

**MASTER DEVELOPMENT DRAINAGE PLAN
FOR
NORTH FORK AT BRIARGATE**

Prepared For:

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**MASTER DEVELOPMENT DRAINAGE PLAN
FOR
NORTH FORK AT BRIARGATE
DRAINAGE REPORT STATEMENT**

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. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

Steve Rossoll
Steve Rossoll, Colorado P.E. # 34655
For and On Behalf of JR Engineering, LLC



DEVELOPER'S STATEMENT:

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

Business Name: High Valley Land Company, Inc.
By: Thomas Taylor
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CITY OF COLORADO SPRINGS ONLY:

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

[Signature] For the City Engineer
Date 6/11/14

Conditions: CDOT acknowledgment necessary.

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TABLE OF CONTENTS

I.	Introduction	1
II.	General Location and Description.....	1
III.	Historic Drainage Patterns and Features.....	2
IV.	Drainage Design Criteria	4
V.	Proposed Drainage Plan.....	6
VI.	Drainage and Bridge Fees.....	15
VII.	Conclusions	16
VIII.	References	17

APPENDIX

- A. FIGURES & EXHIBITS
- B. HISTORIC CUHP & SWMM MODELS
- C. PROPOSED CUHP & SWMM MODELS
- D. PRELIMINARY POND CALCULATIONS
- E. HEC-HMS UPDATED DBPS MODEL RESULTS
- F. MAP POCKET

MASTER DEVELOPMENT DRAINAGE PLAN FOR NORTH FORK AT BRIARGATE

I. Introduction

This document is the Master Development Drainage Plan for North Fork at Briargate. The purpose of this document is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site, and to establish a post development drainage concept for the planned manner of development that indicates which types of drainage facilities will be needed and where they will be located. The report will also discuss potential drainage problems associated with the proposed development and will explore solutions to those problems.

II. General Location and Description

North Fork at Briargate is a proposed mixed-use development comprised of single family residential, multifamily residential, an elementary school, and a park site. The property lies near the intersection of Old Ranch Road and Powers Boulevard and is situated in the northern reach of the Briargate Master Plan. The site covers approximately 267 acres. The site is bound on the west by Powers Boulevard, on the east by Howells Road (which coincides with the eastern boundary of the Colorado Springs Township). The southern boundary meets with Old Ranch Road and Pine Creek High School. The northern boundary of the site meets with undeveloped, unplatted property. Further to the north lies Kettle Creek. Please refer to the Vicinity Map located in Appendix A.

As previously mentioned, North Fork at Briargate is a multi-use, phased development. The site will consist primarily of single family residential development. An apartment complex will occupy an 8-acre site on the property, an elementary school will occupy a 11-acre site, and 10 acres of the property will be designated as a park. Thunder Mountain Avenue will be extended to the north and be looped, so as to provide the primary means of access to the majority of the site. Thunder Mountain Avenue, once looped, will also serve to provide the primary means of access for the property to the north. For this reason the roadway has been placed to straddle the northern property line.

Phase 1 of Development for the site will occupy most of the area between Thunder Mountain Avenue (and its extension to the north) and Howells Road, an area of about 71 acres. A 22-acre area that occupies the northeast corner of the North Fork Property will be home to the future Elementary School and Park site. Thunder Mountain Avenue will be improved to the northern extent of proposed Phase 1 improvements. Howells Road meets with the eastern property boundary and also forms the eastern boundary of the Colorado Springs Township. It should be noted that no improvements are proposed for Howells Road, and that the

governing municipality for this development will be the City of Colorado Springs. Phase 1 of Development will be comprised of single family residential development with associated improvements, two proposed detention ponds (one public and one private), and storm drain improvements. Subsequent phasing or a phase plan for North Fork has yet to be developed.

The sites soils are predominantly Peyton-Pring complex and are classified as Hydrologic "Type B" soils. These are classified by the USDA-NRCS soil survey of El Paso County Area, Colorado (CO625). Please refer to the soils map included in Appendix A.

According the FEMA FIRM panel 08041C0507F, dated March 17, 1997, the site lies within Zone X. Zone X is an area determined to be outside the 500-year floodplain. Please refer to the FIRMette included in Appendix A.

III. Historic Drainage Patterns and Features

The North Fork site is situated in the Kettle Creek Watershed. The southeast portion of the site is part of the Old Ranch Road Tributary, which was analyzed with the "Kettle Creek Drainage Basin Old Ranch Road Tributary DBPS & MDDP" by JR Engineering in April of 2001. This study analyzed the portion of the North Fork site that is tributary to Old Ranch Road. This document provides a detailed account of historic drainage patterns and facilities in the area and serves to establish the hydrologic constraints associated with the discharge of runoff from the southern region of the North Fork site. The remainder of the site is directly tributary to Kettle Creek. This area has not been studied as part of any DBPS or MDDP. Therefore, a DBPS is necessary for this portion of Kettle Creek and is currently being completed.

Offsite Basins OS1 ($Q_5=11.2$ cfs, $Q_{100}=33.5$ cfs) and OS2 ($Q_5=4.9$ cfs, $Q_{100}=23.2$ cfs) are currently developed in the county with large single family lots incorporating a large amount of open space. These two basins were identified and studied in the Old Ranch Road Tributary DBPS. Values for their percent impervious were taken from the DBPS and utilized within this report. Historically these basins are conveyed across Howell Road to Design Points 1 and 2 respectively and into Basin H1. Basin H1 ($Q_5=17.2$ cfs, $Q_{100}=75.6$ cfs) is undeveloped. Swales and historic drainageways convey runoff from Howells Road to Design Point 3 where all runoff from the southern portion of the site is combined. From there it is conveyed under Old Ranch Road via an existing 48" RCP culvert. Runoff from Thunder Mountain Avenue is collected in inlets at the intersection of Thunder Mountain and Old Ranch Road. Collected flows are then piped east to the 48" culvert. Flows from Thunder Mountain are combined with flows from H1 and Design Point 3 in the culvert. The culvert outfalls at Design Point 3a and from there runoff is conveyed via historic drainage paths to Powers Boulevard.

Several basins within the Historic analysis are equivalent to basins from the Proposed conditions model of the DBPS. Basin D11 is equivalent to Basin H1, Basin OS1 is equivalent to Basin D12, and Basin OS2 is equivalent to Basin D10.

The DBPS for the Old Ranch Road Tributary identified flow rates (DP5) for the release under Old Ranch Road at what is now Design Point 3a. These flow rates will need to be maintained during the future condition. The values are as follows in Table 1. It is important to note that the values identified in the DBPS are for full build out. This means that Basin D11 of the DBPS utilizes a 29.6% impervious value for the portion of the site that drains to Old Ranch Road. The 29.6% impervious was an assumed developed percent impervious from the DBPS. These flow rates are given as a maximum not to exceed value. The values were used to check the proposed design to ensure that it conforms to the DBPS. The values are greater than historic conditions for the Old Ranch Road Basin due to the development within the county and the planned development of Basin D11.

Table 1: DBPS Allowable Flow Rates at Old Ranch Road (Historic DP 3a)

Storm	DBPS Flow Rates (cfs)
2-yr	19
5-yr	40
10-yr	58
25-yr	88
50-yr	110
100-yr	133

The difference between the numbers located in Table 1 and the values located within Table 2 is the assumed development of Basin D11.

Offsite Basin OS3 ($Q_5=35.1$ cfs, $Q_{100}=175.8$ cfs), which is currently developed in the county with large single family lots and incorporates a large amount of open space, is collected in an unnamed tributary and is conveyed via a natural drainageway to Howells Road at Design Point 4. From there it is piped underneath the roadway and back into a natural drainageway. Runoff from Design Point 4 combines at Design Point 5 along Powers Boulevard with the runoff from Basin H2. Basin H2 ($Q_5=8.8$ cfs, $Q_{100}=51.9$ cfs) is currently undeveloped.

Offsite Basin OS4 ($Q_5=4.2$ cfs, $Q_{100}=19.2$ cfs), which is currently developed in the county with large single family lots and incorporates a large amount of open space, sheet flows to Howells Road where it will cross the road into Basin H3 ($Q_5=31.9$ cfs, $Q_{100}=188.5$ cfs), which is currently undeveloped, at Design Point 6. Flows from the two basins combine and are conveyed through Basin H3 via natural drainageways to Design Point 7. Runoff from Basin OS5 ($Q_5=8.2$ cfs, $Q_{100}=43.3$ cfs) is collected in a natural drainageway and is conveyed onto the site to Design Point 7 at Powers Boulevard.

All runoff from Design Points 5 and 7 collect against berms that were constructed as a part of the Powers Boulevard improvements. These berms prevent runoff, from the site, from entering into CDOT ROW. Runoff is partially retained within shallow holes and the remainder is conveyed along the berms to the north where it outfalls into Kettle Creek. There may be small amounts of runoff that do make it into the Powers storm system, but they are miniscule in the overall basin picture.

Table 2 below is a summary of the total outflow from the site at the three site outfall locations as determined by the CUHP and SWMM modeling performed with this report.

Table 2: Historic Flow Rates (cfs) at Site Outfalls From SWMM Model

Storm	Old Ranch Road (DP 3a)	NE Corner (DP 8)	Powers Road (DP 7a)
2-yr	10.3	0.7	7.2
5-yr	32.4	4.9	68.8
10-yr	46.7	7.7	119.1
25-yr	95.0	16.6	306.4
50-yr	117.1	20.6	384.7
100-yr	129.8	23.0	445.3

There are a couple of differences between the results in Table 1 and the DP3a results in Table 2. Basin H1, which is the equivalent to D11 from the DBPS, was modified to historic rather than developed percent impervious. Additionally H1 was made larger to accommodate the west side of Thunder Mountain Avenue, when in the DBPS it was part of Basin D19. The routing presented in this report is an accurate representation of the existing site conditions. The additional reason for the difference is the different methods utilized in the hydrology and routing. The DBPS was developed utilizing the SCS method in HEC-1 (now HEC-HMS) while this report utilizes CUHP and SWMM.

After field investigation the culverts under Howells Road have been identified. There is no known culvert at Howells Road and Old Ranch Road. Runoff from Basin OS1 and Old Ranch Road cross directly over the roadway and back into a small roadside ditch west of Howells Road. There is an 18” CMP culvert located at Design Point 2. This culvert is crushed on the east side of Howells Road and is completely silted in on the west side. There is an 18” RCP culvert located at Ridgeway Lane and Howells Road. This culvert is almost entirely silted in. There is another 18” CMP culvert located just north of the Ridgeway Lane intersection that is also silted in. There is a 36” CMP culvert located at Design Point 4. This culvert is mostly open on the east side of Howells Road, while the west end is completely silted in. The culvert at Design Point 6 is an 18” CMP that is approximately half full of silt. All culverts under Howells Road would be deemed non-functioning at this point in time.

IV. Drainage Design Criteria

A. Regulations

Storm Drainage analysis and design criteria for this project were taken from the City of Colorado Springs/El Paso County “Drainage Criteria Manual” (DCM) and the “Urban Storm Drainage Criteria Manual” by Urban Drainage and Flood Control District (USDCM).

B. Development Criteria Reference and Constraints

As was previously mentioned the southern portion of the site has been studied by the “Kettle Creek Drainage Basin Old Ranch Road Tributary DBPS & MDDP” by JR Engineering in April of 2001. This report will be the constraining report for the southern portion of the site. There are no other existing MDDPs or DBPS studies for the northern portion of the site. A DBPS is currently being created to study the upstream portion of Kettle Creek.

C. Hydrologic Criteria

The Urban Drainage and Flood Control Districts CUHP (Colorado Urban Hydrograph Program) program was utilized in conjunction with EPA SWMM to define and route the hydrology for the site. CUHP version 1.4.0 was used to define the basin hydrology. EPA SWMM version 5.0.22 was used to route the basins and size the detention ponds.

USACE HEC-HMS v3.5 was utilized to verify that the revised basin limits and release from the site do not negatively affect the downstream system. The DBPS HEC-1 model was imported into HEC-HMS for this analysis.

The 2, 5, 10, 25, 50, and 100 year storms were modeled for the site. One hour point rainfall data for the storm events is identified in the chart below.

Storm	Rainfall (in)
2-year	1.09
5-year	1.50
10-year	1.75
25-year	2.25
50-year	2.55
100-year	2.67

Table 3: 1-hr Point Rainfall Data

D. Hydraulic Criteria

The EPA’s SWMM 5.0 was utilized to route runoff through the site to the proposed ponds. SWMM was then utilized in the sizing of the pond volume as well as the outlet structure release rates.

The Urban Drainage and Flood Control Districts UD_BMP spreadsheet was utilized in the sizing of the full spectrum detention volumes (EURV) and sizing the EURV release rates.

The USAFA has established that the full spectrum of storms be mitigated to historic rates prior to release onto USAFA property.

V. Proposed Drainage Plan

A. General Description

Historically there are three outfall locations from the site: Old Ranch Road, Kettle Creek at the Northeast corner of the site, and Kettle Creek at Powers Boulevard at the Northwest corner of the site. These three locations will remain. The historic basin paths will, for the most part, remain as well. The exception to this is Basin OS3. Basin OS3 will be routed to the south towards Old Ranch Road rather than to Powers Boulevard. This will be discussed more in subsequent portions of this report. There are three proposed detention ponds on the site. Their purpose is to provide water quality and detain developed runoff to at or below historic rates. The ponds will be discussed more in depth later in the report.

B. Proposed Basins

The descriptions of the offsite basins OS1-OS5 will remain the same as discussed in the historic section of the report. They are offsite fully developed basins that are routed through the site. They will remain in their historic state after development. However, their flow patterns through the site will change.

Basin OS1 ($Q_5=11.5$ cfs, $Q_{100}=33.7$ cfs) is collected in roadside ditches that convey runoff to the intersection of Howells Road and Old Ranch Road. At the intersection, the ditches dump flow directly into the street and it is conveyed west across Howells Road where it will be routed via curb & gutter proposed with the work being done by Matrix Design to the intersection of Old Ranch Road and Thunder Mountain Avenue at Design Point 1. Matrix is currently in the process of designing the widening of Old Ranch Road from Thunder Mountain Avenue to the future Cordera Crest. It is currently unknown the exact drainage pattern for this basin and how it will be collected into the system. This will be provided by Matrix with the design for Old Ranch Road. It has been assumed that runoff from the basin will be collected via inlets and discharged into the existing 48" culvert under Old Ranch Road. It will bypass the Old Ranch Road Pond (ORR Pond) and be collected at Design Point 4a.

Basin OS2 ($Q_5=5.0$ cfs, $Q_{100}=23.2$ cfs) is collected at Design Point 2. Field investigations turned up a crushed and silted in culvert at Design Point 2. In its current state it is believed that a minimal flow will actually go through the culvert. In its cleaned installed state the culvert would most likely pass the minor storm, but not the major storm. It is therefore assumed that flows overtop the road. From there it will be allowed to sheet flow, or be conveyed via shallow swales to the street inside the property where it will be conveyed via the street to the proposed sump inlets adjacent to the ORR Pond at Design Point 4.

Basin OS3 ($Q_5=35.3$ cfs, $Q_{100}=175.8$ cfs) is collected at Design Point 3 which is an existing 36" culvert under Howells Road. Basin OS3 will have a significant change in its flow routing. Historically the offsite basin was routed to the north around Pine Creek High School. This was not preferred due to the length and size of pipe that would be required to convey the historic basin to the Powers Pond. Since all of the outfalls from the site are

tributary to Kettle Creek there is no basin transfer to route runoff in a different direction. The only concern is to ensure that historic or planned flow rates are not exceeded at the planned outfall location (DP 4a). Basin OS3 will therefore be conveyed to the south into Howells Pond. Howells Pond has been designed to detain the OS3 basin such that the infrastructure through the site is limited. The release from Howells Pond will then flow through the site bypassing the ORR Pond and outfalling directly into the existing Old Ranch Road culvert. The Howells Pond volume, release rates, and emergency overflow will be discussed later in the report.

Basin D1 ($Q_5=33.1$ cfs, $Q_{100}=100.5$ cfs) will be developed with single family lots. There are two single family residential (SFR) densities associated with this basin. The eastern portion of the basin is an area that is greater than 1 ac/du, but has been assumed to be 1 ac/du to be conservative. The western portion of the basin is an area that has a density of 1/7 ac/du. A percent impervious has been interpolated from the DCM chart for this density. A composite percent impervious was then calculated for this basin. Runoff from the basin is conveyed via the on-site streets to the sump inlets at Design Point 4. From there runoff will be conveyed into the ORR Pond.

Basin D1a ($Q_5=9.5$ cfs, $Q_{100}=20.5$ cfs) is associated with Thunder Mountain Avenue and collects runoff from the road as well as the backs of the lots on the site. Runoff will be collected at the intersection of Thunder Mountain Avenue and Old Ranch Road in existing 14' D-10-R Inlets. The captured runoff will then be conveyed to the existing 48" culvert at Design Point 4a.

Basin D1b ($Q_5=10.3$ cfs, $Q_{100}=20.2$ cfs) is associated with Old Ranch Road. The basin collects runoff from the developed roadway as well as portions of the lots on the site. Runoff will be collect at the intersection of Thunder Mountain Avenue and Old Ranch Road at Design Point 4a.

Basins OS1, D1b, and D1a will all be collected within Thunder Mountain Avenue and Old Ranch Road and will bypass the ORR Pond and be conveyed directly into the existing 48" culvert under Old Ranch Road at Design Point 4a.

Basin OS4 ($Q_5=4.2$ cfs, $Q_{100}=19.1$ cfs) is collected at Design Point 5. From there it will continue on its historic pattern to a culvert under Howells Road. The culvert outfall will be picked up with a swale and routed to the street and to Design Point 6.

Basin D2 ($Q_5=21.1$ cfs, $Q_{100}=57.5$ cfs) will be developed with single family lots. The density for this basin was calculated in the same fashion as Basin D1. Composite percent impervious calculations have been included. Runoff from the basin will follow the same flow pattern as Basin OS4. It will be street flow to Design Point 6.

Runoff from Basins OS4 and D2 will combine and will be conveyed via surface flow along the extension of Thunder Mountain Avenue to the north and west to Design Point 10 where they will enter sump inlets and outfall into the proposed Powers Pond.

Basin D3 ($Q_5=30.1$ cfs, $Q_{100}=72.1$ cfs) will be developed as a future school and park and is collected at Design Point 7. The percent impervious for the basin has been assumed to be 50% impervious. This is a conservative value as a good portion of the basin will most likely remain pervious as a park. Runoff from the basin will be collected at Design Point 7 and piped under Thunder Mountain Avenue into a proposed channel that will run through the middle of the northern portion of the site. The channel will convey the runoff to Design Point 7A and into the Powers Pond.

Basin D4 ($Q_5=2.6$ cfs, $Q_{100}=11.0$ cfs) is approximately equivalent to Basin H4 from the historic analysis with the exception of its size. A portion of the historic basin along the south was added to proposed basin D3 as it is part of the school site. The basin will remain relatively undeveloped. Basin D4 will become a park site in the future which will maintain a low percent impervious. Runoff from the basin flows offsite at Design Point 20. This is one of the three outfalls from the site. Table 4 below shows a comparison of the historic vs. developed releases from this northeastern outfall location. The change in runoff values is due to the reduction of the basin size from historic to proposed.

Table 4: NE Outfall Historic vs. Proposed Runoff (DP 20)

Storm	Historic (cfs)	Proposed (cfs)
2-yr	0.3	0.3
5-yr	4.5	2.6
10-yr	7.2	3.8
25-yr	16.2	8.0
50-yr	20.2	9.9
100-yr	22.6	11.0

Basin D5 ($Q_5=32.5$ cfs, $Q_{100}=83.1$ cfs) will be developed with single family lots with a density of 1/7 du/ac. Runoff will be surface routed to Design Point 8 and will be conveyed down Thunder Mountain Avenue to the west to Design Point 9.

Basin D6a ($Q_5=17.4$ cfs, $Q_{100}=37.8$ cfs) is planned to be a multifamily residential development. The percent impervious for this basin has been assumed to be 65% in accordance with the Urban Drainage and Flood Control Districts recommendations for multifamily sites. Runoff from the basin will be surface routed to Design Point 9.

Basin D6 ($Q_5=53.7$ cfs, $Q_{100}=131.8$ cfs) will be developed as single family residential lots with a density of 1/7 du/ac. Runoff will be conveyed via the street system to the looped extension of Thunder Mountain Avenue.

Runoff from Basins D5, D6, and D6a will be collected in Thunder Mountain Avenue. Low flows will be allowed to exit the roadway and will be captured in a swale that will parallel the roadway. This swale will be designed to keep velocities very low to create a water quality feature. It will allow for sediment and other pollutants to be removed prior to entering the Powers Pond. Runoff that does not enter the water quality feature will continue down the roadway to Design Point 10 where it will be collected in sump inlets and piped into the Powers Pond. No runoff from the site will be allowed to exit the site into the Powers

Boulevard storm system that is immediately adjacent to the site. There will be no affects to the Powers storm system due to the development of this site.

Basin D7 ($Q_5=41.4$ cfs, $Q_{100}=114.2$ cfs) will be developed with single family lots. The density has been assumed to be approximately 1/7 acres per dwelling unit. Runoff from the basin will be collected in a channel that runs through the basin which will convey runoff from the basin with the runoff from Design Point 7 to the Powers Pond. The channel will be designed to maintain a low velocity so that it can be used as a water quality feature for the site. It will allow for sediment and other pollutants to be removed prior to entering the Powers Pond. The channel will convey flows to Design Point 7a prior to releasing into the Powers Pond. At this point the channel is a concept design only. Depending on the final lot configuration this routing could change. Ownership and maintenance will be decided at the time of the Final Drainage Report.

Basin D8 ($Q_5=57.3$ cfs, $Q_{100}=142.9$ cfs) will be developed with single family lots. The density has been assumed to be approximately 1/7 acres per dwelling unit. Runoff from the basin will be collected in Thunder Mountain Avenue along with runoff from Basins D2 and OS4. Runoff will be conveyed via the roadway to Design Point 10 where it will be collected by sump inlets and piped to the Powers Pond.

Basin OS5 ($Q_5=22.4$ cfs, $Q_{100}=69.7$ cfs) is assumed to be developed as single family residential. Runoff from the basin will be directed into the Powers Pond per historic flow patterns. Powers Pond has been designed to accommodate runoff generated over Basin OS5 since the basin historically drains towards the Powers pond. Runoff from the basin will be routed around on-site lots at the time of development.

C. Detention and Water Quality

There are three ponds on the site: the Howells Pond, Old Ranch Road (ORR) Pond, and the Powers Pond. Both the ORR and Powers Ponds will provide water quality for the site in addition to detention. Since the site lies within a Basin that is ultimately tributary to the Air Force Academy the 2, 5, 10, 25, 50, and 100 year storm events were analyzed for the entire site.

Howells Pond

As was previously discussed basin OS3 historically was routed west towards Powers. To reduce onsite infrastructure the basin will be routed to the south towards Old Ranch Road. The DBPS for the Old Ranch Road Tributary previously studied this area and identified fully developed flow rates for the 48" culvert under Old Ranch Road. To maintain these flow rates at Old Ranch Road, the Howells Pond was introduced to detain flows from Basin OS3. The Howells Pond has been designed with a single stage outlet. A 12" circular orifice mounted over the 18" outfall pipe will suffice to control the release from the pond to a rate that when introduced in series with the ORR Pond is manageable. Table 5 below shows the required volume and the associated release rate for Howells Pond.

Table 5: Howells Pond Volume & Release

Storm	Volume (ac-ft)	Release (cfs)
2-yr	0.11	4.7
5-yr	1.90	8.6
10-yr	3.79	9.8
25-yr	10.28	11.7
50-yr	13.58	12.3
100-yr	15.95	12.7

The release from Howells Pond is piped through the site via an 18” pipe and will tie directly into the existing 48” culvert under Old Ranch Road.

In the event that the Howells Pond outlet becomes clogged and a 100-year rainfall event occurs the pond has adequate volume to fully retain the 100-year event while maintaining approximately 0.5’ of freeboard in the pond. This is due to the significantly reduced release rate from the pond. There will effectively be no emergency overflow from the pond in this scenario.

Howells Pond Effect on Existing System

To ensure that the addition of the runoff from Howells Pond does not have a negative effect on the downstream infrastructure, including pipes and ponds, the HEC-1 model from the DBPS was revised to show the proposed improvements to the site. The original model was imported using HEC-HMS. Once the DBPS model was imported several modifications were made.

1. A basin was added to model Basin OS3. Note that the flow rates from HEC-HMS and CUHP do not match perfectly due to the difference in methods of runoff and rainfall, but are approximately equal.
2. Howells Pond was added to the model and routed to the DBPS Design Point 5 at Old Ranch Road.
3. Basin D11 was updated to match the proposed area and land use.
4. ORR Pond was added with Basin D11 routed into it. The ORR Pond was routed to the DBPS Design Point 5.

The results of the revised model versus the model prepared in the DBPS are included in Table 6 below. Four design points and the pond inflow and outflow are given. Design Point 4 was given as a basis for comparison to ensure that the flow coming in from the east is being routed the same as the DBPS. Design Point 5 was given to show that the flow rates under Old Ranch Road are equivalent or less than the DBPS. Design Point 6 was given to show the effect of the site prior to entering into Powers Boulevard and show that the infrastructure under Powers, as designed by the DBPS, is adequate. Design Point 7 was given to show the effects just outside of Powers Boulevard and that the downstream pipe system is adequately sized for the development of the site. The pond inflow and outflows were given to show that the pond volume will be at or below what was previously designed based upon the total inflow and outflow from the pond.

Table 6: Updated DBPS Model Results

Design Point	DBPS		North Fork Revised		Δ (CFS)
	Q100 (cfs)	Time (hr)	Q100 (cfs)	Time (hr)	
D4	102	6.15	102	6.50	0
D5	133	6.15	109	6.50	-24
D6	323	6.05	259	6.25	-64
D7	567	6.05	505	6.25	-62
Pond E (In)	1079	6.05	1025	6.25	-54
Pond E (Out)	600	6.25	573	6.50	-27

As can be seen at Design Point 4 the flow rates match exactly meaning that the imported model exactly matches the results within the DBPS. Other spot checks were performed, but not included within the report.

As can be seen in the table above the development of the site even with the proposed basin transfer has no negative effect on the system. The addition of the two on site ponds significantly reduces the runoff downstream. The designed volume for the downstream pond, Pond E, will be adequate based on the revised design. All of the existing pipe systems will function properly with the development of the site. The Howells Pond release into the system has no negative effect on the downstream development. That coupled with its ability to fully retain in a clogged scenario mean that the pond presents no risk to downstream development or infrastructure due to the basin transfer.

ORR Pond

The ORR Pond has been designed to provide full spectrum detention. The outlet structure and full spectrum detention volume were designed in accordance to the Urban Drainage and Flood Control Districts standards for Excess Urban Runoff Volume (EURV). The outlet structure will be constructed as a three stage outlet with the EURV volume and release consisting of the first stage, a 25-yr outlet and volume consisting of the second stage, and the 100-year outlet and volume consisting of the third stage.

The EURV portion of the pond, the first stage, will be designed as an extended detention basin (EDB) and includes the water quality capture volume. A perforated steel plate will be designed to release the water quality capture volume over 72 hours. This volume and release will control the 2-year event. The outlet structure will consist of two area inlet type boxes. On the outside of the first box will be the EURV plate. The top of the first box will be set at the elevation that controls the EURV volume.

The second box will be set at an elevation that controls the 25-year volume. Inside the first box will be an orifice plate controlling the 25-year release rate. This second stage will control the 5-year, 10-year and 25-year storm events. This is accomplished using the varied head on the 25-year orifice plate and the corresponding volumes at the water surface elevations. While there is no formal restriction to the 5-year and 10-year releases they are incidental due to the configuration of the outlet structure.

Within the second box will be an orifice plate that will control the 100-year and 50-year release. The way the 50-year event is controlled is similar to the smaller storms. While there is no formal control for the 50-year storm the control of the 50-year release is incidental due to the varied head on the outlet structure. The 100-year orifice was designed to release at approximately 1.3 cfs per tributary acre. The SWMM model was utilized to verify that the pond doesn't need to overd detain to meet the constraints set forth by the DBPS for the Old Ranch Road Tributary. These DBPS flow rates were identified earlier in the report in Table 1.

While it is preferable to collect the entire site and discharge it into the ORR Pond it is not possible with two outlying basins: Basin D1a and Basin D1b. Both of these basins will have small developed discharges from the site into flow paths that bypass the ORR Pond. In an effort to compensate for these bypassed flows the ORR Pond EURV volume has been designed including the on-site developed areas from these basins. For portions of the proposed homes that are routed into Thunder Mountain Avenue, the impervious area of the lots will be disconnected from the main conveyance path by pervious areas in the form of landscape buffers and landscape swales. This disconnection will allow for slower velocities allowing sediments to fall out and runoff to infiltrate prior to being collected in curb & gutter where the velocities are higher maintaining suspension of sediments and not allowing for infiltration.

Table 7 below identifies the volumes and release rates associated with the different storms analyzed with this report.

Table 7: ORR Pond Volume & Release

Storm	Volume (ac-ft)	Release (cfs)
WQCV	0.84	-
EURV	1.54	-
2-yr	1.07	0.4
5-yr	1.93	10.1
10-yr	2.18	20.3
25-yr	3.14	44.5
50-yr	3.69	56.6
100-yr	4.21	59.8

Table 8: ORR DBPS vs. Proposed Conditions Runoff (DP4A)

Storm	DBPS (cfs)	Proposed (cfs)	Δ (cfs)
2-yr	19	20.2	1.2
5-yr	40	34.1	-5.9
10-yr	58	41.7	-16.3
25-yr	88	88.1	0.1
50-yr	110	103.7	-6.3
100-yr	133	112.6	-20.4

Table 8 is a comparison of the flows identified in the DBPS versus the flows proposed with this development. As can be seen there are only two slight increases in the release under Old Ranch Road. They occur in the 2-year and 25-year events. Both increases are very minor. The remaining storms have reduced, in some case significantly, the releases under Old Ranch Road. These rates include the release from Howells Pond. Based upon the SWMM modeling performed here and the additional HEC-HMS modeling there will be no impact to the downstream infrastructure or the adjacent developments (including the Pond E as identified in the DBPS) due to the development of this site or the rerouting of Basin OS3 to the south.

As could be seen in Table 6 the introduction of Basin OS3 through Howells Pond and the introduction of the ORR Pond into the system have no negative effect on the downstream system and in fact create a reduction in the 100-year design storm. All infrastructure is adequately sized, per the DBPS, to handle the proposed drainage patterns from this site.

When final designed, the ORR Pond should include forebays at all inflow points and concrete trickle channels to the outlet structure. Additionally a micropool shall be incorporated into the outlet structure with the EURV plate and well screen extending to the bottom of the micropool. This extension of the screen will prevent the pond from failing when the well screen clogs. The opening below the micropool permanent water surface allows water to flow below the clogged area of the screen using hydrostatic pressure, keeping the pond functioning properly.

ORR Pond Emergency Overflow

In the event the ORR Pond should become clogged or in the case of a storm larger than the 100-year design event the pond emergency overflow will be activated. Flows through the emergency overflow will be conveyed to the southwest. The majority of the flow will cross over Old Ranch Road and sheet flow off the roadway in the property to the south. It will then be conveyed through the property to the Powers Blvd ROW. Once in the Powers Blvd ROW flows will be conveyed via existing swales to the existing culvert under the roadway. The culvert has a large available headwater on it which will allow for attenuation and capture of a large portion of the emergency overflow. In the case that the culvert overtops it will continue west over Powers Blvd to another culvert which again has a large allowable head and area for attenuation. See figure included in Appendix A for more information.

Powers Pond

The Powers Pond has been designed to provide water quality and detention for the entire tributary area. The outlet structure will be designed as a two stage outlet: full spectrum detention (Excess Urban Runoff Volume or EURV), and 100-year outlet.

The first stage is the EURV stage. The EURV volume was designed per the Urban Drainage and Flood Control Districts criteria. The EURV is also known as full spectrum detention and is designed to mitigate higher flows from the full spectrum of storms. Included in the EURV volume is a minor storm detention volume as well as water quality volume. It can be seen that the 2-year storm is completely contained within the EURV volume as well as a good portion of the remaining storms. The EURV is designed to release over 72 hours while

maintaining an approximate 40 hour drain time for the WQCV. While there are other water quality features planned within development for areas that are tributary to the Powers Pond, it was decided to incorporate a WQCV that ignores all of the other features and provide WQCV for the entire tributary area. This is all conceptual design and may change at the time of final design.

The second stage is the major storm detention. This is accomplished using a 48” pipe with an orifice plate. All volumes that exceed the EURV volume (i.e. 5-year, 10-year, 25-year, 50-year, and 100-year) will overtop the structure passing through a grated opening and then out through the orifice on the 48” pipe. Table 9 below identifies the volumes and release rates associated with the pond.

Table 9: Powers Pond Volume & Release

Storm	Volume (ac-ft)	Release (cfs)
WQCV	4.66	-
EURV	11.45	-
2-yr	8.44	5.2
5-yr	13.37	35.5
10-yr	14.69	83.5
25-yr	17.81	198.7
50-yr	20.15	206.0
100-yr	22.18	211.9

The historic model accurately models what the current site conditions are as these are not the original historic flow patterns. Historically Basin OS3 is conveyed through what is now Pine Creek High School. With the construction of Pine Creek High School runoff from Basin OS3 was routed to the north around the school. The historic SWMM model was modified to remove Basin OS3 from routing to the north to match to the routing associated with the proposed conditions. Comparing this routing to the proposed releases from the Powers Pond will show if the pond is truly releasing at or below historic rates. Table 10 below shows a comparison of the historic as the site exists flow rates, the historic rates without Basin OS3 flowing to outfall 7a, and the proposed releases from the Powers Pond.

Table 10: Powers Pond Outfall Historic vs. Proposed Conditions Runoff (DP11)

Storm	Historic w/ OS3 (cfs)	Historic w/o OS3 (cfs)	Proposed (cfs)	Δ (cfs)
2-yr	7.2	2.6	5.2	2.6
5-yr	68.8	44.4	35.5	-8.9
10-yr	119.1	76.4	83.5	7.1
25-yr	303.0	193.7	198.7	5.0
50-yr	384.7	245.4	206.0	-39.4
100-yr	445.3	282.7	211.9	-70.8

As can be seen in the table the proposed Powers Pond effectively mitigates the flow increases caused by the development to a level that is approximately at or below the historic rates for the majority of storm events in the scenario without Basin OS3. Additionally the site release is well below the historic rates with Basin OS3. There are small increases in the 2-yr, 10-yr, and 25-year storms. However, the increases are small+ in magnitude. The 2-yr storm is approximately doubled, but the flow rate is still insignificant. The 10 and 25 year storms have increases on the order of 9% and 3%. The increases are small and are well below what the site releases in its current conditions today with basin OS3 being routed to Powers Boulevard. There will be no significant impacts to the downstream infrastructure. With the increases being small, the outlet structure can be easily tweaked at the time of final design to reduce or eliminate the increased releases. Since this is a concept design and there are many things that could change until then it was decided to leave the design as is until final design.

When final designed the Powers Pond should include forebays at all inflow points and concrete trickle channels to the outlet structure. Additionally a micropool shall be incorporated into the outlet structure with the water quality plate and well screen extending to the bottom of the micropool. This extension of the screen will prevent the pond from failing when the well screen clogs. The opening below the micropool permanent water surface allows water to flow below the clogged area of the screen using hydrostatic pressure, keeping the pond functioning properly.

VI. Drainage and Bridge Fees

This site lies within the Kettle Creek Basin. A portion of the site lies within the Kettle Creek Old Ranch Tributary and a portion is within an unstudied area.

The Old Ranch Tributary is closed and therefore no fees are due. With the releases under Old Ranch Road meeting the values set by the ORR DBPS there will be no need for downstream improvements on Kettle Creek due to this portion of the site as detention is provided prior to releasing into Kettle Creek per the DBPS.

A DBPS is being prepared for the unstudied upstream portion of Kettle Creek. Fees may be determined with this DBPS and will be collected with the Final Plats for those areas. The City will not be responsible for any of La Plata's PMJM habitat.

VII. Conclusions

The proposed development will not adversely affect the offsite major drainageways or surrounding development. There will be no significant impact to downstream drainageways due to the proposed development. Adequate detention has been provided to fully mitigate increases at all outfall points from the site. Water quality will be provided for the entire site in the form of extended detention basins. The SWMM Modeling has shown that the full spectrum (2, 5, 10, 25, 50, and 100 year storms) of storm events release from the site at or below historic rates.

The proposed drainage facilities meet the requirements of the City of Colorado Springs/El Paso County "Drainage Criteria Manual".

Prepared By:

JR Engineering, LLC



Scott Brown, P.E.
Project Engineer

VIII. References

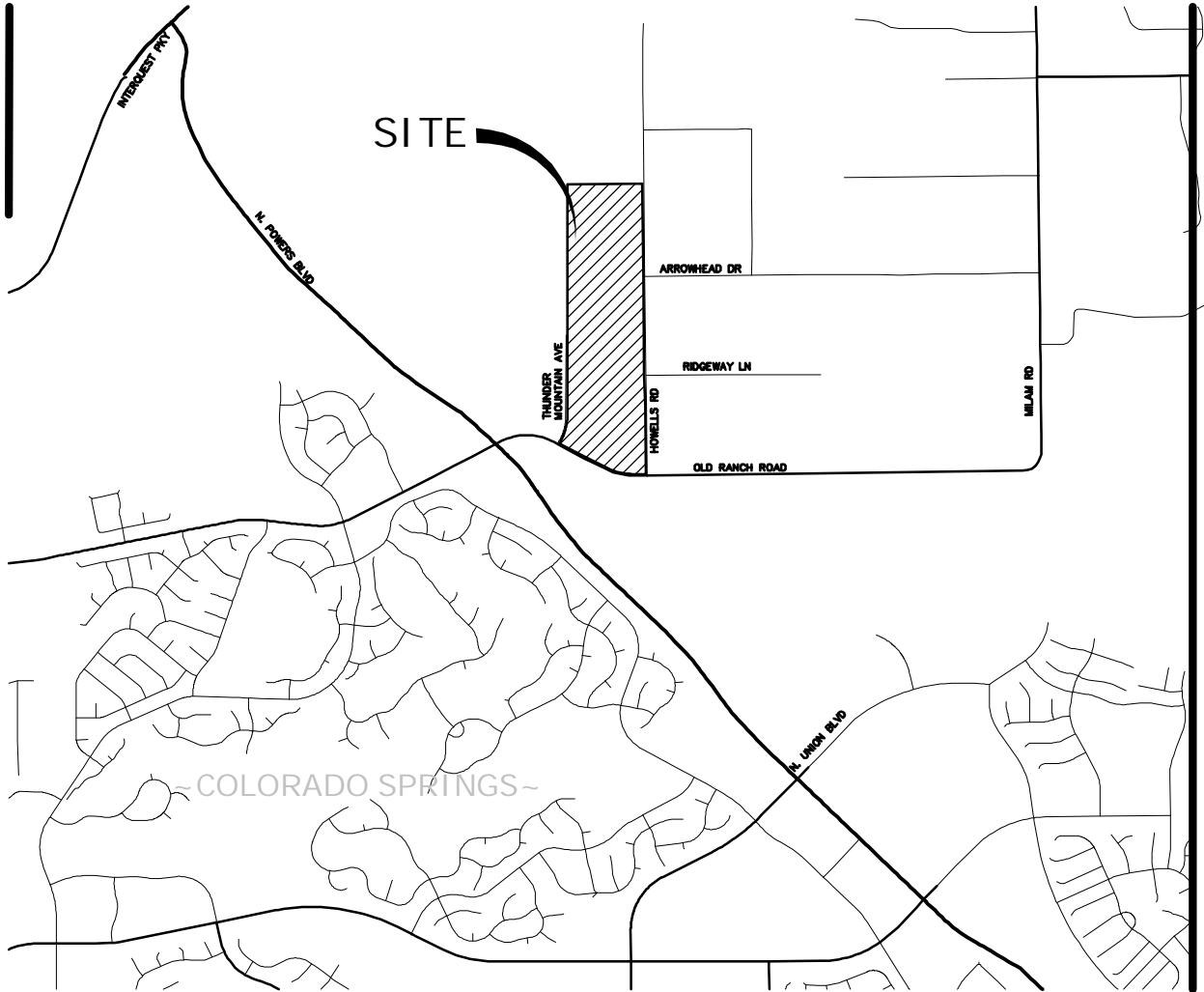
Drainage Criteria Manual, City of Colorado Springs/El Paso County, Revised 1994.

Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Latest Edition.

Kettle Creek Drainage Basin Old Ranch Road Tributary Drainage Basin Planning Study and Master Development Drainage Plan, JR Engineering, April 2001.

