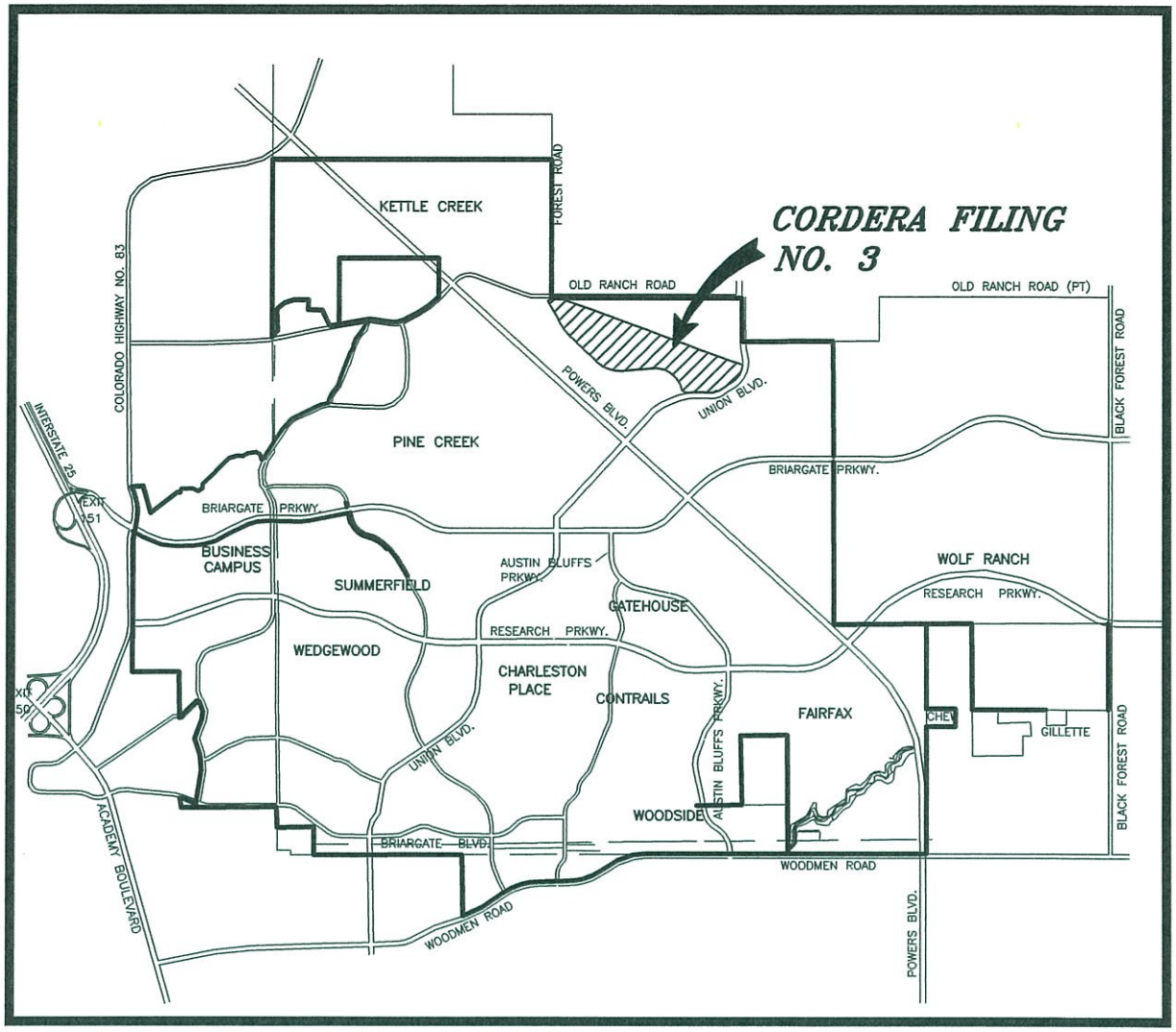
# V. REFERENCES

1. ***City of Colorado Springs & El Paso County Drainage Criteria Manual***, City of Colorado Springs, latest edition.
2. ***City of Colorado Springs Drainage Criteria Manual, Volume 2,*** City of Colorado Springs, November 1, 2002.
3. ***Soil Survey of El Paso County Area, Colorado***. United States Department of Agriculture Soil Conservation Service, June 1981.
4. ***Flood Insurance Rate Map for El Paso County, Colorado and Incorporated Areas, Panel 528 of 1300***, Federal Emergency Management Agency, Effective Date March 17, 1997.
5. ***Flood Insurance Rate Map for El Paso County, Colorado and Incorporated Areas, Panel 530 of 1300***, Federal Emergency Management Agency, Effective Date March 17, 1997.
6. ***Pine Creek Drainage Basin, Drainage Basin Planning Study***, Obering Wurth & Associates, Revised October 1988.
7. ***Amendment No. 1 to Pine Creek Drainage Planning Study as Approved by City Council 12/18/88 & as Approved by El Paso County Commissioner 8/25/88***, Obering Wurth & Associates, Revised July 29, 1992.
8. ***Amendment No. 2 to Pine Creek Drainage Basin Planning Study and Master Development Drainage Plan for Pine Creek Subdivision (Portion Contributing to Pine Creek)***, JR Engineering, October 1998.
9. ***Amendment No. 3 to Pine Creek Drainage Basin Planning Study and Master Development Plan for the Pine Creek and Cordera Neighborhoods (Portions Contributing to Pine Creek)***, by JR Engineering, February 2003.
10. ***Kettle Creek Drainage Basin, Old Ranch Road Tributary, Drainage Basin Planning Study and Master Development Drainage Plan***, by J.R. Engineering, March 2003.
11. ***Final Drainage Report for Cordera Filing No. 1 and Master Development Drainage Plan for Cordera and Briargate Crossing East, Pine Creek and Cottonwood Creek Basins***, Matrix Design Group, Inc., November 2004.
12. ***Final Drainage Report for Cordera Filing No. 2A & Master Development Drainage Plan for Cordera Filings 2A-2D, Pine Creek Drainage Basin***, by Matrix Design Group, Inc., April 2006.
13. ***Final Drainage Report for Cordera Filing No. 2B, Pine Creek Drainage Basins***, by Matrix Design Group, Inc., June 2006.
14. ***Final Drainage Report for Briargate Crossing East Filing No. 2, Pine Creek Drainage Basin***, by Matrix Design Group, Inc., October 2006.
15. ***Preliminary/Final Drainage Report for Cordera Filing No. 3C,*** by JR Engineering LLC, April 9, 2013.

16. ***Final Drainage Report for Cordera Filing No. 3A & Master Development Drainage Plan for Cordera Filings 3, Pine Creek Drainage Basin & Kettle Creek Drainage Basins***, by Matrix Design Group, Inc., April 2007.

# APPENDIX A

## REFERENCE MAPS

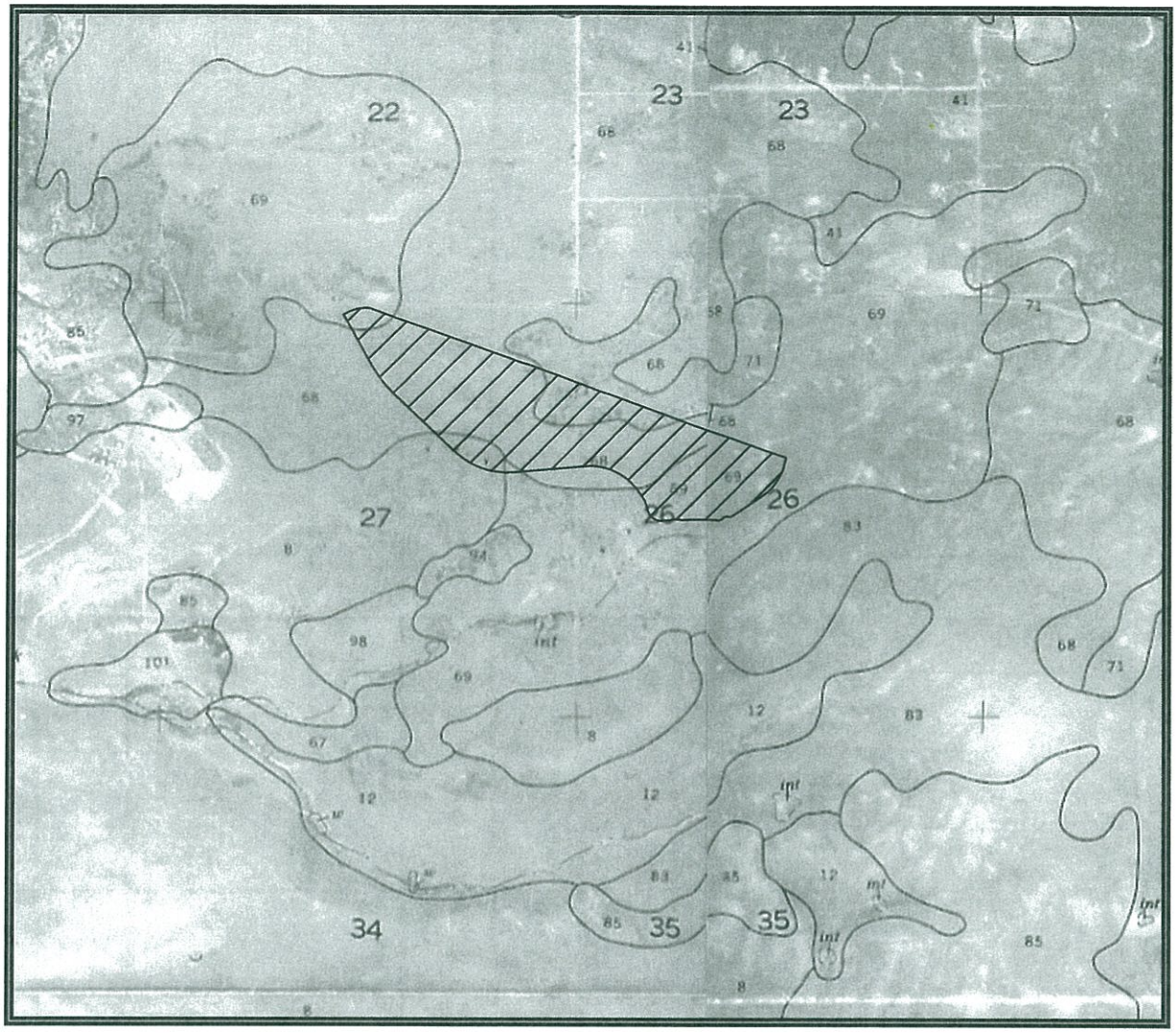



# VICINITY MAP

NORTH
N.T.S.

Matrix DESIGN GROUP

2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208




# SOILS MAP

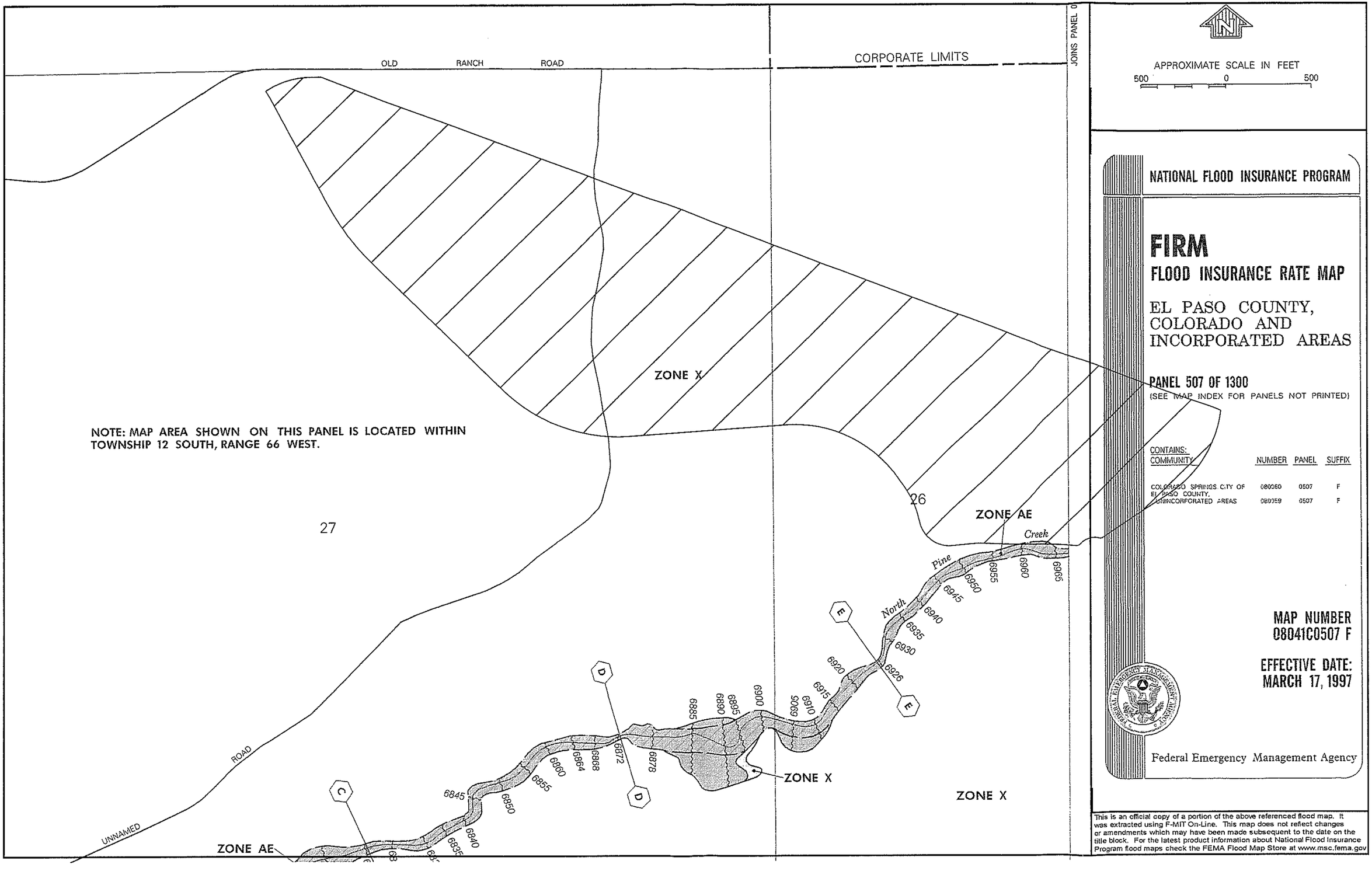
NORTH
N.T.S.

## LEGEND

| ID | SOIL NAME | HYD. GROUP |
|---|---|---|
| 12 | BRESSER SANDY LOAM | B |
| 68 | PEYTON–PRING COMPLEX (3%–8%) | B |
| 69 | PEYTON–PRING COMPLEX (8%–15%) | B |
| 71 | PRING | B |
| 83 | STAPLETON | B |
| 85 | STAPLETON–BERNAL COMPLEX | B/D |

Matrix DESIGN GROUP

2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208




APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

**PANEL 507 OF 1300**

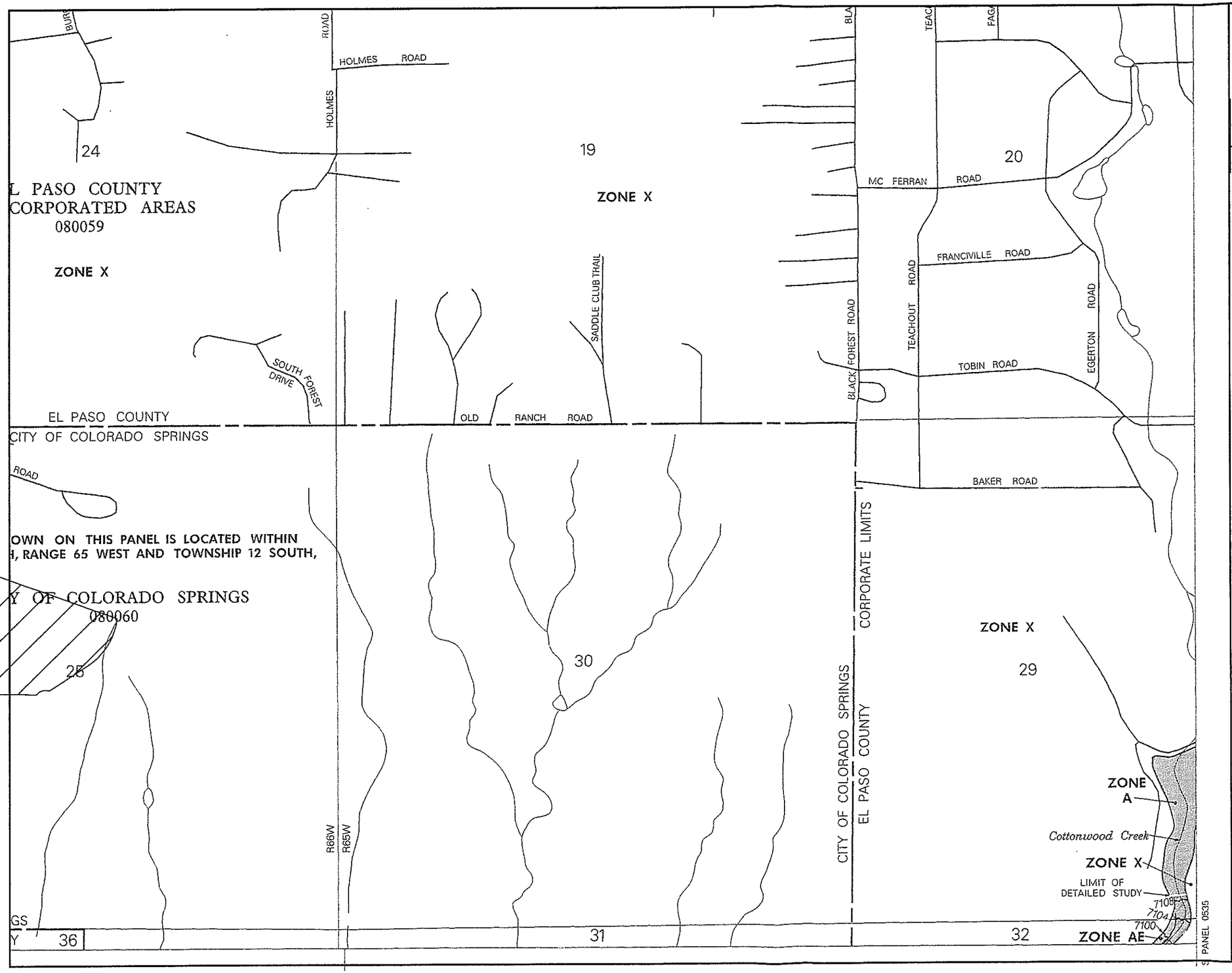
(SEE MAP INDEX FOR PANELS NOT PRINTED)

| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| COLORADO SPRINGS CITY OF | 080060 | 0507 | F |
| EL PASO COUNTY, UNINCORPORATED AREAS | 080059 | 0507 | F |

**MAP NUMBER 08041C0507 F**

**EFFECTIVE DATE: MARCH 17, 1997**

Federal Emergency Management Agency




APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

**PANEL 530 OF 1300**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| COLORADO SPRINGS, CITY OF | 080060 | 0530 | F |
| EL PASO COUNTY, UNINCORPORATED AREAS | 080059 | 0530 | F |

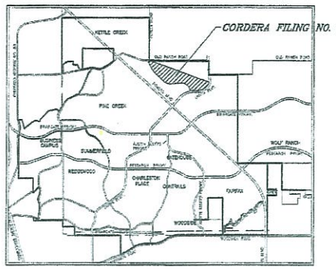
**MAP NUMBER**
**08041C0530 F**

**EFFECTIVE DATE:**
**MARCH 17, 1997**

Federal Emergency Management Agency

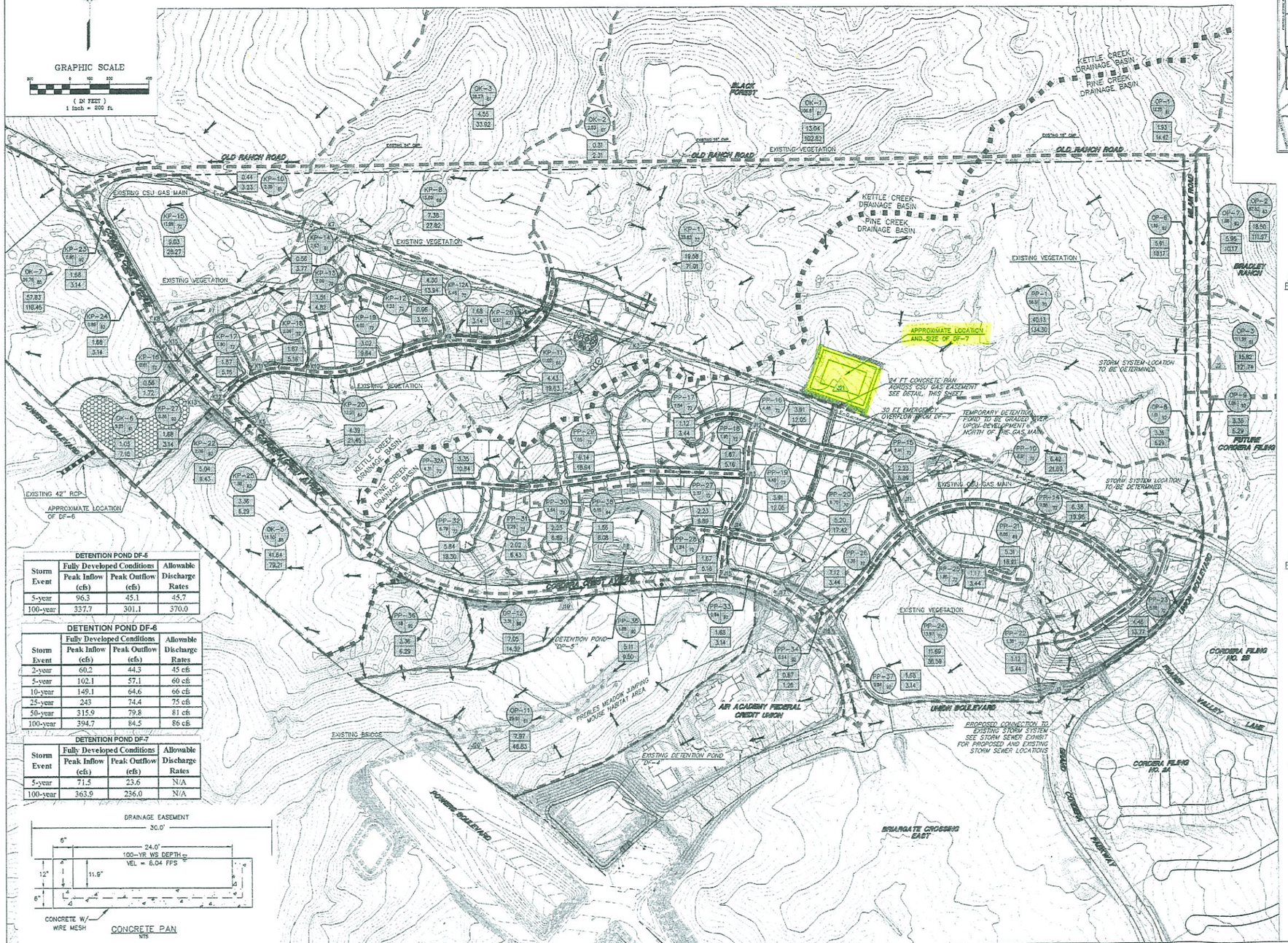
N

GRAPHIC SCALE
( IN FEET )
1 inch = 200 ft.




VICINITY MAP

NORTH
N.T.S.




**DETENTION POND DF-5**

| Storm Event | Fully Developed Conditions Peak Inflow (cfs) | Fully Developed Conditions Peak Outflow (cfs) | Allowable Discharge Rates |
|---|---|---|---|
| 5-year | 96.3 | 45.1 | 45.7 |
| 100-year | 337.7 | 301.1 | 370.0 |

**DETENTION POND DF-6**

| Storm Event | Fully Developed Conditions Peak Inflow (cfs) | Fully Developed Conditions Peak Outflow (cfs) | Allowable Discharge Rates |
|---|---|---|---|
| 2-year | 60.2 | 44.3 | 45 cfs |
| 5-year | 102.1 | 57.1 | 60 cfs |
| 10-year | 149.1 | 64.6 | 66 cfs |
| 25-year | 243 | 74.4 | 75 cfs |
| 50-year | 315.9 | 79.8 | 81 cfs |
| 100-year | 394.7 | 84.5 | 86 cfs |

**DETENTION POND DF-7**

| Storm Event | Fully Developed Conditions Peak Inflow (cfs) | Fully Developed Conditions Peak Outflow (cfs) | Allowable Discharge Rates |
|---|---|---|---|
| 5-year | 71.5 | 23.6 | N/A |
| 100-year | 363.9 | 236.0 | N/A |




CONCRETE PAN
NTS

## PINE CREEK SUMMARY TABLE

| DESIGN POINT ID | Q(5) (CFS) | Q(100) (CFS) | SUB-BASINS |
|---|---|---|---|
| J1 | (NOT USED) | | |
| J2 | | | OP2,OP3, OP6 OP7 |
| J3 | 5.58 | 17.21 | PP22, PP23 |
| J4 | (NOT USED) | | |
| J5 | (NOT USED) | | |
| J6 | (NOT USED) | | |
| J7 | (NOT USED) | | |
| J8 | (NOT USED) | | |
| J9 | (NOT USED) | | |
| J10 | (NOT USED) | | |
| J11 | | | PP10, PP14,PP15,PP21,OP8,OP9 |
| J12 | 24.20 | 238.64 | PP16, PP17, DF7 |
| J13 | 24.41 | 239.51 | PP18, J12 |
| J14 | 27.77 | 243.04 | PP19, PP27, J13 |
| J15 | 66.96 | 297.49 | PP20, PP33, J14, J17 |
| J16 | 14.82 | 44.05 | PP24, PP25, PP26, PP34, PP37 |
| J17 | 35.86 | 114.32 | PP26, J11, J16 |
| J18 | 94.91 | 331.27 | PP28, PP31, PP35, PP36, J15, J19 |
| J19 | 17.11 | 54.21 | PP29, PP30, PP32, PP32A |
| J20 | 47.14 | 308.69 | OP11, OP12, DF5 |
| J21 | 71.54 | 363.88 | OP1, PP1, J1 |

## KETTLE CREEK SUMMARY TABLE

| DESIGN POINT ID | Q(5) (CFS) | Q(100) (CFS) | SUB-BASINS |
|---|---|---|---|
| K1 | (NOT USED) | | |
| K2 | (NOT USED) | | |
| K3 | 22.84 | 152.01 | KP1, OK1, OK2 |
| K4 | (NOT USED) | | |
| K5 | 6.16 | 37.43 | KP11, KP20 |
| K6 | (NOT USED) | | |
| K7 | 9.91 | 58.27 | KP5, OK3 |
| K8 | 15.44 | 89.82 | KP10, KP13, KP14, KP15, K7 |
| K9 | 27.51 | 166.15 | KP12, KP12A, KP26, K3 |
| K10 | 29.91 | 172.76 | KP19, K9 |
| K11 | 30.89 | 175.16 | KP18, K10 |
| K12 | 39.48 | 216.68 | KP17, KP22, K5, K11 |
| K13 | 60.56 | 315.99 | K12, K15 |
| K14 | (NOT USED) | | |
| K15 | 22.04 | 101.78 | KP16, KP23, KP24, KP25, KP27, K8 |

## LEGEND

- SUB-BASIN BOUNDARY
- 4900 EXISTING CONTOUR
- FLOW DIRECTION
- FLOODPLAIN WAY
- LOT LINE
- DESIGN POINT
- SUB BASIN DESIGNATION
- SUB BASIN CURVE NUMBER
- SUB BASIN AREA (AC.)
- 0.0 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 0.0 100-YEAR STORM EVENT PEAK FLOW (CFS)

x-ex-topo
x-title-drainage
x-topoF2B
x-boseF3
x-topo-F3
x-ex-F2
x-ex-union gc
x-ex-F2B
x-ex-F2A
x-ex-OF1
X-topoF2A
x-topo
x-boseF-OF
X-BASE
x-topo-union gc

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | REVISIONS | |

NAME: S:\06104.070\cwp\Drainage\DR03-FP-Analysis.cwp
PCP: Matrix.ctb
PLOT DATE: Oct 11, 2007 9:30am

BENCHMARK DATA(ELEV.)
(DATUM)
(DESCRIPTION/LOCATION)

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

Matrix Design Group, Inc.
Integrated Design Solutions
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

# CORDERA FILING NO. 3

## MASTER DEVELOPMENT DRAINAGE PLAN

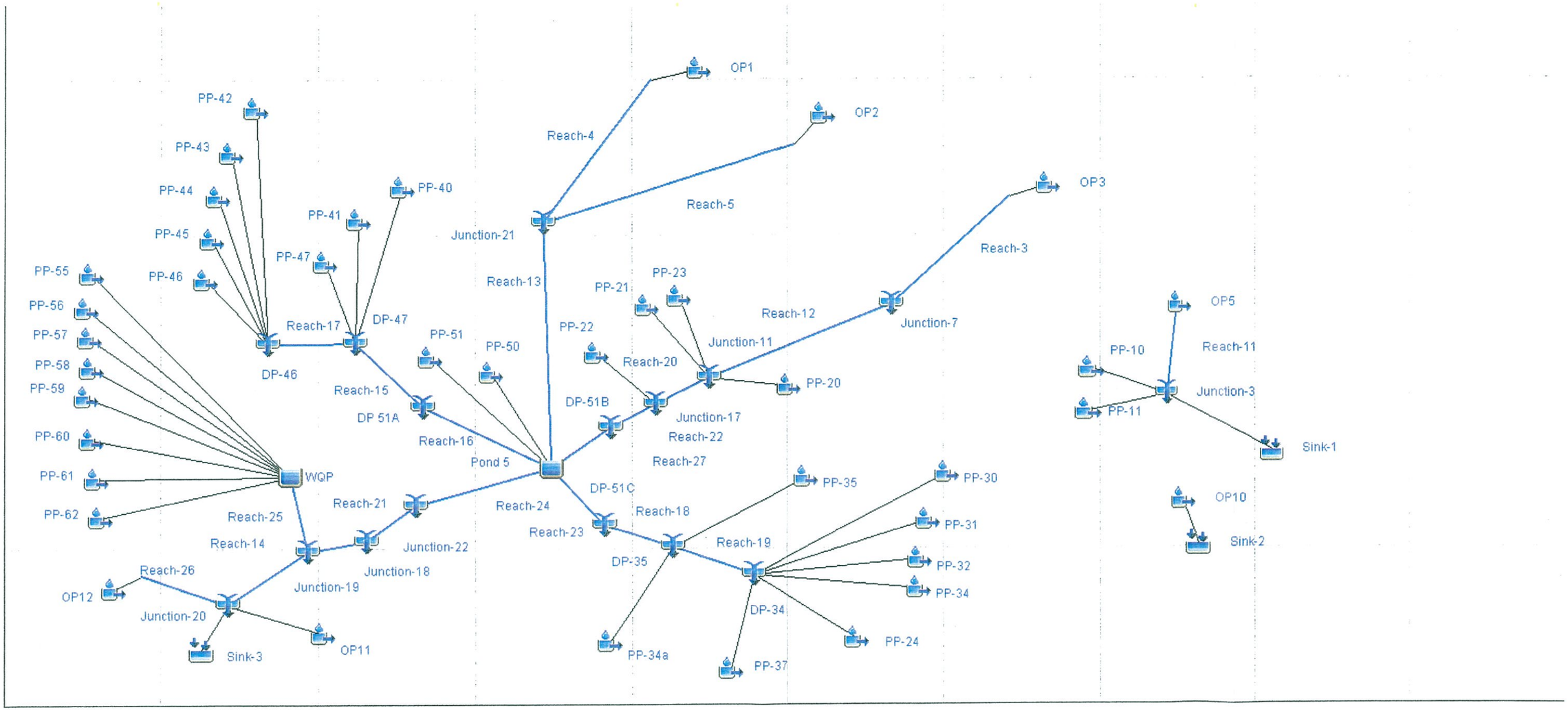
## FULLY DEVELOPED DRAINAGE MAP

| | | | | | |
|---|---|---|---|---|---|
| DESIGNED BY: | BAS | SCALE | | DATE ISSUED | OCTOBER 2007 |
| DRAWN BY: | BAS | HOR. | 1"=200' | SHEET NO. | OF SHEETS |
| CHECKED BY: | RDG | VERT. | N/A | | DP03 |

