MASTER DEVELOPMENT DRAINAGE PLAN UPDATE FOR WOODMEN HEIGHTS AND FINAL DRAINAGE REPORT FOR FOREST MEADOWS FILING NO. 1 AND NO. 4

February 2006

Prepared for:

Morley Companies
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Prepared by:

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Project #08-001

MASTER DEVELOPMENT DRAINAGE PLAN UPDATE FOR WOODMEN HEIGHTS AND FINAL DRAINAGE REPORT FOR FOREST MEADOWS FILING NO. 1 AND NO. 4

DRAINAGE PLAN STATEMENTS

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 acceptable to the City of Colorado Springs. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

COLORADO REGISTERED
BENJAMIN E. SHEETS
35165
PROFESSIONAL ENGINEER

Benjamin E. Sheets, P.E. #35165
For and on Behalf of Engineering and Surveying, Inc.

DEVELOPER'S STATEMENT

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

Morley Companies

BY: James F. Morley DATE: 2/24/06

TITLE: Owner

ADDRESS: 15 North Nevada Avenue
Colorado Springs, 80903

CITY OF COLORADO SPRINGS

Filed in accordance with Section 7-7-906 of the Code of the City of Colorado Springs, 2001, as amended.

BY: For The City Engineer DATE: Feb 25, 2006

CONDITIONS:

MASTER DEVELOPMENT DRAINAGE PLAN UPDATE FOR WOODMEN HEIGHTS AND FINAL DRAINAGE REPORT FOR FOREST MEADOWS FILING NO. 1 AND NO. 4

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PURPOSE

This document is the Final Drainage Report for a portion of Forest Meadows Subdivision. The purpose of this report is to identify the existing and proposed runoff patterns and peak rates of runoff and identify any drainage improvements needed to safely route stormwater to adequate outfall facilities per the current City of Colorado Springs Drainage Criteria.

GENERAL LOCATION AND DESCRIPTION

The Forest Meadows Subdivision site is located in Section 5, Township 13 South, Range 65 West of the 6th P.M. in the City of Colorado Springs, El Paso County, Colorado. The site is bounded on the north by the El Paso County land (not annexed into the City), on the south by proposed Forest Meadows Avenue, on the west by Black Forest Road and on the east by grass land, approximately 1200 feet shy of Sand Creek. The site lies within the Sand Creek Drainage Basin.

The existing site terrain generally slopes from north to south at grades of approximately 2.5% to 2.9%. Vegetation consists of native grasses, shrubs and a few trees.

The proposed site consists of approximately 133 acres (Filing No. 1) and 155 acres (Filing No. 4), for a total of 288 acres and is currently zoned "A", Agriculture. The development is proposed to be zoned "PUD", Planned Unit Development, for the construction of single family and multi-family homes. Construction of the site, in this report, is anticipated to be completed in two phases, and multiple filings.

SOILS

According to the Soil Survey of El Paso County, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the Blakeland soil series (Soil No.'s 8 & 9) underlies a portion of the south and east side of the site along Vollmer Road. The Columbine series (Soil No. 19) underlies the remainder of the site to the north and west of Vollmer Road. The Columbine and Blakeland series are both designated as Hydrologic Group "A" soils. Runoff coefficients were selected based on "A" type soils.

CLIMATE

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in the spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

FLOODPLAIN STATEMENT

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM)

Panel No.'s 08041C0529 F and 08041C0535 F, effective dates March 17, 1997, no portion of the of the site (defined as the 289 acres of the ~800 total acres of the Woodmen Heights Master Planned Community) currently lies within a designated 100-year floodplain.

DRAINAGE CRITERIA

The drainage analysis has been prepared in accordance with the current City of Colorado Springs/El Paso County Drainage Criteria Manual. Calculations were performed to determine runoff quantities during the 5-year and 100-year frequency storms for developed conditions using the Rational Method as required for basins having less than 100 acres.

EROSION CONTROL PLAN

The City of Colorado Springs Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate be submitted with the Final Drainage Report. ESI, Inc. respectfully requests that the Erosion Control Plan and estimate be submitted separately and that erosion control assurances be posted prior to obtaining a grading permit.

PROPOSED DRAINAGE CHARACTERISTICS

A brief description of each developed drainage basin including developed runoff rates, drainage patterns and proposed drainage facilities for each basin is provided in this section of the report. A summary of peak developed runoff for the basins and designated design points are depicted on the Drainage Map in the appendix. The drainage map has been divided into four residential areas and an overall map containing the roads and off-site basins with associated proposed drainage features. Each residential area has internal streets that will be public residential streets with a minimum of 34' fl-fl width, with type 5 ramp curb and gutter. Three areas will have public alleys constructed with a 24' fl-fl width, with type 5 ramp curb and gutter. The adjacent collector streets will be constructed with a minimum of 36' fl-fl width, with type 1 – 8" vertical curb and gutter. Black Forest Road and Vollmer Road will be widened to accommodate additional traffic volumes, using urban cross sections.

In reference to the following narratives for proposed drainage characteristics, "Design Point Flows" listed individually for each contributing basin reflect un-routed conditions. Design Points described below and shown on the drainage maps reflect above ground reference locations with the exception of offsite basin inflow locations (e.g. – MDDP OS-1) where there are no surface collection structures or conveyance channels. "Pipe Routing/Pipe Capacity" values listed for 1) pipe slopes reflect the minimum slope for a given run between design points (i.e. – not between structures or geometric breaks), 2) full flow capacity reflect open channel flow (explaining why the actual flow at times is higher than the full flow capacity under pressurized conditions), 3) pipe sizes reflect the largest size in a given run between design points. During the final design and construction document preparation phase of each system, sizes may be adjusted up or down per the final design hydraulic grade line computations. It should also be noted that pipe sizes labeled on the maps for a given run may differ, due to the reflection of the HGL within the system which sometimes necessitates upsizing pipes downstream of manhole or inlet structures.

AREA 1 (Filing No. 1 & No. 4)

This area has been divided into 49 developed drainage basins which are described by each design point. Off-site flows from basin MDDP OS-1 will enter the site through a tract between basins S & BB. Minimal off-site flows from Basin OS-1 shall enter the Forest Meadows development via overland flow. North of the site, an off-site temporary drainage swale shall be built and maintained by the Woodmen Heights Metropolitan District to divert flows from off-site basin OS-1, to ensure adjacent lots are not inundated by overland flow from the north. Once development of Basin OS-1 occurs, the drainage swale can be eliminated providing the development of Basin OS-1 redirects the developed flow by other means. *Refer to the design point 3 (DP3) narrative for further discussion.*

Unconcentrated sheet flow and shallow swale flow from basin SS (Q5=4.7cfs, Q100=9.9cfs) and basin TT (Q5=2.7cfs, Q100=5.6cfs) enters Vollmer Road from the rear of the lots, conveyed via side lot swales and overland flow until intercepted by street curb and gutter on the west side of the road. *Refer to the "Offsite and Roadways" design point narratives for surface routing information.*

Basin R flows (Q5=40.1cfs, Q100=71.4cfs) consist of school development improvements; parking lots, streets, rooftops, recreation fields, landscaping areas, etc. Surface flow will most likely be picked up with at-grade and sump inlets and would then be conveyed via underground piping to the outfall location delineated as "*Offsite and Roadways*" pipe 103A, a 30" RCP located at the south end of the basin/site. *Refer to the "Offsite and Roadways" design points 2 & 2A narrative for pipe routing/capacity information.* In the interim condition, a sediment basin shall be constructed at the south end of the basin at the stub location. This will be designed when the Grading and Erosion Control Plan for the site is submitted. Detailed developed drainage information for this basin will be required when the site is developed and a Final Drainage Report is prepared.

Basin UU flows (Q5=7.4cfs, Q100=24.2cfs) consist of park development improvements; parking lots, streets, rooftops, recreation fields, landscaping areas, etc. Surface flow will enter Cowpoke Road via unconcentrated sheet flow and will be routed to two 10' sump inlets west of the Vollmer Road intersection. *Refer to the "Offsite and Roadways" design points 2 & 2A narrative for surface routing information.* Detailed developed drainage information for this basin will be required when the site is developed and a Final Drainage Report is prepared.

Unconcentrated sheet flow and shallow swale flow from basin VV (Q5=1.7cfs, Q100=3.5cfs) and basin WW (Q5=0.6cfs, Q100=1.2cfs) enters Black Forest Road from the rear of the lots, conveyed via side lot swales and overland flow until intercepted by street curb and gutter on the east side of the road. *Refer to the "Offsite and Roadways" design point narratives for surface routing information.*

The future extension of Admiral Way and Early Sunset Trail within Basin A and Basin II, respectively, into off-site Basin OS-1, should be designed to limit an increase in developed flow into the Forest Meadows storm sewer system. If additional flow is added, the Forest Meadows storm sewer system should be analyzed to limit adverse impacts to the Forest Meadows subdivision.

Design Point Flows
Design Points 1 & 1A (DP1 & DP1A) flows (Q5=30.5cfs, Q100=63.9cfs) are generated by basins A (Q5=8.3cfs, Q100=17.3cfs), basin B (Q5=6.4cfs, Q100=13.4cfs), basin C (Q5=4.6cfs, Q100=9.7cfs), basin D (Q5=3.3cfs, Q100=7.0cfs), basin E (Q5=2.1cfs, Q100=4.5cfs), basin F (Q5=3.0cfs, Q100=6.3cfs), basin G (Q5=3.9cfs, Q100=8.2cfs) and basin H (Q5=3.1cfs, Q100=6.5cfs).

Basin Runoff Description
Basins A-H consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot

intercepted by street curb and gutter. An allowance for a street extension to the north in basin A has been made. The development to the north will not be allowed to convey surface flow into the Forest Meadows development. It is the responsibility of the developer of that land to pick up and adequate convey runoff to another location. Basins A-H flows combine and are conveyed to DP1 & DP1A via type 5 curb and gutter. *Refer to Area 1 Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 10' D-10-R sump inlets intercept (Q5=30.5cfs, Q100=63.9cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the east and proceed to design points 2 & 2A (DP2 & DP2A).

Pipe Routing/Pipe Capacity
The combined flows via two 24" RCP's (pipes 100 & 101) are then conveyed easterly towards design point 2 (DP2), via a 48" RCP, pipe 102, in Skywood place. The flow in pipes 100 and 101 is Q5=15.2cfs and Q100=31.9cfs in each with a full flow capacity of 36.5 cfs assuming a 2.6% slope. The total flow in pipe 102 is Q5=30.5cfs and Q100=63.9cfs with a full flow capacity of 129.9cfs assuming a 0.8% slope.

Design Point Flows
Design Points 2 & 2A (DP2 & DP2A) flows (Q5=26.5cfs, Q100=55.9cfs) are generated by basins basin I (Q5=2.8cfs, Q100=5.9cfs), basin J (Q5=3.2cfs, Q100=6.8cfs), basin K (Q5=5.1cfs, Q100=10.6cfs), basin L (Q5=3.4cfs, Q100=7.0cfs), basin M (Q5=2.0cfs, Q100=4.2cfs), basin N (Q5=3.5cfs, Q100=7.4cfs), basin O (Q5=3.6cfs, Q100=7.6cfs), basin P (Q5=3.7cfs, Q100=7.8cfs) and basin Q (Q5=1.0cfs, Q100=2.6cfs).

Basin Runoff Description
Basins I-Q consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins I-Q flows combine and are conveyed to DP2 & DP2A via type 5 curb and gutter. *Refer to Area 1 Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Flow conveyed in the cross pan along Canary Circle at Skywood Place is (Q5=5.4cfs, Q100=11.2cfs). Two 8' D-10-R sump inlets intercept (Q5=26.5cfs, Q100=55.9cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the south and proceed to Cowpoke Road.

Pipe Routing/Pipe Capacity
The flows are then conveyed via 30" RCP's (pipes 103 and 104) into a manhole combining with pipe 102 flow, then towards Cowpoke Road via pipe 105, a 48" RCP in Canary Circle. *Refer to the "Offsite and Roadways" design point narratives for pipe routing information.* The flow in pipes 103 and 104 is Q5=13.3cfs and Q100=28.0cfs in each with a full flow capacity of 66.1cfs assuming a 2.6% slope. The total flow in pipe 105 is Q5=52.5cfs and Q100=110.3cfs with a full flow capacity of 105.0cfs assuming a 0.5% slope.

Design Point Flows
Design Point 3 (DP3) flows (Q5=34.0cfs, Q100=84.0cfs) are generated by MDDP basin OS-1.

Basin Runoff Description

The "MDDP OS-1" basin refers to basin "OS-1" in the report prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan" dated June 2004. The MDDP cited that historic flows of Q5=65cfs and Q100=162cfs would be maintained in the future as discharge from a future detention facility "Alternative Site C" as outlined in the Sand Creek DBPS. Per the MDDP, it was inferred that the entire watershed would be transported to the future detention facility outfalling into our development (through our basin BB). ESI believes that a portion of this (50%) will actually be routed through Area 1 with the remainder being transported to our site via a roadside ditch on the west side of Vollmer Road to be picked up in a proposed system as described in the section below "Offsite and Roadways" within the Design Point 1 narrative. We have come to this decision based on the review of the existing topographic drainage patterns north of our development and from a report prepared by Law and Mariotti Consultants titled "Preliminary/Final Drainage Report for Highland Park Filing No. 2, July 2000, revised June 2002. A copy of said report elements pertaining to this site has been included with this report submittal per the request of City Engineering.

Surface Routing

On the north edge of the Forest Meadows site, along basins A, S, BB, II and PP, there is a berm which for the most part prevents flow from entering the site, with the exception of a few locations along said line which seem to allow some surface runoff to enter. The majority of the existing flows from basin MDDP OS-1 do not enter the site because of the existing aforementioned berm. Also, there is an existing large pit which collects this surface flow. The current owner (TST Construction) has verbally agreed to allow the berm and perimeter swales to pick up and redirect surface flows to collection points as described below. (See top of page 6). ESI and Morley Companies respectfully requests that a letter from TST Construction to this effect be provided to City Engineering prior to overlot grading north of Area 1. In the interim condition (until the MDDP OS-1 basin is developed), swales will be constructed along the northern boundary of Area 1 routing overland flows to a collection point (a depressed area which will be the confluence of the perimeter swales) where a proposed 36" RCP and flared end section will be constructed. ESI and Morley Companies are working with the owner of said land to determine the exact location of the swales and collection point, onsite or offsite.

Clogging Statement

Clogging is not anticipated at the entrance to the 36" RCP due to the large pipe size and flared end section. It is the responsibility of the Woodmen Heights Metropolitan District to ensure the inlet is clean of debris. At the time of detention pond construction, a trash rack is likely to be incorporated into the outlet structure design. An emergency overflow swale will be required within a drainage tract (*see Area 1 map*). The tract shall be graded to provide a trapezoidal channel with an 8' minimum bottom width, 3:1 side slopes, 3.0' minimum depth and a minimum slope of 2%. The capacity of which will be the 100 yr overflow value 243.9cfs with a freeboard value of ~1.0'. *Refer to Hydraulic Calculations in the appendix for computations.* Surface maintenance for the drainage tract shall be provided by the Woodmen Heights Metropolitan District.