APPENDIX

APPENDIX A
FIGURES & EXHIBITS



VICINITY MAP
 NORTH FORK © KETTLE CREEK
 JRE PROJECT #25100.00
 12/17/2013
 SHEET 1 OF 1



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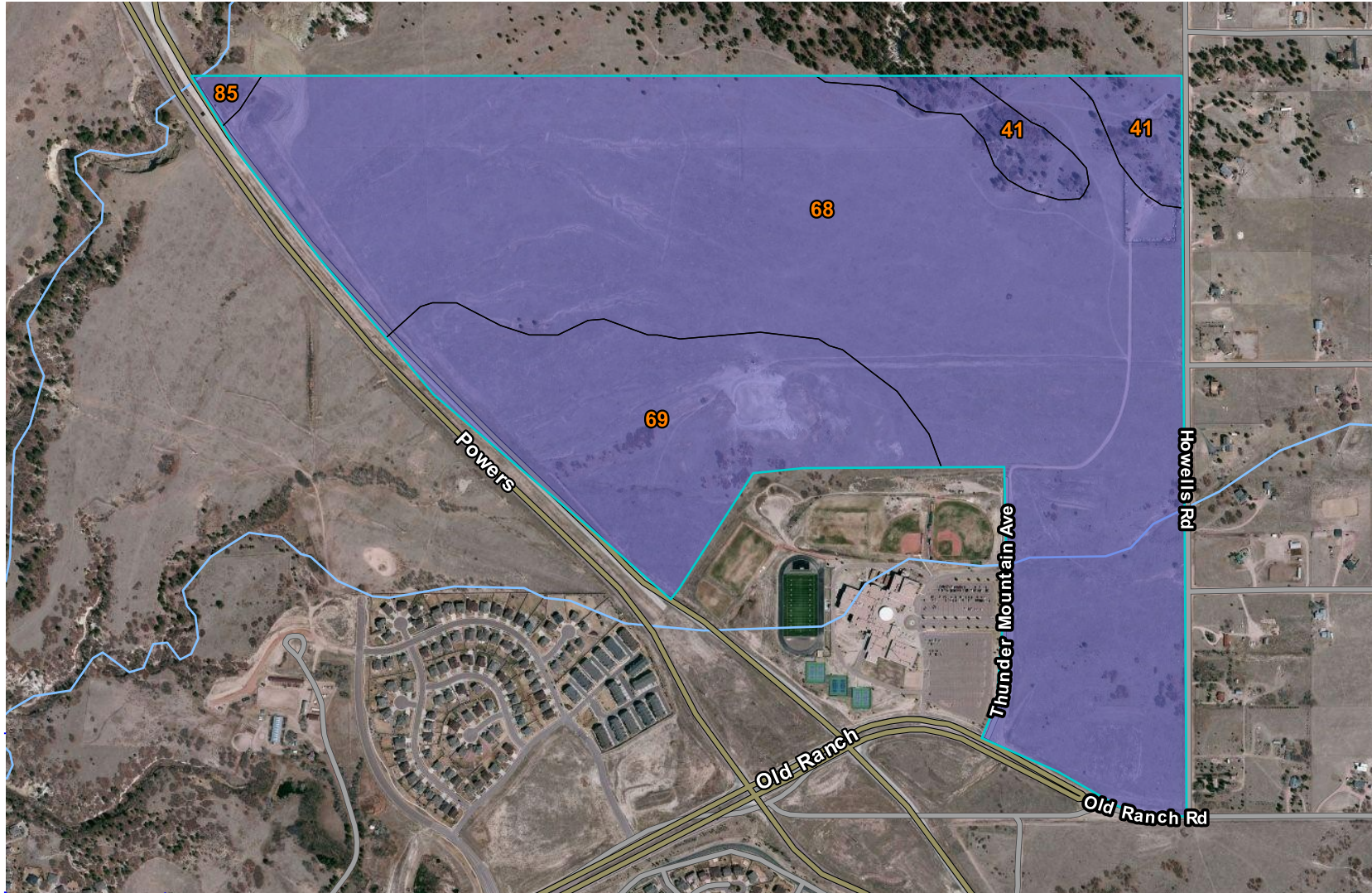
Hydrologic Soil Group—El Paso County Area, Colorado
(North Fork At Briargate)

104° 46' 52" W

104° 45' 10" W

38° 59' 49" N

38° 59' 49" N

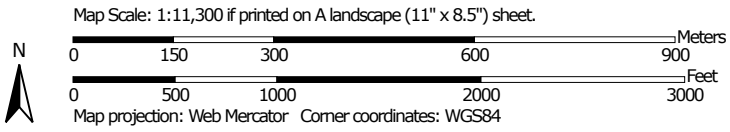


38° 58' 57" N

38° 58' 57" N

104° 46' 52" W


104° 45' 10" W



Hydrologic Soil Group—El Paso County Area, Colorado
(North Fork At Briargate)

MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


Water Features

 Streams and Canals

Transportation

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

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 9, Sep 17, 2012

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

Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — El Paso County Area, Colorado (CO625)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	B	15.7	4.8%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	246.6	75.4%
69	Peyton-Pring complex, 8 to 15 percent slopes	B	63.4	19.4%
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	B	1.5	0.5%
Totals for Area of Interest			327.2	100.0%

Description

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

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

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

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

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

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

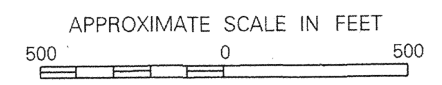
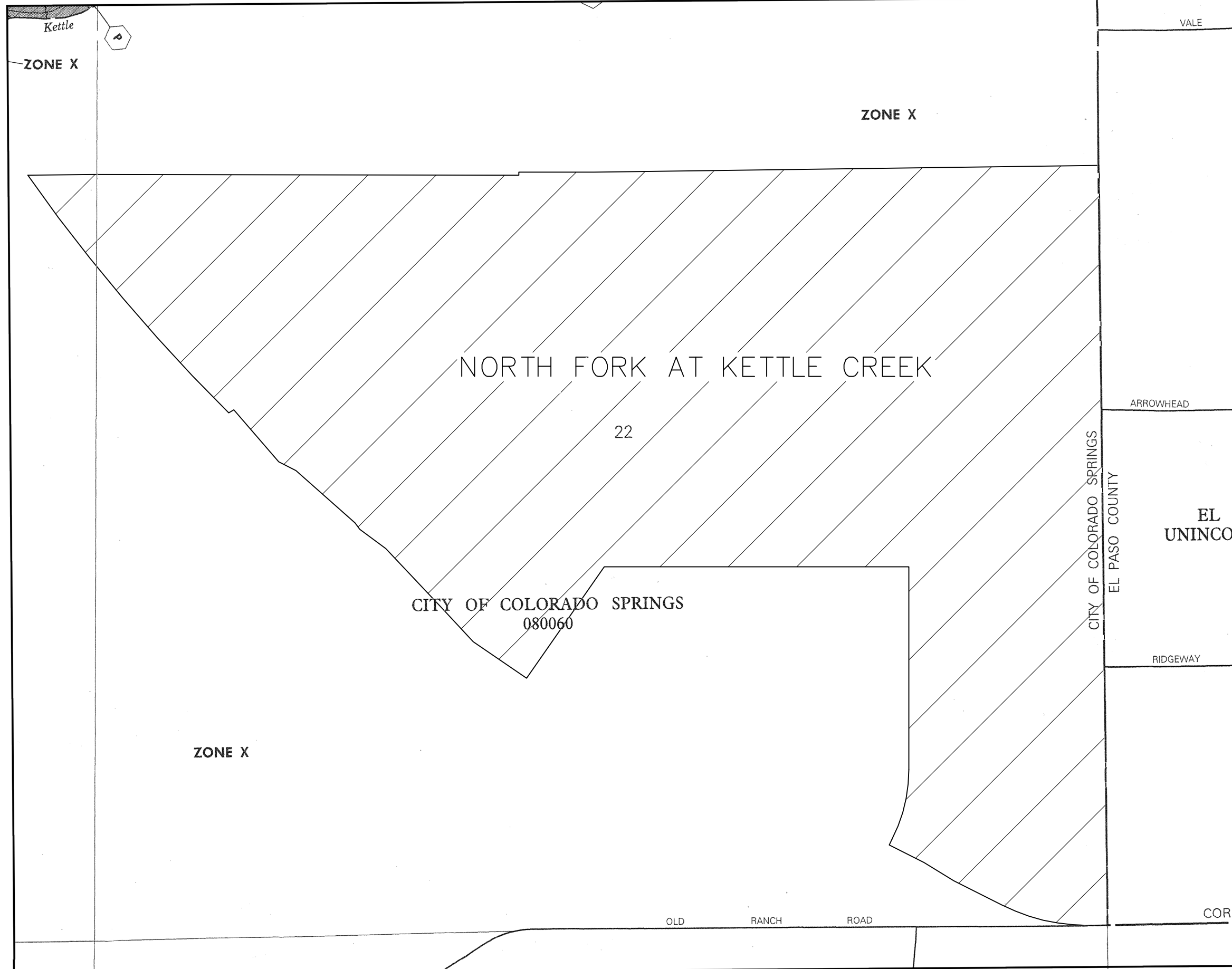
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
 EL PASO COUNTY,
 COLORADO AND
 INCORPORATED AREAS

PANEL 507 OF 1300
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

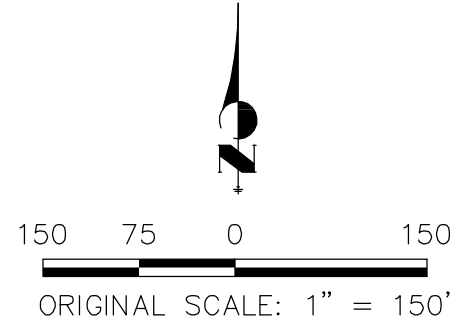
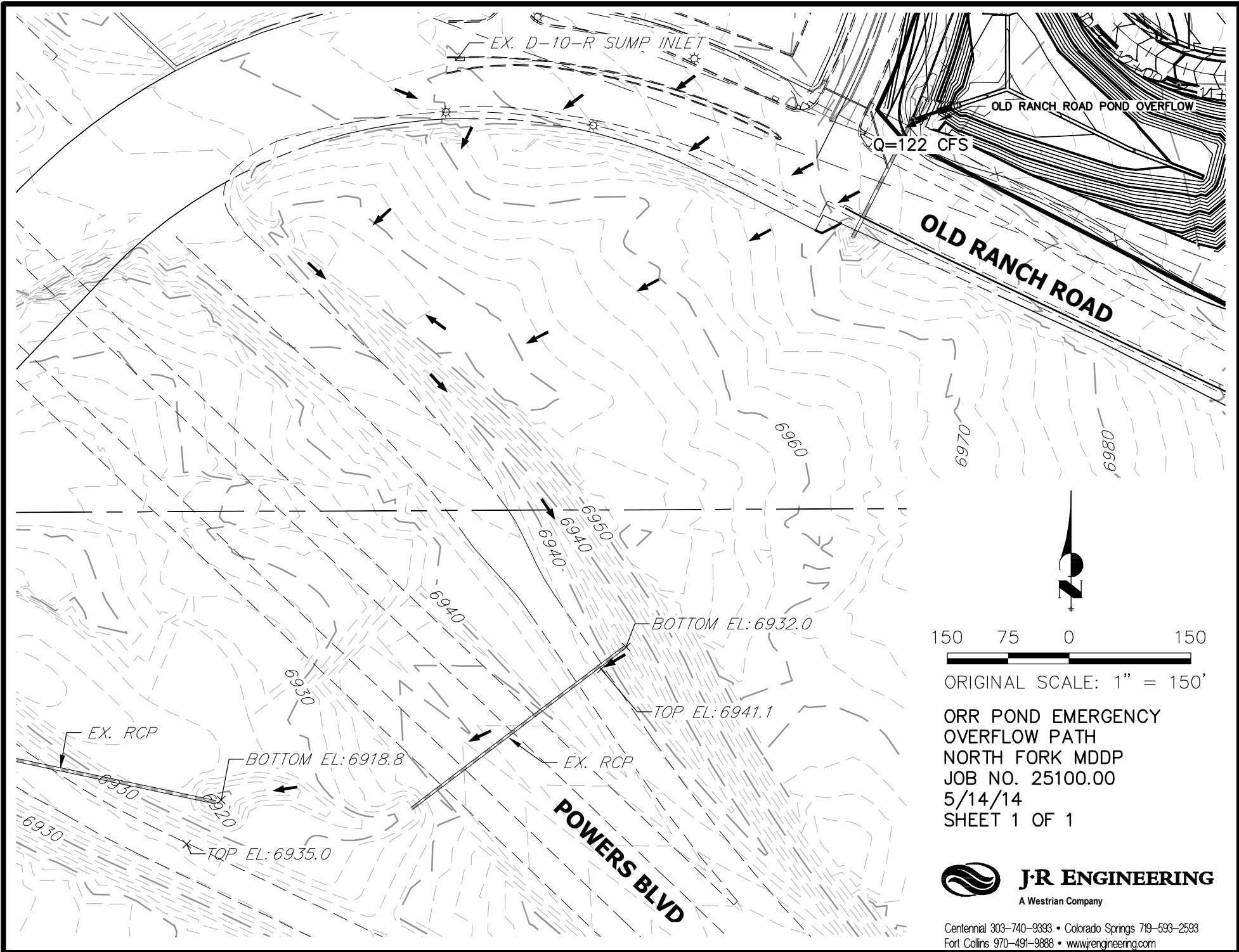
COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS CITY OF	080060	0507	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0507	F



MAP NUMBER
08041C0507 F
EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

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



ORR POND EMERGENCY
 OVERFLOW PATH
 NORTH FORK MDDP
 JOB NO. 25100.00
 5/14/14
 SHEET 1 OF 1

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APPENDIX B
HISTORIC CUHP & SWMM MODELING

Historic CUHP Input

Summary of CUHP Input Parameters (Version 1.4.0)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	
OS1	basin_OS1	2YR PRECIP	0.021	0.127	0.314	0.035	34.5	0.40	0.10	4.50	0.60	0.0018	0.00	0.69	0.18	31.32
OS2	basin_OS2	2YR PRECIP	0.027	0.144	0.343	0.030	8.3	0.40	0.10	4.50	0.60	0.0018	0.00	0.17	0.08	6.26
OS3	basin_OS3	2YR PRECIP	0.229	0.478	1.127	0.030	7.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.14	0.07	5.23
OS4	basin_OS4	2YR PRECIP	0.020	0.095	0.258	0.030	8.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.16	0.08	6.02
OS5	basin_OS5	2YR PRECIP	0.041	0.127	0.294	0.033	2.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.04	0.02	1.45
H1	basin_H1	2YR PRECIP	0.053	0.102	0.207	0.046	10.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.20	0.10	7.62
H2	basin_H2	2YR PRECIP	0.079	0.365	0.788	0.034	2.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.04	0.02	1.45
H3	basin_H3	2YR PRECIP	0.277	0.697	1.190	0.035	2.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.04	0.02	1.45
H4	basin_H4	2YR PRECIP	0.017	0.041	0.186	0.031	2.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.04	0.02	1.45

Historic CUHP 2-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.213	0.230	20.6	3.95	10.7	2.79	6.6	30	48,196	0.34	16,377	34.0	6	16,376	0.42
OS2		0.279	0.177	40.3	5.79	21.0	4.09	9.6	20	62,401	0.07	4,083	42.0	1	4,083	0.06
OS3		0.147	0.249	47.7	9.43	24.8	6.66	15.7	144	532,230	0.05	29,091	47.0	7	29,090	0.04
OS4		0.310	0.170	33.4	4.66	17.4	3.29	7.8	18	45,423	0.06	2,858	40.0	1	2,858	0.07
OS5		0.276	0.210	28.8	4.94	15.0	3.49	8.2	43	95,580	0.02	1,438	38.0	1	1,438	0.02
H1		0.218	0.191	17.5	2.88	9.1	2.03	4.8	90	121,968	0.08	9,733	33.0	5	9,731	0.14
H2		0.225	0.232	56.1	10.28	29.2	7.26	17.1	42	184,517	0.02	2,776	49.0	1	2,776	0.01
H3		0.158	0.279	53.9	11.86	28.0	8.38	19.8	154	643,239	0.02	9,678	51.0	2	9,678	0.01
H4		0.361	0.184	20.6	3.20	10.7	2.26	5.3	25	39,922	0.02	601	34.0	0	601	0.02

Historic CUHP 5-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.211	0.235	20.1	3.93	10.5	2.78	6.6	31	48,196	0.64	30,886	34.0	11	30,884	0.85
OS2		0.275	0.176	40.1	5.71	20.9	4.04	9.5	20	62,401	0.29	18,368	42.0	5	18,368	0.29
OS3		0.146	0.247	47.6	9.33	24.7	6.59	15.5	145	532,230	0.28	148,433	47.0	35	148,430	0.24
OS4		0.306	0.168	33.3	4.60	17.3	3.25	7.7	18	45,423	0.29	13,208	39.0	4	13,208	0.33
OS5		0.275	0.209	28.8	4.93	15.0	3.48	8.2	43	95,580	0.22	21,068	39.0	8	21,067	0.31
H1		0.215	0.190	17.4	2.84	9.1	2.01	4.7	90	121,968	0.31	38,388	34.0	20	38,380	0.58
H2		0.224	0.231	56.1	10.25	29.2	7.24	17.1	42	184,517	0.22	40,671	49.0	9	40,669	0.17
H3		0.157	0.278	53.9	11.82	28.0	8.36	19.7	154	643,239	0.22	141,781	51.0	32	141,781	0.18
H4		0.360	0.183	20.6	3.20	10.7	2.26	5.3	25	39,922	0.22	8,799	36.0	5	8,798	0.41

Historic CUHP 10-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.211	0.237	19.9	3.92	10.4	2.77	6.5	31	48,196	0.86	41,449	34.0	15	41,444	1.11
OS2		0.274	0.175	40.1	5.69	20.8	4.02	9.5	20	62,401	0.49	30,346	42.0	7	30,345	0.44
OS3		0.145	0.246	47.5	9.29	24.7	6.56	15.5	145	532,230	0.47	249,643	47.0	55	249,640	0.37
OS4		0.304	0.168	33.2	4.58	17.3	3.24	7.6	18	45,423	0.48	21,908	39.0	6	21,908	0.50
OS5		0.274	0.209	28.8	4.92	15.0	3.48	8.2	43	95,580	0.40	38,544	38.0	13	38,543	0.51
H1		0.214	0.189	17.4	2.82	9.0	1.99	4.7	91	121,968	0.51	62,074	33.0	29	62,064	0.87
H2		0.224	0.230	56.1	10.23	29.2	7.23	17.1	42	184,517	0.40	74,409	50.0	15	74,407	0.29
H3		0.157	0.278	53.9	11.81	28.0	8.35	19.7	154	643,239	0.40	259,395	51.0	54	259,395	0.30
H4		0.360	0.183	20.6	3.19	10.7	2.26	5.3	25	39,922	0.40	16,099	35.0	7	16,097	0.66

Historic CUHP 25-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.210	0.239	19.6	3.91	10.2	2.76	6.5	32	48,196	1.43	68,778	39.0	25	68,766	1.91
OS2		0.272	0.174	39.9	5.65	20.8	3.99	9.4	20	62,401	1.06	66,389	48.0	17	66,389	0.96
OS3		0.144	0.245	47.4	9.23	24.7	6.52	15.4	145	532,230	1.05	557,487	54.0	125	557,487	0.85
OS4		0.302	0.167	33.2	4.55	17.2	3.22	7.6	18	45,423	1.06	48,153	44.0	14	48,153	1.10
OS5		0.274	0.208	28.8	4.91	15.0	3.47	8.2	43	95,580	0.98	94,125	44.0	31	94,122	1.17
H1		0.212	0.188	17.3	2.80	9.0	1.98	4.7	91	121,968	1.09	132,398	38.0	59	132,382	1.75
H2		0.223	0.230	56.1	10.22	29.2	7.22	17.0	42	184,517	0.98	181,707	57.0	36	181,702	0.71
H3		0.157	0.277	53.9	11.79	28.0	8.33	19.7	154	643,239	0.98	633,445	58.0	131	633,444	0.74
H4		0.359	0.183	20.6	3.19	10.7	2.25	5.3	25	39,922	0.98	39,314	40.0	16	39,309	1.47

Historic CUHP 50-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.210	0.241	19.5	3.91	10.1	2.76	6.5	32	48,196	1.73	83,314	39.0	31	83,300	2.30
OS2		0.271	0.174	39.9	5.63	20.7	3.98	9.4	20	62,401	1.35	84,279	48.0	21	84,279	1.19
OS3		0.144	0.245	47.4	9.21	24.6	6.51	15.3	145	532,230	1.33	709,488	53.0	155	709,489	1.06
OS4		0.301	0.167	33.1	4.54	17.2	3.21	7.6	18	45,423	1.35	61,164	44.0	17	61,163	1.37
OS5		0.274	0.208	28.8	4.91	15.0	3.47	8.2	43	95,580	1.27	121,007	43.0	39	121,003	1.47
H1		0.211	0.188	17.3	2.79	9.0	1.97	4.7	91	121,968	1.37	167,540	38.0	73	167,522	2.16
H2		0.223	0.230	56.1	10.21	29.2	7.21	17.0	42	184,517	1.27	233,603	57.0	45	233,596	0.89
H3		0.157	0.277	53.9	11.78	28.0	8.33	19.6	154	643,239	1.27	814,357	58.0	165	814,357	0.93
H4		0.359	0.183	20.6	3.18	10.7	2.25	5.3	25	39,922	1.27	50,542	40.0	20	50,536	1.84

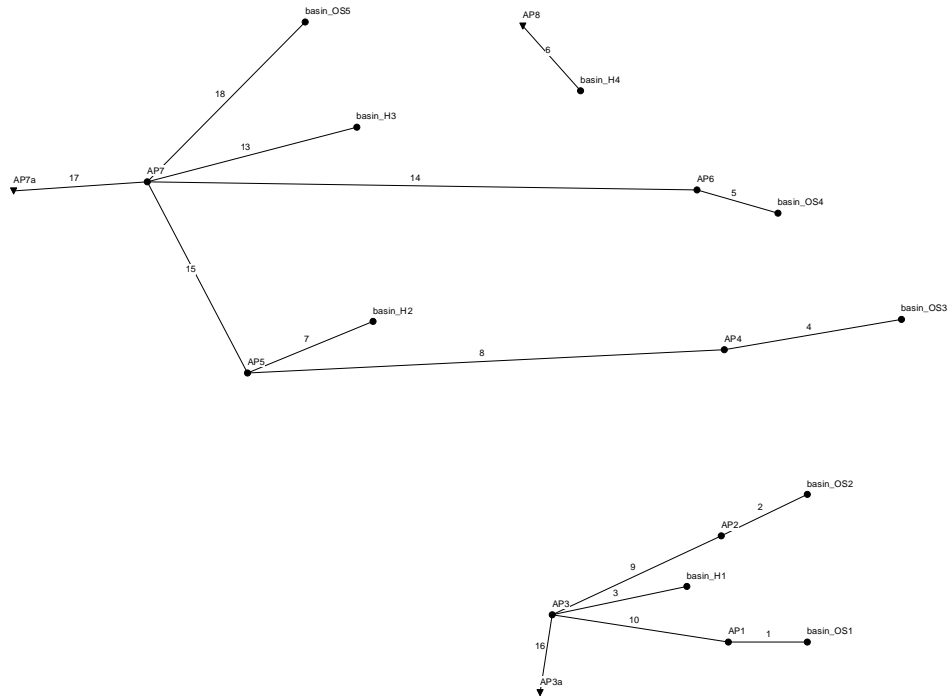
Historic CUHP 100-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.210	0.241	19.5	3.90	10.1	2.76	6.5	32	48,196	1.91	91,916	39.0	34	91,901	2.53
OS2		0.271	0.174	39.9	5.62	20.7	3.97	9.4	20	62,401	1.55	96,833	49.0	23	96,832	1.35
OS3		0.144	0.245	47.4	9.20	24.6	6.50	15.3	145	532,230	1.54	817,365	54.0	176	817,366	1.20
OS4		0.301	0.167	33.1	4.53	17.2	3.20	7.6	18	45,423	1.55	70,318	45.0	19	70,318	1.53
OS5		0.274	0.208	28.8	4.91	15.0	3.47	8.2	43	95,580	1.47	140,947	44.0	43	140,943	1.65
H1		0.211	0.188	17.3	2.79	9.0	1.97	4.6	91	121,968	1.57	191,837	38.0	81	191,816	2.41
H2		0.223	0.230	56.1	10.21	29.2	7.21	17.0	42	184,517	1.47	272,097	58.0	52	272,088	1.02
H3		0.157	0.277	53.9	11.78	28.0	8.32	19.6	154	643,239	1.47	948,548	59.0	188	948,547	1.06
H4		0.359	0.183	20.6	3.18	10.7	2.25	5.3	25	39,922	1.47	58,870	40.0	23	58,864	2.06

Historic SWMM Input

01/02/2005 00:05:00



Historic SWMM Input

[TITLE]

North Fork at Briargate MDDP
Historic Conditions

[OPTIONS]

```

FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
START_DATE           01/01/2005
START_TIME           00:00:00
REPORT_START_DATE    01/01/2005
REPORT_START_TIME    00:00:00
END_DATE             01/03/2005
END_TIME             00:00:00
SWEEP_START          10/01
SWEEP_END            10/02
DRY_DAYS             0
REPORT_STEP          24:05:00
WET_STEP             00:05:00
DRY_STEP             01:00:00
ROUTING_STEP         0:00:15
ALLOW_PONDING       YES
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE            0
    
```

[FILES]

USE INFLOWS "X:\2510000.all\2510000\Excel\Drainage\EPA SWMM MODELS & CUHP INPUT_this folder for MDDP report cal

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
basin_OS1	7100	0	0	0	0
basin_OS2	7120	5	0	0	0
basin_OS3	7200	0	0	0	0
basin_OS4	7080	0	0	0	0
basin_H1	7026	0	0	0	0
basin_H2	7010	0	0	0	0
basin_H3	7025	0	0	0	0
basin_H4	7020	0	0	0	0
basin_OS5	6910	0	0	0	0
AP1	7019.5	0	0	0	0
AP2	7026.9	0	0	0	0
AP3	6965.17	0	0	0	0
AP4	7007.75	0	0	0	0
AP6	7025.1	0	0	0	0
AP5	6862.5	0	0	0	0
AP7	6830	0	0	0	0

[OUTFALLS]

;;Name	Invert Elev.	Outfall Type	Stage/Table Time Series	Tide Gate
AP7a	6744	FREE		NO
AP3a	6959.78	FREE		NO
AP8	6989.5	FREE		NO

[CONDUITS]

Historic SWMM Input

```

;;
;;Name      Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
;;-----  Node       Node       -----      N            Offset     Offset     Flow      Flow
1          basin_OS1   AP1        400          0.01         0          0          0          0
2          basin_OS2   AP2        400          0.01         0          0          0          0
3          basin_H1    AP3        400          0.01         0          0          0          0
4          basin_OS3   AP4        400          0.01         0          0          0          0
5          basin_OS4   AP6        400          0.01         0          0          0          0
6          basin_H4    AP8        400          0.01         0          0          0          0
7          basin_H2    AP5        400          0.01         0          0          0          0
8          AP4        AP5        4159         .035         0          0          0          0
9          AP2        AP3        1091         .04          0          0          0          0
10         AP1        AP3        1211         .025         0          0          0          0
13         basin_H3    AP7        400          0.01         0          0          0          0
14         AP6        AP7        6281         .035         0          0          0          0
15         AP5        AP7        2458         .035         0          0          0          0
16         AP3        AP3a       209.5        .015         0          0          0          0
17         AP7        AP7a       150          .04          0          0          0          0
18         basin_OS5   AP7        400          0.01         0          0          0          0

```

```

[XSECTIONS]
;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----  -----  -----  -----  -----  -----  -----
1          DUMMY      0          0          0          0          1
2          DUMMY      0          0          0          0          1
3          DUMMY      0          0          0          0          1
4          DUMMY      0          0          0          0          1
5          DUMMY      0          0          0          0          1
6          DUMMY      0          0          0          0          1
7          DUMMY      0          0          0          0          1
8          TRAPEZOIDAL 5          10         10         10         1
9          TRAPEZOIDAL 4          10         25         25         1
10         DUMMY      0          0          0          0          1
13         DUMMY      0          0          0          0          1
14         TRAPEZOIDAL 3          20         20         20         1
15         TRAPEZOIDAL 2          10         10         20         1
16         CIRCULAR    4          0          0          0          1
17         TRAPEZOIDAL 6          75         10         10         1
18         DUMMY      0          0          0          0          1

```

3

```

[LOSSES]
;;Link      Inlet      Outlet      Average      Flap Gate
;;-----  -----  -----  -----  -----

```

```

[REPORT]
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

```

[TAGS]

```

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

```

```

[COORDINATES]
;;Node      X-Coord      Y-Coord
;;-----  -----  -----
basin_OS1   1225.071     5840.456
basin_OS2   1226.158     7220.708
basin_OS3   2100.656     8851.204
basin_OS4   951.860      9835.886
basin_H1    103.834      6357.827
basin_H2    -2822.757    8829.322
basin_H3    -2964.989    10645.514
basin_H4    -886.214     10984.683
basin_OS5   -3446.389    11619.256
AP1         486.871      5842.451
AP2         423.323      6837.061

```


Historic SWMM Input

AP3	-1148.796	6094.092
AP4	448.578	8566.740
AP6	201.342	10053.691
AP5	-3982.495	8347.921
AP7	-4923.414	10131.291
AP7a	-6159.587	10045.924
AP3a	-1263.676	5371.991
AP8	-1422.319	11586.433

```
[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----
```

Historic SWMM 2-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 19
Number of links 16
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H1	JUNCTION	7026.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_H4	JUNCTION	7020.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP2	JUNCTION	7026.90	4.00	0.0	
AP3	JUNCTION	6965.17	4.00	0.0	
AP4	JUNCTION	7007.75	5.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	5.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	
AP3a	OUTFALL	6959.78	4.00	0.0	
AP8	OUTFALL	6989.50	0.00	0.0	

Historic SWMM 2-yr Results

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_H1	AP3	CONDUIT	400.0	15.3865	0.0100
4	basin_OS3	AP4	CONDUIT	400.0	54.8079	0.0100
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
6	basin_H4	AP8	CONDUIT	400.0	7.6473	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
8	AP4	AP5	CONDUIT	4159.0	3.4946	0.0350
9	AP2	AP3	CONDUIT	1091.0	5.6672	0.0400
10	AP1	AP3	CONDUIT	1211.0	4.4909	0.0250
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
16	AP3	AP3a	CONDUIT	209.5	2.5736	0.0150
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400
18	basin_OS5	AP7	CONDUIT	400.0	20.4124	0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
8	TRAPEZOIDAL	5.00	300.00	2.71	110.00	1	4633.87
9	TRAPEZOIDAL	4.00	440.00	2.09	210.00	1	6368.40
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
16	CIRCULAR	4.00	12.57	1.00	4.00	1	199.72
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10^6 gal
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	1.759	0.573
External Outflow	1.853	0.604
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-5.352	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Historic SWMM 2-yr Results

```

*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
  
```

```

*****
Node Depth Summary
*****
  
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H1	JUNCTION	0.00	0.00	7026.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_H4	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP2	JUNCTION	0.00	0.07	7026.97	0 00:42
AP3	JUNCTION	0.02	0.62	6965.79	0 00:34
AP4	JUNCTION	0.01	0.21	7007.96	0 00:47
AP6	JUNCTION	0.00	0.04	7025.14	0 00:40
AP5	JUNCTION	0.01	0.26	6862.76	0 01:10
AP7	JUNCTION	0.01	0.24	6830.24	0 01:30
AP7a	OUTFALL	0.00	0.03	6744.03	0 01:28
AP3a	OUTFALL	0.02	0.62	6960.40	0 00:34
AP8	OUTFALL	0.00	0.00	6989.50	0 00:00

```

*****
Node Inflow Summary
*****
  
```

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS1	JUNCTION	5.59	5.59	0 00:34	0.122	0.122
basin_OS2	JUNCTION	1.04	1.04	0 00:42	0.031	0.031
basin_OS3	JUNCTION	6.57	6.57	0 00:47	0.218	0.218
basin_OS4	JUNCTION	0.85	0.85	0 00:40	0.021	0.021
basin_H1	JUNCTION	4.62	4.62	0 00:33	0.073	0.073
basin_H2	JUNCTION	0.56	0.56	0 00:49	0.021	0.021
basin_H3	JUNCTION	2.04	2.04	0 00:51	0.072	0.072
basin_H4	JUNCTION	0.27	0.27	0 00:34	0.004	0.004
basin_OS5	JUNCTION	0.51	0.51	0 00:38	0.011	0.011
AP1	JUNCTION	0.00	5.59	0 00:34	0.000	0.122
AP2	JUNCTION	0.00	1.04	0 00:42	0.000	0.031
AP3	JUNCTION	0.00	10.29	0 00:34	0.000	0.226
AP4	JUNCTION	0.00	6.57	0 00:47	0.000	0.218
AP6	JUNCTION	0.00	0.85	0 00:40	0.000	0.021
AP5	JUNCTION	0.00	5.90	0 01:10	0.000	0.252
AP7	JUNCTION	0.00	7.21	0 01:27	0.000	0.378
AP7a	OUTFALL	0.00	7.21	0 01:28	0.000	0.373
AP3a	OUTFALL	0.00	10.29	0 00:34	0.000	0.226
AP8	OUTFALL	0.00	0.27	0 00:34	0.000	0.004

```

*****
Node Surchage Summary
  
```

Historic SWMM 2-yr Results

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H1	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_H4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	14.82	1.95	7.21	0.373
AP3a	8.81	1.99	10.29	0.226
AP8	4.17	0.08	0.27	0.004
System	9.27	4.02	12.25	0.604

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/Full Flow	Max/Full Depth
1	DUMMY	5.59	0 00:34			
2	DUMMY	1.04	0 00:42			
3	DUMMY	4.62	0 00:33			
4	DUMMY	6.57	0 00:47			
5	DUMMY	0.85	0 00:40			
6	DUMMY	0.27	0 00:34			
7	DUMMY	0.56	0 00:49			
8	CONDUIT	5.44	0 01:11	2.54	0.00	0.04
9	CONDUIT	0.96	0 00:52	1.33	0.00	0.02
10	DUMMY	5.59	0 00:34			
13	DUMMY	2.04	0 00:51			
14	CONDUIT	0.44	0 01:39	1.15	0.00	0.01
15	CONDUIT	5.44	0 01:30	1.70	0.01	0.12
16	CONDUIT	10.29	0 00:34	8.36	0.05	0.15
17	CONDUIT	7.21	0 01:28	3.07	0.00	0.01
18	DUMMY	0.51	0 00:38			

Historic SWMM 2-yr Results

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
7	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
13	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 15:43:50 2014
 Analysis ended on: Wed May 14 15:43:50 2014
 Total elapsed time: < 1 sec

Historic SWMM 5-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions

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

Analysis Options

Flow Units CFS

Process Models:

Rainfall/Runoff NO
Snowmelt NO
Groundwater NO
Flow Routing YES
Ponding Allowed YES
Water Quality NO

Flow Routing Method KINWAVE

Starting Date JAN-01-2005 00:00:00

Ending Date JAN-03-2005 00:00:00

Antecedent Dry Days 0.0

Report Time Step 00:05:00

Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 19
Number of links 16
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H1	JUNCTION	7026.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_H4	JUNCTION	7020.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP2	JUNCTION	7026.90	4.00	0.0	
AP3	JUNCTION	6965.17	4.00	0.0	
AP4	JUNCTION	7007.75	5.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	5.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	
AP3a	OUTFALL	6959.78	4.00	0.0	
AP8	OUTFALL	6989.50	0.00	0.0	

Historic SWMM 5-yr Results

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_H1	AP3	CONDUIT	400.0	15.3865	0.0100
4	basin_OS3	AP4	CONDUIT	400.0	54.8079	0.0100
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
6	basin_H4	AP8	CONDUIT	400.0	7.6473	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
8	AP4	AP5	CONDUIT	4159.0	3.4946	0.0350
9	AP2	AP3	CONDUIT	1091.0	5.6672	0.0400
10	AP1	AP3	CONDUIT	1211.0	4.4909	0.0250
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
16	AP3	AP3a	CONDUIT	209.5	2.5736	0.0150
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400
18	basin_OS5	AP7	CONDUIT	400.0	20.4124	0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
8	TRAPEZOIDAL	5.00	300.00	2.71	110.00	1	4633.87
9	TRAPEZOIDAL	4.00	440.00	2.09	210.00	1	6368.40
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
16	CIRCULAR	4.00	12.57	1.00	4.00	1	199.72
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10^6 gal
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	10.596	3.453
External Outflow	10.842	3.533
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-2.318	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Historic SWMM 5-yr Results

```

*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
  
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*****
Node Depth Summary
*****
  
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H1	JUNCTION	0.00	0.00	7026.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_H4	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP2	JUNCTION	0.00	0.16	7027.06	0 00:42
AP3	JUNCTION	0.03	1.09	6966.26	0 00:36
AP4	JUNCTION	0.02	0.53	7008.28	0 00:47
AP6	JUNCTION	0.00	0.11	7025.21	0 00:39
AP5	JUNCTION	0.03	0.69	6863.19	0 00:59
AP7	JUNCTION	0.03	0.67	6830.67	0 01:11
AP7a	OUTFALL	0.01	0.12	6744.12	0 01:06
AP3a	OUTFALL	0.03	1.09	6960.87	0 00:36
AP8	OUTFALL	0.00	0.00	6989.50	0 00:00

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*****
Node Inflow Summary
*****
  
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Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS1	JUNCTION	11.23	11.23	0 00:34	0.231	0.231
basin_OS2	JUNCTION	4.92	4.92	0 00:42	0.137	0.137
basin_OS3	JUNCTION	35.13	35.13	0 00:47	1.110	1.110
basin_OS4	JUNCTION	4.15	4.15	0 00:39	0.099	0.099
basin_H1	JUNCTION	19.63	19.63	0 00:34	0.287	0.287
basin_H2	JUNCTION	8.78	8.78	0 00:49	0.304	0.304
basin_H3	JUNCTION	31.93	31.93	0 00:51	1.061	1.061
basin_H4	JUNCTION	4.51	4.51	0 00:36	0.066	0.066
basin_OS5	JUNCTION	8.22	8.22	0 00:39	0.158	0.158
AP1	JUNCTION	0.00	11.23	0 00:34	0.000	0.231
AP2	JUNCTION	0.00	4.92	0 00:42	0.000	0.137
AP3	JUNCTION	0.00	32.38	0 00:36	0.000	0.657
AP4	JUNCTION	0.00	35.13	0 00:47	0.000	1.110
AP6	JUNCTION	0.00	4.15	0 00:39	0.000	0.099
AP5	JUNCTION	0.00	40.18	0 00:59	0.000	1.447
AP7	JUNCTION	0.00	68.80	0 01:05	0.000	2.815
AP7a	OUTFALL	0.00	68.80	0 01:06	0.000	2.811
AP3a	OUTFALL	0.00	32.37	0 00:36	0.000	0.656
AP8	OUTFALL	0.00	4.51	0 00:36	0.000	0.066

```

*****
Node Surchage Summary
  
```

Historic SWMM 5-yr Results

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H1	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_H4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	15.98	13.61	68.80	2.811
AP3a	9.86	5.15	32.37	0.656
AP8	5.03	1.01	4.51	0.066
System	10.29	19.77	85.63	3.533

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/Full Flow	Max/Full Depth
1	DUMMY	11.23	0 00:34			
2	DUMMY	4.92	0 00:42			
3	DUMMY	19.63	0 00:34			
4	DUMMY	35.13	0 00:47			
5	DUMMY	4.15	0 00:39			
6	DUMMY	4.51	0 00:36			
7	DUMMY	8.78	0 00:49			
8	CONDUIT	32.16	0 01:00	4.34	0.01	0.10
9	CONDUIT	4.77	0 00:48	2.23	0.00	0.04
10	DUMMY	11.23	0 00:34			
13	DUMMY	31.93	0 00:51			
14	CONDUIT	2.52	0 01:27	1.88	0.00	0.03
15	CONDUIT	37.80	0 01:11	2.93	0.09	0.33
16	CONDUIT	32.37	0 00:36	11.68	0.16	0.27
17	CONDUIT	68.80	0 01:06	7.50	0.00	0.02
18	DUMMY	8.22	0 00:39			

Historic SWMM 5-yr Results

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
7	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
13	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 15:03:19 2014
 Analysis ended on: Wed May 14 15:03:19 2014
 Total elapsed time: < 1 sec

Historic SWMM 10-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 19
Number of links 16
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H1	JUNCTION	7026.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_H4	JUNCTION	7020.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP2	JUNCTION	7026.90	4.00	0.0	
AP3	JUNCTION	6965.17	4.00	0.0	
AP4	JUNCTION	7007.75	5.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	5.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	
AP3a	OUTFALL	6959.78	4.00	0.0	
AP8	OUTFALL	6989.50	0.00	0.0	

Historic SWMM 10-yr Results

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_H1	AP3	CONDUIT	400.0	15.3865	0.0100
4	basin_OS3	AP4	CONDUIT	400.0	54.8079	0.0100
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
6	basin_H4	AP8	CONDUIT	400.0	7.6473	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
8	AP4	AP5	CONDUIT	4159.0	3.4946	0.0350
9	AP2	AP3	CONDUIT	1091.0	5.6672	0.0400
10	AP1	AP3	CONDUIT	1211.0	4.4909	0.0250
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
16	AP3	AP3a	CONDUIT	209.5	2.5736	0.0150
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400
18	basin_OS5	AP7	CONDUIT	400.0	20.4124	0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
8	TRAPEZOIDAL	5.00	300.00	2.71	110.00	1	4633.87
9	TRAPEZOIDAL	4.00	440.00	2.09	210.00	1	6368.40
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
16	CIRCULAR	4.00	12.57	1.00	4.00	1	199.72
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10^6 gal
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	18.223	5.938
External Outflow	18.537	6.041
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-1.721	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Historic SWMM 10-yr Results

```

*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
    
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*****
Node Depth Summary
*****
    
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Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H1	JUNCTION	0.00	0.00	7026.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_H4	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP2	JUNCTION	0.01	0.20	7027.10	0 00:42
AP3	JUNCTION	0.04	1.32	6966.49	0 00:35
AP4	JUNCTION	0.03	0.67	7008.42	0 00:47
AP6	JUNCTION	0.00	0.14	7025.24	0 00:39
AP5	JUNCTION	0.04	0.87	6863.37	0 00:57
AP7	JUNCTION	0.04	0.85	6830.85	0 01:08
AP7a	OUTFALL	0.01	0.17	6744.17	0 01:04
AP3a	OUTFALL	0.04	1.32	6961.10	0 00:35
AP8	OUTFALL	0.00	0.00	6989.50	0 00:00

```

*****
Node Inflow Summary
*****
    
```

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS1	JUNCTION	14.75	14.75	0 00:34	0.310	0.310
basin_OS2	JUNCTION	7.49	7.49	0 00:42	0.227	0.227
basin_OS3	JUNCTION	54.79	54.79	0 00:47	1.867	1.867
basin_OS4	JUNCTION	6.31	6.31	0 00:39	0.164	0.164
basin_H1	JUNCTION	29.30	29.30	0 00:33	0.464	0.464
basin_H2	JUNCTION	14.71	14.71	0 00:50	0.557	0.557
basin_H3	JUNCTION	53.50	53.50	0 00:51	1.940	1.940
basin_H4	JUNCTION	7.24	7.24	0 00:35	0.120	0.120
basin_OS5	JUNCTION	13.33	13.33	0 00:38	0.288	0.288
AP1	JUNCTION	0.00	14.75	0 00:34	0.000	0.310
AP2	JUNCTION	0.00	7.49	0 00:42	0.000	0.227
AP3	JUNCTION	0.00	46.71	0 00:35	0.000	1.003
AP4	JUNCTION	0.00	54.79	0 00:47	0.000	1.867
AP6	JUNCTION	0.00	6.31	0 00:39	0.000	0.164
AP5	JUNCTION	0.00	65.44	0 00:57	0.000	2.465
AP7	JUNCTION	0.00	119.05	0 01:03	0.000	4.922
AP7a	OUTFALL	0.00	119.05	0 01:04	0.000	4.917
AP3a	OUTFALL	0.00	46.71	0 00:35	0.000	1.002
AP8	OUTFALL	0.00	7.24	0 00:35	0.000	0.120

```

*****
Node Surchage Summary
    
```

Historic SWMM 10-yr Results

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H1	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_H4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	16.50	23.06	119.05	4.917
AP3a	10.14	7.65	46.71	1.002
AP8	5.61	1.66	7.24	0.120
System	10.75	32.36	146.65	6.040

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/Full Flow	Max/Full Depth
1	DUMMY	14.75	0 00:34			
2	DUMMY	7.49	0 00:42			
3	DUMMY	29.30	0 00:33			
4	DUMMY	54.79	0 00:47			
5	DUMMY	6.31	0 00:39			
6	DUMMY	7.24	0 00:35			
7	DUMMY	14.71	0 00:50			
8	CONDUIT	51.46	0 00:58	4.92	0.01	0.13
9	CONDUIT	7.37	0 00:48	2.53	0.00	0.05
10	DUMMY	14.75	0 00:34			
13	DUMMY	53.50	0 00:51			
14	CONDUIT	4.16	0 01:27	2.06	0.00	0.04
15	CONDUIT	62.41	0 01:08	3.32	0.15	0.42
16	CONDUIT	46.71	0 00:35	12.96	0.23	0.33
17	CONDUIT	119.05	0 01:04	9.29	0.00	0.03
18	DUMMY	13.33	0 00:38			

Historic SWMM 10-yr Results

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
7	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
13	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 15:02:47 2014
 Analysis ended on: Wed May 14 15:02:47 2014
 Total elapsed time: < 1 sec

Historic SWMM 25-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 19
Number of links 16
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H1	JUNCTION	7026.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_H4	JUNCTION	7020.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP2	JUNCTION	7026.90	4.00	0.0	
AP3	JUNCTION	6965.17	4.00	0.0	
AP4	JUNCTION	7007.75	5.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	5.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	
AP3a	OUTFALL	6959.78	4.00	0.0	
AP8	OUTFALL	6989.50	0.00	0.0	

Historic SWMM 25-yr Results

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_H1	AP3	CONDUIT	400.0	15.3865	0.0100
4	basin_OS3	AP4	CONDUIT	400.0	54.8079	0.0100
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
6	basin_H4	AP8	CONDUIT	400.0	7.6473	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
8	AP4	AP5	CONDUIT	4159.0	3.4946	0.0350
9	AP2	AP3	CONDUIT	1091.0	5.6672	0.0400
10	AP1	AP3	CONDUIT	1211.0	4.4909	0.0250
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
16	AP3	AP3a	CONDUIT	209.5	2.5736	0.0150
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400
18	basin_OS5	AP7	CONDUIT	400.0	20.4124	0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
8	TRAPEZOIDAL	5.00	300.00	2.71	110.00	1	4633.87
9	TRAPEZOIDAL	4.00	440.00	2.09	210.00	1	6368.40
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
16	CIRCULAR	4.00	12.57	1.00	4.00	1	199.72
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10^6 gal
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	41.820	13.628
External Outflow	42.273	13.775
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-1.082	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Historic SWMM 25-yr Results

```

*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.01
  
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*****
Node Depth Summary
*****
  
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H1	JUNCTION	0.00	0.00	7026.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_H4	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP2	JUNCTION	0.01	0.30	7027.20	0 00:48
AP3	JUNCTION	0.05	1.94	6967.11	0 00:41
AP4	JUNCTION	0.04	1.02	7008.77	0 00:54
AP6	JUNCTION	0.01	0.23	7025.33	0 00:44
AP5	JUNCTION	0.06	1.29	6863.79	0 01:01
AP7	JUNCTION	0.06	1.27	6831.27	0 01:10
AP7a	OUTFALL	0.01	0.29	6744.29	0 01:05
AP3a	OUTFALL	0.05	1.94	6961.72	0 00:41
AP8	OUTFALL	0.00	0.00	6989.50	0 00:00

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*****
Node Inflow Summary
*****
  
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Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS1	JUNCTION	25.42	25.42	0 00:39	0.514	0.514
basin_OS2	JUNCTION	16.52	16.52	0 00:48	0.497	0.497
basin_OS3	JUNCTION	124.65	124.65	0 00:54	4.170	4.170
basin_OS4	JUNCTION	13.78	13.78	0 00:44	0.360	0.360
basin_H1	JUNCTION	58.81	58.81	0 00:38	0.990	0.990
basin_H2	JUNCTION	36.07	36.07	0 00:57	1.359	1.359
basin_H3	JUNCTION	131.06	131.06	0 00:58	4.738	4.738
basin_H4	JUNCTION	16.19	16.19	0 00:40	0.294	0.294
basin_OS5	JUNCTION	30.88	30.88	0 00:44	0.704	0.704
AP1	JUNCTION	0.00	25.42	0 00:39	0.000	0.514
AP2	JUNCTION	0.00	16.52	0 00:48	0.000	0.497
AP3	JUNCTION	0.00	95.02	0 00:41	0.000	2.003
AP4	JUNCTION	0.00	124.65	0 00:54	0.000	4.170
AP6	JUNCTION	0.00	13.78	0 00:44	0.000	0.360
AP5	JUNCTION	0.00	155.83	0 01:01	0.000	5.586
AP7	JUNCTION	0.00	302.97	0 01:05	0.000	11.483
AP7a	OUTFALL	0.00	302.97	0 01:05	0.000	11.478
AP3a	OUTFALL	0.00	95.02	0 00:41	0.000	2.002
AP8	OUTFALL	0.00	16.19	0 00:40	0.000	0.294

```

*****
Node Surchage Summary
  
```

Historic SWMM 25-yr Results

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H1	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_H4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	16.75	53.01	302.97	11.478
AP3a	10.22	15.14	95.02	2.002
AP8	5.77	3.94	16.19	0.294
System	10.92	72.09	369.92	13.774

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/Full Flow	Max/Full Depth
1	DUMMY	25.42	0 00:39			
2	DUMMY	16.52	0 00:48			
3	DUMMY	58.81	0 00:38			
4	DUMMY	124.65	0 00:54			
5	DUMMY	13.78	0 00:44			
6	DUMMY	16.19	0 00:40			
7	DUMMY	36.07	0 00:57			
8	CONDUIT	120.52	0 01:02	6.17	0.03	0.20
9	CONDUIT	16.41	0 00:52	3.16	0.00	0.07
10	DUMMY	25.42	0 00:39			
13	DUMMY	131.06	0 00:58			
14	CONDUIT	10.24	0 01:20	2.65	0.00	0.06
15	CONDUIT	151.79	0 01:10	4.17	0.36	0.64
16	CONDUIT	95.02	0 00:41	15.69	0.48	0.49
17	CONDUIT	302.97	0 01:05	13.33	0.00	0.05
18	DUMMY	30.88	0 00:44			