# APPENDIX B

## HYDROLOGIC AND HYDRAULIC CALCULATIONS

# INTERIM CONDITIONS HMS MODEL



## Interim Condition - HMS input/Hydrologic Results

| Basin Name | Area ($mi^2$) | Area (acres) | Lag Time | % Impervious | Weighted CN | 5-yr Peak (cfs) | 100-yr Peak (cfs) |
|---|---|---|---|---|---|---|---|
| OP1 | 0.0190 | 12.16 | 6.6 | 0 | 61 | 2.8 | 18.2 |
| OP10 | 0.0050 | 3.20 | 3.9 | 95 | 98 | 9.9 | 16.9 |
| OP11 | 0.0470 | 30.08 | 10.2 | 0 | 61 | 5.1 | 37.6 |
| OP12 | 0.0050 | 3.20 | 5.7 | 72 | 88 | 7.1 | 14.4 |
| OP2 | 0.1880 | 120.32 | 6.3 | 5 | 61 | 16.7 | 129.6 |
| OP3 | 0.0980 | 62.72 | 5.5 | 0 | 61 | 9.9 | 74.4 |
| OP5 | 0.0320 | 20.48 | 8.9 | 0 | 61 | 3.8 | 27.3 |
| PP-10 | 0.0020 | 1.28 | 5.7 | 25 | 78 | 1.7 | 4.3 |
| PP-11 | 0.0090 | 5.76 | 6.4 | 25 | 78 | 7.5 | 19.1 |
| PP-20 | 0.0072 | 4.61 | 8.22 | 25 | 78 | 5.5 | 14.5 |
| PP-21 | 0.0017 | 1.11 | 7.56 | 25 | 78 | 1.4 | 3.6 |
| PP-22 | 0.0011 | 0.68 | 6.24 | 25 | 78 | 0.9 | 2.3 |
| PP-23 | 0.0033 | 2.09 | 6.42 | 25 | 78 | 2.7 | 6.9 |
| PP-24 | 0.0210 | 13.44 | 6.7 | 25 | 78 | 17.2 | 44.3 |
| PP-30 | 0.0067 | 4.30 | 8.1 | 25 | 78 | 5.2 | 13.6 |
| PP-31 | 0.0035 | 2.27 | 7.44 | 25 | 78 | 2.8 | 7.3 |
| PP-32 | 0.0044 | 2.80 | 7.44 | 25 | 78 | 3.5 | 9 |
| PP-34 | 0.0019 | 1.22 | 6.96 | 55 | 78 | 1.5 | 4 |
| PP-34a | 0.0004 | 0.26 | 2.7 | 85 | 98 | 0.8 | 1.4 |
| PP-35 | 0.0013 | 0.82 | 7.38 | 55 | 78 | 1 | 2.7 |
| PP-37 | 0.0010 | 0.64 | 3.1 | 85 | 98 | 2 | 3.4 |
| PP-40 | 0.0053 | 3.37 | 7.2 | 25 | 78 | 4.2 | 11 |
| PP-41 | 0.0006 | 0.39 | 7.26 | 25 | 78 | 0.5 | 1.3 |
| PP-42 | 0.0012 | 0.77 | 7.14 | 25 | 78 | 1 | 2.5 |
| PP-43 | 0.0025 | 1.62 | 5.64 | 25 | 78 | 2.2 | 5.5 |
| PP-44 | 0.0013 | 0.80 | 7.26 | 25 | 78 | 1 | 2.6 |
| PP-45 | 0.0017 | 1.11 | 7.2 | 25 | 78 | 1.4 | 3.6 |
| PP-46 | 0.0018 | 1.16 | 7.14 | 25 | 78 | 1.5 | 3.8 |
| PP-47 | 0.0029 | 1.88 | 8.1 | 25 | 78 | 2.3 | 6 |
| PP-50 | 0.0030 | 1.93 | 7.86 | 25 | 78 | 2.4 | 6.2 |
| PP-51 | 0.0110 | 7.06 | 10.56 | 25 | 78 | 7.7 | 20.8 |
| PP-55 | 0.0110 | 7.04 | 6.3 | 25 | 78 | 9.2 | 23.4 |
| PP-56 | 0.0070 | 4.48 | 8.9 | 25 | 78 | 5.2 | 13.9 |
| PP-57 | 0.0110 | 7.04 | 6.6 | 25 | 78 | 9 | 23.3 |
| PP-58 | 0.0020 | 1.28 | 5 | 85 | 98 | 4 | 6.8 |
| PP-59 | 0.0040 | 2.56 | 8.4 | 25 | 78 | 3.1 | 8 |
| PP-60 | 0.0040 | 2.56 | 5.7 | 25 | 78 | 3.4 | 8.7 |
| PP-61 | 0.0030 | 1.92 | 5 | 85 | 98 | 5.9 | 10.2 |
| PP-62 | 0.0080 | 5.12 | 5 | 25 | 78 | 7 | 17.7 |

Project: Cordera FLG 3 111706 Simulation Run: 5-yr Pine-PP

Start of Run: 01Jan2007, 00:00 Basin Model: Pine Creek-Interim
End of Run: 02Jan2007, 00:00 Meteorologic Model: Met 1
Compute Time: 17Jun2013, 12:34:36 Control Specifications: Control 1

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| DP-34 | 0.0385469 | 31.8 | 01Jan2007, 06:02 | 0.89 |
| DP-35 | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| DP-46 | 0.0085277 | 7.0 | 01Jan2007, 06:02 | 0.85 |
| DP-47 | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| DP 51A | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| DP-51B | 0.11127 | 13.2 | 01Jan2007, 06:12 | 0.30 |
| DP-51C | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| Junction-11 | 0.11020 | 13.0 | 01Jan2007, 06:12 | 0.29 |
| Junction-17 | 0.11127 | 13.2 | 01Jan2007, 06:12 | 0.30 |
| Junction-18 | 0.38988 | 6.8 | 01Jan2007, 08:05 | 0.26 |
| Junction-19 | 0.43988 | 37.6 | 01Jan2007, 06:06 | 0.33 |
| Junction-20 | 0.49188 | 43.1 | 01Jan2007, 06:12 | 0.33 |
| Junction-21 | 0.20700 | 18.5 | 01Jan2007, 06:14 | 0.23 |
| Junction-22 | 0.38988 | 6.8 | 01Jan2007, 08:05 | 0.26 |
| Junction-3 | 0.0430000 | 11.3 | 01Jan2007, 06:04 | 0.39 |
| Junction-7 | 0.0980000 | 9.9 | 01Jan2007, 06:14 | 0.23 |
| OP1 | 0.0190000 | 2.8 | 01Jan2007, 06:04 | 0.23 |
| OP10 | 0.0050000 | 9.9 | 01Jan2007, 06:00 | 2.37 |
| OP11 | 0.0470000 | 5.1 | 01Jan2007, 06:08 | 0.23 |
| OP12 | 0.0050000 | 7.1 | 01Jan2007, 06:01 | 1.47 |
| OP2 | 0.18800 | 16.7 | 01Jan2007, 06:11 | 0.23 |
| OP3 | 0.0980000 | 9.9 | 01Jan2007, 06:09 | 0.23 |
| OP5 | 0.0320000 | 3.8 | 01Jan2007, 06:06 | 0.23 |
| Pond 5 | 0.38988 | 6.8 | 01Jan2007, 08:05 | 0.26 |
| PP-10 | 0.0020000 | 1.7 | 01Jan2007, 06:02 | 0.85 |
| PP-11 | 0.0090000 | 7.5 | 01Jan2007, 06:02 | 0.85 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| PP-20 | 0.0072031 | 5.5 | 01Jan2007, 06:03 | 0.85 |
| PP-21 | 0.0017344 | 1.4 | 01Jan2007, 06:03 | 0.85 |
| PP-22 | 0.0010625 | 0.9 | 01Jan2007, 06:02 | 0.85 |
| PP-23 | 0.0032656 | 2.7 | 01Jan2007, 06:02 | 0.85 |
| PP-24 | 0.0210000 | 17.2 | 01Jan2007, 06:02 | 0.85 |
| PP-30 | 0.0067188 | 5.2 | 01Jan2007, 06:03 | 0.85 |
| PP-31 | 0.0035469 | 2.8 | 01Jan2007, 06:03 | 0.85 |
| PP-32 | 0.0043750 | 3.5 | 01Jan2007, 06:03 | 0.85 |
| PP-34 | 0.0019062 | 1.5 | 01Jan2007, 06:03 | 0.85 |
| PP-34a | .0004 | 0.8 | 01Jan2007, 06:00 | 2.37 |
| PP-35 | 0.0012812 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-37 | .001 | 2.0 | 01Jan2007, 06:00 | 2.37 |
| PP-40 | 0.0052656 | 4.2 | 01Jan2007, 06:03 | 0.85 |
| PP-41 | .00060938 | 0.5 | 01Jan2007, 06:03 | 0.85 |
| PP-42 | 0.0012000 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-43 | 0.0025312 | 2.2 | 01Jan2007, 06:02 | 0.85 |
| PP-44 | 0.0012500 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-45 | 0.0017340 | 1.4 | 01Jan2007, 06:03 | 0.85 |
| PP-46 | 0.0018125 | 1.5 | 01Jan2007, 06:03 | 0.85 |
| PP-47 | 0.0029375 | 2.3 | 01Jan2007, 06:03 | 0.85 |
| PP-50 | 0.0030156 | 2.4 | 01Jan2007, 06:03 | 0.85 |
| PP-51 | 0.0110312 | 7.7 | 01Jan2007, 06:05 | 0.85 |
| PP-55 | 0.0110000 | 9.2 | 01Jan2007, 06:02 | 0.85 |
| PP-56 | 0.0070000 | 5.2 | 01Jan2007, 06:04 | 0.85 |
| PP-57 | 0.0110000 | 9.0 | 01Jan2007, 06:02 | 0.85 |
| PP-58 | 0.0020000 | 4.0 | 01Jan2007, 06:00 | 2.37 |
| PP-59 | 0.0040000 | 3.1 | 01Jan2007, 06:04 | 0.85 |
| PP-60 | 0.0040000 | 3.4 | 01Jan2007, 06:02 | 0.85 |
| PP-61 | 0.0030000 | 5.9 | 01Jan2007, 06:00 | 2.37 |
| PP-62 | 0.0080000 | 7.0 | 01Jan2007, 06:01 | 0.85 |
| Reach-11 | 0.0320000 | 3.8 | 01Jan2007, 06:08 | 0.23 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| Reach-12 | 0.0980000 | 9.9 | 01Jan2007, 06:14 | 0.23 |
| Reach-13 | 0.20700 | 18.4 | 01Jan2007, 06:15 | 0.23 |
| Reach-14 | 0.38988 | 6.8 | 01Jan2007, 08:06 | 0.26 |
| Reach-15 | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| Reach-16 | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| Reach-17 | 0.0085277 | 6.9 | 01Jan2007, 06:02 | 0.85 |
| Reach-18 | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| Reach-19 | 0.0385469 | 31.8 | 01Jan2007, 06:02 | 0.89 |
| Reach-20 | 0.11020 | 13.0 | 01Jan2007, 06:12 | 0.29 |
| Reach-21 | 0.38988 | 6.8 | 01Jan2007, 08:05 | 0.26 |
| Reach-22 | 0.11127 | 13.2 | 01Jan2007, 06:12 | 0.30 |
| Reach-23 | 0.0402281 | 33.3 | 01Jan2007, 06:02 | 0.91 |
| Reach-24 | 0.38988 | 6.8 | 01Jan2007, 08:05 | 0.26 |
| Reach-25 | 0.0500000 | 36.4 | 01Jan2007, 06:06 | 0.87 |
| Reach-26 | 0.0050000 | 7.1 | 01Jan2007, 06:01 | 1.47 |
| Reach-27 | 0.11127 | 13.2 | 01Jan2007, 06:12 | 0.30 |
| Reach-28 | 0.43988 | 37.5 | 01Jan2007, 06:13 | 0.33 |
| Reach-3 | 0.0980000 | 9.9 | 01Jan2007, 06:14 | 0.23 |
| Reach-4 | 0.0190000 | 2.8 | 01Jan2007, 06:09 | 0.23 |
| Reach-5 | 0.18800 | 16.7 | 01Jan2007, 06:15 | 0.22 |
| Sink-1 | 0.0430000 | 11.3 | 01Jan2007, 06:04 | 0.39 |
| Sink-2 | 0.0050000 | 9.9 | 01Jan2007, 06:00 | 2.37 |
| Sink-3 | 0.49188 | 43.1 | 01Jan2007, 06:12 | 0.33 |
| WQP | 0.0500000 | 36.4 | 01Jan2007, 06:05 | 0.87 |

Summary Results for Reservoir "Pond 5"

Project: Cordera FLG 3 111706

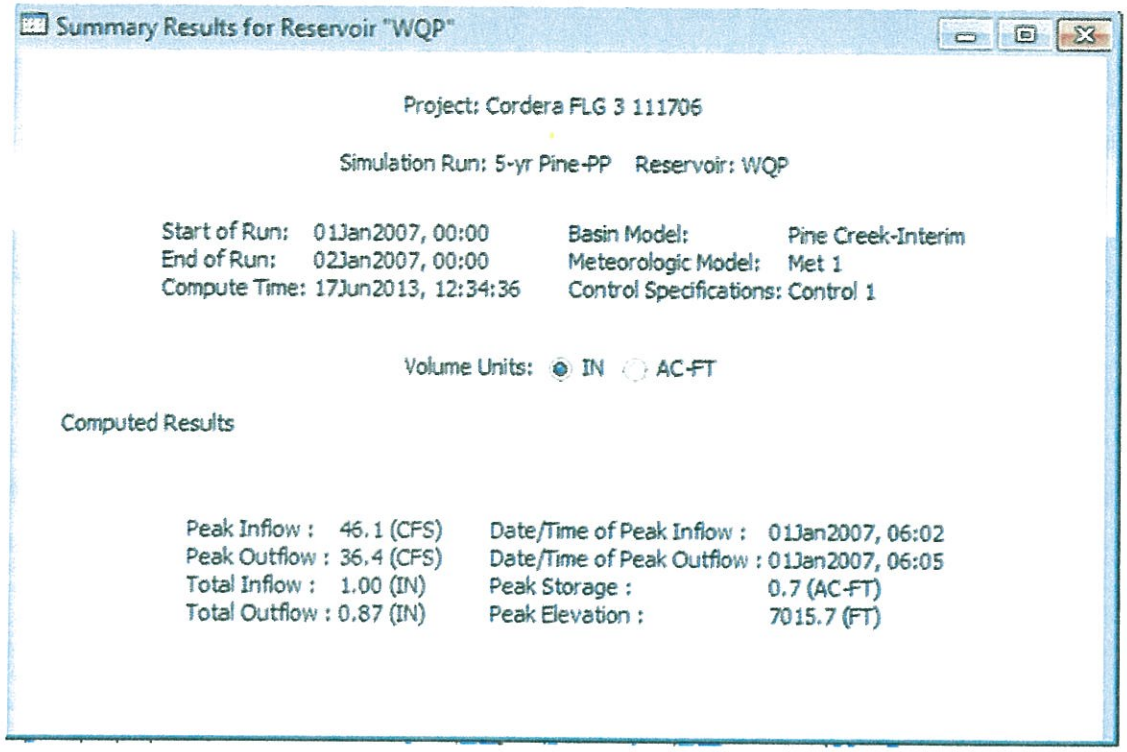
Simulation Run: 5-yr Pine-PP  Reservoir: Pond 5

| | | | |
|---|---|---|---|
| Start of Run: | 01Jan2007, 00:00 | Basin Model: | Pine Creek-Interim |
| End of Run: | 02Jan2007, 00:00 | Meteorologic Model: | Met 1 |
| Compute Time: | 17Jun2013, 12:34:36 | Control Specifications: | Control 1 |

Volume Units: (•) IN ( ) AC-FT

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow : | 68.9 (CFS) | Date/Time of Peak Inflow : | 01Jan2007, 06:03 |
| Peak Outflow : | 6.8 (CFS) | Date/Time of Peak Outflow : | 01Jan2007, 08:05 |
| Total Inflow : | 0.37 (IN) | Peak Storage : | 3.3 (AC-FT) |
| Total Outflow : | 0.26 (IN) | Peak Elevation : | 7025.9 (FT) |


Summary Results for Reservoir "WQP"
Project: Cordera FLG 3 111706
Simulation Run: 5-yr Pine-PP Reservoir: WQP
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:34:36
Basin Model: Pine Creek-Interim
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 46.1 (CFS)
Peak Outflow : 36.4 (CFS)
Total Inflow : 1.00 (IN)
Total Outflow : 0.87 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:02
Date/Time of Peak Outflow : 01Jan2007, 06:05
Peak Storage : 0.7 (AC-FT)
Peak Elevation : 7015.7 (FT)

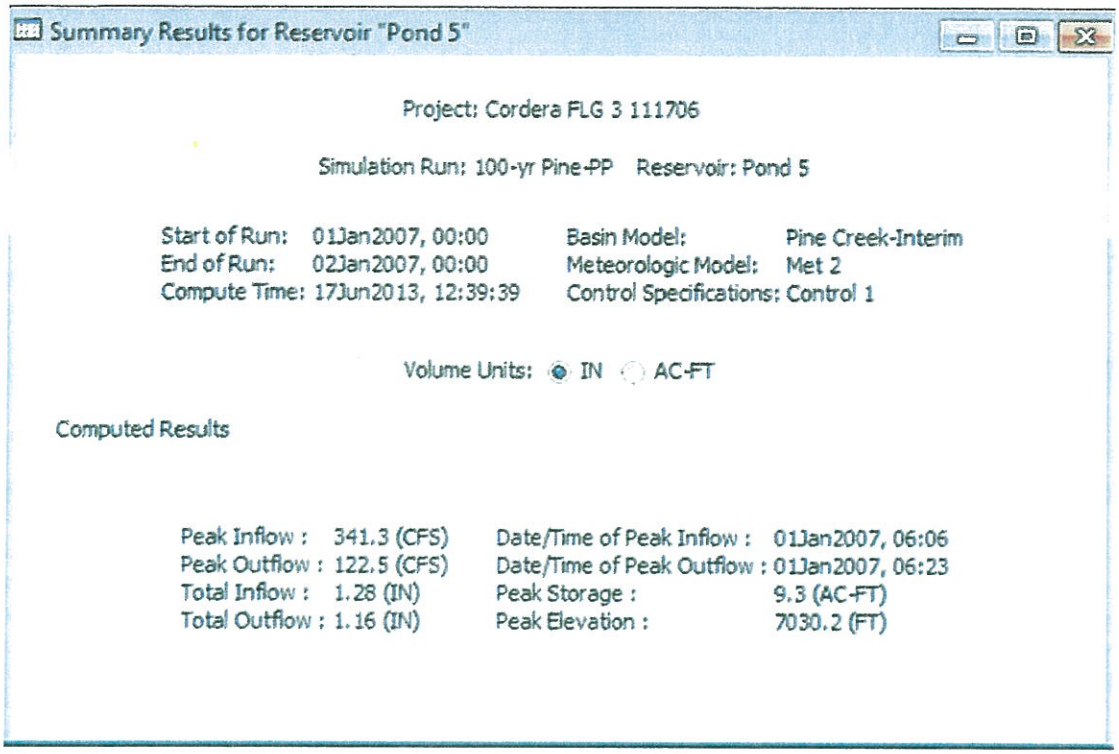
Project: Cordera FLG 3 111706 Simulation Run: 100-yr Pine-PP

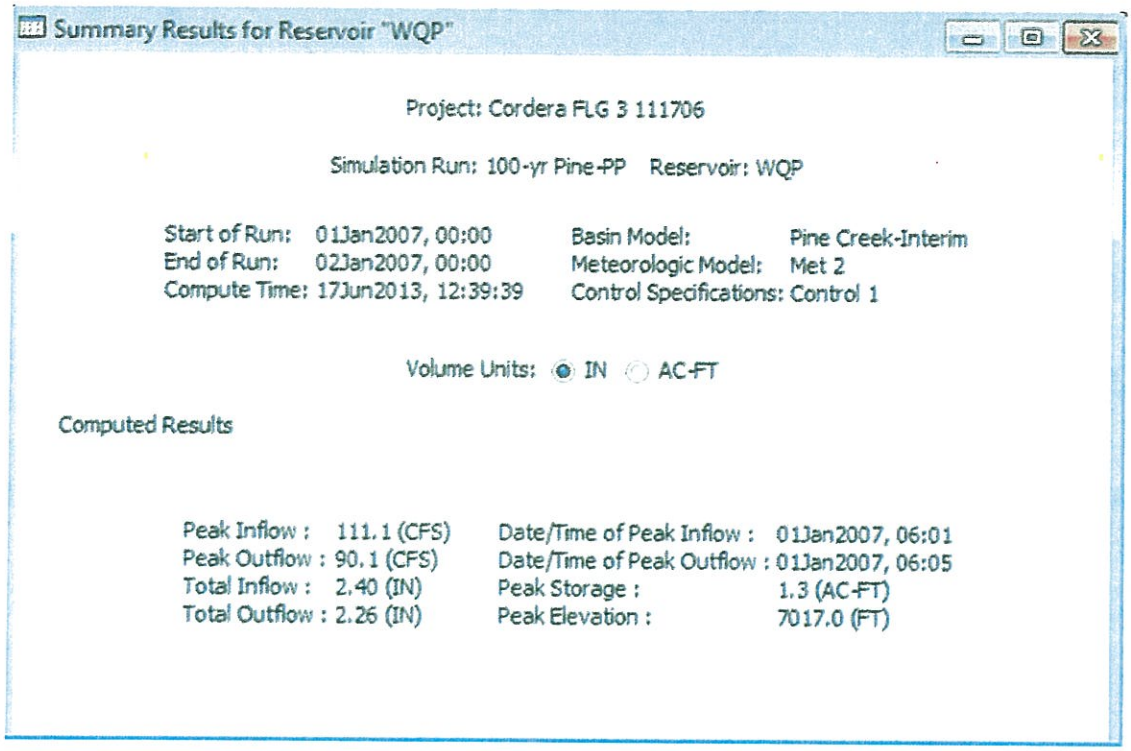
Start of Run: 01Jan2007, 00:00 Basin Model: Pine Creek-Interim
End of Run: 02Jan2007, 00:00 Meteorologic Model: Met 2
Compute Time: 17Jun2013, 12:39:39 Control Specifications: Control 1

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| DP-34 | 0.0385469 | 81.2 | 01Jan2007, 06:02 | 2.26 |
| DP-35 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| DP-46 | 0.0085277 | 17.9 | 01Jan2007, 06:02 | 2.21 |
| DP-47 | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| DP 51A | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| DP-51B | 0.11127 | 91.1 | 01Jan2007, 06:08 | 1.16 |
| DP-51C | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Junction-11 | 0.11020 | 89.9 | 01Jan2007, 06:08 | 1.15 |
| Junction-17 | 0.11127 | 91.1 | 01Jan2007, 06:08 | 1.16 |
| Junction-18 | 0.38988 | 122.5 | 01Jan2007, 06:23 | 1.16 |
| Junction-19 | 0.43988 | 169.7 | 01Jan2007, 06:16 | 1.28 |
| Junction-20 | 0.49188 | 182.6 | 01Jan2007, 06:19 | 1.27 |
| Junction-21 | 0.20700 | 142.1 | 01Jan2007, 06:09 | 1.02 |
| Junction-22 | 0.38988 | 122.5 | 01Jan2007, 06:23 | 1.16 |
| Junction-3 | 0.0430000 | 48.0 | 01Jan2007, 06:03 | 1.32 |
| Junction-7 | 0.0980000 | 74.3 | 01Jan2007, 06:09 | 1.02 |
| OP1 | 0.0190000 | 18.2 | 01Jan2007, 06:03 | 1.02 |
| OP10 | 0.0050000 | 16.9 | 01Jan2007, 06:00 | 4.16 |
| OP11 | 0.0470000 | 37.6 | 01Jan2007, 06:05 | 1.02 |
| OP12 | 0.0050000 | 14.4 | 01Jan2007, 06:01 | 3.10 |
| OP2 | 0.18800 | 129.6 | 01Jan2007, 06:08 | 1.02 |
| OP3 | 0.0980000 | 74.4 | 01Jan2007, 06:06 | 1.02 |
| OP5 | 0.0320000 | 27.3 | 01Jan2007, 06:04 | 1.02 |
| Pond 5 | 0.38988 | 122.5 | 01Jan2007, 06:23 | 1.16 |
| PP-10 | 0.0020000 | 4.3 | 01Jan2007, 06:01 | 2.21 |
| PP-11 | 0.0090000 | 19.1 | 01Jan2007, 06:02 | 2.21 |

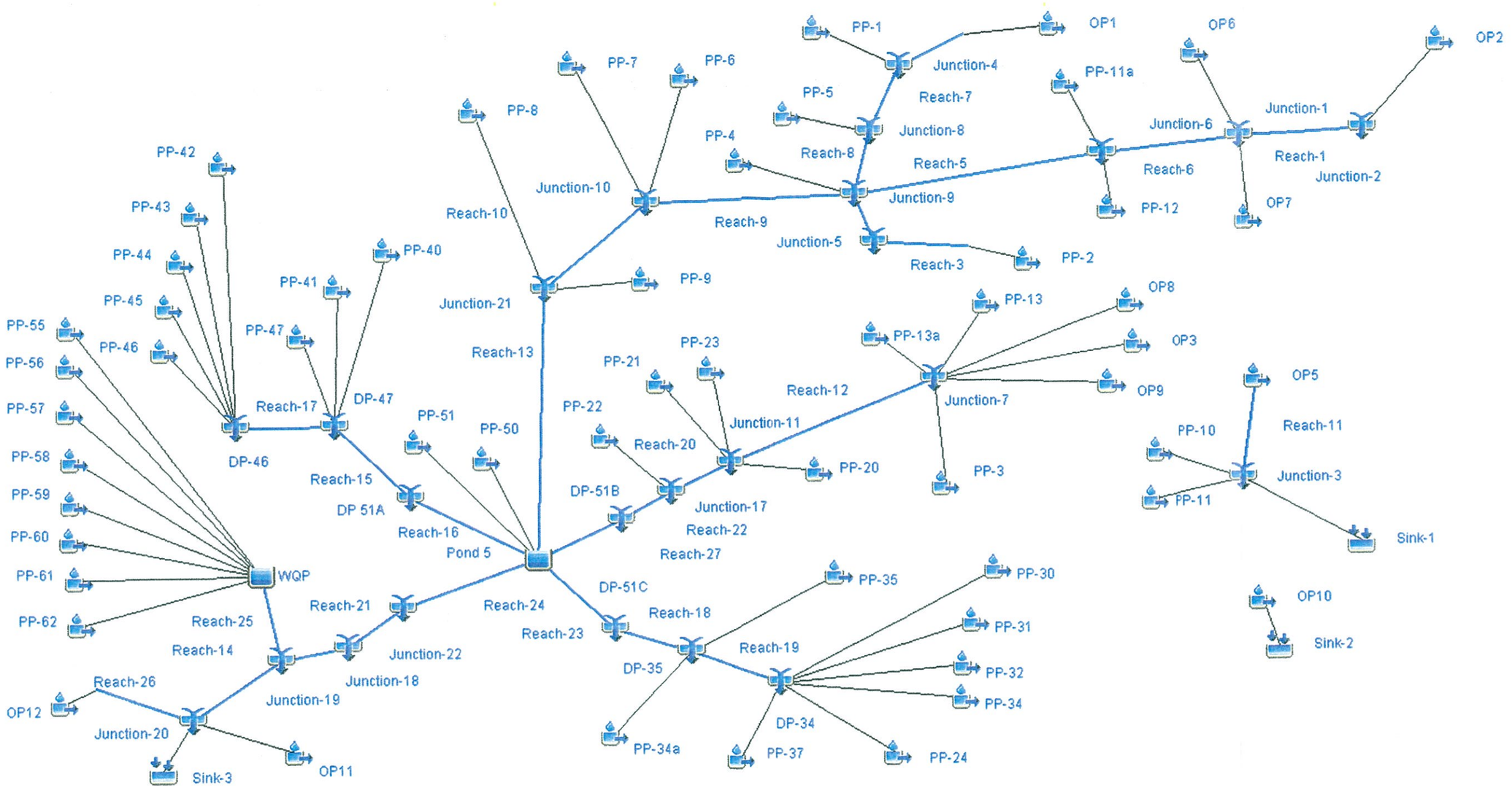
| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| PP-20 | 0.0072031 | 14.5 | 01Jan2007, 06:03 | 2.21 |
| PP-21 | 0.0017344 | 3.6 | 01Jan2007, 06:02 | 2.21 |
| PP-22 | 0.0010625 | 2.3 | 01Jan2007, 06:01 | 2.21 |
| PP-23 | 0.0032656 | 6.9 | 01Jan2007, 06:02 | 2.21 |
| PP-24 | 0.0210000 | 44.3 | 01Jan2007, 06:02 | 2.21 |
| PP-30 | 0.0067188 | 13.6 | 01Jan2007, 06:03 | 2.21 |
| PP-31 | 0.0035469 | 7.3 | 01Jan2007, 06:02 | 2.21 |
| PP-32 | 0.0043750 | 9.0 | 01Jan2007, 06:02 | 2.21 |
| PP-34 | 0.0019062 | 4.0 | 01Jan2007, 06:02 | 2.21 |
| PP-34a | .0004 | 1.4 | 01Jan2007, 06:00 | 4.16 |
| PP-35 | 0.0012812 | 2.7 | 01Jan2007, 06:02 | 2.21 |
| PP-37 | .001 | 3.4 | 01Jan2007, 06:00 | 4.16 |
| PP-40 | 0.0052656 | 11.0 | 01Jan2007, 06:02 | 2.21 |
| PP-41 | .00060938 | 1.3 | 01Jan2007, 06:02 | 2.21 |
| PP-42 | 0.0012000 | 2.5 | 01Jan2007, 06:02 | 2.21 |
| PP-43 | 0.0025312 | 5.5 | 01Jan2007, 06:01 | 2.21 |
| PP-44 | 0.0012500 | 2.6 | 01Jan2007, 06:02 | 2.21 |
| PP-45 | 0.0017340 | 3.6 | 01Jan2007, 06:02 | 2.21 |
| PP-46 | 0.0018125 | 3.8 | 01Jan2007, 06:02 | 2.21 |
| PP-47 | 0.0029375 | 6.0 | 01Jan2007, 06:03 | 2.21 |
| PP-50 | 0.0030156 | 6.2 | 01Jan2007, 06:02 | 2.21 |
| PP-51 | 0.0110312 | 20.8 | 01Jan2007, 06:04 | 2.20 |
| PP-55 | 0.0110000 | 23.4 | 01Jan2007, 06:02 | 2.21 |
| PP-56 | 0.0070000 | 13.9 | 01Jan2007, 06:03 | 2.20 |
| PP-57 | 0.0110000 | 23.3 | 01Jan2007, 06:02 | 2.21 |
| PP-58 | 0.0020000 | 6.8 | 01Jan2007, 06:00 | 4.16 |
| PP-59 | 0.0040000 | 8.0 | 01Jan2007, 06:03 | 2.21 |
| PP-60 | 0.0040000 | 8.7 | 01Jan2007, 06:01 | 2.21 |
| PP-61 | 0.0030000 | 10.2 | 01Jan2007, 06:00 | 4.16 |
| PP-62 | 0.0080000 | 17.7 | 01Jan2007, 06:01 | 2.21 |
| Reach-11 | 0.0320000 | 27.2 | 01Jan2007, 06:06 | 1.02 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| Reach-12 | 0.0980000 | 74.1 | 01Jan2007, 06:09 | 1.02 |
| Reach-13 | 0.20700 | 142.0 | 01Jan2007, 06:10 | 1.02 |
| Reach-14 | 0.38988 | 122.5 | 01Jan2007, 06:23 | 1.16 |
| Reach-15 | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| Reach-16 | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| Reach-17 | 0.0085277 | 17.9 | 01Jan2007, 06:02 | 2.21 |
| Reach-18 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Reach-19 | 0.0385469 | 81.2 | 01Jan2007, 06:02 | 2.26 |
| Reach-20 | 0.11020 | 89.9 | 01Jan2007, 06:08 | 1.15 |
| Reach-21 | 0.38988 | 122.5 | 01Jan2007, 06:23 | 1.16 |
| Reach-22 | 0.11127 | 91.1 | 01Jan2007, 06:08 | 1.16 |
| Reach-23 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Reach-24 | 0.38988 | 122.5 | 01Jan2007, 06:23 | 1.16 |
| Reach-25 | 0.0500000 | 90.0 | 01Jan2007, 06:05 | 2.26 |
| Reach-26 | 0.0050000 | 14.4 | 01Jan2007, 06:01 | 3.10 |
| Reach-27 | 0.11127 | 91.1 | 01Jan2007, 06:08 | 1.16 |
| Reach-28 | 0.43988 | 169.4 | 01Jan2007, 06:20 | 1.28 |
| Reach-3 | 0.0980000 | 74.3 | 01Jan2007, 06:09 | 1.02 |
| Reach-4 | 0.0190000 | 18.1 | 01Jan2007, 06:05 | 1.02 |
| Reach-5 | 0.18800 | 129.3 | 01Jan2007, 06:10 | 1.02 |
| Sink-1 | 0.0430000 | 48.0 | 01Jan2007, 06:03 | 1.32 |
| Sink-2 | 0.0050000 | 16.9 | 01Jan2007, 06:00 | 4.16 |
| Sink-3 | 0.49188 | 182.6 | 01Jan2007, 06:19 | 1.27 |
| WQP | 0.0500000 | 90.1 | 01Jan2007, 06:05 | 2.26 |