Pipe Routing/Pipe Capacity

The intercepted surface flows from basin MDDP OS-1 (Q5=34.0cfs, Q100=84.0cfs) are conveyed southerly to Breezewood Circle through a tract via pipe 106, a 36" RCP, to Breezewood Circle. Flows are then conveyed via pipe 106 southerly to Calthea Way, intersecting with pipe 109 (*described below*). The full flow capacity of pipe 106 is 73.9cfs assuming a 1.2% slope.

Design Point Flows

Design Points 4 & 4A (DP4 & DP4A) flows (Q5=24.7cfs, Q100=53.3cfs) are generated by basins II (Q5=7.1cfs, Q100=14.9cfs), basin JJ (Q5=4.4cfs, Q100=9.1cfs), basin KK (Q5=2.4cfs, Q100=5.1cfs), basin LL (Q5=4.1cfs, Q100=8.6cfs), basin MM (Q5=1.8cfs, Q100=4.7cfs), basin NN (Q5=2.9cfs, Q100=6.0cfs), basin OO (Q5=3.2cfs, Q100=6.6cfs), basin PP (Q5=5.1cfs, Q100=11.3cfs), basin QQ (Q5=2.4cfs, Q100=5.0cfs) and basin RR (Q5=2.4cfs, Q100=5.1cfs)

Basin Runoff Description
Basins II-RR consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. An allowance for a street extension to the north in basin II has been made. The development to the north will not be allowed to convey surface flow into the Forest Meadows development. It is the responsibility of the developer of that land to pick up and adequate convey runoff to another location. Basins II-RR flows combine and are conveyed to DP4 & DP4A via type 5 curb and gutter. *Refer to "Area 1" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 6' D-10-R sump inlets intercept (Q5=24.7cfs, Q100=53.3cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the west and proceed into Breezewood Circle.

Pipe Routing/Pipe Capacity
The flows are then conveyed via 30" RCP's (pipes 107 and 108) into a manhole, then towards Breezewood Circle via pipe 109, a 36" RCP in Calthea Way. Flow in pipe 109 combines with pipe 106 at the intersection of Calthea Way and Breezewood Circle. Flow then proceeds southerly via pipe 110, a 48" RCP, towards design point 5. The flow in pipes 107 and 108 is Q5=12.4cfs and Q100=26.6cfs in each with a full flow capacity of 83.4cfs assuming a 4.1% slope. The flow in pipe 109 is Q5=24.7cfs and Q100=53.3cfs with a full flow capacity of 61.1cfs assuming a 0.8% slope. The flow in pipe 110 is Q5=58.7cfs and Q100=137.3cfs with a full flow capacity of 181.6cfs assuming a 1.6% slope.

Design Point Flows
Design Points 5 & 5A (DP5 & DP5A) flows (Q5=50.7cfs, Q100=106.6cfs) are generated by basins S (Q5=8.2cfs, Q100=17.2cfs), basin T (Q5=3.9cfs, Q100=8.2cfs), basin U (Q5=2.8cfs, Q100=5.8cfs), basin V (Q5=0.9cfs, Q100=2.3cfs), basin W (Q5=2.3cfs, Q100=4.7cfs), basin X (Q5=4.7cfs, Q100=9.9cfs), basin Y (Q5=8.8cfs, Q100=18.4cfs), basin Z (Q5=2.4cfs, Q100=5.0cfs), basin AA (Q5=3.5cfs, Q100=7.3cfs), basin BB (Q5=5.6cfs, Q100=11.8cfs), basin CC (Q5=4.6cfs, Q100=9.6cfs) and basin DD (Q5=2.3cfs, Q100=4.9cfs), basin EE (Q5=1.0cfs, Q100=2.1cfs), basin FF (Q5=4.5cfs, Q100=9.3cfs), basin GG (Q5=1.6cfs, Q100=3.3cfs) and basin HH (Q5=5.7cfs, Q100=12.0cfs),

Basin Runoff Description
Basins S-HH consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins S-HH flows combine and are conveyed to DP5 & DP5A via type 5 curb and gutter. *Refer to "Area 1" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 20' D-10-R sump inlets intercept (Q5=50.7cfs, Q100=106.6cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and proceed to Vollmer Road within a drainage and utility tract (*see Area 1 map*). The tract shall be graded to provide a trapezoidal channel with an 8' minimum bottom width, 3:1 side slopes, 3.0' minimum depth and a minimum slope of 2%. The capacity of which will be the 100 yr overflow value 243.9cfs with a freeboard value of ~1.0'. *Refer to Hydraulic Calculations in the appendix for computations.* Surface maintenance for the drainage tract shall be provided by the Woodmen Heights Metropolitan District.
Pipe Routing/Pipe Capacity
The intercepted flow at DP5 is conveyed via a 18" RCP (pipe 111) into a manhole combining with flows from pipe 110, then southerly via pipe 112, a 54" RCP, to DP5A. Flows then combine at DP5A and proceed southerly via pipe 113, a 54" RCP, towards Vollmer Road. *Refer to the "Offsite and Roadways" design point narratives for pipe routing information.* The flow in pipe 111 is Q5=25.3cfs and Q100=53.3cfs with a full flow capacity of 36.9cfs assuming a 12.4% slope. The flow in pipe 112 is Q5=84.1cfs and Q100=190.6cfs with a full flow capacity of 371.6cfs assuming a 3.6% slope. The flow in pipe 113 is Q5=109.4cfs and Q100=243.9cfs with a full flow capacity of 361.2cfs assuming a 3.4% slope. Routing of DP3 flows (MDDP OS-1) were added directly to those of Area 1 (i.e. – not routed) since a time of concentration cannot be determined without knowing the future detention pond outflow hydrograph. This yields a conservative discharge value for the Forest Meadows storm drain system design.

AREA 2 (Filing No. 1)
This area has been divided into 29 developed drainage basins which are described by each design point below. Off-site flows from basin MDDP OS-B enter the site through a tract in basin C. No off-site flows shall enter the Forest Meadows development via overland flow. *Refer to the Design Point 1 narrative for further discussion.*

Unconcentrated sheet flow and shallow swale flow from basin CC (Q5=3.6cfs, Q100=7.5cfs) enters Offsite and Roadways basin FF from the rear of the lots. *Refer to the "Offsite and Roadways" design point 8 narrative for surface routing information.*

Design Point Flows
Design Point 1 (DP1) flows (Q5=41.0cfs, Q100=96.0cfs) are generated by MDDP basin OS-B.

Basin Runoff Description
The "MDDP OS-B" basin refers to a 100.9 acre area designated as "OS-B" in the report prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan" dated June 2004. The MDDP cited that historic flows of Q5=41.0cfs and Q100=96.0cfs would be maintained in the future as discharge from a future detention facility. Per the MDDP, it was inferred that the entire watershed would be transported to the future detention facility ultimately outfalling into the Woodmen Heights development.

Surface Routing
On the west edge of Black Forest Road, the roadway embankment prevents flow from entering the Woodmen Heights site. In the interim condition (until the MDDP OS-B basin is developed), flow from this basin shall be maintained via existing roadway culverts (*see "Offsite and Roadways" Map*). The existing flow patterns shall be maintained as well.

Clogging Statement
Clogging is not anticipated at the entrance to the 54" RCP due to the large pipe size since at the time of detention pond construction, a trash rack is likely to be incorporated into the outlet structure design.

Pipe Routing/Pipe Capacity
In the interim condition, the existing culverts shall convey flow to the site as they have been. Once Black Forest Road is reconstructed, a proposed 54" RCP (pipe 100) and a temporary plug will be constructed just beyond the western edge of Cowpoke Road. The flow in pipe 100 will be Q5=41.0cfs and Q100=96.0cfs with a full flow capacity of 161.4cfs assuming a 0.7% slope.

Design Point Flows
Design Point 1A (DP1A) flows (Q5=11.4cfs, Q100=23.8cfs) are generated by basins A (Q5=4.8cfs, Q100=10.03cfs), basin B (Q5=3.7cfs, Q100=7.8cfs) and 1/2C (Q5=3.7cfs, Q100=7.7cfs).

Design Point 1B (DP1B) flows (Q5=15.5cfs, Q100=32.3cfs) are generated by basins E (Q5=5.1cfs, Q100=10.7cfs), basin F (Q5=2.3cfs, Q100=4.7cfs), basin G (Q5=2.8cfs, Q100=5.8cfs), basin H (Q5=3.7cfs, Q100=7.7cfs) and 1/2I (Q5=3.4cfs, Q100=7.0cfs).

Basin Runoff Description
Basins A-C, E-I consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins A-C, E-I flows combine and are conveyed to DP1A & DP1B via type 5 curb and gutter. Initial storm flows necessitated placing inlets at this location to maintain the use of type 5 curb and gutter. *Refer to "Area 2" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. The DP1A 18' D-10-R at-grade inlet on the west side of Chasewood Loop intercepts (Q5=7.5cfs, Q100=13.2cfs) while the DP1B 18' D-10-R at-grade inlet on the east side of Chasewood Loop intercepts (Q5=8.8cfs, Q100=17.9cfs). DP1A flowby is Q5=3.9cfs, Q100=10.6cfs while the DP1B flowby is Q5=6.7cfs, Q100=14.4cfs. This flow proceeds southerly and easterly in Chasewood Loop towards design points 4 & 4A.

Clogging Statement
In the event of clogging or inlet failure, the runoff will proceed southerly in Chasewood Loop towards design points 2 & 2A (DP2 & DP2A).

Pipe Routing/Pipe Capacity
The intercepted flow at DP1A and DP1B is conveyed via two a 18" RCP's (pipes 100A & 100B) into a manhole, then southerly via pipe 100C, a 24" RCP. These flows combine with those from pipe 100 and proceed southerly towards design points 2 & 2A (DP2 & DP2A) in a 54" RCP (pipe 101). The flow in pipes 100A & 100B is Q5=7.5cfs and Q100=17.9cfs in each with a full flow capacity of 23.0cfs assuming a 4.8% slope. The flow in pipe 100C is Q5=14.2cfs and Q100=31.0cfs with a full flow capacity of 56.8cfs assuming a 6.3% slope. The flow in pipe 101 is Q5=55.2cfs and Q100=127.0cfs with a full flow capacity of 132.4cfs assuming a 0.5% slope.

Design Point Flows
Design Points 2 & 2A (DP2 & DP2A) flows (Q5=25.4cfs, Q100=55.5cfs) are generated by basins A (Q5=4.8cfs, Q100=10.03cfs), basin B (Q5=3.7cfs, Q100=7.8cfs), basin C (Q5=7.4cfs, Q100=15.4cfs), basin D (Q5=1.4cfs, Q100=2.9cfs), basin E (Q5=5.1cfs, Q100=10.7cfs), basin F (Q5=2.3cfs, Q100=4.7cfs), basin G (Q5=2.8cfs, Q100=5.8cfs), basin H (Q5=3.7cfs, Q100=7.7cfs), basin I (Q5=6.7cfs, Q100=13.9cfs), basin J (Q5=3.9cfs, Q100=8.2cfs) and basin K (Q5=6.7cfs, Q100=14.0cfs).

Basin Runoff Description
Basins C, D, I-K consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins C, D, I-K flows combine and are conveyed to DP2 & DP2A via type 5 curb and gutter. The alleys convey surface flow like the other roadway classifications except within a narrower section. *Refer to "Area 2" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 8' D-10-R sump inlets intercept (Q5=25.4cfs, Q100=55.5cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will Overtop the high point to the east and proceed to design points 6 & 6A (DP6 & DP6A).

Pipe Routing/Pipe Capacity
The flows are then conveyed via 30" RCP's (pipes 102 and 103) into a manhole combining with flow from pipe 101, then towards design points 6 & 6A via pipe 104, a 72" RCP in Chasewood Loop. The flow in pipes 102 and 103 is Q5=12.7cfs and Q100=27.7cfs in each with a full flow capacity of 40.1cfs assuming a 3.1% slope. The flow in pipe 104 is Q5=80.5cfs and Q100=182.5cfs with a full flow capacity of 430.76cfs assuming a 1.0% slope.

Design Point Flows
Design Point 3 (DP3) flows (Q5=21.7cfs, Q100=45.9cfs) are generated by basins L (Q5=7.2cfs, Q100=15.1cfs), basin M (Q5=5.2cfs, Q100=10.8cfs), basin N (Q5=4.8cfs, Q100=10.0cfs), basin O (Q5=2.2cfs, Q100=4.7cfs), basin P (Q5=1.2cfs, Q100=2.6cfs) and basin Q (Q5=2.6cfs, Q100=6.1cfs)

Basin Runoff Description
Basins L-Q consists of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basin L-Q flows combine and are conveyed to DP3 via type 5 curb and gutter. *Refer to "Area 2" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. One 20' D-10-R at-grade inlet intercepts (Q5=9.6cfs, Q100=9.6cfs). Initial storm flows necessitated placing an inlet at this location to maintain the use of type 5 curb and gutter. DP3 flowby is Q5=12.1cfs, Q100=36.3cfs. This flow proceeds southerly and easterly in Dry Needle Place and Sierra Meadows Drive towards design point 4

Clogging Statement
In the event of clogging or inlet failure, the runoff will proceed southerly and easterly towards design point 4 (DP4) in Sierra Meadows Drive.

Pipe Routing/Pipe Capacity
Flow from design point 3 is then conveyed southerly and easterly via pipe 105, an 18" RCP, towards design point 4 in Sierra Meadows Drive. The flow in pipe 105 is Q5=9.6cfs and Q100=9.6cfs with a full flow capacity of 9.0cfs assuming a 0.7% slope.

Design Point Flows
Design Point 4 (DP4) flows (Q5=16.7cfs, Q100=45.8cfs) are generated by basin R (Q5=5.1cfs, Q100=10.7cfs) along with flowby from design point 3 (DP3) (Q5=12.1cfs, Q100=36.3cfs).

Basin Runoff Description
DP3 basins and basin R consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins R flows combine with DP3 flowby and is conveyed to via type 5 curb and gutter. *Refer to "Area 2" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. One 12' D-10-R at-grade inlet intercepts (Q5=5.9cfs, Q100=5.9cfs). Initial storm flows necessitated placing an inlet at this location to maintain the use of type 5 curb and gutter. DP4 flowby is Q5=10.8cfs, Q100=39.9cfs. This flow proceeds easterly in Sierra Meadows Drive towards design point 5 in Chasewood Loop.

Clogging Statement
In the event of clogging or inlet failure, the runoff will proceed easterly towards design point 5 (DP5) in Sierra Meadows Drive.

Pipe Routing/Pipe Capacity
The flows are then conveyed via a 18" RCP (pipe 106) combining with flow from pipe 105, then towards design points 5 & 5A via pipe 107, a 24" RCP in Sierra Meadows Drive. The flow in pipe 106 is Q5=5.9cfs and Q100=5.9cfs with a full flow capacity of 14.2cfs assuming a 1.8% slope. The flow in pipe 107 is Q5=15.3cfs and Q100=15.3cfs with a full flow capacity of 33.1cfs assuming a 2.1% slope.