Historic SWMM 25-yr Results

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
7	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
13	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 15:02:08 2014
 Analysis ended on: Wed May 14 15:02:08 2014
 Total elapsed time: < 1 sec

Historic SWMM 50-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 19
Number of links 16
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H1	JUNCTION	7026.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_H4	JUNCTION	7020.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP2	JUNCTION	7026.90	4.00	0.0	
AP3	JUNCTION	6965.17	4.00	0.0	
AP4	JUNCTION	7007.75	5.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	5.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	
AP3a	OUTFALL	6959.78	4.00	0.0	
AP8	OUTFALL	6989.50	0.00	0.0	

Historic SWMM 50-yr Results

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_H1	AP3	CONDUIT	400.0	15.3865	0.0100
4	basin_OS3	AP4	CONDUIT	400.0	54.8079	0.0100
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
6	basin_H4	AP8	CONDUIT	400.0	7.6473	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
8	AP4	AP5	CONDUIT	4159.0	3.4946	0.0350
9	AP2	AP3	CONDUIT	1091.0	5.6672	0.0400
10	AP1	AP3	CONDUIT	1211.0	4.4909	0.0250
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
16	AP3	AP3a	CONDUIT	209.5	2.5736	0.0150
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400
18	basin_OS5	AP7	CONDUIT	400.0	20.4124	0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
8	TRAPEZOIDAL	5.00	300.00	2.71	110.00	1	4633.87
9	TRAPEZOIDAL	4.00	440.00	2.09	210.00	1	6368.40
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
16	CIRCULAR	4.00	12.57	1.00	4.00	1	199.72
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10^6 gal
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	53.378	17.394
External Outflow	53.885	17.559
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.950	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Historic SWMM 50-yr Results

```

*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.01
  
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*****
Node Depth Summary
*****
  
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H1	JUNCTION	0.00	0.00	7026.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_H4	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP2	JUNCTION	0.01	0.34	7027.24	0 00:48
AP3	JUNCTION	0.06	2.20	6967.37	0 00:41
AP4	JUNCTION	0.04	1.13	7008.88	0 00:53
AP6	JUNCTION	0.01	0.26	7025.36	0 00:44
AP5	JUNCTION	0.06	1.43	6863.93	0 01:01
AP7	JUNCTION	0.07	1.41	6831.41	0 01:09
AP7a	OUTFALL	0.01	0.34	6744.34	0 01:05
AP3a	OUTFALL	0.06	2.20	6961.98	0 00:41
AP8	OUTFALL	0.00	0.00	6989.50	0 00:00

```

*****
Node Inflow Summary
*****
  
```

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS1	JUNCTION	30.58	30.58	0 00:39	0.623	0.623
basin_OS2	JUNCTION	20.51	20.51	0 00:48	0.630	0.630
basin_OS3	JUNCTION	155.22	155.22	0 00:53	5.307	5.307
basin_OS4	JUNCTION	17.11	17.11	0 00:44	0.458	0.458
basin_H1	JUNCTION	72.70	72.70	0 00:38	1.253	1.253
basin_H2	JUNCTION	45.37	45.37	0 00:57	1.747	1.747
basin_H3	JUNCTION	164.82	164.82	0 00:58	6.091	6.091
basin_H4	JUNCTION	20.22	20.22	0 00:40	0.378	0.378
basin_OS5	JUNCTION	38.66	38.66	0 00:43	0.905	0.905
AP1	JUNCTION	0.00	30.58	0 00:39	0.000	0.623
AP2	JUNCTION	0.00	20.51	0 00:48	0.000	0.630
AP3	JUNCTION	0.00	117.09	0 00:41	0.000	2.509
AP4	JUNCTION	0.00	155.22	0 00:53	0.000	5.307
AP6	JUNCTION	0.00	17.11	0 00:44	0.000	0.458
AP5	JUNCTION	0.00	195.51	0 01:01	0.000	7.117
AP7	JUNCTION	0.00	384.73	0 01:04	0.000	14.678
AP7a	OUTFALL	0.00	384.72	0 01:05	0.000	14.673
AP3a	OUTFALL	0.00	117.08	0 00:41	0.000	2.507
AP8	OUTFALL	0.00	20.22	0 00:40	0.000	0.378

```

*****
Node Surchage Summary
  
```


Historic SWMM 50-yr Results

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H1	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_H4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	16.96	66.93	384.72	14.673
AP3a	10.38	18.68	117.08	2.507
AP8	5.94	4.93	20.22	0.378
System	11.09	90.53	469.75	17.558

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/Full Flow	Max/Full Depth
1	DUMMY	30.58	0 00:39			
2	DUMMY	20.51	0 00:48			
3	DUMMY	72.70	0 00:38			
4	DUMMY	155.22	0 00:53			
5	DUMMY	17.11	0 00:44			
6	DUMMY	20.22	0 00:40			
7	DUMMY	45.37	0 00:57			
8	CONDUIT	150.87	0 01:01	6.54	0.03	0.22
9	CONDUIT	20.39	0 00:52	3.35	0.00	0.08
10	DUMMY	30.58	0 00:39			
13	DUMMY	164.82	0 00:58			
14	CONDUIT	13.02	0 01:19	2.85	0.01	0.07
15	CONDUIT	191.16	0 01:09	4.41	0.45	0.70
16	CONDUIT	117.08	0 00:41	16.51	0.59	0.55
17	CONDUIT	384.72	0 01:05	14.61	0.01	0.06
18	DUMMY	38.66	0 00:43			

Historic SWMM 50-yr Results

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
7	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
13	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 15:01:23 2014
 Analysis ended on: Wed May 14 15:01:23 2014
 Total elapsed time: < 1 sec

Historic SWMM 100-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 19
Number of links 16
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H1	JUNCTION	7026.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_H4	JUNCTION	7020.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP2	JUNCTION	7026.90	4.00	0.0	
AP3	JUNCTION	6965.17	4.00	0.0	
AP4	JUNCTION	7007.75	5.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	5.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	
AP3a	OUTFALL	6959.78	4.00	0.0	
AP8	OUTFALL	6989.50	0.00	0.0	

Historic SWMM 100-yr Results

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_H1	AP3	CONDUIT	400.0	15.3865	0.0100
4	basin_OS3	AP4	CONDUIT	400.0	54.8079	0.0100
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
6	basin_H4	AP8	CONDUIT	400.0	7.6473	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
8	AP4	AP5	CONDUIT	4159.0	3.4946	0.0350
9	AP2	AP3	CONDUIT	1091.0	5.6672	0.0400
10	AP1	AP3	CONDUIT	1211.0	4.4909	0.0250
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
16	AP3	AP3a	CONDUIT	209.5	2.5736	0.0150
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400
18	basin_OS5	AP7	CONDUIT	400.0	20.4124	0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
8	TRAPEZOIDAL	5.00	300.00	2.71	110.00	1	4633.87
9	TRAPEZOIDAL	4.00	440.00	2.09	210.00	1	6368.40
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
16	CIRCULAR	4.00	12.57	1.00	4.00	1	199.72
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10^6 gal
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	61.721	20.113
External Outflow	62.251	20.286
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.859	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Historic SWMM 100-yr Results

```

*****
Minimum Time Step      : 15.00 sec
Average Time Step     : 15.00 sec
Maximum Time Step     : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.01
  
```

```

*****
Node Depth Summary
*****
  
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H1	JUNCTION	0.00	0.00	7026.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_H4	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP2	JUNCTION	0.01	0.36	7027.26	0 00:49
AP3	JUNCTION	0.06	2.35	6967.52	0 00:41
AP4	JUNCTION	0.05	1.20	7008.95	0 00:54
AP6	JUNCTION	0.01	0.27	7025.37	0 00:45
AP5	JUNCTION	0.07	1.51	6864.01	0 01:02
AP7	JUNCTION	0.07	1.50	6831.50	0 01:10
AP7a	OUTFALL	0.02	0.37	6744.37	0 01:06
AP3a	OUTFALL	0.06	2.35	6962.13	0 00:41
AP8	OUTFALL	0.00	0.00	6989.50	0 00:00

```

*****
Node Inflow Summary
*****
  
```

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS1	JUNCTION	33.53	33.53	0 00:39	0.687	0.687
basin_OS2	JUNCTION	23.17	23.17	0 00:49	0.724	0.724
basin_OS3	JUNCTION	175.81	175.81	0 00:54	6.114	6.114
basin_OS4	JUNCTION	19.17	19.17	0 00:45	0.526	0.526
basin_H1	JUNCTION	81.12	81.12	0 00:38	1.435	1.435
basin_H2	JUNCTION	51.88	51.88	0 00:58	2.035	2.035
basin_H3	JUNCTION	188.47	188.47	0 00:59	7.095	7.095
basin_H4	JUNCTION	22.60	22.60	0 00:40	0.440	0.440
basin_OS5	JUNCTION	43.32	43.32	0 00:44	1.054	1.054
AP1	JUNCTION	0.00	33.53	0 00:39	0.000	0.687
AP2	JUNCTION	0.00	23.17	0 00:49	0.000	0.724
AP3	JUNCTION	0.00	129.84	0 00:41	0.000	2.849
AP4	JUNCTION	0.00	175.81	0 00:54	0.000	6.114
AP6	JUNCTION	0.00	19.17	0 00:45	0.000	0.526
AP5	JUNCTION	0.00	222.80	0 01:02	0.000	8.214
AP7	JUNCTION	0.00	445.33	0 01:06	0.000	17.001
AP7a	OUTFALL	0.00	445.33	0 01:06	0.000	16.997
AP3a	OUTFALL	0.00	129.84	0 00:41	0.000	2.847
AP8	OUTFALL	0.00	22.60	0 00:40	0.000	0.440

```

*****
Node Surchage Summary
  
```

Historic SWMM 100-yr Results

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H1	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_H4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	16.94	77.61	445.33	16.997
AP3a	10.25	21.49	129.84	2.847
AP8	5.80	5.87	22.60	0.440
System	11.00	104.97	545.87	20.284

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/Full Flow	Max/Full Depth
1	DUMMY	33.53	0 00:39			
2	DUMMY	23.17	0 00:49			
3	DUMMY	81.12	0 00:38			
4	DUMMY	175.81	0 00:54			
5	DUMMY	19.17	0 00:45			
6	DUMMY	22.60	0 00:40			
7	DUMMY	51.88	0 00:58			
8	CONDUIT	171.38	0 01:02	6.76	0.04	0.24
9	CONDUIT	23.03	0 00:52	3.45	0.00	0.09
10	DUMMY	33.53	0 00:39			
13	DUMMY	188.47	0 00:59			
14	CONDUIT	15.37	0 01:20	3.00	0.01	0.08
15	CONDUIT	219.08	0 01:10	4.57	0.51	0.75
16	CONDUIT	129.84	0 00:41	16.91	0.65	0.59
17	CONDUIT	445.33	0 01:06	15.44	0.01	0.06
18	DUMMY	43.32	0 00:44			

Historic SWMM 100-yr Results

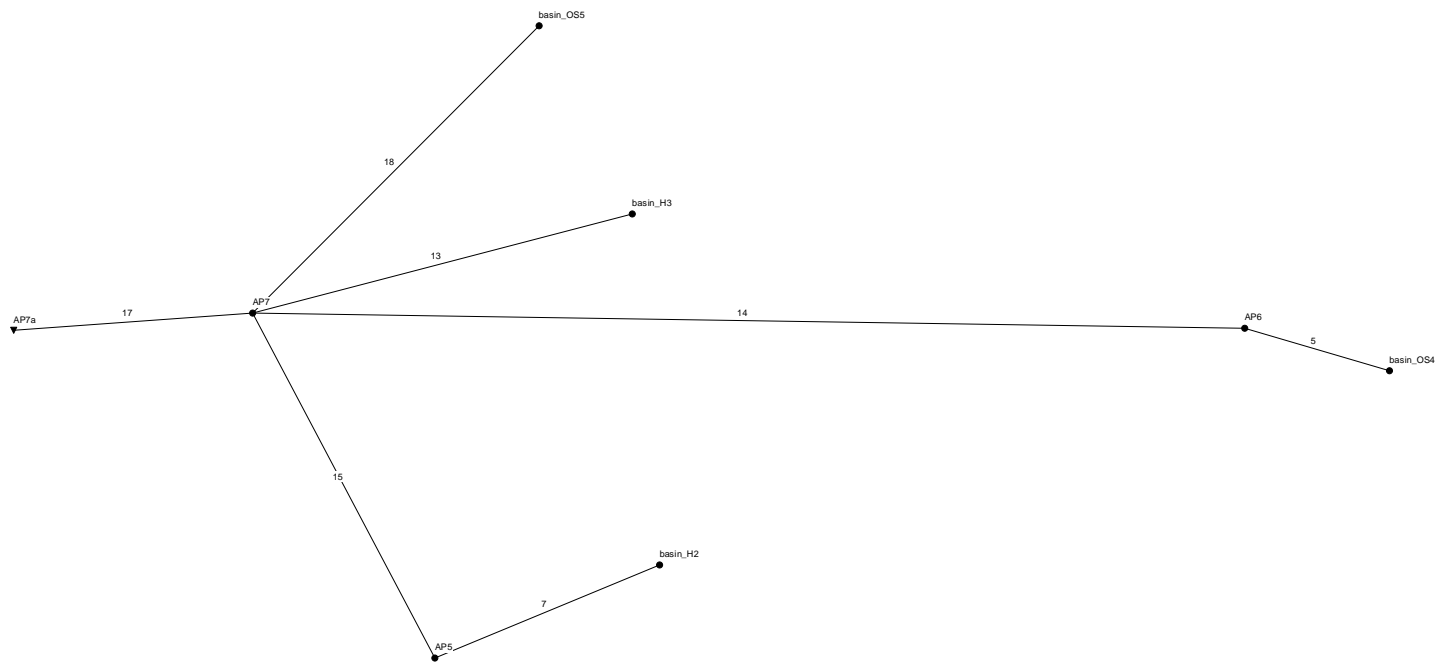
Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
7	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
13	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 14:57:22 2014
 Analysis ended on: Wed May 14 14:57:23 2014
 Total elapsed time: 00:00:01

**HISTORIC SWMM MODEL
WITHOUT BASIN OS3 ROUTED TO POWERS BLVD**

Historic SWMM Input W/O OS3



Historic SWMM Input W/O OS3

[TITLE]

North Fork at Briargate MDDP
 Historic Conditions
 Without Basin OS3 to Powers Blvd

[OPTIONS]

```

FLOW_UNITS           CFS
INFILTRATION         HORTON
FLOW_ROUTING         KINWAVE
START_DATE           01/01/2005
START_TIME           00:00:00
REPORT_START_DATE    01/01/2005
REPORT_START_TIME    00:00:00
END_DATE             01/03/2005
END_TIME             00:00:00
SWEEP_START          10/01
SWEEP_END            10/02
DRY_DAYS             0
REPORT_STEP          24:05:00
WET_STEP             00:05:00
DRY_STEP             01:00:00
ROUTING_STEP         0:00:15
ALLOW_PONDING        YES
INERTIAL_DAMPING      PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
  
```

[FILES]

USE INFLOWS "X:\2510000.all\2510000\Excel\Drainage\EPA SWMMM MODELS & CUHP INPUT_this folder for MDDP report cal

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
  
```

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
basin_OS4	7080	0	0	0	0
basin_H2	7010	0	0	0	0
basin_H3	7025	0	0	0	0
basin_OS5	6910	0	0	0	0
AP6	7025.1	0	0	0	0
AP5	6862.5	0	0	0	0
AP7	6830	0	0	0	0

[OUTFALLS]

;;Name	Invert Elev.	Outfall Type	Stage/Table Time Series	Tide Gate
AP7a	6744	FREE		NO

[CONDUITS]

;;Name	Inlet Node	Outlet Node	Length	Manning N	Inlet Offset	Outlet Offset	Init. Flow	Max. Flow
5	basin_OS4	AP6	400	0.01	0	0	0	0
7	basin_H2	AP5	400	0.01	0	0	0	0
13	basin_H3	AP7	400	0.01	0	0	0	0
14	AP6	AP7	6281	.035	0	0	0	0
15	AP5	AP7	2458	.035	0	0	0	0
17	AP7	AP7a	150	.04	0	0	0	0
18	basin_OS5	AP7	400	0.01	0	0	0	0

Historic SWMM Input W/O OS3

```

[XSECTIONS]
;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
5           DUMMY      0          0          0          0          1
7           DUMMY      0          0          0          0          1
13          DUMMY      0          0          0          0          1
14          TRAPEZOIDAL 3          20         20         20         1
15          TRAPEZOIDAL 2          10         10         20         1
17          TRAPEZOIDAL 6          75         10         10         1
18          DUMMY      0          0          0          0          1

[LOSSES]
;;Link      Inlet      Outlet      Average      Flap Gate
;;-----

[REPORT]
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node      X-Coord      Y-Coord
;;-----
basin_OS4   951.860      9835.886
basin_H2    -2822.757    8829.322
basin_H3    -2964.989    10645.514
basin_OS5   -3446.389    11619.256
AP6         201.342      10053.691
AP5         -3982.495    8347.921
AP7         -4923.414    10131.291
AP7a        -6159.587    10045.924

[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----

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Historic SWMM 2-yr Results W/O OS3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
 Historic Conditions
 Without Basin OS3 to Powers Blvd

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

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
 Flow Routing Method KINWAVE
 Starting Date JAN-01-2005 00:00:00
 Ending Date JAN-03-2005 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 15.00 sec

 Element Count

Number of rain gages 0
 Number of subcatchments ... 0
 Number of nodes 8
 Number of links 7
 Number of pollutants 0
 Number of land uses 0

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	2.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	

 Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400

Historic SWMM 2-yr Results W/O OS3

18 basin_OS5 AP7 CONDUIT 400.0 20.4124 0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.385	0.125
External Outflow	0.422	0.137
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-9.643	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 15.00 sec
Average Time Step : 15.00 sec
Maximum Time Step : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP6	JUNCTION	0.00	0.04	7025.14	0 00:40
AP5	JUNCTION	0.00	0.07	6862.57	0 00:49
AP7	JUNCTION	0.00	0.06	6830.06	0 01:31
AP7a	OUTFALL	0.00	0.02	6744.02	0 00:55

Historic SWMM 2-yr Results W/O OS3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS4	JUNCTION	0.85	0.85	0 00:40	0.021	0.021
basin_H2	JUNCTION	0.56	0.56	0 00:49	0.021	0.021
basin_H3	JUNCTION	2.04	2.04	0 00:51	0.072	0.072
basin_OS5	JUNCTION	0.51	0.51	0 00:38	0.011	0.011
AP6	JUNCTION	0.00	0.85	0 00:40	0.000	0.021
AP5	JUNCTION	0.00	0.56	0 00:49	0.000	0.021
AP7	JUNCTION	0.00	2.63	0 00:55	0.000	0.142
AP7a	OUTFALL	0.00	2.63	0 00:55	0.000	0.137

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pent.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	11.54	0.92	2.63	0.137
System	11.54	0.92	2.63	0.137

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	0.85	0 00:40			
7	DUMMY	0.56	0 00:49			
13	DUMMY	2.04	0 00:51			
14	CONDUIT	0.44	0 01:39	1.15	0.00	0.01
15	CONDUIT	0.41	0 01:31	0.74	0.00	0.03
17	CONDUIT	2.63	0 00:55	2.06	0.00	0.00

Historic SWMM 5-yr Results W/O OS3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
 Historic Conditions
 Without Basin OS3 to Powers Blvd

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

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
 Flow Routing Method KINWAVE
 Starting Date JAN-01-2005 00:00:00
 Ending Date JAN-03-2005 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 15.00 sec

 Element Count

Number of rain gages 0
 Number of subcatchments ... 0
 Number of nodes 8
 Number of links 7
 Number of pollutants 0
 Number of land uses 0

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	2.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	

 Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400

Historic SWMM 5-yr Results W/O OS3

18 basin_OS5 AP7 CONDUIT 400.0 20.4124 0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	4.975	1.621
External Outflow	5.109	1.665
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-2.683	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 15.00 sec
Average Time Step : 15.00 sec
Maximum Time Step : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP6	JUNCTION	0.00	0.11	7025.21	0 00:39
AP5	JUNCTION	0.01	0.32	6862.82	0 00:49
AP7	JUNCTION	0.01	0.30	6830.30	0 01:07
AP7a	OUTFALL	0.00	0.09	6744.09	0 00:54

Historic SWMM 5-yr Results W/O OS3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS4	JUNCTION	4.15	4.15	0 00:39	0.099	0.099
basin_H2	JUNCTION	8.78	8.78	0 00:49	0.304	0.304
basin_H3	JUNCTION	31.93	31.93	0 00:51	1.061	1.061
basin_OS5	JUNCTION	8.22	8.22	0 00:39	0.158	0.158
AP6	JUNCTION	0.00	4.15	0 00:39	0.000	0.099
AP5	JUNCTION	0.00	8.78	0 00:49	0.000	0.304
AP7	JUNCTION	0.00	44.41	0 00:54	0.000	1.669
AP7a	OUTFALL	0.00	44.41	0 00:54	0.000	1.665

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pent.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	13.40	9.61	44.41	1.665
System	13.40	9.61	44.41	1.665

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	4.15	0 00:39			
7	DUMMY	8.78	0 00:49			
13	DUMMY	31.93	0 00:51			
14	CONDUIT	2.52	0 01:27	1.88	0.00	0.03
15	CONDUIT	7.78	0 01:07	1.91	0.02	0.15
17	CONDUIT	44.41	0 00:54	6.31	0.00	0.02

Historic SWMM 10-yr Results W/O OS3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
 Historic Conditions
 Without Basin OS3 to Powers Blvd

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

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
 Flow Routing Method KINWAVE
 Starting Date JAN-01-2005 00:00:00
 Ending Date JAN-03-2005 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 15.00 sec

 Element Count

Number of rain gages 0
 Number of subcatchments ... 0
 Number of nodes 8
 Number of links 7
 Number of pollutants 0
 Number of land uses 0

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	2.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	

 Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400

Historic SWMM 10-yr Results W/O OS3

18 basin_OS5 AP7 CONDUIT 400.0 20.4124 0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	9.050	2.949
External Outflow	9.224	3.006
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-1.918	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 15.00 sec
Average Time Step : 15.00 sec
Maximum Time Step : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP6	JUNCTION	0.00	0.14	7025.24	0 00:39
AP5	JUNCTION	0.02	0.41	6862.91	0 00:50
AP7	JUNCTION	0.02	0.40	6830.40	0 01:05
AP7a	OUTFALL	0.01	0.13	6744.13	0 00:54

Historic SWMM 10-yr Results W/O OS3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS4	JUNCTION	6.31	6.31	0 00:39	0.164	0.164
basin_H2	JUNCTION	14.71	14.71	0 00:50	0.557	0.557
basin_H3	JUNCTION	53.50	53.50	0 00:51	1.940	1.940
basin_OS5	JUNCTION	13.33	13.33	0 00:38	0.288	0.288
AP6	JUNCTION	0.00	6.31	0 00:39	0.000	0.164
AP5	JUNCTION	0.00	14.71	0 00:50	0.000	0.557
AP7	JUNCTION	0.00	76.44	0 00:54	0.000	3.010
AP7a	OUTFALL	0.00	76.44	0 00:54	0.000	3.006

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pent.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	14.01	16.60	76.44	3.006
System	14.01	16.60	76.44	3.006

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	6.31	0 00:39			
7	DUMMY	14.71	0 00:50			
13	DUMMY	53.50	0 00:51			
14	CONDUIT	4.16	0 01:27	2.06	0.00	0.04
15	CONDUIT	13.50	0 01:05	2.20	0.03	0.20
17	CONDUIT	76.44	0 00:54	7.81	0.00	0.02

Historic SWMM 25-yr Results W/O OS3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
 Historic Conditions
 Without Basin OS3 to Powers Blvd

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

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
 Flow Routing Method KINWAVE
 Starting Date JAN-01-2005 00:00:00
 Ending Date JAN-03-2005 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 15.00 sec

 Element Count

Number of rain gages 0
 Number of subcatchments ... 0
 Number of nodes 8
 Number of links 7
 Number of pollutants 0
 Number of land uses 0

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	2.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	

 Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400

Historic SWMM 25-yr Results W/O OS3

18 basin_OS5 AP7 CONDUIT 400.0 20.4124 0.0100

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	21.979	7.162
External Outflow	22.240	7.247
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-1.188	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 15.00 sec
Average Time Step : 15.00 sec
Maximum Time Step : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP6	JUNCTION	0.01	0.23	7025.33	0 00:44
AP5	JUNCTION	0.03	0.65	6863.15	0 00:57
AP7	JUNCTION	0.03	0.64	6830.64	0 01:08
AP7a	OUTFALL	0.01	0.22	6744.22	0 01:00

Historic SWMM 25-yr Results W/O OS3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS4	JUNCTION	13.78	13.78	0 00:44	0.360	0.360
basin_H2	JUNCTION	36.07	36.07	0 00:57	1.359	1.359
basin_H3	JUNCTION	131.06	131.06	0 00:58	4.738	4.738
basin_OS5	JUNCTION	30.88	30.88	0 00:44	0.704	0.704
AP6	JUNCTION	0.00	13.78	0 00:44	0.000	0.360
AP5	JUNCTION	0.00	36.07	0 00:57	0.000	1.359
AP7	JUNCTION	0.00	193.70	0 01:00	0.000	7.251
AP7a	OUTFALL	0.00	193.69	0 01:00	0.000	7.247

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pent.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	14.43	38.86	193.69	7.247
System	14.43	38.86	193.69	7.247

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	13.78	0 00:44			
7	DUMMY	36.07	0 00:57			
13	DUMMY	131.06	0 00:58			
14	CONDUIT	10.24	0 01:20	2.65	0.00	0.06
15	CONDUIT	34.48	0 01:08	2.85	0.08	0.32
17	CONDUIT	193.69	0 01:00	11.23	0.00	0.04

Historic SWMM 50-yr Results W/O OS3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
 Historic Conditions
 Without Basin OS3 to Powers Blvd

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

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
 Flow Routing Method KINWAVE
 Starting Date JAN-01-2005 00:00:00
 Ending Date JAN-03-2005 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Routing Time Step 15.00 sec

 Element Count

Number of rain gages 0
 Number of subcatchments ... 0
 Number of nodes 8
 Number of links 7
 Number of pollutants 0
 Number of land uses 0

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	2.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	

 Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400

Historic SWMM 50-yr Results W/O OS3

18 basin_OS5 AP7 CONDUIT 400.0 20.4124 0.0100

 Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	28.239	9.202
External Outflow	28.534	9.298
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-1.045	

 Highest Flow Instability Indexes

 All links are stable.

 Routing Time Step Summary

Minimum Time Step : 15.00 sec
 Average Time Step : 15.00 sec
 Maximum Time Step : 15.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 1.00

 Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP6	JUNCTION	0.01	0.26	7025.36	0 00:44
AP5	JUNCTION	0.03	0.73	6863.23	0 00:57
AP7	JUNCTION	0.04	0.71	6830.71	0 01:07
AP7a	OUTFALL	0.01	0.26	6744.26	0 01:00

Historic SWMM 50-yr Results W/O OS3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS4	JUNCTION	17.11	17.11	0 00:44	0.458	0.458
basin_H2	JUNCTION	45.37	45.37	0 00:57	1.747	1.747
basin_H3	JUNCTION	164.82	164.82	0 00:58	6.091	6.091
basin_OS5	JUNCTION	38.66	38.66	0 00:43	0.905	0.905
AP6	JUNCTION	0.00	17.11	0 00:44	0.000	0.458
AP5	JUNCTION	0.00	45.37	0 00:57	0.000	1.747
AP7	JUNCTION	0.00	245.36	0 01:00	0.000	9.302
AP7a	OUTFALL	0.00	245.35	0 01:00	0.000	9.297

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pent.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	14.64	49.12	245.35	9.297
System	14.64	49.12	245.35	9.297

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	17.11	0 00:44			
7	DUMMY	45.37	0 00:57			
13	DUMMY	164.82	0 00:58			
14	CONDUIT	13.02	0 01:19	2.85	0.01	0.07
15	CONDUIT	43.67	0 01:07	3.02	0.10	0.36
17	CONDUIT	245.35	0 01:00	12.30	0.00	0.04

Historic SWMM 100-yr Results W/O OS3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Historic Conditions
Without Basin OS3 to Powers Blvd

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 8
Number of links 7
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_H2	JUNCTION	7010.00	0.00	0.0	
basin_H3	JUNCTION	7025.00	0.00	0.0	
basin_OS5	JUNCTION	6910.00	0.00	0.0	
AP6	JUNCTION	7025.10	3.00	0.0	
AP5	JUNCTION	6862.50	2.00	0.0	
AP7	JUNCTION	6830.00	6.00	0.0	
AP7a	OUTFALL	6744.00	6.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
5	basin_OS4	AP6	CONDUIT	400.0	13.8561	0.0100
7	basin_H2	AP5	CONDUIT	400.0	39.6706	0.0100
13	basin_H3	AP7	CONDUIT	400.0	55.8341	0.0100
14	AP6	AP7	CONDUIT	6281.0	3.1077	0.0350
15	AP5	AP7	CONDUIT	2458.0	1.3223	0.0350
17	AP7	AP7a	CONDUIT	150.0	69.9765	0.0400

Historic SWMM 100-yr Results W/O OS3

18 basin_OS5 AP7 CONDUIT 400.0 20.4124 0.0100

 Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
7	DUMMY	0.00	0.00	0.00	0.00	1	0.00
13	DUMMY	0.00	0.00	0.00	0.00	1	0.00
14	TRAPEZOIDAL	3.00	240.00	1.71	140.00	1	2571.15
15	TRAPEZOIDAL	2.00	80.00	1.14	70.00	1	426.34
17	TRAPEZOIDAL	6.00	810.00	4.14	195.00	1	64913.21
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	32.871	10.711
External Outflow	33.181	10.812
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.944	

 Highest Flow Instability Indexes

 All links are stable.

 Routing Time Step Summary

Minimum Time Step : 15.00 sec
 Average Time Step : 15.00 sec
 Maximum Time Step : 15.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 1.00

 Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_H2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_H3	JUNCTION	0.00	0.00	7025.00	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6910.00	0 00:00
AP6	JUNCTION	0.01	0.27	7025.37	0 00:45
AP5	JUNCTION	0.03	0.78	6863.28	0 00:58
AP7	JUNCTION	0.04	0.76	6830.76	0 01:10
AP7a	OUTFALL	0.01	0.28	6744.28	0 01:01

Historic SWMM 100-yr Results W/O OS3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
basin_OS4	JUNCTION	19.17	19.17	0 00:45	0.526	0.526
basin_H2	JUNCTION	51.88	51.88	0 00:58	2.035	2.035
basin_H3	JUNCTION	188.47	188.47	0 00:59	7.095	7.095
basin_OS5	JUNCTION	43.32	43.32	0 00:44	1.054	1.054
AP6	JUNCTION	0.00	19.17	0 00:45	0.000	0.526
AP5	JUNCTION	0.00	51.88	0 00:58	0.000	2.035
AP7	JUNCTION	0.00	282.73	0 01:01	0.000	10.816
AP7a	OUTFALL	0.00	282.73	0 01:01	0.000	10.812

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_H2	JUNCTION	48.00	0.000	0.000
basin_H3	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq. Pent.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP7a	14.68	56.98	282.73	10.812
System	14.68	56.98	282.73	10.812

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
5	DUMMY	19.17	0 00:45			
7	DUMMY	51.88	0 00:58			
13	DUMMY	188.47	0 00:59			
14	CONDUIT	15.37	0 01:20	3.00	0.01	0.08
15	CONDUIT	50.37	0 01:10	3.15	0.12	0.38
17	CONDUIT	282.73	0 01:01	12.98	0.00	0.05

APPENDIX C
FUTURE CUHP & SWMM MODELING

COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: North Fork at Kettle Creek
 Location: Colorado Springs

Project Name: North Fork at Kettle Creek
 Project No.: 251000.00
 Calculated By: CEB
 Checked By: _____
 Date: 3/25/14

Basin ID	Total Area (ac)	Roadway			SFR 1/8 ac/du			SFR 1 ac/du			Open Space			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
OS1	13.3*													34.5*
OS2	17.2*													8.3*
OS3	146.60	100	0.00	0.0	46		0.0	7	146.60	7.0	2	0.00	0.0	7.0
OS4	12.50	100	0.00	0.0	46		0.0	8	12.50	8.0	2	0.00	0.0	8.0
OS5	25.40	100	0.00	0.0	46		0.0	30	25.40	30.0	2	0.00	0.0	30.0
D1	44.00	100	1.25	2.8	46	14.94	15.6	20	20.09	9.1	5	7.72	0.9	28.4
D1a	6.80	100	3.57	52.5	46	2.68	18.1	20	0.00	0.0	5	0.55	0.4	71.0
D1b	4.70	100	3.80	80.9	46	0.00	0.0	20	0.90	3.8	5	0.00	0.0	84.7
D2	20.00	100	1.79	9.0	46	7.80	17.9	20	10.41	10.4	5	0.00	0.0	37.3
D3	17.30													50.0
D4	5.60	100	0.00	0.0	46	0.00	0.0	20	0.00	0.0	2	5.60	2.0	2.0
D5	24.80	100	3.40	13.7	46	15.40	28.6	20	0.00	0.0	5	6.00	1.2	43.5
D6	45.20	100	4.30	9.5	46	40.90	41.6	20	0.00	0.0	5	0.00	0.0	51.1
D6a	8.30	100	0.00	0.0	65	8.30	65.0	20	0.00	0.0	5	0.00	0.0	65.0
D7	48.90	100	0.00	0.0	46	40.50	38.1	20	0.00	0.0	5	8.40	0.9	39.0
D8	47.90	100	7.30	15.2	46	33.60	32.3	20	0.00	0.0	5	8.00	0.8	48.3

Note: Areas that are designated as Single Family Residential Include the adjacent roadway in the % Imp. Impervious value for 1/8 ac/du is an interpretation from the DCM between the values for 1/4 and 1/8 ac/du based on a density of 1/7 ac/du. The multifamily basin has assumed a 65% impervious. Basin OS5 assumes a 1/3 ac/du density. Basin D3, the future school site has been assumed to be 50% impervious per the UDFCD criteria for Schools.

* Values for OS1 and OS2 taken from the Old Ranch Road Tributary DBPS.

TABLE 5-5
RUNOFF CURVE NUMBERS FOR HYDROLOGIC SOIL
COVER COMPLEXES - URBAN AND SUBURBAN CONDITIONS 1/
(Antecedent Moisture Condition II)
(From: U.S. Dept. of Agriculture,
Soil Conservation Service, 1977)

<u>Land Use</u>	<u>Hydrologic Soil Group</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Open spaces, lawns, parks, golf courses, cemeteries, etc.				
Good condition: grass cover on 75% or more of the area	39*	61	74	80
Fair condition: grass cover on 50% to 75% of the area	49*	69	79	84
Commercial and Business areas (85% Impervious)	89*	92	94	95
Industrial Districts (72% Impervious)	81*	88	91	93
Residential: <u>2/</u>				
<u>Acres per Dwelling Unit</u>	<u>Average %</u>			
	<u>Impervious</u>	<u>3/</u>		
1/8 acre or less	65	77*	85	90
1/4 acre	38	61*	75	83
1/3 acre	30	57*	72	81
1/2 acre	25	54*	70	80
1 acre	20	51*	68	79
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and Roads:				
paved with curbs and storm sewers	98	98	98	98
gravel	76*	85	89	91
dirt	72*	82	87	89

1/ For a more detailed description of agricultural land use curve numbers, refer to the National Engineering Handbook (U.S. Dept. of Agriculture, Soil Conservation Service, 1972).

2/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

3/ The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

* Not to be used wherever overlot grading or filling is to occur.

Proposed CUHP Input

Summary of CUHP Input Parameters (Version 1.4.0)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	
OS1	basin_OS1	2YR PRECIP	0.021	0.127	0.314	0.035	34.5	0.40	0.05	4.50	0.60	0.0018	0.00	0.69	0.18	31.32
OS2	basin_OS2	2YR PRECIP	0.027	0.144	0.343	0.030	8.3	0.40	0.05	4.50	0.60	0.0018	0.00	0.17	0.08	6.26
OS3	basin_OS3	2YR PRECIP	0.229	0.478	1.127	0.030	7.0	0.40	0.05	4.50	0.60	0.0018	0.00	0.14	0.07	5.23
OS4	basin_OS4	2YR PRECIP	0.020	0.095	0.258	0.030	8.0	0.40	0.05	4.50	0.60	0.0018	0.00	0.16	0.08	6.02
OS5	basin_OS5	2YR PRECIP	0.040	0.127	0.294	0.033	30.0	0.40	0.10	4.50	0.60	0.0018	0.00	0.60	0.17	26.57
D1	basin_D1	2YR PRECIP	0.069	0.207	0.410	0.020	28.4	0.35	0.10	4.50	0.60	0.0018	0.00	0.57	0.16	24.94
D1a	basin_D1a	2YR PRECIP	0.011	0.197	0.341	0.015	71.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.92	0.30	69.19
D1b	basin_D1b	2YR PRECIP	0.007	0.133	0.218	0.038	84.7	0.35	0.10	4.50	0.60	0.0018	0.00	0.95	0.35	83.39
D2	basin_D2	2YR PRECIP	0.031	0.135	0.298	0.020	37.3	0.35	0.10	4.50	0.60	0.0018	0.00	0.75	0.19	34.38
D3	basin_D3	2YR PRECIP	0.027	0.120	0.226	0.033	50.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.85	0.23	47.57
D4	basin_D4	2YR PRECIP	0.009	0.052	0.108	0.036	2.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.00	0.02	1.43
D5	basin_D5	2YR PRECIP	0.039	0.161	0.371	0.030	43.5	0.35	0.10	4.50	0.60	0.0018	0.00	0.82	0.21	40.94
D6	basin_D6	2YR PRECIP	0.071	0.449	0.653	0.032	51.1	0.35	0.10	4.50	0.60	0.0018	0.00	0.86	0.23	48.70
D6a	basin_D6a	2YR PRECIP	0.013	0.114	0.157	0.032	65.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.91	0.29	63.05
D7	basin_D7	2YR PRECIP	0.076	0.388	0.777	0.035	39.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.78	0.20	36.29
D8	basin_D8	2YR PRECIP	0.075	0.341	0.728	0.034	48.3	0.35	0.10	4.50	0.60	0.0018	0.00	0.84	0.22	45.82

Proposed CUHP 2-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.213	0.231	20.6	3.95	10.7	2.79	6.6	30	48,279	0.35	16,996	34.0	6	16,996	0.44
OS2		0.279	0.177	40.3	5.78	21.0	4.09	9.6	20	62,436	0.07	4,166	42.0	1	4,166	0.06
OS3		0.147	0.249	47.7	9.43	24.8	6.66	15.7	144	532,158	0.06	29,649	47.0	7	29,648	0.05
OS4		0.310	0.170	33.4	4.66	17.4	3.29	7.8	18	45,375	0.06	2,912	40.0	1	2,912	0.07
OS5		0.182	0.226	17.6	3.36	9.2	2.37	5.6	68	92,202	0.29	26,518	33.0	10	26,518	0.41
D1		0.156	0.237	24.1	4.68	12.5	3.31	7.8	85	159,720	0.28	45,224	36.0	15	45,220	0.33
D1a		0.214	0.380	19.7	6.07	10.3	4.29	10.1	16	24,684	0.77	18,888	35.0	6	18,885	0.92
D1b		0.227	0.387	11.0	3.57	5.7	2.52	5.9	20	17,061	0.92	15,715	31.0	7	15,712	1.53
D2		0.183	0.266	17.8	3.92	9.2	2.77	6.5	53	72,600	0.39	27,999	34.0	10	27,991	0.52
D3		0.178	0.350	9.6	2.87	5.0	2.03	4.8	85	62,799	0.53	33,216	30.0	17	33,209	0.98
D4		0.445	0.166	23.2	3.26	12.0	2.30	5.4	11	20,328	0.03	570	38.0	0	570	0.05
D5		0.165	0.327	14.2	3.86	7.4	2.73	6.4	82	90,024	0.46	41,110	32.0	17	41,095	0.70
D6		0.131	0.411	19.0	6.28	9.9	4.44	10.5	112	164,076	0.54	88,804	36.0	31	88,787	0.69
D6a		0.207	0.374	8.5	2.76	4.4	1.95	4.6	46	30,129	0.70	21,031	29.0	11	21,020	1.32
D7		0.137	0.320	25.2	6.49	13.1	4.58	10.8	91	177,507	0.41	72,083	38.0	21	72,084	0.44
D8		0.131	0.396	17.9	5.75	9.3	4.06	9.6	125	173,877	0.51	88,662	35.0	32	88,653	0.67

Proposed CUHP 5-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.211	0.235	20.1	3.93	10.5	2.78	6.5	31	48,279	0.65	31,557	34.0	11	31,554	0.86
OS2		0.275	0.176	40.1	5.71	20.9	4.04	9.5	20	62,436	0.30	18,479	42.0	5	18,478	0.29
OS3		0.146	0.247	47.6	9.33	24.7	6.59	15.5	144	532,158	0.28	149,102	47.0	35	149,099	0.24
OS4		0.306	0.168	33.3	4.60	17.3	3.25	7.7	18	45,375	0.29	13,264	39.0	4	13,264	0.33
OS5		0.180	0.230	17.1	3.33	8.9	2.36	5.6	69	92,202	0.58	53,348	33.0	22	53,341	0.88
D1		0.154	0.241	23.5	4.65	12.2	3.28	7.7	88	159,720	0.59	94,654	36.0	33	94,653	0.75
D1a		0.213	0.382	19.6	6.06	10.2	4.28	10.1	16	24,684	1.16	28,617	35.0	10	28,612	1.40
D1b		0.227	0.388	11.0	3.57	5.7	2.52	5.9	20	17,061	1.34	22,921	30.0	10	22,917	2.20
D2		0.182	0.271	17.4	3.91	9.0	2.76	6.5	54	72,600	0.71	51,650	33.0	21	51,642	1.05
D3		0.177	0.353	9.5	2.86	4.9	2.02	4.8	86	62,799	0.88	55,261	30.0	30	55,258	1.74
D4		0.444	0.166	23.2	3.25	12.0	2.30	5.4	11	20,328	0.27	5,475	36.0	3	5,475	0.46
D5		0.165	0.332	13.9	3.85	7.2	2.72	6.4	83	90,024	0.79	71,494	32.0	33	71,474	1.31
D6		0.131	0.414	18.7	6.26	9.7	4.43	10.4	113	164,076	0.89	146,766	35.0	54	146,743	1.19
D6a		0.206	0.376	8.5	2.75	4.4	1.94	4.6	46	30,129	1.08	32,519	29.0	17	32,496	2.10
D7		0.137	0.326	24.7	6.46	12.8	4.57	10.8	93	177,507	0.73	130,394	38.0	41	130,376	0.85
D8		0.131	0.400	17.7	5.73	9.2	4.05	9.5	127	173,877	0.86	149,093	35.0	57	149,098	1.20

Proposed CUHP 10-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.211	0.237	19.9	3.92	10.3	2.77	6.5	31	48,279	0.87	42,068	34.0	15	42,062	1.12
OS2		0.274	0.175	40.0	5.69	20.8	4.02	9.5	20	62,436	0.49	30,404	42.0	8	30,404	0.44
OS3		0.145	0.246	47.5	9.29	24.7	6.56	15.5	145	532,158	0.47	249,865	47.0	55	249,861	0.37
OS4		0.304	0.168	33.3	4.58	17.3	3.24	7.6	18	45,375	0.48	21,913	39.0	6	21,913	0.50
OS5		0.180	0.232	17.0	3.32	8.8	2.35	5.5	70	92,202	0.79	73,262	33.0	30	73,243	1.18
D1		0.154	0.243	23.2	4.63	12.1	3.27	7.7	89	159,720	0.81	128,949	35.0	43	128,946	0.99
D1a		0.213	0.382	19.6	6.05	10.2	4.28	10.1	16	24,684	1.41	34,799	35.0	11	34,791	1.66
D1b		0.227	0.388	11.0	3.56	5.7	2.52	5.9	20	17,061	1.61	27,405	30.0	12	27,399	2.58
D2		0.182	0.273	17.2	3.90	8.9	2.76	6.5	55	72,600	0.93	67,682	33.0	27	67,674	1.35
D3		0.177	0.354	9.4	2.86	4.9	2.02	4.8	86	62,799	1.11	69,804	30.0	37	69,803	2.16
D4		0.443	0.166	23.2	3.25	12.0	2.29	5.4	11	20,328	0.45	9,193	35.0	4	9,193	0.68
D5		0.164	0.333	13.9	3.85	7.2	2.72	6.4	84	90,024	1.02	91,807	32.0	41	91,788	1.65
D6		0.131	0.416	18.6	6.25	9.7	4.42	10.4	114	164,076	1.13	184,923	35.0	66	184,908	1.47
D6a		0.206	0.376	8.5	2.75	4.4	1.94	4.6	46	30,129	1.32	39,898	28.0	21	39,866	2.55
D7		0.136	0.328	24.4	6.46	12.7	4.56	10.8	94	177,507	0.96	169,749	37.0	53	169,730	1.08
D8		0.130	0.402	17.6	5.72	9.1	4.04	9.5	128	173,877	1.09	189,092	34.0	71	189,105	1.49