Summary Results for Reservoir "Pond 5"
Project: Cordera FLG 3 111706
Simulation Run: 100-yr Pine-PP Reservoir: Pond 5
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:39:39
Basin Model: Pine Creek-Interim
Meteorologic Model: Met 2
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 341.3 (CFS)
Peak Outflow : 122.5 (CFS)
Total Inflow : 1.28 (IN)
Total Outflow : 1.16 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:06
Date/Time of Peak Outflow : 01Jan2007, 06:23
Peak Storage : 9.3 (AC-FT)
Peak Elevation : 7030.2 (FT)


Summary Results for Reservoir "WQP"
Project: Cordera FLG 3 111706
Simulation Run: 100-yr Pine-PP Reservoir: WQP
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:39:39
Basin Model: Pine Creek-Interim
Meteorologic Model: Met 2
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 111.1 (CFS)
Peak Outflow : 90.1 (CFS)
Total Inflow : 2.40 (IN)
Total Outflow : 2.26 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:01
Date/Time of Peak Outflow : 01Jan2007, 06:05
Peak Storage : 1.3 (AC-FT)
Peak Elevation : 7017.0 (FT)

# FULLY DEVELOPED CONDITIONS HMS MODEL



## Fully Developed Condition - HMS input/Hydrologic Results

| Basin Name | Area ($mi^2$) | Area (acres) | Lag Time | % Impervious | Weighted CN | 5-yr Peak (cfs) | 100-yr Peak (cfs) |
|---|---|---|---|---|---|---|---|
| OP1 | 0.0190 | 12.16 | 6.6 | 0 | 61 | 2.8 | 18.2 |
| OP10 | 0.0050 | 3.20 | 3.9 | 95 | 98 | 9.9 | 16.9 |
| OP11 | 0.0470 | 30.08 | 10.2 | 0 | 61 | 5.1 | 37.6 |
| OP12 | 0.0050 | 3.20 | 5.7 | 72 | 88 | 7.1 | 14.4 |
| OP2 | 0.1200 | 76.80 | 6.3 | 5 | 61 | 20.5 | 116.6 |
| OP3 | 0.1420 | 90.88 | 5.5 | 0 | 61 | 28.3 | 144.1 |
| OP5 | 0.0320 | 20.48 | 8.9 | 0 | 61 | 3.8 | 27.3 |
| OP6 | 0.0030 | 1.92 | 3.4 | 85 | 98 | 6 | 10.2 |
| OP7 | 0.0030 | 1.92 | 3.4 | 85 | 98 | 6 | 10.2 |
| OP8 | 0.0020 | 1.28 | 3 | 85 | 98 | 4 | 6.8 |
| OP9 | 0.0020 | 1.28 | 3 | 85 | 98 | 4 | 6.8 |
| PP-1 | 0.0120 | 7.68 | 8.5 | 20 | 68 | 4 | 15.7 |
| PP-10 | 0.0020 | 1.28 | 5.7 | 25 | 78 | 1.1 | 3.5 |
| PP-11 | 0.0090 | 5.76 | 6.4 | 25 | 78 | 4.9 | 15.3 |
| PP-11a | 0.0020 | 1.28 | 3.2 | 20 | 98 | 4 | 6.8 |
| PP-12 | 0.0110 | 7.04 | 6.1 | 20 | 70 | 5.2 | 17.4 |
| PP-13 | 0.0080 | 5.12 | 6.5 | 20 | 70 | 3.7 | 12.4 |
| PP-13a | 0.0060 | 3.84 | 5.7 | 20 | 70 | 2.9 | 9.6 |
| PP-2 | 0.0070 | 4.48 | 8.5 | 20 | 68 | 2.4 | 9.1 |
| PP-20 | 0.0072 | 4.61 | 8.22 | 25 | 78 | 5.5 | 14.5 |
| PP-21 | 0.0017 | 1.11 | 7.56 | 25 | 78 | 1.4 | 3.6 |
| PP-22 | 0.0011 | 0.68 | 6.24 | 25 | 78 | 0.9 | 2.3 |
| PP-23 | 0.0033 | 2.09 | 6.42 | 25 | 78 | 2.7 | 6.9 |
| PP-24 | 0.0210 | 13.44 | 6.7 | 25 | 78 | 17.2 | 44.3 |
| PP-3 | 0.0080 | 5.12 | 6.4 | 20 | 68 | 3.1 | 11.4 |
| PP-30 | 0.0067 | 4.30 | 8.1 | 25 | 78 | 5.2 | 13.6 |
| PP-31 | 0.0035 | 2.27 | 7.44 | 25 | 78 | 2.8 | 7.3 |
| PP-32 | 0.0044 | 2.80 | 7.44 | 25 | 78 | 3.5 | 9 |
| PP-34 | 0.0019 | 1.22 | 6.96 | 55 | 78 | 1.5 | 4 |
| PP-34a | 0.0004 | 0.26 | 2.7 | 85 | 98 | 0.8 | 1.4 |
| PP-35 | 0.0013 | 0.82 | 7.38 | 55 | 78 | 1 | 2.7 |
| PP-37 | 0.0010 | 0.64 | 3.1 | 85 | 98 | 2 | 3.4 |
| PP-4 | 0.0170 | 10.88 | 6.4 | 20 | 70 | 7.9 | 26.5 |
| PP-40 | 0.0053 | 3.37 | 7.2 | 25 | 78 | 4.2 | 11 |
| PP-41 | 0.0006 | 0.39 | 7.26 | 25 | 78 | 0.5 | 1.3 |
| PP-42 | 0.0012 | 0.77 | 7.14 | 25 | 78 | 1 | 2.5 |
| PP-43 | 0.0025 | 1.62 | 5.64 | 25 | 78 | 2.2 | 5.5 |
| PP-44 | 0.0013 | 0.80 | 7.26 | 25 | 78 | 1 | 2.6 |
| PP-45 | 0.0017 | 1.11 | 7.2 | 25 | 78 | 1.4 | 3.6 |
| PP-46 | 0.0018 | 1.16 | 7.14 | 25 | 78 | 1.5 | 3.8 |
| PP-47 | 0.0029 | 1.88 | 8.1 | 25 | 78 | 2.3 | 6 |
| PP-5 | 0.0040 | 2.56 | 6.1 | 20 | 70 | 1.9 | 6.3 |
| PP-50 | 0.0030 | 1.93 | 7.86 | 25 | 78 | 2.4 | 6.2 |
| PP-51 | 0.0110 | 7.06 | 10.56 | 25 | 78 | 7.7 | 20.8 |
| PP-55 | 0.0110 | 7.04 | 6.3 | 25 | 78 | 6 | 18.8 |
| PP-56 | 0.0070 | 4.48 | 8.9 | 25 | 78 | 5.2 | 13.9 |
| PP-57 | 0.0110 | 7.04 | 6.6 | 25 | 78 | 9 | 23.3 |
| PP-58 | 0.0020 | 1.28 | 5 | 85 | 98 | 4 | 6.8 |
| PP-59 | 0.0040 | 2.56 | 8.4 | 25 | 78 | 3.1 | 8 |
| PP-6 | 0.0100 | 6.40 | 6.6 | 20 | 70 | 4.6 | 15.5 |
| PP-60 | 0.0040 | 2.56 | 5.7 | 25 | 78 | 3.4 | 8.7 |
| PP-61 | 0.0030 | 1.92 | 5 | 85 | 98 | 5.9 | 10.2 |
| PP-62 | 0.0080 | 5.12 | 5 | 25 | 78 | 7 | 17.7 |
| PP-7 | 0.0110 | 7.04 | 6.8 | 20 | 70 | 5 | 16.9 |
| PP-8 | 0.0030 | 1.92 | 5.8 | 20 | 70 | 1.4 | 4.8 |
| PP-9 | 0.0030 | 1.92 | 5.7 | 20 | 70 | 1.4 | 4.8 |

Project: Cordera FLG 3 111706 Simulation Run: 5-yr Pine-PP

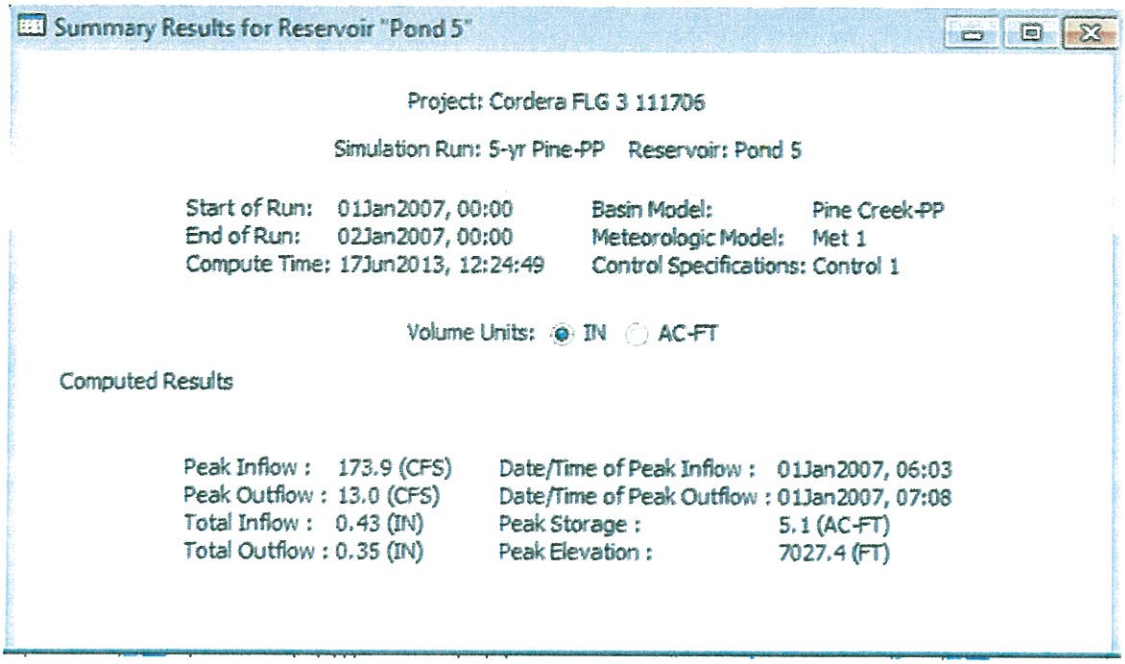
Start of Run: 01Jan2007, 00:00 Basin Model: Pine Creek-PP
End of Run: 02Jan2007, 00:00 Meteorologic Model: Met 1
Compute Time: 17Jun2013, 12:24:49 Control Specifications: Control 1

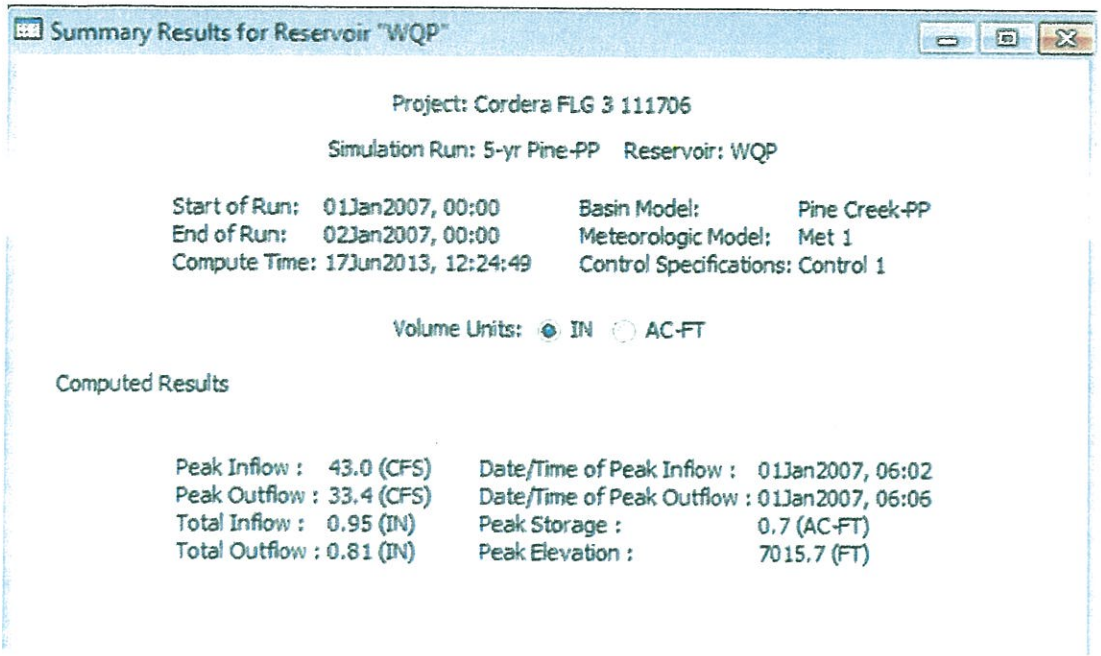
| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| DP-34 | 0.0385469 | 31.8 | 01Jan2007, 06:02 | 0.89 |
| DP-35 | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| DP-46 | 0.0085277 | 7.0 | 01Jan2007, 06:02 | 0.85 |
| DP-47 | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| DP 51A | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| DP-51B | 0.21427 | 53.6 | 01Jan2007, 06:03 | 0.33 |
| DP-51C | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| Junction-1 | 0.14300 | 28.5 | 01Jan2007, 06:02 | 0.32 |
| Junction-10 | 0.23600 | 62.9 | 01Jan2007, 06:04 | 0.38 |
| Junction-11 | 0.21320 | 52.8 | 01Jan2007, 06:03 | 0.33 |
| Junction-17 | 0.21427 | 53.6 | 01Jan2007, 06:03 | 0.33 |
| Junction-18 | 0.52788 | 13.0 | 01Jan2007, 07:08 | 0.35 |
| Junction-19 | 0.57788 | 40.3 | 01Jan2007, 06:07 | 0.39 |
| Junction-2 | 0.13700 | 20.5 | 01Jan2007, 06:04 | 0.23 |
| Junction-20 | 0.62988 | 45.1 | 01Jan2007, 06:13 | 0.38 |
| Junction-21 | 0.24200 | 65.6 | 01Jan2007, 06:04 | 0.38 |
| Junction-22 | 0.52788 | 13.0 | 01Jan2007, 07:08 | 0.35 |
| Junction-3 | 0.0430000 | 8.5 | 01Jan2007, 06:05 | 0.32 |
| Junction-4 | 0.0310000 | 6.8 | 01Jan2007, 06:05 | 0.31 |
| Junction-5 | 0.0070000 | 2.3 | 01Jan2007, 06:05 | 0.43 |
| Junction-6 | 0.15600 | 36.3 | 01Jan2007, 06:03 | 0.36 |
| Junction-7 | 0.20100 | 43.3 | 01Jan2007, 06:02 | 0.30 |
| Junction-8 | 0.0350000 | 8.4 | 01Jan2007, 06:05 | 0.33 |
| Junction-9 | 0.21500 | 53.7 | 01Jan2007, 06:04 | 0.37 |
| OP1 | 0.0190000 | 2.8 | 01Jan2007, 06:04 | 0.23 |
| OP10 | 0.0050000 | 9.9 | 01Jan2007, 06:00 | 2.37 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| OP11 | 0.0470000 | 5.1 | 01Jan2007, 06:08 | 0.23 |
| OP12 | 0.0050000 | 7.1 | 01Jan2007, 06:01 | 1.47 |
| OP2 | 0.13700 | 20.5 | 01Jan2007, 06:04 | 0.23 |
| OP3 | 0.17500 | 28.3 | 01Jan2007, 06:03 | 0.23 |
| OP5 | 0.0320000 | 3.8 | 01Jan2007, 06:06 | 0.23 |
| OP6 | 0.0030000 | 6.0 | 01Jan2007, 06:00 | 2.37 |
| OP7 | 0.0030000 | 6.0 | 01Jan2007, 06:00 | 2.37 |
| OP8 | 0.0020000 | 4.0 | 01Jan2007, 06:00 | 2.37 |
| OP9 | 0.0020000 | 4.0 | 01Jan2007, 06:00 | 2.37 |
| Pond 5 | 0.52788 | 13.0 | 01Jan2007, 07:08 | 0.35 |
| PP-1 | 0.0120000 | 4.0 | 01Jan2007, 06:05 | 0.43 |
| PP-10 | 0.0020000 | 1.1 | 01Jan2007, 06:02 | 0.58 |
| PP-11 | 0.0090000 | 4.9 | 01Jan2007, 06:03 | 0.58 |
| PP-11a | 0.0020000 | 4.0 | 01Jan2007, 06:00 | 2.37 |
| PP-12 | 0.0110000 | 5.2 | 01Jan2007, 06:03 | 0.50 |
| PP-13 | 0.0080000 | 3.7 | 01Jan2007, 06:03 | 0.50 |
| PP-13a | 0.0060000 | 2.9 | 01Jan2007, 06:02 | 0.50 |
| PP-2 | 0.0070000 | 2.4 | 01Jan2007, 06:05 | 0.43 |
| PP-20 | 0.0072031 | 5.5 | 01Jan2007, 06:03 | 0.85 |
| PP-21 | 0.0017344 | 1.4 | 01Jan2007, 06:03 | 0.85 |
| PP-22 | 0.0010625 | 0.9 | 01Jan2007, 06:02 | 0.85 |
| PP-23 | 0.0032656 | 2.7 | 01Jan2007, 06:02 | 0.85 |
| PP-24 | 0.0210000 | 17.2 | 01Jan2007, 06:02 | 0.85 |
| PP-3 | 0.0080000 | 3.1 | 01Jan2007, 06:03 | 0.43 |
| PP-30 | 0.0067188 | 5.2 | 01Jan2007, 06:03 | 0.85 |
| PP-31 | 0.0035469 | 2.8 | 01Jan2007, 06:03 | 0.85 |
| PP-32 | 0.0043750 | 3.5 | 01Jan2007, 06:03 | 0.85 |
| PP-34 | 0.0019062 | 1.5 | 01Jan2007, 06:03 | 0.85 |
| PP-34a | .0004 | 0.8 | 01Jan2007, 06:00 | 2.37 |
| PP-35 | 0.0012812 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-37 | .001 | 2.0 | 01Jan2007, 06:00 | 2.37 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| PP-4 | 0.0170000 | 7.9 | 01Jan2007, 06:03 | 0.50 |
| PP-40 | 0.0052656 | 4.2 | 01Jan2007, 06:03 | 0.85 |
| PP-41 | .00060938 | 0.5 | 01Jan2007, 06:03 | 0.85 |
| PP-42 | 0.0012000 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-43 | 0.0025312 | 2.2 | 01Jan2007, 06:02 | 0.85 |
| PP-44 | 0.0012500 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-45 | 0.0017340 | 1.4 | 01Jan2007, 06:03 | 0.85 |
| PP-46 | 0.0018125 | 1.5 | 01Jan2007, 06:03 | 0.85 |
| PP-47 | 0.0029375 | 2.3 | 01Jan2007, 06:03 | 0.85 |
| PP-5 | 0.0040000 | 1.9 | 01Jan2007, 06:03 | 0.50 |
| PP-50 | 0.0030156 | 2.4 | 01Jan2007, 06:03 | 0.85 |
| PP-51 | 0.0110312 | 7.7 | 01Jan2007, 06:05 | 0.85 |
| PP-55 | 0.0110000 | 6.0 | 01Jan2007, 06:03 | 0.58 |
| PP-56 | 0.0070000 | 5.2 | 01Jan2007, 06:04 | 0.85 |
| PP-57 | 0.0110000 | 9.0 | 01Jan2007, 06:02 | 0.85 |
| PP-58 | 0.0020000 | 4.0 | 01Jan2007, 06:00 | 2.37 |
| PP-59 | 0.0040000 | 3.1 | 01Jan2007, 06:04 | 0.85 |
| PP-6 | 0.0100000 | 4.6 | 01Jan2007, 06:03 | 0.50 |
| PP-60 | 0.0040000 | 3.4 | 01Jan2007, 06:02 | 0.85 |
| PP-61 | 0.0030000 | 5.9 | 01Jan2007, 06:00 | 2.37 |
| PP-62 | 0.0080000 | 7.0 | 01Jan2007, 06:01 | 0.85 |
| PP-7 | 0.0110000 | 5.0 | 01Jan2007, 06:03 | 0.50 |
| PP-8 | 0.0030000 | 1.4 | 01Jan2007, 06:02 | 0.50 |
| PP-9 | 0.0030000 | 1.4 | 01Jan2007, 06:02 | 0.50 |
| Reach-1 | 0.13700 | 20.4 | 01Jan2007, 06:04 | 0.23 |
| Reach-10 | 0.23600 | 62.9 | 01Jan2007, 06:04 | 0.38 |
| Reach-11 | 0.0320000 | 3.8 | 01Jan2007, 06:08 | 0.23 |
| Reach-12 | 0.20100 | 43.2 | 01Jan2007, 06:03 | 0.30 |
| Reach-13 | 0.24200 | 65.3 | 01Jan2007, 06:04 | 0.38 |
| Reach-14 | 0.52788 | 13.0 | 01Jan2007, 07:09 | 0.35 |
| Reach-15 | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| Reach-16 | 0.0173402 | 13.9 | 01Jan2007, 06:03 | 0.85 |
| Reach-17 | 0.0085277 | 6.9 | 01Jan2007, 06:02 | 0.85 |
| Reach-18 | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| Reach-19 | 0.0385469 | 31.8 | 01Jan2007, 06:02 | 0.89 |
| Reach-2 | 0.0190000 | 2.7 | 01Jan2007, 06:05 | 0.23 |
| Reach-20 | 0.21320 | 52.8 | 01Jan2007, 06:03 | 0.33 |
| Reach-21 | 0.52788 | 13.0 | 01Jan2007, 07:08 | 0.35 |
| Reach-22 | 0.21427 | 53.6 | 01Jan2007, 06:03 | 0.33 |
| Reach-23 | 0.0402281 | 33.3 | 01Jan2007, 06:02 | 0.91 |
| Reach-24 | 0.52788 | 13.0 | 01Jan2007, 07:08 | 0.35 |
| Reach-25 | 0.0500000 | 33.4 | 01Jan2007, 06:06 | 0.81 |
| Reach-26 | 0.0050000 | 7.1 | 01Jan2007, 06:01 | 1.47 |
| Reach-27 | 0.21427 | 53.6 | 01Jan2007, 06:03 | 0.33 |
| Reach-28 | 0.57788 | 40.1 | 01Jan2007, 06:14 | 0.39 |
| Reach-3 | 0.0070000 | 2.3 | 01Jan2007, 06:05 | 0.43 |
| Reach-4 | 0.0070000 | 2.3 | 01Jan2007, 06:06 | 0.43 |
| Reach-5 | 0.15600 | 35.9 | 01Jan2007, 06:04 | 0.36 |
| Reach-6 | 0.14300 | 28.3 | 01Jan2007, 06:03 | 0.32 |
| Reach-7 | 0.0310000 | 6.8 | 01Jan2007, 06:06 | 0.31 |
| Reach-8 | 0.0350000 | 8.3 | 01Jan2007, 06:05 | 0.33 |
| Reach-9 | 0.21500 | 53.5 | 01Jan2007, 06:04 | 0.37 |
| Sink-1 | 0.0430000 | 8.5 | 01Jan2007, 06:05 | 0.32 |
| Sink-2 | 0.0050000 | 9.9 | 01Jan2007, 06:00 | 2.37 |
| Sink-3 | 0.62988 | 45.1 | 01Jan2007, 06:13 | 0.38 |
| WQP | 0.0500000 | 33.4 | 01Jan2007, 06:06 | 0.81 |


Summary Results for Reservoir "Pond 5"
Project: Cordera FLG 3 111706
Simulation Run: 5-yr Pine-PP Reservoir: Pond 5
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:24:49
Basin Model: Pine Creek-PP
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 173.9 (CFS)
Peak Outflow : 13.0 (CFS)
Total Inflow : 0.43 (IN)
Total Outflow : 0.35 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:03
Date/Time of Peak Outflow : 01Jan2007, 07:08
Peak Storage : 5.1 (AC-FT)
Peak Elevation : 7027.4 (FT)


Summary Results for Reservoir "WQP"
Project: Cordera FLG 3 111706
Simulation Run: 5-yr Pine-PP Reservoir: WQP
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:24:49
Basin Model: Pine Creek-PP
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 43.0 (CFS)
Peak Outflow : 33.4 (CFS)
Total Inflow : 0.95 (IN)
Total Outflow : 0.81 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:02
Date/Time of Peak Outflow : 01Jan2007, 06:06
Peak Storage : 0.7 (AC-FT)
Peak Elevation : 7015.7 (FT)

Project: Cordera FLG 3 111706 Simulation Run: 100-yr Pine-PP

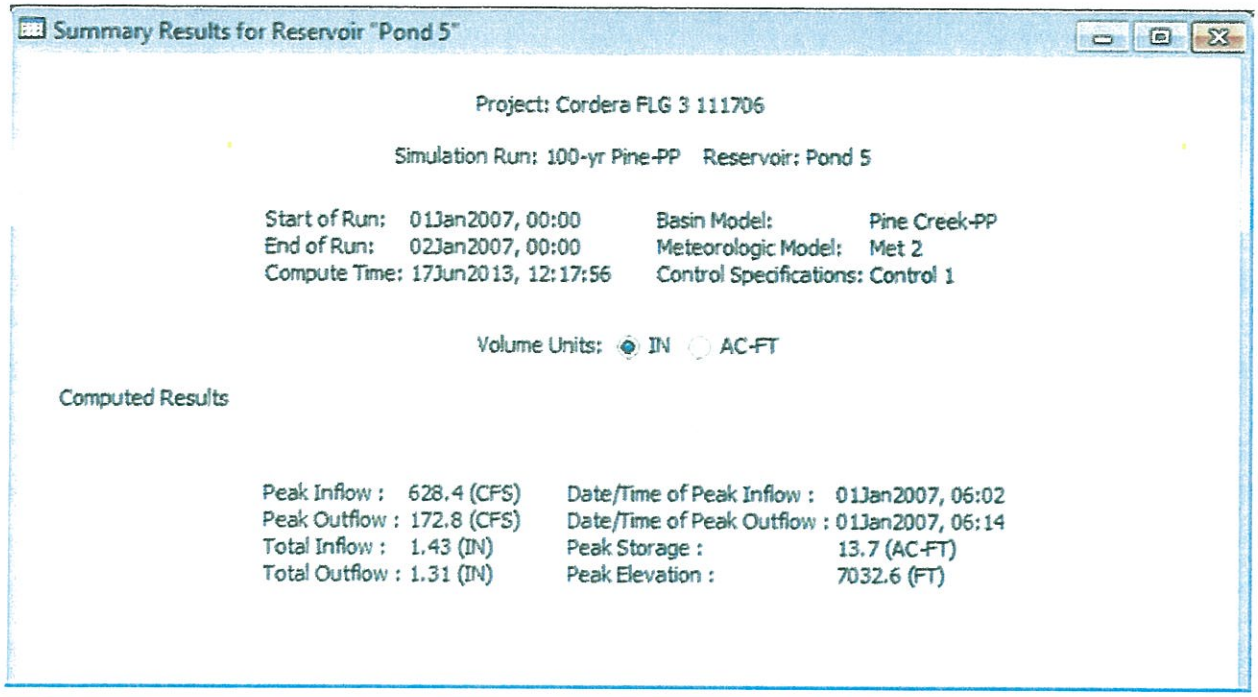
Start of Run: 01Jan2007, 00:00 Basin Model: Pine Creek-PP
End of Run: 02Jan2007, 00:00 Meteorologic Model: Met 2
Compute Time: 17Jun2013, 12:17:56 Control Specifications: Control 1