Design Point Flows
Design Points 5 & 5A (DP5 & DP5A) flows (Q5=35.2cfs, Q100=83.9cfs) are generated by basins S (Q5=3.6cfs, Q100=7.4cfs), basin T (Q5=2.4cfs, Q100=4.9cfs), basin U (Q5=5.6cfs, Q100=11.8cfs), basin V (Q5=3.1cfs, Q100=6.5cfs) and AA split flows (Q5=3.5cfs, Q100=7.4cfs) along with flowby from design point 4 (DP4) (Q5=10.8cfs, Q100=39.9cfs).

Basin Runoff Description
DP4 basins and basins S-V and AA consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins S-V and AA split flows combine and are conveyed to DP5 & DP5A via type 5 curb and gutter. Street capacity calculations reveal the potential for crown overtopping by 0.02'+/-. Due to construction roadway tolerances being greater than this amount, it is impossible to actually quantify what would crossover. For this report, it was therefore assumed that there would be crossover, which is reflected by splitting the surface flows at this location. *Refer to "Area 2" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 12' D-10-R at-grade inlets intercept (Q5=5.9cfs, Q100=17.3cfs) each. DP5 & DP5A flowby is Q5=11.7cfs, Q100=24.6cfs each. This flow proceeds southerly in Chasewood Loop towards design points 6 & 6A.

Clogging Statement
In the event of clogging or inlet failure, the runoff will proceed towards design points 6 & 6A.

Pipe Routing/Pipe Capacity
The flows are then conveyed via 18" RCP's (pipes 108 and 109) into a manhole combining with flow from pipe 107, then towards design points 6 & 6A via pipe 109A, a 36" RCP in Chasewood Loop. The flow in pipes 108 and 109 is Q5=5.9cfs and Q100=17.3cfs in each with a full flow capacity of 19.7cfs assuming a 3.5% slope. The flow in pipe 109A is Q5=26.7cfs and Q100=49.6cfs with a full flow capacity of 61.8cfs assuming a 2.3% slope.

Design Point Flows
Design Points 6 & 6A (DP6 & DP6A) flows (Q5=33.7cfs, Q100=72.0cfs) are generated by basins W (Q5=3.6cfs, Q100=9.0cfs), basin X (Q5=2.8cfs, Q100=5.9cfs), basin Y (Q5=2.9cfs, Q100=6.0cfs), basin Z (Q5=0.9cfs, Q100=1.8cfs) and basin BB (Q5=4.1cfs, Q100=8.5cfs) along with flowby from design points 5 & 5A (DP5 & DP5A).

Basin Runoff Description
Basins W-Z and BB consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins W-Z and BB flows combine and are conveyed to DP6 & DP6A via type 5 curb and gutter. *Refer to "Area 2" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 12' D-10-R sump inlets intercept (Q5=33.7cfs, Q100=72.0cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and proceed to Vollmer Road within a drainage and utility tract. The flow will then proceed southerly to the low point in Vollmer Road (design point 8), ultimately being routed to Pond No. 6 via underground piping. (*see Area 2 and Offsite and Roadways map*). The tract shall be graded to provide a trapezoidal channel with an 8' minimum bottom width, 3:1 side slopes, 3.3' minimum depth and a minimum slope of 2%. The capacity of which will be the 100 yr overflow value 304.1cfs with a freeboard value of ~1.0'. *Refer to Hydraulic Calculations in the appendix for computations.*

Pipe Routing/Pipe Capacity
The intercepted flow at DP6 is conveyed via a 30" RCP (pipe 110) into a manhole combining with flows from pipes 104 and 109A, then southeasterly via pipe 111, a 84" RCP, to DP6A. Flows then combine at DP6A and proceed southeasterly via pipe 112, a 84" RCP, towards Vollmer Road. *Refer to the "Offsite and Roadways" design point narratives for pipe routing information.* The flow in pipe 110 is Q5=16.8cfs and Q100=36.0cfs with a full flow capacity of 184.1cfs assuming a 20.1% slope. The flow in pipe 111 is Q5=124.1cfs and Q100=212.6cfs with a full flow capacity of 479.1cfs assuming a 0.6% slope. The flow in pipe 112 is Q5=140.9cfs and Q100=248.6cfs with a full flow capacity of 454.3cfs assuming a 0.5% slope. Routing of DP1 flows (MDDP OS-A) were added directly to those of Area 2 (i.e. – not routed) since a time of concentration cannot be determined without knowing the future detention pond outflow hydrograph. This yields a conservative discharge value for the Forest Meadows storm drain system design.

AREA 3 (Filing No. 1 & No. 4)
This area has been divided into 28 developed drainage basins which are described by each design point. Off-site flows from basin MDDP OS-2 enter the site from the north via piping under Cowpoke Road proceeding southerly towards design points 3 & 3A. No off-site flows shall enter the Forest Meadows development via overland flow. *Refer to the Design Point 2 narrative for further discussion.*

Unconcentrated sheet flow and shallow swale flow from basins A (Q5=1.8cfs, Q100=3.9cfs) enters Vollmer Road, basin AA (Q5=3.9cfs, Q100=8.1cfs) enters Forest Meadows Avenue and basin BB (Q5=1.8cfs, Q100=4.7cfs) enters "Offsite and Roadways" basin GG from the rear of the lots, conveyed via side lot swales and overland flow until intercepted by street curb and gutter. *Refer to the "Offsite and Roadways" design point narratives for surface routing information.*

Design Point Flows
Design Point 1 (DP1) flows (identified as 1 West in the Surface Routing Summary in the appendix). (Q5=13.8cfs, Q100=28.6cfs) are generated by basins C (Q5=3.8cfs, Q100=7.9cfs) and basin D (Q5=10.5cfs, Q100=21.7cfs).

Basin Runoff Description
Basins C & D consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basin C & D flows combine and are conveyed to DP1 via type 5 curb and gutter. Initial storm flows necessitated placing an inlet at this location to maintain the use of type 5 curb and gutter. *Refer to "Area 3" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. The DP1 16' D-10-R at-grade inlet intercepts (Q5=7.9cfs, Q100=16.6cfs). DP1 flowby is Q5=5.9cfs, Q100=12.0cfs. This flow proceeds southerly and easterly in Red Cardinal Loop towards design points 1A & 1B

Clogging Statement
In the event of clogging or inlet failure, the runoff will proceed towards design points 1A & 1B (DP1A & DP1B).

Pipe Routing/Pipe Capacity
The collected flows are then conveyed via an 18" RCP (pipe 100) southerly towards design points 1A & 1B (DP1A & DP1B) in Red Cardinal Loop. The flow in pipe 100 is Q5=7.9cfs and Q100=16.6cfs with a full flow capacity of 13.4cfs assuming a 1.6% slope.

Design Point Flows
Design Point 1A & 1B (DP1A & DP1B) flows (Q5=18.4cfs, Q100=38.5cfs) are generated by DP1 flowby from basins C & D (Q5=5.9cfs, Q100=12.0cfs), basin E (Q5=6.8cfs, Q100=14.0cfs) and basin F (Q5=7.9cfs, Q100=16.5cfs).

Basin Runoff Description
DP1 flowby basins and basins E & F consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales

("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins E & F flows combine and are conveyed to DP1A & DP1B via type 5 curb and gutter. The alleys convey surface flow like the other roadway classifications except within a narrower section. *Refer to "Area 3" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 4' D-10-R sump inlets intercept (Q5=18.4cfs, Q100=38.5cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point at the intersection of Red Cardinal Loop and Morning Dew Road to the south and proceed southerly to design points 5 and 5A (DP5 and DP5A).

Pipe Routing/Pipe Capacity
The flows are then conveyed via 30" RCP's (pipes 101 and 102) into a manhole, then south and westerly towards Red Cardinal Loop via pipe 103, a 36" RCP in Morning Dew Road. Flow in pipe 103 combines with pipe 100 and proceeds in pipe 104, a 36" RCP toward design points 5 & 5A The flow in pipes 101 and 102 is Q5=9.2cfs, Q100=19.2cfs in each with a full flow capacity of 23.2cfs assuming a 1.1% slope. The flow in pipe 103 is Q5=18.4cfs and Q100=38.5cfs with a full flow capacity of 33.7cfs assuming a 0.5% slope. The flow in pipe 104 is Q5=26.3cfs and Q100=55.1cfs with a full flow capacity of 66.0cfs assuming a 1.0% slope.

Design Point Flows
Design Point 2 (DP2) flows (Q5=34.1cfs, Q100=69.1cfs) are generated by flows from Offsite and Roadways design points 11 & 11A (DP11 & 11A). *Refer to "Offsite & Roadways" design points 11 & 11A narratives for additional information.*

Pipe Routing/Pipe Capacity
The flows from Offsite and Roadway pipe 123 are conveyed southerly via a 36" RCP (pipe 105) in Smokewood Drive. The flow in pipe 105 is Q5=34.1cfs and Q100=69.1cfs with a full flow capacity of 113.3cfs assuming a 2.9% slope.

Design Point Flows
Design Points 3 & 3A (DP3 & DP3A) flows (Q5=26.5cfs, Q100=56.5cfs) are generated by basins I (Q5=4.8cfs, Q100=10.0cfs), basin J (Q5=5.1cfs, Q100=10.7cfs), basin K (Q5=3.9cfs, Q100=8.2cfs), basin L (Q5=4.9cfs, Q100=10.3cfs), basin M (Q5=3.0cfs, Q100=7.6cfs), basin N (Q5=3.3cfs, Q100=6.8cfs) and basin O (Q5=4.6cfs, Q100=9.6cfs).

Basin Runoff Description
Basins I-O consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins I-O flows combine and are conveyed to DP3 & DP3A via type 5 curb and gutter. *Refer to "Area 3" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 8' D-10-R sump inlets intercept (Q5=26.5cfs, Q100=56.5cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point in at the intersection of Smokewood Drive and Pearly Heath Road to the south and proceed west towards Red Cardinal Loop to

design points 5 and 5A (DP5 and DP5A).

Pipe Routing/Pipe Capacity
The flows are then conveyed via 24" RCP's (pipes 106 and 107) into a manhole, then south towards Pearly Heath Road via pipe 108, a 48" RCP in Smokewood Drive. Flow in pipe 103 combines with pipe 108 and proceeds towards Pearly Heath Road. The flow in pipes 106 and 107 is Q5=13.2cfs and Q100=28.3cfs in each with a full flow capacity of 22.5cfs assuming a 1.0% slope. The flow in pipe 108 is Q5=54.9cfs and Q100=114.2cfs with a full flow capacity of 215.1cfs assuming a 2.2% slope.

Design Point Flows
Design Points 4 & 4A (DP4 & DP4A) flows (Q5=17.0cfs, Q100=35.5cfs) are generated by basins P (Q5=5.5cfs, Q100=11.5cfs), basin Q (Q5=1.8cfs, Q100=3.7cfs), basin R (Q5=0.7cfs, Q100=1.4cfs), basin S (Q5=6.6cfs, Q100=13.7cfs) and 2/3 basin T (Q5=4.7cfs, Q100=9.9cfs).

Basin Runoff Description
Basins P, Q, R and 2/3T consist of single-family residential development, streets, rooftops and landscaping areas. It has been assumed that 2/3 of basin T's flow is directed westerly onto Pearly Heath Road towards design points 4 & 4A while the remaining flow continues southerly in Red Cardinal Loop ultimately routing to design points 5 & 5A.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basin P-T flows combine and are conveyed to DP4 & DP4A via type 5 curb and gutter. *Refer to "Area 3" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 4' D-10-R sump inlets intercept (Q5=17.0cfs, Q100=35.5cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the high point at the intersection of Pearly Heath Road and Smokewood Drive and proceed westerly towards Red Cardinal Loop.

Pipe Routing/Pipe Capacity
The flows are then conveyed via 30" RCP's (pipes 109 and 110) into a manhole, then south and westerly towards Red Cardinal Loop via pipe 111, a 30" RCP in Pearly Heath Road. Flow in pipe 111 combines with pipe 108, a 48" RCP, and proceeds towards Red Cardinal Loop via pipe 112, a 48" RCP. The flow in pipes 109 and 110 is Q5=8.5cfs, Q100=17.8cfs in each with a full flow capacity of 32.5cfs assuming a 2.1% slope. The flow in pipe 111 is Q5=17.0cfs and Q100=35.5cfs with a full flow capacity of 18.5cfs assuming a 0.7% slope. The flow in pipe 112 is Q5=70.2cfs and Q100=146.2cfs with a full flow capacity of 233.2cfs assuming a 2.6% slope.

Design Point Flows
Design Points 5 & 5A (DP5 & DP5A) flows (Q5=40.3cfs, Q100=86.1cfs) are generated by basins B (Q5=8.9cfs, Q100=18.7cfs), basin G (Q5=7.8cfs, Q100=16.2cfs), 1/3 basin T (Q5=2.4cfs, Q100=5.0cfs), basin U (Q5=2.6cfs, Q100=5.4cfs), basin V (Q5=2.8cfs, Q100=5.8cfs), basin W (Q5=6.3cfs, Q100=13.2cfs), basin X (Q5=5.6cfs, Q100=11.7cfs) basin Y (Q5=9.2cfs, Q100=19.2cfs) and basin Z (Q5=1.8cfs, Q100=3.8cfs).

Basin Runoff Description
Basins B, G, 1/3T and U-Z consist of single-family residential development, streets, rooftops and landscaping areas. It has been assumed that 2/3 of basin T's flow is directed westerly onto Pearly Heath

Road towards design points 4 & 4A while the remaining flow continues southerly in Red Cardinal Loop ultimately routing to design points 5 & 5A.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basin B, G, 1/3T and U-Z flows combine and are conveyed to DP5 & DP5A via type 5 curb and gutter. The alleys convey surface flow like the other roadway classifications except within a narrower section. *Refer to "Area 3" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 14' D-10-R sump inlets intercept (Q5=38.9cfs, Q100=81.3cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and proceed to Forest Meadows Avenue within a drainage tract (*see Area 3 map*). The tract shall be graded to provide a trapezoidal channel with an 8' minimum bottom width, 3:1 side slopes, 3.2' minimum depth and a minimum slope of 2%. The capacity of which will be the 100 yr overflow value 267.2cfs with a freeboard value of ~1.0'. *Refer to Hydraulic Calculations in the appendix for computations.* Surface maintenance for the drainage tract shall be provided by the Woodmen Heights Metropolitan District.