Proposed CUHP 25-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.210	0.240	19.6	3.91	10.2	2.76	6.5	32	48,279	1.44	69,442	39.0	26	69,431	1.93
OS2		0.272	0.174	39.9	5.65	20.8	3.99	9.4	20	62,436	1.06	66,467	48.0	17	66,467	0.96
OS3		0.144	0.245	47.4	9.23	24.7	6.52	15.4	145	532,158	1.05	557,660	54.0	125	557,659	0.85
OS4		0.302	0.167	33.2	4.55	17.2	3.22	7.6	18	45,375	1.06	48,130	44.0	14	48,129	1.10
OS5		0.179	0.235	16.7	3.31	8.7	2.34	5.5	71	92,202	1.36	125,711	38.0	52	125,690	2.06
D1		0.153	0.245	22.9	4.61	11.9	3.26	7.7	90	159,720	1.38	219,915	41.0	76	219,906	1.73
D1a		0.213	0.383	19.6	6.05	10.2	4.27	10.1	16	24,684	1.96	48,487	40.0	16	48,478	2.43
D1b		0.227	0.388	10.9	3.56	5.7	2.52	5.9	20	17,061	2.16	36,809	34.0	17	36,801	3.53
D2		0.181	0.275	17.0	3.89	8.8	2.75	6.5	55	72,600	1.50	108,763	38.0	44	108,765	2.20
D3		0.177	0.356	9.4	2.86	4.9	2.02	4.8	87	62,799	1.67	105,041	34.0	57	105,037	3.30
D4		0.443	0.165	23.2	3.24	12.0	2.29	5.4	11	20,328	1.03	21,014	41.0	8	21,013	1.43
D5		0.164	0.335	13.7	3.84	7.1	2.71	6.4	85	90,024	1.58	142,522	36.0	64	142,490	2.60
D6		0.131	0.418	18.5	6.24	9.6	4.41	10.4	114	164,076	1.69	276,921	40.0	104	276,906	2.29
D6a		0.206	0.377	8.4	2.75	4.4	1.94	4.6	46	30,129	1.88	56,672	33.0	31	56,622	3.71
D7		0.136	0.331	24.2	6.44	12.6	4.55	10.7	95	177,507	1.52	270,065	43.0	88	270,062	1.80
D8		0.130	0.404	17.5	5.71	9.1	4.04	9.5	129	173,877	1.65	286,759	39.0	112	286,762	2.33

Proposed CUHP 50-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.210	0.241	19.5	3.90	10.1	2.76	6.5	32	48,279	1.74	84,004	39.0	31	83,990	2.31
OS2		0.271	0.174	39.9	5.63	20.7	3.98	9.4	20	62,436	1.35	84,367	48.0	21	84,366	1.19
OS3		0.144	0.245	47.4	9.21	24.6	6.51	15.3	145	532,158	1.33	709,640	53.0	155	709,641	1.06
OS4		0.301	0.167	33.1	4.54	17.2	3.21	7.6	18	45,375	1.35	61,127	44.0	17	61,126	1.37
OS5		0.178	0.236	16.6	3.31	8.6	2.34	5.5	72	92,202	1.66	153,308	37.0	63	153,293	2.49
D1		0.153	0.247	22.7	4.60	11.8	3.25	7.7	91	159,720	1.68	267,583	41.0	92	267,567	2.08
D1a		0.213	0.383	19.5	6.04	10.2	4.27	10.1	16	24,684	2.28	56,358	40.0	19	56,347	2.81
D1b		0.227	0.388	10.9	3.56	5.7	2.52	5.9	20	17,061	2.48	42,337	34.0	19	42,328	4.04
D2		0.181	0.277	16.9	3.89	8.8	2.75	6.5	56	72,600	1.80	130,774	38.0	53	130,773	2.63
D3		0.177	0.356	9.3	2.86	4.9	2.02	4.8	87	62,799	1.98	124,479	33.0	67	124,469	3.89
D4		0.442	0.165	23.2	3.24	12.0	2.29	5.4	11	20,328	1.32	26,732	41.0	10	26,730	1.76
D5		0.164	0.336	13.7	3.84	7.1	2.71	6.4	85	90,024	1.89	170,107	36.0	76	170,072	3.08
D6		0.130	0.418	18.5	6.24	9.6	4.41	10.4	115	164,076	2.00	327,795	40.0	122	327,786	2.70
D6a		0.206	0.378	8.4	2.74	4.4	1.94	4.6	46	30,129	2.20	66,185	33.0	36	66,126	4.31
D7		0.136	0.333	24.0	6.44	12.5	4.55	10.7	95	177,507	1.83	324,053	42.0	105	324,045	2.14
D8		0.130	0.405	17.4	5.71	9.1	4.03	9.5	129	173,877	1.96	340,438	39.0	132	340,437	2.75

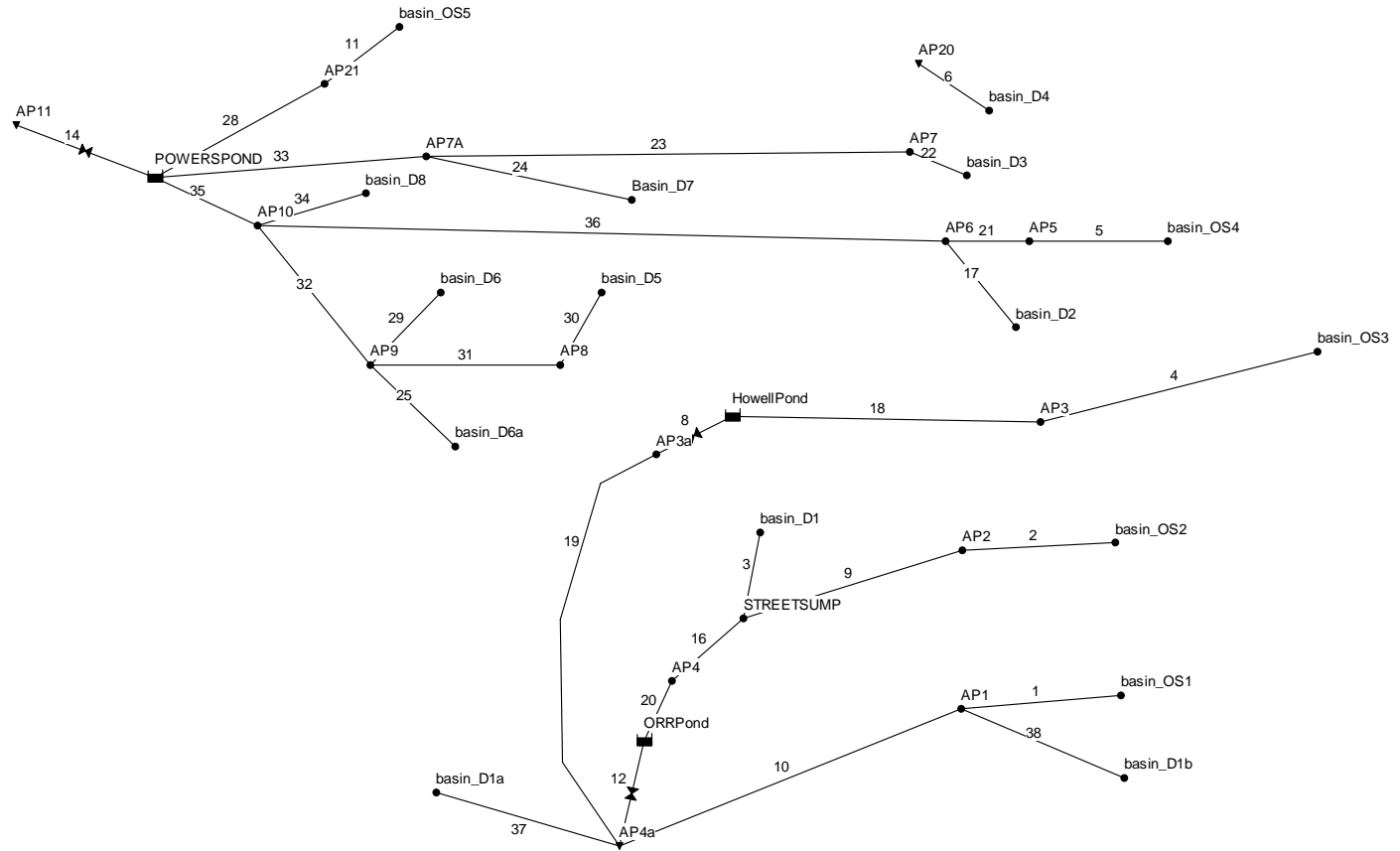
Proposed CUHP 100-yr Results

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.0)

Catchment Name/ID	User Comment for Catchment	Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
		Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
OS1		0.210	0.241	19.5	3.90	10.1	2.76	6.5	32	48,279	1.92	92,620	39.0	34	92,605	2.54
OS2		0.271	0.174	39.9	5.62	20.7	3.97	9.4	20	62,436	1.55	96,927	49.0	23	96,927	1.35
OS3		0.144	0.245	47.4	9.20	24.6	6.50	15.3	145	532,158	1.54	817,502	54.0	176	817,503	1.20
OS4		0.301	0.166	33.1	4.53	17.2	3.20	7.6	18	45,375	1.55	70,271	45.0	19	70,270	1.53
OS5		0.178	0.236	16.6	3.30	8.6	2.34	5.5	72	92,202	1.84	170,099	38.0	70	170,087	2.74
D1		0.153	0.247	22.7	4.60	11.8	3.25	7.7	91	159,720	1.86	296,882	41.0	101	296,868	2.28
D1a		0.213	0.383	19.5	6.04	10.2	4.27	10.1	16	24,684	2.43	60,075	40.0	20	60,065	3.01
D1b		0.227	0.388	10.9	3.56	5.7	2.52	5.9	20	17,061	2.62	44,752	35.0	20	44,742	4.30
D2		0.181	0.277	16.8	3.89	8.8	2.75	6.5	56	72,600	1.98	143,556	38.0	57	143,556	2.87
D3		0.177	0.357	9.3	2.85	4.8	2.02	4.8	87	62,799	2.15	134,904	35.0	72	134,891	4.17
D4		0.442	0.165	23.2	3.24	12.0	2.29	5.4	11	20,328	1.52	30,972	41.0	11	30,970	1.96
D5		0.164	0.337	13.7	3.83	7.1	2.71	6.4	85	90,024	2.06	185,502	37.0	83	185,462	3.35
D6		0.130	0.419	18.5	6.24	9.6	4.41	10.4	115	164,076	2.16	354,890	40.0	132	354,883	2.91
D6a		0.206	0.378	8.4	2.74	4.4	1.94	4.6	46	30,129	2.35	70,851	33.0	38	70,787	4.55
D7		0.136	0.333	24.0	6.44	12.5	4.55	10.7	96	177,507	2.00	355,044	43.0	114	355,036	2.33
D8		0.130	0.405	17.4	5.71	9.0	4.03	9.5	129	173,877	2.13	369,528	40.0	143	369,525	2.98

North Fork at Briargate MDDP

01/01/2005 00:05:00



Proposed SWMM Input

[TITLE]

North Fork at Briargate MDDP
Proposed Conditions

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        HORTON
FLOW_ROUTING        KINWAVE
START_DATE          01/01/2005
START_TIME          00:00:00
REPORT_START_DATE   01/01/2005
REPORT_START_TIME   00:00:00
END_DATE            01/03/2005
END_TIME            00:00:00
SWEEP_START         10/01
SWEEP_END           10/02
DRY_DAYS            0
REPORT_STEP         00:05:00
WET_STEP            00:05:00
DRY_STEP            01:00:00
ROUTING_STEP        0:00:15
ALLOW_PONDING       YES
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0
    
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[FILES]

USE INFLOWS "X:\2510000.all\2510000\Excel\Drainage\EPA SWMM MODELS & CUHP INPUT_this folder for MDDP report cal

[EVAPORATION]

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;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
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[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
basin_OS1	7100	0	0	0	0
basin_OS2	7120	5	0	0	0
basin_OS3	7200	0	0	0	0
basin_OS4	7080	0	0	0	0
basin_D1	7026.05	0	0	0	0
basin_D2	7010	0	0	0	0
basin_D3	7020	0	0	0	0
basin_D4	7010.5	0	0	0	0
basin_OS5	6906	0	0	0	0
AP1	7019.5	0	0	0	0
AP4	6964	0	0	0	0
AP6	6993.9	0	0	0	0
AP9	6876	0	0	0	0
AP21	6854	0	0	0	0
AP2	7026.9	0	0	0	0
AP3	7007.75	0	0	0	0
AP3a	6985	0	0	0	0
basin_D6a	7025	0	0	0	0
STREETSUMP	6985.5	0	0	0	0
AP5	7015	0	0	0	0
AP7	6983	0	0	0	0
AP7A	6842	0	0	0	0
Basin_D7	06994	0	0	0	0
basin_D6	6955	0	0	0	0
AP10	6849.47	0	0	0	0
basin_D5	6994.85	0	0	0	0
AP8	6937.55	0	0	0	0
basin_D8	6983	0	0	0	0
basin_D1a	7100	0	0	0	0
basin_D1b	7100	0	0	0	0

Proposed SWMM Input

[OUTFALLS]

;;Name	Invert Elev.	Outfall Type	Stage/Table Time Series	Tide Gate
AP4a	6961.34	FREE		NO
AP11	6816	FREE		NO
AP20	6989.5	FREE		NO

[STORAGE]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Storage Curve	Curve Params	Ponded Area	Evap. Frac.	Infiltration
HowellPond	6990	13	0	TABULAR	Howell_Pond	0	0	
ORRPond	6962	7	0	TABULAR	ORR_Pond	0	0	
POWERSPOND	6826	14	0	TABULAR	Powers_Pond	0	0	

[CONDUITS]

;;Name	Inlet Node	Outlet Node	Length	Manning N	Inlet Offset	Outlet Offset	Init. Flow	Max. Flow
1	basin_OS1	AP1	400	0.01	0	0	0	0
2	basin_OS2	AP2	400	0.01	0	0	0	0
3	basin_D1	STREETSUMP	400	0.01	0	0	0	0
4	basin_OS3	AP3	400	0.01	0	0	0	0
6	basin_D4	AP20	400	0.01	0	0	0	0
9	AP2	STREETSUMP	585	.03	0	0	0	0
10	AP1	AP4a	1211	.025	0	0	0	0
11	basin_OS5	AP21	400	0.01	0	0	0	0
18	AP3	HowellPond	400	0.01	0	0	0	0
19	AP3a	AP4a	1460	.013	0	0	0	0
25	basin_D6a	AP9	400	0.01	0	0	0	0
28	AP21	POWERSPOND	540	.015	0	0	0	0
5	basin_OS4	AP5	400	.02	0	0	0	0
16	STREETSUMP	AP4	123	.013	0	0	0	0
17	basin_D2	AP6	400	0.01	0	0	0	0
20	AP4	ORRPond	400	0.01	0	0	0	0
21	AP5	AP6	1022	.018	0	0	0	0
22	basin_D3	AP7	400	0.01	0	0	0	0
23	AP7	AP7A	3800	.03	0	0	0	0
24	Basin_D7	AP7A	400	0.01	0	0	0	0
29	basin_D6	AP9	400	0.01	0	0	0	0
30	basin_D5	AP8	400	0.01	0	0	0	0
31	AP8	AP9	1174	.018	0	0	0	0
32	AP9	AP10	1870	0.01	0	0	0	0
33	AP7A	POWERSPOND	187	.013	0	8	0	0
34	basin_D8	AP10	400	0.01	0	0	0	0
35	AP10	POWERSPOND	128	.013	0	8	0	0
36	AP6	AP10	400	.018	0	0	0	0
37	basin_D1a	AP4a	400	0.01	0	0	0	0
38	basin_D1b	AP1	400	0.01	0	0	0	0

[ORIFICES]

;;Name	Inlet Node	Outlet Node	Orifice Type	Crest Height	Disch. Coeff.	Flap Gate	Open/Close Time
8	HowellPond	AP3a	SIDE	0	.61	NO	0

[OUTLETS]

;;Name	Inlet Node	Outlet Node	Outflow Height	Outlet Type	Qcoeff/QTable	Qexpon	Flap Gate
12	ORRPond	AP4a	0	TABULAR/DEPTH	ORRPondOutlet		NO
14	POWERSPOND	AP11	0	TABULAR/DEPTH	PowersPondOutlet		NO

[XSECTIONS]

;;Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels
1	DUMMY	0	0	0	0	1
2	DUMMY	0	0	0	0	1
3	DUMMY	0	0	0	0	1
4	DUMMY	0	0	0	0	1
6	DUMMY	0	0	0	0	1
9	DUMMY	0	0	0	0	1
10	DUMMY	0	0	0	0	1

Proposed SWMM Input

```

11          DUMMY          0          0          0          0          1
18          DUMMY          0          0          0          0          1
19          CIRCULAR        1.5        0          0          0          1
25          DUMMY          0          0          0          0          1
28          DUMMY          0          0          0          0          1
5           DUMMY          0          0          0          0          1
16          CIRCULAR        4          0          0          0          1
17          DUMMY          0          0          0          0          1
20          DUMMY          0          0          0          0          1
21          IRREGULAR        StreetSection-localresidential 0          0          0          1
22          DUMMY          0          0          0          0          1
23          TRAPEZOIDAL     4          10         4          0.4         1
24          DUMMY          0          0          0          0          1
29          DUMMY          0          0          0          0          1
30          DUMMY          0          0          0          0          1
31          IRREGULAR        80'ROW_streetconveyance 0          0          0          1
32          IRREGULAR        80'ROW_streetconveyance 0          0          0          1
33          CIRCULAR        4          0          0          0          1
34          DUMMY          0          0          0          0          1
35          CIRCULAR        4          0          0          0          1
36          IRREGULAR        80'ROW_streetconveyance 0          0          0          1
37          DUMMY          0          0          0          0          1
38          DUMMY          0          0          0          0          1
8           CIRCULAR        1          0          0          0          1

```

[TRANSECTS]

```

;50 ROW, minor residential local - detached sidewalk
NC .018      .018      .018
X1 StreetSection-localresidential 15      13.33  46.5  0.0  0.0  0.0  0.0  0.0
GR 10.1      0          10         5          9.88  10.83  9.88  11.08  9.51  12.5
GR 9.38      12.5     9.51      13.33     9.83  29.5  9.51  45.67  9.38  46.5
GR 9.51      46.5     9.88      47.92     9.88  48.17  10    54.5  10.1  59.5

```

```

;80'ROW_collector street - attached sidewalks
NC .012      .012      .018
X1 80'ROW_streetconveyance 11      7.5    63.5  0.0  0.0  0.0  0.0  0.0
GR 10.1      0          10         5          9.88  10.83  9.88  11.08  9.51  12.5
GR 10.06     35.5     9.5        63.5     9.33  65.5  10    65.5  10    66
GR 10.1      71

```

[LOSSES]

```

;;Link          Inlet          Outlet          Average          Flap Gate
;;-----
19              .5            1              0              NO
16              .5            1              0              NO
33              .5            1              0              NO

```

[CURVES]

```

;;Name          Type          X-Value          Y-Value
;;-----
;ORR Pond MDDP Outlet Design
ORRPondOutlet  Rating          0.00            0.00
ORRPondOutlet          0.33            0.02
ORRPondOutlet          0.67            0.04
ORRPondOutlet          1.00            0.07
ORRPondOutlet          1.33            0.10
ORRPondOutlet          1.67            0.14
ORRPondOutlet          2.00            0.18
ORRPondOutlet          2.33            0.22
ORRPondOutlet          2.67            0.27
ORRPondOutlet          3.00            0.32
ORRPondOutlet          3.33            0.37
ORRPondOutlet          3.67            0.42
ORRPondOutlet          4.00            0.48
ORRPondOutlet          4.20            0.50
ORRPondOutlet          4.50            8.38
ORRPondOutlet          5.50            42.69
ORRPondOutlet          5.90            44.51
ORRPondOutlet          6.00            46.57
ORRPondOutlet          6.50            57.44
ORRPondOutlet          7.00            59.97

```

```

;Powers Pond MDDP Outlet Design
PowersPondOutlet Rating          0.00            0.00

```

Proposed SWMM Input

PowersPondOutlet		0.33	0.06
PowersPondOutlet		0.67	0.14
PowersPondOutlet		1.00	0.24
PowersPondOutlet		1.33	0.36
PowersPondOutlet		1.67	0.48
PowersPondOutlet		2.00	0.63
PowersPondOutlet		2.33	0.78
PowersPondOutlet		2.67	0.94
PowersPondOutlet		3.00	1.12
PowersPondOutlet		3.33	1.30
PowersPondOutlet		3.67	1.49
PowersPondOutlet		4.00	1.69
PowersPondOutlet		4.33	1.90
PowersPondOutlet		4.67	2.12
PowersPondOutlet		5.00	2.34
PowersPondOutlet		5.33	2.57
PowersPondOutlet		5.67	2.81
PowersPondOutlet		6.00	3.06
PowersPondOutlet		6.33	3.31
PowersPondOutlet		6.67	3.57
PowersPondOutlet		7.00	3.83
PowersPondOutlet		7.33	4.10
PowersPondOutlet		7.67	4.38
PowersPondOutlet		8.00	4.66
PowersPondOutlet		8.33	4.95
PowersPondOutlet		8.67	5.25
PowersPondOutlet		9.00	5.55
PowersPondOutlet		9.33	5.85
PowersPondOutlet		9.67	6.16
PowersPondOutlet		10.00	6.42
PowersPondOutlet		10.50	25.43
PowersPondOutlet		11.00	71.93
PowersPondOutlet		11.50	132.14
PowersPondOutlet		12.00	196.82
PowersPondOutlet		12.50	201.58
PowersPondOutlet		13.00	206.22
PowersPondOutlet		13.50	210.76
PowersPondOutlet		14.00	215.21
PowersPondOutlet		14.50	219.57
PowersPondOutlet		15.00	223.84
;Howell Pond MDDP Volume			
Howell_Pond	Storage	0.00	0
Howell_Pond		1.00	1811
Howell_Pond		2.00	6212
Howell_Pond		3.00	13118
Howell_Pond		4.00	22575
Howell_Pond		5.00	34629
Howell_Pond		6.00	49582
Howell_Pond		7.00	67920
Howell_Pond		8.00	89718
Howell_Pond		9.00	115086
Howell_Pond		10.00	142378
Howell_Pond		11.00	156829
Howell_Pond		12.00	163978
Howell_Pond		13.00	169697
;ORR Pond MDDP Volume			
ORR_Pond	Storage	0.00	147
ORR_Pond		1.00	2803
ORR_Pond		2.00	15481
ORR_Pond		3.00	28617
ORR_Pond		4.00	34686
ORR_Pond		5.00	38360
ORR_Pond		6.00	42020
ORR_Pond		7.00	45746
;Powers Pond MDDP Volume			
Powers_Pond	Storage	0.00	485
Powers_Pond		1.00	4411
Powers_Pond		2.00	10540
Powers_Pond		3.00	18869
Powers_Pond		4.00	30157
Powers_Pond		5.00	45886
Powers_Pond		6.00	64008

Proposed SWMM Input

Powers_Pond	7.00	81523
Powers_Pond	8.00	97146
Powers_Pond	9.00	104488
Powers_Pond	10.00	111674
Powers_Pond	11.00	118960
Powers_Pond	12.00	126347
Powers_Pond	13.00	133834
Powers_Pond	14.00	141423
Powers_Pond	15.00	149111
Powers_Pond	16.00	156901
Powers_Pond	17.00	164791
Powers_Pond	18.00	172782
Powers_Pond	19.00	180675

```
[REPORT]
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES      ALL
LINKS      ALL
```

```
[TAGS]
```

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

```
[COORDINATES]
; ;Node      X-Coord      Y-Coord
; ;-----
basin_OS1    2636.485    5978.695
basin_OS2    2596.538    7270.306
basin_OS3    4300.932    8881.491
basin_OS4    3039.474    9815.789
basin_D1     -407.371     7352.085
basin_D2     1756.393    9084.791
basin_D3     1339.166    10363.392
basin_D4     1527.591    10915.209
basin_OS5    -3446.389    11619.256
AP1          1291.611    5858.855
AP4          -1148.796    6094.092
AP6          1158.455    9813.582
AP9          -3694.482    8761.777
AP21         -4080.963    11137.856
AP2          1304.927    7203.728
AP3          1957.390    8282.290
AP3a         -1280.310    8011.639
basin_D6a    -2981.157    8075.370
STREETSUMP  -543.162     6624.636
AP5          1864.065    9811.575
AP7          854.643     10565.276
AP7A         -3223.419    10524.899
Basin_D7     -1487.214    10161.507
basin_D6     -3102.288    9380.888
AP10         -4650.067    9946.164
basin_D5     -1742.934    9380.888
AP8          -2092.867    8761.777
basin_D8     -3734.859    10215.343
basin_D1a    -3142.580    5160.039
basin_D1b    2667.313     5276.431
AP4a         -1595.208    4703.657
AP11         -6684.211    10789.474
AP20         935.397     11305.518
HowellPond   -642.857     8328.571
ORRPond      -1384.820    5592.543
POWERSPOND   -5517.024    10353.090
```

```
[VERTICES]
; ;Link      X-Coord      Y-Coord
; ;-----
19           -1755.577    7769.156
19           -2095.053    6614.937
19           -2075.655    5412.221
```

Proposed SWMM Input

Proposed SWMM 2-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Proposed Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 36
Number of links 33
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_D1	JUNCTION	7026.05	0.00	0.0	
basin_D2	JUNCTION	7010.00	0.00	0.0	
basin_D3	JUNCTION	7020.00	0.00	0.0	
basin_D4	JUNCTION	7010.50	0.00	0.0	
basin_OS5	JUNCTION	6906.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP4	JUNCTION	6964.00	4.00	0.0	
AP6	JUNCTION	6993.90	0.77	0.0	
AP9	JUNCTION	6876.00	0.77	0.0	
AP21	JUNCTION	6854.00	0.00	0.0	
AP2	JUNCTION	7026.90	0.00	0.0	
AP3	JUNCTION	7007.75	0.00	0.0	
AP3a	JUNCTION	6985.00	1.50	0.0	
basin_D6a	JUNCTION	7025.00	0.00	0.0	
STREETSUMP	JUNCTION	6985.50	4.00	0.0	
AP5	JUNCTION	7015.00	0.72	0.0	
AP7	JUNCTION	6983.00	4.00	0.0	
AP7A	JUNCTION	6842.00	4.00	0.0	
Basin_D7	JUNCTION	6994.00	0.00	0.0	
basin_D6	JUNCTION	6955.00	0.00	0.0	
AP10	JUNCTION	6849.47	4.00	0.0	
basin_D5	JUNCTION	6994.85	0.00	0.0	

Proposed SWMM 2-yr Results

AP8	JUNCTION	6937.55	0.77	0.0
basin_D8	JUNCTION	6983.00	0.00	0.0
basin_D1a	JUNCTION	7100.00	0.00	0.0
basin_D1b	JUNCTION	7100.00	0.00	0.0
AP4a	OUTFALL	6961.34	1.50	0.0
AP11	OUTFALL	6816.00	0.00	0.0
AP20	OUTFALL	6989.50	0.00	0.0
HowellPond	STORAGE	6990.00	13.00	0.0
ORRPond	STORAGE	6962.00	7.00	0.0
POWERSPOND	STORAGE	6826.00	14.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_D1	STREETSUMP	CONDUIT	400.0	10.1900	0.0100
4	basin_OS3	AP3	CONDUIT	400.0	54.8079	0.0100
6	basin_D4	AP20	CONDUIT	400.0	5.2573	0.0100
9	AP2	STREETSUMP	CONDUIT	585.0	7.0947	0.0300
10	AP1	AP4a	CONDUIT	1211.0	4.8082	0.0250
11	basin_OS5	AP21	CONDUIT	400.0	13.1113	0.0100
18	AP3	HowellPond	CONDUIT	400.0	4.4419	0.0100
19	AP3a	AP4a	CONDUIT	1460.0	1.6208	0.0130
25	basin_D6a	AP9	CONDUIT	400.0	40.1387	0.0100
28	AP21	POWERSPOND	CONDUIT	540.0	5.1922	0.0150
5	basin_OS4	AP5	CONDUIT	400.0	16.4689	0.0200
16	STREETSUMP	AP4	CONDUIT	123.0	17.7530	0.0130
17	basin_D2	AP6	CONDUIT	400.0	4.0283	0.0100
20	AP4	ORRPond	CONDUIT	400.0	0.5000	0.0100
21	AP5	AP6	CONDUIT	1022.0	2.0650	0.0180
22	basin_D3	AP7	CONDUIT	400.0	9.2898	0.0100
23	AP7	AP7A	CONDUIT	3800.0	3.7131	0.0300
24	Basin_D7	AP7A	CONDUIT	400.0	41.0817	0.0100
29	basin_D6	AP9	CONDUIT	400.0	20.1468	0.0100
30	basin_D5	AP8	CONDUIT	400.0	14.4743	0.0100
31	AP8	AP9	CONDUIT	1174.0	5.2500	0.0180
32	AP9	AP10	CONDUIT	1870.0	1.4189	0.0180
33	AP7A	POWERSPOND	CONDUIT	187.0	4.2820	0.0130
34	basin_D8	AP10	CONDUIT	400.0	35.4140	0.0100
35	AP10	POWERSPOND	CONDUIT	128.0	12.1752	0.0130
36	AP6	AP10	CONDUIT	400.0	38.7197	0.0180
37	basin_D1a	AP4a	CONDUIT	400.0	36.9565	0.0100
38	basin_D1b	AP1	CONDUIT	400.0	20.5454	0.0100
8	HowellPond	AP3a	ORIFICE			
12	ORRPond	AP4a	OUTLET			
14	POWERSPOND	AP11	OUTLET			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
11	DUMMY	0.00	0.00	0.00	0.00	1	0.00
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00
19	CIRCULAR	1.50	1.77	0.38	1.50	1	13.37
25	DUMMY	0.00	0.00	0.00	0.00	1	0.00
28	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
16	CIRCULAR	4.00	12.57	1.00	4.00	1	605.23
17	DUMMY	0.00	0.00	0.00	0.00	1	0.00
20	DUMMY	0.00	0.00	0.00	0.00	1	0.00
21	StreetSection-localresidential			0.72	18.70	0.31	59.50
						1	101.83

Proposed SWMM 2-yr Results

22	DUMMY	0.00	0.00	0.00	0.00	1	0.00
23	TRAPEZOIDAL	4.00	104.00	2.42	42.00	1	1789.00
24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
29	DUMMY	0.00	0.00	0.00	0.00	1	0.00
30	DUMMY	0.00	0.00	0.00	0.00	1	0.00
31	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	190.91
32	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	99.25
33	CIRCULAR	4.00	12.57	1.00	4.00	1	297.24
34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
35	CIRCULAR	4.00	12.57	1.00	4.00	1	501.21
36	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	518.47
37	DUMMY	0.00	0.00	0.00	0.00	1	0.00
38	DUMMY	0.00	0.00	0.00	0.00	1	0.00

 Transect Summary

Transect StreetSection-localresidential
 Area:

0.0001	0.0003	0.0006	0.0011	0.0018
0.0025	0.0035	0.0045	0.0057	0.0076
0.0106	0.0149	0.0204	0.0270	0.0349
0.0440	0.0543	0.0658	0.0785	0.0924
0.1075	0.1238	0.1413	0.1601	0.1800
0.2011	0.2235	0.2470	0.2718	0.2978
0.3249	0.3530	0.3812	0.4094	0.4379
0.4676	0.4983	0.5302	0.5632	0.5973
0.6326	0.6689	0.7064	0.7450	0.7848
0.8256	0.8675	0.9106	0.9547	1.0000

Hrad:

0.0197	0.0395	0.0592	0.0789	0.0986
0.1184	0.1381	0.1578	0.1776	0.1310
0.1265	0.1350	0.1491	0.1661	0.1848
0.2045	0.2249	0.2458	0.2671	0.2887
0.3105	0.3324	0.3545	0.3767	0.3990
0.4214	0.4439	0.4664	0.4889	0.5115
0.5341	0.5727	0.6165	0.6602	0.6879
0.7073	0.7270	0.7470	0.7671	0.7875
0.8080	0.8287	0.8495	0.8707	0.8920
0.9135	0.9350	0.9566	0.9783	1.0000

Width:

0.0031	0.0062	0.0093	0.0124	0.0155
0.0185	0.0216	0.0247	0.0278	0.0535
0.0798	0.1061	0.1324	0.1588	0.1851
0.2114	0.2377	0.2640	0.2903	0.3166
0.3430	0.3693	0.3956	0.4219	0.4482
0.4745	0.5009	0.5272	0.5535	0.5798
0.6061	0.6141	0.6160	0.6178	0.6344
0.6589	0.6834	0.7079	0.7325	0.7570
0.7815	0.8060	0.8306	0.8548	0.8790
0.9032	0.9274	0.9516	0.9758	1.0000

Transect 80'ROW_streetconveyance
 Area:

0.0001	0.0005	0.0012	0.0021	0.0033
0.0047	0.0064	0.0084	0.0106	0.0131
0.0159	0.0193	0.0238	0.0295	0.0362
0.0441	0.0531	0.0632	0.0744	0.0867
0.1002	0.1148	0.1304	0.1472	0.1652
0.1842	0.2043	0.2256	0.2480	0.2715
0.2961	0.3218	0.3486	0.3766	0.4056
0.4358	0.4671	0.4995	0.5331	0.5677
0.6035	0.6404	0.6784	0.7180	0.7600
0.8043	0.8508	0.8994	0.9491	1.0000

Hrad:

0.0396	0.0791	0.1187	0.1583	0.1978
0.2374	0.2770	0.3165	0.3561	0.3957
0.4352	0.4916	0.5207	0.5344	0.5414
0.5463	0.5513	0.5575	0.5651	0.5742
0.5847	0.5964	0.6093	0.6231	0.6378
0.6531	0.6692	0.6858	0.7029	0.7204
0.7383	0.7566	0.7751	0.7939	0.8130

Proposed SWMM 2-yr Results

	0.8323	0.8518	0.8715	0.8913	0.9113
	0.9315	0.9517	0.9721	0.9224	0.9077
	0.9051	0.9099	0.9317	0.9648	1.0000
Width:					
	0.0051	0.0102	0.0153	0.0204	0.0255
	0.0306	0.0357	0.0408	0.0459	0.0510
	0.0561	0.0772	0.0989	0.1206	0.1423
	0.1639	0.1856	0.2073	0.2290	0.2507
	0.2724	0.2941	0.3158	0.3375	0.3592
	0.3808	0.4025	0.4242	0.4459	0.4676
	0.4893	0.5110	0.5327	0.5544	0.5761
	0.5977	0.6194	0.6411	0.6628	0.6845
	0.7062	0.7279	0.7496	0.7961	0.8394
	0.8828	0.9262	0.9566	0.9783	1.0000

```

*****
Flow Routing Continuity          Volume      Volume
                                acre-feet   10^6 gal
*****                          -
Dry Weather Inflow .....        0.000      0.000
Wet Weather Inflow .....        0.000      0.000
Groundwater Inflow .....        0.000      0.000
RDII Inflow .....                0.000      0.000
External Inflow .....           12.246      3.991
External Outflow .....          12.174      3.967
Internal Outflow .....           0.000      0.000
Storage Losses .....            0.000      0.000
Initial Stored Volume ....        0.000      0.000
Final Stored Volume .....        0.129      0.042
Continuity Error (%) .....      -0.463

```

```

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

```

```

*****
Routing Time Step Summary
*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00

```

```

*****
Node Depth Summary
*****

```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_D1	JUNCTION	0.00	0.00	7026.05	0 00:00
basin_D2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_D3	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_D4	JUNCTION	0.00	0.00	7010.50	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6906.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP4	JUNCTION	0.01	0.44	6964.44	0 00:35
AP6	JUNCTION	0.01	0.22	6994.12	0 00:34
AP9	JUNCTION	0.02	0.63	6876.63	0 00:35
AP21	JUNCTION	0.00	0.00	6854.00	0 00:00
AP2	JUNCTION	0.00	0.00	7026.90	0 00:00
AP3	JUNCTION	0.00	0.00	7007.75	0 00:00
AP3a	JUNCTION	0.03	0.61	6985.61	0 01:14
basin_D6a	JUNCTION	0.00	0.00	7025.00	0 00:00

Proposed SWMM 2-yr Results

STREETSUMP	JUNCTION	0.01	0.46	6985.96	0	00:35
AP5	JUNCTION	0.01	0.20	7015.20	0	00:40
AP7	JUNCTION	0.01	0.34	6983.34	0	00:30
AP7A	JUNCTION	0.03	0.93	6842.93	0	00:39
Basin_D7	JUNCTION	0.00	0.00	6994.00	0	00:00
basin_D6	JUNCTION	0.00	0.00	6955.00	0	00:00
AP10	JUNCTION	0.03	1.18	6850.65	0	00:39
basin_D5	JUNCTION	0.00	0.00	6994.85	0	00:00
AP8	JUNCTION	0.01	0.35	6937.90	0	00:32
basin_D8	JUNCTION	0.00	0.00	6983.00	0	00:00
basin_D1a	JUNCTION	0.00	0.00	7100.00	0	00:00
basin_D1b	JUNCTION	0.00	0.00	7100.00	0	00:00
AP4a	OUTFALL	0.03	0.61	6961.95	0	01:16
AP11	OUTFALL	0.00	0.00	6816.00	0	00:00
AP20	OUTFALL	0.00	0.00	6989.50	0	00:00
HowellPond	STORAGE	0.07	1.98	6991.98	0	01:14
ORRPond	STORAGE	2.53	3.46	6965.46	0	02:40
POWERSPOND	STORAGE	4.65	8.64	6834.64	0	02:31

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal
basin_OS1	JUNCTION	5.79	5.79	0 00:34	0.127	0.127
basin_OS2	JUNCTION	1.06	1.06	0 00:42	0.031	0.031
basin_OS3	JUNCTION	6.70	6.70	0 00:47	0.222	0.222
basin_OS4	JUNCTION	0.86	0.86	0 00:40	0.022	0.022
basin_D1	JUNCTION	14.62	14.62	0 00:36	0.338	0.338
basin_D2	JUNCTION	10.46	10.46	0 00:34	0.209	0.209
basin_D3	JUNCTION	16.97	16.97	0 00:30	0.248	0.248
basin_D4	JUNCTION	0.26	0.26	0 00:38	0.004	0.004
basin_OS5	JUNCTION	10.39	10.39	0 00:33	0.198	0.198
AP1	JUNCTION	0.00	12.78	0 00:32	0.000	0.245
AP4	JUNCTION	0.00	15.81	0 00:35	0.000	0.369
AP6	JUNCTION	0.00	10.74	0 00:34	0.000	0.231
AP9	JUNCTION	0.00	57.18	0 00:34	0.000	1.129
AP21	JUNCTION	0.00	10.39	0 00:33	0.000	0.198
AP2	JUNCTION	0.00	1.06	0 00:42	0.000	0.031
AP3	JUNCTION	0.00	6.70	0 00:47	0.000	0.222
AP3a	JUNCTION	0.00	4.68	0 01:14	0.000	0.222
basin_D6a	JUNCTION	10.99	10.99	0 00:29	0.157	0.157
STREETSUMP	JUNCTION	0.00	15.62	0 00:37	0.000	0.369
AP5	JUNCTION	0.00	0.86	0 00:40	0.000	0.022
AP7	JUNCTION	0.00	16.97	0 00:30	0.000	0.248
AP7A	JUNCTION	0.00	34.71	0 00:39	0.000	0.802
Basin_D7	JUNCTION	21.35	21.35	0 00:38	0.539	0.539
basin_D6	JUNCTION	31.05	31.05	0 00:36	0.664	0.664
AP10	JUNCTION	0.00	94.71	0 00:39	0.000	2.029
basin_D5	JUNCTION	17.33	17.33	0 00:32	0.307	0.307
AP8	JUNCTION	0.00	17.33	0 00:32	0.000	0.307
basin_D8	JUNCTION	32.25	32.25	0 00:35	0.663	0.663
basin_D1a	JUNCTION	6.24	6.24	0 00:35	0.141	0.141
basin_D1b	JUNCTION	7.18	7.18	0 00:31	0.118	0.118
AP4a	OUTFALL	0.00	20.24	0 00:36	0.000	0.937
AP11	OUTFALL	0.00	5.22	0 02:31	0.000	3.026
AP20	OUTFALL	0.00	0.26	0 00:38	0.000	0.004
HowellPond	STORAGE	0.00	6.70	0 00:47	0.000	0.222
ORRPond	STORAGE	0.00	15.81	0 00:35	0.000	0.369
POWERSPOND	STORAGE	0.00	138.74	0 00:39	0.000	3.028

Node Surge Summary

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

Max. Height Min. Depth

Proposed SWMM 2-yr Results

Node	Type	Hours Surcharged	Above Crown Feet	Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_D1	JUNCTION	48.00	0.000	0.000
basin_D2	JUNCTION	48.00	0.000	0.000
basin_D3	JUNCTION	48.00	0.000	0.000
basin_D4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000
AP21	JUNCTION	48.00	0.000	0.000
AP2	JUNCTION	48.00	0.000	0.000
AP3	JUNCTION	48.00	0.000	0.000
basin_D6a	JUNCTION	48.00	0.000	0.000
Basin_D7	JUNCTION	48.00	0.000	0.000
basin_D6	JUNCTION	48.00	0.000	0.000
basin_D5	JUNCTION	48.00	0.000	0.000
basin_D8	JUNCTION	48.00	0.000	0.000
basin_D1a	JUNCTION	48.00	0.000	0.000
basin_D1b	JUNCTION	48.00	0.000	0.000
HowellPond	STORAGE	1.61	0.984	11.016
ORRPond	STORAGE	48.00	3.458	3.542

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
HowellPond	0.120	0	0	4.821	1	0 01:14	4.68
ORRPond	22.879	12	0	46.395	25	0 02:40	0.39
POWERSPOND	118.539	12	0	367.598	36	0 02:31	5.22

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP4a	99.72	0.73	20.24	0.937
AP11	99.55	2.35	5.22	3.026
AP20	3.65	0.09	0.26	0.004
System	67.64	3.17	22.60	3.967

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	5.79	0 00:34			
2	DUMMY	1.06	0 00:42			

Proposed SWMM 2-yr Results

3	DUMMY	14.62	0	00:36			
4	DUMMY	6.70	0	00:47			
6	DUMMY	0.26	0	00:38			
9	DUMMY	1.06	0	00:42			
10	DUMMY	12.78	0	00:32			
11	DUMMY	10.39	0	00:33			
18	DUMMY	6.70	0	00:47			
19	CONDUIT	4.68	0	01:16	6.90	0.35	0.41
25	DUMMY	10.99	0	00:29			
28	DUMMY	10.39	0	00:33			
5	DUMMY	0.86	0	00:40			
16	CONDUIT	15.81	0	00:35	20.74	0.03	0.11
17	DUMMY	10.46	0	00:34			
20	DUMMY	15.81	0	00:35			
21	CHANNEL	0.81	0	00:48	2.26	0.01	0.28
22	DUMMY	16.97	0	00:30			
23	CONDUIT	13.58	0	00:40	4.50	0.01	0.07
24	DUMMY	21.35	0	00:38			
29	DUMMY	31.05	0	00:36			
30	DUMMY	17.33	0	00:32			
31	CHANNEL	17.06	0	00:35	6.66	0.09	0.45
32	CHANNEL	54.38	0	00:40	4.67	0.55	0.80
33	CONDUIT	34.70	0	00:39	15.80	0.12	0.23
34	DUMMY	32.25	0	00:35			
35	CONDUIT	94.72	0	00:39	30.63	0.19	0.29
36	CHANNEL	10.74	0	00:34	16.12	0.02	0.29
37	DUMMY	6.24	0	00:35			
38	DUMMY	7.18	0	00:31			
8	ORIFICE	4.68	0	01:14			0.00
12	DUMMY	0.39	0	02:40			
14	DUMMY	5.22	0	02:31			

 Conduit Surcharge Summary

Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
9	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
11	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01
25	0.01	0.01	0.01	48.00	0.01
28	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
17	0.01	0.01	0.01	48.00	0.01
20	0.01	0.01	0.01	48.00	0.01
22	0.01	0.01	0.01	48.00	0.01
24	0.01	0.01	0.01	48.00	0.01
29	0.01	0.01	0.01	48.00	0.01
30	0.01	0.01	0.01	48.00	0.01
34	0.01	0.01	0.01	48.00	0.01
37	0.01	0.01	0.01	48.00	0.01
38	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 12:58:15 2014
 Analysis ended on: Wed May 14 12:58:15 2014
 Total elapsed time: < 1 sec

Proposed SWMM 5-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Proposed Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 36
Number of links 33
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_D1	JUNCTION	7026.05	0.00	0.0	
basin_D2	JUNCTION	7010.00	0.00	0.0	
basin_D3	JUNCTION	7020.00	0.00	0.0	
basin_D4	JUNCTION	7010.50	0.00	0.0	
basin_OS5	JUNCTION	6906.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP4	JUNCTION	6964.00	4.00	0.0	
AP6	JUNCTION	6993.90	0.77	0.0	
AP9	JUNCTION	6876.00	0.77	0.0	
AP21	JUNCTION	6854.00	0.00	0.0	
AP2	JUNCTION	7026.90	0.00	0.0	
AP3	JUNCTION	7007.75	0.00	0.0	
AP3a	JUNCTION	6985.00	1.50	0.0	
basin_D6a	JUNCTION	7025.00	0.00	0.0	
STREETSUMP	JUNCTION	6985.50	4.00	0.0	
AP5	JUNCTION	7015.00	0.72	0.0	
AP7	JUNCTION	6983.00	4.00	0.0	
AP7A	JUNCTION	6842.00	4.00	0.0	
Basin_D7	JUNCTION	6994.00	0.00	0.0	
basin_D6	JUNCTION	6955.00	0.00	0.0	
AP10	JUNCTION	6849.47	4.00	0.0	
basin_D5	JUNCTION	6994.85	0.00	0.0	