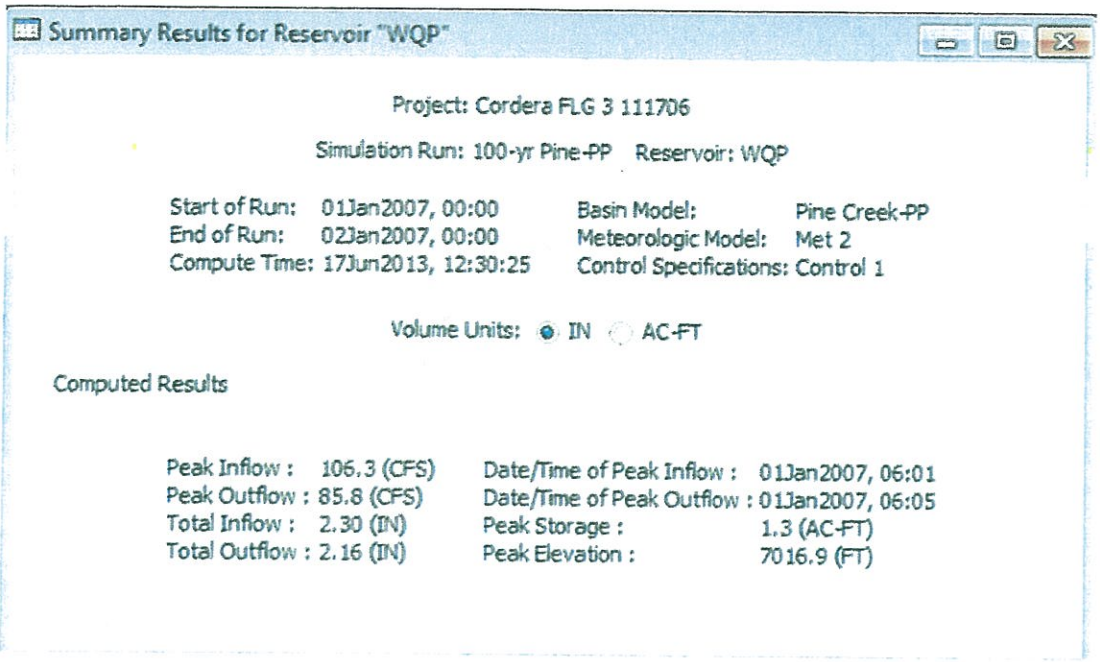
| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| DP-34 | 0.0385469 | 81.2 | 01Jan2007, 06:02 | 2.26 |
| DP-35 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| DP-46 | 0.0085277 | 17.9 | 01Jan2007, 06:02 | 2.21 |
| DP-47 | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| DP 51A | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| DP-51B | 0.18127 | 215.8 | 01Jan2007, 06:02 | 1.24 |
| DP-51C | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Junction-1 | 0.12600 | 133.9 | 01Jan2007, 06:02 | 1.17 |
| Junction-10 | 0.21900 | 261.2 | 01Jan2007, 06:03 | 1.31 |
| Junction-11 | 0.18020 | 213.6 | 01Jan2007, 06:02 | 1.24 |
| Junction-17 | 0.18127 | 215.8 | 01Jan2007, 06:02 | 1.24 |
| Junction-18 | 0.47788 | 172.8 | 01Jan2007, 06:14 | 1.31 |
| Junction-19 | 0.52788 | 247.1 | 01Jan2007, 06:08 | 1.39 |
| Junction-2 | 0.12000 | 116.6 | 01Jan2007, 06:03 | 1.02 |
| Junction-20 | 0.57988 | 279.1 | 01Jan2007, 06:10 | 1.38 |
| Junction-21 | 0.22500 | 270.4 | 01Jan2007, 06:03 | 1.32 |
| Junction-22 | 0.47788 | 172.8 | 01Jan2007, 06:14 | 1.31 |
| Junction-3 | 0.0430000 | 43.8 | 01Jan2007, 06:04 | 1.20 |
| Junction-4 | 0.0310000 | 33.8 | 01Jan2007, 06:03 | 1.19 |
| Junction-5 | 0.0070000 | 9.1 | 01Jan2007, 06:04 | 1.46 |
| Junction-6 | 0.13900 | 155.8 | 01Jan2007, 06:02 | 1.25 |
| Junction-7 | 0.16800 | 189.0 | 01Jan2007, 06:02 | 1.17 |
| Junction-8 | 0.0350000 | 39.6 | 01Jan2007, 06:03 | 1.24 |
| Junction-9 | 0.19800 | 229.5 | 01Jan2007, 06:03 | 1.28 |
| OP1 | 0.0190000 | 18.2 | 01Jan2007, 06:03 | 1.02 |
| OP10 | 0.0050000 | 16.9 | 01Jan2007, 06:00 | 4.16 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| OP11 | 0.0470000 | 37.6 | 01Jan2007, 06:05 | 1.02 |
| OP12 | 0.0050000 | 14.4 | 01Jan2007, 06:01 | 3.10 |
| OP2 | 0.12000 | 116.6 | 01Jan2007, 06:03 | 1.02 |
| OP3 | 0.14200 | 144.1 | 01Jan2007, 06:02 | 1.02 |
| OP5 | 0.0320000 | 27.3 | 01Jan2007, 06:04 | 1.02 |
| OP6 | 0.0030000 | 10.2 | 01Jan2007, 06:00 | 4.16 |
| OP7 | 0.0030000 | 10.2 | 01Jan2007, 06:00 | 4.16 |
| OP8 | 0.0020000 | 6.8 | 01Jan2007, 06:00 | 4.16 |
| OP9 | 0.0020000 | 6.8 | 01Jan2007, 06:00 | 4.16 |
| Pond 5 | 0.47788 | 172.8 | 01Jan2007, 06:14 | 1.31 |
| PP-1 | 0.0120000 | 15.7 | 01Jan2007, 06:04 | 1.46 |
| PP-10 | 0.0020000 | 3.5 | 01Jan2007, 06:02 | 1.74 |
| PP-11 | 0.0090000 | 15.3 | 01Jan2007, 06:02 | 1.74 |
| PP-11a | 0.0020000 | 6.8 | 01Jan2007, 06:00 | 4.16 |
| PP-12 | 0.0110000 | 17.4 | 01Jan2007, 06:02 | 1.60 |
| PP-13 | 0.0080000 | 12.4 | 01Jan2007, 06:02 | 1.60 |
| PP-13a | 0.0060000 | 9.6 | 01Jan2007, 06:02 | 1.60 |
| PP-2 | 0.0070000 | 9.1 | 01Jan2007, 06:04 | 1.46 |
| PP-20 | 0.0072031 | 14.5 | 01Jan2007, 06:03 | 2.21 |
| PP-21 | 0.0017344 | 3.6 | 01Jan2007, 06:02 | 2.21 |
| PP-22 | 0.0010625 | 2.3 | 01Jan2007, 06:01 | 2.21 |
| PP-23 | 0.0032656 | 6.9 | 01Jan2007, 06:02 | 2.21 |
| PP-24 | 0.0210000 | 44.3 | 01Jan2007, 06:02 | 2.21 |
| PP-3 | 0.0080000 | 11.4 | 01Jan2007, 06:02 | 1.46 |
| PP-30 | 0.0067188 | 13.6 | 01Jan2007, 06:03 | 2.21 |
| PP-31 | 0.0035469 | 7.3 | 01Jan2007, 06:02 | 2.21 |
| PP-32 | 0.0043750 | 9.0 | 01Jan2007, 06:02 | 2.21 |
| PP-34 | 0.0019062 | 4.0 | 01Jan2007, 06:02 | 2.21 |
| PP-34a | .0004 | 1.4 | 01Jan2007, 06:00 | 4.16 |
| PP-35 | 0.0012812 | 2.7 | 01Jan2007, 06:02 | 2.21 |
| PP-37 | .001 | 3.4 | 01Jan2007, 06:00 | 4.16 |

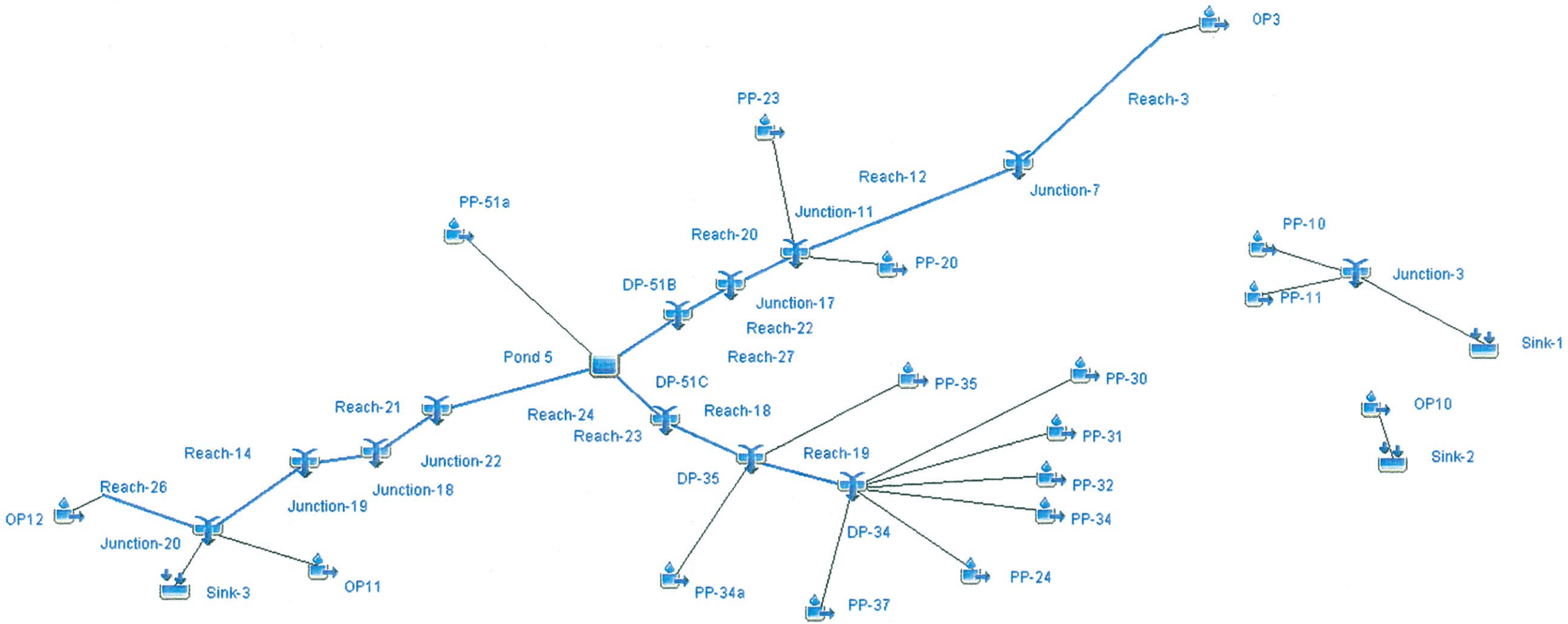
| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| PP-4 | 0.0170000 | 26.5 | 01Jan2007, 06:02 | 1.60 |
| PP-40 | 0.0052656 | 11.0 | 01Jan2007, 06:02 | 2.21 |
| PP-41 | .00060938 | 1.3 | 01Jan2007, 06:02 | 2.21 |
| PP-42 | 0.0012000 | 2.5 | 01Jan2007, 06:02 | 2.21 |
| PP-43 | 0.0025312 | 5.5 | 01Jan2007, 06:01 | 2.21 |
| PP-44 | 0.0012500 | 2.6 | 01Jan2007, 06:02 | 2.21 |
| PP-45 | 0.0017340 | 3.6 | 01Jan2007, 06:02 | 2.21 |
| PP-46 | 0.0018125 | 3.8 | 01Jan2007, 06:02 | 2.21 |
| PP-47 | 0.0029375 | 6.0 | 01Jan2007, 06:03 | 2.21 |
| PP-5 | 0.0040000 | 6.3 | 01Jan2007, 06:02 | 1.60 |
| PP-50 | 0.0030156 | 6.2 | 01Jan2007, 06:02 | 2.21 |
| PP-51 | 0.0110312 | 20.8 | 01Jan2007, 06:04 | 2.20 |
| PP-55 | 0.0110000 | 18.8 | 01Jan2007, 06:02 | 1.74 |
| PP-56 | 0.0070000 | 13.9 | 01Jan2007, 06:03 | 2.20 |
| PP-57 | 0.0110000 | 23.3 | 01Jan2007, 06:02 | 2.21 |
| PP-58 | 0.0020000 | 6.8 | 01Jan2007, 06:00 | 4.16 |
| PP-59 | 0.0040000 | 8.0 | 01Jan2007, 06:03 | 2.21 |
| PP-6 | 0.0100000 | 15.5 | 01Jan2007, 06:02 | 1.60 |
| PP-60 | 0.0040000 | 8.7 | 01Jan2007, 06:01 | 2.21 |
| PP-61 | 0.0030000 | 10.2 | 01Jan2007, 06:00 | 4.16 |
| PP-62 | 0.0080000 | 17.7 | 01Jan2007, 06:01 | 2.21 |
| PP-7 | 0.0110000 | 16.9 | 01Jan2007, 06:02 | 1.60 |
| PP-8 | 0.0030000 | 4.8 | 01Jan2007, 06:02 | 1.60 |
| PP-9 | 0.0030000 | 4.8 | 01Jan2007, 06:02 | 1.60 |
| Reach-1 | 0.12000 | 116.5 | 01Jan2007, 06:03 | 1.02 |
| Reach-10 | 0.21900 | 261.0 | 01Jan2007, 06:03 | 1.31 |
| Reach-11 | 0.0320000 | 27.2 | 01Jan2007, 06:06 | 1.02 |
| Reach-12 | 0.16800 | 188.6 | 01Jan2007, 06:02 | 1.17 |
| Reach-13 | 0.22500 | 269.7 | 01Jan2007, 06:03 | 1.32 |
| Reach-14 | 0.47788 | 172.8 | 01Jan2007, 06:14 | 1.31 |
| Reach-15 | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| Reach-16 | 0.0173402 | 36.1 | 01Jan2007, 06:02 | 2.21 |
| Reach-17 | 0.0085277 | 17.9 | 01Jan2007, 06:02 | 2.21 |
| Reach-18 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Reach-19 | 0.0385469 | 81.2 | 01Jan2007, 06:02 | 2.26 |
| Reach-2 | 0.0190000 | 18.2 | 01Jan2007, 06:03 | 1.02 |
| Reach-20 | 0.18020 | 213.5 | 01Jan2007, 06:02 | 1.24 |
| Reach-21 | 0.47788 | 172.8 | 01Jan2007, 06:14 | 1.31 |
| Reach-22 | 0.18127 | 215.8 | 01Jan2007, 06:02 | 1.24 |
| Reach-23 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Reach-24 | 0.47788 | 172.8 | 01Jan2007, 06:14 | 1.31 |
| Reach-25 | 0.0500000 | 85.7 | 01Jan2007, 06:05 | 2.16 |
| Reach-26 | 0.0050000 | 14.4 | 01Jan2007, 06:01 | 3.10 |
| Reach-27 | 0.18127 | 215.6 | 01Jan2007, 06:02 | 1.24 |
| Reach-28 | 0.52788 | 246.9 | 01Jan2007, 06:12 | 1.39 |
| Reach-3 | 0.0070000 | 9.1 | 01Jan2007, 06:04 | 1.46 |
| Reach-4 | 0.0070000 | 9.1 | 01Jan2007, 06:05 | 1.46 |
| Reach-5 | 0.13900 | 155.2 | 01Jan2007, 06:03 | 1.25 |
| Reach-6 | 0.12600 | 133.0 | 01Jan2007, 06:03 | 1.17 |
| Reach-7 | 0.0310000 | 33.7 | 01Jan2007, 06:04 | 1.19 |
| Reach-8 | 0.0350000 | 39.6 | 01Jan2007, 06:04 | 1.24 |
| Reach-9 | 0.19800 | 229.0 | 01Jan2007, 06:03 | 1.28 |
| Sink-1 | 0.0430000 | 43.8 | 01Jan2007, 06:04 | 1.20 |
| Sink-2 | 0.0050000 | 16.9 | 01Jan2007, 06:00 | 4.16 |
| Sink-3 | 0.57988 | 279.1 | 01Jan2007, 06:10 | 1.38 |
| WQP | 0.0500000 | 85.8 | 01Jan2007, 06:05 | 2.16 |


Summary Results for Reservoir "Pond 5"
Project: Cordera FLG 3 111706
Simulation Run: 100-yr Pine-PP Reservoir: Pond 5
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:17:56
Basin Model: Pine Creek-PP
Meteorologic Model: Met 2
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 628.4 (CFS)
Peak Outflow : 172.8 (CFS)
Total Inflow : 1.43 (IN)
Total Outflow : 1.31 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:02
Date/Time of Peak Outflow : 01Jan2007, 06:14
Peak Storage : 13.7 (AC-FT)
Peak Elevation : 7032.6 (FT)


Summary Results for Reservoir "WQP"
Project: Cordera FLG 3 111706
Simulation Run: 100-yr Pine-PP Reservoir: WQP
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:30:25
Basin Model: Pine Creek-PP
Meteorologic Model: Met 2
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 106.3 (CFS)
Peak Outflow : 85.8 (CFS)
Total Inflow : 2.30 (IN)
Total Outflow : 2.16 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:01
Date/Time of Peak Outflow : 01Jan2007, 06:05
Peak Storage : 1.3 (AC-FT)
Peak Elevation : 7016.9 (FT)

# FILING 3A & 3F FINAL CONDITIONS HMS MODEL



## Filing 3A & 3F Final Conditions - HMS input/Hydrologic Results

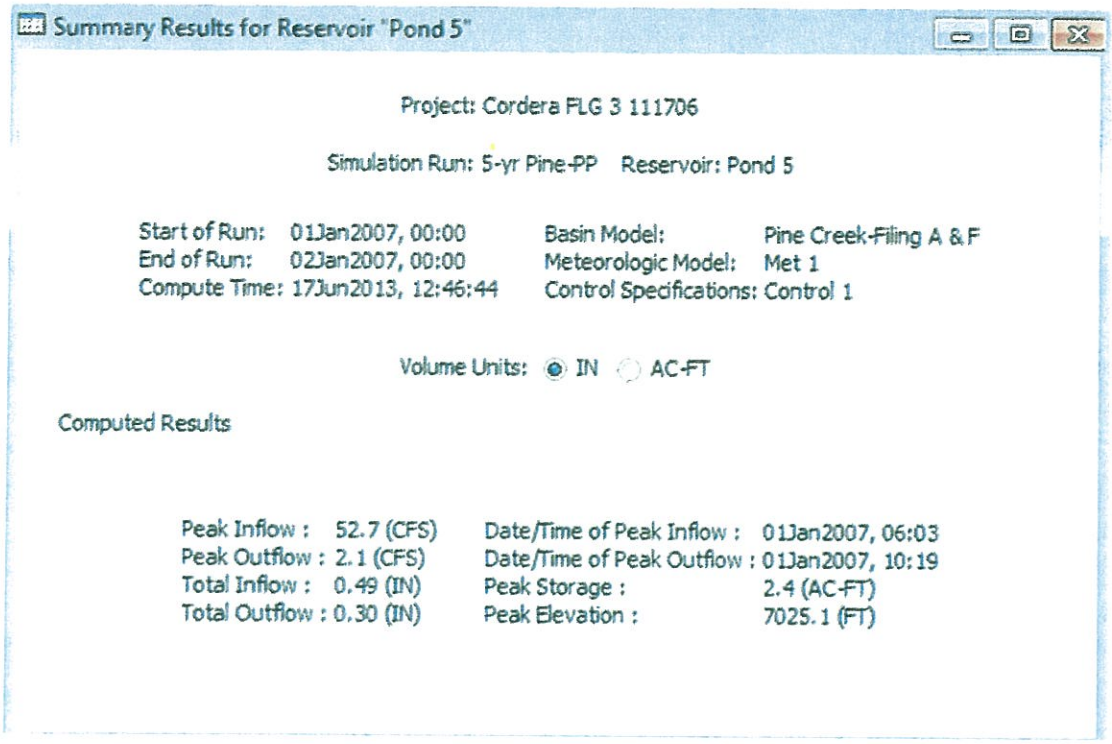
| Basin Name | Area ($mi^2$) | Area (acres) | Lag Time | % Impervious | Weighted CN | 5-yr Peak (cfs) | 100-yr Peak (cfs) |
|---|---|---|---|---|---|---|---|
| OP10 | 0.0050 | 3.20 | 3.9 | 95 | 98 | 9.9 | 16.9 |
| OP11 | 0.0470 | 30.08 | 10.2 | 0 | 61 | 5.1 | 37.6 |
| OP12 | 0.0050 | 3.20 | 5.7 | 72 | 88 | 7.1 | 14.4 |
| OP3 | 0.0980 | 62.72 | 11.3 | 0 | 61 | 9.9 | 74.4 |
| PP-10 | 0.0020 | 1.28 | 5.7 | 25 | 78 | 1.7 | 4.3 |
| PP-11 | 0.0090 | 5.76 | 6.4 | 25 | 78 | 7.5 | 19.1 |
| PP-20 | 0.0072 | 4.61 | 8.22 | 25 | 78 | 5.5 | 14.5 |
| PP-23 | 0.0033 | 2.09 | 6.42 | 25 | 78 | 2.7 | 6.9 |
| PP-24 | 0.0210 | 13.44 | 6.7 | 25 | 78 | 17.2 | 44.3 |
| PP-30 | 0.0067 | 4.30 | 8.1 | 25 | 78 | 5.2 | 13.6 |
| PP-31 | 0.0035 | 2.27 | 7.44 | 25 | 78 | 2.8 | 7.3 |
| PP-32 | 0.0044 | 2.80 | 7.44 | 25 | 78 | 3.5 | 9 |
| PP-34 | 0.0019 | 1.22 | 6.96 | 55 | 78 | 1.5 | 4 |
| PP-34a | 0.0004 | 0.26 | 2.7 | 85 | 98 | 0.8 | 1.4 |
| PP-35 | 0.0013 | 0.82 | 7.38 | 55 | 78 | 1 | 2.7 |
| PP-37 | 0.0010 | 0.64 | 3.1 | 85 | 98 | 2 | 3.4 |
| PP-51a | 0.0164 | 10.50 | 10.56 | 25 | 78 | 11.5 | 30.8 |

Project: Cordera FLG 3 111706 Simulation Run: 5-yr Pine-PP

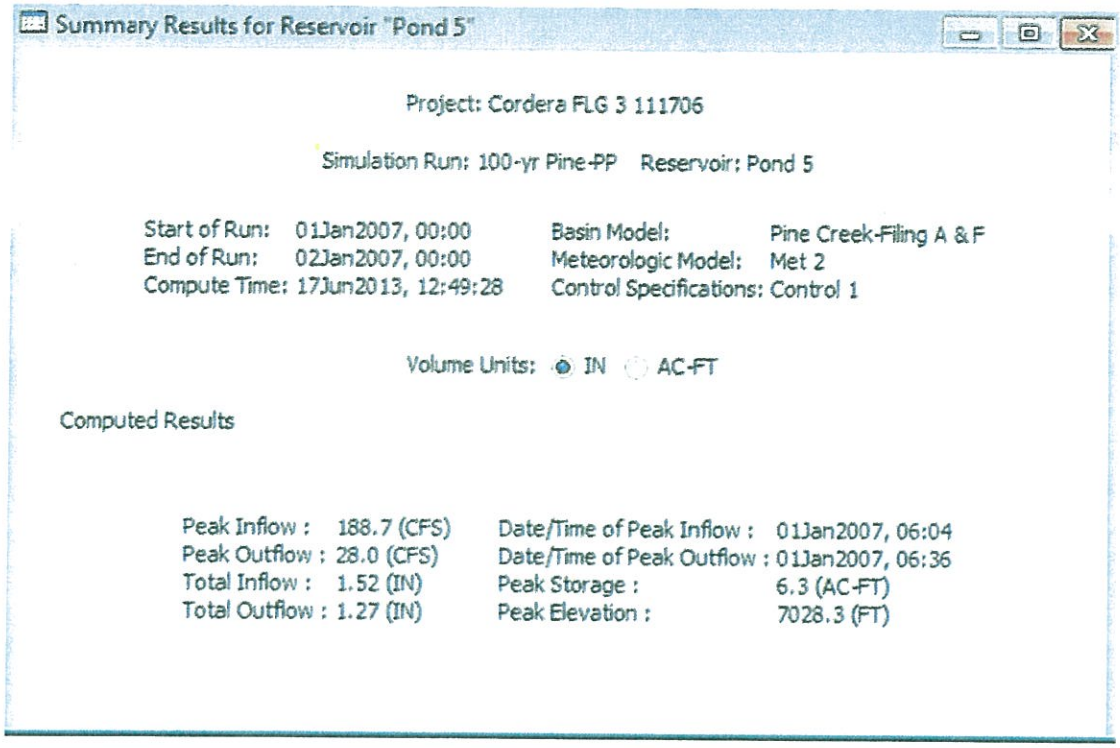
Start of Run: 01Jan2007, 00:00 Basin Model: Pine Creek-Filing A & F
End of Run: 02Jan2007, 00:00 Meteorologic Model: Met 1
Compute Time: 17Jun2013, 12:46:44 Control Specifications: Control 1

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| DP-34 | 0.0385469 | 31.8 | 01Jan2007, 06:02 | 0.89 |
| DP-35 | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| DP-51B | 0.1084687 | 12.5 | 01Jan2007, 06:13 | 0.29 |
| DP-51C | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| Junction-11 | 0.1084687 | 12.5 | 01Jan2007, 06:13 | 0.29 |
| Junction-17 | 0.1084687 | 12.5 | 01Jan2007, 06:13 | 0.29 |
| Junction-18 | 0.1650968 | 2.1 | 01Jan2007, 10:20 | 0.30 |
| Junction-19 | 0.1650968 | 2.1 | 01Jan2007, 10:20 | 0.30 |
| Junction-20 | 0.2170968 | 10.6 | 01Jan2007, 06:04 | 0.30 |
| Junction-22 | 0.1650968 | 2.1 | 01Jan2007, 10:20 | 0.30 |
| Junction-3 | 0.0110000 | 9.2 | 01Jan2007, 06:02 | 0.85 |
| Junction-7 | 0.0980000 | 9.9 | 01Jan2007, 06:14 | 0.23 |
| OP10 | 0.0050000 | 9.9 | 01Jan2007, 06:00 | 2.37 |
| OP11 | 0.0470000 | 5.1 | 01Jan2007, 06:08 | 0.23 |
| OP12 | 0.0050000 | 7.1 | 01Jan2007, 06:01 | 1.47 |
| OP3 | 0.0980000 | 9.9 | 01Jan2007, 06:09 | 0.23 |
| Pond 5 | 0.1650968 | 2.1 | 01Jan2007, 10:19 | 0.30 |
| PP-10 | 0.0020000 | 1.7 | 01Jan2007, 06:02 | 0.85 |
| PP-11 | 0.0090000 | 7.5 | 01Jan2007, 06:02 | 0.85 |
| PP-20 | 0.0072031 | 5.5 | 01Jan2007, 06:03 | 0.85 |
| PP-23 | 0.0032656 | 2.7 | 01Jan2007, 06:02 | 0.85 |
| PP-24 | 0.0210000 | 17.2 | 01Jan2007, 06:02 | 0.85 |
| PP-30 | 0.0067188 | 5.2 | 01Jan2007, 06:03 | 0.85 |
| PP-31 | 0.0035469 | 2.8 | 01Jan2007, 06:03 | 0.85 |
| PP-32 | 0.0043750 | 3.5 | 01Jan2007, 06:03 | 0.85 |
| PP-34 | 0.0019062 | 1.5 | 01Jan2007, 06:03 | 0.85 |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| PP-34a | 0.0004000 | 0.8 | 01Jan2007, 06:00 | 2.37 |
| PP-35 | 0.0012812 | 1.0 | 01Jan2007, 06:03 | 0.85 |
| PP-37 | 0.0010000 | 2.0 | 01Jan2007, 06:00 | 2.37 |
| PP-51a | 0.0164000 | 11.5 | 01Jan2007, 06:05 | 0.85 |
| Reach-12 | 0.0980000 | 9.9 | 01Jan2007, 06:14 | 0.23 |
| Reach-14 | 0.1650968 | 2.1 | 01Jan2007, 10:20 | 0.30 |
| Reach-18 | 0.0402281 | 33.4 | 01Jan2007, 06:02 | 0.91 |
| Reach-19 | 0.0385469 | 31.8 | 01Jan2007, 06:02 | 0.89 |
| Reach-20 | 0.1084687 | 12.5 | 01Jan2007, 06:13 | 0.29 |
| Reach-21 | 0.1650968 | 2.1 | 01Jan2007, 10:20 | 0.30 |
| Reach-22 | 0.1084687 | 12.5 | 01Jan2007, 06:13 | 0.29 |
| Reach-23 | 0.0402281 | 33.3 | 01Jan2007, 06:02 | 0.91 |
| Reach-24 | 0.1650968 | 2.1 | 01Jan2007, 10:20 | 0.30 |
| Reach-26 | 0.0050000 | 7.1 | 01Jan2007, 06:01 | 1.47 |
| Reach-27 | 0.1084687 | 12.5 | 01Jan2007, 06:13 | 0.29 |
| Reach-28 | 0.1650968 | 2.1 | 01Jan2007, 10:41 | 0.29 |
| Reach-3 | 0.0980000 | 9.9 | 01Jan2007, 06:14 | 0.23 |
| Sink-1 | 0.0110000 | 9.2 | 01Jan2007, 06:02 | 0.85 |
| Sink-2 | 0.0050000 | 9.9 | 01Jan2007, 06:00 | 2.37 |
| Sink-3 | 0.2170968 | 10.6 | 01Jan2007, 06:04 | 0.30 |

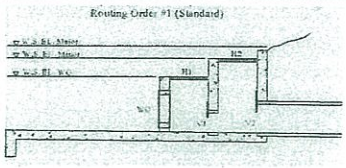

Summary Results for Reservoir "Pond 5"
Project: Cordera FLG 3 111706
Simulation Run: 5-yr Pine-PP Reservoir: Pond 5
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:46:44
Basin Model: Pine Creek-Filing A & F
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 52.7 (CFS)
Peak Outflow : 2.1 (CFS)
Total Inflow : 0.49 (IN)
Total Outflow : 0.30 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:03
Date/Time of Peak Outflow : 01Jan2007, 10:19
Peak Storage : 2.4 (AC-FT)
Peak Elevation : 7025.1 (FT)

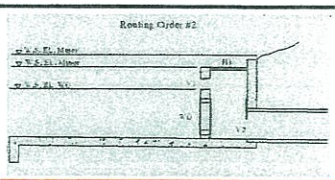
| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| PP-34a | 0.0004000 | 1.4 | 01Jan2007, 06:00 | 4.16 |
| PP-35 | 0.0012812 | 2.7 | 01Jan2007, 06:02 | 2.21 |
| PP-37 | 0.0010000 | 3.4 | 01Jan2007, 06:00 | 4.16 |
| PP-51a | 0.0164000 | 30.8 | 01Jan2007, 06:04 | 2.20 |
| Reach-12 | 0.0980000 | 74.1 | 01Jan2007, 06:09 | 1.02 |
| Reach-14 | 0.1650968 | 28.0 | 01Jan2007, 06:37 | 1.27 |
| Reach-18 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Reach-19 | 0.0385469 | 81.2 | 01Jan2007, 06:02 | 2.26 |
| Reach-20 | 0.1084687 | 87.5 | 01Jan2007, 06:08 | 1.13 |
| Reach-21 | 0.1650968 | 28.0 | 01Jan2007, 06:36 | 1.27 |
| Reach-22 | 0.1084687 | 87.5 | 01Jan2007, 06:08 | 1.13 |
| Reach-23 | 0.0402281 | 84.9 | 01Jan2007, 06:02 | 2.27 |
| Reach-24 | 0.1650968 | 28.0 | 01Jan2007, 06:36 | 1.27 |
| Reach-26 | 0.0050000 | 14.4 | 01Jan2007, 06:01 | 3.10 |
| Reach-27 | 0.1084687 | 87.5 | 01Jan2007, 06:08 | 1.13 |
| Reach-28 | 0.1650968 | 28.0 | 01Jan2007, 06:44 | 1.26 |
| Reach-3 | 0.0980000 | 74.3 | 01Jan2007, 06:09 | 1.02 |
| Sink-1 | 0.0110000 | 23.4 | 01Jan2007, 06:01 | 2.21 |
| Sink-2 | 0.0050000 | 16.9 | 01Jan2007, 06:00 | 4.16 |
| Sink-3 | 0.2170968 | 50.2 | 01Jan2007, 06:04 | 1.25 |

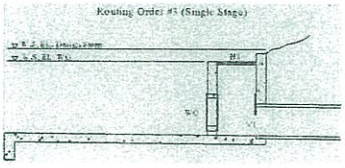

Summary Results for Reservoir "Pond 5"
Project: Cordera FLG 3 111706
Simulation Run: 100-yr Pine-PP Reservoir: Pond 5
Start of Run: 01Jan2007, 00:00
End of Run: 02Jan2007, 00:00
Compute Time: 17Jun2013, 12:49:28
Basin Model: Pine Creek-Filing A &F
Meteorologic Model: Met 2
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 188.7 (CFS)
Peak Outflow : 28.0 (CFS)
Total Inflow : 1.52 (IN)
Total Outflow : 1.27 (IN)
Date/Time of Peak Inflow : 01Jan2007, 06:04
Date/Time of Peak Outflow : 01Jan2007, 06:36
Peak Storage : 6.3 (AC-FT)
Peak Elevation : 7028.3 (FT)

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

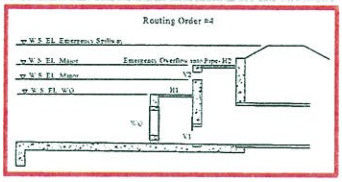
Project: Pond 5
Basin ID:


Routing Order #1 (Standard)


Routing Order #2


Routing Order #3 (Single Stage)

Current Routing Order is #4


Routing Order #4

**Design Information (Input):**

| | | | #1 Horiz. | #2 Horiz. | #1 Vert. | #2 Vert. | |
|---|---|---|---|---|---|---|---|
| Circular Opening: | Diameter in Inches | Dia. = | | | 72.00 | | inches |
| OR | | | | | | | |
| Rectangular Opening: | Width in Feet | W = | 1.25 | 4.50 | | 0.50 | ft. |
| | Length (Height for Vertical) | L or H = | 1.25 | 4.50 | | 1.50 | ft. |
| | Percentage of Open Area After Trash Rack Reduction | % open = | 70 | 70 | 100 | 100 | % |
| | Orifice Coefficient | $C_o$ = | 0.60 | 0.60 | 0.60 | 0.60 | |
| | Weir Coefficient | $C_w$ = | 3.00 | 3.00 | | | |
| | Orifice Elevation (Bottom for Vertical) | $E_o$ = | 7025.00 | 7028.00 | 7,021.00 | 7,026.00 | ft. |