Pipe Routing/Pipe Capacity
Flow in pipes 111 and 108 combine and proceed west combining with flow from pipe 104. These flows are conveyed via a 54" RCP (pipe 113) south towards design points 5 & 5A (DP5 & DP5A). The intercepted flow at DP5 is conveyed via a 30" RCP (pipe 114) into a manhole. The intercepted flow at DP5A is conveyed via a 30" RCP (pipe 115) into a manhole combining with flow from pipe 114. Flows then proceed to another manhole to the west and combine with flows from pipe 113, a 54" RCP. The combined flows then proceed southwesterly via pipe 117, a 66" RCP within a drainage tract (*see Area 3 map*). *Refer to the "Offsite and Roadways" design point narratives for pipe routing information.* The flow in pipe 113 is Q5=94.2cfs and Q100=196.7cfs with a full flow capacity of 240.3cfs assuming a 1.5% slope. The flow in pipe 114 is Q5=19.4cfs and Q100=40.6cfs with a full flow capacity of 86.4cfs assuming a 4.4% slope. The flow in pipe 115 is Q5=19.4cfs and Q100=40.6cfs with a full flow capacity of 122.8cfs assuming a 9.0% slope. The flow in pipe 116 is Q5=38.9cfs and Q100=81.3cfs with a full flow capacity of 176.2cfs assuming a 7.0% slope. The flow in pipe 117 is Q5=125.7cfs and Q100=262.4cfs with a full flow capacity of 240.0cfs assuming a 0.5% slope.

AREA 4 (Filing No. 4)
This area has been divided into 25 developed drainage basins which are described by each design point. Off-site flows from basin MDDP OS-2 enter the site from the north via piping under Cowpoke Road proceeding southerly in Logwood Road to Dry Willow Way. No off-site flows shall enter the Forest Meadows development via overland flow. *Refer to the "Offsite and Roadways" design point 12 (DP12) narratives for further information.*

Unconcentrated sheet flow and shallow swale flow from basin W (Q5=2.0cfs, Q100=4.2cfs), basin X (Q5=5.0cfs, Q100=10.5cfs) and basin Y (Q5=1.3cfs, Q100=2.7cfs) enters Forest Meadows Avenue from the rear of the lots, conveyed via side lot swales and overland flow until intercepted by street curb and gutter on the west and north sides of the road. *Refer to the "Offsite and Roadways" design point 13 narrative for surface routing information.*

Design Point Flows
Design Point 1 (DP1) flows (Q5=108.0cfs, Q100=305.0cfs) are generated by MDDP basin OS-2.

Basin Runoff Description
Refer to the "Offsite and Roadways" design point 12 (DP12) narratives for basin runoff information.

Surface Routing
Refer to the "Offsite and Roadways" design point 12 (DP12) narratives for surface routing information.

Clogging Statement
Clogging is not anticipated at the entrance to the 66" RCP due to the large pipe size and flared end section. At the time of future development, a trash rack is likely to be incorporated into the outlet structure design.

Pipe Routing/Pipe Capacity
The collected flow from MDDP OS-2 is conveyed via a 66" RCP (pipe 100) easterly in Dry Willow Way from Logwood Road into a manhole combining with flow from pipe 101. The flow in pipe 100 is Q5=108.0cfs and Q100=305.0cfs with a full flow capacity of 322.5cfs assuming a 0.9% slope.

Design Point Flows
Design Point 2 & 2A (DP2 & DP2A) flows (Q5=25.8cfs, Q100=56.6cfs) are generated by basins A (Q5=3.1cfs, Q100=9.4cfs), basin B (Q5=2.4cfs, Q100=5.0cfs), basin C (Q5=3.6cfs, Q100=7.6cfs), basin D (Q5=5.8cfs, Q100=12.0cfs), basin E (Q5=5.3cfs, Q100=11.0cfs), basin F (Q5=4.2cfs, Q100=8.7cfs), basin G (Q5=3.6cfs, Q100=7.5cfs) and basin H (Q5=4.7cfs, Q100=9.7cfs).

Basin Runoff Description
Basins A-H consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins A-H flows combine and are conveyed to DP2 & DP2A via type 5 curb and gutter. The alleys convey surface flow like the other roadway classifications except within a narrower section. *Refer to Area 4 Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 8' D-10-R sump inlets intercept (Q5=25.8cfs, Q100=56.6cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and proceed to Wagonwood Terrace within a drainage and utility tract (*see Area 4 map*). The tract shall be graded to provide a trapezoidal channel with an 8' minimum bottom width, 3:1 side slopes, 1.0' minimum depth and a minimum slope of 2%. The capacity of which will be the 100 yr overflow value 56.6cfs with a freeboard value of ~1.0'. *Refer to Hydraulic Calculations in the appendix for computations.* Surface maintenance for the drainage tract shall be provided by the Woodmen Heights Metropolitan District.

Pipe Routing/Pipe Capacity
The flows from DP2 are conveyed via an 18" RCP (pipe 101) to a manhole combining with flows from pipe 100. The combined flows are then conveyed via pipe 102 south to an inlet at DP2A. Flows from pipe 102 then combine with surface flows from DP2A and are then conveyed via a 72" RCP (pipe 103) south towards design point 3 (DP3) in Wagonwood Terrace. The flow in pipe 101 is Q5=12.9cfs and Q100=28.3cfs with a full flow capacity of 11.7cfs assuming a 1.2% slope. The flow in pipe 102 is Q5=120.9cfs and Q100=333.3cfs with a full flow capacity of 874.8cfs assuming a 4.3% slope. The flow in pipe 103 is Q5=133.8cfs and Q100=361.6cfs with a full flow capacity of 468.3cfs assuming a 1.2% slope.

Design Point Flows
Design Point 3 & 3A (DP3 & DP3A) flows (Q5=25.5cfs, Q100=52.5cfs) are generated by basins I (Q5=3.0cfs, Q100=5.7cfs), basin J (Q5=6.9cfs, Q100=14.3cfs), basin K (Q5=3.3cfs, Q100=6.9cfs), basin L (Q5=1.8cfs, Q100=3.7cfs), basin M (Q5=4.1cfs, Q100=8.5cfs), basin N (Q5=3.7cfs, Q100=7.6cfs) and basin O (Q5=5.6cfs, Q100=11.7cfs).

Basin Runoff Description
Basins I-O consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins I-O flows combine and are conveyed to DP3 & DP3A via type 5 curb and gutter. *Refer to "Area 4" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 8' D-10-R sump inlets intercept (Q5=25.5cfs, Q100=52.5cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and proceed to Hardwood Circle within a drainage and utility tract (*see Area 4 map*). The tract shall be graded to provide a trapezoidal channel with an 8' minimum bottom width, 3:1 side slopes, 1.4' minimum depth and a minimum slope of 2%. The capacity of which will be the 100 yr overflow value 109.1cfs with a freeboard value of ~1.0'. *Refer to Hydraulic Calculations in the appendix for computations.* Surface maintenance for the drainage tract shall be provided by the Woodmen Heights Metropolitan District.

Pipe Routing/Pipe Capacity
The collected surface flows from design point 3 (DP3) combine with those from pipe 103 are then conveyed via a 72" RCP (pipe 104) south towards design point 3A (DP3A). The collected surface flows from design point 3A (DP3A) combine with those from pipe 104 are then conveyed via a 72" RCP (pipe 105) south towards design point 4 (DP4) in Hardwood Circle. The flow in pipe 104 is Q5=146.5cfs and Q100=387.9cfs with a full flow capacity of 428.3cfs assuming a 1.0% slope. The flow in pipe 105 is Q5=159.3cfs and Q100=414.1cfs with a full flow capacity of 641.4cfs assuming a 2.3% slope.

Design Point Flows
Design Point 4 & 4A (DP4 & DP4A) flows (Q5=34.9cfs, Q100=72.7cfs) are generated by basins P (Q5=4.9cfs, Q100=10.2cfs), basin Q (Q5=9.5cfs, Q100=19.8cfs), basin R (Q5=6.9cfs, Q100=14.4cfs), basin S (Q5=1.7cfs, Q100=3.5cfs), basin T (Q5=7.5cfs, Q100=15.5cfs), basin U (Q5=2.2cfs, Q100=4.6cfs) and basin V (Q5=5.0cfs, Q100=10.5cfs).

Basin Runoff Description
Basins P-V consist of single-family residential development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins P-V flows combine and are conveyed to DP4 & DP4A via type 5 curb and gutter. *Refer to "Area 4" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 12' D-10-R sump inlets intercept (Q5=34.9cfs, Q100=72.7cfs).

The knuckle in Hardwood Circle has a Q100=19.7cfs. A hydraulic check has been done to ensure that no overtopping will occur into the adjacent properties. *Refer to "Knuckle Calculations" in the Hydraulic Calculations of the appendix for detailed calculations.* A rating curve was used to determine the various depths of the water with varying street grades. It was determined that no water would enter into adjacent properties during the 100 year storm event.

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the west and proceed to Forest Meadows Avenue via Calamint Place (*see Area 4 map*).

Pipe Routing/Pipe Capacity
The collected surface flows from design point 4 (DP4) are conveyed via a 30" RCP (pipe 106) south towards design point 4A (DP4A). The collected surface flows from design point 4A (DP4A) combine with those from pipe 106 are then conveyed via a 36" RCP (pipe 107) west to a manhole combining with flows from pipe 105 in Calamint Place. Flows from pipes 105 and 107 combine and are routed south to Forest Meadows Avenue via a 72" RCP (pipe 108). *Refer to "Offsite and Roadways" Pipe Routing/Pipe Capacity narratives for further routing information.* The flow in pipe 106 is Q5=17.4cfs and Q100=36.3cfs with a full flow capacity of 57.6cfs assuming a 2.0% slope. The flow in pipe 107 is Q5=34.9cfs and Q100=72.7cfs with a full flow capacity of 61.4cfs assuming a 0.9% slope. The flow in pipe 108 is Q5=194.2cfs and Q100=486.8cfs with a full flow capacity of 520.3cfs assuming a 1.5% slope.

OFFSITE and ROADWAYS (Filing No. 1- 4 & Future Filings)
This portion of the site has been divided into 35 developed drainage basins which are described by each design point as follows:

Design Point Flows
Design Point 1 (DP1) flows (Q5=80.6cfs, Q100=195.5cfs) are generated by offsite basins approaching the Woodmen Heights development via a roadside ditch on the northwest side of Vollmer Road. A 48" flared end section collection point will be constructed immediately north of and adjacent to Area 1. Flow will be conveyed via a 48" RCP (pipe 100) towards Cowpoke Road. This flow value was established in the El Paso County "Preliminary/Final Drainage Report for Highland Park Filing No. 2, July 2000, revised June 2002, by Law and Mariotti Consultants, page 9 with a time of concentration value taken from the hydrologic data in the appendix of said report. This data has been included in the appendix in the Hydrologic Calculations section.

Design Point Flows
Design Point 2 & 2A (DP2 & DP2A) flows (Q5=30.1cfs, Q100=67.5cfs) are generated by basins C (Q5=10.2cfs, Q100=19.1cfs), basin D (Q5=8.7cfs, Q100=16.3cfs), basin A1SS (Q5=4.7cfs, Q100=9.9cfs), basin A1TT (Q5=2.7cfs, Q100=5.6cfs) and basin A1UU (Q5=7.4cfs, Q100=24.2cfs).

Basin Runoff Description
Basins C, D, A1SS, A1TT and A1UU consist of single-family residential and roadway corridor development, streets, rooftops, landscaping areas and park development improvements.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins C, D, A1SS, A1TT and A1UU flows combine and are conveyed to DP2 & DP2A via type 1 curb and gutter. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Two 10' D-10-R sump inlets intercept (Q5=30.1cfs, Q100=67.5cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the east and proceed south to the low point in Vollmer Road (design point 8), ultimately being routed to Pond No. 6 via underground piping. (*refer to "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity
The collected surface flows from design point 1 (DP1) are conveyed via a 48" RCP (pipe 100) south towards Cowpoke Road. These flows combine with flows from pipe 101, a 54" RCP (Area 1 pipe 113) north of the Cowpoke Road intersection into a 66" RCP (pipe 102). *Refer to the "Area 1" design point 5 & 5A narrative for upstream pipe routing information.* The flow in pipe 100 is Q5=80.6cfs and Q100=195.5cfs with a full flow capacity of 183.0cfs assuming a 1.6% slope. The flow in pipe 101 is Q5=109.4cfs and Q100=243.9cfs with a full flow capacity of 361.2cfs assuming a 3.4% slope. The flow in pipe 102 is Q5=190.0cfs and Q100=439.4cfs with a full flow capacity of 626.1cfs assuming a 3.5% slope.

The collected surface flows from Area 1 design point 2 & 2A (DP2 & DP2A) are conveyed via a 48" RCP (Area 1 pipe 105) south towards Cowpoke Road. *Refer to the "Area 1" design points 2 & 2A narrative for routing information.* These flows are conveyed via pipe 103 in Cowpoke Road easterly combining with flows from a 30" RCP (Area 1 pipe 103A). *Refer to the "Area 1" basin R narrative for basin routing information.* The combined flows then proceed easterly in Cowpoke Road towards design points 2 & 2A (DP2 & DP2A) via a 54" RCP (pipe 103B). The collected surface flows from design points 2 & 2A (DP2 & DP2A) are conveyed via 24" RCP's (pipes 104 and 105) into a manhole combining with flows from pipe 103B. The combined flows proceed towards Vollmer Road via a 66" RCP (pipe 106) to a manhole where they combine with flows from pipe 102 and 106C (see design points 3 & 3A narrative). The flow in pipe 103 is Q5=52.5cfs and Q100=110.3cfs with a full flow capacity of 129.9cfs assuming a 0.8% slope. The flow in pipe 103A is Q5=40.1cfs and Q100=71.4cfs with a full flow capacity of 47.7cfs assuming a 4.5% slope. The flow in pipe 103B is Q5=92.6cfs and Q100=181.7cfs with a full flow capacity of 258.8cfs assuming a 1.7% slope. The flow in pipe 104 is Q5=15.0cfs and Q100=33.8cfs with a full flow capacity of 28.8cfs assuming a 1.6% slope. The flow in pipe 105 is Q5=15.0cfs and Q100=33.8cfs with a full flow capacity of 52.7cfs assuming a 5.4% slope. The flow in pipe 106 is Q5=122.7cfs and Q100=249.2cfs with a full flow capacity of 281.4cfs assuming a 0.7% slope.

Design Point Flows
Design Points 3 & 3A (DP3 & DP3A) flows (Q5=10.9cfs, Q100=21.0cfs) are generated by basins A (Q5=10.1cfs, Q100=19.0cfs and basin B (Q5=0.8cfs, Q100=2.1cfs).

Basin Runoff Description
Basins A and B consist of multi-family residential and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from landscape areas and roadways are intercepted by type 1 street curb and gutter. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Two 4' D-10-R sump inlets intercept (Q5=10.9cfs, Q100=21.0cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the west and proceed south in Vollmer Road (*see "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity
The collected surface flows from design points 3 & 3A (DP3 & DP3A) are conveyed via 24" RCP's (pipes

106A and 106B) into a manhole, then west towards Vollmer Road via a 30" RCP (pipe 106C). The combined flows proceed towards Vollmer Road to a manhole where they combine with flows from pipe 102 and 106 (see design point 2 & 2A narrative). The flow in pipes 106A & 106B is Q5=5.5cfs and Q100=10.5cfs in each with a full flow capacity of 40.2cfs assuming a 3.2% slope. The flow in pipe 106C is Q5=10.9cfs and Q100=21.0cfs with a full flow capacity of 74.5cfs assuming a 3.3% slope. *Refer to design point 5 (DP5) for the continuation of pipe routing in Vollmer Road and to Pond No. 6.*

Design Point Flows
Design Points 4 (DP4) flows (Q5=6.3cfs, Q100=11.9cfs) are generated by basin E (Q5=6.3cfs, Q100=11.9cfs).