Proposed SWMM 5-yr Results

AP8	JUNCTION	6937.55	0.77	0.0
basin_D8	JUNCTION	6983.00	0.00	0.0
basin_D1a	JUNCTION	7100.00	0.00	0.0
basin_D1b	JUNCTION	7100.00	0.00	0.0
AP4a	OUTFALL	6961.34	1.50	0.0
AP11	OUTFALL	6816.00	0.00	0.0
AP20	OUTFALL	6989.50	0.00	0.0
HowellPond	STORAGE	6990.00	13.00	0.0
ORRPond	STORAGE	6962.00	7.00	0.0
POWERSPOND	STORAGE	6826.00	14.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_D1	STREETSUMP	CONDUIT	400.0	10.1900	0.0100
4	basin_OS3	AP3	CONDUIT	400.0	54.8079	0.0100
6	basin_D4	AP20	CONDUIT	400.0	5.2573	0.0100
9	AP2	STREETSUMP	CONDUIT	585.0	7.0947	0.0300
10	AP1	AP4a	CONDUIT	1211.0	4.8082	0.0250
11	basin_OS5	AP21	CONDUIT	400.0	13.1113	0.0100
18	AP3	HowellPond	CONDUIT	400.0	4.4419	0.0100
19	AP3a	AP4a	CONDUIT	1460.0	1.6208	0.0130
25	basin_D6a	AP9	CONDUIT	400.0	40.1387	0.0100
28	AP21	POWERSPOND	CONDUIT	540.0	5.1922	0.0150
5	basin_OS4	AP5	CONDUIT	400.0	16.4689	0.0200
16	STREETSUMP	AP4	CONDUIT	123.0	17.7530	0.0130
17	basin_D2	AP6	CONDUIT	400.0	4.0283	0.0100
20	AP4	ORRPond	CONDUIT	400.0	0.5000	0.0100
21	AP5	AP6	CONDUIT	1022.0	2.0650	0.0180
22	basin_D3	AP7	CONDUIT	400.0	9.2898	0.0100
23	AP7	AP7A	CONDUIT	3800.0	3.7131	0.0300
24	Basin_D7	AP7A	CONDUIT	400.0	41.0817	0.0100
29	basin_D6	AP9	CONDUIT	400.0	20.1468	0.0100
30	basin_D5	AP8	CONDUIT	400.0	14.4743	0.0100
31	AP8	AP9	CONDUIT	1174.0	5.2500	0.0180
32	AP9	AP10	CONDUIT	1870.0	1.4189	0.0180
33	AP7A	POWERSPOND	CONDUIT	187.0	4.2820	0.0130
34	basin_D8	AP10	CONDUIT	400.0	35.4140	0.0100
35	AP10	POWERSPOND	CONDUIT	128.0	12.1752	0.0130
36	AP6	AP10	CONDUIT	400.0	38.7197	0.0180
37	basin_D1a	AP4a	CONDUIT	400.0	36.9565	0.0100
38	basin_D1b	AP1	CONDUIT	400.0	20.5454	0.0100
8	HowellPond	AP3a	ORIFICE			
12	ORRPond	AP4a	OUTLET			
14	POWERSPOND	AP11	OUTLET			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
11	DUMMY	0.00	0.00	0.00	0.00	1	0.00
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00
19	CIRCULAR	1.50	1.77	0.38	1.50	1	13.37
25	DUMMY	0.00	0.00	0.00	0.00	1	0.00
28	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
16	CIRCULAR	4.00	12.57	1.00	4.00	1	605.23
17	DUMMY	0.00	0.00	0.00	0.00	1	0.00
20	DUMMY	0.00	0.00	0.00	0.00	1	0.00
21	StreetSection-localresidential			0.72	18.70	0.31	59.50
						1	101.83

Proposed SWMM 5-yr Results

22	DUMMY	0.00	0.00	0.00	0.00	1	0.00
23	TRAPEZOIDAL	4.00	104.00	2.42	42.00	1	1789.00
24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
29	DUMMY	0.00	0.00	0.00	0.00	1	0.00
30	DUMMY	0.00	0.00	0.00	0.00	1	0.00
31	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	190.91
32	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	99.25
33	CIRCULAR	4.00	12.57	1.00	4.00	1	297.24
34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
35	CIRCULAR	4.00	12.57	1.00	4.00	1	501.21
36	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	518.47
37	DUMMY	0.00	0.00	0.00	0.00	1	0.00
38	DUMMY	0.00	0.00	0.00	0.00	1	0.00

Transect Summary

Transect StreetSection-localresidential
Area:

0.0001	0.0003	0.0006	0.0011	0.0018
0.0025	0.0035	0.0045	0.0057	0.0076
0.0106	0.0149	0.0204	0.0270	0.0349
0.0440	0.0543	0.0658	0.0785	0.0924
0.1075	0.1238	0.1413	0.1601	0.1800
0.2011	0.2235	0.2470	0.2718	0.2978
0.3249	0.3530	0.3812	0.4094	0.4379
0.4676	0.4983	0.5302	0.5632	0.5973
0.6326	0.6689	0.7064	0.7450	0.7848
0.8256	0.8675	0.9106	0.9547	1.0000

Hrad:

0.0197	0.0395	0.0592	0.0789	0.0986
0.1184	0.1381	0.1578	0.1776	0.1310
0.1265	0.1350	0.1491	0.1661	0.1848
0.2045	0.2249	0.2458	0.2671	0.2887
0.3105	0.3324	0.3545	0.3767	0.3990
0.4214	0.4439	0.4664	0.4889	0.5115
0.5341	0.5727	0.6165	0.6602	0.6879
0.7073	0.7270	0.7470	0.7671	0.7875
0.8080	0.8287	0.8495	0.8707	0.8920
0.9135	0.9350	0.9566	0.9783	1.0000

Width:

0.0031	0.0062	0.0093	0.0124	0.0155
0.0185	0.0216	0.0247	0.0278	0.0535
0.0798	0.1061	0.1324	0.1588	0.1851
0.2114	0.2377	0.2640	0.2903	0.3166
0.3430	0.3693	0.3956	0.4219	0.4482
0.4745	0.5009	0.5272	0.5535	0.5798
0.6061	0.6141	0.6160	0.6178	0.6344
0.6589	0.6834	0.7079	0.7325	0.7570
0.7815	0.8060	0.8306	0.8548	0.8790
0.9032	0.9274	0.9516	0.9758	1.0000

Transect 80'ROW_streetconveyance
Area:

0.0001	0.0005	0.0012	0.0021	0.0033
0.0047	0.0064	0.0084	0.0106	0.0131
0.0159	0.0193	0.0238	0.0295	0.0362
0.0441	0.0531	0.0632	0.0744	0.0867
0.1002	0.1148	0.1304	0.1472	0.1652
0.1842	0.2043	0.2256	0.2480	0.2715
0.2961	0.3218	0.3486	0.3766	0.4056
0.4358	0.4671	0.4995	0.5331	0.5677
0.6035	0.6404	0.6784	0.7180	0.7600
0.8043	0.8508	0.8994	0.9491	1.0000

Hrad:

0.0396	0.0791	0.1187	0.1583	0.1978
0.2374	0.2770	0.3165	0.3561	0.3957
0.4352	0.4916	0.5207	0.5344	0.5414
0.5463	0.5513	0.5575	0.5651	0.5742
0.5847	0.5964	0.6093	0.6231	0.6378
0.6531	0.6692	0.6858	0.7029	0.7204
0.7383	0.7566	0.7751	0.7939	0.8130

Proposed SWMM 5-yr Results

	0.8323	0.8518	0.8715	0.8913	0.9113
	0.9315	0.9517	0.9721	0.9224	0.9077
	0.9051	0.9099	0.9317	0.9648	1.0000
Width:					
	0.0051	0.0102	0.0153	0.0204	0.0255
	0.0306	0.0357	0.0408	0.0459	0.0510
	0.0561	0.0772	0.0989	0.1206	0.1423
	0.1639	0.1856	0.2073	0.2290	0.2507
	0.2724	0.2941	0.3158	0.3375	0.3592
	0.3808	0.4025	0.4242	0.4459	0.4676
	0.4893	0.5110	0.5327	0.5544	0.5761
	0.5977	0.6194	0.6411	0.6628	0.6845
	0.7062	0.7279	0.7496	0.7961	0.8394
	0.8828	0.9262	0.9566	0.9783	1.0000

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	24.207	7.888
External Outflow	23.758	7.742
Internal Outflow	0.001	0.000
Storage Losses	0.000	0.000
Initial Stored Volume ...	0.000	0.000
Final Stored Volume	0.502	0.164
Continuity Error (%)	-0.227	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step	:	15.00 sec
Average Time Step	:	15.00 sec
Maximum Time Step	:	15.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_D1	JUNCTION	0.00	0.00	7026.05	0 00:00
basin_D2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_D3	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_D4	JUNCTION	0.00	0.00	7010.50	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6906.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP4	JUNCTION	0.02	0.68	6964.68	0 00:36
AP6	JUNCTION	0.01	0.29	6994.19	0 00:45
AP9	JUNCTION	0.02	0.77	6876.77	0 00:33
AP21	JUNCTION	0.00	0.00	6854.00	0 00:00
AP2	JUNCTION	0.00	0.00	7026.90	0 00:00
AP3	JUNCTION	0.00	0.00	7007.75	0 00:00
AP3a	JUNCTION	0.09	0.88	6985.88	0 02:07
basin_D6a	JUNCTION	0.00	0.00	7025.00	0 00:00

Proposed SWMM 5-yr Results

STREETSUMP	JUNCTION	0.02	0.68	6986.18	0	00:36
AP5	JUNCTION	0.01	0.29	7015.29	0	00:39
AP7	JUNCTION	0.01	0.48	6983.48	0	00:30
AP7A	JUNCTION	0.04	1.28	6843.28	0	00:38
Basin_D7	JUNCTION	0.00	0.00	6994.00	0	00:00
basin_D6	JUNCTION	0.00	0.00	6955.00	0	00:00
AP10	JUNCTION	0.04	1.60	6851.07	0	00:38
basin_D5	JUNCTION	0.00	0.00	6994.85	0	00:00
AP8	JUNCTION	0.01	0.43	6937.98	0	00:32
basin_D8	JUNCTION	0.00	0.00	6983.00	0	00:00
basin_D1a	JUNCTION	0.00	0.00	7100.00	0	00:00
basin_D1b	JUNCTION	0.00	0.00	7100.00	0	00:00
AP4a	OUTFALL	0.09	0.88	6962.22	0	02:10
AP11	OUTFALL	0.00	0.00	6816.00	0	00:00
AP20	OUTFALL	0.00	0.00	6989.50	0	00:00
HowellPond	STORAGE	0.50	5.56	6995.56	0	02:07
ORRPond	STORAGE	3.22	4.55	6966.55	0	01:34
POWERSPOND	STORAGE	6.13	10.61	6836.61	0	01:51

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal
basin_OS1	JUNCTION	11.45	11.45	0 00:34	0.236	0.236
basin_OS2	JUNCTION	4.95	4.95	0 00:42	0.138	0.138
basin_OS3	JUNCTION	35.27	35.27	0 00:47	1.115	1.115
basin_OS4	JUNCTION	4.16	4.16	0 00:39	0.099	0.099
basin_D1	JUNCTION	33.13	33.13	0 00:36	0.708	0.708
basin_D2	JUNCTION	21.06	21.06	0 00:33	0.386	0.386
basin_D3	JUNCTION	30.08	30.08	0 00:30	0.413	0.413
basin_D4	JUNCTION	2.56	2.56	0 00:36	0.041	0.041
basin_OS5	JUNCTION	22.39	22.39	0 00:33	0.399	0.399
AP1	JUNCTION	0.00	21.22	0 00:32	0.000	0.407
AP4	JUNCTION	0.00	37.70	0 00:36	0.000	0.846
AP6	JUNCTION	0.00	22.79	0 00:35	0.000	0.486
AP9	JUNCTION	0.00	99.91	0 00:34	0.000	1.876
AP21	JUNCTION	0.00	22.39	0 00:33	0.000	0.399
AP2	JUNCTION	0.00	4.95	0 00:42	0.000	0.138
AP3	JUNCTION	0.00	35.27	0 00:47	0.000	1.115
AP3a	JUNCTION	0.00	8.64	0 02:07	0.000	1.115
basin_D6a	JUNCTION	17.39	17.39	0 00:29	0.243	0.243
STREETSUMP	JUNCTION	0.00	37.71	0 00:36	0.000	0.846
AP5	JUNCTION	0.00	4.16	0 00:39	0.000	0.099
AP7	JUNCTION	0.00	30.08	0 00:30	0.000	0.413
AP7A	JUNCTION	0.00	66.18	0 00:38	0.000	1.404
Basin_D7	JUNCTION	41.39	41.39	0 00:38	0.975	0.975
basin_D6	JUNCTION	53.73	53.73	0 00:35	1.098	1.098
AP10	JUNCTION	0.00	168.96	0 00:38	0.000	3.483
basin_D5	JUNCTION	32.53	32.53	0 00:32	0.535	0.535
AP8	JUNCTION	0.00	32.53	0 00:32	0.000	0.535
basin_D8	JUNCTION	57.28	57.28	0 00:35	1.115	1.115
basin_D1a	JUNCTION	9.50	9.50	0 00:35	0.214	0.214
basin_D1b	JUNCTION	10.34	10.34	0 00:30	0.171	0.171
AP4a	OUTFALL	0.00	34.09	0 00:35	0.000	2.468
AP11	OUTFALL	0.00	35.46	0 01:51	0.000	5.233
AP20	OUTFALL	0.00	2.56	0 00:36	0.000	0.041
HowellPond	STORAGE	0.00	35.27	0 00:47	0.000	1.115
ORRPond	STORAGE	0.00	37.70	0 00:36	0.000	0.846
POWERSPOND	STORAGE	0.00	255.49	0 00:38	0.000	5.283

Node Surcharge Summary

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

Max. Height Min. Depth

Proposed SWMM 5-yr Results

Node	Type	Hours Surcharged	Above Crown Feet	Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_D1	JUNCTION	48.00	0.000	0.000
basin_D2	JUNCTION	48.00	0.000	0.000
basin_D3	JUNCTION	48.00	0.000	0.000
basin_D4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000
AP9	JUNCTION	0.04	0.000	0.000
AP21	JUNCTION	48.00	0.000	0.000
AP2	JUNCTION	48.00	0.000	0.000
AP3	JUNCTION	48.00	0.000	0.000
basin_D6a	JUNCTION	48.00	0.000	0.000
Basin_D7	JUNCTION	48.00	0.000	0.000
basin_D6	JUNCTION	48.00	0.000	0.000
basin_D5	JUNCTION	48.00	0.000	0.000
basin_D8	JUNCTION	48.00	0.000	0.000
basin_D1a	JUNCTION	48.00	0.000	0.000
basin_D1b	JUNCTION	48.00	0.000	0.000
HowellPond	STORAGE	5.58	4.556	7.444
ORRPond	STORAGE	48.00	4.549	2.451

Node Flooding Summary

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

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Volume 1000 ft3
AP9	0.04	0.66	0 00:34	0.000	0.000

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
HowellPond	5.514	1	0	82.575	9	0 02:07	8.64
ORRPond	40.844	22	0	83.915	45	0 01:34	10.06
POWERSPOND	200.383	20	0	582.342	57	0 01:50	35.46

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP4a	99.77	1.91	34.09	2.468
AP11	99.60	4.06	35.46	5.233
AP20	4.82	0.66	2.56	0.041
System	68.06	6.64	57.13	7.741

Link Flow Summary

Proposed SWMM 5-yr Results

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	11.45	0 00:34			
2	DUMMY	4.95	0 00:42			
3	DUMMY	33.13	0 00:36			
4	DUMMY	35.27	0 00:47			
6	DUMMY	2.56	0 00:36			
9	DUMMY	4.95	0 00:42			
10	DUMMY	21.22	0 00:32			
11	DUMMY	22.39	0 00:33			
18	DUMMY	35.27	0 00:47			
19	CONDUIT	8.64	0 02:10	8.04	0.65	0.59
25	DUMMY	17.39	0 00:29			
28	DUMMY	22.39	0 00:33			
5	DUMMY	4.16	0 00:39			
16	CONDUIT	37.70	0 00:36	26.73	0.06	0.17
17	DUMMY	21.06	0 00:33			
20	DUMMY	37.70	0 00:36			
21	CHANNEL	4.03	0 00:45	2.50	0.04	0.40
22	DUMMY	30.08	0 00:30			
23	CONDUIT	24.88	0 00:39	5.45	0.01	0.11
24	DUMMY	41.39	0 00:38			
29	DUMMY	53.73	0 00:35			
30	DUMMY	32.53	0 00:32			
31	CHANNEL	32.08	0 00:34	7.14	0.17	0.55
32	CHANNEL	93.97	0 00:40	5.10	0.95	0.98
33	CONDUIT	66.17	0 00:38	19.03	0.22	0.32
34	DUMMY	57.28	0 00:35			
35	CONDUIT	168.96	0 00:38	35.97	0.34	0.40
36	CHANNEL	22.79	0 00:36	16.57	0.04	0.36
37	DUMMY	9.50	0 00:35			
38	DUMMY	10.34	0 00:30			
8	ORIFICE	8.64	0 02:07			0.00
12	DUMMY	10.06	0 01:34			
14	DUMMY	35.46	0 01:51			

 Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
9	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
11	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01
25	0.01	0.01	0.01	48.00	0.01
28	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
17	0.01	0.01	0.01	48.00	0.01
20	0.01	0.01	0.01	48.00	0.01
22	0.01	0.01	0.01	48.00	0.01
24	0.01	0.01	0.01	48.00	0.01
29	0.01	0.01	0.01	48.00	0.01
30	0.01	0.01	0.01	48.00	0.01
32	0.01	0.03	0.01	0.01	0.03
34	0.01	0.01	0.01	48.00	0.01
37	0.01	0.01	0.01	48.00	0.01
38	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 13:03:49 2014

Proposed SWMM 5-yr Results

Analysis ended on: Wed May 14 13:03:49 2014
Total elapsed time: < 1 sec

Proposed SWMM 10-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Proposed Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 36
Number of links 33
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_D1	JUNCTION	7026.05	0.00	0.0	
basin_D2	JUNCTION	7010.00	0.00	0.0	
basin_D3	JUNCTION	7020.00	0.00	0.0	
basin_D4	JUNCTION	7010.50	0.00	0.0	
basin_OS5	JUNCTION	6906.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP4	JUNCTION	6964.00	4.00	0.0	
AP6	JUNCTION	6993.90	0.77	0.0	
AP9	JUNCTION	6876.00	0.77	0.0	
AP21	JUNCTION	6854.00	0.00	0.0	
AP2	JUNCTION	7026.90	0.00	0.0	
AP3	JUNCTION	7007.75	0.00	0.0	
AP3a	JUNCTION	6985.00	1.50	0.0	
basin_D6a	JUNCTION	7025.00	0.00	0.0	
STREETSUMP	JUNCTION	6985.50	4.00	0.0	
AP5	JUNCTION	7015.00	0.72	0.0	
AP7	JUNCTION	6983.00	4.00	0.0	
AP7A	JUNCTION	6842.00	4.00	0.0	
Basin_D7	JUNCTION	6994.00	0.00	0.0	
basin_D6	JUNCTION	6955.00	0.00	0.0	
AP10	JUNCTION	6849.47	4.00	0.0	
basin_D5	JUNCTION	6994.85	0.00	0.0	

Proposed SWMM 10-yr Results

AP8	JUNCTION	6937.55	0.77	0.0
basin_D8	JUNCTION	6983.00	0.00	0.0
basin_D1a	JUNCTION	7100.00	0.00	0.0
basin_D1b	JUNCTION	7100.00	0.00	0.0
AP4a	OUTFALL	6961.34	1.50	0.0
AP11	OUTFALL	6816.00	0.00	0.0
AP20	OUTFALL	6989.50	0.00	0.0
HowellPond	STORAGE	6990.00	13.00	0.0
ORRPond	STORAGE	6962.00	7.00	0.0
POWERSPOND	STORAGE	6826.00	14.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_D1	STREETSUMP	CONDUIT	400.0	10.1900	0.0100
4	basin_OS3	AP3	CONDUIT	400.0	54.8079	0.0100
6	basin_D4	AP20	CONDUIT	400.0	5.2573	0.0100
9	AP2	STREETSUMP	CONDUIT	585.0	7.0947	0.0300
10	AP1	AP4a	CONDUIT	1211.0	4.8082	0.0250
11	basin_OS5	AP21	CONDUIT	400.0	13.1113	0.0100
18	AP3	HowellPond	CONDUIT	400.0	4.4419	0.0100
19	AP3a	AP4a	CONDUIT	1460.0	1.6208	0.0130
25	basin_D6a	AP9	CONDUIT	400.0	40.1387	0.0100
28	AP21	POWERSPOND	CONDUIT	540.0	5.1922	0.0150
5	basin_OS4	AP5	CONDUIT	400.0	16.4689	0.0200
16	STREETSUMP	AP4	CONDUIT	123.0	17.7530	0.0130
17	basin_D2	AP6	CONDUIT	400.0	4.0283	0.0100
20	AP4	ORRPond	CONDUIT	400.0	0.5000	0.0100
21	AP5	AP6	CONDUIT	1022.0	2.0650	0.0180
22	basin_D3	AP7	CONDUIT	400.0	9.2898	0.0100
23	AP7	AP7A	CONDUIT	3800.0	3.7131	0.0300
24	Basin_D7	AP7A	CONDUIT	400.0	41.0817	0.0100
29	basin_D6	AP9	CONDUIT	400.0	20.1468	0.0100
30	basin_D5	AP8	CONDUIT	400.0	14.4743	0.0100
31	AP8	AP9	CONDUIT	1174.0	5.2500	0.0180
32	AP9	AP10	CONDUIT	1870.0	1.4189	0.0180
33	AP7A	POWERSPOND	CONDUIT	187.0	4.2820	0.0130
34	basin_D8	AP10	CONDUIT	400.0	35.4140	0.0100
35	AP10	POWERSPOND	CONDUIT	128.0	12.1752	0.0130
36	AP6	AP10	CONDUIT	400.0	38.7197	0.0180
37	basin_D1a	AP4a	CONDUIT	400.0	36.9565	0.0100
38	basin_D1b	AP1	CONDUIT	400.0	20.5454	0.0100
8	HowellPond	AP3a	ORIFICE			
12	ORRPond	AP4a	OUTLET			
14	POWERSPOND	AP11	OUTLET			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
11	DUMMY	0.00	0.00	0.00	0.00	1	0.00
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00
19	CIRCULAR	1.50	1.77	0.38	1.50	1	13.37
25	DUMMY	0.00	0.00	0.00	0.00	1	0.00
28	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
16	CIRCULAR	4.00	12.57	1.00	4.00	1	605.23
17	DUMMY	0.00	0.00	0.00	0.00	1	0.00
20	DUMMY	0.00	0.00	0.00	0.00	1	0.00
21	StreetSection-localresidential			0.72	18.70	0.31	59.50
						1	101.83

Proposed SWMM 10-yr Results

22	DUMMY	0.00	0.00	0.00	0.00	1	0.00
23	TRAPEZOIDAL	4.00	104.00	2.42	42.00	1	1789.00
24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
29	DUMMY	0.00	0.00	0.00	0.00	1	0.00
30	DUMMY	0.00	0.00	0.00	0.00	1	0.00
31	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	190.91
32	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	99.25
33	CIRCULAR	4.00	12.57	1.00	4.00	1	297.24
34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
35	CIRCULAR	4.00	12.57	1.00	4.00	1	501.21
36	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	518.47
37	DUMMY	0.00	0.00	0.00	0.00	1	0.00
38	DUMMY	0.00	0.00	0.00	0.00	1	0.00

 Transect Summary

Transect StreetSection-localresidential
 Area:

0.0001	0.0003	0.0006	0.0011	0.0018
0.0025	0.0035	0.0045	0.0057	0.0076
0.0106	0.0149	0.0204	0.0270	0.0349
0.0440	0.0543	0.0658	0.0785	0.0924
0.1075	0.1238	0.1413	0.1601	0.1800
0.2011	0.2235	0.2470	0.2718	0.2978
0.3249	0.3530	0.3812	0.4094	0.4379
0.4676	0.4983	0.5302	0.5632	0.5973
0.6326	0.6689	0.7064	0.7450	0.7848
0.8256	0.8675	0.9106	0.9547	1.0000

Hrad:

0.0197	0.0395	0.0592	0.0789	0.0986
0.1184	0.1381	0.1578	0.1776	0.1310
0.1265	0.1350	0.1491	0.1661	0.1848
0.2045	0.2249	0.2458	0.2671	0.2887
0.3105	0.3324	0.3545	0.3767	0.3990
0.4214	0.4439	0.4664	0.4889	0.5115
0.5341	0.5727	0.6165	0.6602	0.6879
0.7073	0.7270	0.7470	0.7671	0.7875
0.8080	0.8287	0.8495	0.8707	0.8920
0.9135	0.9350	0.9566	0.9783	1.0000

Width:

0.0031	0.0062	0.0093	0.0124	0.0155
0.0185	0.0216	0.0247	0.0278	0.0535
0.0798	0.1061	0.1324	0.1588	0.1851
0.2114	0.2377	0.2640	0.2903	0.3166
0.3430	0.3693	0.3956	0.4219	0.4482
0.4745	0.5009	0.5272	0.5535	0.5798
0.6061	0.6141	0.6160	0.6178	0.6344
0.6589	0.6834	0.7079	0.7325	0.7570
0.7815	0.8060	0.8306	0.8548	0.8790
0.9032	0.9274	0.9516	0.9758	1.0000

Transect 80'ROW_streetconveyance
 Area:

0.0001	0.0005	0.0012	0.0021	0.0033
0.0047	0.0064	0.0084	0.0106	0.0131
0.0159	0.0193	0.0238	0.0295	0.0362
0.0441	0.0531	0.0632	0.0744	0.0867
0.1002	0.1148	0.1304	0.1472	0.1652
0.1842	0.2043	0.2256	0.2480	0.2715
0.2961	0.3218	0.3486	0.3766	0.4056
0.4358	0.4671	0.4995	0.5331	0.5677
0.6035	0.6404	0.6784	0.7180	0.7600
0.8043	0.8508	0.8994	0.9491	1.0000

Hrad:

0.0396	0.0791	0.1187	0.1583	0.1978
0.2374	0.2770	0.3165	0.3561	0.3957
0.4352	0.4916	0.5207	0.5344	0.5414
0.5463	0.5513	0.5575	0.5651	0.5742
0.5847	0.5964	0.6093	0.6231	0.6378
0.6531	0.6692	0.6858	0.7029	0.7204
0.7383	0.7566	0.7751	0.7939	0.8130

Proposed SWMM 10-yr Results

	0.8323	0.8518	0.8715	0.8913	0.9113
	0.9315	0.9517	0.9721	0.9224	0.9077
	0.9051	0.9099	0.9317	0.9648	1.0000
Width:					
	0.0051	0.0102	0.0153	0.0204	0.0255
	0.0306	0.0357	0.0408	0.0459	0.0510
	0.0561	0.0772	0.0989	0.1206	0.1423
	0.1639	0.1856	0.2073	0.2290	0.2507
	0.2724	0.2941	0.3158	0.3375	0.3592
	0.3808	0.4025	0.4242	0.4459	0.4676
	0.4893	0.5110	0.5327	0.5544	0.5761
	0.5977	0.6194	0.6411	0.6628	0.6845
	0.7062	0.7279	0.7496	0.7961	0.8394
	0.8828	0.9262	0.9566	0.9783	1.0000

```

*****
Flow Routing Continuity          Volume      Volume
                                acre-feet   10^6 gal
*****                          -
Dry Weather Inflow .....        0.000        0.000
Wet Weather Inflow .....        0.000        0.000
Groundwater Inflow .....        0.000        0.000
RDII Inflow .....                0.000        0.000
External Inflow .....            32.843       10.702
External Outflow .....           32.181       10.487
Internal Outflow .....           0.281        0.092
Storage Losses .....             0.000        0.000
Initial Stored Volume ....        0.000        0.000
Final Stored Volume .....         0.511        0.166
Continuity Error (%) .....       -0.398
    
```

```

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

```

*****
Routing Time Step Summary
*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
    
```

```

*****
Node Depth Summary
*****
    
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_D1	JUNCTION	0.00	0.00	7026.05	0 00:00
basin_D2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_D3	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_D4	JUNCTION	0.00	0.00	7010.50	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6906.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP4	JUNCTION	0.02	0.78	6964.78	0 00:36
AP6	JUNCTION	0.02	0.32	6994.22	0 00:44
AP9	JUNCTION	0.03	0.77	6876.77	0 00:28
AP21	JUNCTION	0.00	0.00	6854.00	0 00:00
AP2	JUNCTION	0.00	0.00	7026.90	0 00:00
AP3	JUNCTION	0.00	0.00	7007.75	0 00:00
AP3a	JUNCTION	0.15	0.96	6985.96	0 02:33
basin_D6a	JUNCTION	0.00	0.00	7025.00	0 00:00

Proposed SWMM 10-yr Results

STREETSUMP	JUNCTION	0.02	0.78	6986.28	0	00:36
AP5	JUNCTION	0.01	0.32	7015.32	0	00:39
AP7	JUNCTION	0.01	0.54	6983.54	0	00:30
AP7A	JUNCTION	0.04	1.45	6843.45	0	00:37
Basin_D7	JUNCTION	0.00	0.00	6994.00	0	00:00
basin_D6	JUNCTION	0.00	0.00	6955.00	0	00:00
AP10	JUNCTION	0.05	1.76	6851.23	0	00:35
basin_D5	JUNCTION	0.00	0.00	6994.85	0	00:00
AP8	JUNCTION	0.01	0.46	6938.01	0	00:32
basin_D8	JUNCTION	0.00	0.00	6983.00	0	00:00
basin_D1a	JUNCTION	0.00	0.00	7100.00	0	00:00
basin_D1b	JUNCTION	0.00	0.00	7100.00	0	00:00
AP4a	OUTFALL	0.15	0.96	6962.30	0	02:36
AP11	OUTFALL	0.00	0.00	6816.00	0	00:00
AP20	OUTFALL	0.00	0.00	6989.50	0	00:00
HowellPond	STORAGE	0.93	7.05	6997.05	0	02:33
ORRPond	STORAGE	3.24	4.85	6966.85	0	01:22
POWERSPOND	STORAGE	6.18	11.10	6837.10	0	01:29

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal
basin_OS1	JUNCTION	14.93	14.93	0 00:34	0.315	0.315
basin_OS2	JUNCTION	7.51	7.51	0 00:42	0.227	0.227
basin_OS3	JUNCTION	54.83	54.83	0 00:47	1.869	1.869
basin_OS4	JUNCTION	6.31	6.31	0 00:39	0.164	0.164
basin_D1	JUNCTION	43.45	43.45	0 00:35	0.965	0.965
basin_D2	JUNCTION	26.93	26.93	0 00:33	0.506	0.506
basin_D3	JUNCTION	37.36	37.36	0 00:30	0.522	0.522
basin_D4	JUNCTION	3.82	3.82	0 00:35	0.069	0.069
basin_OS5	JUNCTION	29.94	29.94	0 00:33	0.548	0.548
AP1	JUNCTION	0.00	26.36	0 00:32	0.000	0.520
AP4	JUNCTION	0.00	50.41	0 00:36	0.000	1.192
AP6	JUNCTION	0.00	30.15	0 00:35	0.000	0.671
AP9	JUNCTION	0.00	123.79	0 00:34	0.000	2.368
AP21	JUNCTION	0.00	29.94	0 00:33	0.000	0.548
AP2	JUNCTION	0.00	7.51	0 00:42	0.000	0.227
AP3	JUNCTION	0.00	54.83	0 00:47	0.000	1.869
AP3a	JUNCTION	0.00	9.84	0 02:33	0.000	1.869
basin_D6a	JUNCTION	21.16	21.16	0 00:28	0.298	0.298
STREETSUMP	JUNCTION	0.00	50.42	0 00:36	0.000	1.192
AP5	JUNCTION	0.00	6.31	0 00:39	0.000	0.164
AP7	JUNCTION	0.00	37.36	0 00:30	0.000	0.522
AP7A	JUNCTION	0.00	83.67	0 00:37	0.000	1.807
Basin_D7	JUNCTION	52.61	52.61	0 00:37	1.270	1.270
basin_D6	JUNCTION	66.37	66.37	0 00:35	1.383	1.383
AP10	JUNCTION	0.00	200.36	0 00:35	0.000	4.395
basin_D5	JUNCTION	40.97	40.97	0 00:32	0.687	0.687
AP8	JUNCTION	0.00	40.97	0 00:32	0.000	0.687
basin_D8	JUNCTION	71.17	71.17	0 00:34	1.415	1.415
basin_D1a	JUNCTION	11.29	11.29	0 00:35	0.260	0.260
basin_D1b	JUNCTION	12.11	12.11	0 00:30	0.205	0.205
AP4a	OUTFALL	0.00	41.74	0 00:34	0.000	3.724
AP11	OUTFALL	0.00	83.48	0 01:29	0.000	6.693
AP20	OUTFALL	0.00	3.82	0 00:35	0.000	0.069
HowellPond	STORAGE	0.00	54.83	0 00:47	0.000	1.869
ORRPond	STORAGE	0.00	50.41	0 00:36	0.000	1.192
POWERSPOND	STORAGE	0.00	310.54	0 00:35	0.000	6.748

Node Surge Summary

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

Max. Height Min. Depth

Proposed SWMM 10-yr Results

Node	Type	Hours Surcharged	Above Crown Feet	Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_D1	JUNCTION	48.00	0.000	0.000
basin_D2	JUNCTION	48.00	0.000	0.000
basin_D3	JUNCTION	48.00	0.000	0.000
basin_D4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000
AP9	JUNCTION	0.23	0.000	0.000
AP21	JUNCTION	48.00	0.000	0.000
AP2	JUNCTION	48.00	0.000	0.000
AP3	JUNCTION	48.00	0.000	0.000
basin_D6a	JUNCTION	48.00	0.000	0.000
Basin_D7	JUNCTION	48.00	0.000	0.000
basin_D6	JUNCTION	48.00	0.000	0.000
basin_D5	JUNCTION	48.00	0.000	0.000
basin_D8	JUNCTION	48.00	0.000	0.000
basin_D1a	JUNCTION	48.00	0.000	0.000
basin_D1b	JUNCTION	48.00	0.000	0.000
HowellPond	STORAGE	8.33	6.047	5.953
ORRPond	STORAGE	48.00	4.847	2.153

Node Flooding Summary

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

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Volume 1000 ft3
AP9	0.23	24.50	0 00:34	0.092	0.000

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
HowellPond	15.459	2	0	165.138	17	0 02:33	9.84
ORRPond	41.508	22	0	95.031	51	0 01:22	20.30
POWERSPOND	204.549	20	0	639.880	63	0 01:29	83.48

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP4a	99.79	2.89	41.74	3.724
AP11	99.62	5.20	83.48	6.693
AP20	5.49	0.97	3.82	0.069
System	68.30	9.05	122.90	10.486

Link Flow Summary

Proposed SWMM 10-yr Results

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	14.93	0 00:34			
2	DUMMY	7.51	0 00:42			
3	DUMMY	43.45	0 00:35			
4	DUMMY	54.83	0 00:47			
6	DUMMY	3.82	0 00:35			
9	DUMMY	7.51	0 00:42			
10	DUMMY	26.36	0 00:32			
11	DUMMY	29.94	0 00:33			
18	DUMMY	54.83	0 00:47			
19	CONDUIT	9.84	0 02:36	8.27	0.74	0.64
25	DUMMY	21.16	0 00:28			
28	DUMMY	29.94	0 00:33			
5	DUMMY	6.31	0 00:39			
16	CONDUIT	50.41	0 00:36	29.20	0.08	0.20
17	DUMMY	26.93	0 00:33			
20	DUMMY	50.41	0 00:36			
21	CHANNEL	6.17	0 00:44	2.68	0.06	0.44
22	DUMMY	37.36	0 00:30			
23	CONDUIT	31.17	0 00:38	5.83	0.02	0.12
24	DUMMY	52.61	0 00:37			
29	DUMMY	66.37	0 00:35			
30	DUMMY	40.97	0 00:32			
31	CHANNEL	40.36	0 00:34	7.36	0.21	0.59
32	CHANNEL	99.25	0 00:35	5.05	1.00	1.00
33	CONDUIT	83.67	0 00:37	20.32	0.28	0.36
34	DUMMY	71.17	0 00:34			
35	CONDUIT	200.37	0 00:35	37.66	0.40	0.44
36	CHANNEL	30.15	0 00:35	16.83	0.06	0.40
37	DUMMY	11.29	0 00:35			
38	DUMMY	12.11	0 00:30			
8	ORIFICE	9.84	0 02:33			0.00
12	DUMMY	20.30	0 01:22			
14	DUMMY	83.48	0 01:29			

 Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
9	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
11	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01
25	0.01	0.01	0.01	48.00	0.01
28	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
17	0.01	0.01	0.01	48.00	0.01
20	0.01	0.01	0.01	48.00	0.01
22	0.01	0.01	0.01	48.00	0.01
24	0.01	0.01	0.01	48.00	0.01
29	0.01	0.01	0.01	48.00	0.01
30	0.01	0.01	0.01	48.00	0.01
32	0.12	0.23	0.15	0.15	0.23
34	0.01	0.01	0.01	48.00	0.01
37	0.01	0.01	0.01	48.00	0.01
38	0.01	0.01	0.01	48.00	0.01

Analysis begun on: Wed May 14 13:03:21 2014

Proposed SWMM 10-yr Results

Analysis ended on: Wed May 14 13:03:21 2014
Total elapsed time: < 1 sec

Proposed SWMM 25-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Proposed Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 36
Number of links 33
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_D1	JUNCTION	7026.05	0.00	0.0	
basin_D2	JUNCTION	7010.00	0.00	0.0	
basin_D3	JUNCTION	7020.00	0.00	0.0	
basin_D4	JUNCTION	7010.50	0.00	0.0	
basin_OS5	JUNCTION	6906.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP4	JUNCTION	6964.00	4.00	0.0	
AP6	JUNCTION	6993.90	0.77	0.0	
AP9	JUNCTION	6876.00	0.77	0.0	
AP21	JUNCTION	6854.00	0.00	0.0	
AP2	JUNCTION	7026.90	0.00	0.0	
AP3	JUNCTION	7007.75	0.00	0.0	
AP3a	JUNCTION	6985.00	1.50	0.0	
basin_D6a	JUNCTION	7025.00	0.00	0.0	
STREETSUMP	JUNCTION	6985.50	4.00	0.0	
AP5	JUNCTION	7015.00	0.72	0.0	
AP7	JUNCTION	6983.00	4.00	0.0	
AP7A	JUNCTION	6842.00	4.00	0.0	
Basin_D7	JUNCTION	6994.00	0.00	0.0	
basin_D6	JUNCTION	6955.00	0.00	0.0	
AP10	JUNCTION	6849.47	4.00	0.0	
basin_D5	JUNCTION	6994.85	0.00	0.0	

Proposed SWMM 25-yr Results

AP8	JUNCTION	6937.55	0.77	0.0
basin_D8	JUNCTION	6983.00	0.00	0.0
basin_D1a	JUNCTION	7100.00	0.00	0.0
basin_D1b	JUNCTION	7100.00	0.00	0.0
AP4a	OUTFALL	6961.34	1.50	0.0
AP11	OUTFALL	6816.00	0.00	0.0
AP20	OUTFALL	6989.50	0.00	0.0
HowellPond	STORAGE	6990.00	13.00	0.0
ORRPond	STORAGE	6962.00	7.00	0.0
POWERSPOND	STORAGE	6826.00	14.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_D1	STREETSUMP	CONDUIT	400.0	10.1900	0.0100
4	basin_OS3	AP3	CONDUIT	400.0	54.8079	0.0100
6	basin_D4	AP20	CONDUIT	400.0	5.2573	0.0100
9	AP2	STREETSUMP	CONDUIT	585.0	7.0947	0.0300
10	AP1	AP4a	CONDUIT	1211.0	4.8082	0.0250
11	basin_OS5	AP21	CONDUIT	400.0	13.1113	0.0100
18	AP3	HowellPond	CONDUIT	400.0	4.4419	0.0100
19	AP3a	AP4a	CONDUIT	1460.0	1.6208	0.0130
25	basin_D6a	AP9	CONDUIT	400.0	40.1387	0.0100
28	AP21	POWERSPOND	CONDUIT	540.0	5.1922	0.0150
5	basin_OS4	AP5	CONDUIT	400.0	16.4689	0.0200
16	STREETSUMP	AP4	CONDUIT	123.0	17.7530	0.0130
17	basin_D2	AP6	CONDUIT	400.0	4.0283	0.0100
20	AP4	ORRPond	CONDUIT	400.0	0.5000	0.0100
21	AP5	AP6	CONDUIT	1022.0	2.0650	0.0180
22	basin_D3	AP7	CONDUIT	400.0	9.2898	0.0100
23	AP7	AP7A	CONDUIT	3800.0	3.7131	0.0300
24	Basin_D7	AP7A	CONDUIT	400.0	41.0817	0.0100
29	basin_D6	AP9	CONDUIT	400.0	20.1468	0.0100
30	basin_D5	AP8	CONDUIT	400.0	14.4743	0.0100
31	AP8	AP9	CONDUIT	1174.0	5.2500	0.0180
32	AP9	AP10	CONDUIT	1870.0	1.4189	0.0180
33	AP7A	POWERSPOND	CONDUIT	187.0	4.2820	0.0130
34	basin_D8	AP10	CONDUIT	400.0	35.4140	0.0100
35	AP10	POWERSPOND	CONDUIT	128.0	12.1752	0.0130
36	AP6	AP10	CONDUIT	400.0	38.7197	0.0180
37	basin_D1a	AP4a	CONDUIT	400.0	36.9565	0.0100
38	basin_D1b	AP1	CONDUIT	400.0	20.5454	0.0100
8	HowellPond	AP3a	ORIFICE			
12	ORRPond	AP4a	OUTLET			
14	POWERSPOND	AP11	OUTLET			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
11	DUMMY	0.00	0.00	0.00	0.00	1	0.00
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00
19	CIRCULAR	1.50	1.77	0.38	1.50	1	13.37
25	DUMMY	0.00	0.00	0.00	0.00	1	0.00
28	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
16	CIRCULAR	4.00	12.57	1.00	4.00	1	605.23
17	DUMMY	0.00	0.00	0.00	0.00	1	0.00
20	DUMMY	0.00	0.00	0.00	0.00	1	0.00
21	StreetSection-localresidential			0.72	18.70	0.31	59.50
						1	101.83

Proposed SWMM 25-yr Results

22	DUMMY	0.00	0.00	0.00	0.00	1	0.00
23	TRAPEZOIDAL	4.00	104.00	2.42	42.00	1	1789.00
24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
29	DUMMY	0.00	0.00	0.00	0.00	1	0.00
30	DUMMY	0.00	0.00	0.00	0.00	1	0.00
31	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	190.91
32	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	99.25
33	CIRCULAR	4.00	12.57	1.00	4.00	1	297.24
34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
35	CIRCULAR	4.00	12.57	1.00	4.00	1	501.21
36	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	518.47
37	DUMMY	0.00	0.00	0.00	0.00	1	0.00
38	DUMMY	0.00	0.00	0.00	0.00	1	0.00

Transect Summary

Transect StreetSection-localresidential
Area:

	0.0001	0.0003	0.0006	0.0011	0.0018
	0.0025	0.0035	0.0045	0.0057	0.0076
	0.0106	0.0149	0.0204	0.0270	0.0349
	0.0440	0.0543	0.0658	0.0785	0.0924
	0.1075	0.1238	0.1413	0.1601	0.1800
	0.2011	0.2235	0.2470	0.2718	0.2978
	0.3249	0.3530	0.3812	0.4094	0.4379
	0.4676	0.4983	0.5302	0.5632	0.5973
	0.6326	0.6689	0.7064	0.7450	0.7848
	0.8256	0.8675	0.9106	0.9547	1.0000
Hrad:	0.0197	0.0395	0.0592	0.0789	0.0986
	0.1184	0.1381	0.1578	0.1776	0.1310
	0.1265	0.1350	0.1491	0.1661	0.1848
	0.2045	0.2249	0.2458	0.2671	0.2887
	0.3105	0.3324	0.3545	0.3767	0.3990
	0.4214	0.4439	0.4664	0.4889	0.5115
	0.5341	0.5727	0.6165	0.6602	0.6879
	0.7073	0.7270	0.7470	0.7671	0.7875
	0.8080	0.8287	0.8495	0.8707	0.8920
	0.9135	0.9350	0.9566	0.9783	1.0000
Width:	0.0031	0.0062	0.0093	0.0124	0.0155
	0.0185	0.0216	0.0247	0.0278	0.0535
	0.0798	0.1061	0.1324	0.1588	0.1851
	0.2114	0.2377	0.2640	0.2903	0.3166
	0.3430	0.3693	0.3956	0.4219	0.4482
	0.4745	0.5009	0.5272	0.5535	0.5798
	0.6061	0.6141	0.6160	0.6178	0.6344
	0.6589	0.6834	0.7079	0.7325	0.7570
	0.7815	0.8060	0.8306	0.8548	0.8790
	0.9032	0.9274	0.9516	0.9758	1.0000

Transect 80'ROW_streetconveyance
Area:

	0.0001	0.0005	0.0012	0.0021	0.0033
	0.0047	0.0064	0.0084	0.0106	0.0131
	0.0159	0.0193	0.0238	0.0295	0.0362
	0.0441	0.0531	0.0632	0.0744	0.0867
	0.1002	0.1148	0.1304	0.1472	0.1652
	0.1842	0.2043	0.2256	0.2480	0.2715
	0.2961	0.3218	0.3486	0.3766	0.4056
	0.4358	0.4671	0.4995	0.5331	0.5677
	0.6035	0.6404	0.6784	0.7180	0.7600
	0.8043	0.8508	0.8994	0.9491	1.0000
Hrad:	0.0396	0.0791	0.1187	0.1583	0.1978
	0.2374	0.2770	0.3165	0.3561	0.3957
	0.4352	0.4916	0.5207	0.5344	0.5414
	0.5463	0.5513	0.5575	0.5651	0.5742
	0.5847	0.5964	0.6093	0.6231	0.6378
	0.6531	0.6692	0.6858	0.7029	0.7204
	0.7383	0.7566	0.7751	0.7939	0.8130