**Calculation of Collection Capacity:**

| | | #1 Horiz. | #2 Horiz. | #1 Vert. | #2 Vert. | |
|---|---|---|---|---|---|---|
| Net Opening Area (after Trash Rack Reduction) | $A_o$ = | 1.09 | 14.18 | 28.27 | 0.75 | sq. ft. |
| OPTIONAL: User-Overide Net Opening Area | $A_o$ = | | | | | sq. ft. |
| Perimeter as Weir Length | $L_w$ = | 4.25 | 15.30 | ft. | | |
| OPTIONAL: User-Overide Weir Length | $L_w$ = | | | ft. | | |
| Top Elevation of Vertical Orifice Opening, Top = | | | | 7027.00 | 7027.50 | ft. |
| Center Elevation of Vertical Orifice Opening, Cen = | | | | 7024.00 | 7026.75 | ft. |

## Routing 4: Water through WQCV plate & #1 horizontal opening flows through #2 vertical opening. That flow plus flow from #2 vertical & #2 horizontal openings will be applied to culvert sheet.

| | | | Horizontal Orifices | | | | Vertical Orifices | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Labels for WQCV, Minor, & Major Storage W.S. Elevations (input) | Water Surface Elevation ft (linked) | WQCV Plate/Riser Flow cfs (User-linked) | #1 Horiz. Weir Flow cfs (output) | #1 Horiz. Orifice Flow cfs (output) | #2 Horiz. Weir Flow cfs (output) | #2 Horiz. Orifice Flow cfs (output) | #1 Vert. Collection Capacity cfs (output) | #2 Vert. Collection Capacity cfs (output) | **Total Collection Capacity cfs (output)** | Target Volumes for WQCV, Minor, & Major Storage Volumes (link for goal seek) |
| | 7021.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | |
| | 7022.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 16.04 | 0.00 | **0.27** | |
| | 7023.00 | 0.72 | 0.00 | 0.00 | 0.00 | 0.00 | 45.38 | 0.00 | **0.72** | |
| | 7024.00 | 1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 83.37 | 0.00 | **1.28** | |
| WQCV | 7025.00 | 1.66 | 0.00 | 0.00 | 0.00 | 0.00 | 128.35 | 0.00 | **1.66** | |
| 5-yr | 7026.00 | 1.96 | 12.75 | 5.27 | 0.00 | 0.00 | 179.38 | 0.00 | **7.23** | |
| | 7027.00 | 2.22 | 36.06 | 7.45 | 0.00 | 0.00 | 235.80 | 1.70 | **11.37** | |
| | 7028.00 | 2.45 | 66.25 | 9.12 | 0.00 | 0.00 | 272.28 | 4.04 | **15.61** | |
| | 7029.00 | 2.66 | 102.00 | 10.53 | 45.90 | 68.25 | 304.42 | 5.42 | **64.51** | |
| | 7030.00 | 2.85 | 142.55 | 11.78 | 129.82 | 96.52 | 333.47 | 6.51 | **117.66** | |
| 100-yr | 7031.00 | 3.03 | 187.39 | 12.90 | 238.50 | 118.22 | 360.19 | 7.44 | **141.60** | |
| | 7032.00 | 3.21 | 236.13 | 13.93 | 367.20 | 136.50 | 385.06 | 8.27 | **161.92** | |
| | 7033.00 | 3.37 | 288.50 | 14.90 | 513.18 | 152.62 | 408.42 | 9.03 | **179.91** | |
| | 7034.00 | 3.52 | 344.25 | 15.80 | 674.59 | 167.18 | 430.51 | 9.72 | **196.23** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |
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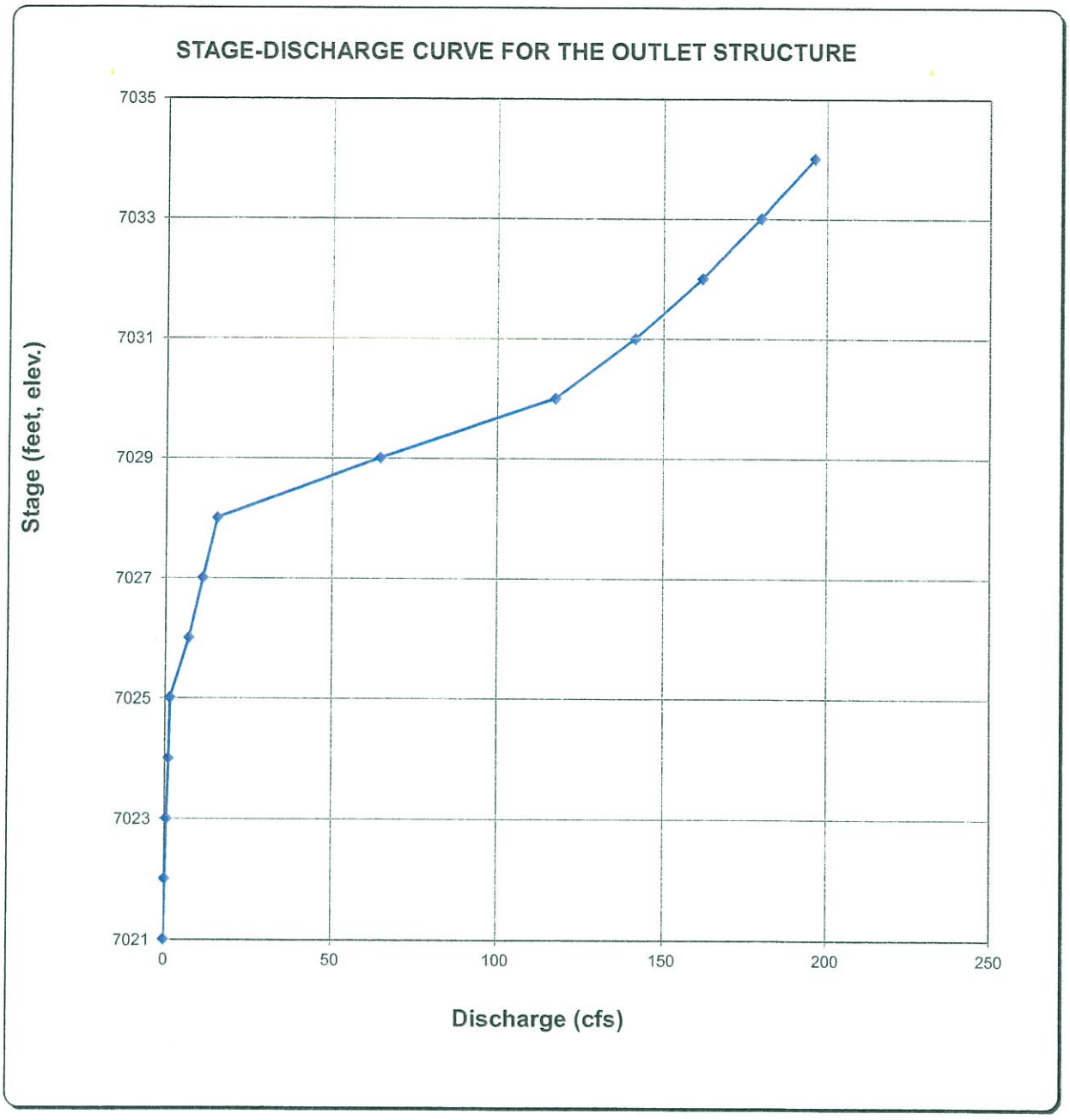
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | **#N/A** | |

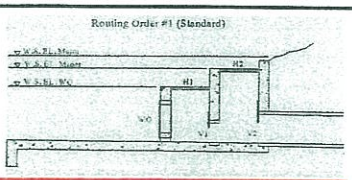
STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

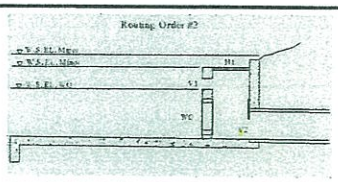
Project: Pond 5
Basin ID:

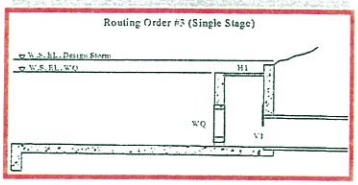


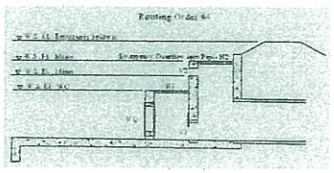
# STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: WQP
Basin ID:









Current Routing Order is #3

**Design Information (Input):**

| | | | #1 Horiz. | #2 Horiz. | #1 Vert. | #2 Vert. | |
|---|---|---|---|---|---|---|---|
| Circular Opening: | Diameter in Inches | Dia. = | | | 78.00 | | inches |
| OR | | | | | | | |
| Rectangular Opening: | Width in Feet | W = | 6.00 | | | | ft. |
| | Length (Height for Vertical) | L or H = | 6.00 | | | | ft. |
| | Percentage of Open Area After Trash Rack Reduction | % open = | 70 | | 100 | | % |
| | Orifice Coefficient | $C_o$ = | 0.60 | | 0.60 | | |
| | Weir Coefficient | $C_w$ = | 3.00 | | | | |
| | Orifice Elevation (Bottom for Vertical) | $E_o$ = | 7015.00 | | 7,014.00 | | ft. |

**Calculation of Collection Capacity:**

| | | #1 Horiz. | #2 Horiz. | #1 Vert. | #2 Vert. | |
|---|---|---|---|---|---|---|
| Net Opening Area (after Trash Rack Reduction) | $A_o$ = | 25.20 | | 33.18 | | sq. ft. |
| OPTIONAL: User-Overide Net Opening Area | $A_o$ = | | | | | sq. ft. |
| Perimeter as Weir Length | $L_w$ = | 20.40 | ft. | | | |
| OPTIONAL: User-Overide Weir Length | $L_w$ = | | ft. | | | |

Top Elevation of Vertical Orifice Opening, Top = 7020.50 ft.
Center Elevation of Vertical Orifice Opening, Cen = 7017.25 ft.

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

| | | | Horizontal Orifices | | | | Vertical Orifices | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Labels for WQCV, Minor, & Major Storage W.S. Elevations (input) | Water Surface Elevation ft (linked) | WQCV Plate/Riser Flow cfs (User-linked) | #1 Horiz. Weir Flow cfs (output) | #1 Horiz. Orifice Flow cfs (output) | #2 Horiz. Weir Flow cfs (output) | #2 Horiz. Orifice Flow cfs (output) | #1 Vert. Collection Capacity cfs (output) | #2 Vert. Collection Capacity cfs (output) | **Total Collection Capacity cfs (output)** | Target Volumes for WQCV, Minor, & Major Storage Volumes (link for goal seek) |
| | 7014.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **0.00** | |
| WQV | 7015.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 17.38 | 0.00 | **0.04** | |
| | 7016.00 | 0.11 | 61.20 | 121.34 | 0.00 | 0.00 | 49.16 | 0.00 | **49.16** | |
| | 7017.00 | 0.15 | 173.10 | 171.60 | 0.00 | 0.00 | 90.32 | 0.00 | **90.32** | |
| | 7018.00 | 0.18 | 318.00 | 210.16 | 0.00 | 0.00 | 139.05 | 0.00 | **139.05** | |
| | 7019.00 | 0.21 | 489.60 | 242.67 | 0.00 | 0.00 | 194.33 | 0.00 | **194.33** | |
| | 7020.00 | 0.23 | 684.24 | 271.32 | 0.00 | 0.00 | 255.45 | 0.00 | **255.45** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
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| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
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| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | 0.00 | **#N/A** | |
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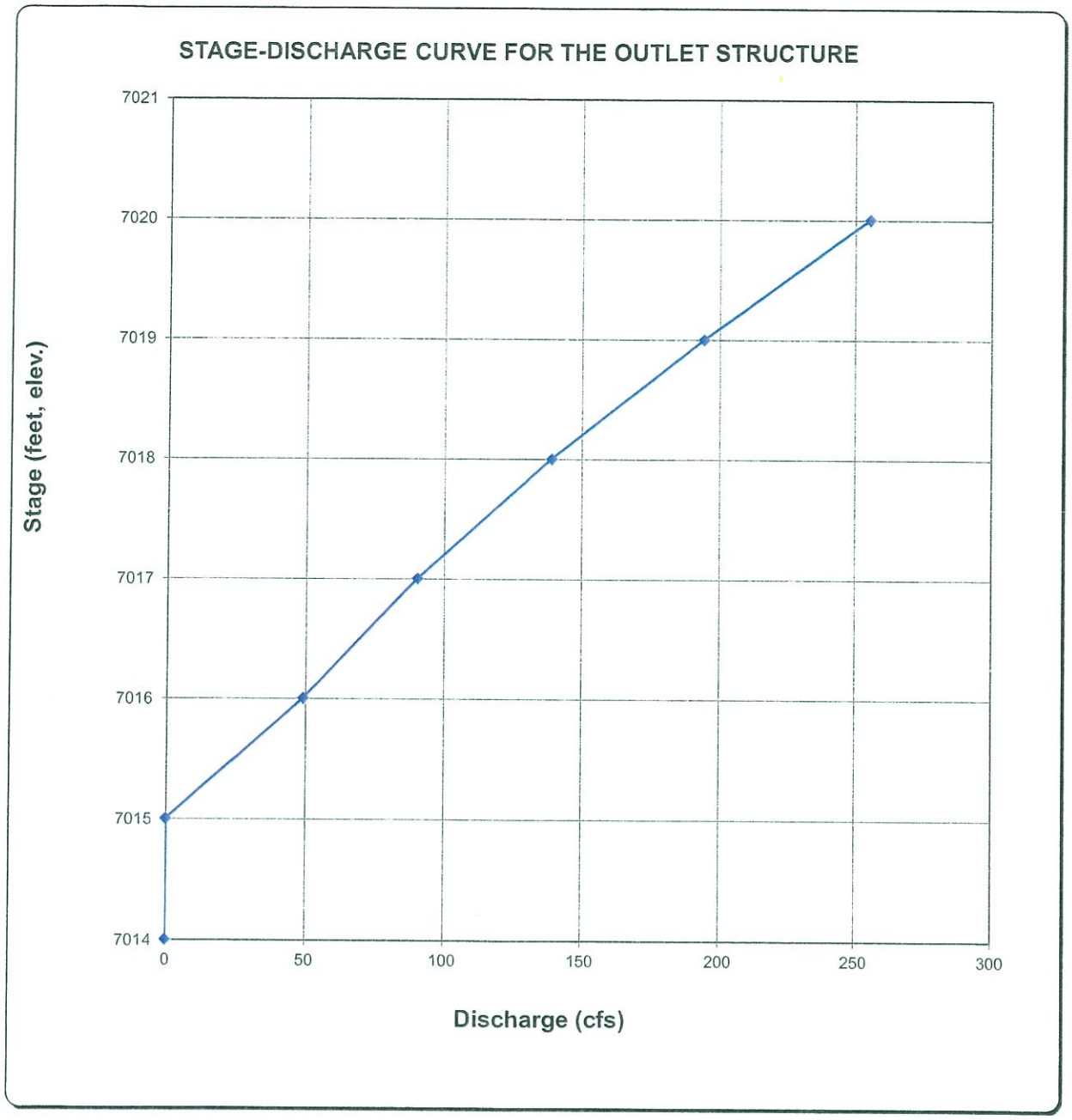
STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: WQP
Basin ID:



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

Project: Pond 5

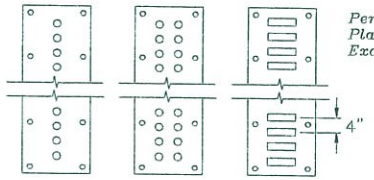
Basin ID:

**WQCV Design Volume (Input):**

Catchment Imperviousness, $I_a$ = 25.0 percent
Catchment Area, A = 166.00 acres
Depth at WQCV outlet above lowest perforation, H = 3 feet
Vertical distance between rows, h = 4.00 inches
Number of rows, NL = 9
Orifice discharge coefficient, $C_o$ = 0.60
Slope of Basin Trickle Channel, S = 0.005 ft / ft

Diameter of holes, D = 1.478 in.
Number of holes per row, N = 2
OR
Height of slot, H = in.
Width of slot, W = in.

Time to Drain the Pond = 40 hours



*Perforated Plate Examples*

**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)), WQCV = 0.135 watershed inches
Water Quality Capture Volume (WQCV) = 1.888 acre-feet
**Design Volume (WQCV / 12 * Area * 1.2) Vol = 2.265 acre-feet**
Outlet area per row, Ao = 3.43 square inches
Total opening area at each row based on user-input above, Ao = 3.43 square inches
Total opening area at each row based on user-input above, Ao = 0.024 square feet

**Calculation of Collection Capacity:**

| Stage ft (input) | Central Elevations of Rows of Holes in feet | | | | | | | | | | | | | | | | | | | | | | | | Σ Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Row 1 | Row 2 | Row 3 | Row 4 | Row 5 | Row 6 | Row 7 | Row 8 | Row 9 | Row 10 | Row 11 | Row 12 | Row 13 | Row 14 | Row 15 | Row 16 | Row 17 | Row 18 | Row 19 | Row 20 | Row 21 | Row 22 | Row 23 | Row 23 | |
| | 7021.00 | 7021.33 | 7021.67 | 7022.00 | 7022.33 | 7022.67 | 7023.00 | 7023.33 | 7023.67 | | | | | | | | | | | | | | | | |
| | Collection Capacity for Each Row of Holes in cfs | | | | | | | | | | | | | | | | | | | | | | | | |
| 7021.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | | | | | | | | | | | | | | 0.00 |
| 7022.00 | 0.1147 | 0.0939 | 0.0659 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | | | | | | | | | | | | | | 0.27 |
| 7023.00 | 0.1622 | 0.1482 | 0.1322 | 0.1147 | 0.0939 | 0.0659 | 0.0000 | 0.0000 | 0.0000 | | | | | | | | | | | | | | | | 0.72 |
| 7024.00 | 0.1986 | 0.1874 | 0.1750 | 0.1622 | 0.1482 | 0.1322 | 0.1147 | 0.0939 | 0.0659 | | | | | | | | | | | | | | | | 1.28 |
| 7025.00 | 0.2293 | 0.2197 | 0.2092 | 0.1986 | 0.1874 | 0.1750 | 0.1622 | 0.1482 | 0.1322 | | | | | | | | | | | | | | | | 1.66 |
| 7026.00 | 0.2564 | 0.2478 | 0.2386 | 0.2293 | 0.2197 | 0.2092 | 0.1986 | 0.1874 | 0.1750 | | | | | | | | | | | | | | | | 1.96 |
| 7027.00 | 0.2809 | 0.2730 | 0.2647 | 0.2564 | 0.2478 | 0.2386 | 0.2293 | 0.2197 | 0.2092 | | | | | | | | | | | | | | | | 2.22 |
| 7028.00 | 0.3034 | 0.2961 | 0.2885 | 0.2809 | 0.2730 | 0.2647 | 0.2564 | 0.2478 | 0.2386 | | | | | | | | | | | | | | | | 2.45 |
| 7029.00 | 0.3243 | 0.3176 | 0.3104 | 0.3034 | 0.2961 | 0.2885 | 0.2809 | 0.2730 | 0.2647 | | | | | | | | | | | | | | | | 2.66 |
| 7030.00 | 0.3440 | 0.3376 | 0.3309 | 0.3243 | 0.3176 | 0.3104 | 0.3034 | 0.2961 | 0.2885 | | | | | | | | | | | | | | | | 2.85 |
| 7031.00 | 0.3626 | 0.3566 | 0.3502 | 0.3440 | 0.3376 | 0.3309 | 0.3243 | 0.3176 | 0.3104 | | | | | | | | | | | | | | | | 3.03 |
| 7032.00 | 0.3803 | 0.3746 | 0.3685 | 0.3626 | 0.3566 | 0.3502 | 0.3440 | 0.3376 | 0.3309 | | | | | | | | | | | | | | | | 3.21 |
| 7033.00 | 0.3972 | 0.3917 | 0.3860 | 0.3803 | 0.3746 | 0.3685 | 0.3626 | 0.3566 | 0.3502 | | | | | | | | | | | | | | | | 3.37 |
| 7034.00 | 0.4134 | 0.4082 | 0.4026 | 0.3972 | 0.3917 | 0.3860 | 0.3803 | 0.3746 | 0.3685 | | | | | | | | | | | | | | | | 3.52 |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
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| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
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| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
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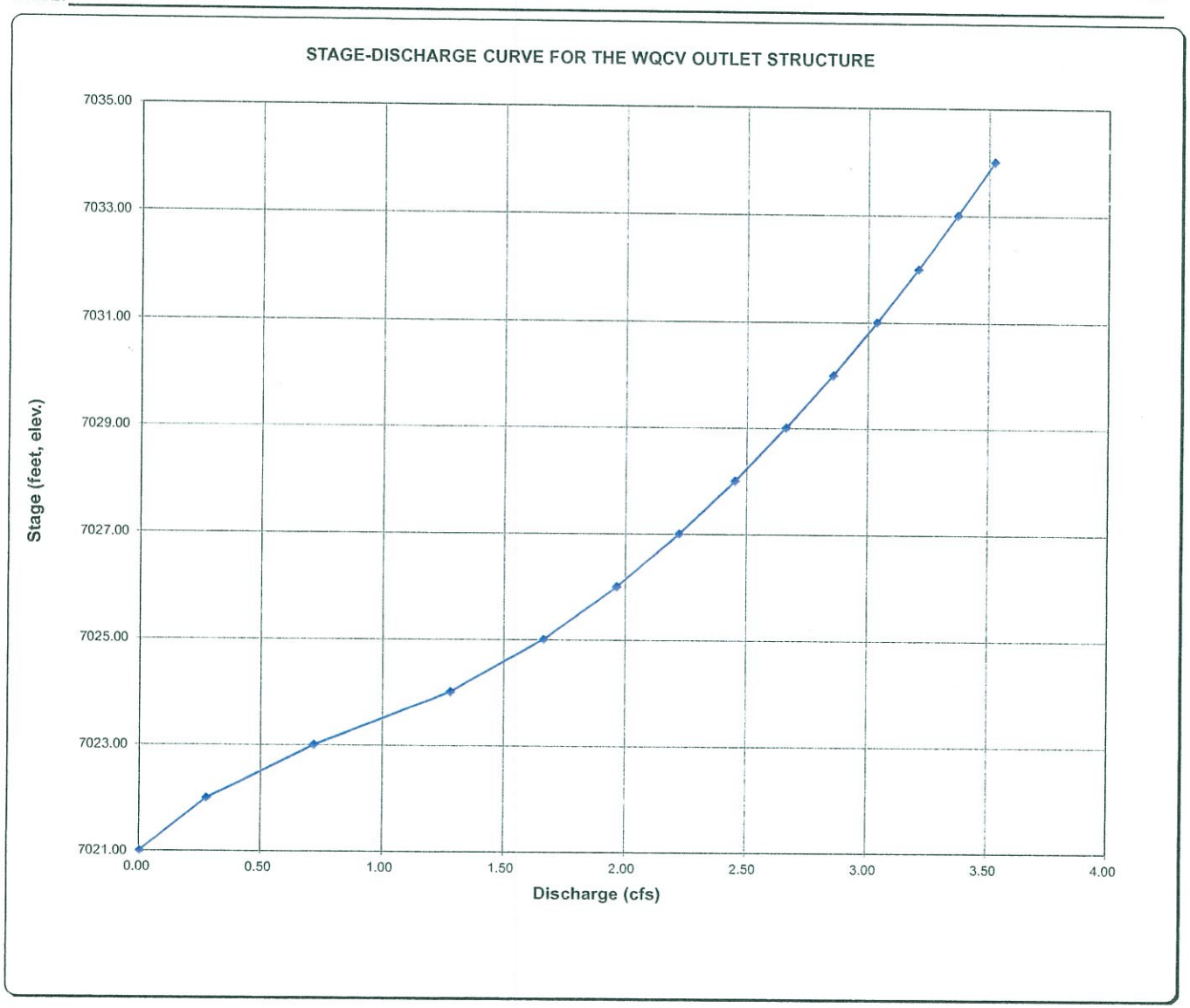
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |
| | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | | | | | | | | | | | | | | | | #N/A |

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

Project: Pond 5

Basin ID:



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

**Project:** WQP

**Basin ID:**

**WQCV Design Volume (Input):**

Catchment Imperviousness, $I_a$ = 25.0 percent
Catchment Area, A = 15.53 acres
Depth at WQCV outlet above lowest perforation, H = 2 feet
Vertical distance between rows, h = 4.00 inches
Number of rows, NL = 6
Orifice discharge coefficient, $C_o$ = 0.60
Slope of Basin Trickle Channel, S = 0.005 ft / ft

Diameter of holes, D = 0.809 in.
Number of holes per row, N = 1

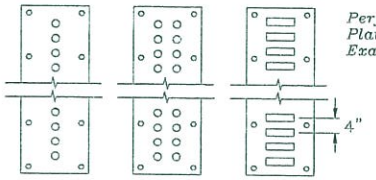
OR

Height of slot, H = in.
Width of slot, W = in.

Time to Drain the Pond = 40 hours

**Outlet Design Information (Output):**

Water Quality Capture Volume (1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)), WQCV = 0.135 watershed inches
Water Quality Capture Volume (WQCV) = 0.174 acre-feet
**Design Volume (WQCV / 12 * Area * 1.2) Vol = 0.209 acre-feet**
Outlet area per row, Ao = 0.51 square inches
Total opening area at each row based on user-input above, Ao = 0.51 square inches
Total opening area at each row based on user-input above, Ao = 0.004 square feet



*Perforated Plate Examples*

**Calculation of Collection Capacity:**

| Stage<br>ft<br>(input) | Central Elevations of Rows of Holes in feet |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Σ<br>Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Row 1 | Row 2 | Row 3 | Row 4 | Row 5 | Row 6 | Row 7 | Row 8 | Row 9 | Row 10 | Row 11 | Row 12 | Row 13 | Row 14 | Row 15 | Row 16 | Row 17 | Row 18 | Row 19 | Row 20 | Row 21 | Row 22 | Row 23 | Row 23 |  |
|  | 7014.00 | 7014.33 | 7014.67 | 7015.00 | 7015.33 | 7015.67 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Collection Capacity for Each Row of Holes in cfs |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7014.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.00 |
| 7015.00 | 0.0172 | 0.0141 | 0.0099 | 0.0000 | 0.0000 | 0.0000 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.04 |
| 7016.00 | 0.0243 | 0.0222 | 0.0198 | 0.0172 | 0.0141 | 0.0099 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.11 |
| 7017.00 | 0.0297 | 0.0281 | 0.0262 | 0.0243 | 0.0222 | 0.0198 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.15 |
| 7018.00 | 0.0343 | 0.0329 | 0.0313 | 0.0297 | 0.0281 | 0.0262 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.18 |
| 7019.00 | 0.0384 | 0.0371 | 0.0357 | 0.0343 | 0.0329 | 0.0313 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.21 |
| 7020.00 | 0.0421 | 0.0409 | 0.0396 | 0.0384 | 0.0371 | 0.0357 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.23 |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
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|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
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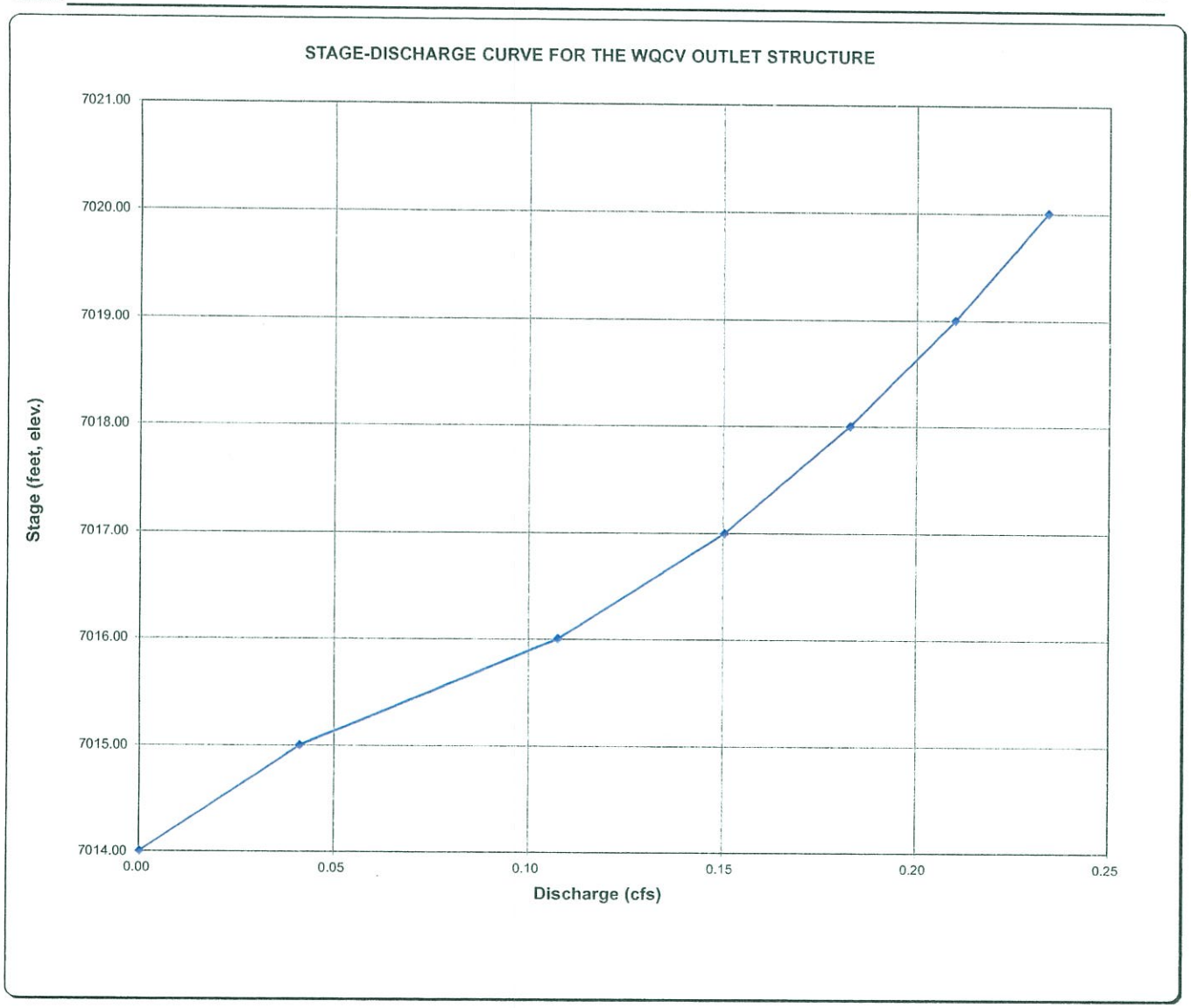
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |
|  | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | #N/A |

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

Project: WQP

Basin ID:



# HYDROLOGY (SHEET 1 of 2)
## Cordera Filings 3A, 3B & 3F - May 2013

**Table 1**

~~C100*Cf(<=1.0)~~

| BASIN No. | AREA Ac. | PEAK FLOW (CFS) Q2 Year | Q5 Year | Q100 Year | TIME OF CONCENTRATION (Tc) (1) OVERLAND FLOW L Ft. | H Ft. | Slope % | C5 | Tt Min. | (2) OVERLAND NATURAL CHANNEL L Ft. | H Ft. | Slope % | Vel/ FPS | Tt Min. | (3) NATURAL, PIPE OR STREET FLOW L Ft. | H Ft. | Slope % | F note 7 | Vel FPS | Tt Min. | (4) PIPE OR STREET FLOW L Ft. | H Ft. | Slope % | F note 8 | Vel FPS | Tt Min. | Tc Min. | INTENSITY (see note 3) 2 Year | 5 Year | 100 Year | RUNOFF COEFFICIENT 5 Year | 100 Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING: | (use "H" for Historic or Existing condition) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEVELOPED: | (use "D" for Developed condition) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Basins: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 3.61 | 4.7 | 6.4 | 13.2 | 100 | 2.5 | 2.5 | 0.25 | 11.7 | 50 | 1 | 2.0 | 3.0 | 0.3 | 700 | 14.0 | 2.0 | 26 | 3.7 | 3.2 | | | | | | | 15.2 | 2.5 | 3.4 | 6.1 | 0.52 | 0.60 |
| 11 | 2.22 | 3.1 | 4.3 | 8.8 | 100 | 4.0 | 4.0 | 0.25 | 10.1 | | | | | | 1100 | 58.0 | 5.3 | 30 | 6.9 | 2.7 | | | | | | | 12.7 | 2.7 | 3.7 | 6.6 | 0.52 | 0.60 |
| 20 | 4.61 | 6.2 | 8.6 | 17.6 | 100 | 4.0 | 4.0 | 0.25 | 10.1 | 100 | 2 | 2.0 | 3.0 | 0.6 | 1150 | 66.0 | 5.7 | 26 | 6.2 | 3.1 | | | | | | | 13.7 | 2.6 | 3.6 | 6.4 | 0.52 | 0.60 |
| 21 | 1.11 | 1.6 | 2.1 | 4.4 | 100 | 3.0 | 3.0 | 0.25 | 11.1 | 50 | 1 | 2.0 | 3.0 | 0.3 | 250 | 5.0 | 2.0 | 24 | 3.4 | 1.2 | | | | | | | 12.6 | 2.7 | 3.7 | 6.7 | 0.52 | 0.60 |
| 22 | 0.68 | 1.0 | 1.4 | 2.9 | 80 | 3.0 | 3.8 | 0.25 | 9.2 | | | | | | 250 | 5.0 | 2.0 | 24 | 3.4 | 1.2 | | | | | | | 10.4 | 2.9 | 4.0 | 7.2 | 0.52 | 0.60 |
| 23 | 2.09 | 2.3 | 3.2 | 7.0 | 100 | 4.0 | 4.0 | 0.25 | 10.1 | 50 | 1 | 2.0 | 3.0 | 0.3 | 200 | 6.0 | 3.0 | NA | 10.0 | 0.3 | | | | | | | 10.7 | 2.9 | 4.0 | 7.1 | 0.38 | 0.47 |
| 30 | 4.30 | 5.9 | 8.1 | 16.6 | 100 | 4.0 | 4.0 | 0.25 | 10.1 | 100 | 2 | 2.0 | 3.0 | 0.6 | 1100 | 66.0 | 6.0 | 26 | 6.4 | 2.9 | | | | | | | 13.5 | 2.6 | 3.6 | 6.5 | 0.52 | 0.60 |
| 31 | 2.27 | 3.2 | 4.4 | 9.1 | 200 | 22.0 | 11.0 | 0.25 | 10.2 | 100 | 2 | 2.0 | 3.0 | 0.6 | 600 | 34.0 | 5.7 | 26 | 6.2 | 1.6 | | | | | | | 12.4 | 2.7 | 3.8 | 6.7 | 0.52 | 0.60 |
| 32 | 2.80 | 4.0 | 5.5 | 11.2 | 200 | 22.0 | 11.0 | 0.25 | 10.2 | 100 | 2 | 2.0 | 3.0 | 0.6 | 600 | 34.0 | 5.7 | 26 | 6.2 | 1.6 | | | | | | | 12.4 | 2.7 | 3.8 | 6.7 | 0.52 | 0.60 |
| 34 | 1.22 | 1.8 | 2.4 | 5.0 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | 50 | 1 | 2.0 | 3.0 | 0.3 | 100 | 0.7 | 0.7 | 26 | 2.2 | 0.8 | | | | | | | 11.6 | 2.8 | 3.9 | 6.9 | 0.52 | 0.60 |
| 35 | 0.82 | 1.2 | 1.6 | 3.3 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | 50 | 1 | 2.0 | 3.0 | 0.3 | 200 | 1.5 | 0.8 | 26 | 2.3 | 1.5 | | | | | | | 12.3 | 2.7 | 3.8 | 6.7 | 0.52 | 0.60 |
| JRDP2 | 10.56 | 14.5 | 20.0 | 41.1 | 100 | 4.0 | 4.0 | 0.25 | 10.1 | 100 | 2 | 2.0 | 3.0 | 0.6 | 800 | 32.0 | 4.0 | 26 | 5.2 | 2.6 | | | | | | | 13.2 | 2.7 | 3.7 | 6.5 | 0.52 | 0.60 |
| 40 | 3.37 | 4.8 | 6.6 | 13.7 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | 100 | 2 | 2.0 | 3.0 | 0.6 | 200 | 4.0 | 2.0 | 26 | 3.7 | 0.9 | | | | | | | 12.0 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 41 | 0.39 | 0.6 | 0.8 | 1.6 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | | | | | | 400 | 10.0 | 2.5 | 26 | 4.1 | 1.6 | | | | | | | 12.1 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 42 | 0.78 | 1.1 | 1.5 | 3.2 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | | | | | | 400 | 13.0 | 3.3 | 26 | 4.7 | 1.4 | | | | | | | 11.9 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 43 | 1.62 | 2.6 | 3.5 | 7.2 | 100 | 8.0 | 8.0 | 0.25 | 8.0 | 100 | 2 | 2.0 | 3.0 | 0.6 | 150 | 2.0 | 1.3 | 26 | 3.0 | 0.8 | | | | | | | 9.4 | 3.1 | 4.2 | 7.5 | 0.52 | 0.60 |
| 44 | 0.80 | 1.1 | 1.6 | 3.2 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | | | | | | 400 | 10.0 | 2.5 | 26 | 4.1 | 1.6 | | | | | | | 12.1 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 45 | 1.11 | 1.6 | 2.2 | 4.5 | 100 | 4.0 | 4.0 | 0.25 | 10.1 | 200 | 4 | 2.0 | 3.0 | 1.1 | 150 | 2.0 | 1.3 | 26 | 3.0 | 0.8 | | | | | | | 12.0 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 46 | 1.16 | 1.7 | 2.3 | 4.7 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | | | | | | 300 | 6.0 | 2.0 | 26 | 3.7 | 1.4 | | | | | | | 11.9 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 47 | 1.88 | 2.6 | 3.5 | 7.2 | 100 | 6.0 | 6.0 | 0.25 | 8.8 | 200 | 8 | 4.0 | 3.0 | 1.1 | 600 | 7.0 | 1.2 | 26 | 2.8 | 3.6 | | | | | | | 13.5 | 2.6 | 3.6 | 6.5 | 0.52 | 0.60 |
| 50 | 1.93 | 2.7 | 3.7 | 7.5 | 80 | 2.0 | 2.5 | 0.25 | 10.5 | 50 | 1 | 2.0 | 3.0 | 0.3 | 500 | 10.0 | 2.0 | 26 | 3.7 | 2.3 | | | | | | | 13.1 | 2.7 | 3.7 | 6.6 | 0.52 | 0.60 |
| 51 | 7.06 | 5.9 | 8.1 | 17.9 | 100 | 2.0 | 2.0 | 0.25 | 12.6 | 100 | 2 | 2.0 | 3.0 | 0.6 | 800 | 8.0 | 1.0 | NA | 2.0 | 6.7 | | | | | | | 19.9 | 2.2 | 3.0 | 5.4 | 0.38 | 0.47 |
| Design Points: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | 5.72 | 7.7 | 10.7 | 21.9 | Basins 20 & 21 | | | | | Tc from Basin 20: | | | | 13.7 | | | | | | | | | | | | | 13.7 | 2.6 | 3.6 | 6.4 | 0.52 | 0.60 |
| 32 | 9.37 | 12.8 | 17.6 | 36.1 | Basins 30, 31 & 32 | | | | | Tc from Basin 30: | | | | 13.5 | | | | | | | | | | | | | 13.5 | 2.6 | 3.6 | 6.5 | 0.52 | 0.60 |
| 34 | 21.15 | 27.1 | 37.3 | 76.7 | Design Point 32 + Basin 34 +JRDP2 | | | | | Tc from sign Point 32: | | | | 13.5 | 300 | 3.0 | 1.0 | 26 | 2.6 | 1.9 | | | | | | | 15.4 | 2.5 | 3.4 | 6.1 | 0.52 | 0.60 |
| 41 | 3.76 | 5.4 | 7.4 | 15.2 | Basins 40 & 41 | | | | | Tc from Basin 40: | | | | 12.0 | | | | | | | | | | | | | 12.0 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 44 | 3.20 | 4.6 | 6.3 | 12.9 | Basins 42, 43 & 44 | | | | | Tc from Basin 44: | | | | 12.1 | | | | | | | | | | | | | 12.1 | 2.8 | 3.8 | 6.8 | 0.52 | 0.60 |
| 45 | 4.31 | 5.8 | 8.0 | 16.4 | Basin 45 & DP 44 | | | | | Tc from Design Point 44: | | | | 12.1 | 300 | 4.0 | 1.3 | 26 | 3.0 | 1.7 | | | | | | | 13.8 | 2.6 | 3.6 | 6.4 | 0.52 | 0.60 |
| 46 | 5.47 | 7.2 | 9.9 | 20.3 | Basin 46 & DP 45 | | | | | Tc from Design Point 45: | | | | 13.8 | 100 | 0.5 | 0.5 | 26 | 1.8 | 0.9 | | | | | | | 14.7 | 2.5 | 3.5 | 6.2 | 0.52 | 0.60 |
| 47 | 5.64 | 6.8 | 9.4 | 19.3 | Basin 47 & DP 41 | | | | | Tc from Design Point 41: | | | | 12.0 | 750 | 6.0 | 0.8 | 26 | 2.3 | 5.4 | | | | | | | 17.3 | 2.4 | 3.2 | 5.8 | 0.52 | 0.60 |
| 51A | 11.11 | 13.4 | 18.5 | 37.9 | Design Points 46 & 47 | | | | | Tc from Design Point 47 | | | | 17.3 | 100 | 1.0 | 1.0 | NA | 10.0 | 0.2 | | | | | | | 17.5 | 2.3 | 3.2 | 5.7 | 0.52 | 0.60 |
| 51B | 8.49 | 11.1 | 15.2 | 31.5 | Design Point 21 & Basins 22 & 23 | | | | | Tc from Design Point 21: | | | | 13.7 | | | | | | | | | | | | | 13.7 | 2.6 | 3.6 | 6.4 | 0.50 | 0.58 |
| 51C | 21.97 | 28.1 | 38.7 | 79.5 | Basin 35 & DP 34 | | | | | Tc from DP 34: | | | | 15.4 | 50 | 2.0 | 4.0 | NA | 10.0 | 0.1 | | | | | | | 15.5 | 2.5 | 3.4 | 6.1 | 0.52 | 0.60 |
| 51 | 48.63 | 53.8 | 74.1 | 152.9 | Design Points 51ABC & Basin 51 | | | | | Tc from Basin 51: | | | | 19.9 | | | | | | | | | | | | | 19.9 | 2.2 | 3.0 | 5.4 | 0.50 | 0.58 |

Note: 1) Peak Flow = C*I*A = Runoff Coefficient * Intensity * Area
2) The Mannings equation is used to calculate the travel times of natural channels (.03<=n<=.05), street flow (n=.016) and pipe flow (n=.013).
3) The Intensity is derived from Figure 5-1 in the DCM (modified for the 5/10/100 year storms). See formula with varriables & coefficients below.
4) The overland flow travel time (Tt) is derived from the formula in section 5.2.3 in the DCM: Tt=1.87(1.1-C5)(L^.5)(S^-.33)
5) The Time of Concentration (Tc) is the sum of all the appropriate Travel Times (Tt's).
6) The Runoff Coefficient may be a composite value.
7) The street flow velocity is determined from Fx(slope^.5), where the value of F ranges from 20 (shallow gutter flow) to 32 (full street flow). "NA" identifies channel or pipe flow where velocity controls.
8) The pipe or channel velocity is estimated based on the anticipated slope, material, size and flow rate.
9) Q2, Q5 & Q10 are based on C10; Q25, Q50 & Q100 are based on C100

| City | 1 hour Rainfall 2 yr | 5 yr | 10 yr | 25 yr | 50 yr | 100 yr |
|---|---|---|---|---|---|---|
| Colorado Springs | 1.09 | 1.5 | 1.75 | 2.25 | 2.55 | 2.7 |
| Woodland Park | 0.8 | 1.1 | | | | 2.1 |

(Woodland Park): A = 26.65 B = 10.00 C = 0.76
Colorado Springs): A = 26.65 B = 10.00 C = 0.76

IDF Formula: i (in/hr) = (A*P1)/((B+Td)^C)
Where: P1 = One hour rainfall depth in inches, and Td = Duration in minutes
Equation is from the Jan 7th, 2003 Memo from the City of Colo. Sp. Dept. of Pub. Works.

CORDERA 3B BASINS & DESIGN POINTS: 21, 22, 40, 41, 42, 45, 46, 47, 50, 51, 51A, 51B
CORDERA 3D BASINS & DESIGN POINTS: 43, 44
RATIONAL METHOD DESIGN POINTS: 51, 51A, 51B & 51C DO NOT INCLUDE OFF-SITE BASINS

# HYDROLOGY (SHEET 2 of 2)

## Cordera Filings 3A, 3B & 3F - May 2013

## Runoff Coefficients

**Table 2**

| BASIN No. | AREA Ac. | Land Use #1: (Impervious) Description | Soil | Area Ac. | Area % | C 5 Year | C 100 Year | Land Use #2: (Pervious) Description | Soil | Area Ac. | Area % | C 5 Year | C 100 Year | Land Use #3: (other) Description | Soil | Area Ac. | Area % | C 5 Year | C 100 Year | COMPOSITE COEFFICIENT 5 Year | COMPOSITE COEFFICIENT 100 Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING: | | | | | | | | | | | | | | | | | | | | | |
| DEVELOPED: | | | | | | | | | | | | | | | | | | | | | |
| Basins: | | | | | | | | | | | | | | | | | | | | | |
| 10 | 3.61 | Drives Walks Roofs | B | 1.5 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 2.1 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 11 | 2.22 | Drives Walks Roofs | B | 0.9 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.3 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 20 | 4.61 | Drives Walks Roofs | B | 1.9 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 2.7 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 21 | 1.11 | Drives Walks Roofs | B | 0.5 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.7 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 22 | 0.68 | Drives Walks Roofs | B | 0.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.4 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 23 | 2.09 | Drives Walks Roofs | B | 0.4 | 20 | 0.9 | 0.95 | Lawns (steep) | B | 1.7 | 80 | 0.25 | 0.35 | | | | | | | 0.38 | 0.47 |
| 30 | 4.30 | Drives Walks Roofs | B | 1.8 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 2.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 31 | 2.27 | Drives Walks Roofs | B | 0.9 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.3 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 32 | 2.80 | Drives Walks Roofs | B | 1.1 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.7 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 34 | 1.22 | Drives Walks Roofs | B | 0.5 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.7 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 35 | 0.82 | Drives Walks Roofs | B | 0.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| JRDP2 | 10.56 | Drives Walks Roofs | B | 4.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 6.2 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 40 | 3.37 | Drives Walks Roofs | B | 1.4 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 2.0 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 41 | 0.39 | Drives Walks Roofs | B | 0.2 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.2 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 42 | 0.78 | Drives Walks Roofs | B | 0.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 43 | 1.62 | Drives Walks Roofs | B | 0.7 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.0 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 44 | 0.80 | Drives Walks Roofs | B | 0.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 45 | 1.11 | Drives Walks Roofs | B | 0.5 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.7 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 46 | 1.16 | Drives Walks Roofs | B | 0.5 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 0.7 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 47 | 1.88 | Drives Walks Roofs | B | 0.8 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.1 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 50 | 1.93 | Drives Walks Roofs | B | 0.8 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.1 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 51 | 7.06 | Drives Walks Roofs | B | 1.4 | 20 | 0.9 | 0.95 | Lawns (steep) | B | 5.6 | 80 | 0.25 | 0.35 | | | | | | | 0.38 | 0.47 |
| Design Points: | | | | | | | | | | | | | | | | | | | | | |
| 21 | 5.72 | Drives Walks Roofs | B | 2.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 3.4 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 32 | 9.37 | Drives Walks Roofs | B | 3.8 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 5.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 34 | 21.15 | Drives Walks Roofs | B | 8.7 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 12.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 41 | 3.76 | Drives Walks Roofs | B | 1.5 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 2.2 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 44 | 3.20 | Drives Walks Roofs | B | 1.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 1.9 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 45 | 4.31 | Drives Walks Roofs | B | 1.8 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 2.5 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 46 | 5.47 | Drives Walks Roofs | B | 2.2 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 3.2 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 47 | 5.64 | Drives Walks Roofs | B | 2.3 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 3.3 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 51A | 11.11 | Drives Walks Roofs | B | 4.6 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 6.6 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 51B | 8.49 | Drives Walks Roofs | B | 3.2 | 38 | 0.9 | 0.95 | Lawns (steep) | B | 5.3 | 62 | 0.25 | 0.35 | | | | | | | 0.50 | 0.58 |
| 51C | 21.97 | Drives Walks Roofs | B | 9.0 | 41 | 0.9 | 0.95 | Lawns (steep) | B | 13.0 | 59 | 0.25 | 0.35 | | | | | | | 0.52 | 0.60 |
| 51 | 48.63 | Drives Walks Roofs | B | 19.0 | 39 | 0.9 | 0.95 | Lawns (steep) | B | 29.7 | 61 | 0.25 | 0.35 | | | | | | | 0.50 | 0.58 |

Note: 1) The Runoff Coefficient values are derived from Table 5-1 in the DCM.

# STREET CAPACITIES

Table 3

## Cordera Filings 3A, 3B & 3F - May 2013

| Basin/ Design Pt | - FLOW RATES- Total Flow (street + pipe) Q5 | Q100 | Street Flow (total-pipe+flowby) Q5 | Q100 | - STREET CAPACITY (1/2 street section) - Name | Width | Slope | Ramp or Vert | Allowable Flow Q5 | Q100 Note 3 | Inlet Req'd ? | - INLET SIZE - Exist (ft) | Prop (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING: | | | | | | | | | | | | | |
| DEVELOPED: | | | | | | | | | | | | | |
| Basins: | | | | | | | | | | | | | |
| 10 | 6.4 | 13.2 | 6.4 | 13.2 | Coyote Ridge | 34 | 0.04 | V | 34.0 | 141 | NO | | 10' D10R |
| 11 | 4.3 | 8.8 | 4.3 | 8.8 | Union Blvd | 40 | 0.06 | V | 34.0 | 224 | NO | | |
| 20 | 8.6 | 17.6 | 8.6 | 17.6 | Outlook Ridge | 34 | 0.05 | V | 34.0 | 158 | NO | | 15' D10R |
| 21 | 2.1 | 4.4 | 2.1 | 4.4 | Gunsight Pass | 34 | 0.01 | V | 17.0 | 71 | NO | | 15' D10R |
| 22 | 1.4 | 2.9 | 1.4 | 7.7 | Gunsight Pass | 34 | 0.01 | V | 17.0 | 71 | NO | | 5' D10R |
| 23 | 3.2 | 7.0 | 3.2 | 7.0 | - | | | | | | | | 5' D10R |
| 30 | 8.1 | 16.6 | 8.1 | 16.6 | Outlook Ridge | 34 | 0.055 | V | 34.0 | 166 | NO | | |
| 31 | 4.4 | 9.1 | 4.4 | 9.1 | Gunsight Pass | 34 | 0.055 | V | 34.0 | 166 | NO | | |
| 32 | 5.5 | 11.2 | 5.5 | 11.2 | Gunsight Pass | 34 | 0.055 | V | 34.0 | 166 | NO | | |
| 34 | 2.4 | 5.0 | 2.4 | 5.0 | Outlook Ridge | 34 | 0.007 | V | 14.2 | 59 | NO | | 20' D10R |
| 35 | 1.6 | 3.3 | 13.7 | 38.9 | Outlook Ridge | 34 | 0.007 | V | 14.2 | 59 | NO | | 20' D10R |
| JRDP2 | 20.0 | 41.1 | 20.0 | 41.1 | Portillo Place | 34 | 0.055 | V | 34.0 | 166 | NO | | 16' D10R |
| 40 | 6.6 | 13.7 | 6.6 | 13.7 | Gunsight Pass | 34 | 0.01 | V | 17.0 | 71 | NO | | 15' D10R |
| 41 | 0.8 | 1.6 | 0.8 | 1.6 | Gunsight Pass | 34 | 0.01 | V | 17.0 | 71 | NO | | |
| 42 | 1.5 | 3.2 | 1.5 | 3.2 | Gunsight Pass | 34 | 0.01 | V | 17.0 | 71 | NO | | |
| 43 | 3.5 | 7.2 | 3.5 | 7.2 | Horsetheif Falls | 34 | 0.006 | V | 13.2 | 55 | NO | | |
| 44 | 1.6 | 3.2 | 1.6 | 3.2 | Horsetheif Falls | 34 | 0.006 | V | 13.2 | 55 | NO | | |
| 45 | 2.2 | 4.5 | 2.2 | 4.5 | Edgemont Ranch | 34 | 0.008 | V | 15.2 | 63 | NO | | |
| 46 | 2.3 | 4.7 | 2.3 | 4.7 | Edgemont Ranch | 34 | 0.007 | V | 14.2 | 59 | NO | | 15' D10R |
| 47 | 3.5 | 7.2 | 3.5 | 7.2 | Edgemont Ranch | 34 | 0.007 | V | 14.2 | 59 | NO | | 15' D10R |
| 50 | 3.7 | 7.5 | 3.7 | 7.5 | New Notch Trail | 34 | 0.02 | V | 24.1 | 100 | NO | | 5' D10R |
| 51 | 8.1 | 17.9 | 8.1 | 17.9 | | | | | | | | | |
| Design Points: | | | | | | | | | | | | | |
| 21 | 10.7 | 21.9 | 10.7 | 21.9 | Gunsight Pass | 34 | 0.01 | V | 17.0 | 71 | NO | | 15' D10R |
| 32 | 17.6 | 36.1 | 17.6 | 36.1 | Outlook Ridge | 34 | 0.025 | V | 26.9 | 112 | NO | | |
| 34 | 37.3 | 76.7 | 26.5 | 60.1 | Outlook Ridge | 34 | 0.007 | V | 14.2 | 59 | YES | | 20' D10R |
| 41 | 7.4 | 15.2 | 7.4 | 15.2 | Edgemont Ranch | 34 | 0.025 | V | 26.9 | 112 | NO | | |
| 44 | 6.3 | 12.9 | 6.3 | 12.9 | Edgemont Ranch | 34 | 0.013 | V | 19.4 | 81 | NO | | |
| 45 | 8.0 | 16.4 | 8.0 | 16.4 | Edgemont Ranch | 34 | 0.013 | V | 19.4 | 81 | NO | | |
| 46 | 9.9 | 20.3 | 9.9 | 20.3 | Edgemont Ranch | 34 | 0.007 | V | 14.2 | 59 | NO | | 15' D10R |
| 47 | 9.4 | 19.3 | 9.4 | 19.3 | Edgemont Ranch | 34 | 0.007 | V | 14.2 | 59 | NO | | 15' D10R |
| 51A | 18.5 | 37.9 | 18.5 | 37.9 | | | | | | | | | |
| 51B | 15.2 | 31.5 | 15.2 | 31.5 | | | | | | | | | |
| 51C | 38.7 | 79.5 | 38.7 | 79.5 | | | | | | | | | |
| 51 | 74.1 | 152.9 | 74.1 | 152.9 | | | | | | | | | |

1) Inlets are required if "Street Flow" exceeds "Allowable Flow".
2) The allowable street flow is determined from Y*(slope^.5), where the value of "Y" for the 5 or 100 year storm, is found in the adjacent table.
3) If overtopping will occur, then, the amount of overtopping is approximately the difference between the Q5 and Q100 allowable flow.

| Width (ft) | Ramp Curb Y5 | Y100 | Q5max cfs | Vertical Curb Y5 | Y100 | Q5max cfs |
|---|---|---|---|---|---|---|
| 24 | 68.9 | | 15 | 164.1 | | 25 |
| 34 | 112.6 | 892.8 | 20 | 170.2 | 706.4 | 34 |
| 36 | 112.6 | 892.8 | 20 | 170.2 | 706.4 | 34 |
| 40 | 141.6 | 1049.5 | 20 | 171.7 | 914.6 | 34 |
| 44 | | | | 171.7 | 914.6 | 34 |
| 72 | | | | 110.2 | 914.6 | 34 |

# INLET DESIGN

## Cordera Filings 3A, 3B & 3F - May 2013

**Table 4**

Width of pan (ft) = 2

| Basin or Design Pt | - DESIGN FLOW - TOTAL FLOW (surface+pipe) Q5 cfs | Q100 cfs | SURFACE FLOW Q5 cfs | Q100 cfs | - STREET HYDRAULICS- Street Name | Width Ft | Slope At Inlet % | Cross Slope (Sx) % | Flow Spread @ Sx T5 Ft | T100 Ft | Depth at Edge of Pan D5 Ft | D100 Ft | - INLET HYDRAULICS- Size (ft) | Exist or Proposed | Ratio of Flow Pickup Qi/Qtotal Q5 | Q100 | Flow Pickup Q5 cfs | Q100 cfs | Flow-by Q5 cfs | Q100 cfs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING: | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| DEVELOPED: | | | | | | | | | | | | | | | | | | | | |
| Basins: | | | | | | | | | | | | | | | | | | | | |
| 10 | 6.4 | 13.2 | 6.4 | 13.2 | Coyote Ridge | 34 | sag | 2.0 | 19.0 | 30.5 | 0.34 | 0.57 | 10 | Prop | 1.00 | 1.00 | 6.6 | 13.1 | 0.0 | 0.0 |
| 11 | 4.3 | 8.8 | 4.3 | 8.8 | Union Blvd | 40 | 6.0 | 2.0 | 8.9 | 11.6 | 0.14 | 0.19 | | | | | | | | |
| 20 | 8.6 | 17.6 | 8.6 | 17.6 | Outlook Ridge | 34 | sag | 2.5 | 15.2 | 24.8 | 0.33 | 0.57 | 15 | Prop | 1.00 | 1.00 | 8.7 | 18.0 | 0.0 | 0.0 |
| 21 | 2.1 | 4.4 | 2.1 | 4.4 | Gunsight Pass | 34 | sag | 2.5 | 4.8 | 9.2 | 0.07 | 0.18 | 15 | Prop | 1.00 | 1.00 | 2.2 | 4.5 | 0.0 | 0.0 |
| 22 | 1.4 | 2.9 | 1.4 | 7.7 | Gunsight Pass | 34 | sag | 2.0 | 8.5 | 29.0 | 0.13 | 0.54 | 5 | Prop | 1.00 | 0.99 | 1.5 | 7.7 | 0.0 | 0.0 |
| 23 | 3.2 | 7.0 | 3.2 | 7.0 | - | 34 | sag | 4.0 | 9.0 | 14.8 | 0.28 | 0.51 | 5 | Prop | 1.00 | 1.00 | 3.3 | 7.1 | 0.0 | 0.0 |
| 30 | 8.1 | 16.6 | 8.1 | 16.6 | Outlook Ridge | 34 | 5.3 | 2.0 | 11.5 | 15.1 | 0.19 | 0.26 | | | | | | | | |
| 31 | 4.4 | 9.1 | 4.4 | 9.1 | Gunsight Pass | 34 | 5.3 | 2.0 | 9.2 | 12.1 | 0.14 | 0.20 | | | | | | | | |
| 32 | 5.5 | 11.2 | 5.5 | 11.2 | Gunsight Pass | 34 | 5.5 | 2.0 | 9.9 | 13.0 | 0.16 | 0.22 | | | | | | | | |
| 34 | 2.4 | 5.0 | 2.4 | 5.0 | Outlook Ridge | 34 | sag | 2.5 | 22.0 | 34.0 | 0.50 | 0.88 | 14 | Prop | 1.00 | 1.00 | 14.1 | 32.6 | 0.0 | 0.0 |
| 35 | 1.6 | 3.3 | 14.0 | 30.8 | Outlook Ridge | 34 | sag | 3.3 | 17.0 | 28.4 | 0.50 | 0.88 | 14 | Prop | 1.00 | 1.00 | 14.1 | 32.6 | 0.0 | 0.0 |
| JRDP2 | 20.0 | 41.1 | 20.0 | 41.1 | Portillo Place | 34 | 4.0 | 2.0 | 17.1 | 22.4 | 0.30 | 0.41 | 16 | Prop | 0.54 | 0.47 | 14.7 | 22.7 | 5.3 | 18.4 |
| 40 | 6.6 | 13.7 | 6.6 | 13.7 | Gunsight Pass | 34 | sag | 3.3 | 10.1 | 16.1 | 0.27 | 0.47 | 15 | Prop | 1.00 | 1.00 | 6.8 | 13.7 | 0.0 | 0.0 |
| 41 | 0.8 | 1.6 | 0.8 | 1.6 | Gunsight Pass | 34 | 1.0 | 2.0 | 6.5 | 8.5 | 0.09 | 0.13 | | | | | | | | |
| 42 | 1.5 | 3.2 | 1.5 | 3.2 | Gunsight Pass | 34 | 1.1 | 2.0 | 8.3 | 10.9 | 0.13 | 0.18 | | | | | | | | |
| 43 | 3.5 | 7.2 | 3.5 | 7.2 | Horsetheif Falls | 34 | 1.2 | 2.0 | 11.2 | 14.6 | 0.18 | 0.25 | | | | | | | | |
| 44 | 1.6 | 3.2 | 1.6 | 3.2 | Horsetheif Falls | 34 | 1.6 | 2.0 | 7.8 | 10.2 | 0.12 | 0.16 | | | | | | | | |
| 45 | 2.2 | 4.5 | 2.2 | 4.5 | Edgemont Ranch | 34 | 1.2 | 2.0 | 9.3 | 12.2 | 0.15 | 0.20 | | | | | | | | |
| 46 | 2.3 | 4.7 | 2.3 | 4.7 | Edgemont Ranch | 34 | sag | 3.3 | 4.4 | 7.7 | 0.08 | 0.19 | 15 | Prop | 1.00 | 1.00 | 2.4 | 4.7 | 0.0 | 0.0 |
| 47 | 3.5 | 7.2 | 3.5 | 7.2 | Edgemont Ranch | 34 | sag | 3.3 | 6.2 | 10.7 | 0.14 | 0.29 | 15 | Prop | 1.00 | 1.00 | 3.6 | 7.4 | 0.0 | 0.0 |
| 50 | 3.7 | 7.5 | 3.7 | 7.5 | New Notch Trail | 34 | sag | 2.0 | 17.5 | 28.5 | 0.31 | 0.53 | 5 | Prop | 1.00 | 1.00 | 3.7 | 7.5 | 0.0 | 0.0 |
| 51 | 8.1 | 17.9 | 8.1 | 17.9 | | | | | | | | | | | | | | | | |
| Design Points: | | | | | | | | | | | | | | | | | | | | |
| 21 | 10.7 | 21.9 | 10.7 | 21.9 | Gunsight Pass | 34 | sag | 2.5 | 17.6 | 24.0 | 0.39 | 0.55 | 15 | Prop | 1.00 | 0.78 | 10.7 | 17.1 | 0.0 | 4.8 |
| 32 | 17.6 | 36.1 | 17.6 | 36.1 | Outlook Ridge | 34 | 2.5 | 2.0 | 17.8 | 23.3 | 0.32 | 0.43 | | | | | | | | |
| 34 | 37.3 | 76.7 | 26.5 | 60.1 | Outlook Ridge | 34 | sag | 2.5 | 22.0 | 34.0 | 0.50 | 0.88 | 14 | Prop | 0.53 | 0.54 | 14.1 | 32.6 | 12.4 | 27.6 |
| 41 | 7.4 | 15.2 | 7.4 | 15.2 | Edgemont Ranch | 34 | 1.3 | 2.0 | 14.5 | 19.1 | 0.25 | 0.34 | | | | | | | | |
| 44 | 6.3 | 12.9 | 6.3 | 12.9 | Edgemont Ranch | 34 | 1.3 | 2.0 | 13.7 | 17.9 | 0.23 | 0.32 | | | | | | | | |
| 45 | 8.0 | 16.4 | 8.0 | 16.4 | Edgemont Ranch | 34 | 1.3 | 2.0 | 15.0 | 19.6 | 0.26 | 0.35 | | | | | | | | |
| 46 | 9.9 | 20.3 | 9.9 | 20.3 | Edgemont Ranch | 34 | sag | 4.0 | 11.3 | 17.5 | 0.37 | 0.62 | 15 | Prop | 1.00 | 1.00 | 10.0 | 20.3 | 0.0 | 0.0 |
| 47 | 9.4 | 19.3 | 9.4 | 19.3 | Edgemont Ranch | 34 | sag | 4.0 | 11.0 | 17.0 | 0.36 | 0.60 | 15 | Prop | 1.00 | 1.00 | 9.7 | 19.3 | 0.0 | 0.0 |
| 51A | 18.5 | 37.9 | 18.5 | 37.9 | | | | | | | | | | | | | | | | |
| 51B | 15.2 | 31.5 | 15.2 | 31.5 | | | | | | | | | | | | | | | | |
| 51C | 38.7 | 79.5 | 38.7 | 79.5 | | | | | | | | | | | | | | | | |
| 51 | 74.1 | 152.9 | 74.1 | 152.9 | | | | | | | | | | | | | | | | |