Basin Runoff Description
Basins E consists of single-family residential and roadway corridor development, streets and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basin E flows are conveyed to DP4 via type 1 curb and gutter. This location was chosen as a check point to determine if the street had adequate capacity to convey flow without necessitating an at-grade inlet. Street capacity calculations reveal that an inlet is not needed. Curb and gutter flows will be conveyed across intersections with cross pans. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.*

Design Point Flows
Design Points 4A (DP4A) flows (Q5=5.6cfs, Q100=10.8cfs) are generated by basins E1 (Q5=4.8cfs, Q100=9.1cfs) and Area 3 basin A (Q5=1.8cfs, Q100=3.9cfs).

Basin Runoff Description
Basins E1 and Area 3 A consists of single-family residential and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins E1 and Area 3 A flows combine and are conveyed to DP4A via type 1 curb and gutter. This location was chosen as a check point to determine if the street had adequate capacity to convey flow without necessitating an at-grade inlet. Street capacity calculations reveal that an inlet is not needed. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.*

Design Point Flows
Design Point 5 (DP5) flows (Q5=622.2cfs, Q100=1345.1cfs) are generated by basins in Areas 1, 2, 3 and Offsite and Roadway flows from the aforementioned areas described above as design points Area 1: DP1, DP2, DP2A, DP3, DP4, DP4A, DP5, DP5A. Area 2: DP1, DP1A, DP1BA, DP3, DP2, DP2A, DP3, DP4, DP5, DP5A, DP6, DP6A. Area 3: DP1, DP1A, DP1B, DP2, DP3, DP3A, DP4, DP4A, DP5, DP5A. O & R: DP1, DP2, DP2A, DP3, DP3A.

Basin Runoff Description
Basins contributing to this point consist of single-family residential, multi-family, park, school and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
This reference point was chosen to compute the flows for the proposed box culvert to be constructed under Forest Meadows Avenue and to determine the adequacy of the open channel geometry immediately upstream.

Clogging Statement
In the event of clogging of the proposed box culvert, channel flow will overtop Forest Meadows Avenue and flow directly into the pond to the south at the low point in Forest Meadows approximately 200' to the west. (*see "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity
The flow in pipes 102, 106 and 106C combine at the intersection of Cowpoke Road and Vollmer Road within a manhole structure. These flows are conveyed to the south via an 84" RCP (pipe 107) and combine with those from an 84" RCP (pipe 108) (Area 2 pipe 112). The combined flows are then conveyed southeasterly via a 108" RCP (pipe 109) within a 40' wide drainage tract to an outfall location at the terminus of single-family lots on the west edge of Area 3. The flow in pipe 107 is Q5=324.4cfs and Q100=711.1cfs with a full flow capacity of 974.1cfs assuming a 2.3% slope. The flow in pipe 108 is Q5=140.9cfs and Q100=304.1cfs with a full flow capacity of 673.1cfs assuming a 1.1% slope. The flow in pipe 109 is Q5=464.9cfs and Q100=1015.1cfs with a full flow capacity of 1204.6cfs assuming a 1.7% slope. *See below for information regarding Area 3 and basin GG outfall flows into the channel.*

Open Channel
Flow discharging from pipe 109 will outfall into a natural ditch at the north end *(see "Offsite and Roadways" map)*. Field observations reveal a natural wetland habitat. ESI has been working with the Army Corp of Engineers and have agreed that this area shall be maintained as such and therefore shall be preserved as being a natural drainageway. The geometry varies and is therefore difficult to quantify discharge and depth relationships; however a conservative section has been assumed (section assumed immediately upstream of the discharge point of Area 3 pipe 117 (O & R pipe 110)). *Refer to the Hydraulic Calculations in the appendix for more information.* The discharge into the channel from pipe 109 is Q5=464.9cfs and Q100=1015.1cfs. Discharge from a 66" RCP (pipe 110) (Area 3 pipe 117) is Q5=125.7cfs and Q100=262.4cfs enters the channel at the south end on the east side. *Refer to the "Area 3 design points 5 & 5A" narrative for basin/pipe routing information.*

Discharge from a 42" RCP (pipe 111) is Q5=30.2cfs and Q100=62.7cfs enters the channel at the south end on the west side. Basin GG (pipe 111 flow) consists of multi-family residential streets, rooftops and landscaping areas. Basin GG is owned by Swat X, LLC and is to have a proposed density of 12-15.99 DU/AC as dictated by the approved Master Plan for Woodmen Heights dated July 27, 2004, CPC MP 03-00279. In the interim condition, a sediment basin shall be constructed at the south end of the basin at the stub location. This will be designed when the Grading and Erosion Control Plan for the site is submitted. Detailed developed drainage information for this basin will be required when the site is developed and a Final Drainage Report is prepared.

Surface flows will be routed to these outfall locations and shall be discharged into the channel directly upstream of the proposed box culvert under Forest Meadows Avenue. The velocity determined from the aforementioned section is 5.2fps with a Froude number of 0.61. The existing wetlands have and will maintain vegetation in the bottom of the channel. During final design of the channel, it will be necessary to perform a detailed analysis of the entire reach determining critical velocities in the process. At that time, it will be determined what type of grass channel lining seed mix shall be used to thwart erosion by conveyed flows. In the unlikely event that a grass lining would not prevent erosion, other methods of channel protection shall be utilized. The flow in pipe 110 (Area 3 pipe 117) is Q5=125.7cfs and Q100=262.4cfs with a full flow capacity of 240.0cfs assuming a 0.5% slope. The flow in pipe 111 is Q5=30.2cfs and

Q100=62.7cfs with a full flow capacity of 128.3cfs assuming a 3.7% slope. The total channel flow routed to the box culvert under Forest Meadows Avenue is Q5=622.2cfs and Q100=1345.1cfs.

Box Culvert

Flow conveyed in the open channel (described above) will enter a box culvert under Forest Meadows Avenue. During final design the exact geometry and material will be determined. For the purposes of budgeting, a conservative approach has been taken which assumes a reinforced concrete box structure. *Refer to Hydraulic Calculations of the appendix for calculations.* The computed size has been a 3-cell 9' x 5' (span x rise) with concrete wingwalls and toe walls at the approach and downstream ends. During final design, it may be determined that inlet and outlet protection in the form of rip-rap or a concrete apron may be necessary, but is not assumed for this analysis. As previously noted, differing materials/configurations may be used such as corrugated arch pipe, pipe arch, multiple pipes (circular or elliptical). Regardless of size and shape, the flow that will be conveyed will be Q5=622.2cfs and Q100=1345.1cfs). It should be noted that these flows listed reflect Rational Method peak flows. As mentioned above in the Pond No. 6 section, the pond has been sized utilizing the Soil Conservation Service (SCS) Method of determining peak flows as agreed upon with Colorado Springs City Engineering representatives. *Refer to Pond No. 6 narrative for more information.*

Design Point Flows

Design Point 6 (DP6) flows (Q5=41.0cfs, Q100=96.0cfs) are generated by MDDP basin OS-B referring to basin "OS-B" in the report prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan", dated June 2004.

Basin Runoff Description

Per the aforementioned MDDP Report for Woodmen Heights, basin OS-B consists of low-density residential and agricultural land containing natural grasses and a few rural structures at the present time. In the future, differing zoning and resultant runoff values may be yielded but will be limited by construction of an on-site detention facility. *Refer to "Area 2" design point 1 (DP1) narrative for further discussion.*

Surface Routing

MDDP basin OS-B flows naturally route to the location as shown on "Offsite and Roadways" drainage map (DP6). Historic flows of Q5=41.0cfs and Q100=96.0cfs will be maintained per the MDDP. *Refer to "Area 2" design point 1 (DP1) narrative for further discussion.*

Clogging Statement

Clogging is not anticipated at the entrance to the 54" RCP due to the large pipe size since at the time of detention pond construction, a trash rack is likely to be incorporated into the outlet structure design.

Pipe Routing/Pipe Capacity

Refer to "Area 2" design point 1 (DP1) narrative for further discussion.

Design Point Flows

Design Points 7 & 7A (DP7 & DP7A) flows (Q5=44.0cfs, Q100=80.9cfs) are generated by basins A1VV (Q5=1.7cfs, Q100=3.5cfs), basin A1WW (Q5=0.6cfs, Q100=1.2cfs), basin H (Q5=8.7cfs, Q100=16.3cfs), basin I (Q5=17.3cfs, Q100=32.5cfs), basin J (Q5=0.6cfs, Q100=1.5cfs), basin K (Q5=7.2cfs, Q100=13.6cfs), basin L (Q5=14.5cfs, Q100=27.2cfs) and basin M (Q5=6.2cfs, Q100=11.6cfs).

Basin Runoff Description

Basins A1VV, A1WW, H-M consist of single-family and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins A1VV, A1WW, H-M flows combine and are conveyed to DP7 & DP7A via type 1 curb and gutter. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections for the minor and major storm events. Two 16' D-10-R sump inlets intercept (Q5=44.0cfs, Q100=80.9cfs).

NOTE: An inlet will be constructed at the northeast corner of Black Forest Road and Cowpoke Road to pick up nuisance flows only. During the 2 year storm event the flow will be ~6.3cfs which necessitates a 6' at-grade inlet. These flows will be routed via an 18" RCP (111A) to a proposed low point in Cowpoke Road west of Black Forest Road. Currently this road is being designed for full reconstruction as part of the redevelopment west of Black Forest Road. Refer to Matrix Design Group Cowpoke Road construction documents for further information regarding this system.

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the south at the intersection of Vollmer Road and proceed east to design points 8 & 8A (*see "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity
The collected surface flows from design points 7 & 7A (DP7 & DP7A) are conveyed via 30" RCP's (pipes 113 and 114) into a manhole, then east towards Vollmer Road via a 42" RCP (pipe 115). The flows then proceed towards design points 8 & 8A. The flow in pipes 113 & 114 is Q5=22.0cfs and Q100=40.4cfs in each with a full flow capacity of 55.8cfs assuming a 1.9% slope. The flow in pipe 115 is Q5=44.0cfs and Q100=80.9cfs with a full flow capacity of 125.3cfs assuming a 1.6% slope.

Design Point Flows
Design Points 8 & 8A (DP8 & DP8A) flows (Q5=25.2cfs, Q100=48.2cfs) are generated by basins E (Q5=6.3cfs, Q100=11.9cfs), basin F (Q5=12.8cfs, Q100=24.0cfs), basin G (Q5=0.6cfs, Q100=1.4cfs), basin N (Q5=5.8cfs, Q100=10.8cfs), basin O (Q5=0.5cfs, Q100=1.2cfs), basin P (Q5=5.6cfs, Q100=10.5cfs), basin Q (Q5=0.4cfs, Q100=1.0cfs) and basin FF (Q5=39.7cfs, Q100=82.5cfs).

Basin Runoff Description
Basins E-G, N-Q and FF consists of multi-family, commercial and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
Flow from basin FF (Q5=39.7cfs, Q100=82.5cfs) and basin A2CC (Q5=3.6cfs, Q100=7.5cfs) will proceed south and east either in the form of overland flow, underground piping or a combination thereof. Surface flow will consist of landscape area in and around single-family lots and roadway landscaping. Basin FF is owned by Swat X, LLC and is to have a proposed density of 3.5-7.99 DU/AC as dictated by the approved Master Plan for Woodmen Heights dated July 27, 2004, CPC MP 03-00279. In the interim condition, a sediment basin shall be constructed at the south end of the basin at the stub location. This will be designed when the Grading and Erosion Control Plan for the site is submitted. Detailed developed drainage information for this basin will be required when the site is developed and a Final Drainage Report is prepared. Overland flow and parking lot/street sheet flow will become concentrated when intercepted by type 5 curb and gutter. Basins E-G, N-Q flows combine and are conveyed to DP8 & DP8A via type 1 curb and gutter. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Two 8' D-10-R sump inlets intercept (Q5=25.2cfs, Q100=48.2cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway high point to the east at the intersection of Forest Meadows Avenue and proceed east to design points 10 & 10A (*see "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity
Flow from parcel FF via a 42" RCP (pipe 115A) is routed to the inlet structure at DP8. This flow then combines with surface flow intercepted at design point 8. The collected surface flows from design points 8 & 8A (DP8 & DP8A) are conveyed via a 42" RCP's (pipes 116 and 117) into a manhole combining with flows from pipe 115. Flows then proceed east towards Forest Meadows via a 54" RCP (pipe 118). Flows then discharge into Pond No. 6 in the northwest corner of said facility. This point being design point 9 (DP9). The flow in pipe 115A is Q5=39.7cfs and Q100=82.5cfs with a full flow capacity of 132.0cfs assuming a 1.7% slope. The flow in pipes 116 is Q5=49.6cfs and Q100=101.0cfs with a full flow capacity of 175.8cfs assuming a 6.9% slope. The flow in pipe 117 is Q5=12.6cfs and Q100=24.1cfs with a full flow capacity of 23.6cfs assuming a 5.1% slope. The flow in pipe 118 is Q5=97.6cfs and Q100=188.7cfs with a full flow capacity of 594.0cfs assuming a 5.2% slope. *Refer to Pond No. 6 narrative for more information.*

Design Point Flows
Design Point 9 (DP9) flows (Q5=97.6cfs, Q100=188.7cfs) have been fully described prior in the design point 8 & 8A narratives above. This point has been chosen for reference use only in the Pond No. 6 section.

Design Point Flows
Design Points 10 & 10A (DP10 & DP10A) flows (Q5=30.5cfs, Q100=59.3cfs) are generated by basins A3A (Q5=1.8cfs, Q100=3.9cfs), basin A3AA (Q5=3.9cfs, Q100=8.1cfs), basin E1 (Q5=4.8cfs, Q100=9.1cfs), basin R (Q5=0.6cfs, Q100=1.5cfs), basin S (Q5=4.2cfs, Q100=7.9cfs), basin T (Q5=0.5cfs, Q100=1.3cfs), basin U (Q5=5.0cfs, Q100=9.3cfs), basin V (Q5=10.1cfs, Q100=19.0cfs), basin W (Q5=0.9cfs, Q100=2.3cfs) and basin EE (Q5=9.7cfs, Q100=18.2cfs).

Basin Runoff Description
Basins A3A, A3AA, E1, R-W & EE consist of single-family residential, commercial and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins A3A, A3AA, E1, R-W & EE flows combine and are conveyed to DP10 & DP10A via type 1 curb and gutter. *Refer to "Offsite and Roadway" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 10' D-10-R sump inlets intercept (Q5=30.5cfs, Q100=59.3cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the roadway curb and gutter and proceed directly into Pond No. 6.