Proposed SWMM 25-yr Results

	0.8323	0.8518	0.8715	0.8913	0.9113
	0.9315	0.9517	0.9721	0.9224	0.9077
	0.9051	0.9099	0.9317	0.9648	1.0000
Width:					
	0.0051	0.0102	0.0153	0.0204	0.0255
	0.0306	0.0357	0.0408	0.0459	0.0510
	0.0561	0.0772	0.0989	0.1206	0.1423
	0.1639	0.1856	0.2073	0.2290	0.2507
	0.2724	0.2941	0.3158	0.3375	0.3592
	0.3808	0.4025	0.4242	0.4459	0.4676
	0.4893	0.5110	0.5327	0.5544	0.5761
	0.5977	0.6194	0.6411	0.6628	0.6845
	0.7062	0.7279	0.7496	0.7961	0.8394
	0.8828	0.9262	0.9566	0.9783	1.0000

```

*****
Flow Routing Continuity          Volume      Volume
                                acre-feet   10^6 gal
*****                          -
Dry Weather Inflow .....       0.000       0.000
Wet Weather Inflow .....       0.000       0.000
Groundwater Inflow .....       0.000       0.000
RDII Inflow .....              0.000       0.000
External Inflow .....          56.018      18.254
External Outflow .....         53.340      17.382
Internal Outflow .....         2.326       0.758
Storage Losses .....           0.000       0.000
Initial Stored Volume ....      0.000       0.000
Final Stored Volume .....      0.517       0.168
Continuity Error (%) .....     -0.294
    
```

```

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

```

*****
Routing Time Step Summary
*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.01
    
```

```

*****
Node Depth Summary
*****
    
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_D1	JUNCTION	0.00	0.00	7026.05	0 00:00
basin_D2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_D3	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_D4	JUNCTION	0.00	0.00	7010.50	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6906.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP4	JUNCTION	0.03	1.05	6965.05	0 00:42
AP6	JUNCTION	0.02	0.39	6994.29	0 00:48
AP9	JUNCTION	0.03	0.77	6876.77	0 00:30
AP21	JUNCTION	0.00	0.00	6854.00	0 00:00
AP2	JUNCTION	0.00	0.00	7026.90	0 00:00
AP3	JUNCTION	0.00	0.00	7007.75	0 00:00
AP3a	JUNCTION	0.32	1.09	6986.09	0 03:02
basin_D6a	JUNCTION	0.00	0.00	7025.00	0 00:00

Proposed SWMM 25-yr Results

STREETSUMP	JUNCTION	0.03	1.05	6986.55	0	00:42
AP5	JUNCTION	0.02	0.39	7015.39	0	00:44
AP7	JUNCTION	0.01	0.69	6983.69	0	00:34
AP7A	JUNCTION	0.05	1.92	6843.92	0	00:42
Basin_D7	JUNCTION	0.00	0.00	6994.00	0	00:00
basin_D6	JUNCTION	0.00	0.00	6955.00	0	00:00
AP10	JUNCTION	0.06	2.07	6851.54	0	00:40
basin_D5	JUNCTION	0.00	0.00	6994.85	0	00:00
AP8	JUNCTION	0.01	0.53	6938.08	0	00:36
basin_D8	JUNCTION	0.00	0.00	6983.00	0	00:00
basin_D1a	JUNCTION	0.00	0.00	7100.00	0	00:00
basin_D1b	JUNCTION	0.00	0.00	7100.00	0	00:00
AP4a	OUTFALL	0.32	1.09	6962.43	0	03:04
AP11	OUTFALL	0.00	0.00	6816.00	0	00:00
AP20	OUTFALL	0.00	0.00	6989.50	0	00:00
HowellPond	STORAGE	2.38	9.83	6999.83	0	03:02
ORRPond	STORAGE	3.27	5.89	6967.89	0	01:17
POWERSPOND	STORAGE	6.22	12.19	6838.19	0	01:18

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal
basin_OS1	JUNCTION	25.60	25.60	0 00:39	0.519	0.519
basin_OS2	JUNCTION	16.54	16.54	0 00:48	0.497	0.497
basin_OS3	JUNCTION	124.66	124.66	0 00:54	4.171	4.171
basin_OS4	JUNCTION	13.76	13.76	0 00:44	0.360	0.360
basin_D1	JUNCTION	76.24	76.24	0 00:41	1.645	1.645
basin_D2	JUNCTION	44.09	44.09	0 00:38	0.814	0.814
basin_D3	JUNCTION	57.09	57.09	0 00:34	0.786	0.786
basin_D4	JUNCTION	8.00	8.00	0 00:41	0.157	0.157
basin_OS5	JUNCTION	52.31	52.31	0 00:38	0.940	0.940
AP1	JUNCTION	0.00	41.16	0 00:37	0.000	0.795
AP4	JUNCTION	0.00	91.59	0 00:42	0.000	2.142
AP6	JUNCTION	0.00	54.14	0 00:41	0.000	1.175
AP9	JUNCTION	0.00	192.77	0 00:39	0.000	3.561
AP21	JUNCTION	0.00	52.31	0 00:38	0.000	0.940
AP2	JUNCTION	0.00	16.54	0 00:48	0.000	0.497
AP3	JUNCTION	0.00	124.66	0 00:54	0.000	4.171
AP3a	JUNCTION	0.00	11.74	0 03:02	0.000	4.171
basin_D6a	JUNCTION	30.78	30.78	0 00:33	0.424	0.424
STREETSUMP	JUNCTION	0.00	91.60	0 00:42	0.000	2.142
AP5	JUNCTION	0.00	13.76	0 00:44	0.000	0.360
AP7	JUNCTION	0.00	57.09	0 00:34	0.000	0.786
AP7A	JUNCTION	0.00	138.08	0 00:42	0.000	2.819
Basin_D7	JUNCTION	87.95	87.95	0 00:43	2.020	2.020
basin_D6	JUNCTION	103.60	103.60	0 00:40	2.071	2.071
AP10	JUNCTION	0.00	264.54	0 00:40	0.000	6.174
basin_D5	JUNCTION	64.42	64.42	0 00:36	1.066	1.066
AP8	JUNCTION	0.00	64.42	0 00:36	0.000	1.066
basin_D8	JUNCTION	111.81	111.81	0 00:39	2.145	2.145
basin_D1a	JUNCTION	16.50	16.50	0 00:40	0.363	0.363
basin_D1b	JUNCTION	16.57	16.57	0 00:34	0.275	0.275
AP4a	OUTFALL	0.00	88.09	0 00:57	0.000	7.352
AP11	OUTFALL	0.00	198.66	0 01:18	0.000	9.871
AP20	OUTFALL	0.00	8.00	0 00:41	0.000	0.157
HowellPond	STORAGE	0.00	124.66	0 00:54	0.000	4.171
ORRPond	STORAGE	0.00	91.59	0 00:42	0.000	2.142
POWERSPOND	STORAGE	0.00	451.91	0 00:41	0.000	9.929

Node Surge Summary

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

Max. Height Min. Depth

Proposed SWMM 25-yr Results

Node	Type	Hours Surcharged	Above Crown Feet	Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_D1	JUNCTION	48.00	0.000	0.000
basin_D2	JUNCTION	48.00	0.000	0.000
basin_D3	JUNCTION	48.00	0.000	0.000
basin_D4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000
AP9	JUNCTION	0.53	0.000	0.000
AP21	JUNCTION	48.00	0.000	0.000
AP2	JUNCTION	48.00	0.000	0.000
AP3	JUNCTION	48.00	0.000	0.000
basin_D6a	JUNCTION	48.00	0.000	0.000
Basin_D7	JUNCTION	48.00	0.000	0.000
basin_D6	JUNCTION	48.00	0.000	0.000
basin_D5	JUNCTION	48.00	0.000	0.000
basin_D8	JUNCTION	48.00	0.000	0.000
basin_D1a	JUNCTION	48.00	0.000	0.000
basin_D1b	JUNCTION	48.00	0.000	0.000
HowellPond	STORAGE	15.78	8.829	3.171
ORRPond	STORAGE	48.00	5.895	1.105
POWERSPOND	STORAGE	0.37	0.193	1.807

Node Flooding Summary

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

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Pondered Volume 1000 ft3
AP9	0.53	93.46	0 00:39	0.758	0.000

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
HowellPond	73.415	8	0	447.929	47	0 03:02	11.74
ORRPond	42.737	23	0	136.622	74	0 01:16	44.49
POWERSPOND	208.519	20	0	775.594	76	0 01:17	198.66

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP4a	99.79	5.70	88.09	7.352
AP11	99.63	7.66	198.66	9.871
AP20	5.52	2.20	8.00	0.157
System	68.31	15.57	281.90	17.380

Link Flow Summary

Proposed SWMM 25-yr Results

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	25.60	0 00:39			
2	DUMMY	16.54	0 00:48			
3	DUMMY	76.24	0 00:41			
4	DUMMY	124.66	0 00:54			
6	DUMMY	8.00	0 00:41			
9	DUMMY	16.54	0 00:48			
10	DUMMY	41.16	0 00:37			
11	DUMMY	52.31	0 00:38			
18	DUMMY	124.66	0 00:54			
19	CONDUIT	11.74	0 03:04	8.53	0.88	0.73
25	DUMMY	30.78	0 00:33			
28	DUMMY	52.31	0 00:38			
5	DUMMY	13.76	0 00:44			
16	CONDUIT	91.59	0 00:42	34.73	0.15	0.26
17	DUMMY	44.09	0 00:38			
20	DUMMY	91.59	0 00:42			
21	CHANNEL	13.58	0 00:48	3.22	0.13	0.54
22	DUMMY	57.09	0 00:34			
23	CONDUIT	50.14	0 00:42	6.73	0.03	0.16
24	DUMMY	87.95	0 00:43			
29	DUMMY	103.60	0 00:40			
30	DUMMY	64.42	0 00:36			
31	CHANNEL	63.93	0 00:38	7.84	0.33	0.69
32	CHANNEL	99.25	0 00:34	5.16	1.00	1.00
33	CONDUIT	138.08	0 00:42	23.22	0.46	0.48
34	DUMMY	111.81	0 00:39			
35	CONDUIT	264.52	0 00:40	40.41	0.53	0.52
36	CHANNEL	54.14	0 00:42	17.75	0.10	0.48
37	DUMMY	16.50	0 00:40			
38	DUMMY	16.57	0 00:34			
8	ORIFICE	11.74	0 03:02			0.00
12	DUMMY	44.49	0 01:17			
14	DUMMY	198.66	0 01:18			

 Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
9	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
11	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01
25	0.01	0.01	0.01	48.00	0.01
28	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
17	0.01	0.01	0.01	48.00	0.01
20	0.01	0.01	0.01	48.00	0.01
22	0.01	0.01	0.01	48.00	0.01
24	0.01	0.01	0.01	48.00	0.01
29	0.01	0.01	0.01	48.00	0.01
30	0.01	0.01	0.01	48.00	0.01
32	0.45	0.53	0.49	0.49	0.53
34	0.01	0.01	0.01	48.00	0.01
37	0.01	0.01	0.01	48.00	0.01
38	0.01	0.01	0.01	48.00	0.01

Proposed SWMM 25-yr Results

Analysis begun on: Wed May 14 13:04:36 2014
Analysis ended on: Wed May 14 13:04:36 2014
Total elapsed time: < 1 sec

Proposed SWMM 50-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Proposed Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 36
Number of links 33
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_D1	JUNCTION	7026.05	0.00	0.0	
basin_D2	JUNCTION	7010.00	0.00	0.0	
basin_D3	JUNCTION	7020.00	0.00	0.0	
basin_D4	JUNCTION	7010.50	0.00	0.0	
basin_OS5	JUNCTION	6906.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP4	JUNCTION	6964.00	4.00	0.0	
AP6	JUNCTION	6993.90	0.77	0.0	
AP9	JUNCTION	6876.00	0.77	0.0	
AP21	JUNCTION	6854.00	0.00	0.0	
AP2	JUNCTION	7026.90	0.00	0.0	
AP3	JUNCTION	7007.75	0.00	0.0	
AP3a	JUNCTION	6985.00	1.50	0.0	
basin_D6a	JUNCTION	7025.00	0.00	0.0	
STREETSUMP	JUNCTION	6985.50	4.00	0.0	
AP5	JUNCTION	7015.00	0.72	0.0	
AP7	JUNCTION	6983.00	4.00	0.0	
AP7A	JUNCTION	6842.00	4.00	0.0	
Basin_D7	JUNCTION	6994.00	0.00	0.0	
basin_D6	JUNCTION	6955.00	0.00	0.0	
AP10	JUNCTION	6849.47	4.00	0.0	
basin_D5	JUNCTION	6994.85	0.00	0.0	

Proposed SWMM 50-yr Results

AP8	JUNCTION	6937.55	0.77	0.0
basin_D8	JUNCTION	6983.00	0.00	0.0
basin_D1a	JUNCTION	7100.00	0.00	0.0
basin_D1b	JUNCTION	7100.00	0.00	0.0
AP4a	OUTFALL	6961.34	1.50	0.0
AP11	OUTFALL	6816.00	0.00	0.0
AP20	OUTFALL	6989.50	0.00	0.0
HowellPond	STORAGE	6990.00	13.00	0.0
ORRPond	STORAGE	6962.00	7.00	0.0
POWERSPOND	STORAGE	6826.00	14.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_D1	STREETSUMP	CONDUIT	400.0	10.1900	0.0100
4	basin_OS3	AP3	CONDUIT	400.0	54.8079	0.0100
6	basin_D4	AP20	CONDUIT	400.0	5.2573	0.0100
9	AP2	STREETSUMP	CONDUIT	585.0	7.0947	0.0300
10	AP1	AP4a	CONDUIT	1211.0	4.8082	0.0250
11	basin_OS5	AP21	CONDUIT	400.0	13.1113	0.0100
18	AP3	HowellPond	CONDUIT	400.0	4.4419	0.0100
19	AP3a	AP4a	CONDUIT	1460.0	1.6208	0.0130
25	basin_D6a	AP9	CONDUIT	400.0	40.1387	0.0100
28	AP21	POWERSPOND	CONDUIT	540.0	5.1922	0.0150
5	basin_OS4	AP5	CONDUIT	400.0	16.4689	0.0200
16	STREETSUMP	AP4	CONDUIT	123.0	17.7530	0.0130
17	basin_D2	AP6	CONDUIT	400.0	4.0283	0.0100
20	AP4	ORRPond	CONDUIT	400.0	0.5000	0.0100
21	AP5	AP6	CONDUIT	1022.0	2.0650	0.0180
22	basin_D3	AP7	CONDUIT	400.0	9.2898	0.0100
23	AP7	AP7A	CONDUIT	3800.0	3.7131	0.0300
24	Basin_D7	AP7A	CONDUIT	400.0	41.0817	0.0100
29	basin_D6	AP9	CONDUIT	400.0	20.1468	0.0100
30	basin_D5	AP8	CONDUIT	400.0	14.4743	0.0100
31	AP8	AP9	CONDUIT	1174.0	5.2500	0.0180
32	AP9	AP10	CONDUIT	1870.0	1.4189	0.0180
33	AP7A	POWERSPOND	CONDUIT	187.0	4.2820	0.0130
34	basin_D8	AP10	CONDUIT	400.0	35.4140	0.0100
35	AP10	POWERSPOND	CONDUIT	128.0	12.1752	0.0130
36	AP6	AP10	CONDUIT	400.0	38.7197	0.0180
37	basin_D1a	AP4a	CONDUIT	400.0	36.9565	0.0100
38	basin_D1b	AP1	CONDUIT	400.0	20.5454	0.0100
8	HowellPond	AP3a	ORIFICE			
12	ORRPond	AP4a	OUTLET			
14	POWERSPOND	AP11	OUTLET			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
11	DUMMY	0.00	0.00	0.00	0.00	1	0.00
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00
19	CIRCULAR	1.50	1.77	0.38	1.50	1	13.37
25	DUMMY	0.00	0.00	0.00	0.00	1	0.00
28	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
16	CIRCULAR	4.00	12.57	1.00	4.00	1	605.23
17	DUMMY	0.00	0.00	0.00	0.00	1	0.00
20	DUMMY	0.00	0.00	0.00	0.00	1	0.00
21	StreetSection-localresidential			0.72	18.70	0.31	59.50
						1	101.83

Proposed SWMM 50-yr Results

22	DUMMY	0.00	0.00	0.00	0.00	1	0.00
23	TRAPEZOIDAL	4.00	104.00	2.42	42.00	1	1789.00
24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
29	DUMMY	0.00	0.00	0.00	0.00	1	0.00
30	DUMMY	0.00	0.00	0.00	0.00	1	0.00
31	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	190.91
32	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	99.25
33	CIRCULAR	4.00	12.57	1.00	4.00	1	297.24
34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
35	CIRCULAR	4.00	12.57	1.00	4.00	1	501.21
36	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	518.47
37	DUMMY	0.00	0.00	0.00	0.00	1	0.00
38	DUMMY	0.00	0.00	0.00	0.00	1	0.00

Transect Summary

Transect StreetSection-localresidential
Area:

0.0001	0.0003	0.0006	0.0011	0.0018
0.0025	0.0035	0.0045	0.0057	0.0076
0.0106	0.0149	0.0204	0.0270	0.0349
0.0440	0.0543	0.0658	0.0785	0.0924
0.1075	0.1238	0.1413	0.1601	0.1800
0.2011	0.2235	0.2470	0.2718	0.2978
0.3249	0.3530	0.3812	0.4094	0.4379
0.4676	0.4983	0.5302	0.5632	0.5973
0.6326	0.6689	0.7064	0.7450	0.7848
0.8256	0.8675	0.9106	0.9547	1.0000

Hrad:

0.0197	0.0395	0.0592	0.0789	0.0986
0.1184	0.1381	0.1578	0.1776	0.1310
0.1265	0.1350	0.1491	0.1661	0.1848
0.2045	0.2249	0.2458	0.2671	0.2887
0.3105	0.3324	0.3545	0.3767	0.3990
0.4214	0.4439	0.4664	0.4889	0.5115
0.5341	0.5727	0.6165	0.6602	0.6879
0.7073	0.7270	0.7470	0.7671	0.7875
0.8080	0.8287	0.8495	0.8707	0.8920
0.9135	0.9350	0.9566	0.9783	1.0000

Width:

0.0031	0.0062	0.0093	0.0124	0.0155
0.0185	0.0216	0.0247	0.0278	0.0535
0.0798	0.1061	0.1324	0.1588	0.1851
0.2114	0.2377	0.2640	0.2903	0.3166
0.3430	0.3693	0.3956	0.4219	0.4482
0.4745	0.5009	0.5272	0.5535	0.5798
0.6061	0.6141	0.6160	0.6178	0.6344
0.6589	0.6834	0.7079	0.7325	0.7570
0.7815	0.8060	0.8306	0.8548	0.8790
0.9032	0.9274	0.9516	0.9758	1.0000

Transect 80'ROW_streetconveyance
Area:

0.0001	0.0005	0.0012	0.0021	0.0033
0.0047	0.0064	0.0084	0.0106	0.0131
0.0159	0.0193	0.0238	0.0295	0.0362
0.0441	0.0531	0.0632	0.0744	0.0867
0.1002	0.1148	0.1304	0.1472	0.1652
0.1842	0.2043	0.2256	0.2480	0.2715
0.2961	0.3218	0.3486	0.3766	0.4056
0.4358	0.4671	0.4995	0.5331	0.5677
0.6035	0.6404	0.6784	0.7180	0.7600
0.8043	0.8508	0.8994	0.9491	1.0000

Hrad:

0.0396	0.0791	0.1187	0.1583	0.1978
0.2374	0.2770	0.3165	0.3561	0.3957
0.4352	0.4916	0.5207	0.5344	0.5414
0.5463	0.5513	0.5575	0.5651	0.5742
0.5847	0.5964	0.6093	0.6231	0.6378
0.6531	0.6692	0.6858	0.7029	0.7204
0.7383	0.7566	0.7751	0.7939	0.8130