Notes: 1) Flow spread T is from formula on page 7-6 in the DCM. T=(((Q*n*Sx)/(.56*S^.5))^.375)/Sx

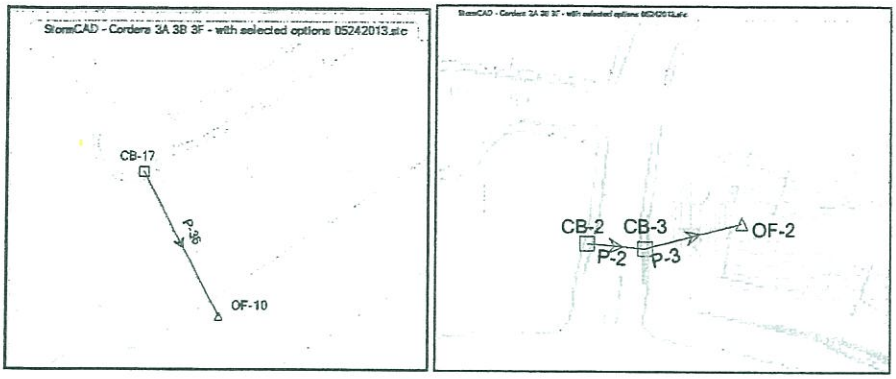
2) Depth at edge of pan is from formula at the top of Figure 7-9 in the DCM. Dw=Sx(T-2)

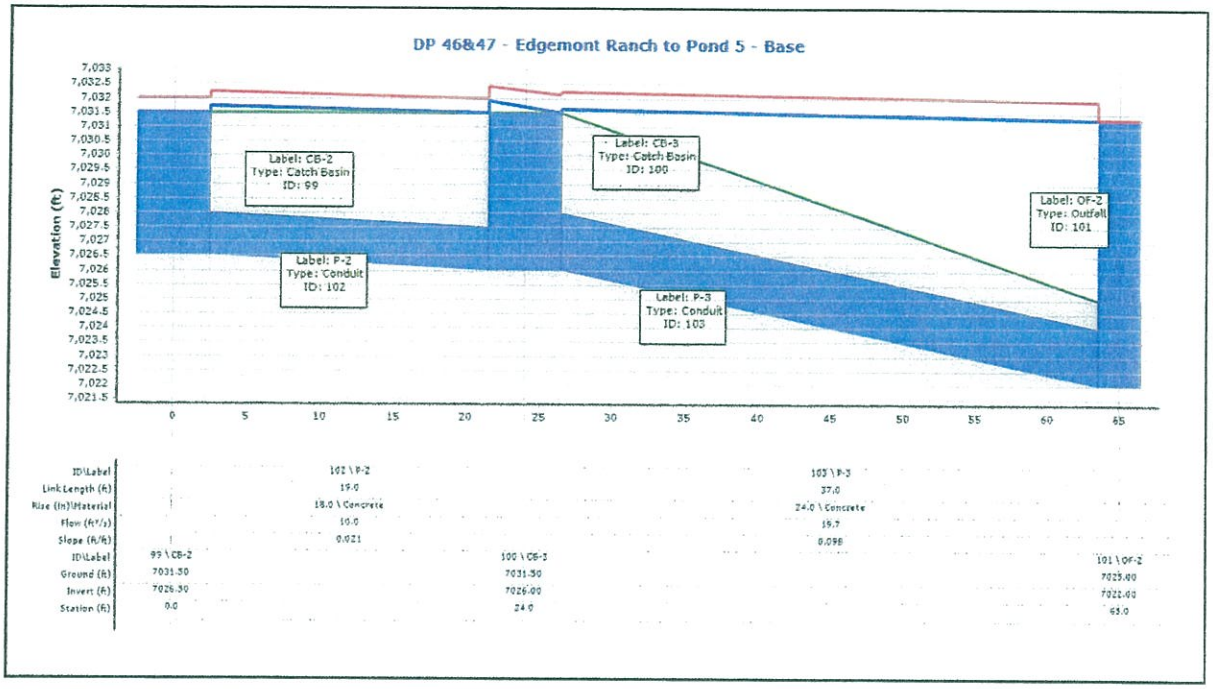
3) Ratio of flow pick-up from on-grade inlets is determined from Figure 7-9 in the DCM plus additional inlet flow from a compound section per Fig. 7-10.

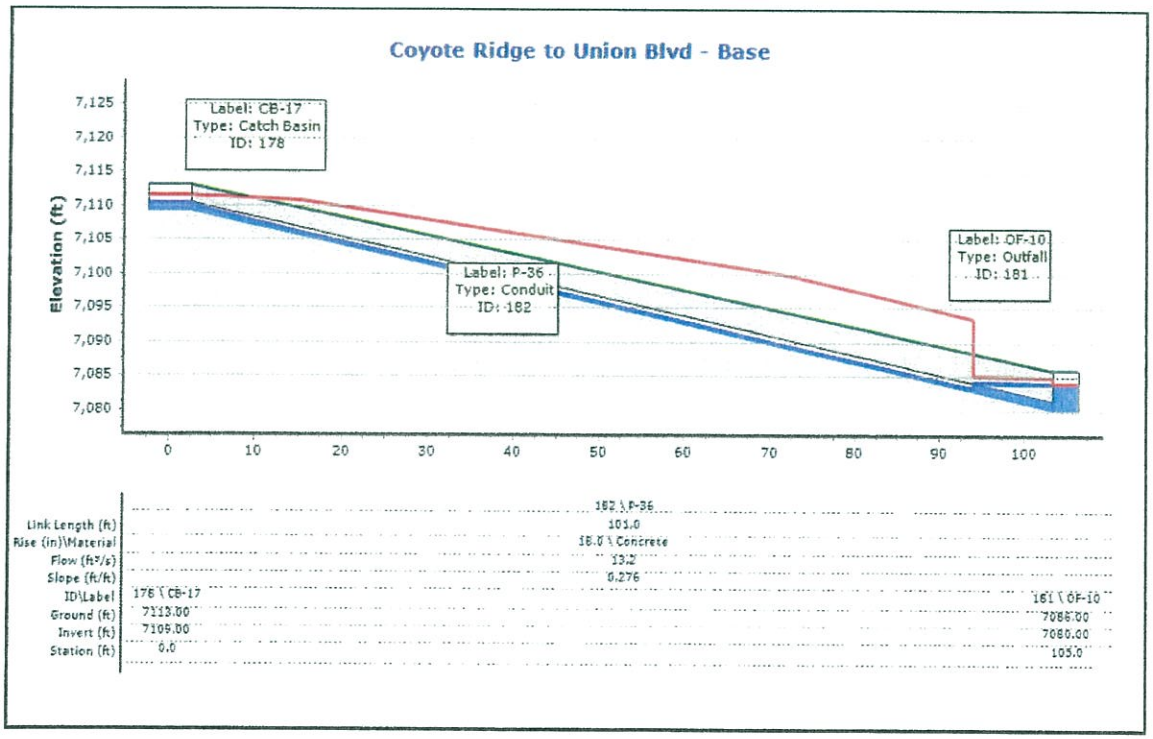
4) The capacity of curb opening inlets in a sag location is determined from formulas in Figure 7-11 in the DCM.

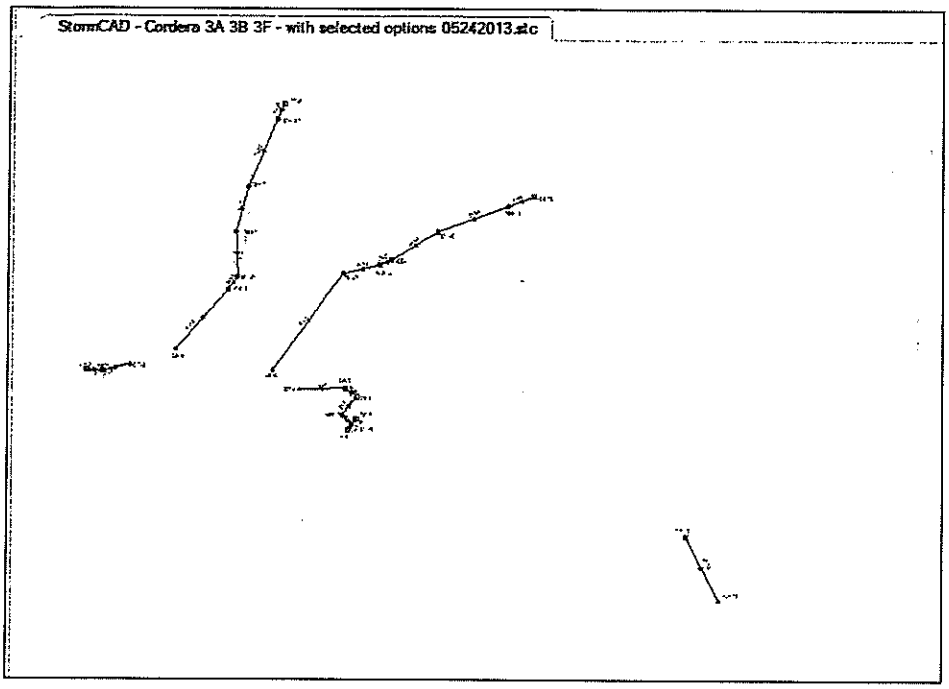
5) For sag condition inlets, the "flow pickup" column represents allowable inlet capacity, which may exceed actual flows.

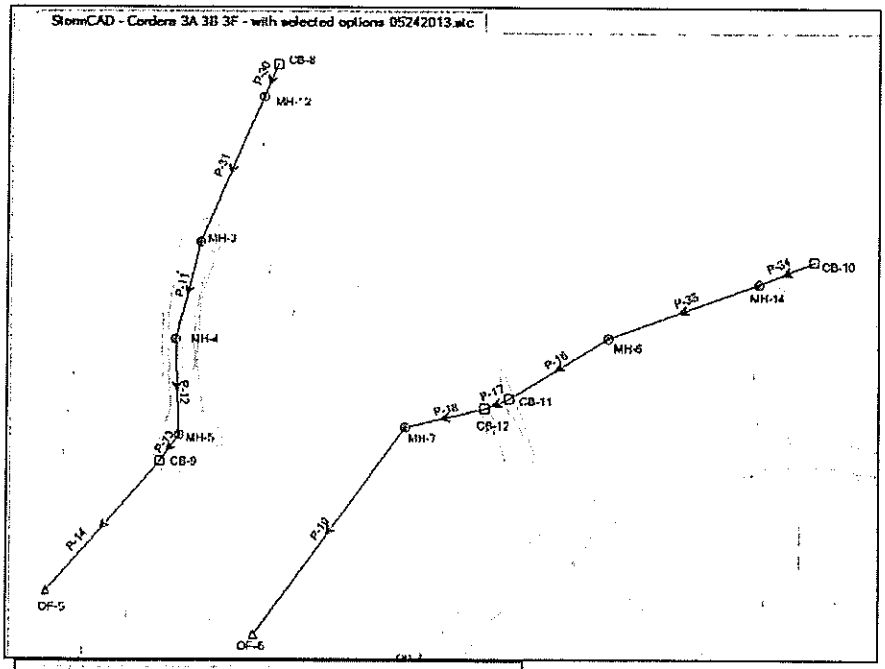
# Cordera - StormCAD Profiles:
## 5/28/2013

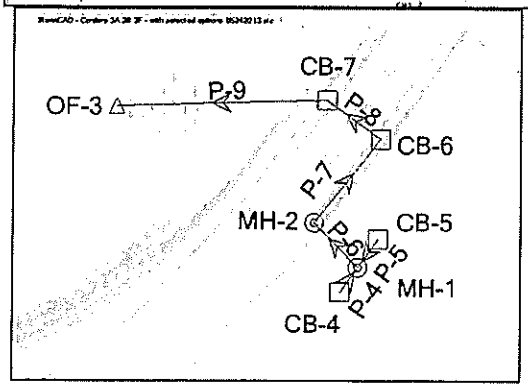


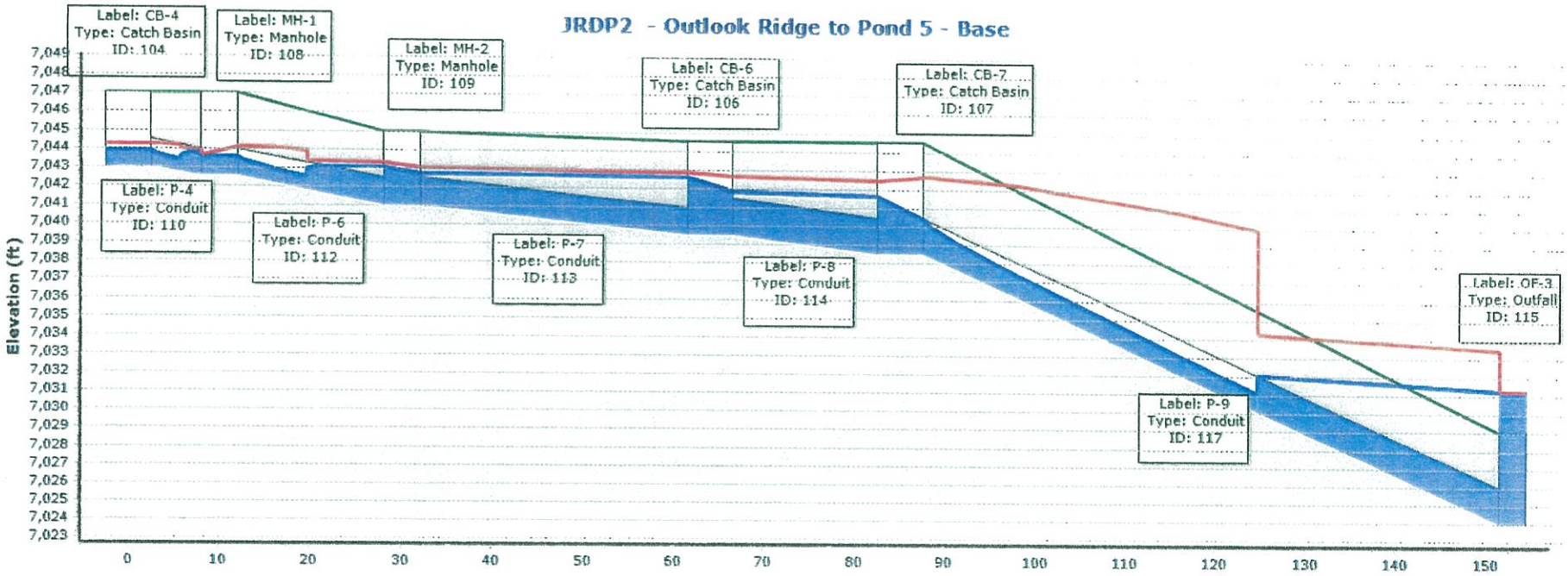




StormCAD - Cordera 3A 3B 3F - with selected options 05242013.stc

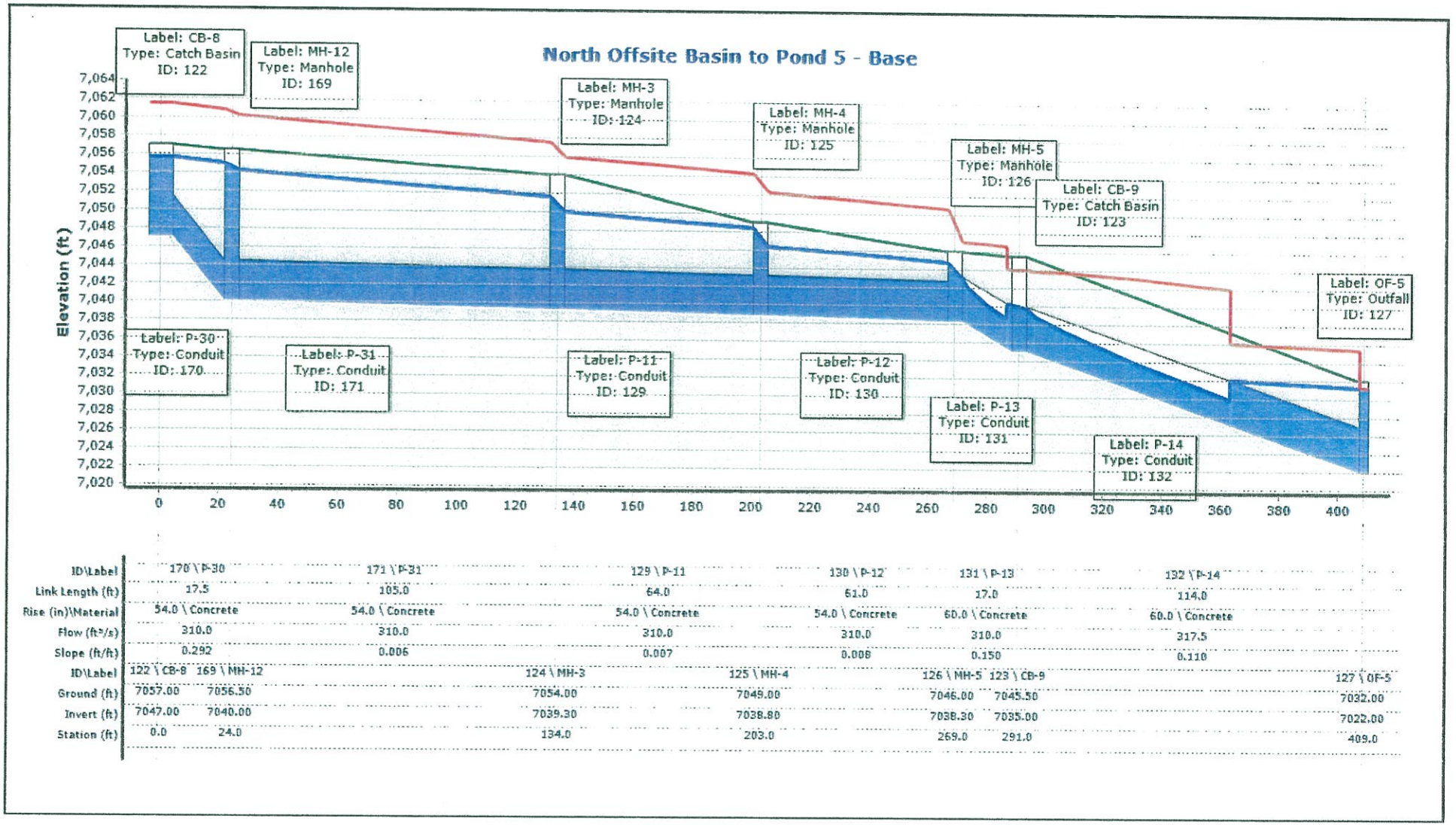

StormCAD - Cordera 3A 3B 3F - with selected options 05242013.stc
CB-8
P-20
MH-2
P-21
MH-3
P-11
MH-4
P-12
MH-5
P-13
CB-9
P-14
OF-5
P-10
OF-6
MH-7
P-18
CB-12
P-17
CB-11
P-16
MH-6
P-35
MH-14
P-34
CB-10


CB-7
OF-3
P-9
P-8
CB-6
P-7
MH-2
CB-5
P-6
P-5
P-4
MH-1
CB-4

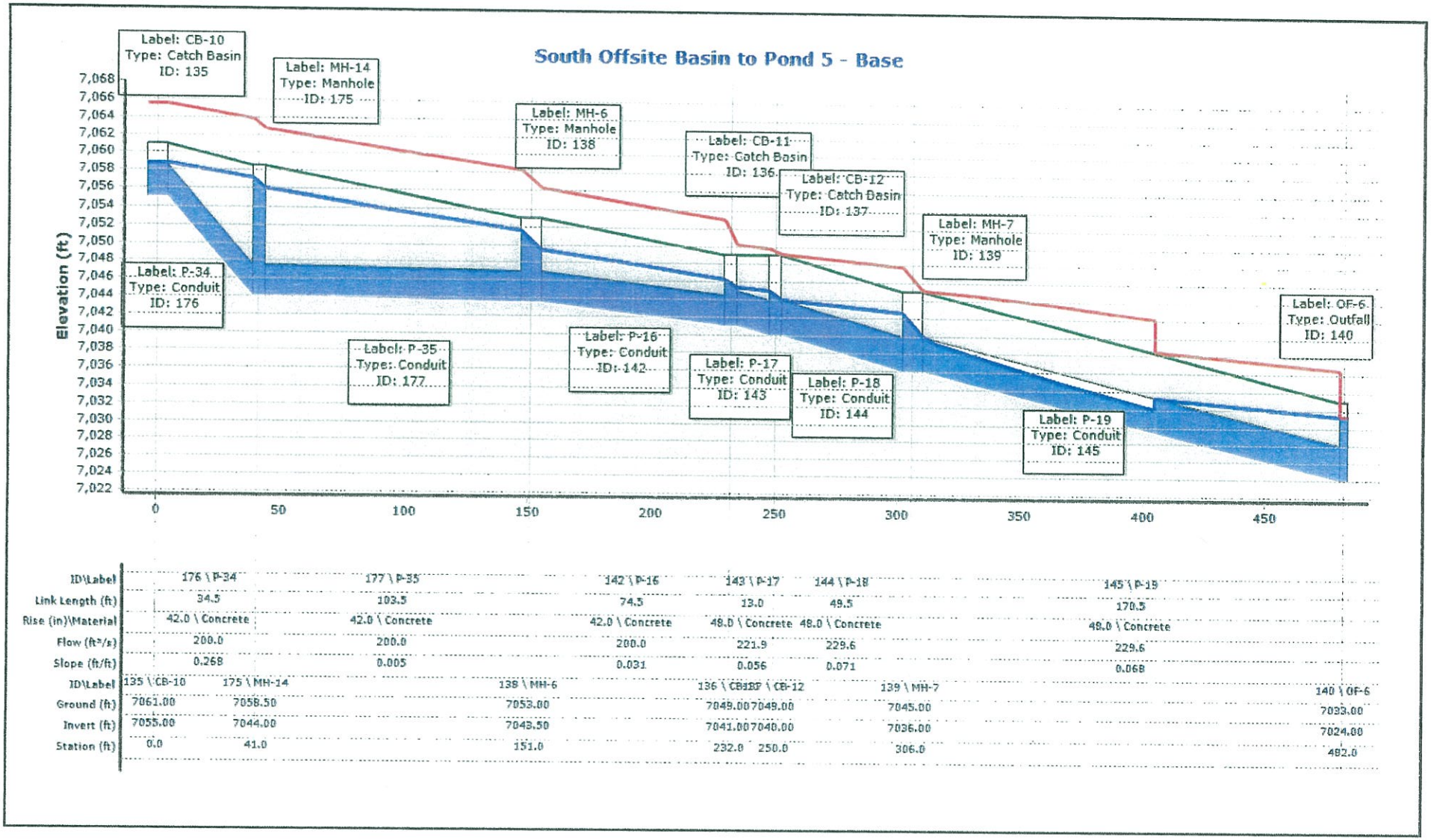



| ID\Label | 110 \ P-4 | 112 \ P-6 | 113 \ P-7 | 114 \ P-8 | 117 \ P-9 |
|---|---|---|---|---|---|
| Link Length (ft) | 5.5 | 16.0 | 29.5 | 16.0 | 64.0 |
| Rise (in)\Material | 18.0 \ Concrete | 18.0 \ Concrete | 18.0 \ Concrete | 24.0 \ Concrete | 24.0 \ Concrete |
| Flow (ft³/s) | 5.4 | 8.0 | 8.0 | 22.5 | 37.2 |
| Slope (ft/ft) | 0.050 | 0.075 | 0.044 | 0.048 | 0.213 |

| ID\Label | 104 \ CB-4 | 109 \ MH-1 | 109 \ MH-2 | 106 \ CB-6 | 107 \ CB-7 | 115 \ OF-3 |
|---|---|---|---|---|---|---|
| Ground (ft) | 7047.00 | 7047.00 | 7045.00 | 7044.50 | 7044.50 | 7029.00 |
| Invert (ft) | 7043.00 | 7042.50 | 7041.00 | 7039.50 | 7038.50 | 7024.00 |
| Station (ft) | 0.0 | 10.0 | 30.0 | 64.0 | 85.0 | 153.0 |




| ID\Label | 170 \ P-30 | | 171 \ P-31 | | 129 \ P-11 | | 130 \ P-12 | 131 \ P-13 | | 132 \ P-14 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Link Length (ft) | 17.5 | | 105.0 | | 64.0 | | 61.0 | 17.0 | | 114.0 | | |
| Rise (in)\Material | 54.0 \ Concrete | | 54.0 \ Concrete | | 54.0 \ Concrete | | 54.0 \ Concrete | 60.0 \ Concrete | | 60.0 \ Concrete | | |
| Flow (ft³/s) | 310.0 | | 310.0 | | 310.0 | | 310.0 | 310.0 | | 317.5 | | |
| Slope (ft/ft) | 0.292 | | 0.006 | | 0.007 | | 0.008 | 0.150 | | 0.110 | | |
| ID\Label | 122 \ CB-8 | 169 \ MH-12 | | 124 \ MH-3 | | 125 \ MH-4 | | 126 \ MH-5 | 123 \ CB-9 | | | 127 \ OF-5 |
| Ground (ft) | 7057.00 | 7056.50 | | 7054.00 | | 7049.00 | | 7046.00 | 7045.50 | | | 7032.00 |
| Invert (ft) | 7047.00 | 7040.00 | | 7039.30 | | 7038.80 | | 7038.30 | 7035.00 | | | 7022.00 |
| Station (ft) | 0.0 | 24.0 | | 134.0 | | 203.0 | | 269.0 | 291.0 | | | 409.0 |



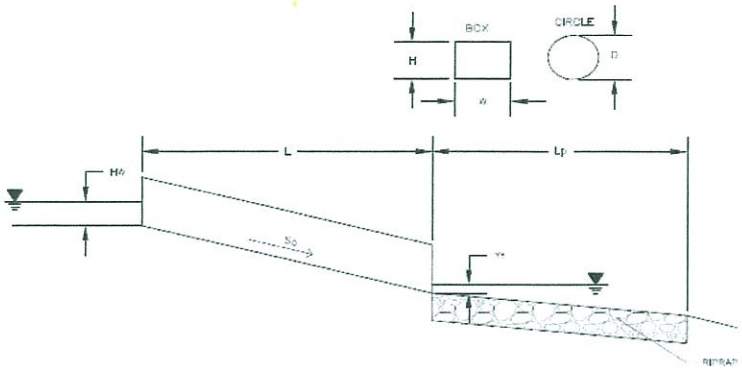

| ID\Label | 176 \ P-34 | 177 \ P-35 | 142 \ P-16 | 143 \ P-17 | 144 \ P-18 | 145 \ P-19 |
|---|---|---|---|---|---|---|
| Link Length (ft) | 34.5 | 103.5 | 74.5 | 13.0 | 49.5 | 170.5 |
| Rise (in)\Material | 42.0 \ Concrete | 42.0 \ Concrete | 42.0 \ Concrete | 48.0 \ Concrete | 48.0 \ Concrete | 48.0 \ Concrete |
| Flow (ft³/s) | 200.0 | 200.0 | 200.0 | 221.9 | 229.6 | 229.6 |
| Slope (ft/ft) | 0.268 | 0.005 | 0.031 | 0.056 | 0.071 | 0.068 |

| ID\Label | 135 \ CB-10 | 175 \ MH-14 | 138 \ MH-6 | 136 \ CB-11 | 137 \ CB-12 | 139 \ MH-7 | 140 \ OF-6 |
|---|---|---|---|---|---|---|---|
| Ground (ft) | 7061.00 | 7058.50 | 7053.00 | 7049.00 | 7049.00 | 7045.00 | 7033.00 |
| Invert (ft) | 7055.00 | 7044.00 | 7043.50 | 7041.00 | 7040.00 | 7036.00 | 7024.00 |
| Station (ft) | 0.0 | 41.0 | 151.0 | 232.0 | 250.0 | 306.0 | 482.0 |

# Determination of Culvert Headwater and Outlet Protection

Project: Blue cells are for user data entry

Basin ID: Green cells are calculated values




**Soil Type:**
Choose One:
- (●) Sandy
- ( ) Non-Sandy

## Design Information (Input):

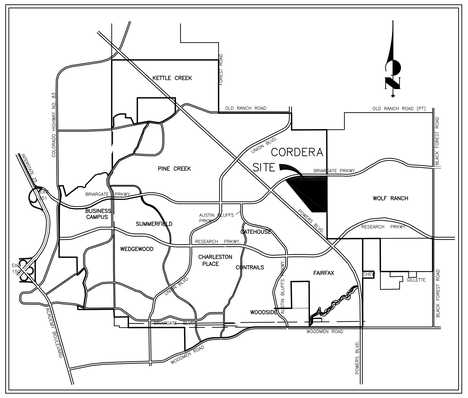
| | | | |
|---|---|---|---|
| Design Discharge | Q = | 172.8 | cfs |
| **Circular Culvert:** | | | |
| Barrel Diameter in Inches | D = | 72 | inches |
| Inlet Edge Type (Choose from pull-down list) | | Square End with Headwall | |
| **Box Culvert:** | | OR | |
| Barrel Height (Rise) in Feet | Height (Rise) = | | ft. |
| Barrel Width (Span) in Feet | Width (Span) = | | ft. |
| Inlet Edge Type (Choose from pull-down list) | | 1 : 1 Bevel w/ Headwall | |
| Number of Barrels | No = | 1 | |
| Inlet Elevation | Elev IN = | 7022 | ft |
| Outlet Elevation **OR** Slope | Elev OUT = | 7014 | ft |
| Culvert Length | L = | 356.35 | ft |
| Mannings number | n = | 0.012 | |
| Bend Loss Coefficient | $k_b$ = | 0 | |
| Exit Loss Coefficient | $k_x$ = | 1 | |
| Tailwater Surface Elevation | $Y_t$ = | | ft. |

## Required Protection (Output):

| | | | |
|---|---|---|---|
| Tailwater Surface Height | $Y_t$ = | 2.40 | ft |
| Max Allowable Channel Velocity | V = | 5.00 | ft/s |
| Flow Area at Max Channel Velocity | $A_t$ = | 34.56 | $ft^2$ |
| Culvert Cross Sectional Area Available | A = | 28.27 | $ft^2$ |
| Entrance Loss Coefficient | $k_e$ = | 0.50 | |
| Friction Loss Coefficient | $k_f$ = | 0.87 | |
| Sum of All Losses Coefficients | $k_c$ = | 2.37 | ft |
| Culvert Normal Depth | $Y_n$ = | 2.05 | ft |
| Culvert Critical Depth | $Y_c$ = | 3.58 | ft |
| Tailwater Depth for Design | d = | 4.79 | ft |
| Adjusted Diameter **OR** Adjusted Rise | $D_a$ = | 4.02 | ft |
| Expansion Factor | 1/(2*tan(Θ)) = | 6.70 | |
| Flow/Diameter$^{1.5}$ **OR** Flow/(Rise*Span)$^{0.5}$ | Q/D^1.5 = | 11.76 | $ft^{1.5}/s$ |
| Tailwater/Diameter **OR** Tailwater/Rise | Yt/D = | 0.40 | |
| Inlet Control Headwater | $HW_I$ = | 5.40 | ft |
| Outlet Control Headwater | $HW_O$ = | -1.26 | ft |
| **Design Headwater Elevation** | **HW =** | 7,027.40 | ft |
| **Headwater/Diameter OR Headwater/Rise Ratio** | **HW/D =** | 0.90 | |
| Minimum Theoretical Riprap Size | $d_{50}$ = | 10 | in |
| Nominal Riprap Size | $d_{50}$ = | 12 | in |
| **UDFCD Riprap Type** | **Type =** | M | |
| **Length of Protection** | $L_p$ = | 50 | ft |

# ***APPENDIX C***

## *DRAINAGE BASIN MAPS*




VICINITY MAP:

N.T.S.