Pipe Routing/Pipe Capacity
The flows from the northern inlet proceed to the southern inlet via an 18" RCP (pipe 119). Flow then combines with surface flows from design point 10A (DP10A) and discharge into Pond No. 6 via an 18" RCP (pipe 120). The flow in pipe 119 is Q5=15.3cfs and Q100=29.7cfs with a full flow capacity of 21.2cfs assuming a 4.1% slope. The flow in pipe 120 is Q5=30.5cfs and Q100=59.3cfs with a full flow capacity of 46.3cfs assuming a 19.4% slope. *Refer to Pond No. 6 narrative for more information.*

Design Point Flows

Designs Point 11 & 11A (DP11 & DP11A) flows (Q5=9.9cfs, Q100=18.7cfs) are generated by basins BL (Q5=11.0cfs, Q100=20.6cfs) and basin CC (Q5=0.4cfs, Q100=0.9cfs).

Basin Runoff Description

Basins BB & CC consist of multi-family residential and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing

Flow from basin DD will proceed southerly either in the form of overland flow, underground piping or a combination thereof. Surface flow will consist of landscape area overland flow and parking lot/street sheet flow possibly becoming concentrated if intercepted by curb and gutter. Basins BB & CC flows combine and are conveyed to DP11 & DP11A via type 1 curb and gutter. *Refer to "Offsite & Roadway" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 4' D-10-R sump inlets intercept (Q5=9.9cfs, Q100=18.7cfs).

Clogging Statement

In the event of clogging or inlet failure, the runoff will proceed easterly to Smokewood Drive and south to Area 3 design points 3 & 3A (DP3 & DP3A). (*see "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity

Flow from parcel DD via a 36" RCP (pipe 121) is routed to the inlet structure at DP11. This flow then combines with surface flow intercepted at design point 11. The combined flows are then conveyed from the northern inlet via a 36" RCP (pipe 122) towards the southern inlet. This flow combines with intercepted surface flows at DP 11A and proceeds easterly via a 36" RCP (pipe 123) and ultimately turn south in Smokewood Drive through Area 3. *Refer to "Area 3" Pipe Routing/Capacity narrative for further discussion.* The flow in pipe 121 is Q5=24.2cfs and Q100=50.3cfs with a full flow capacity of 105.9cfs assuming a 2.5% slope. The flow in pipe 122 is Q5=28.9cfs and Q100=59.1cfs with a full flow capacity of 68.1cfs assuming a 1.0% slope. The flow in pipe 123 is Q5=33.5cfs and Q100=68.0cfs with a full flow capacity of 76.4cfs assuming a 1.3% slope.

Design Point Flows

Design Point 12 (DP12) flows (Q5=108.0cfs, Q100=305.0cfs) are generated by half of MDDP basin OS-2.

Basin Runoff Description

The "MDDP OS-2" basin refers to basin "OS-2" in the report prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan" dated June 2004. The MDDP cited that historic flows of Q5=216.0cfs and Q100=610.0cfs would be maintained in the future as discharge from a future detention facility as outlined in the Sand Creek DBPS. Per the MDDP, it was inferred that the entire watershed would be transported to the future detention facility ultimately outfalling into the Woodmen Heights development. Per the MDDP report, it was assumed that half of the flow (Q5=108.0cfs and Q100=305.0cfs) would be routed via Logwood Road and half would be routed via Forest Meadows Avenue (MDDP report roadways not named, however configuration is the same).

Surface Routing

On the north edge of the Forest Meadows site, along Cowpoke Road adjacent to MDDP OS-2, there is a series of berms which prevent flow from entering the Woodmen Heights site. In the interim condition (until the MDDP OS-2 basin is developed), these shall be maintained by the current property owner. In the future, approximately one half of the sites' surface flows shall be collected and routed to this location to be conveyed via underground piping.

Clogging Statement
Clogging is not anticipated at the entrance to the 54" RCP due to the large pipe size since at the time of detention pond construction, a trash rack is likely to be incorporated into the outlet structure design.

Pipe Routing/Pipe Capacity
In the interim condition, a proposed 54" RCP (pipe 124) and a temporary plug will be constructed up to the northern ROW line of Cowpoke Road. Existing runoff is contained in whole on-site in various pond facilities. No outfall is known to exist whereby flow would enter the Forest meadows site. Once the site to the north is developed and a detention pond is constructed, the plug shall be removed and piping will be extended north towards the pond possibly serving as part of the pond outfall pipe system, depending on the configuration of the outlet structure and pond geometry. In the future, the intercepted surface flows from half of basin MDDP OS-2 (Q5=108.0cfs, Q100=305.0cfs) will be conveyed underneath Cowpoke Road and then southerly to Dry Willow Way within Logwood Road via a 66" RCP (Area 4 pipe 100). In the future, the flow in pipe 124 will be Q5=108.0cfs and Q100=305.0cfs with a full flow capacity of 322.5cfs assuming a 0.9% slope. *Refer to "Area 4" design point 1 (DP1) Pipe Routing/Capacity narrative for further discussion.*

Design Point Flows
Design Points 13 & 13A (DP13 & DP13A) flows (Q5=22.0cfs, Q100=42.9cfs) are generated by basins AA (Q5=15.6cfs, Q100=29.4cfs), basin A4W (Q5=2.0cfs, Q100=4.2cfs), basin A4X (Q5=5.0cfs, Q100=10.5cfs and basin A4Y (Q5=1.3cfs, Q100=2.7cfs).

Basin Runoff Description
Basins AA, A4W, A4X and A4Y consist of single-family residential and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
All unconcentrated sheet flow from uphill lots will be conveyed through the lower lots via side lot swales ("B", "Garden" and "Walkout" lots), and via rear & side lot swales ("A" lot) to the front of the lot intercepted by street curb and gutter. Basins AA, A4W, A4X and A4Y flows combine and are conveyed to DP13 & DP13A via type 1 curb and gutter. *Refer to "Offsite and Roadways" Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Curb and gutter flows will be conveyed across intersections with cross pans. Two 6' D-10-R sump inlets intercept (Q5=22.0cfs, Q100=42.9cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and discharge directly into Pond No. 3.

Pipe Routing/Pipe Capacity
Flows from Area 4 pipe 108 enter Forest Meadows Avenue and proceed east towards design points 13 and 13A (DP13 & 13A) via a 72" RCP (pipe 132). The collected surface flows from design points 13 & 13A (DP13 & DP13A) are conveyed via 30" RCP's (pipes 133 and 134) into a manhole combining with pipe 132 flow. The combined flows then proceed east via an 84" RCP (pipe 135) and outfall directly into Pond No. 3. The flow in pipe 132 is Q5=194.2cfs and Q100=486.8cfs with a full flow capacity of 987.5cfs assuming a 5.4% slope. The flow in pipes 133 & 134 is Q5=11.0cfs and Q100=21.5cfs in each with a full flow capacity of 244.4cfs assuming a 35.5% slope. The flow in pipe 135 is Q5=216.1cfs and Q100=529.7cfs with a full flow capacity of 1172.1cfs assuming a 3.4% slope.

Design Point Flows
Design Points 14 & 14A (DP14 & DP14A) flows (Q5=7.7cfs, Q100=14.4cfs) are generated by basin Z

(Q5=7.7cfs, Q100=14.4cfs).

Basin Runoff Description
Basin Z consists of roadway corridor development and landscaping areas.

Surface Routing
Basin Z flows are conveyed to DP14 & DP14A via type 1 curb and gutter. *Refer to Offsite and Roadways Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information.* Two 4' D-10-R sump inlets intercept (Q5=7.7cfs, Q100=14.4cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will overtop the curb and gutter and discharge between Area 4 lots in the side lot drainage swale for type "A" lots. This flow will proceed to Hardwood Circle and ultimately flow to Area 4 design points 2 & 2A (DP2 & DP2A). Typically, an emergency outfall location as this is not ideal; however it is felt that the relatively small amount of discharge to this location does not warrant additional design/construction requirements. .

Pipe Routing/Pipe Capacity
Half of the MDDP basin OS-2 flows (Q5=108.0cfs, Q100=305.0cfs) (*Refer to design point 12 (DP12) narrative*) enter the site from the north and proceed into the inlet structure at design point 14 via a 60" RCP (pipe 125) in the future. In the interim condition, a proposed 54" RCP (pipe 124) and a temporary plug will be constructed up to the northern ROW line of Cowpoke Road. Existing runoff is contained in whole on-site in various pond facilities. No outfall is known to exist whereby flow would enter the Forest meadows site. Once the site to the north is developed and a detention pond is constructed, the plug shall be removed and piping will be extended north towards the pond possibly serving as part of the pond outfall pipe system, depending on the configuration of the outlet structure and pond geometry. The collected surface flow from design point 14 (DP14) combines with flows from pipe 125 and is conveyed via a 60" RCP (pipe 125A) into an inlet at design point 14A combining with surface flows from design point 14A. The combined flows then proceed east via a 66" RCP (pipe 126) towards the intersection of Cowpoke Road and Forest Meadows Avenue. The flow in pipe 125 is Q5=108.0cfs and Q100=305.0cfs with a full flow capacity of 371.3cfs assuming a 2.0% slope. The flow in pipe 125A is Q5=111.8cfs and Q100=312.2cfs with a full flow capacity of 343.8cfs assuming a 1.7% slope. The flow in pipe 126 is Q5=115.7cfs and Q100=319.4cfs with a full flow capacity of 318.2cfs assuming a 0.9% slope.

Design Point Flows
Design Point 15 (DP1) flows (Q5=26.3cfs, Q100=54.6cfs) are generated by basin OS-1.

Basin Runoff Description
Basin OS-1 consists of multi-family residential, streets, rooftops and landscaping areas.

Surface Routing
Flow from this basin will proceed southerly either in the form of overland flow, underground piping or a combination thereof. Surface flow will consist of landscape area overland flow and parking lot/street sheet flow possibly becoming concentrated if intercepted by curb and gutter.

Pipe Routing/Pipe Capacity
In the interim condition, a proposed 36" RCP (pipe 127) and a temporary plug will be constructed up to the northern ROW line of Cowpoke Road. In the future, the intercepted surface flows from basin OS-1 will be conveyed towards design points 16 & 16A (DP16 & DP16A). The flow in pipe 127 will be Q5=26.3cfs and Q100=54.6cfs with a full flow capacity of 79.0cfs assuming a 1.4% slope.

Design Point Flows
Designs Point 16 & 16A (DP16 & DP16A) flows (Q5=6.3cfs, Q100=12.3cfs) are generated by basins X (Q5=0.3cfs, Q100=0.8cfs) and basin Y (Q5=5.6cfs, Q100=10.5cfs).

Basin Runoff Description
Basins X & Y consist of multi-family residential and roadway corridor development, streets, rooftops and landscaping areas.

Surface Routing
Basin X & Y flows combine and are conveyed to DP16 & DP16A via type 1 curb and gutter. Refer to Offsite and Roadways Street Capacity Summary in the Hydraulic Calculations of the appendix for street capacity information. Two 4' D-10-R sump inlets intercept (Q5=6.3fs, Q100=12.3cfs).

Clogging Statement
In the event of clogging or inlet failure, the runoff will proceed westerly in Cowpoke Road and proceed south in Forest Meadows Avenue towards design points 13 & 13A (DP13 & DP13A). (*see "Offsite and Roadways" map*).

Pipe Routing/Pipe Capacity
The collected surface flows from design points 16 & 16A (DP16 & DP16A) are conveyed via 18" RCP's (pipes 128 and 129) into a manhole combining with flows from pipe 127. Flows then proceed west towards Forest Meadows Avenue via a 36" RCP (pipe 130) to a manhole combining with flows from pipe 126. Flows then proceed south via a 72" RCP (pipe 131) and discharge into Pond No. 3. *Refer to Pond No. 3 narrative for more information.* The flow in pipes 128 and 129 is Q5=3.2cfs and Q100=6.1cfs in each with a full flow capacity of 47.44cfs assuming a 20.4% slope. The flow in pipe 130 is Q5=31.7cfs and Q100=65.0cfs with a full flow capacity of 111.4cfs assuming a 2.8% slope. The flow in pipe 131 is Q5=147.3cfs and Q100=384.5cfs with a full flow capacity of 421.7cfs assuming a 1.6% slope.

STORM SEWER SYSTEM MODELING

A storm sewer model using StormCad version 5.6 software by Bentley Systems, Inc. was used to compute system pipe sizes and full flow capacities for this report. Sizes previously determined (1st submittal to City Engineering) by open channel hydraulics with an assumed percentage allowance for head losses due to friction and junctions proved to be too small after performing detailed computing of the hydraulic grade line (HGL). Model input consisted of structure rim and invert data, assumed beginning pipe sizes, flow at various node locations and Manning's roughness coefficients along with miscellaneous modeling parameter options. Through iterative steps with various input data/approaches, the model will compute an HGL and resultant flow capacity with pressurized and non-pressurized flow conditions. Pipe sizes are iteratively determined by maintaining the HGL 1' below the finished grade (per the City/El Paso County Drainage Criteria Manual specifications). *Refer to Hydraulic Calculations in the appendix for StormCad input and output data.*

REGIONAL DETENTION PONDS

General

Drainage Basin Planning Study Requirements
Sand Creek Drainage Basin Planning Study, Kiowa Engineering Corporation, March 1996 the proposed construction of the two ponds (No. 3 and No. 6) as shown with option "Detention Site Alternative 'A" is required. This option would replace the detention facilities no's 4 and 5, thus routing upstream flows into

the expanded facilities on this site.

Preliminary Design Approach
The intent this report was to size the regional detention ponds on a preliminary basis for interim and ultimate build-out. A detailed design in conjunction with construction document preparation shall be conducted in the future. This report and computer model is not intended to be a definitive source for facility design and should be relied upon only in a "preliminary" sense. However, the accuracy of the model contained in this report should be fairly close to that of the final design computations. Design refinement and inclusion of additional factors unknown at this time will be incorporated and will yield a facility similar in storage and geometry.

Peak Flow Determination
The calculations performed for the individual areas and offsite and roadway areas for the Forest Meadows development were based on the Rational Method of peak flow determination. The Colorado Springs/El Paso County Drainage Criteria Manual states that a watershed of this magnitude shall be analyzed using the Soil Conservation Service (SCS) method. It was agreed upon with City Engineering representatives that this was acceptable since the individual areas are basically stand alone sub-systems (i.e. – if studied individually, they would be analyzed using the Rational Method). Using the SCS method would yield internal area system components smaller than those using the Rational Method which may pose problems during the design storm events, therefore Rational Method peak flows were used to size piping and catchment structures.

Computer Modeling
Per discussions with City Engineering regarding preliminary pond sizing, it was agreed upon that the SCS Method would be used. If Rational Method peak flows were used, accurate storm hydrograph routing could not be performed and would therefore yield overly conservative discharge values and resultant storage requirements. Therefore, a model was created using PondPack version 8, Haested Methods, Inc. software. Input data consists of acreage, curve numbers, time of concentrations, outlet structure components, outfall piping, rainfall event values, pond geometry and miscellaneous modeling parameters.