Proposed SWMM 50-yr Results

	0.8323	0.8518	0.8715	0.8913	0.9113
	0.9315	0.9517	0.9721	0.9224	0.9077
	0.9051	0.9099	0.9317	0.9648	1.0000
Width:					
	0.0051	0.0102	0.0153	0.0204	0.0255
	0.0306	0.0357	0.0408	0.0459	0.0510
	0.0561	0.0772	0.0989	0.1206	0.1423
	0.1639	0.1856	0.2073	0.2290	0.2507
	0.2724	0.2941	0.3158	0.3375	0.3592
	0.3808	0.4025	0.4242	0.4459	0.4676
	0.4893	0.5110	0.5327	0.5544	0.5761
	0.5977	0.6194	0.6411	0.6628	0.6845
	0.7062	0.7279	0.7496	0.7961	0.8394
	0.8828	0.9262	0.9566	0.9783	1.0000

```

*****
Flow Routing Continuity          Volume      Volume
                                acre-feet   10^6 gal
*****                          -
Dry Weather Inflow .....       0.000       0.000
Wet Weather Inflow .....       0.000       0.000
Groundwater Inflow .....       0.000       0.000
RDII Inflow .....              0.000       0.000
External Inflow .....          68.159      22.210
External Outflow .....         64.222      20.928
Internal Outflow .....         3.593       1.171
Storage Losses .....           0.000       0.000
Initial Stored Volume ....       0.000       0.000
Final Stored Volume .....       0.522       0.170
Continuity Error (%) .....     -0.262

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

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*****
Routing Time Step Summary
*****
Minimum Time Step      : 15.00 sec
Average Time Step      : 15.00 sec
Maximum Time Step      : 15.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.01

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*****
Node Depth Summary
*****

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Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_D1	JUNCTION	0.00	0.00	7026.05	0 00:00
basin_D2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_D3	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_D4	JUNCTION	0.00	0.00	7010.50	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6906.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP4	JUNCTION	0.03	1.16	6965.16	0 00:42
AP6	JUNCTION	0.02	0.42	6994.32	0 00:48
AP9	JUNCTION	0.03	0.77	6876.77	0 00:29
AP21	JUNCTION	0.00	0.00	6854.00	0 00:00
AP2	JUNCTION	0.00	0.00	7026.90	0 00:00
AP3	JUNCTION	0.00	0.00	7007.75	0 00:00
AP3a	JUNCTION	0.40	1.14	6986.14	0 03:08
basin_D6a	JUNCTION	0.00	0.00	7025.00	0 00:00

Proposed SWMM 50-yr Results

STREETSUMP	JUNCTION	0.03	1.16	6986.66	0	00:43
AP5	JUNCTION	0.02	0.42	7015.42	0	00:44
AP7	JUNCTION	0.01	0.76	6983.76	0	00:33
AP7A	JUNCTION	0.06	2.12	6844.12	0	00:42
Basin_D7	JUNCTION	0.00	0.00	6994.00	0	00:00
basin_D6	JUNCTION	0.00	0.00	6955.00	0	00:00
AP10	JUNCTION	0.06	2.21	6851.68	0	00:40
basin_D5	JUNCTION	0.00	0.00	6994.85	0	00:00
AP8	JUNCTION	0.02	0.56	6938.11	0	00:36
basin_D8	JUNCTION	0.00	0.00	6983.00	0	00:00
basin_D1a	JUNCTION	0.00	0.00	7100.00	0	00:00
basin_D1b	JUNCTION	0.00	0.00	7100.00	0	00:00
AP4a	OUTFALL	0.40	1.14	6962.48	0	03:10
AP11	OUTFALL	0.00	0.00	6816.00	0	00:00
AP20	OUTFALL	0.00	0.00	6989.50	0	00:00
HowellPond	STORAGE	3.15	10.81	7000.81	0	03:08
ORRPond	STORAGE	3.30	6.46	6968.46	0	01:15
POWERSPOND	STORAGE	6.26	12.97	6838.97	0	01:22

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal
basin_OS1	JUNCTION	30.76	30.76	0 00:39	0.628	0.628
basin_OS2	JUNCTION	20.53	20.53	0 00:48	0.631	0.631
basin_OS3	JUNCTION	155.23	155.23	0 00:53	5.308	5.308
basin_OS4	JUNCTION	17.09	17.09	0 00:44	0.457	0.457
basin_D1	JUNCTION	91.68	91.68	0 00:41	2.001	2.001
basin_D2	JUNCTION	52.56	52.56	0 00:38	0.978	0.978
basin_D3	JUNCTION	67.28	67.28	0 00:33	0.931	0.931
basin_D4	JUNCTION	9.87	9.87	0 00:41	0.200	0.200
basin_OS5	JUNCTION	63.22	63.22	0 00:37	1.147	1.147
AP1	JUNCTION	0.00	48.72	0 00:37	0.000	0.945
AP4	JUNCTION	0.00	110.83	0 00:42	0.000	2.632
AP6	JUNCTION	0.00	65.47	0 00:41	0.000	1.437
AP9	JUNCTION	0.00	226.98	0 00:39	0.000	4.219
AP21	JUNCTION	0.00	63.22	0 00:37	0.000	1.147
AP2	JUNCTION	0.00	20.53	0 00:48	0.000	0.631
AP3	JUNCTION	0.00	155.23	0 00:53	0.000	5.308
AP3a	JUNCTION	0.00	12.34	0 03:08	0.000	5.308
basin_D6a	JUNCTION	35.79	35.79	0 00:33	0.495	0.495
STREETSUMP	JUNCTION	0.00	110.83	0 00:42	0.000	2.632
AP5	JUNCTION	0.00	17.09	0 00:44	0.000	0.457
AP7	JUNCTION	0.00	67.28	0 00:33	0.000	0.931
AP7A	JUNCTION	0.00	164.29	0 00:42	0.000	3.368
Basin_D7	JUNCTION	104.78	104.78	0 00:42	2.424	2.424
basin_D6	JUNCTION	121.88	121.88	0 00:40	2.452	2.452
AP10	JUNCTION	0.00	295.87	0 00:40	0.000	7.087
basin_D5	JUNCTION	76.36	76.36	0 00:36	1.272	1.272
AP8	JUNCTION	0.00	76.36	0 00:36	0.000	1.272
basin_D8	JUNCTION	131.91	131.91	0 00:39	2.546	2.546
basin_D1a	JUNCTION	19.11	19.11	0 00:40	0.421	0.421
basin_D1b	JUNCTION	19.01	19.01	0 00:34	0.317	0.317
AP4a	OUTFALL	0.00	103.72	0 00:51	0.000	9.188
AP11	OUTFALL	0.00	205.97	0 01:22	0.000	11.538
AP20	OUTFALL	0.00	9.87	0 00:41	0.000	0.200
HowellPond	STORAGE	0.00	155.23	0 00:53	0.000	5.308
ORRPond	STORAGE	0.00	110.83	0 00:42	0.000	2.632
POWERSPOND	STORAGE	0.00	519.95	0 00:40	0.000	11.598

Node Surge Summary

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

Max. Height Min. Depth

Proposed SWMM 50-yr Results

Node	Type	Hours Surcharged	Above Crown Feet	Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_D1	JUNCTION	48.00	0.000	0.000
basin_D2	JUNCTION	48.00	0.000	0.000
basin_D3	JUNCTION	48.00	0.000	0.000
basin_D4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000
AP9	JUNCTION	0.63	0.000	0.000
AP21	JUNCTION	48.00	0.000	0.000
AP2	JUNCTION	48.00	0.000	0.000
AP3	JUNCTION	48.00	0.000	0.000
basin_D6a	JUNCTION	48.00	0.000	0.000
Basin_D7	JUNCTION	48.00	0.000	0.000
basin_D6	JUNCTION	48.00	0.000	0.000
basin_D5	JUNCTION	48.00	0.000	0.000
basin_D8	JUNCTION	48.00	0.000	0.000
basin_D1a	JUNCTION	48.00	0.000	0.000
basin_D1b	JUNCTION	48.00	0.000	0.000
HowellPond	STORAGE	19.17	9.807	2.193
ORRPond	STORAGE	48.00	6.463	0.537
POWERSPOND	STORAGE	0.84	0.973	1.027

Node Flooding Summary

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

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Pondered Volume 1000 ft3
AP9	0.63	127.72	0 00:39	1.171	0.000

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
HowellPond	115.815	12	0	591.465	62	0 03:07	12.34
ORRPond	43.590	24	0	160.893	87	0 01:15	56.64
POWERSPOND	212.413	21	0	877.530	86	0 01:21	205.97

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP4a	99.79	7.12	103.72	9.188
AP11	99.65	8.96	205.97	11.538
AP20	5.78	2.68	9.87	0.200
System	68.41	18.76	304.74	20.926

Link Flow Summary

Proposed SWMM 50-yr Results

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	30.76	0 00:39			
2	DUMMY	20.53	0 00:48			
3	DUMMY	91.68	0 00:41			
4	DUMMY	155.23	0 00:53			
6	DUMMY	9.87	0 00:41			
9	DUMMY	20.53	0 00:48			
10	DUMMY	48.72	0 00:37			
11	DUMMY	63.22	0 00:37			
18	DUMMY	155.23	0 00:53			
19	CONDUIT	12.34	0 03:10	8.58	0.92	0.76
25	DUMMY	35.79	0 00:33			
28	DUMMY	63.22	0 00:37			
5	DUMMY	17.09	0 00:44			
16	CONDUIT	110.83	0 00:42	36.64	0.18	0.29
17	DUMMY	52.56	0 00:38			
20	DUMMY	110.83	0 00:42			
21	CHANNEL	16.89	0 00:48	3.39	0.17	0.58
22	DUMMY	67.28	0 00:33			
23	CONDUIT	59.52	0 00:41	7.08	0.03	0.17
24	DUMMY	104.78	0 00:42			
29	DUMMY	121.88	0 00:40			
30	DUMMY	76.36	0 00:36			
31	CHANNEL	75.80	0 00:38	8.07	0.40	0.73
32	CHANNEL	99.25	0 00:33	5.24	1.00	1.00
33	CONDUIT	164.27	0 00:42	24.24	0.55	0.53
34	DUMMY	131.91	0 00:39			
35	CONDUIT	295.86	0 00:40	41.51	0.59	0.55
36	CHANNEL	65.47	0 00:41	18.15	0.13	0.50
37	DUMMY	19.11	0 00:40			
38	DUMMY	19.01	0 00:34			
8	ORIFICE	12.34	0 03:08			0.00
12	DUMMY	56.64	0 01:15			
14	DUMMY	205.97	0 01:22			

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
9	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
11	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01
25	0.01	0.01	0.01	48.00	0.01
28	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
17	0.01	0.01	0.01	48.00	0.01
20	0.01	0.01	0.01	48.00	0.01
22	0.01	0.01	0.01	48.00	0.01
24	0.01	0.01	0.01	48.00	0.01
29	0.01	0.01	0.01	48.00	0.01
30	0.01	0.01	0.01	48.00	0.01
32	0.56	0.63	0.59	0.59	0.63
34	0.01	0.01	0.01	48.00	0.01
37	0.01	0.01	0.01	48.00	0.01
38	0.01	0.01	0.01	48.00	0.01

Proposed SWMM 50-yr Results

Analysis begun on: Wed May 14 13:05:15 2014
Analysis ended on: Wed May 14 13:05:15 2014
Total elapsed time: < 1 sec

Proposed SWMM 100-yr Results

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

North Fork at Briargate MDDP
Proposed Conditions

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

Analysis Options

Flow Units CFS
Process Models:
 Rainfall/Runoff NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
Flow Routing Method KINWAVE
Starting Date JAN-01-2005 00:00:00
Ending Date JAN-03-2005 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step 15.00 sec

Element Count

Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 36
Number of links 33
Number of pollutants 0
Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
basin_OS1	JUNCTION	7100.00	0.00	0.0	
basin_OS2	JUNCTION	7120.00	5.00	0.0	
basin_OS3	JUNCTION	7200.00	0.00	0.0	
basin_OS4	JUNCTION	7080.00	0.00	0.0	
basin_D1	JUNCTION	7026.05	0.00	0.0	
basin_D2	JUNCTION	7010.00	0.00	0.0	
basin_D3	JUNCTION	7020.00	0.00	0.0	
basin_D4	JUNCTION	7010.50	0.00	0.0	
basin_OS5	JUNCTION	6906.00	0.00	0.0	
AP1	JUNCTION	7019.50	0.00	0.0	
AP4	JUNCTION	6964.00	4.00	0.0	
AP6	JUNCTION	6993.90	0.77	0.0	
AP9	JUNCTION	6876.00	0.77	0.0	
AP21	JUNCTION	6854.00	0.00	0.0	
AP2	JUNCTION	7026.90	0.00	0.0	
AP3	JUNCTION	7007.75	0.00	0.0	
AP3a	JUNCTION	6985.00	1.50	0.0	
basin_D6a	JUNCTION	7025.00	0.00	0.0	
STREETSUMP	JUNCTION	6985.50	4.00	0.0	
AP5	JUNCTION	7015.00	0.72	0.0	
AP7	JUNCTION	6983.00	4.00	0.0	
AP7A	JUNCTION	6842.00	4.00	0.0	
Basin_D7	JUNCTION	6994.00	0.00	0.0	
basin_D6	JUNCTION	6955.00	0.00	0.0	
AP10	JUNCTION	6849.47	4.00	0.0	
basin_D5	JUNCTION	6994.85	0.00	0.0	

Proposed SWMM 100-yr Results

AP8	JUNCTION	6937.55	0.77	0.0
basin_D8	JUNCTION	6983.00	0.00	0.0
basin_D1a	JUNCTION	7100.00	0.00	0.0
basin_D1b	JUNCTION	7100.00	0.00	0.0
AP4a	OUTFALL	6961.34	1.50	0.0
AP11	OUTFALL	6816.00	0.00	0.0
AP20	OUTFALL	6989.50	0.00	0.0
HowellPond	STORAGE	6990.00	13.00	0.0
ORRPond	STORAGE	6962.00	7.00	0.0
POWERSPOND	STORAGE	6826.00	14.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	basin_OS1	AP1	CONDUIT	400.0	20.5454	0.0100
2	basin_OS2	AP2	CONDUIT	400.0	23.9323	0.0100
3	basin_D1	STREETSUMP	CONDUIT	400.0	10.1900	0.0100
4	basin_OS3	AP3	CONDUIT	400.0	54.8079	0.0100
6	basin_D4	AP20	CONDUIT	400.0	5.2573	0.0100
9	AP2	STREETSUMP	CONDUIT	585.0	7.0947	0.0300
10	AP1	AP4a	CONDUIT	1211.0	4.8082	0.0250
11	basin_OS5	AP21	CONDUIT	400.0	13.1113	0.0100
18	AP3	HowellPond	CONDUIT	400.0	4.4419	0.0100
19	AP3a	AP4a	CONDUIT	1460.0	1.6208	0.0130
25	basin_D6a	AP9	CONDUIT	400.0	40.1387	0.0100
28	AP21	POWERSPOND	CONDUIT	540.0	5.1922	0.0150
5	basin_OS4	AP5	CONDUIT	400.0	16.4689	0.0200
16	STREETSUMP	AP4	CONDUIT	123.0	17.7530	0.0130
17	basin_D2	AP6	CONDUIT	400.0	4.0283	0.0100
20	AP4	ORRPond	CONDUIT	400.0	0.5000	0.0100
21	AP5	AP6	CONDUIT	1022.0	2.0650	0.0180
22	basin_D3	AP7	CONDUIT	400.0	9.2898	0.0100
23	AP7	AP7A	CONDUIT	3800.0	3.7131	0.0300
24	Basin_D7	AP7A	CONDUIT	400.0	41.0817	0.0100
29	basin_D6	AP9	CONDUIT	400.0	20.1468	0.0100
30	basin_D5	AP8	CONDUIT	400.0	14.4743	0.0100
31	AP8	AP9	CONDUIT	1174.0	5.2500	0.0180
32	AP9	AP10	CONDUIT	1870.0	1.4189	0.0180
33	AP7A	POWERSPOND	CONDUIT	187.0	4.2820	0.0130
34	basin_D8	AP10	CONDUIT	400.0	35.4140	0.0100
35	AP10	POWERSPOND	CONDUIT	128.0	12.1752	0.0130
36	AP6	AP10	CONDUIT	400.0	38.7197	0.0180
37	basin_D1a	AP4a	CONDUIT	400.0	36.9565	0.0100
38	basin_D1b	AP1	CONDUIT	400.0	20.5454	0.0100
8	HowellPond	AP3a	ORIFICE			
12	ORRPond	AP4a	OUTLET			
14	POWERSPOND	AP11	OUTLET			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	DUMMY	0.00	0.00	0.00	0.00	1	0.00
2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
3	DUMMY	0.00	0.00	0.00	0.00	1	0.00
4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
6	DUMMY	0.00	0.00	0.00	0.00	1	0.00
9	DUMMY	0.00	0.00	0.00	0.00	1	0.00
10	DUMMY	0.00	0.00	0.00	0.00	1	0.00
11	DUMMY	0.00	0.00	0.00	0.00	1	0.00
18	DUMMY	0.00	0.00	0.00	0.00	1	0.00
19	CIRCULAR	1.50	1.77	0.38	1.50	1	13.37
25	DUMMY	0.00	0.00	0.00	0.00	1	0.00
28	DUMMY	0.00	0.00	0.00	0.00	1	0.00
5	DUMMY	0.00	0.00	0.00	0.00	1	0.00
16	CIRCULAR	4.00	12.57	1.00	4.00	1	605.23
17	DUMMY	0.00	0.00	0.00	0.00	1	0.00
20	DUMMY	0.00	0.00	0.00	0.00	1	0.00
21	StreetSection-localresidential			0.72	18.70	0.31	59.50
						1	101.83

Proposed SWMM 100-yr Results

22	DUMMY	0.00	0.00	0.00	0.00	1	0.00
23	TRAPEZOIDAL	4.00	104.00	2.42	42.00	1	1789.00
24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
29	DUMMY	0.00	0.00	0.00	0.00	1	0.00
30	DUMMY	0.00	0.00	0.00	0.00	1	0.00
31	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	190.91
32	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	99.25
33	CIRCULAR	4.00	12.57	1.00	4.00	1	297.24
34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
35	CIRCULAR	4.00	12.57	1.00	4.00	1	501.21
36	80'ROW_streetconveyance	0.77	21.26	0.33	71.00	1	518.47
37	DUMMY	0.00	0.00	0.00	0.00	1	0.00
38	DUMMY	0.00	0.00	0.00	0.00	1	0.00

Transect Summary

Transect StreetSection-localresidential
Area:

0.0001	0.0003	0.0006	0.0011	0.0018
0.0025	0.0035	0.0045	0.0057	0.0076
0.0106	0.0149	0.0204	0.0270	0.0349
0.0440	0.0543	0.0658	0.0785	0.0924
0.1075	0.1238	0.1413	0.1601	0.1800
0.2011	0.2235	0.2470	0.2718	0.2978
0.3249	0.3530	0.3812	0.4094	0.4379
0.4676	0.4983	0.5302	0.5632	0.5973
0.6326	0.6689	0.7064	0.7450	0.7848
0.8256	0.8675	0.9106	0.9547	1.0000

Hrad:

0.0197	0.0395	0.0592	0.0789	0.0986
0.1184	0.1381	0.1578	0.1776	0.1310
0.1265	0.1350	0.1491	0.1661	0.1848
0.2045	0.2249	0.2458	0.2671	0.2887
0.3105	0.3324	0.3545	0.3767	0.3990
0.4214	0.4439	0.4664	0.4889	0.5115
0.5341	0.5727	0.6165	0.6602	0.6879
0.7073	0.7270	0.7470	0.7671	0.7875
0.8080	0.8287	0.8495	0.8707	0.8920
0.9135	0.9350	0.9566	0.9783	1.0000

Width:

0.0031	0.0062	0.0093	0.0124	0.0155
0.0185	0.0216	0.0247	0.0278	0.0535
0.0798	0.1061	0.1324	0.1588	0.1851
0.2114	0.2377	0.2640	0.2903	0.3166
0.3430	0.3693	0.3956	0.4219	0.4482
0.4745	0.5009	0.5272	0.5535	0.5798
0.6061	0.6141	0.6160	0.6178	0.6344
0.6589	0.6834	0.7079	0.7325	0.7570
0.7815	0.8060	0.8306	0.8548	0.8790
0.9032	0.9274	0.9516	0.9758	1.0000

Transect 80'ROW_streetconveyance
Area:

0.0001	0.0005	0.0012	0.0021	0.0033
0.0047	0.0064	0.0084	0.0106	0.0131
0.0159	0.0193	0.0238	0.0295	0.0362
0.0441	0.0531	0.0632	0.0744	0.0867
0.1002	0.1148	0.1304	0.1472	0.1652
0.1842	0.2043	0.2256	0.2480	0.2715
0.2961	0.3218	0.3486	0.3766	0.4056
0.4358	0.4671	0.4995	0.5331	0.5677
0.6035	0.6404	0.6784	0.7180	0.7600
0.8043	0.8508	0.8994	0.9491	1.0000

Hrad:

0.0396	0.0791	0.1187	0.1583	0.1978
0.2374	0.2770	0.3165	0.3561	0.3957
0.4352	0.4916	0.5207	0.5344	0.5414
0.5463	0.5513	0.5575	0.5651	0.5742
0.5847	0.5964	0.6093	0.6231	0.6378
0.6531	0.6692	0.6858	0.7029	0.7204
0.7383	0.7566	0.7751	0.7939	0.8130

Proposed SWMM 100-yr Results

	0.8323	0.8518	0.8715	0.8913	0.9113
	0.9315	0.9517	0.9721	0.9224	0.9077
	0.9051	0.9099	0.9317	0.9648	1.0000
Width:					
	0.0051	0.0102	0.0153	0.0204	0.0255
	0.0306	0.0357	0.0408	0.0459	0.0510
	0.0561	0.0772	0.0989	0.1206	0.1423
	0.1639	0.1856	0.2073	0.2290	0.2507
	0.2724	0.2941	0.3158	0.3375	0.3592
	0.3808	0.4025	0.4242	0.4459	0.4676
	0.4893	0.5110	0.5327	0.5544	0.5761
	0.5977	0.6194	0.6411	0.6628	0.6845
	0.7062	0.7279	0.7496	0.7961	0.8394
	0.8828	0.9262	0.9566	0.9783	1.0000

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	75.621	24.642
External Outflow	70.692	23.036
Internal Outflow	4.586	1.494
Storage Losses	0.000	0.000
Initial Stored Volume ...	0.000	0.000
Final Stored Volume	0.524	0.171
Continuity Error (%)	-0.239	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step	:	15.00 sec
Average Time Step	:	15.00 sec
Maximum Time Step	:	15.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.01

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
basin_OS1	JUNCTION	0.00	0.00	7100.00	0 00:00
basin_OS2	JUNCTION	0.00	0.00	7120.00	0 00:00
basin_OS3	JUNCTION	0.00	0.00	7200.00	0 00:00
basin_OS4	JUNCTION	0.00	0.00	7080.00	0 00:00
basin_D1	JUNCTION	0.00	0.00	7026.05	0 00:00
basin_D2	JUNCTION	0.00	0.00	7010.00	0 00:00
basin_D3	JUNCTION	0.00	0.00	7020.00	0 00:00
basin_D4	JUNCTION	0.00	0.00	7010.50	0 00:00
basin_OS5	JUNCTION	0.00	0.00	6906.00	0 00:00
AP1	JUNCTION	0.00	0.00	7019.50	0 00:00
AP4	JUNCTION	0.04	1.22	6965.22	0 00:42
AP6	JUNCTION	0.02	0.43	6994.33	0 00:49
AP9	JUNCTION	0.03	0.77	6876.77	0 00:29
AP21	JUNCTION	0.00	0.00	6854.00	0 00:00
AP2	JUNCTION	0.00	0.00	7026.90	0 00:00
AP3	JUNCTION	0.00	0.00	7007.75	0 00:00
AP3a	JUNCTION	0.45	1.17	6986.17	0 03:11
basin_D6a	JUNCTION	0.00	0.00	7025.00	0 00:00

Proposed SWMM 100-yr Results

STREETSUMP	JUNCTION	0.04	1.22	6986.72	0	00:42
AP5	JUNCTION	0.02	0.43	7015.43	0	00:45
AP7	JUNCTION	0.01	0.79	6983.79	0	00:35
AP7A	JUNCTION	0.06	2.24	6844.24	0	00:42
Basin_D7	JUNCTION	0.00	0.00	6994.00	0	00:00
basin_D6	JUNCTION	0.00	0.00	6955.00	0	00:00
AP10	JUNCTION	0.06	2.29	6851.76	0	00:40
basin_D5	JUNCTION	0.00	0.00	6994.85	0	00:00
AP8	JUNCTION	0.02	0.58	6938.13	0	00:37
basin_D8	JUNCTION	0.00	0.00	6983.00	0	00:00
basin_D1a	JUNCTION	0.00	0.00	7100.00	0	00:00
basin_D1b	JUNCTION	0.00	0.00	7100.00	0	00:00
AP4a	OUTFALL	0.46	1.17	6962.51	0	03:13
AP11	OUTFALL	0.00	0.00	6816.00	0	00:00
AP20	OUTFALL	0.00	0.00	6989.50	0	00:00
HowellPond	STORAGE	3.72	11.46	7001.46	0	03:11
ORRPond	STORAGE	3.31	6.97	6968.97	0	01:19
POWERSPOND	STORAGE	6.28	13.62	6839.62	0	01:24

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal
basin_OS1	JUNCTION	33.73	33.73	0 00:39	0.693	0.693
basin_OS2	JUNCTION	23.19	23.19	0 00:49	0.725	0.725
basin_OS3	JUNCTION	175.82	175.82	0 00:54	6.115	6.115
basin_OS4	JUNCTION	19.14	19.14	0 00:45	0.526	0.526
basin_D1	JUNCTION	100.50	100.50	0 00:41	2.221	2.221
basin_D2	JUNCTION	57.46	57.46	0 00:38	1.074	1.074
basin_D3	JUNCTION	72.12	72.12	0 00:35	1.009	1.009
basin_D4	JUNCTION	10.98	10.98	0 00:41	0.232	0.232
basin_OS5	JUNCTION	69.68	69.68	0 00:38	1.272	1.272
AP1	JUNCTION	0.00	53.04	0 00:38	0.000	1.027
AP4	JUNCTION	0.00	121.87	0 00:42	0.000	2.945
AP6	JUNCTION	0.00	72.01	0 00:41	0.000	1.601
AP9	JUNCTION	0.00	246.17	0 00:39	0.000	4.572
AP21	JUNCTION	0.00	69.68	0 00:38	0.000	1.272
AP2	JUNCTION	0.00	23.19	0 00:49	0.000	0.725
AP3	JUNCTION	0.00	175.82	0 00:54	0.000	6.115
AP3a	JUNCTION	0.00	12.73	0 03:11	0.000	6.115
basin_D6a	JUNCTION	37.81	37.81	0 00:33	0.529	0.529
STREETSUMP	JUNCTION	0.00	121.88	0 00:42	0.000	2.946
AP5	JUNCTION	0.00	19.14	0 00:45	0.000	0.526
AP7	JUNCTION	0.00	72.12	0 00:35	0.000	1.009
AP7A	JUNCTION	0.00	178.94	0 00:42	0.000	3.679
Basin_D7	JUNCTION	114.17	114.17	0 00:43	2.656	2.656
basin_D6	JUNCTION	131.75	131.75	0 00:40	2.655	2.655
AP10	JUNCTION	0.00	313.57	0 00:40	0.000	7.498
basin_D5	JUNCTION	83.11	83.11	0 00:37	1.387	1.387
AP8	JUNCTION	0.00	83.11	0 00:37	0.000	1.387
basin_D8	JUNCTION	142.89	142.89	0 00:40	2.764	2.764
basin_D1a	JUNCTION	20.48	20.48	0 00:40	0.449	0.449
basin_D1b	JUNCTION	20.19	20.19	0 00:35	0.335	0.335
AP4a	OUTFALL	0.00	112.61	0 00:49	0.000	10.418
AP11	OUTFALL	0.00	211.86	0 01:24	0.000	12.385
AP20	OUTFALL	0.00	10.98	0 00:41	0.000	0.232
HowellPond	STORAGE	0.00	175.82	0 00:54	0.000	6.115
ORRPond	STORAGE	0.00	121.87	0 00:42	0.000	2.945
POWERSPOND	STORAGE	0.00	558.66	0 00:41	0.000	12.444

Node Surge Summary

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

Max. Height Min. Depth

Proposed SWMM 100-yr Results

Node	Type	Hours Surcharged	Above Crown Feet	Below Rim Feet
basin_OS1	JUNCTION	48.00	0.000	0.000
basin_OS2	JUNCTION	48.00	0.000	5.000
basin_OS3	JUNCTION	48.00	0.000	0.000
basin_OS4	JUNCTION	48.00	0.000	0.000
basin_D1	JUNCTION	48.00	0.000	0.000
basin_D2	JUNCTION	48.00	0.000	0.000
basin_D3	JUNCTION	48.00	0.000	0.000
basin_D4	JUNCTION	48.00	0.000	0.000
basin_OS5	JUNCTION	48.00	0.000	0.000
AP1	JUNCTION	48.00	0.000	0.000
AP9	JUNCTION	0.72	0.000	0.000
AP21	JUNCTION	48.00	0.000	0.000
AP2	JUNCTION	48.00	0.000	0.000
AP3	JUNCTION	48.00	0.000	0.000
basin_D6a	JUNCTION	48.00	0.000	0.000
Basin_D7	JUNCTION	48.00	0.000	0.000
basin_D6	JUNCTION	48.00	0.000	0.000
basin_D5	JUNCTION	48.00	0.000	0.000
basin_D8	JUNCTION	48.00	0.000	0.000
basin_D1a	JUNCTION	48.00	0.000	0.000
basin_D1b	JUNCTION	48.00	0.000	0.000
HowellPond	STORAGE	21.49	10.463	1.537
ORRPond	STORAGE	48.00	6.965	0.035
POWERSPOND	STORAGE	1.05	1.623	0.377

Node Flooding Summary

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

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Pondered Volume 1000 ft3
AP9	0.72	146.87	0 00:39	1.494	0.000

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
HowellPond	151.128	16	0	694.863	73	0 03:11	12.73
ORRPond	44.225	24	0	183.341	99	0 01:19	59.80
POWERSPOND	214.868	21	0	966.091	95	0 01:23	211.86

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
AP4a	99.79	8.08	112.61	10.418
AP11	99.63	9.62	211.86	12.385
AP20	5.61	3.20	10.98	0.232
System	68.34	20.89	322.26	23.034

Link Flow Summary

Proposed SWMM 100-yr Results

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1	DUMMY	33.73	0 00:39			
2	DUMMY	23.19	0 00:49			
3	DUMMY	100.50	0 00:41			
4	DUMMY	175.82	0 00:54			
6	DUMMY	10.98	0 00:41			
9	DUMMY	23.19	0 00:49			
10	DUMMY	53.04	0 00:38			
11	DUMMY	69.68	0 00:38			
18	DUMMY	175.82	0 00:54			
19	CONDUIT	12.73	0 03:13	8.61	0.95	0.78
25	DUMMY	37.81	0 00:33			
28	DUMMY	69.68	0 00:38			
5	DUMMY	19.14	0 00:45			
16	CONDUIT	121.87	0 00:42	37.66	0.20	0.30
17	DUMMY	57.46	0 00:38			
20	DUMMY	121.87	0 00:42			
21	CHANNEL	19.00	0 00:49	3.49	0.19	0.60
22	DUMMY	72.12	0 00:35			
23	CONDUIT	64.93	0 00:41	7.19	0.04	0.18
24	DUMMY	114.17	0 00:43			
29	DUMMY	131.75	0 00:40			
30	DUMMY	83.11	0 00:37			
31	CHANNEL	82.46	0 00:39	8.20	0.43	0.75
32	CHANNEL	99.25	0 00:33	5.32	1.00	1.00
33	CONDUIT	178.96	0 00:42	24.73	0.60	0.56
34	DUMMY	142.89	0 00:40			
35	CONDUIT	313.56	0 00:40	42.07	0.63	0.57
36	CHANNEL	72.01	0 00:42	18.37	0.14	0.52
37	DUMMY	20.48	0 00:40			
38	DUMMY	20.19	0 00:35			
8	ORIFICE	12.73	0 03:11			0.00
12	DUMMY	59.80	0 01:19			
14	DUMMY	211.86	0 01:24			

 Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	0.01	0.01	0.01	48.00	0.01
2	0.01	0.01	0.01	48.00	0.01
3	0.01	0.01	0.01	48.00	0.01
4	0.01	0.01	0.01	48.00	0.01
6	0.01	0.01	0.01	48.00	0.01
9	0.01	0.01	0.01	48.00	0.01
10	0.01	0.01	0.01	48.00	0.01
11	0.01	0.01	0.01	48.00	0.01
18	0.01	0.01	0.01	48.00	0.01
25	0.01	0.01	0.01	48.00	0.01
28	0.01	0.01	0.01	48.00	0.01
5	0.01	0.01	0.01	48.00	0.01
17	0.01	0.01	0.01	48.00	0.01
20	0.01	0.01	0.01	48.00	0.01
22	0.01	0.01	0.01	48.00	0.01
24	0.01	0.01	0.01	48.00	0.01
29	0.01	0.01	0.01	48.00	0.01
30	0.01	0.01	0.01	48.00	0.01
32	0.65	0.72	0.69	0.69	0.72
34	0.01	0.01	0.01	48.00	0.01
37	0.01	0.01	0.01	48.00	0.01
38	0.01	0.01	0.01	48.00	0.01

Proposed SWMM 100-yr Results

Analysis begun on: Wed May 14 13:05:52 2014
Analysis ended on: Wed May 14 13:05:52 2014
Total elapsed time: < 1 sec

APPENDIX D
POND CALCULATIONS

POND VOLUME CALCULATIONS

Subdivision North Fork At Briargate
Location Colorado Springs

Project Name: North Fork At Briargate
Project No. 25100.00
By: SMB
Checked By: _____
Date: 5/14/14

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

Howell Pond

Stage	Stage Elevation	Stage Surface Area (square feet)	Stage Volume (cubic feet)	Cumulative Volume (cubic feet)	Cumulative Volume (acre feet)
0.00	6990.00	0	0	0	0.00
1.00	6991.00	1,811	604	604	0.01
2.00	6992.00	6,212	3,792	4,396	0.10
3.00	6993.00	13,118	9,452	13,848	0.32
4.00	6994.00	22,575	17,634	31,482	0.72
5.00	6995.00	34,629	28,388	59,870	1.37
6.00	6996.00	49,582	41,882	101,752	2.34
7.00	6997.00	67,920	58,511	160,263	3.68
8.00	6998.00	89,718	78,567	238,830	5.48
9.00	6999.00	115,086	102,139	340,969	7.83
10.00	7000.00	142,378	128,490	469,459	10.78
11.00	7001.00	156,829	149,545	619,004	14.21
12.00	7002.00	163,978	160,390	779,394	17.89
13.00	7003.00	169,697	166,829	946,223	21.72

Volume (acre feet)	Volume	Water Surface Elevation	Stage
2-Year Detention	0.11	6992.05	2.05
5-Year Detention	1.90	6995.55	5.55
10-Year Detention	3.79	6997.07	7.07
25-Year Detention	10.28	6999.84	9.84
50-Year Detention	13.58	7000.82	10.82
100-Year Detention	15.95	7001.48	11.48

POND VOLUME CALCULATIONS

Subdivision North Fork At Briargate
Location Colorado Springs

Project Name: North Fork At Briargate
Project No. 25100.00
By: SMB
Checked By: _____
Date: 5/14/14

Volume=1/3 x Depth x (A+B+(A*B)^0.5)

A - Upper Surface

B - Lower Surface

Old Ranch Road Pond

Stage	Stage Elevation	Stage Surface Area (square feet)	Stage Volume (cubic feet)	Cumulative Volume (cubic feet)	Cumulative Volume (acre feet)
0.00	6967.00	147	0	0	0.00
1.00	6968.00	2,803	1,197	1,197	0.03
2.00	6969.00	15,481	8,290	9,487	0.22
3.00	6970.00	28,617	21,715	31,202	0.72
4.00	6971.00	34,686	31,603	62,805	1.44
5.00	6972.00	38,360	36,508	99,313	2.28
6.00	6973.00	42,020	40,176	139,489	3.20
7.00	6974.00	45,746	43,870	183,359	4.21

Volume (acre feet)	Volume	Water Surface Elevation	Stage
Required WQCV	0.84	6970.18	3.18
Required EURV	1.54	6971.12	4.12
Provided EURV	1.61	6971.20	4.20
2-Year Detention	1.07	6970.49	3.49
5-Year Detention	1.93	6971.58	4.58
10-Year Detention	2.18	6971.89	4.89
25-Year Detention	3.14	6972.93	5.93
50-Year Detention	3.69	6973.49	6.49
100-Year Detention	4.21	6974.00	7.00

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 1 of 4

Designer: Scott Brown
Company: JR Engineering
Date: March 25, 2014
Project: North Fork at Briargate
Location: ORR Pond

1. Basin Storage Volume

- A) Effective Imperviousness of Tributary Area, I_a
- B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)
- C) Contributing Watershed Area
- D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm
- E) Design Concept
(Select EURV when also designing for flood control)
- F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^2 - 1.19 * i + 0.78 * i) / 12 * Area * 1.2)$)
- G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} / 0.43))$)
- H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired)
- I) Predominant Watershed NRCS Soil Group
- J) Excess Urban Runoff Volume (EURV) Design Volume
 For HSG A: $EURVA = (0.1878i - 0.0104) * Area$
 For HSG B: $EURVB = (0.1178i - 0.0042) * Area$
 For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

$I_a =$ 23.7 %

$i =$ 0.237

Area = 64.780 ac

$d_6 =$ _____ in

Choose One

- Water Quality Capture Volume (WQCV)
- Excess Urban Runoff Volume (EURV)

$V_{DESIGN} =$ 0.843 ac-ft

$V_{DESIGN\ OTHER} =$ _____ ac-ft

$V_{DESIGN\ USER} =$ _____ ac-ft

Choose One

- A
- B
- C / D

EURV = 1.536 ac-ft

- 2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = _____ : 1

3. Basin Side Slopes

- A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Z = _____ ft / ft

4. Inlet

- A) Describe means of providing energy dissipation at concentrated inflow locations:

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 4

Designer: Scott Brown
Company: JR Engineering
Date: March 25, 2014
Project: North Fork at Briargate
Location: ORR Pond

5. Forebay

A) Minimum Forebay Volume
 ($V_{FMIN} =$ 3% of the WQCV)

$V_{FMIN} =$ ac-ft

B) Actual Forebay Volume

$V_F =$ ac-ft

C) Forebay Depth
 ($D_F =$ 18 inch maximum)

$D_F =$ in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge

$Q_{100} =$ cfs

ii) Forebay Discharge Design Flow
 ($Q_F = 0.02 * Q_{100}$)

$Q_F =$ cfs

E) Forebay Discharge Design

Choose One

- Berm With Pipe
- Wall with Rect. Notch
- Wall with V-Notch Weir

(flow too small for berm w/ pipe)

F) Discharge Pipe Size (minimum 8-inches)

Calculated $D_p =$ in

G) Rectangular Notch Width

Calculated $W_N =$ in

6. Trickle Channel

A) Type of Trickle Channel

Choose One

- Concrete
- Soft Bottom

FOR A CONCRETE TRICKLE CHANNEL,
 SLOPE SHOULD BE BETWEEN
 0.004 AND 0.010 FT/FT.

F) Slope of Trickle Channel

$S =$ 0.0200 ft / ft

7. Micropool and Outlet Structure

A) Depth of Micropool (2.5-feet minimum)

$D_M =$ ft

B) Surface Area of Micropool (10 ft² minimum)

$A_M =$ sq ft

C) Outlet Type

Choose One

- Orifice Plate
- Other (Describe):

D) Depth of Design Volume (EURV or 1.2 WQCV) Based on the Design Concept Chosen Under 1.E.

$H =$ 4.15 feet

E) Volume to Drain Over Prescribed Time

EURV = 1.536 ac-ft

F) Drain Time
 (Min T_D for WQCV= 40 hours; Max T_D for EURV= 72 hours)

$T_D =$ 72 hours

G) Recommended Maximum Outlet Area per Row, (A_o)

$A_o =$ 0.79 square inches

H) Orifice Dimensions:

- i) Circular Orifice Diameter or
- ii) Width of 2" High Rectangular Orifice

$D_{orifice} =$ 1 inches
 $W_{orifice} =$ inches

I) Number of Columns

$n_c =$ 1 number

J) Actual Design Outlet Area per Row (A_o)

$A_o =$ 0.79 square inches

K) Number of Rows (nr)

$n_r =$ 12 number

L) Total Outlet Area (A_{ot})

$A_{ot} =$ 9.8 square inches

M) Depth of WQCV (H_{WQCV})
 (Estimate using actual stage-area-volume relationship and V_{WQCV})

$H_{WQCV} =$ 3.2 feet

N) Ensure Minimum 40 Hour Drain Time for WQCV

$T_{D\ WQCV} =$ 46.1 hours

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 3 of 4

Designer: Scott Brown
Company: JR Engineering
Date: March 25, 2014
Project: North Fork at Briargate
Location: ORR Pond

8. Initial Surcharge Volume

- A) Depth of Initial Surcharge Volume
(Minimum recommended depth is 4 inches)
- B) Minimum Initial Surcharge Volume
(Minimum volume of 0.3% of the WQCV)
- C) Initial Surcharge Provided Above Micropool

$D_{IS} =$ _____ in

$V_{IS} =$ _____ cu ft

$V_s =$ _____ cu ft

9. Trash Rack

- A) Type of Water Quality Orifice Used
- B) Water Quality Screen Open Area: $A_t = 38.5 * (e^{-0.095D}) * A_{ot}$
- C) For 2", or Smaller, **Circular Opening** (See Fact Sheet T-12):
 - i) Width of Water Quality Screen and Concrete Opening ($W_{opening}$)
 - ii) Height of Water Quality Screen (H_{TR})
 - iii) Type of Screen, Describe if "Other"

Choose One

- Circular (up to 2" diameter)
- Rectangular (2" high)

$A_t =$ 342 square inches

$W_{opening} =$ _____ inches

$H_{TR} =$ _____ inches

Choose One

- S.S. Well Screen with 60% Open Area*
- Other (Describe):

D) For 2" High **Rectangular Opening**:

- i) Width of Rectangular Opening ($W_{orifice}$)
- ii) Width of Water Quality Screen Opening ($W_{opening}$)
- iii) Height of Water Quality Screen (H_{TR})
- iv) Type of Screen, Describe if "Other"

$W =$ _____ inches

$W_{opening} =$ _____ ft

$H_{TR} =$ _____ ft

Choose One

- Aluminum Amico-Klemp SR Series (or equal)
- Other (Describe):

v) Cross-bar Spacing

_____ inches

vi) Minimum Bearing Bar Size

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 4 of 4

Designer: Scott Brown
Company: JR Engineering
Date: March 25, 2014
Project: North Fork at Briargate
Location: ORR Pond

10. Overflow Embankment

A) Describe embankment protection for 100-year and greater overtopping:

B) Slope of Overflow Embankment
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

$Z_E =$ _____ ft / ft

Choose One

- Irrigated
 Not Irrigated

11. Vegetation

12. Access

A) Describe Sediment Removal Procedures

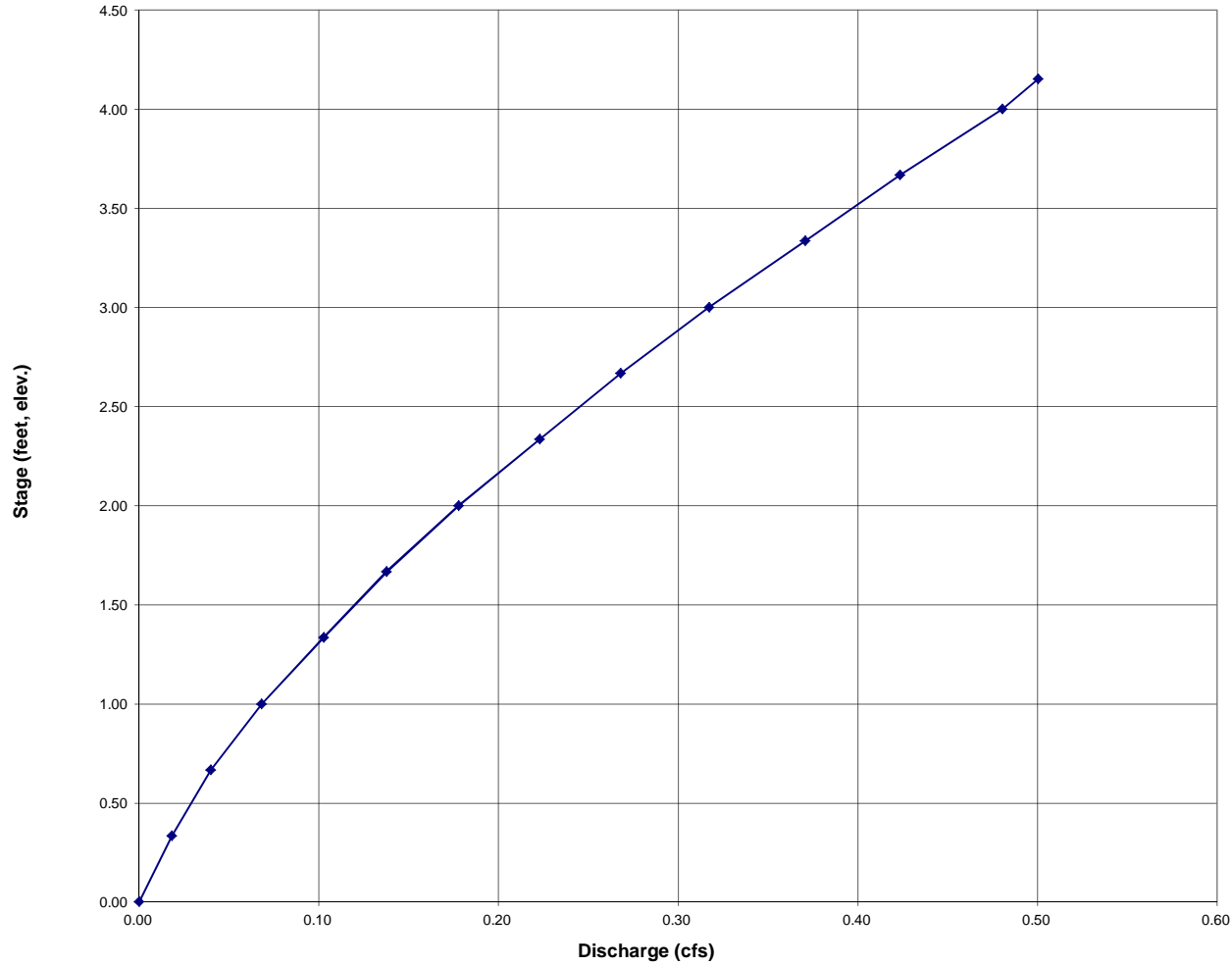
Notes: _____

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

Worksheet Protected

Project: North Fork at Briargate MDDP
Basin ID: ORR Pond EURV

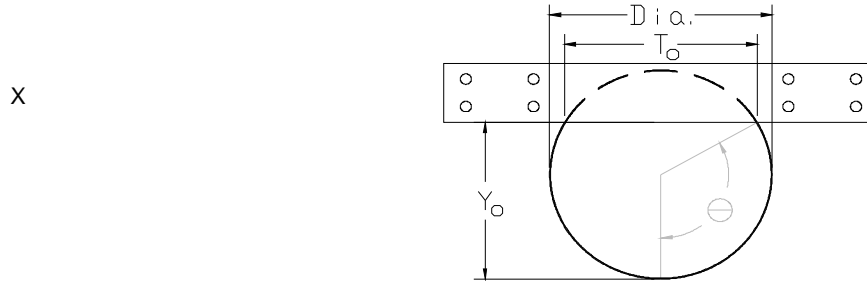
STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



RESTRICTOR PLATE SIZING FOR CIRCULAR VERTICAL ORIFICES

Project: North Fork at Briargate MDDP

Basin ID: ORR Pond 25-yr & 100-yr Orifice



Sizing the Restrictor Plate for Circular Vertical Orifices or Pipes (Input)

Water Surface Elevation at Design Depth
 Pipe/Vertical Orifice Entrance Invert Elevation
 Required Peak Flow through Orifice at Design Depth
 Pipe/Vertical Orifice Diameter (inches)
 Orifice Coefficient

Full-flow Capacity (Calculated)

Full-flow area
 Half Central Angle in Radians
 Full-flow capacity

Calculation of Orifice Flow Condition

Half Central Angle ($0 < \theta < 3.1416$)
 Flow area
 Top width of Orifice (inches)
 Height from Invert of Orifice to Bottom of Plate (feet)
 Elevation of Bottom of Plate
 Resultant Peak Flow Through Orifice at Design Depth

Width of Equivalent Rectangular Vertical Orifice

Centroid Elevation of Equivalent Rectangular Vertical Orifice

	#1 Vertical Orifice	#2 Vertical Orifice	
Elev: WS =	5.90	7.00	feet
Elev: Invert =	0.00	0.00	feet
Q =	44.50	60.00	cfs
Dia =	30.0	36.0	inches
C_o =	0.65	0.65	

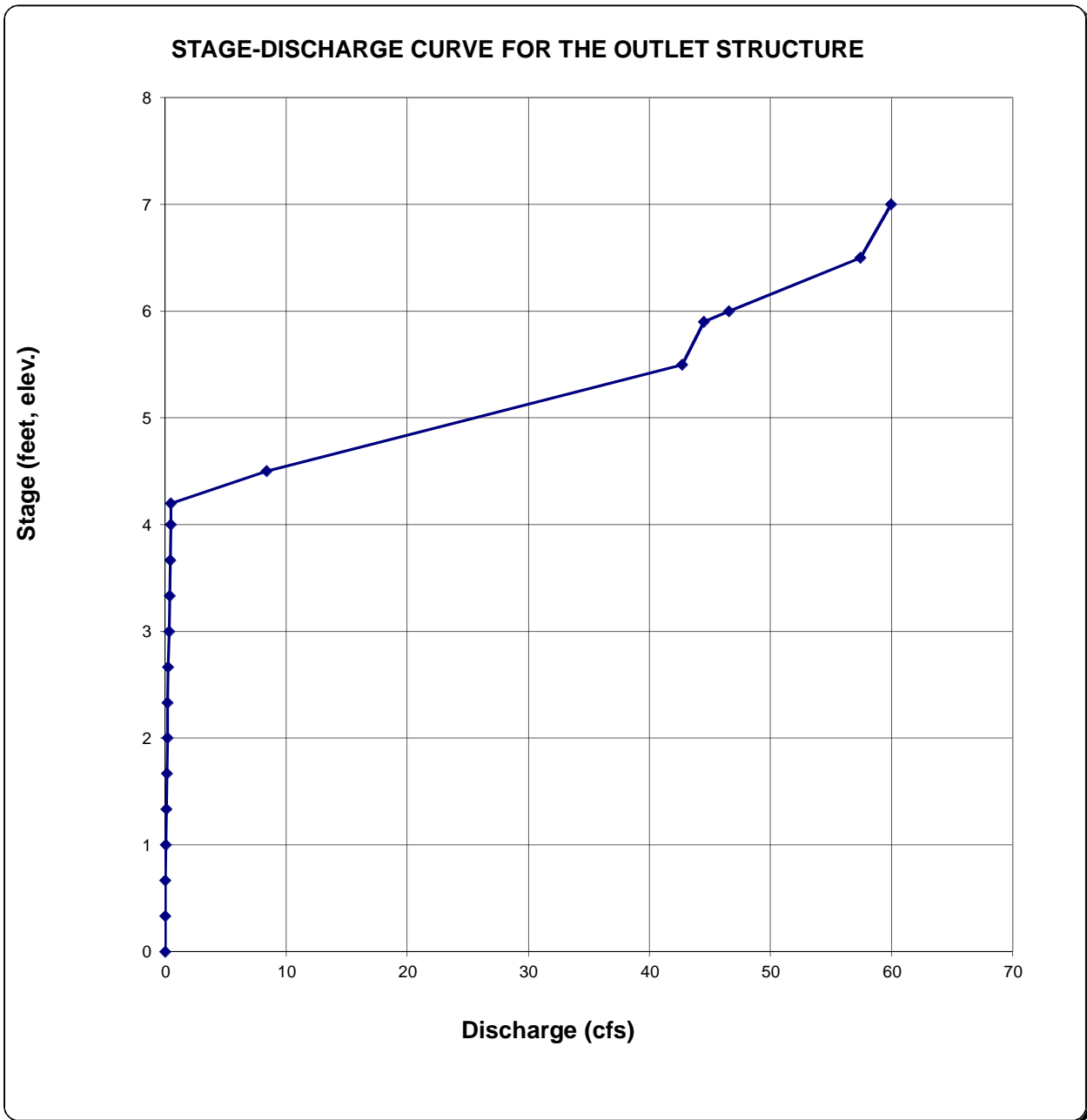
A_f =	4.91	7.07	sq ft
Theta =	3.14	3.14	rad
Q_f =	55.2	86.5	cfs
Percent of Design Flow =	124%	144%	

Theta =	2.04	1.83	rad
A_o =	3.82	4.67	sq ft
T_o =	26.74	34.80	inches
Y_o =	1.82	1.88	feet
Elev Plate Bottom Edge =	1.82	1.88	feet
Q_o =	44.5	60.0	cfs

Equivalent Width =	2.10	2.48	feet
Equiv. Centroid EI. =	0.91	0.94	feet

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

Project: North Fork at Briargate MDDP
Basin ID: ORR Pond Stage Discharge



POND VOLUME CALCULATIONS

Subdivision North Fork At Briargate
Location Colorado Springs

Project Name: North Fork At Briargate
Project No. 25100.00
By: SMB
Checked By: _____
Date: 3/25/14

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

Powers Pond

Stage	Stage Elevation	Stage Surface Area (square feet)	Stage Volume (cubic feet)	Cumulative Volume (cubic feet)	Cumulative Volume (acre feet)
0.00	6826.00	485	0	0	0.00
1.00	6827.00	4,411	2,120	2,120	0.05
2.00	6828.00	10,540	7,256	9,376	0.22
3.00	6829.00	18,869	14,504	23,880	0.55
4.00	6830.00	30,157	24,293	48,173	1.11
5.00	6831.00	45,886	37,747	85,920	1.97
6.00	6832.00	64,008	54,696	140,616	3.23
7.00	6833.00	81,523	72,589	213,205	4.89
8.00	6834.00	97,146	89,220	302,425	6.94
9.00	6835.00	104,488	100,795	403,220	9.26
10.00	6836.00	111,674	108,061	511,281	11.74
11.00	6837.00	118,960	115,298	626,579	14.38
12.00	6838.00	126,347	122,635	749,214	17.20
13.00	6839.00	133,834	130,073	879,287	20.19
14.00	6840.00	141,423	137,611	1,016,898	23.34
15.00	6841.00	149,111	145,250	1,162,148	26.68
16.00	6842.00	156,901	152,989	1,315,137	30.19
17.00	6843.00	164,791	160,830	1,475,967	33.88
18.00	6844.00	172,782	168,771	1,644,738	37.76
19.00	6845.00	180,675	176,714	1,821,452	41.81

Volume (acre feet)	Volume	Water Surface Elevation	Stage
Water Quality	4.66	6832.86	6.86
EURV	11.45	6835.89	9.89
2-Year Detention	8.45	6834.65	8.65
5-Year Detention	12.44	6836.27	10.27
10-Year Detention	13.67	6836.73	10.73
25-Year Detention	16.84	6837.88	11.88
50-Year Detention	19.23	6838.69	12.69
100-Year Detention	21.27	6839.35	13.35

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 1 of 4

Designer: SMB
Company: JR Engineering
Date: March 26, 2014
Project: North Forth @ Briargate
Location: Powers Pond

1. Basin Storage Volume

- A) Effective Imperviousness of Tributary Area, I_a
- B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)
- C) Contributing Watershed Area