SUB-BASIN DATA SUMMARY
EXISTING CONDITIONS

| BASIN ID | AREA (AC) | PEAK RUNOFF Q(5) (CFS) | PEAK RUNOFF Q(100) (CFS) |
|---|---|---|---|
| CE1 | 44.00 | 5.3 | 37.8 |
| CE2 | 60.99 | 8.7 | 60.3 |
| CE3 | 67.86 | 7.5 | 53.5 |
| CE4 | 26.96 | 4.2 | 28.8 |
| A1 | 116.50 | 13.5 | 96.3 |
| A2 | 70.40 | 9.5 | 67.6 |
| A3 | 84.50 | 11.8 | 82.8 |
| | | | |
| PE1 | 32.97 | 4.3 | 30.5 |
| PE2 | 110.91 | 13.8 | 98.5 |
| PE3 | 99.00 | 9.0 | 63.4 |
| PE4 | 139.46 | 14.4 | 102.5 |
| PE5 | 111.99 | 15.8 | 110.7 |
| PE6 | 123.76 | 24.1 | 151.0 |
| PE7 | 134.33 | 14.5 | 103.4 |
| PE8 | 73.16 | 8.6 | 61.3 |

SUB-BASIN DATA SUMMARY
EXISTING CONDITIONS

| DESIGN POINT | PEAK RUNOFF Q(5) (CFS) | PEAK RUNOFF Q(100) (CFS) |
|---|---|---|
| C1 | 9.8 | 85.5 |
| C2 | 16.2 | 138.0 |
| C3 | 42.0 | 362.9 |
| DPA | 27.4 | 225.6 |
| | | |
| P1 | 13.9 | 119.0 |
| P2 | 34.9 | 291.0 |
| P3 | 9.0 | 63.4 |
| P4 | 38.0 | 244.9 |
| P5 | 45.7 | 304.2 |

LEGEND

- FILING LIMITS
- DRAINAGE BASIN BOUNDARY
- 6520 PROPOSED CONTOUR
- 6520 EXISTING CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- DRAINAGE CHANNEL
- PROPOSED TYPE 'R' INLET
- PROPOSED TYPE I OR II MANHOLE
- PROPOSED FLOW DIRECTION ARROW
- DP DESIGN POINT
- TAG DESIGN SEGMENT
- C-13 5.19 AC 0.42 BASIN DESIGNATION
- "C" COEFFICIENT (100 YR)
- BASIN AREA (ACRES)



GRAPHIC SCALE

400 0 200 400 800 1600

( IN FEET )
1 inch = 400 ft.

2003-07-17stormsewer plan
x-powers-fromURS
28715320H
x-cordera
x-pinecreek16
x-topo
x-base

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | REVISIONS | |

NAME: S:\Cordera Filing 3\DWG\DP03_F1-EXISTING.dwg
PCP: Matrix.ctb
PLOT DATE: Oct 16, 2013 9:37am

BENCHMARK DATA(ELEV.) 6975.68
(DATUM) ASSUMED
(DESCRIPTION/LOCATION) THE NW SIDE OF FH #104 AT THE INT. OF BRIARGATE PKWY AND BRAINARD DR

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

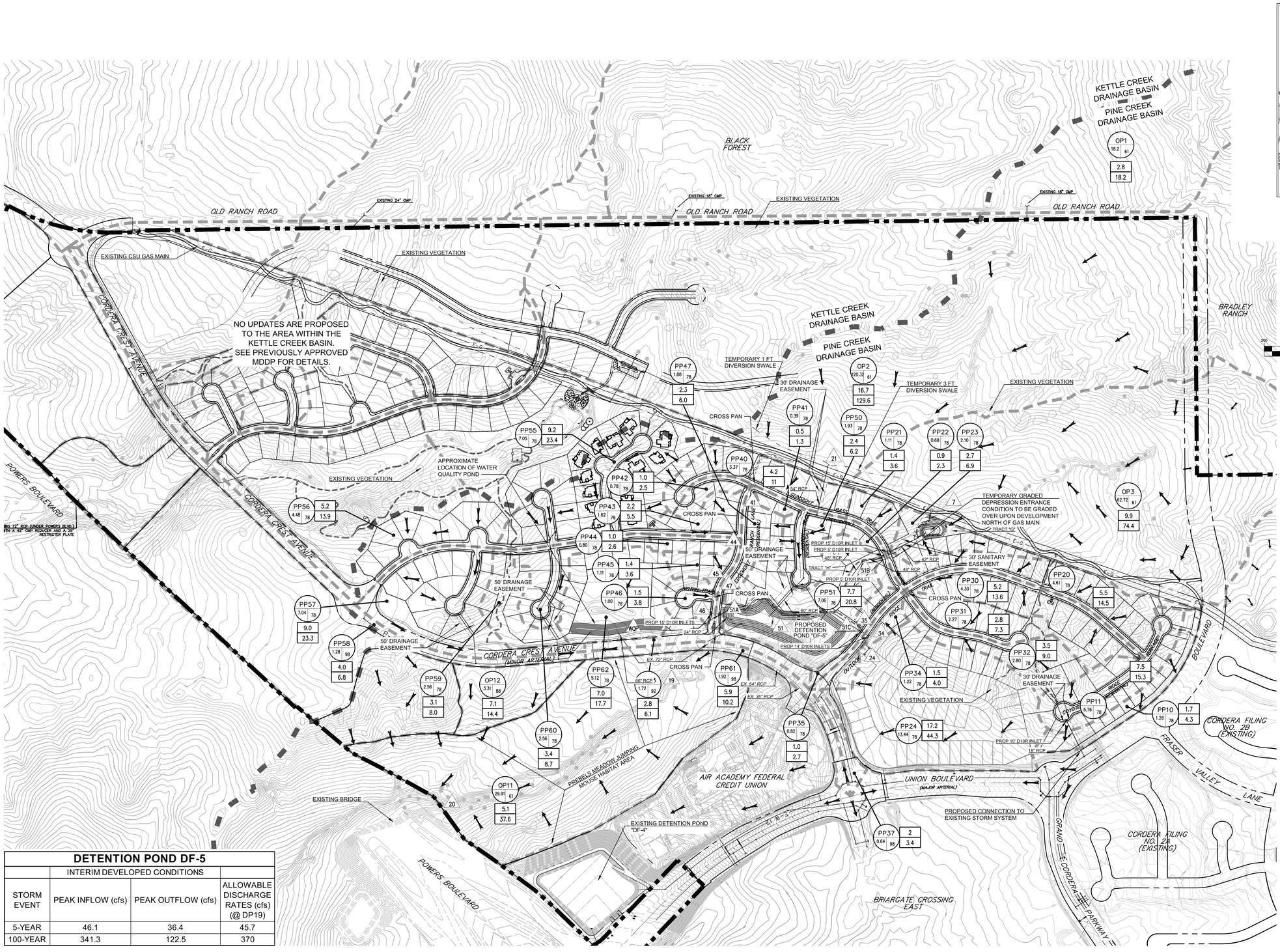
Matrix Design Group, Inc.
Integrated Design Solutions 2925 Professional Place, Suite 202
Colorado Springs, CO 80904
Phone 719-575-0100
Fax 719-575-0208

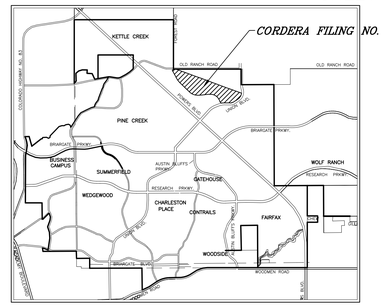
# CORDERA FILING NO. 1

## DRAINAGE REPORT

## EXISTING DRAINAGE MAP

| | | | | |
|---|---|---|---|---|
| DESIGNED BY: | RGG | SCALE | DATE ISSUED: | NOV. 2003 |
| DRAWN BY: | BPK | HORIZ: 1"=400' | SHEET NO. 3 OF 4 SHEETS | DP01 |
| CHECKED BY: | | VERT: N/A | | |




VICINITY MAP

N

NORTH

N.T.S.

GRAPHIC SCALE

200 0 100 200 400

( IN FEET )
1 inch = 200 ft.

## PINE CREEK SUMMARY TABLE - INTERIM

| DESIGN POINT ID | Q(5) (CFS) | Q(100) (CFS) | SUB-BASINS |
|---|---|---|---|
| J1-J6 | (NOT USED) | | |
| J7 | 9.9 | 74.3 | OP3 |
| J8-J18 | (NOT USED) | | |
| J19 | 37.6 | 169.7 | JWQP, J51 |
| J20 | 43.1 | 182.6 | J19, OP11, OP12 |
| J21 | 18.5 | 142.1 | OP1, OP2 |
| J22-J33 | (NOT USED) | | |
| J34 | 31.8 | 81.2 | PP24, PP30, PP31, PP32, PP33, PP34, PP37 |
| J35 | 33.4 | 84.9 | PP35 |
| J36-J45 | (NOT USED) | | |
| J46 | 7 | 17.9 | PP42, PP43, PP44, PP45, PP46 |
| J47 | 13.9 | 36.1 | PP40, PP41, PP47 |
| J48-J50 | (NOT USED) | | |
| J51 | 68.9 | 122.5 | J51A, J51B, J51C, |
| J51A | 13.9 | 36.1 | J45, J46, J47 |
| J51B | 13.2 | 91.1 | PP20, PP21, PP22, PP23, J7 |
| J51C | 33.4 | 84.9 | J34, J35 |
| JWQP | 46.1 | 90.1 | PP55, PP56, PP57, PP58, PP59, PP60, PP61, PP62 |

NOTES:
THIS PLAN IS AN UPDATE TO THE PREVIOUSLY APPROVED CORDERA FILING NO. 3 MDDP FULLY DEVELOPED PLAN. THE UPDATES ONLY APPLY TO THE PORTIONS OF THE FILING WITHIN THE PINE CREEK DRAINAGE BASIN SHOWN ON THIS PLAN. THE PORTIONS OF CORDERA FILING NO. 3 LOCATED WITHIN THE KETTLE CREEK BASIN ARE NOT UPDATED WITH THE APPROVAL OF THIS PLAN. REFER TO THE PREVIOUSLY APPROVED MDDP PLAN FOR THE KETTLE CREEK BASIN AREA.

EXCEPT SHOWN HEREON, ALL LOTS SHALL HAVE 5' SIDE YARD AND 7' REAR YARD UTILITY AND DRAINAGE EASEMENTS.

TRACTS "G" AND "H" ARE FOR DRAINAGE, UTILITY, AND LANDSCAPING PURPOSES AND WILL BE OWNED BY THE CITY OF COLORADO SPRINGS.

## DETENTION POND DF-5

| | INTERIM DEVELOPED CONDITIONS | | |
|---|---|---|---|
| STORM EVENT | PEAK INFLOW (cfs) | PEAK OUTFLOW (cfs) | ALLOWABLE DISCHARGE RATES (cfs) (@ DP19) |
| 5-YEAR | 46.1 | 36.4 | 45.7 |
| 100-YEAR | 341.3 | 122.5 | 370 |

## LEGEND

- SUB-BASIN BOUNDARY
- 4900 EXISTING CONTOUR
- FLOW DIRECTION
- FLOODPLAIN WAY
- LOT LINE
- x DESIGN POINT
- X (x.xx / x.xx) SUB BASIN DESIGNATION
- SUB BASIN CURVE NUMBER
- SUB BASIN AREA (AC.)
- 0.0 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 0.0 100-YEAR STORM EVENT PEAK FLOW (CFS)

x-title-drainage
x-vege
x-baseF3
x-ex-topo
x-topo-union gcordera
x-util-union gc
x-utilF3
x-basins
x-topo
x-base
x-topoF2B
X-topoF2A
Proposed ponds 5 and WQP
X-Base F3-interim

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

REVISIONS

NAME: S:\Cordera Filing 3\DWG\DR02.dwg
PCP: Matrix.ctb
PLOT DATE: Oct 16, 2013 9:43am

BENCHMARK DATA(ELEV.) _____
(DATUM) _____
(DESCRIPTION/LOCATION) _____

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SEAL

*PRELIMINARY*
*THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE*

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

Matrix Design Group, Inc.
Integrated Design Solutions
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

# CORDERA FILING NO. 3

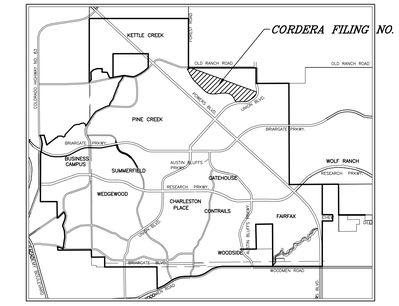
## MASTER DEVELOPMENT DRAINAGE PLAN
## AMMENDMENT #1
## INTERIM DEVELOPED DRAINAGE MAP

| | | | | | |
|---|---|---|---|---|---|
| DESIGNED BY: | BAS | SCALE | | DATE ISSUED: | OCTOBER 2007 |
| DRAWN BY: | BAS | HORIZ: | 1"=200' | | |
| CHECKED BY: | RGG | VERT: | N/A | SHEET NO. | OF SHEETS |

DP02

N

GRAPHIC SCALE
200 0 100 200 400
( IN FEET )
1 inch = 200 ft.




VICINITY MAP

NORTH
N.T.S.

## PINE CREEK SUMMARY TABLE - FULLY DEVELOPED

| DESIGN POINT ID | Q(5) (CFS) | Q(100) (CFS) | SUB-BASINS |
|---|---|---|---|
| J1-J6 | (NOT USED) | | |
| J7 | 43.3 | 189 | PP-13, OP3, OP8, OP9 |
| J8-J18 | (NOT USED) | | |
| J19 | 40.3 | 247.1 | JWQP, J51 |
| J20 | 45.1 | 279.1 | J19, OP11, OP12 |
| J21 | 65.6 | 270.4 | PP1, OP1, OP2, OP6, OP7 |
| J22-J33 | (NOT USED) | | |
| J34 | 31.8 | 81.2 | PP24, PP30, PP31, PP32, PP33, PP34, PP37 |
| J35 | 33.4 | 84.9 | PP35 |
| J36-J45 | (NOT USED) | | |
| J46 | 7 | 17.9 | PP42, PP43, PP44, PP45, PP46 |
| J47 | 13.9 | 36.1 | PP40, PP41, PP47 |
| J48-J50 | (NOT USED) | | |
| J51 | 173.9 | 597.9 | J51A, J51B, J51C, |
| J51A | 13.9 | 36.1 | J45, J46, J47 |
| J51B | 53.6 | 628.8 | PP20, PP21, PP22, PP23, J7 |
| J51C | 33.4 | 84.9 | J34, J35 |
| JWQP | 43 | 106.3 | PP55, PP56, PP57, PP58, PP59, PP60, PP61, PP62 |

NOTE:
1. PP-13 SHOWN ON THIS PLAN IS A COMBINATION OFS PP13, PP13a, PP3 AS SHOWN IN THE MODEL SCHEMATIC.
2. PP-1 SHOWN ON THIS PLAN IS A COMBINATION OF PP1, PP2, PP4, PP5, PP6, PP7, PP8, PP9, PP11a, AND PP12 AS SHOWN IN THE MODEL SCHEMATIC.

NOTES:
THIS PLAN IS AN UPDATE TO THE PREVIOUSLY APPROVED CORDERA FILING NO. 3 MDDP FULLY DEVELOPED PLAN. THE UPDATES ONLY APPLY TO THE PORTIONS OF THE FILING WITHIN THE PINE CREEK DRAINAGE BASIN SHOWN ON THIS PLAN. THE PORTIONS OF CORDERA FILING NO. 3 LOCATED WITHIN THE KETTLE CREEK BASIN ARE NOT UPDATED WITH THE APPROVAL OF THIS PLAN. REFER TO THE PREVIOUSLY APPROVED MDDP PLAN FOR THE KETTLE CREEK BASIN AREA.

## LEGEND

- SUB-BASIN BOUNDARY
- 4900 EXISTING CONTOUR
- FLOW DIRECTION
- FLOODPLAIN WAY
- LOT LINE
- x DESIGN POINT
- X / x.xx / x.xx SUB BASIN DESIGNATION
- SUB BASIN CURVE NUMBER
- SUB BASIN AREA (AC.)
- 0.0 / 0.0 5-YEAR STORM EVENT PEAK FLOW (CFS); 100-YEAR STORM EVENT PEAK FLOW (CFS)
- CORDERA EXTENTS

## DETENTION POND DF-5

| | FULLY DEVELOPED CONDITIONS | | |
|---|---|---|---|
| STORM EVENT | PEAK INFLOW (cfs) | PEAK OUTFLOW (cfs) | ALLOWABLE DISCHARGE RATES (cfs) (@ DP19) |
| 5-YEAR | 173.9 | 13 | 45.7 |
| 100-YEAR | 628.4 | 172.8 | 370 |

x-ex-topo
x-topoF2B
x-baseF3
x-utilF3
x-util-union gc
x-utilF2B
x-utilF2A
x-utilF2P1
X-topoF2A
x-topo-union gc
x-vege
x-basins
x-title-drainage
x-topo
x-base
Proposed ponds 5 and WQP

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

REVISIONS

NAME: S:\Cordera Filing 3\DWG\DR03-PP-Analysis.dwg
PCP: Matrix.ctb
PLOT DATE: Oct 16, 2013 9:46am

BENCHMARK DATA(ELEV.)
(DATUM)
(DESCRIPTION/LOCATION)

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Fax 719-575-0208

# CORDERA FILING NO. 3

## MASTER DEVELOPMENT DRAINAGE PLAN
## AMMENDMENT #1
## FULLY DEVELOPED DRAINAGE MAP

| | | | | | |
|---|---|---|---|---|---|
| DESIGNED BY: | BAS | SCALE | DATE ISSUED: | OCTOBER 2007 | DP03 |
| DRAWN BY: | BAS | HORIZ: 1"=200' | SHEET NO. | OF SHEETS | |
| CHECKED BY: | RGG | VERT: N/A | | | |

GRAPHIC SCALE
100 0 100 100 200
( IN FEET )
1 inch = 100 ft.

KETTLE CREEK DRAINAGE BASIN
PINE CREEK DRAINAGE BASIN

FUTURE CORDERA FILING
FUTURE CORDERA 3B FILING
FUTURE CORDERA 3D FILING
CORDERA FILING 3A
CORDERA FILING 3F
CORDERA FILING 3C
CORDERA FILING NO. 2B
AIR ACADEMY FEDERAL CREDIT UNION

OP2 20.32 63 | 16.7 | 129.6
OP3 67.72 61 | 9.9 | 74.4
PP20 4.61 78 | 5.5 | 14.5
PP23 2.10 78 | 2.7 | 6.9
PP30 4.30 78 | 5.2 | 13.6
PP31 2.27 78 | 2.8 | 7.3
PP32 2.8 78 | 3.5 | 9.0
PP11 5.76 78 | 7.5 | 19.1
PP10 1.28 78 | 1.7 | 4.3
PP35 0.82 78 | 1.0 | 2.7
PP51A 10.50 78 | 11.5 | 30.8
PP34 1.22 78 | 1.5 | 4.0
PP24 13.44 78 | 17.2 | 44.3
PP37 0.64 98 | 2 | 3.4
PP61 1.92 98 | 1.8 | 5.3
OP11 29.91 61 | 5.1 | 37.6

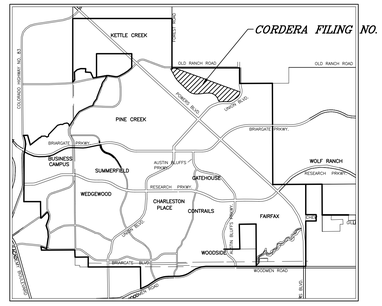
TEMPORARY 2 FT DIVERSION SWALE
TEMPORARY GRADED DEPRESSION ENTRANCE CONDITION TO BE GRADED OVER UPON DEVELOPMENT NORTH OF GAS MAIN
PROPOSED 42" RCP W/ FES TO BE REMOVED UPON FUTURE DEVELOPMENT
EXISTING CSU GAS MAIN
START OF TEMPORARY 1.5 FT DIVERSION SWALE
30 FT DRAINAGE EASEMENT
PROPOSED 15' D10R SUMP INLET
PROPOSED 5' D10R SUMP INLET
CROSS PAN
END OF TEMPORARY 1.5 FT DIVERSION SWALE
PROPOSED 20' D10R SUMP INLETS WITH 24" RCP
PROPOSED FILING 3C INLETS WITH 8" RCP
PROPOSED DETENTION POND "DF-5"
OUTLET STRUCTURE
REMOVE & CAP
48" FES
24" FES
EXISTING VEGETATION
PROPOSED 10' D10R SUMP INLET WITH 18" RCP
EXISTING 10' D10R INLET
PROPOSED CONNECTION TO EXISTING STORM SEWER SYSTEM
EXISTING 36" RCP W/ FES
EXISTING 5' D10R SUMP INLETS
EXISTING 5' D10R INLETS
EXISTING STORM OUTLET FOR DETENTION POND "DF-5"
PREBLES MEADOW JUMPING MOUSE HABITAT AREA

42" RCP
48" RCP
24" RCP
EX 24" RCP
EX 48" RCP
EX 60" RCP
EX 42" RCP
EX 54" RCP
EX 18" RCP
EX 72" RCP
EX 36" RCP
EX 24" RCP

UNION BOULEVARD
FRASER VALLEY LANE
CORDERA CREST AVENUE
GRAND CORDERA PARKWAY

| DETENTION POND DF-5 (SCS CALCULATIONS) | | | |
|---|---|---|---|
| | FILINGS 3A &3F DEVELOPED CONDITIONS | | |
| STORM EVENT | PEAK INFLOW (cfs) | PEAK OUTFLOW (cfs) | ALLOWABLE DISCHARGE RATES (cfs) (@ DP19) |
| 5-YEAR | 52.7 | 2.1 | 45.7 |
| 100-YEAR | 188.7 | 28 | 370 |

SLOPE VARIES
EROSION CONTROL LINER SEE REPORT FOR SHEAR STRENGTH REQUIREMENTS
3:1
DEPTH
DIVERSION SWALE (TYP.)
NTS




VICINITY MAP
NORTH
N.T.S.

## LEGEND

- SUB-BASIN BOUNDARY
- 4900 — EXISTING CONTOUR
- PHASE 3A FILING LIMITS
- TEMPORARY DIVERSION SWALE
- LOT LINE
- X — DESIGN POINT
- XX / 99.99 / 0.99 — SUB BASIN DESIGNATION / SUB BASIN CURVE NUMBER / SUB BASIN AREA (AC.)
- 0.0 / 0.0 — 5-YEAR / 100-YEAR STORM EVENT PEAK FLOW (CFS)
- FLOW DIRECTION

## PINE CREEK SUMMARY TABLE - FILING 3A AND 3F

| DESIGN POINT ID | Q(5) (CFS) | Q(100) (CFS) | SUB-BASINS |
|---|---|---|---|
| J7 | 9.9 | 74.3 | OP3 |
| J19 | 1.2 | 44.6 | J51 |
| J34 | 23.5 | 68.7 | PP24, PP30, PP31, PP32, PP33, PP34, PP37 |
| J35 | 24.8 | 71.9 | PP35 |
| J51 | 37.9 | 167.2 | J51B, J51C, |
| J51B | 11.9 | 85.8 | PP20, PP23, J7 |
| J51C | 24.8 | 71.9 | J34, J35 |

NOTE:
ALL FLOWS SHOWN ON THIS PLAN ARE FROM THE HMS FILING 3A & 3F FINAL CONDITIONS MODEL.

x-ex-topo
x-vege
x-topoF2B
x-title-drainage
x-topo-union gcordera
x-topo
X-BASE
X-topoF2A
X-Base F3
x-utilF3
x-basins 3A & 3F
x-utilF2B
x-util-union gc
Proposed ponds 5 and WQ
X-Base F3A3F

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

REVISIONS

NAME: S:\Cordera Filing 3\DWG\DR04-F3A.dwg
PCP: Matrix.ctb
PLOT DATE: Oct 16, 2013 9:50am

BENCHMARK DATA(ELEV.)
(DATUM)
(DESCRIPTION/LOCATION)

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Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

# CORDERA FILING NO. 3

## FULLY DEVELOPED DRAINAGE MAP FILING 3A (AMMENDMENT #1) AND 3F SCS CALCULATIONS

DESIGNED BY: ZDH
DRAWN BY: ZDH
CHECKED BY: EDE
SCALE HORIZ: 1"=100' VERT: N/A
DATE ISSUED: OCTOBER 2007
SHEET NO. OF SHEETS

DP04

GRAPHIC SCALE
100 0 100 100 200
( IN FEET )
1 inch = 100 ft.

KETTLE CREEK DRAINAGE BASIN
PINE CREEK DRAINAGE BASIN

FUTURE CORDERA FILING
FUTURE CORDERA 3B FILING
FUTURE CORDERA 3D FILING
CORDERA FILING 3A
CORDERA FILING 3F
CORDERA FILING 3C
CORDERA FILING NO. 2B

OP2 20.32 63 | JRDP2 10.56 52/60 | 16.7 | 129.6 (SCS)
OP3 67.72 61 | JRDP2 10.56 52/60 | 9.9 | 74.4 (SCS)
7 (SCS)
21 (SCS)
19 (SCS)
PP23 2.10 38/47 | 3.2 | 7.0
PP20 4.61 52/60 | 8.6 | 17.6
PP30 4.30 52/60 | 8.1 | 16.6
PP31 2.27 52/60 | 4.4 | 9.1
PP32 2.8 52/60 | 5.5 | 11.2
PP11 5.76 52/60 | 6.4 | 13.2
PP10 1.28 52/60 | 4.3 | 8.8
PP35 0.82 52/60 | 1.6 | 3.3
PP34 1.22 52/60 | 2.4 | 5.0
JRDP2 10.56 52/60 | 20.0 | 41.1

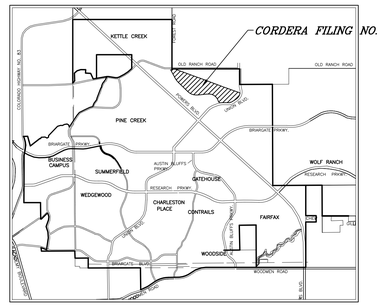
TEMPORARY 2 FT DIVERSION SWALE
TEMPORARY GRADED DEPRESSION ENTRANCE CONDITION TO BE GRADED OVER UPON DEVELOPMENT NORTH OF GAS MAIN
PROPOSED 42" RCP W/ FES TO BE REMOVED UPON FUTURE DEVELOPMENT
EXISTING CSU GAS MAIN
START OF TEMPORARY 1.5 FT DIVERSION SWALE
30 FT DRAINAGE EASEMENT
PROPOSED 15' D10R SUMP INLET
PROPOSED 5' D10R SUMP INLET
CROSS PAN
END OF TEMPORARY 1.5 FT DIVERSION SWALE
PROPOSED DETENTION POND "DF-5"
OUTLET STRUCTURE
REMOVE & CAP
48" FES
24" FES
EXISTING VEGETATION
PROPOSED 10' D10R SUMP INLET WITH 18" RCP
PROPOSED 20' D10R SUMP INLETS WITH 24" RCP
PROPOSED FILING 3C INLETS WITH 18" RCP
EXISTING 10' D10R INLET
PROPOSED CONNECTION TO EXISTING STORM SEWER SYSTEM
EXISTING 36" RCP W/ FES
EXISTING 5' D10R SUMP INLETS
EXISTING 5' D10R INLETS
EXISTING STORM OUTLET FOR DETENTION POND "DF-5"
PREBLES MEADOW JUMPING MOUSE HABITAT AREA
AIR ACADEMY FEDERAL CREDIT UNION

42" RCP
48" RCP
24" RCP
EX 24" RCP
EX 48" RCP
EX 60" RCP
EX 72" RCP
EX 54" RCP
EX 42" RCP
EX 18" RCP
EX 36" RCP
EX 24" RCP

UNION BOULEVARD
FRASER VALLEY LANE
CORDERA CREST AVENUE
GRAND CORDERA PARKWAY

| DETENTION POND DF-5 (SCS CALCULATIONS) | | | |
|---|---|---|---|
| | FILINGS 3A &3F DEVELOPED CONDITIONS | | |
| STORM EVENT | PEAK INFLOW (cfs) | PEAK OUTFLOW (cfs) | ALLOWABLE DISCHARGE RATES (cfs) (@ DP19) |
| 5-YEAR | 52.7 | 2.1 | 45.7 |
| 100-YEAR | 188.7 | 28 | 370 |

SLOPE VARIES — SLOPE VARIES
EROSION CONTROL LINER SEE REPORT FOR SHEAR STRENGTH REQUIREMENTS
3:1 3:1
DEPTH
DIVERSION SWALE (TYP.)
NTS




VICINITY MAP
NORTH
N.T.S.

## LEGEND

- SUB-BASIN BOUNDARY
- 4900 — EXISTING CONTOUR
- PHASE 3A FILING LIMITS
- TEMPORARY DIVERSION SWALE
- LOT LINE
- X — DESIGN POINT
- XX / 99.99 / 0.99 — SUB BASIN DESIGNATION / SUB BASIN RUNOFF COEFFICIENT(S)
- SUB BASIN AREA (AC.)
- 0.0 — 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 0.0 — 100-YEAR STORM EVENT PEAK FLOW (CFS)
- FLOW DIRECTION

## PINE CREEK SUMMARY TABLE - FILING 3A AND 3F

| DESIGN POINT ID | Q(5) (CFS) | Q(100) (CFS) | SUB-BASINS |
|---|---|---|---|
| 21 | 10.7 | 21.9 | 20, 21 |
| 32 | 17.6 | 36.1 | 30, 31, 32 |
| 34 | 37.3 | 76.7 | 30, 31, 32, 34 & JRDP2 |

NOTE:
UNLESS OTHERWISE NOTED, ALL FLOWS SHOWN ON THIS PLAN ARE FROM RATIONAL METHOD CALCULATIONS.

x-ex-topo
x-vege
x-topoF2B
x-title-drainage
x-topo-union gcordera
x-topo
X-BASE
X-topoF2A
x-utilF3
x-basins 3A & 3F
x-utilF2B
x-util-union gc
Proposed ponds 5 and WQ
X-Base F3A3F

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | REVISIONS | |

NAME: S:\Cordera Filing 3\DWG\DR05.dwg
PCP: Matrix.ctb
PLOT DATE: Oct 16, 2013 9:52am

BENCHMARK DATA(ELEV.)
(DATUM)
(DESCRIPTION/LOCATION)

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Fax 719-575-0208

CORDERA FILING NO. 3

FULLY DEVELOPED DRAINAGE MAP
FILING 3A (AMMENDMENT #1) AND 3F
RATIONAL METHOD CALCULATIONS

DESIGNED BY: ZDH
DRAWN BY: ZDH
CHECKED BY: EDE
SCALE
HORIZ: 1"=100'
VERT: N/A
DATE ISSUED: OCTOBER 2007
SHEET NO. OF SHEETS

DP05