- D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm
- E) Design Concept
(Select EURV when also designing for flood control)
- F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^2 - 1.19 * i + 0.78 * i) / 12 * Area * 1.2)$)
- G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} / 0.43))$)
- H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired)
- I) Predominant Watershed NRCS Soil Group
- J) Excess Urban Runoff Volume (EURV) Design Volume
 For HSG A: $EURVA = (0.1878i - 0.0104) * Area$
 For HSG B: $EURVB = (0.1178i - 0.0042) * Area$
 For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

$I_a =$ 42.4 %

$i =$ 0.424

Area = 250,300 ac

$d_6 =$ _____ in

Choose One

- Water Quality Capture Volume (WQCV)
- Excess Urban Runoff Volume (EURV)

$V_{DESIGN} =$ 4.659 ac-ft

$V_{DESIGN\ OTHER} =$ _____ ac-ft

$V_{DESIGN\ USER} =$ _____ ac-ft

Choose One

- A
- B
- C / D

EURV = 11.451 ac-ft

- 2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = _____ : 1

3. Basin Side Slopes

- A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Z = _____ ft / ft

4. Inlet

- A) Describe means of providing energy dissipation at concentrated inflow locations:

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 4

Designer: SMB
Company: JR Engineering
Date: March 26, 2014
Project: North Forth @ Briargate
Location: Powers Pond

5. Forebay

A) Minimum Forebay Volume
 ($V_{FMIN} =$ 3% of the WQCV)

$V_{FMIN} =$ ac-ft

B) Actual Forebay Volume

$V_F =$ ac-ft

C) Forebay Depth
 ($D_F =$ 30 inch maximum)

$D_F =$ in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge

$Q_{100} =$ cfs

ii) Forebay Discharge Design Flow
 ($Q_F = 0.02 * Q_{100}$)

$Q_F =$ cfs

E) Forebay Discharge Design

Choose One

- Berm With Pipe
- Wall with Rect. Notch
- Wall with V-Notch Weir

F) Discharge Pipe Size (minimum 8-inches)

Calculated $D_p =$ in

G) Rectangular Notch Width

Calculated $W_N =$ in

6. Trickle Channel

A) Type of Trickle Channel

Choose One

- Concrete
- Soft Bottom

F) Slope of Trickle Channel

$S =$ 0.0100 ft / ft

7. Micropool and Outlet Structure

A) Depth of Micropool (2.5-feet minimum)

$D_M =$ ft

B) Surface Area of Micropool (10 ft² minimum)

$A_M =$ sq ft

C) Outlet Type

Choose One

- Orifice Plate
- Other (Describe):

D) Depth of Design Volume (EURV or 1.2 WQCV) Based on the Design Concept Chosen Under 1.E.

$H =$ 9.90 feet

E) Volume to Drain Over Prescribed Time

EURV = 11.451 ac-ft

F) Drain Time
 (Min T_D for WQCV= 40 hours; Max T_D for EURV= 72 hours)

$T_D =$ 72 hours

G) Recommended Maximum Outlet Area per Row, (A_o)

$A_o =$ 2.78 square inches

H) Orifice Dimensions:

- i) Circular Orifice Diameter or
- ii) Width of 2" High Rectangular Orifice

$D_{orifice} =$ 1 - 7 / 8 inches
 $W_{orifice} =$ inches

I) Number of Columns

$n_c =$ 1 number

J) Actual Design Outlet Area per Row (A_o)

$A_o =$ 2.76 square inches

K) Number of Rows (nr)

$n_r =$ 29 number

L) Total Outlet Area (A_{ot})

$A_{ot} =$ 82.0 square inches

M) Depth of WQCV (H_{WQCV})
 (Estimate using actual stage-area-volume relationship and V_{WQCV})

$H_{WQCV} =$ 6.9 feet

N) Ensure Minimum 40 Hour Drain Time for WQCV

$T_{D\ WQCV} =$ 40.8 hours

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 3 of 4

Designer: SMB
Company: JR Engineering
Date: March 26, 2014
Project: North Forth @ Briargate
Location: Powers Pond

8. Initial Surcharge Volume

- A) Depth of Initial Surcharge Volume
(Minimum recommended depth is 4 inches)
- B) Minimum Initial Surcharge Volume
(Minimum volume of 0.3% of the WQCV)
- C) Initial Surcharge Provided Above Micropool

$D_{IS} =$ _____ in

$V_{IS} =$ _____ cu ft

$V_s =$ _____ cu ft

9. Trash Rack

- A) Type of Water Quality Orifice Used
- B) Water Quality Screen Open Area: $A_t = 38.5 * (e^{-0.095D}) * A_{ot}$
- C) For 2", or Smaller, **Circular Opening** (See Fact Sheet T-12):
 - i) Width of Water Quality Screen and Concrete Opening ($W_{opening}$)
 - ii) Height of Water Quality Screen (H_{TR})
 - iii) Type of Screen, Describe if "Other"

Choose One

- Circular (up to 2" diameter)
- Rectangular (2" high)

$A_t =$ 2,642 square inches

$W_{opening} =$ _____ inches

$H_{TR} =$ _____ inches

Choose One

- S.S. Well Screen with 60% Open Area*
- Other (Describe):

D) For 2" High **Rectangular Opening**:

- i) Width of Rectangular Opening ($W_{orifice}$)
- ii) Width of Water Quality Screen Opening ($W_{opening}$)
- iii) Height of Water Quality Screen (H_{TR})
- iv) Type of Screen, Describe if "Other"

$W =$ _____ inches

$W_{opening} =$ _____ ft

$H_{TR} =$ _____ ft

Choose One

- Aluminum Amico-Klemp SR Series (or equal)
- Other (Describe):

v) Cross-bar Spacing

_____ inches

vi) Minimum Bearing Bar Size

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 4 of 4

Designer: SMB
Company: JR Engineering
Date: March 26, 2014
Project: North Forth @ Briargate
Location: Powers Pond

<p>10. Overflow Embankment</p> <p>A) Describe embankment protection for 100-year and greater overtopping:</p> <p>B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<hr/> <hr/> <hr/> <p style="text-align: center;">$Z_E = \underline{\hspace{2cm}} \text{ ft / ft}$</p> <p style="text-align: center;">Choose One</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <input type="radio"/> Irrigated <input type="radio"/> Not Irrigated </div>
<p>11. Vegetation</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <input type="radio"/> Irrigated <input type="radio"/> Not Irrigated </div>
<p>12. Access</p> <p>A) Describe Sediment Removal Procedures</p>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Notes: _____</p> <hr/> <hr/> <hr/>	

STAGE-DISCHARGE OF THE EURV OUTLET

Subdivision North Fork
 Location Colorado Springs

Project Name: North Fork at Briargate MDDP
 Project No. 25100.00
 By: SMB
 Checked By: _____
 Date: 3/26/14

Number of Holes = 29
 Diameter of Holes = 1.875 inches
 Opening Area Per Row = 2.76 square inches
 Opening Area Per Row = 0.0192 square feet
 Orifice Discharge Coefficient $C_o = 0.65$

Orifice Flow Equation = $Q = C_o A_o (2gH_o)^{0.5}$

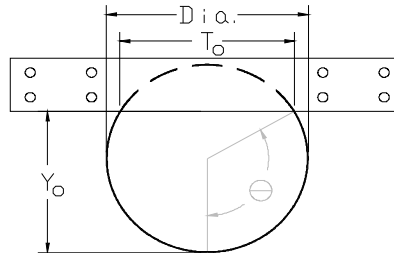
Stage (ft)	Central Elevation of Rows of Holes in Feet																													Sum of Flows	
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20	Row 21	Row 22	Row 23	Row 24	Row 25	Row 26	Row 27	Row 28	Row 29		
	0	0.33	0.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00	5.33	5.67	6.00	6.33	6.67	7.00	7.33	7.67	8.00	8.33	8.67	9.00	9.33		
	Collection Capacity for Each Row of Holes in cfs																														
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.33	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.67	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.33	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.67	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.33	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.67	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.00	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.33	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.67	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.33	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.67	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.33	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.67	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.00	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.33	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.67	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.00	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.33	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.67	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.00	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.33	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00
8.67	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00	0.00
9.00	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00	0.00
9.33	0.31	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00	0.00
9.67	0.31	0.31	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00	0.00
10.00	0.32	0.31	0.31	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.08	0.06	0.00

RESTRICTOR PLATE SIZING FOR CIRCULAR VERTICAL ORIFICES

Project: **North Fork at Briargate**

Basin ID: **Powers Pond 100-year Orifice**

X



Sizing the Restrictor Plate for Circular Vertical Orifices or Pipes (Input)

Water Surface Elevation at Design Depth
 Pipe/Vertical Orifice Entrance Invert Elevation
 Required Peak Flow through Orifice at Design Depth
 Pipe/Vertical Orifice Diameter (inches)
 Orifice Coefficient

	#1 Vertical Orifice	#2 Vertical Orifice	
Elev: WS =	13.70		feet
Elev: Invert =	0.00		feet
Q =	212.50		cfs
Dia =	48.0		inches
C _o =	0.65		

Full-flow Capacity (Calculated)

Full-flow area
 Half Central Angle in Radians
 Full-flow capacity

A _f =	12.57		sq ft
Theta =	3.14		rad
Q _f =	224.2		cfs
Percent of Design Flow =	106%		

Calculation of Orifice Flow Condition

Half Central Angle (0<Theta<3.1416)
 Flow area
 Top width of Orifice (inches)
 Height from Invert of Orifice to Bottom of Plate (feet)
 Elevation of Bottom of Plate
 Resultant Peak Flow Through Orifice at Design Depth

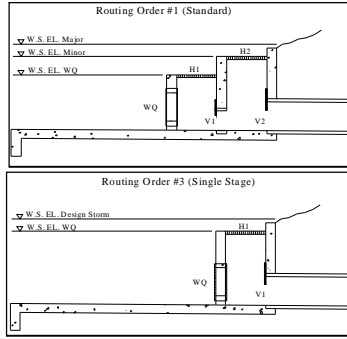
Theta =	2.46		rad
A _o =	11.80		sq ft
T _o =	30.20		inches
Y _o =	3.55		feet
Elev Plate Bottom Edge =	3.55		feet
Q _o =	212.5		cfs

Width of Equivalent Rectangular Vertical Orifice
Centroid Elevation of Equivalent Rectangular Vertical Orifice

Equivalent Width =	3.32		feet
Equiv. Centroid El. =	1.78		feet

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

Project: North Fork at Briargate
 Basin ID: Powers Pond



Current Routing Order is #3

Design Information (Input):

Circular Opening: Diameter in Inches
 OR
 Rectangular Opening: Width in Feet
 Length (Height for Vertical)
 Percentage of Open Area After Trash Rack Reduction
 Orifice Coefficient
 Weir Coefficient
 Orifice Elevation (Bottom for Vertical)

	#1 Horiz.	#2 Horiz.	#1 Vert.	#2 Vert.	
Dia. =			48.00		inches
W =	6.00				ft.
L or H =	6.00				ft.
% open =	80		100		%
C _o =	0.65		0.65		
C _w =	3.33				
E _o =	10.00		0.00		ft.

Calculation of Collection Capacity:

Net Opening Area (after Trash Rack Reduction)
 OPTIONAL: User-Override Net Opening Area
 Perimeter as Weir Length
 OPTIONAL: User-Override Weir Length

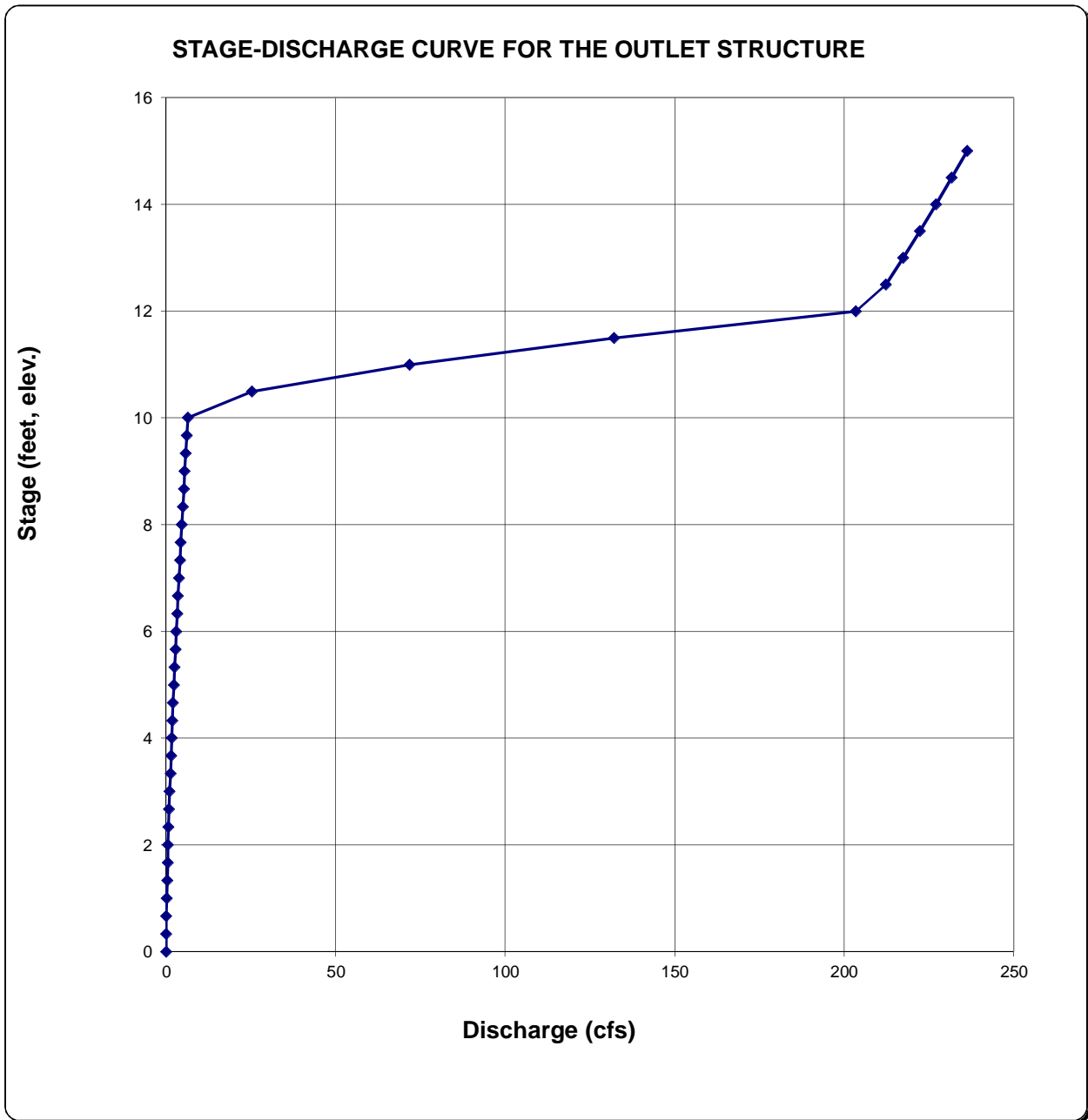
A _o =	28.80	12.57			sq. ft.
A _o =					sq. ft.
L _w =	21.60				ft.
L _w =					ft.
Top Elevation of Vertical Orifice Opening, Top =			4.00		ft.
Center Elevation of Vertical Orifice Opening, Cen =			2.00		ft.

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).

Labels for WQCV, Minor, & Major Storage W.S. Elevations (input)	Water Surface Elevation ft (linked)	WQCV Plate/Riser Flow cfs (User-linked)	Horizontal Orifices				Vertical Orifices		Total Collection Capacity cfs (output)	Target Volumes for WQCV, Minor, & Major Storage Volumes (link for goal seek)
			#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)		
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.33	0.06	0.00	0.00	0.00	0.00	2.23	0.00	0.06	
	0.67	0.14	0.00	0.00	0.00	0.00	6.31	0.00	0.14	
	1.00	0.24	0.00	0.00	0.00	0.00	11.59	0.00	0.24	
	1.33	0.36	0.00	0.00	0.00	0.00	17.84	0.00	0.36	
	1.67	0.48	0.00	0.00	0.00	0.00	24.93	0.00	0.48	
	2.00	0.63	0.00	0.00	0.00	0.00	32.77	0.00	0.63	
	2.33	0.78	0.00	0.00	0.00	0.00	41.30	0.00	0.78	
	2.67	0.94	0.00	0.00	0.00	0.00	50.46	0.00	0.94	
	3.00	1.12	0.00	0.00	0.00	0.00	60.21	0.00	1.12	
	3.33	1.30	0.00	0.00	0.00	0.00	70.52	0.00	1.30	
	3.67	1.49	0.00	0.00	0.00	0.00	81.36	0.00	1.49	
	4.00	1.69	0.00	0.00	0.00	0.00	92.70	0.00	1.69	
	4.33	1.90	0.00	0.00	0.00	0.00	100.13	0.00	1.90	
	4.67	2.12	0.00	0.00	0.00	0.00	107.04	0.00	2.12	
	5.00	2.34	0.00	0.00	0.00	0.00	113.53	0.00	2.34	
	5.33	2.57	0.00	0.00	0.00	0.00	119.68	0.00	2.57	
	5.67	2.81	0.00	0.00	0.00	0.00	125.52	0.00	2.81	
	6.00	3.06	0.00	0.00	0.00	0.00	131.10	0.00	3.06	
	6.33	3.31	0.00	0.00	0.00	0.00	136.45	0.00	3.31	
	6.67	3.57	0.00	0.00	0.00	0.00	141.60	0.00	3.57	
	7.00	3.83	0.00	0.00	0.00	0.00	146.57	0.00	3.83	
	7.33	4.10	0.00	0.00	0.00	0.00	151.38	0.00	4.10	
	7.67	4.38	0.00	0.00	0.00	0.00	156.04	0.00	4.38	
	8.00	4.66	0.00	0.00	0.00	0.00	160.56	0.00	4.66	
	8.33	4.95	0.00	0.00	0.00	0.00	164.96	0.00	4.95	
	8.67	5.25	0.00	0.00	0.00	0.00	169.25	0.00	5.25	
	9.00	5.55	0.00	0.00	0.00	0.00	173.43	0.00	5.55	
	9.33	5.85	0.00	0.00	0.00	0.00	177.51	0.00	5.85	
	9.67	6.16	0.00	0.00	0.00	0.00	181.50	0.00	6.16	
	10.00	6.42	0.00	0.00	0.00	0.00	185.40	0.00	6.42	
	10.50		25.43	106.23	0.00	0.00	191.11	0.00	25.43	
	11.00		71.93	150.23	0.00	0.00	196.65	0.00	71.93	
	11.50		132.14	183.99	0.00	0.00	202.04	0.00	132.14	
	12.00		203.44	212.45	0.00	0.00	207.28	0.00	203.44	
	12.50		284.32	237.53	0.00	0.00	212.40	0.00	212.40	
	13.00		373.75	260.20	0.00	0.00	217.40	0.00	217.40	
	13.50		470.98	281.05	0.00	0.00	222.29	0.00	222.29	
	14.00		575.42	300.45	0.00	0.00	227.07	0.00	227.07	
	14.50		686.62	318.68	0.00	0.00	231.75	0.00	231.75	
	15.00		804.18	335.92	0.00	0.00	236.34	0.00	236.34	
			#/N/A	#/N/A	#/N/A	#/N/A	#/N/A	0.00	#/N/A	
			#/N/A	#/N/A	#/N/A	#/N/A	#/N/A	0.00	#/N/A	
			#/N/A	#/N/A	#/N/A	#/N/A	#/N/A	0.00	#/N/A	

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

Project: North Fork at Briargate
Basin ID: Powers Pond



APPENDIX E
HEC-HMS UPDATED DBPS MODEL RESULTS

**EXCERPTS FROM DBPS
HEC-1 MODEL RESULTS**

100 Year, 24 Hour, Developed Condition
 RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	SB-D1	72.	6.25	12.	5.	5.	0.09		
ROUTED TO	RT-SBD1	72.	6.30	12.	5.	5.	0.09		
HYDROGRAPH AT	SB-D2	72.	6.10	8.	4.	4.	0.06		
2 COMBINED AT	AP-D1	127.	6.20	20.	9.	9.	0.14		
HYDROGRAPH AT	SB-D3	40.	6.15	5.	2.	2.	0.03		
2 COMBINED AT	AP-DDA	165.	6.15	25.	11.	11.	0.17		
ROUTED TO	RR-DFA	65.	6.60	25.	11.	11.	0.17	63.22	6.60
ROUTED TO	RT-APDFA	65.	6.65	25.	11.	11.	0.17		
HYDROGRAPH AT	SB-D6	86.	6.05	9.	4.	4.	0.04		
2 COMBINED AT	AP-D2	131.	6.05	34.	15.	15.	0.21		
ROUTED TO	RT-APD2	130.	6.10	34.	15.	15.	0.21		
HYDROGRAPH AT	SB-D7	157.	6.05	17.	7.	7.	0.07		
HYDROGRAPH AT	SB-D4	56.	6.15	7.	3.	3.	0.05		
HYDROGRAPH AT	SB-D5	47.	6.10	6.	2.	2.	0.03		
2 COMBINED AT	AP-DFB	103.	6.15	12.	6.	6.	0.08		
ROUTED TO	RR-DFB	57.	6.35	12.	6.	6.	0.08	25.45	6.35
ROUTED TO	RT-APDFB	57.	6.35	12.	6.	6.	0.08		
3 COMBINED AT	AP-D3	330.	6.05	63.	28.	28.	0.36		
ROUTED TO	RT-APD3	329.	6.10	63.	28.	28.	0.36		
HYDROGRAPH AT	SB-D8	208.	6.00	22.	9.	9.	0.06		
2 COMBINED AT	AP-DFC	524.	6.05	84.	37.	37.	0.42		
ROUTED TO	RR-DFC	86.	7.30	74.	37.	37.	0.42	65.48	7.30

ROUTED TO	RT-DFC	86.	7.35	74.	37.	37.	0.42
HYDROGRAPH AT	SB-D9A	30.	6.10	3.	1.	1.	0.02
2 COMBINED AT	AP-D4	102.	6.15	78.	38.	38.	0.44
ROUTED TO	RT-APD4	101.	6.15	78.	38.	38.	0.44
HYDROGRAPH AT	SB-D9	37.	6.10	5.	2.	2.	0.02
2 COMBINED AT	AP-D4a	139.	6.15	82.	40.	40.	0.46
ROUTED TO	RT-APD4a	139.	6.15	82.	40.	40.	0.46
HYDROGRAPH AT	SB-D15	75.	6.10	8.	4.	4.	0.04
2 COMBINED AT	AP-D4b	211.	6.10	90.	44.	44.	0.50
ROUTED TO	RT-APD4b	210.	6.10	90.	44.	44.	0.50
HYDROGRAPH AT	SB-D10	27.	6.20	4.	2.	2.	0.03
ROUTED TO	RT-SBD10	27.	6.25	4.	2.	2.	0.03
HYDROGRAPH AT	SB-D11	81.	6.10	10.	4.	4.	0.05
HYDROGRAPH AT	SB-D12	31.	6.15	4.	2.	2.	0.02
ROUTED TO	RT-SBD12	31.	6.20	4.	2.	2.	0.02
3 COMBINED AT	AP-D5	133.	6.15	17.	8.	8.	0.10
ROUTED TO	RT-APD5	132.	6.15	17.	8.	8.	0.10
HYDROGRAPH AT	SB-D13	219.	6.00	23.	10.	10.	0.07
2 COMBINED AT	AP-D6	323.	6.05	40.	18.	18.	0.17
ROUTED TO	RT-APD6	320.	6.05	40.	18.	18.	0.17
HYDROGRAPH AT	SB-D14	49.	6.05	5.	2.	2.	0.02
ROUTED TO	RT-SBD14	49.	6.05	5.	2.	2.	0.02
3 COMBINED AT	AP-D7	567.	6.05	134.	64.	64.	0.69
ROUTED TO	RT-APD7	562.	6.05	134.	64.	64.	0.69
HYDROGRAPH AT	SB-D17	25.	6.00	2.	1.	1.	0.01

2 COMBINED AT	AP-D7A	586.	6.05	137.	65.	65.	0.70		
HYDROGRAPH AT	SB-D16A	28.	6.05	3.	1.	1.	0.01		
2 COMBINED AT	AP-D7A	614.	6.05	139.	66.	66.	0.71		
ROUTED TO	RT-APD8	610.	6.05	139.	66.	66.	0.71		
HYDROGRAPH AT	SB-D17A	36.	6.00	4.	2.	2.	0.01		
2 COMBINED AT	AP-D8	645.	6.05	143.	68.	68.	0.72		
HYDROGRAPH AT	SB-D16	98.	6.10	11.	5.	5.	0.06		
ROUTED TO	RT-SBD16	98.	6.10	11.	5.	5.	0.06		
2 COMBINED AT	AP-D8	739.	6.05	154.	72.	72.	0.78		
ROUTED TO	RT-APD9	735.	6.05	154.	72.	72.	0.78		
HYDROGRAPH AT	SB-D36	34.	6.10	4.	2.	2.	0.02		
ROUTED TO	RT-SBD36	34.	6.15	4.	2.	2.	0.02		
2 COMBINED AT	AP-D9	765.	6.10	158.	74.	74.	0.81		
HYDROGRAPH AT	SB-D37	40.	6.00	5.	2.	2.	0.01		
ROUTED TO	RT-SBD37	40.	6.00	5.	2.	2.	0.01		
2 COMBINED AT	AP-D9	803.	6.05	162.	76.	76.	0.82		
ROUTED TO	RT-APDFE	799.	6.05	162.	76.	76.	0.82		
HYDROGRAPH AT	SB-D18	106.	6.15	13.	6.	6.	0.06		
ROUTED TO	RR-DFPCH	36.	6.45	11.	5.	5.	0.06	23.15	6.45
ROUTED TO	RT-RRDFP	36.	6.50	11.	5.	5.	0.06		
HYDROGRAPH AT	SB-D19	59.	6.00	6.	3.	3.	0.02		
2 COMBINED AT	AP-D10	65.	6.05	17.	7.	7.	0.09		
ROUTED TO	RT-APD10	65.	6.10	17.	7.	7.	0.09		
HYDROGRAPH AT	SB-D20	107.	6.00	12.	5.	5.	0.03		
2 COMBINED AT	AP-D11	167.	6.00	28.	13.	13.	0.12		

ROUTED TO	RT-APD11	165.	6.05	28.	13.	13.	0.12		
HYDROGRAPH AT	SB-D21	117.	6.00	12.	5.	5.	0.04		
3 COMBINED AT	AP-DFE	1079.	6.05	202.	94.	94.	0.98		
ROUTED TO	RR-DFE	600.	6.25	180.	86.	86.	0.98	40.69	6.25
DIVERSION TO	AP-D12	525.	6.25	119.	51.	51.	0.98		
HYDROGRAPH AT	AP-DFE	75.	6.25	61.	36.	36.	0.98		
ROUTED TO	RT-APD13	75.	6.30	61.	36.	36.	0.98		
HYDROGRAPH AT	SB-D22	81.	6.05	8.	4.	4.	0.04		
2 COMBINED AT	AP-D13	148.	6.05	69.	39.	39.	1.02		
ROUTED TO	RT-APD13	146.	6.10	69.	39.	39.	1.02		
HYDROGRAPH AT	SB-D23	15.	6.00	2.	1.	1.	0.00		
2 COMBINED AT	AP-D14	161.	6.05	70.	40.	40.	1.02		
ROUTED TO	AP-DFF	160.	6.05	70.	40.	40.	1.02		
HYDROGRAPH AT	SB-D24	48.	6.05	5.	2.	2.	0.03		
2 COMBINED AT	AP-DFF	208.	6.05	75.	42.	42.	1.05		
ROUTED TO	RR-DFF	76.	7.10	64.	36.	36.	1.05	69.47	7.10
HYDROGRAPH AT	SB-D25	42.	6.05	4.	2.	2.	0.02		
ROUTED TO	RR-SB025	42.	6.05	4.	2.	2.	0.02		
HYDROGRAPH AT	SB-D26	66.	6.05	7.	3.	3.	0.03		
2 COMBINED AT	AP-D16	108.	6.05	11.	5.	5.	0.05		
ROUTED TO	RT-APD16	107.	6.05	11.	5.	5.	0.05		
2 COMBINED AT	AP-D17	117.	6.05	70.	40.	40.	1.10		
ROUTED TO	RT-APD17	116.	6.05	70.	40.	40.	1.10		
HYDROGRAPH AT	SB-D27	19.	6.05	2.	1.	1.	0.01		
2 COMBINED AT	AP-D18	135.	6.05	71.	41.	41.	1.10		

ROUTED TO	RT-APD18	134.	6.05	71.	41.	41.	1.10		
HYDROGRAPH AT	SB-D29	40.	6.05	4.	2.	2.	0.02		
DIVERSION TO	AP-D19a	20.	5.85	1.	0.	0.	0.02		
HYDROGRAPH AT	AP-D19	20.	5.85	3.	1.	1.	0.02		
ROUTED TO	RT-APD19	20.	5.90	3.	1.	1.	0.02		
HYDROGRAPH AT	SB-D28	11.	6.05	1.	0.	0.	0.00		
3 COMBINED AT	AP-D20	165.	6.05	75.	43.	43.	1.13		
ROUTED TO	RT-APD20	164.	6.05	75.	43.	43.	1.13		
HYDROGRAPH AT	SB-D30	32.	6.05	3.	1.	1.	0.02		
ROUTED TO	RT-SBD30	32.	6.05	3.	1.	1.	0.02		
2 COMBINED AT	AP-D21	196.	6.05	79.	44.	44.	1.14		
HYDROGRAPH AT	SB-D31	16.	6.05	2.	1.	1.	0.01		
2 COMBINED AT	AP-D22	211.	6.05	80.	45.	45.	1.15		
HYDROGRAPH AT	SB-D32	9.	6.05	1.	0.	0.	0.01		
2 COMBINED AT	AP-DFCS	221.	6.05	81.	45.	45.	1.16		
ROUTED TO	RR-DFCS	90.	7.10	74.	42.	42.	1.16		
HYDROGRAPH AT	DR-APD12	525.	6.25	119.	51.	51.	0.00	80.19	7.10
ROUTED TO	RT-APD12	534.	6.40	119.	51.	51.	0.00		
HYDROGRAPH AT	SB-D33	59.	6.05	6.	3.	3.	0.04		
2 COMBINED AT	AP-D23	544.	6.40	123.	53.	53.	0.04		
2 COMBINED AT	AP-D24	630.	6.40	196.	95.	95.	1.19		
HYDROGRAPH AT	SB-D34	80.	6.05	8.	4.	4.	0.04		
ROUTED TO	RT-SBD34	79.	6.05	8.	4.	4.	0.04		
HYDROGRAPH AT	SB-D35	83.	6.05	8.	4.	4.	0.04		
2 COMBINED AT	AP-DFG	162.	6.05	17.	7.	7.	0.08		
ROUTED TO	RR-DFG	41.	6.35	14.	6.	6.	0.08	72.16	6.35

REVISED HEC-HMS MODEL RESULTS

Project: North Fork New Simulation Run: Run 1-100 yr

Start of Run: 01Jan3000, 01:00 Basin Model: KCD100
 End of Run: 01Jan3000, 15:57 Meteorologic Model: KCD100
 Compute Time: 23May2014, 09:11:44 Control Specifications: KCD100

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB-D1	0.085	72.7	01Jan3000, 07:30	1.41
RT-SBD1	0.085	72.7	01Jan3000, 07:33	1.41
SB-D2	0.057	72.8	01Jan3000, 07:21	1.52
AP-D1	0.142	128.5	01Jan3000, 07:27	1.46
SB-D3	0.026	40.1	01Jan3000, 07:24	1.96
AP-DDA	0.168	167.0	01Jan3000, 07:24	1.53
RR-DFA	0.168	65.1	01Jan3000, 07:51	1.53
RT-APDFA	0.168	65.1	01Jan3000, 07:54	1.53
SB-D6	0.039	86.2	01Jan3000, 07:18	2.30
AP-D2	0.207	131.6	01Jan3000, 07:18	1.68
RT-APD2	0.207	130.9	01Jan3000, 07:21	1.67
SB-D4	0.048	56.2	01Jan3000, 07:24	1.47
SB-D5	0.030	47.6	01Jan3000, 07:21	1.92
AP-DFB	0.078	103.3	01Jan3000, 07:24	1.64
RR-DFB	0.078	57.4	01Jan3000, 07:36	1.64
RT-APDFB	0.078	57.4	01Jan3000, 07:36	1.64
SB-D7	0.071	157.3	01Jan3000, 07:18	2.35
AP-D3	0.356	331.3	01Jan3000, 07:18	1.80
RT-APD3	0.356	330.9	01Jan3000, 07:21	1.80
SB-D8	0.062	208.7	01Jan3000, 07:15	3.52
AP-DFC	0.418	526.3	01Jan3000, 07:18	2.06
RR-DFC	0.418	86.4	01Jan3000, 08:33	2.04
RT-DFC	0.418	86.4	01Jan3000, 08:36	2.04
SB-D9A	0.018	30.3	01Jan3000, 07:21	1.92
AP-D4	0.436	102.1	01Jan3000, 07:24	2.03
RT-APD4	0.436	101.8	01Jan3000, 07:24	2.03

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB-D9	0.022	37.7	01Jan3000, 07:21	2.11
AP-D4a	0.458	139.5	01Jan3000, 07:24	2.03
RT-APD4a	0.458	139.2	01Jan3000, 07:24	2.03
SB-D15	0.043	75.6	01Jan3000, 07:21	1.96
AP-D4b	0.501	212.0	01Jan3000, 07:21	2.03
RT-APD4b	0.501	211.0	01Jan3000, 07:21	2.03
SB-OS3	0.229	135.9	01Jan3000, 07:39	1.24
Howells Pond	0.229	11.5	01Jan3000, 09:54	0.66
SB-D11	0.069	119.6	01Jan3000, 07:21	1.96
ORR Pond	0.069	45.0	01Jan3000, 07:36	1.50
SB-D10	0.027	27.5	01Jan3000, 07:27	1.45
RT-SBD10	0.027	27.4	01Jan3000, 07:30	1.45
SB-D12	0.021	31.0	01Jan3000, 07:24	1.93
RT-SBD12	0.021	30.8	01Jan3000, 07:27	1.92
AP-D5	0.346	109.3	01Jan3000, 07:30	0.97
RT-APD5	0.346	109.2	01Jan3000, 07:30	0.97
SB-D13	0.067	220.1	01Jan3000, 07:15	3.44
AP-D6	0.413	259.3	01Jan3000, 07:18	1.37
RT-APD6	0.413	257.9	01Jan3000, 07:18	1.37
SB-D14	0.023	49.3	01Jan3000, 07:18	2.20
RT-SBD14	0.023	49.1	01Jan3000, 07:18	2.20
AP-D7	0.937	506.8	01Jan3000, 07:18	1.74
RT-APD7	0.937	505.7	01Jan3000, 07:21	1.74
SB-D17	0.010	24.7	01Jan3000, 07:15	2.41
AP-D7A	0.947	526.5	01Jan3000, 07:18	1.75
SB-D16A	0.013	28.6	01Jan3000, 07:18	2.20
Junction-1	0.960	555.1	01Jan3000, 07:18	1.75
RT-APD8	0.960	551.8	01Jan3000, 07:18	1.75
SB-D17A	0.010	36.4	01Jan3000, 07:15	4.27
AP-D8	0.970	586.2	01Jan3000, 07:18	1.78
SB-D16	0.062	98.9	01Jan3000, 07:21	1.77

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
RT-SBD16	0.062	98.6	01Jan3000, 07:21	1.77
Junction-2	1.032	681.2	01Jan3000, 07:18	1.78
RT-APD9	1.032	678.0	01Jan3000, 07:21	1.78
SB-D36	0.024	34.2	01Jan3000, 07:21	1.73
RT-SBD36	0.024	34.0	01Jan3000, 07:24	1.73
AP-D9	1.056	711.5	01Jan3000, 07:21	1.78
SB-D37	0.011	40.0	01Jan3000, 07:15	4.27
RT-SBD37	0.011	40.0	01Jan3000, 07:15	4.27
Junction-3	1.067	746.4	01Jan3000, 07:18	1.80
RT-APDFE	1.067	742.7	01Jan3000, 07:21	1.80
SB-D18	0.064	106.4	01Jan3000, 07:24	2.06
RR-DFPCH	0.064	35.9	01Jan3000, 07:42	1.75
RT-RRDFP	0.064	35.8	01Jan3000, 07:45	1.75
SB-D19	0.024	59.5	01Jan3000, 07:15	2.45
AP-D10	0.088	65.6	01Jan3000, 07:18	1.94
RT-APD10	0.088	65.5	01Jan3000, 07:21	1.94
SB-D20	0.030	107.7	01Jan3000, 07:15	3.98
AP-D11	0.118	167.4	01Jan3000, 07:15	2.46
RT-APD11	0.118	165.7	01Jan3000, 07:18	2.46
SB-D21	0.041	117.0	01Jan3000, 07:15	2.95
AP-DFE	1.226	1024.6	01Jan3000, 07:18	1.90
RR-DFE	1.226	573.4	01Jan3000, 07:33	1.73
AP-D12	1.226	74.9	01Jan3000, 07:33	0.67
RT-APD13	1.226	74.8	01Jan3000, 07:33	0.67
SB-D22	0.037	81.1	01Jan3000, 07:18	2.24
AP-D13	1.263	147.6	01Jan3000, 07:18	0.72
Reach-1	1.263	146.1	01Jan3000, 07:18	0.72
SB-D23	0.005	15.4	01Jan3000, 07:15	3.09
AP-D14	1.268	160.9	01Jan3000, 07:18	0.73
AP-DFF	1.268	160.5	01Jan3000, 07:18	0.73
SB-D24	0.025	47.8	01Jan3000, 07:18	1.92

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-4	1.293	208.3	01Jan3000, 07:18	0.75
RR-DFF	1.293	76.1	01Jan3000, 08:21	0.63
SB-D26	0.033	66.3	01Jan3000, 07:18	2.00
SB-D25	0.017	42.0	01Jan3000, 07:18	2.56
RR-SBD25	0.017	41.8	01Jan3000, 07:18	2.56
AP-D16	0.050	108.1	01Jan3000, 07:18	2.19
RT-APD16	0.050	107.8	01Jan3000, 07:18	2.19
AP-D17	1.343	117.4	01Jan3000, 07:18	0.69
RT-APD17	1.343	116.9	01Jan3000, 07:18	0.69
SB-D27	0.008	18.8	01Jan3000, 07:18	2.37
AP-D18	1.351	135.7	01Jan3000, 07:18	0.70
RT-APD18	1.351	135.1	01Jan3000, 07:18	0.70
SB-D29	0.018	39.7	01Jan3000, 07:18	2.22
AP-D19a	0.018	20.0	01Jan3000, 07:06	1.82
RT-APD19	0.018	20.0	01Jan3000, 07:15	1.82
SB-D28	0.004	10.7	01Jan3000, 07:18	2.72
AP-D20	1.373	165.7	01Jan3000, 07:18	0.72
RT-APD20	1.373	165.0	01Jan3000, 07:18	0.72
SB-D30	0.017	31.9	01Jan3000, 07:18	1.92
RT-SBD30	0.017	31.8	01Jan3000, 07:18	1.92
AP-D21	1.390	196.8	01Jan3000, 07:18	0.74
SB-D31	0.007	15.6	01Jan3000, 07:18	2.24
AP-D22	1.397	212.4	01Jan3000, 07:18	0.74
SB-D32	0.006	9.4	01Jan3000, 07:18	1.46
AP-DFCS	1.403	221.8	01Jan3000, 07:18	0.75
RR-DFCS	1.403	90.9	01Jan3000, 08:21	0.68
SB-D33	0.036	59.4	01Jan3000, 07:18	1.61
RT-APD12	0.000	495.9	01Jan3000, 07:36	
AP-D23	0.036	507.5	01Jan3000, 07:36	37.71
AP-D24	1.439	596.9	01Jan3000, 07:36	1.61
SB-D35	0.039	83.1	01Jan3000, 07:18	2.20

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB-D34	0.039	80.5	01Jan3000, 07:18	2.12
RT-SBD34	0.039	79.6	01Jan3000, 07:18	2.12
AP-DFG	0.078	162.7	01Jan3000, 07:18	2.16
RR-DFG	0.078	40.9	01Jan3000, 07:36	1.83

Project: North Fork New
Simulation Run: Run 1-100 yr Junction: AP-D4

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 10:20:51	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Outflow :	101.8 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 07:24
Total Outflow :	2.02 (IN)		

Project: North Fork New
Simulation Run: Run 1-100 yr Reservoir: Howells Pond

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 09:11:44	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Inflow :	135.9 (CFS)	Date/Time of Peak Inflow :	01Jan3000, 07:39
Peak Outflow :	11.5 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 09:54
Total Inflow :	1.24 (IN)	Peak Storage :	9.3 (AC-FT)
Total Outflow :	0.66 (IN)	Peak Elevation :	9.5 (FT)

Project: North Fork New
Simulation Run: Run 1-100 yr Reservoir: ORR Pond

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 09:11:44	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Inflow :	119.6 (CFS)	Date/Time of Peak Inflow :	01Jan3000, 07:21
Peak Outflow :	45.0 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 07:36
Total Inflow :	1.96 (IN)	Peak Storage :	3.2 (AC-FT)
Total Outflow :	1.50 (IN)	Peak Elevation :	5.9 (FT)

Project: North Fork New
Simulation Run: Run 1-100 yr Junction: AP-D5

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 09:11:44	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Outflow :	109.3 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 07:30
Total Outflow :	0.97 (IN)		

Project: North Fork New
Simulation Run: Run 1-100 yr Junction: AP-D6

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 09:11:44	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Outflow :	259.3 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 07:18
Total Outflow :	1.37 (IN)		

Project: North Fork New
Simulation Run: Run 1-100 yr Junction: AP-D7

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 10:20:51	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Outflow :	505.1 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 07:18
Total Outflow :	1.73 (IN)		

Project: North Fork New
Simulation Run: Run 1-100 yr Reservoir: RR-DFE

Start of Run:	01Jan3000, 01:00	Basin Model:	KCD100
End of Run:	01Jan3000, 15:57	Meteorologic Model:	KCD100
Compute Time:	23May2014, 09:11:44	Control Specifications:	KCD100

Volume Units: IN

Computed Results

Peak Inflow :	1024.6 (CFS)	Date/Time of Peak Inflow :	01Jan3000, 07:18
Peak Outflow :	573.4 (CFS)	Date/Time of Peak Outflow :	01Jan3000, 07:33
Total Inflow :	1.90 (IN)	Peak Storage :	27.4 (AC-FT)
Total Outflow :	1.73 (IN)	Peak Elevation :	40.4 (FT)

APPENDIX F
MAP POCKET



UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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No.	REVISION	BY	DATE

H-Scale	V-Scale	DATE	DESIGNED BY	DRAWN BY	CHECKED BY
1" = 300'	N/A	5/28/14	SMB	CEB	

MASTER DEVELOPMENT DRAINAGE PLAN
NORTH FORK AT BRIARGATE
DRAINAGE EXHIBIT
HISTORIC CONDITION

SUB-BASIN DATA SUMMARY
HISTORIC CONDITION

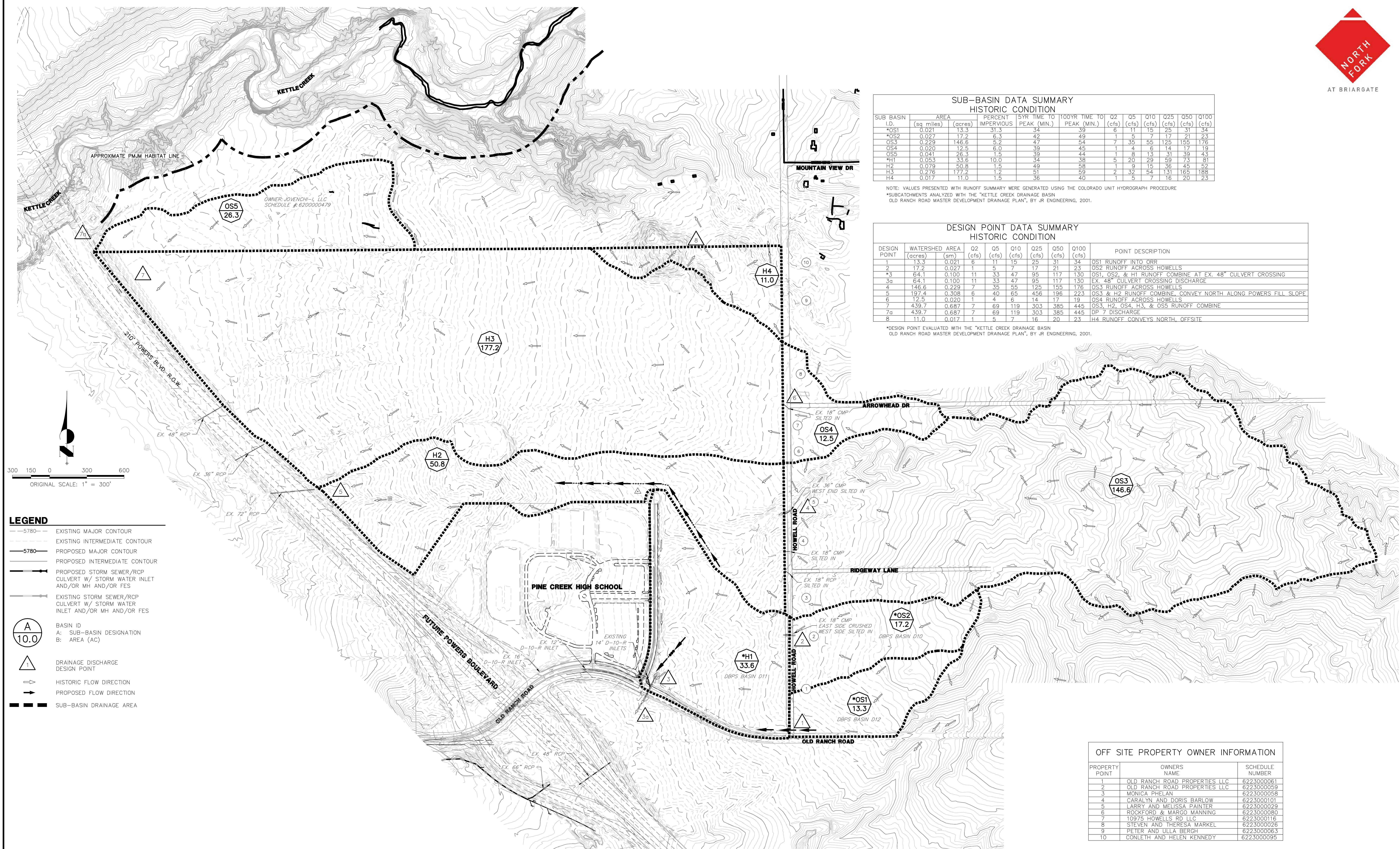
SUB BASIN ID	AREA (sq miles)	AREA (acres)	PERCENT IMPERVIOUS	TOTR TIME TO PEAK (MIN.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)
*OS1	0.021	13.3	31.3	34	39	6	11	15	25	31
*OS2	0.027	17.2	6.3	42	49	1	5	7	17	21
OS3	0.229	146.6	5.2	47	54	7	35	55	125	176
OS4	0.020	12.9	6.0	39	45	1	4	6	14	17
OS5	0.041	26.3	1.5	39	44	1	8	13	31	39
*H1	0.053	33.6	10.0	34	38	5	20	29	59	73
H2	0.079	50.8	1.5	49	58	1	9	15	36	45
H3	0.276	177.2	1.2	51	59	2	32	54	131	165
H4	0.017	11.0	1.5	36	40	1	5	7	16	20

NOTE: VALUES PRESENTED WITH RUNOFF SUMMARY WERE GENERATED USING THE COLORADO UNIT HYDROGRAPH PROCEDURE
 *SUBCATCHMENTS ANALYZED WITH THE "KETTLE CREEK DRAINAGE BASIN OLD RANCH ROAD MASTER DEVELOPMENT DRAINAGE PLAN", BY JR ENGINEERING, 2001.

DESIGN POINT DATA SUMMARY
HISTORIC CONDITION

DESIGN POINT	WATERSHED AREA (acres)	AREA (sq miles)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)	POINT DESCRIPTION
1	13.3	0.021	6	11	15	25	31	34	OS1 RUNOFF INTO ORR
2	17.2	0.027	1	5	7	17	21	23	OS2 RUNOFF ACROSS HOWELLS
*3	64.1	0.100	11	33	47	95	117	130	OS1, OS2, & H1 RUNOFF COMBINE AT EX. 48" CULVERT CROSSING
3a	64.1	0.100	11	33	47	95	117	130	EX. 48" CULVERT CROSSING DISCHARGE
4	146.6	0.229	7	35	55	125	155	176	OS3 RUNOFF ACROSS HOWELLS
5	197.4	0.308	6	40	65	456	196	223	OS3 & H2 RUNOFF COMBINE, CONVEY NORTH ALONG POWERS FILL SLOPE
6	12.5	0.020	1	4	6	14	17	19	OS4 RUNOFF ACROSS HOWELLS
7	439.7	0.687	7	69	119	303	385	445	OS3, H2, OS4, H3, & OS5 RUNOFF COMBINE
7a	439.7	0.687	7	69	119	303	385	445	DP 7 DISCHARGE
8	11.0	0.017	1	5	7	16	20	23	H4 RUNOFF CONVEYS NORTH, OFFSITE

*DESIGN POINT EVALUATED WITH THE "KETTLE CREEK DRAINAGE BASIN OLD RANCH ROAD MASTER DEVELOPMENT DRAINAGE PLAN", BY JR ENGINEERING, 2001.



LEGEND

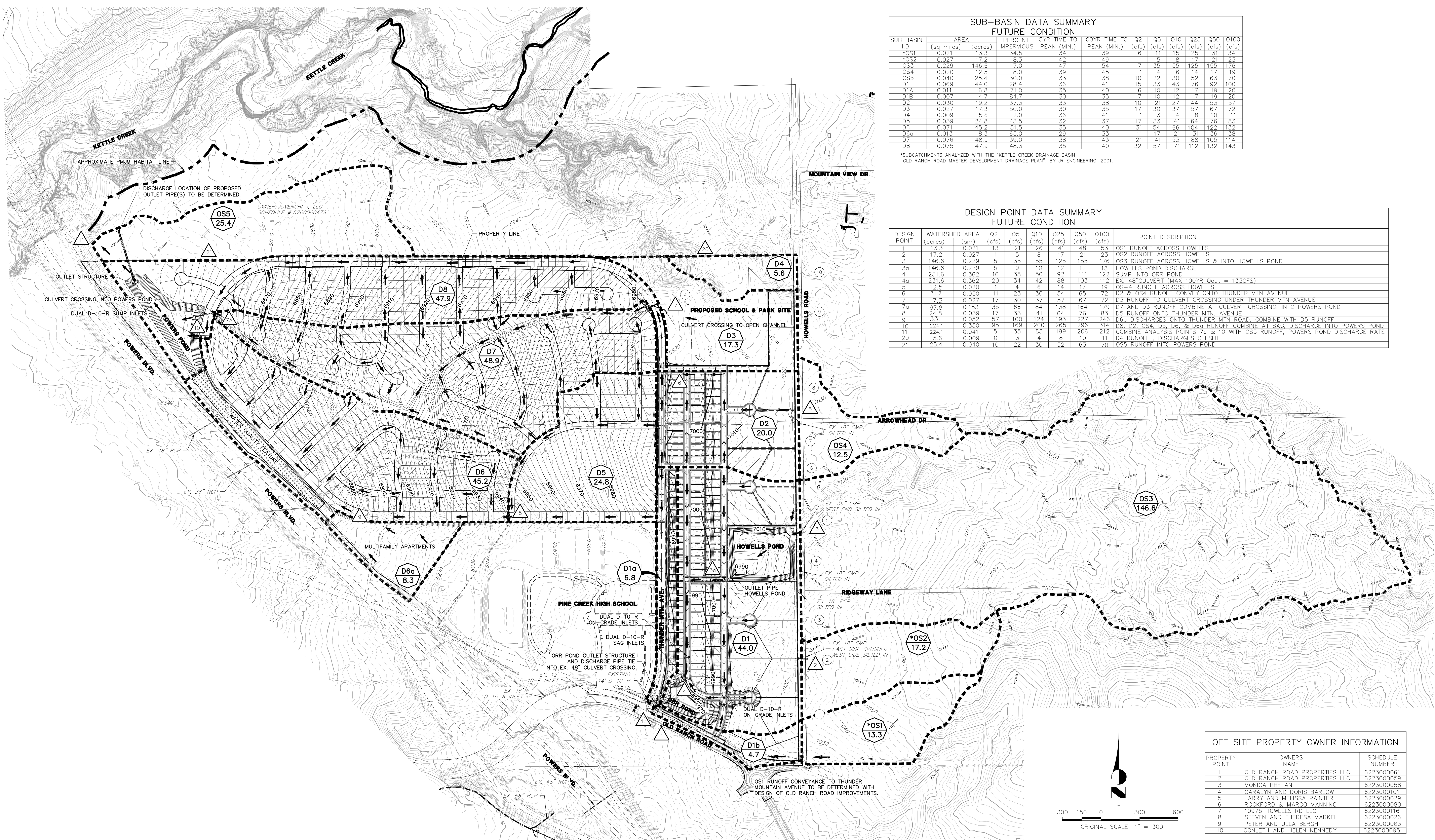
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- 5780--- EXISTING INTERMEDIATE CONTOUR
- 5780--- PROPOSED MAJOR CONTOUR
- 5780--- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED STORM SEWER/RCP CULVERT W/ STORM WATER INLET AND/OR MH AND/OR FES
- EXISTING STORM SEWER/RCP CULVERT W/ STORM WATER INLET AND/OR MH AND/OR FES
- ⊙ A 10.0 ⊙ BASIN ID
A: SUB-BASIN DESIGNATION
B: AREA (AC)
- ⚠ DRAINAGE DISCHARGE DESIGN POINT
- HISTORIC FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- SUB-BASIN DRAINAGE AREA

OFF SITE PROPERTY OWNER INFORMATION

PROPERTY POINT	OWNERS NAME	SCHEDULE NUMBER
1	OLD RANCH ROAD PROPERTIES LLC	6223000061
2	OLD RANCH ROAD PROPERTIES LLC	6223000059
3	MONICA PHELAN	6223000058
4	CARALYN AND DORIS BARLOW	6223000101
5	LARRY AND MELISSA PAINTER	6223000029
6	ROCKFORD & MARGO MANNING	6223000080
7	1097'S HOWELLS RD LLC	6223000116
8	STEVEN AND THERESA MARKEL	6223000026
9	PETER AND ULLA BERGH	6223000063
10	CONLETH AND HELEN KENNEDY	6223000095



Know what's below.
 Call before you dig.



SUB-BASIN DATA SUMMARY FUTURE CONDITION

SUB BASIN I.D.	AREA (sq. miles)	AREA (acres)	PERCENT IMPERVIOUS	5YR TIME TO PEAK (MIN.)	100YR TIME TO PEAK (MIN.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)
*OS1	0.021	13.3	34.5	34	39	6	11	15	25	31	34
*OS2	0.027	17.2	8.3	42	49	1	5	8	17	21	23
OS3	0.229	146.6	7.0	47	54	7	35	55	125	155	176
OS4	0.020	12.5	8.0	39	45	1	4	6	14	17	19
OS5	0.040	25.4	30.0	33	38	10	22	30	52	63	70
D1	0.069	44.0	28.4	36	41	15	33	43	76	92	100
D1A	0.011	6.8	71.0	35	40	6	10	12	17	19	20
D1B	0.007	4.7	84.7	30	35	7	10	12	17	19	20
D2	0.030	19.2	37.3	33	38	10	21	27	44	53	57
D3	0.027	17.3	50.0	30	35	17	30	37	57	67	72
D4	0.009	5.6	2.0	36	41	1	3	4	8	10	11
D5	0.039	24.8	43.4	32	37	17	33	41	64	76	83
D6	0.071	45.2	51.5	35	40	31	54	66	104	122	132
D6a	0.013	8.3	65.0	29	33	11	17	21	31	36	38
D7	0.076	48.9	39.0	35	43	21	41	53	88	105	114
D8	0.075	47.9	48.3	35	40	32	57	71	112	132	143

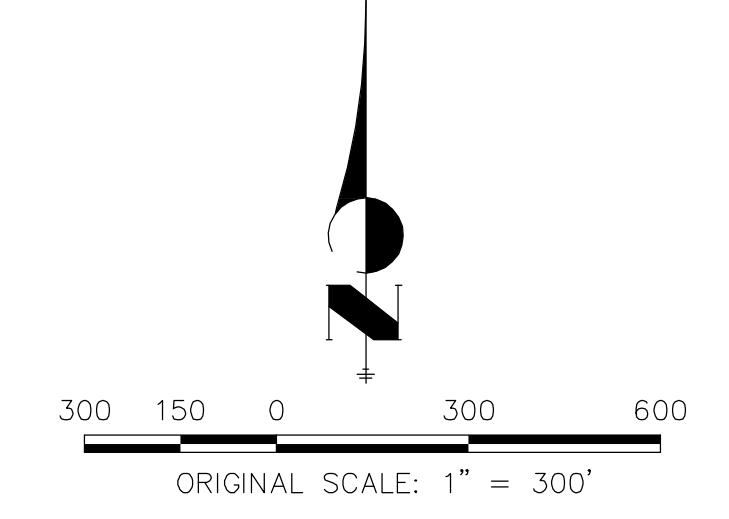
*SUBCATCHMENTS ANALYZED WITH THE "KETTLE CREEK DRAINAGE BASIN OLD RANCH ROAD MASTER DEVELOPMENT DRAINAGE PLAN", BY JR ENGINEERING, 2001.

DESIGN POINT DATA SUMMARY FUTURE CONDITION

DESIGN POINT	WATERSHED AREA (acres)	WATERSHED AREA (sq. miles)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)	POINT DESCRIPTION
1	13.3	0.021	13	21	26	41	48	53	OS1 RUNOFF ACROSS HOWELLS
2	17.2	0.027	1	5	8	17	21	23	OS2 RUNOFF ACROSS HOWELLS
3	146.6	0.229	5	35	55	125	155	176	OS3 RUNOFF ACROSS HOWELLS & INTO HOWELLS POND
3a	146.6	0.229	5	9	10	12	12	13	HOWELLS POND DISCHARGE
4	231.6	0.362	16	38	50	92	111	122	SUMP INTO ORR POND
4a	231.6	0.362	20	34	42	88	103	112	EX. 48" CULVERT (MAX 100YR Qout = 133CFS)
5	12.5	0.020	1	4	6	14	17	19	OS4 RUNOFF ACROSS HOWELLS
6	31.7	0.050	11	23	30	54	65	72	D2 & OS4 RUNOFF CONVEY ONTO THUNDER MTN AVENUE
7	17.3	0.027	17	30	37	57	67	72	D3 RUNOFF TO CULVERT CROSSING UNDER THUNDER MTN AVENUE
7a	47.8	0.153	35	66	84	138	164	179	D7 AND D3 RUNOFF COMBINE AT CULVERT CROSSING, INTO POWERS POND
8	24.8	0.039	17	33	41	64	76	83	D5 RUNOFF ONTO THUNDER MTN AVENUE
9	53.1	0.082	57	100	124	193	227	246	D6a DISCHARGES ONTO THUNDER MTN ROAD, COMBINE WITH D5 RUNOFF
10	224.1	0.350	95	169	200	285	296	314	D8, D2, OS4, D5, D6, & D6a RUNOFF COMBINE AT SAG, DISCHARGE INTO POWERS POND
11	224.1	0.041	5	35	85	199	206	212	COMBINE ANALYSIS POINTS 7a & 10 WITH OS5 RUNOFF, POWERS POND DISCHARGE RATE
20	9.6	0.009	0	3	4	8	10	11	D4 RUNOFF - DISCHARGES OFF SITE
21	25.4	0.040	10	22	30	52	63	70	OS5 RUNOFF INTO POWERS POND

OFF SITE PROPERTY OWNER INFORMATION

PROPERTY POINT	OWNERS NAME	SCHEDULE NUMBER
1	OLD RANCH ROAD PROPERTIES LLC	6223000061
2	OLD RANCH ROAD PROPERTIES LLC	6223000059
3	MONICA PHELAN	6223000058
4	CARALYN AND DORIS BARLOW	6223000101
5	LARRY AND MELISSA PAINTER	6223000029
6	ROCKFORD & MARGO MANNING	6223000080
7	10975 HOWELLS RD LLC	6223000116
8	STEVEN AND THERESA MARKEL	6223000026
9	PETER AND ULLA BERGH	6223000063
10	CONLETH AND HELEN KENNEDY	6223000095



- ### LEGEND
- 5780— EXISTING MAJOR CONTOUR
 - - -5780- - - EXISTING INTERMEDIATE CONTOUR
 - 5780— PROPOSED MAJOR CONTOUR
 - - -5780- - - PROPOSED INTERMEDIATE CONTOUR
 - >— PROPOSED STORM SEWER/RCP CULVERT W/ STORM WATER INLET AND/OR MH AND/OR FES
 - >— EXISTING STORM SEWER/RCP CULVERT W/ STORM WATER INLET AND/OR MH AND/OR FES
 - Ⓐ BASIN ID
A: SUB-BASIN DESIGNATION
B: AREA (AC)
 - △ ANALYSIS POINT
 - PROPOSED FLOW DIRECTION
 - — — SUB-BASIN DRAINAGE AREA
 - ① OFF SITE PROPERTY OWNER MARKER

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED ON THESE DRAWINGS. CONTACT: ANGELA LESSING ALESSING@LAPLATACOMMUNITIES.COM

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No.	REVISION	BY	DATE

MASTER DRAINAGE DEVELOPMENT PLAN
NORTH FORK AT BRIARGATE
HYDROLOGY EXHIBIT
FUTURE CONDITION

SHEET 2 OF 2
JOB NO. 25100.00