Land Ownership Conveyance
The two Regional Detention Ponds No's 3 and 6 will be platted and dedicated to the City of Colorado Springs for ownership and maintenance. The construction of the interim ponds will be sized to adequately handle the developed flows for the development of Woodmen Heights Master Plan areas only. Future development that will add to the conveyance of these ponds will require the ponds to be re-constructed in order to accommodate additional flows. The off-site development will be responsible for the increase in the ponds capacity. The City of Colorado Springs is responsible for the construction of the Regional Detention Facilities for these two ponds.

Wetlands
The Woodmen Heights development contains ~29 acres of existing jurisdictional wetlands. Of which, 11.4 acres of wetlands will be filled and 17.6 acres will be preserved. The filled wetland areas will be mitigated in areas along Sand Creek and within Regional Detention Pond No's 3 and 6. The preserved wetlands exist along the Sand Creek Channel, within the low lying areas that will be contained by Regional Detention Pond No. 6, and the two existing stock pond areas on-site. The detention ponds shall have water quality features which shall ensure the existing wetland areas do not receive any sedimentation build up. This will be accomplished by redirecting the sediment laden flow with open channel ditches and/or swales to a location where maintenance personnel can effectively remove it from the pond site without habitat disturbance. These two perched stock ponds will be complimented by the adjacent development by limiting the developed flows discharged into these areas. The existing at-grade drainage outlets for these pond areas will be modified to handle discharge of the developed flows. The intent of the developed discharge is to

maintain the wetland areas as dictated by the Army Corps of Engineers, on-site and downstream.

Final Design Considerations
As noted in the study prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan" dated June 2004, there are numerous final design considerations that must be performed prior to construction. MDDP noted considerations/issues include water quality management, wetland mitigation and Streamside Ordinance. Additional items include, outfall piping beneath Woodmen Road, outlet structures, maintenance requirements, embankment linings, freeboard, emergency overflow weirs, jurisdictional dam structure design, interim staging to historic flows until the downstream facilities can be constructed, etc. During interim pond final design, it should be designed in a way as to minimize reconstruction of the ultimate facility. It is reasonable to assume that the outfall structure, piping and southern embankment will need to be reconstructed.

Final Design Schedule
At the present time, Engineering and Surveying, Inc. is in the process of preparing construction documents for the interim Pond No. 6. The interim Pond No. 3 design is anticipated to be in the fall of 2006, depending on the progression of development to the east.

Detention Pond No. 3
General Site Information
In the ultimate condition, inflow comes from six sources (refer to study prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan" dated June 2004 for inflow source locations); northwest from Area 4 single-family development, northwest from Forest Meadows Avenue, north from the adjacent park site, northeast from the Sand Creek channel, east from a commercial/multi-family development and southeast from a commercial/office development. Outflow will be routed via an outlet structure in the southeast corner and beneath Woodmen Road via a multi-cell box culvert structure, or bridge. Per the MDDP, this facility will be combined with a neighborhood park area that will exist, at a minimum, above the 10-year storm event elevation. Coordination with the City of Colorado Springs Park and Recreation Department will be required with the final design construction document preparation phase for this facility. Channel improvements associated with the construction of this facility and upstream improvements are summarized in the aforementioned MDDP for the Woodmen Heights Master plan. It should be noted that the downstream facilities will need to be constructed prior to releasing the total developed flows. The release of developed flows shall not adversely affect adjacent or downstream property.

The size and geometry of the outfall structure will be determined during the final design phase of pond construction document preparation. The basic geometric configuration of this pond will be a rectangular facility with the major axis running north and south. The pond's eastern edge will be located within the existing Sand Creek Channel drainageway. The south edge of the pond will be against the proposed fill embankment of Woodmen Road.

Preliminary Design Results - Interim
In the interim condition, a few adjacent parcel areas will become developed and ultimately discharge into this facility. These parcels have been delineated to correlate with the MDDP study. These are: parcels 12, 17, 18, 19 and 25. Development of these parcels corresponds to a required storage pond volume of approximately 10 acre-ft with a developed (Q100=376cfs) peak inflow and a (Historic release, Q5=58cfs, Q100=144cfs) outflow. During the final design phase, the interim pond will be designed to release the 2-year, 5-year, 10-year, 50-year and 100-year developed flow at rates determined by the SCDBPS. The interim pond will release the flow upstream of the proposed Woodmen Road bridge. *Refer to Pond Calculations in the appendix for Pondpack input and output data.*

Preliminary Design Results - Ultimate
In the ultimate condition, numerous parcel areas within the Woodmen Heights and outside of it will become developed and ultimately discharge into this facility. These parcels have been delineated to correlate with the MDDP study. These are: on-site parcels 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 25, and off-site parcels 2, 3, 4, & 5. Development of these parcels corresponds to a required storage pond volume of approximately 209 acre-ft with a (Q100=3207cfs) peak inflow and a (Q100=2240cfs) outflow. *Refer to Pond Calculations in the appendix for Pondpack input and output data.*

Water Quality
In the ultimate condition, the water quality capture volume (WQCV) computed using the Colorado Springs/El Paso County Drainage Criteria Manual – Volume 2 for Extended Detention Basins was approximately 28 acre-ft. This volume will be added to the peak developed required storage volume.

Prior Study Comparison – Ultimate Conditions
The "Sand Creek Drainage Basin Planning Study", Kiowa Engineering Corporation, March 1996 states that the required storage volume is 140 acre-ft with a (Q100=3230cfs) peak inflow and a (Q100=2240cfs) outflow. The 69 acre-ft storage and (Q100=23cfs) peak inflow differences can be attributed to the fact that we are combining DBPS detention facilities 3, 4 and 5. The "Master Development Drainage Plan for Woodmen Heights Master Plan", Classic Consulting Engineers and Surveyors, June 2004 states that the required storage volume is 224 acre-ft with a (Q100=2883cfs) peak inflow and a (Q100=2242cfs) outflow. The 15 acre-ft storage and (Q100=324cfs) peak inflow differences can be attributed to minor basin time of concentration, area and curve number model values based on the latest information available.

Detention Pond No. 6
General Site Information
In the ultimate condition, inflow comes from six sources (refer to study prepared by Classic Consulting Engineers and Surveyors titled "Master Development Drainage Plan for Woodmen Heights Master Plan" dated June 2004 for inflow source locations); southwest from commercial/office development south of Woodmen Road, west from a commercial/office development, northwest from a mixed-use development, north from a roadway corridor, northeast from a mixed-use development, east from a commercial development. Outflow will be released in the southeast corner and ultimately beneath Woodmen Road. The release of developed flows shall not adversely affect adjacent or downstream property.

The size and geometry of the outfall structure will be determined during the final design phase of pond construction document preparation. The interim pond will be designed to release the 2-year, 5-year, 10-year, 50-year and 100-year developed flow at rates determined by the SCDBPS. The release rates are less than the calculated Historic Q100-year flow north of Woodmen Road. Therefore, the developed release should not adversely affect the existing downstream facilities. Since staged flows will be released from the interim and ultimate ponds, ESI feels that the existing downstream facilities will be adequate. This approach is consistent with modern urban hydrologic release methods in place in the City of Colorado Springs and the Denver area.

The basic geometric configuration of this pond will be a square facility. The pond's northern edge will be located adjacent to the proposed fill embankment of Forest Meadows Avenue. The south edge of the pond will be against the existing fill embankment of Woodmen Road.

Preliminary Design Results - Interim
In the interim condition, numerous parcel areas within the Woodmen Heights and outside of it will become developed and ultimately discharge into this facility. The off-site parcels have been delineated to correlate

with the MDDP study. These are: parcels MDDP OS-1, MDDP OS-A, MDDP OS-B and MDDP 7. The on-site parcels have been delineated to correlate with this Forest Meadows study. These are: parcels A1, A2, A3, offsite and roadways miscellaneous roadway corridors, a public park and a public school. Development of these parcels corresponds to a required storage pond volume of approximately 75 acre-ft with a (Q100=1554cfs) peak inflow and a (Q100=70cfs) outflow (historic flow per the aforementioned Woodmen Heights MDDP). *Refer to Pond Calculations in the appendix for Pondpack input and output data.*

Preliminary Design Results - Ultimate

In the ultimate condition, numerous parcel areas within the Woodmen Heights and outside of it will become developed and ultimately discharge into this facility. The off-site parcels have been delineated to correlate with the MDDP study. These are: parcels MDDP OS-1, OS-A, OS-B, 6, 9, 10 and 13. The on-site parcels have been delineated to correlate with this Forest Meadows study. These are: parcels A1, A2, A3, offsite and roadways miscellaneous roadway corridors, a public park and a public school. Development of these parcels corresponds to a required storage pond volume of approximately 87 acre-ft with a (Q100=1811cfs) peak inflow and a (Q100=70cfs) outflow. *Refer to Pond Calculations in the appendix for Pondpack input and output data.*

Water Quality

In the ultimate condition, the water quality capture volume (WQCV) computed using the Colorado Springs/El Paso County Drainage Criteria Manual – Volume 2 for Extended Detention Basins was 16.9 acre-feet. This volume will be added to the peak developed required storage volume. *Refer to the Pond Calculations in the appendix for additional data.*

Prior Study Comparison – Ultimate Conditions

The "Sand Creek Drainage Basin Planning Study", Kiowa Engineering Corporation, March 1996 states that the required storage volume is 125 acre-ft with a (Q100=1320cfs) peak inflow and a (Q100=70cfs) outflow. The 38 acre-ft storage and (Q100=491cfs) peak inflow differences can be attributed basin time of concentration, area and curve number model values based on the latest information available as well as significant routing assumptions made in the DBPS which was based on highly conceptual developed basin geometry. The "Master Development Drainage Plan for Woodmen Heights Master Plan", Classic Consulting Engineers and Surveyors, June 2004 states that the required storage volume is 71acre-ft with a (Q100=1093cfs) peak inflow and a (Q100=70cfs) outflow. The 16 acre-ft storage and (Q100=227cfs) peak inflow differences can be attributed to basin time of concentration, area and curve number model values based on the latest information available.

DRAINAGE, BRIDGE AND POND FEES

The Forest Meadows Filing No. 1 and Filing No. 4 are located within the Sand Creek Drainage Basin. Filing No. 1 consists of ~133 acres and Filing No. 4 consists of ~ 155 acres. The 2006 Drainage, Bridge and Pond Fees per the City of Colorado Springs for these sites are listed below:

Filing No. 1

Drainage Fee:	$ 8,133/acre x 132.883 acres	$ 1,080,737
Bridge Fee:	$ 511/acre x 132.883 acres	$ 67,903
Pond Fee (Land):	$ 734/acre x 132.883 acres	$ 97,536
Pond Fee (Facilities):	$ 1,788/acre x 132.883 acres	$ 237,595
Total fees for this site payable to the City of Colorado Springs:		**$ 1,483,771**

Filing No. 4

Drainage Fee:	$ 8,133/acre x 154.95 acres	$ 1,260,208
Bridge Fee:	$ 511/acre x 154.95 acres	$ 79,179
Pond Fee (Land):	$ 734/acre x 154.95 acres	$ 113,733
Pond Fee (Facilities):	$ 1,788/acre x 154.95 acres	$ 277,051
Total fees for this site payable to the City of Colorado Springs:		**$ 1,730,171**

Per the Annexation Agreement for Woodmen Heights "*...Owners shall be responsible for conformance with the SCDBPS except that no storm drainage flow shall exit the property in excess of historic flow rates until the downstream drainage facilities on the main channel of Sand Creek between Woodmen Road and Constitution Avenue (to include Detention Pond No. 2 which is south of Barnes Road) are either in place in accord with the SCDBPS or the facilities that are in place are adequate to accept flows in excess of historic that owners may desire to release. In the alternative and subject to approval by the City Engineer, the Owners may agree to participate on an equitable basis in the construction of Detention Pond No. 2 in exchange for the approval to release storm flows at the flow rates specified in the SCDBPS.*"

Pond Cost Sharing Discussion

It is the intention of the Owners to proceed with the construction of Detention Pond No. 2 in order for the developed flows released from Woodmen Heights (Forest Meadows) to be allowed to exceed historic rates. The Woodmen Heights Metropolitan District (Metro District) has purchased the land to construct Detention Pond No. 2. in lieu of the obligation for the regional detention ponds within the Woodmen Heights development, north of Woodmen Road. Therefore, the construction of the Woodmen Heights Regional detention ponds will become the responsibility of the City of Colorado Springs. For the construction of Detention Pond No. 2, the Metro District will receive priority for reimbursement for; drainage, pond land, pond facility, fees in the Sand Creek Drainage Basin.

CONSTRUCTION COST OPINION (See Next page)

FOREST MEADOWS FILING NO. 1
Construction Cost Opinion

PROPOSED FILING NO. 1 STORM SEWER SYSTEM (DBPS Segments 155-1, 154, SC #6 and Pond #2 Sky Sox)

DRAINAGE COSTS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
18" RCP	LF	404	$35	$14,140	
24" RCP	LF	501	$45	$22,545	
30" RCP	LF	1299	$55	$71,445	
36" RCP	LF	2316	$65	$150,540	$150,540
42" RCP	LF	1309	$85	$111,265	$111,265
48" RCP	LF	1585	$100	$158,500	$158,500
54" RCP	LF	2076	$125	$259,500	$259,500
60" RCP	LF	0	$145	$0	$0
66" RCP	LF	644	$165	$106,260	$106,260
72" RCP	LF	217	$215	$46,655	$46,655
78" RCP	LF	0	$275	$0	$0
84" RCP	LF	1422	$325	$462,150	$462,150
108" RCP	LF	472	$400	$188,800	$188,800
30" BEND	EA	1	$1,200	$1,200	
36" BEND	EA	2	$1,450	$2,900	$2,900
42" BEND	EA	2	$1,700	$3,400	$3,400
48" BEND	EA	3	$2,000	$6,000	$6,000
54" BEND	EA	3	$2,300	$6,900	$6,900
60" BEND	EA	0	$2,525	$0	$0
66" BEND	EA	0	$2,750	$0	$0
72" BEND	EA	1	$2,975	$2,975	$2,975
84" BEND	EA	2	$3,200	$6,400	$6,400

DRAINAGE COSTS (CONT.)

DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST	REIMBURSABLE COST
18"X18"x24" WYE	EA	2	$950		$1,900	
24"X24"x36" WYE	EA	1	$1,250		$1,250	
36"X48"x48" WYE	EA	1	$1,550		$1,550	$1,550
18" FES	EA	1	$800		$800	
54" FES	EA	1	$2,400		$2,400	$2,400
66" FES	EA	1	$3,000		$3,000	$3,000
108" HW & WW	EA	1	$13,750		$13,750	$13,750
TYPE 1 MANHOLE	EA	15	$5,000		$75,000	$75,000
TYPE 2 MANHOLE	EA	6	$2,500		$15,000	$15,000
4' D-10-R INLET	EA	8	$4,000		$32,000	
6' D-10-R INLET	EA	0	$6,000		$0	
8' D-10-R INLET	EA	8	$8,000		$64,000	
10' D-10-R INLET	EA	4	$10,000		$40,000	
12' D-10-R INLET	EA	5	$12,000		$60,000	
16' D-10-R INLET	EA	5	$16,000		$80,000	
18' D-10-R INLET	EA	2	$18,000		$36,000	
20' D-10-R INLET	EA	1	$20,000		$20,000	
WETLAND CHANNEL	LF	777	$285		$221,445	$221,445
(3) 5'H X 9'W CBC	LF	100	$2,500		$250,000	$250,000
POND #2 (SKY SOX)	EA	1	$895,605 (2004 Dollars)	1.104 (Multiplier)	$988,748	$988,748
					$3,528,418	$3,083,138
10% ENGINEERING AND CONTINGENCIES					$352,842	$308,314
				TOTAL	**$3,881,260**	**$3,391,452**
				FEES		**$1,080,737**

*** Drainage Facility Costs are greater than Pond Facility Fees, Therefore Pond Facility Fees will not be required**

DETENTION POND (FACILITY) COSTS

DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST	REIMBURSABLE COST
INTERIM REG. DET. POND #6	EA	1	$750,000		$750,000	$750,000
REG. DET. POND #2 (SKY SOX)	EA	1	$1,861,185 (2004 Dollars)	1.092 (Multiplier)	$2,032,414	$2,032,414
			SUBTOTAL		$2,782,414	$2,782,414
	10%	ENGINEERING AND CONTINGENCIES			$278,241	$278,241
			TOTAL		**$3,060,655**	**$3,060,655**
			FEES			**$237,595**

*** Pond Facility Costs are greater than Pond Facility Fees, Therefore Pond Facility Fees will not be required**

DETENTION POND (LAND) COSTS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
INTERIM REG. DET. POND #6	AC	16	$52,550	$840,800	$840,800
REG. DET. POND #2 (SKY SOX)	EA	1	$1,538,874	$1,538,874	$1,538,874
			SUBTOTAL	$2,379,674	$2,379,674
	0%	ENGINEERING AND CONTINGENCIES		$0	$0
			TOTAL	**$2,379,674**	**$2,379,674**
			FEES		**$97,536**

*** Detetntion Pond Land Costs are greater than Pond Land Fees, Therefore Pond Land Fees will not be required**

BRIDGE COSTS

*Marksheffel Bridge will not be constructed until land is developed adjacent to Marksheffel Road and Sand Creek. This may likely happen in 2008-2009. Total amount of reimbursable per Annexation Agreement is equal to 50% of the cost. The total cost is estimated at $1,562,000, Therefore $787,000 is reimbursable.

FEES	**$67,903**

*** Bridge Costs are greater than Bridge Fees, Therefore Bridge Fees will not be required**

DRAINAGE FEE COMPARISON - FOR COST INCREASE (For Information Only)
1996 - 2006 DOLLARS

	1996	2006	DIFF	% INCREASE	MULTIPLIER
DRAINAGE	$4,895	$8,133	$3,238	166%	1.66
BRIDGE	$323	$511	$188	158%	1.58
POND LAND	$175	$734	$559	419%	4.19
POND FACILITY	$1,213	$1,788	$575	147%	1.47

CONSTRUCTION COST OPINION PER DBPS (For Information Only)

Tributary Drainageway Conveyance Cost Estimate (pg. 73 DBPS)

SEG/DESCRIPTION	UNIT	QUANTITY	UNIT COST	GRADE CONTROLS	LENGTH	REIMBURSABLE COST
155-1 100-YR GRASSLINED	LF	550	$175	4	140	$121,450
154 100-YR GRASSLINED	LF	2100	$200	10	600	$528,000
SUB-TOTAL (DBPS Dollars)						**$649,450**
***(2006 Dollars)**	*(2006 Dollars) - Drainage Fee Multiplier - See previous sheet - 1.66					***$1,079,056***

Roadway Culvert Crossing Cost Estimate (pg. 76 DBPS)

DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST	REIMBURSABLE COST
Vollmer Road - 2-60" RCP	LF	60	$240		$14,400	$0
Woodmen Road - 4'H x 4'W CBC	LF	400	$210		$84,000	$84,000
Vollmer Road - 2-6'H x 10'W CBC	LF	80	$690		$55,200	$0
SUB-TOTAL (DBPS Dollars)						**$84,000**
***(2006 Dollars)**	*(2006 Dollars) - Drainage Fee Multiplier - See previous sheet - 1.66					***$139,565***

Detention Basin Cost Estimate (pg. 80 DBPS)

DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST	REIMBURSABLE COST
SC-6	AF	125	$10,000	$15,000	$1,265,000	$1,265,000
SUB-TOTAL (DBPS Dollars)						**$1,265,000**
***(2006 Dollars)**	*(2006 Dollars) - Pond Facility Fee Multiplier - See previous sheet - 1.47					***$1,864,650***

TOTAL REIMBURSABLE FACILITIES AMOUNT PER DPBS - Detention and Facilities (2006 Dollars) **$3,083,270**

TOTAL REIMBURSABLE AMOUNT FOR FOREST MEADOWS FILING NO. 1 (2006 Dollars) **$6,452,107**

ESTIMATED CREDITS OWED FILING NO. 1 **$3,368,837**

FOREST MEADOWS FILING NO. 4
Construction Cost Opinion

PROPOSED FILING NO. 4 STORM SEWER SYSTEM (DBPS Segments 152-2, 157, Portion of SC #3, & SC #5)

DRAINAGE COSTS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
18" RCP	LF	95	$35	$3,325	
24" RCP	LF	0	$45	$0	
30" RCP	LF	105	$55	$5,775	
36" RCP	LF	1753	$65	$113,945	$113,945
42" RCP	LF	0	$85	$0	$0
48" RCP	LF	3312	$100	$331,200	$331,200
54" RCP	LF	483	$125	$60,375	$60,375
60" RCP	LF	63	$145	$9,135	$9,135
66" RCP	LF	1265	$165	$208,725	$208,725
72" RCP	LF	3255	$215	$699,825	$699,825
78" RCP	LF	0	$275	$0	$0
84" RCP	LF	254	$325	$82,550	$82,550
30" BEND	EA	0	$1,200	$0	
36" BEND	EA	3	$1,450	$4,350	$4,350
42" BEND	EA	0	$1,700	$0	$0
48" BEND	EA	3	$2,000	$6,000	$6,000
54" BEND	EA	1	$2,300	$2,300	$2,300
60" BEND	EA	0	$2,525	$0	$0
66" BEND	EA	3	$2,750	$8,250	$8,250
72" BEND	EA	6	$2,975	$17,850	$17,850
84" BEND	EA	1	$3,200	$3,200	$3,200

FOREST MEADOWS FILING NO. 4
Construction Cost Opinion

DRAINAGE COSTS (CONT.)

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
72" FES	EA	1	$4,500	$4,500	$4,500
84" HW & WW	EA	1	$12,500	$12,500	$12,500
TYPE 1 MANHOLE	EA	13	$5,000	$65,000	$65,000
TYPE 2 MANHOLE	EA	5	$2,500	$12,500	$12,500
4' D-10-R INLET	EA	4	$4,000	$16,000	
6' D-10-R INLET	EA	2	$6,000	$12,000	
8' D-10-R INLET	EA	4	$8,000	$32,000	
10' D-10-R INLET	EA	0	$10,000	$0	
12' D-10-R INLET	EA	2	$12,000	$24,000	
INTERIM REG. DET. POND #3	EA	1	$1,500,000	$1,500,000	$1,500,000
			SUBTOTAL	$3,235,305	$3,142,205
		10%	ENGINEERING AND CONTINGENCIES	$323,531	$314,221
			TOTAL	**$3,558,836**	**$3,456,426**
			FEES		**$1,260,208**

*** Facility Costs are greater than Drainage Fees, Therefore Drainage Fees will not be required**

FOREST MEADOWS FILING NO. 4
Construction Cost Opinion

DETENTION POND (FACILITY) COSTS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
REGIONAL DET. POND #3	EA	1	$500,000	$500,000	$500,000
			SUBTOTAL	$500,000	$500,000
		10%	ENGINEERING AND CONTINGENCIES	$50,000	$50,000
			TOTAL	**$550,000**	**$550,000**
			FEES		**$277,051**

*** Facility Costs are greater than Pond Facility Fees, Therefore Pond Facility Fees will not be required**

DETENTION POND (LAND) COSTS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
REGIONAL DET. POND #3	AC	25	$52,550	$1,313,750	$1,313,750
			SUBTOTAL	$1,313,750	$1,313,750
		0%	ENGINEERING AND CONTINGENCIES	$0	$0
			TOTAL	**$1,313,750**	**$1,313,750**
			FEES		**$113,733**

*** Detetntion Pond Land Costs are greater than Pond Land Fees, Therefore Pond Land Fees will not be required**

FOREST MEADOWS FILING NO. 4
Construction Cost Opinion

BRIDGE COSTS

*Marksheffel Bridge will not be constructed until land is developed adjacent to Marksheffel Road and Sand Creek. This may likely happen in 2008-2009. Total amount of reimbursable per Annexation Agreement is equal to 50% of the cost. The total cost is estimated at $1,562,000, Therefore $787,000 is reimbursable.

FEES	**$79,179**

*** Bridge Costs are greater than Bridge Fees, Therefore Bridge Fees will not be required**

DRAINAGE FEE COMPARISON - FOR COST INCREASE (For Information Only)

1996 - 2006 DOLLARS

	1996	2006	DIFF	% INCREASE	MULTIPLIER
DRAINAGE	$4,895	$8,133	$3,238	166%	1.66
BRIDGE	$323	$511	$188	158%	1.58
POND LAND	$175	$734	$559	419%	4.19
POND FACILITY	$1,213	$1,788	$575	147%	1.47

FOREST MEADOWS FILING NO. 4
Construction Cost Opinion

CONSTRUCTION COST OPINION PER DBPS (For Information Only)
Tributary Drainageway Conveyance Cost Estimate (pg. 73 DBPS)

SEG/DESCRIPTION	UNIT	QUANTITY	UNIT COST	GRADE CONTROLS	LENGTH	REIMBURSABLE COST
152-2 100-YR GRASSLINED	LF	800	$150	2	100	$138,000
157 100-YR GRASSLINED	LF	2400	$200	13	520	$573,600
SUB-TOTAL (DBPS Dollars)						**$711,600**
***(2006 Dollars)**	*(2006 Dollars) - Drainage Fee Multiplier - See previous sheet - 1.66					***$1,182,317***

Roadway Culvert Crossing Cost Estimate (pg. 76 DBPS)

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	REIMBURSABLE COST
Woodmen Road - 4'H x 6'W CBC	LF	300	$240	$72,000	$72,000
SUB-TOTAL (DBPS Dollars)					**$72,000**
***(2006 Dollars)**	*(2006 Dollars) - Drainage Fee Multiplier - See previous sheet - 1.66				***$119,627***

Detention Basin Cost Estimate (pg. 80 DBPS)

DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST	REIMBURSABLE COST
SC-3	AF	140	$10,000	$15,000	$1,415,000	$1,415,000
SC-5	AF	24	$10,000	$15,000	$255,000	$255,000
SUB-TOTAL (DBPS Dollars)						**$1,670,000**
***(2006 Dollars)**	*(2006 Dollars) - Pond Facility Fee Multiplier - See previous sheet - 1.47					***$2,461,632***

TOTAL REIMBURSABLE FACILITIES AMOUNT PER DPBS - Detention and Facilities (2006 Dollars) **$3,763,577**

TOTAL REIMBURSABLE AMOUNT FOR FOREST MEADOWS FILING NO. 4 (2006 Dollars) **$4,006,426**

ESTIMATED CREDITS OWED FILING NO. 4 **$242,849**

DRAINAGE COST COMPARISON AND CREDIT SUMMARY

FILING NO. 1 – (See above)

Public Facilities:

Total public, on-site drainage facility estimate	**$ 3,881,260**
Total public, reimbursable on-site drainage facility portion is	**$ 3,391,452**
Total public, non-reimbursable on-site drainage facility portion is	**$ 489,808**

FILING NO. 4 – (See above)

Public Facilities:

Total Public reimbursable facilities Estimate	**$ 3,558,836**
Total public, reimbursable on-site drainage facility portion is	**$ 3,456,426**
Total public, non-reimbursable on-site drainage facility portion is	**$ 102,410**

Engineering and Surveying, Inc. (ESI) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above is only an estimate of the facility cost and drainage basin fee amounts in 2006. Upon completion of the aforementioned improvements, including SCRDP #2, ESI shall submit the actual construction costs to the El Paso County/City Drainage Board for reimbursement.

SUMMARY

Forest Meadows Filing No. 1 & No. 4 contains 288 acres within the Sand Creek Drainage Basin with approximately 133 acres being constructed in the first filing. In this first phase of development, a total of ~532 units and associated site improvements will be constructed, with ~1220 remaining units to be constructed in Filing No. 4 and future filings. The development of the site will require drainage and water quality facilities to accommodate developed flows and meet City of Colorado Springs Drainage Criteria. The proposed drainage facilities will adequately convey, detain and route runoff from the site to Sand Creek. All drainage facilities described herein and shown on the included drainage map are subject to change due to final design considerations.

Regional Detention Facility No. 6 (Western Pond – 16 Acres) will be constructed to control the release of the upstream development at or near the ultimate sized intended for the Regional Pond per the SCDBPS. The interim facility will be a 75 ac-ft pond verses the ultimate facility being 87 ac-ft. It will be the responsibility of the City of Colorado Springs or the future contributing watershed developers to expand the 75 ac-ft facility as required. Regional Detention Facility No. 3 (Eastern Pond – 25 Acres) will be constructed to control the release of the upstream development, but does not come close to the ultimate size necessary for the Regional Pond needed. Therefore, the property and channel downstream of Pond No. 3 will not be affected by the Forest Meadows development. It is likely that the interim pond will remain until off-site development occurs, or until the City of Colorado Springs deems the pond necessary.

The development of Forest Meadows shall not adversely affect adjacent or downstream property. The construction of the proposed drainage improvements, detention ponds, and future improvements to Woodmen Road will control the developed flows and release at rates no greater than the specified amount in the Sand Creek Drainage Basin Planning Study. The location of released developed flows will remain at the existing locations to preserve the downstream wetland areas, as specified by the Army Corp of Engineers. The improvements to Woodmen Road will remove and replace the existing culverts at the existing locations. These culverts will be utilized by this development for discharge of developed flows. The summary of this report concludes that the development of ~288 acres of the proposed Forest Meadows subdivision, will not discharge flows off-site in excess of the SCDBPS amount specified. Future reports tributary to this study should analyze, qualify and quantify the increase of the developed flows south of Woodmen Road.

REFERENCES

The sources of information used in the development of this study are listed below:

1. City of Colorado Springs and El Paso County "Drainage Criteria Manual", October 1987, revised November 1991.

2. Soil Survey for El Paso County, Colorado, U.S. Department of Agriculture, Soil Conservation Service, June 1980.

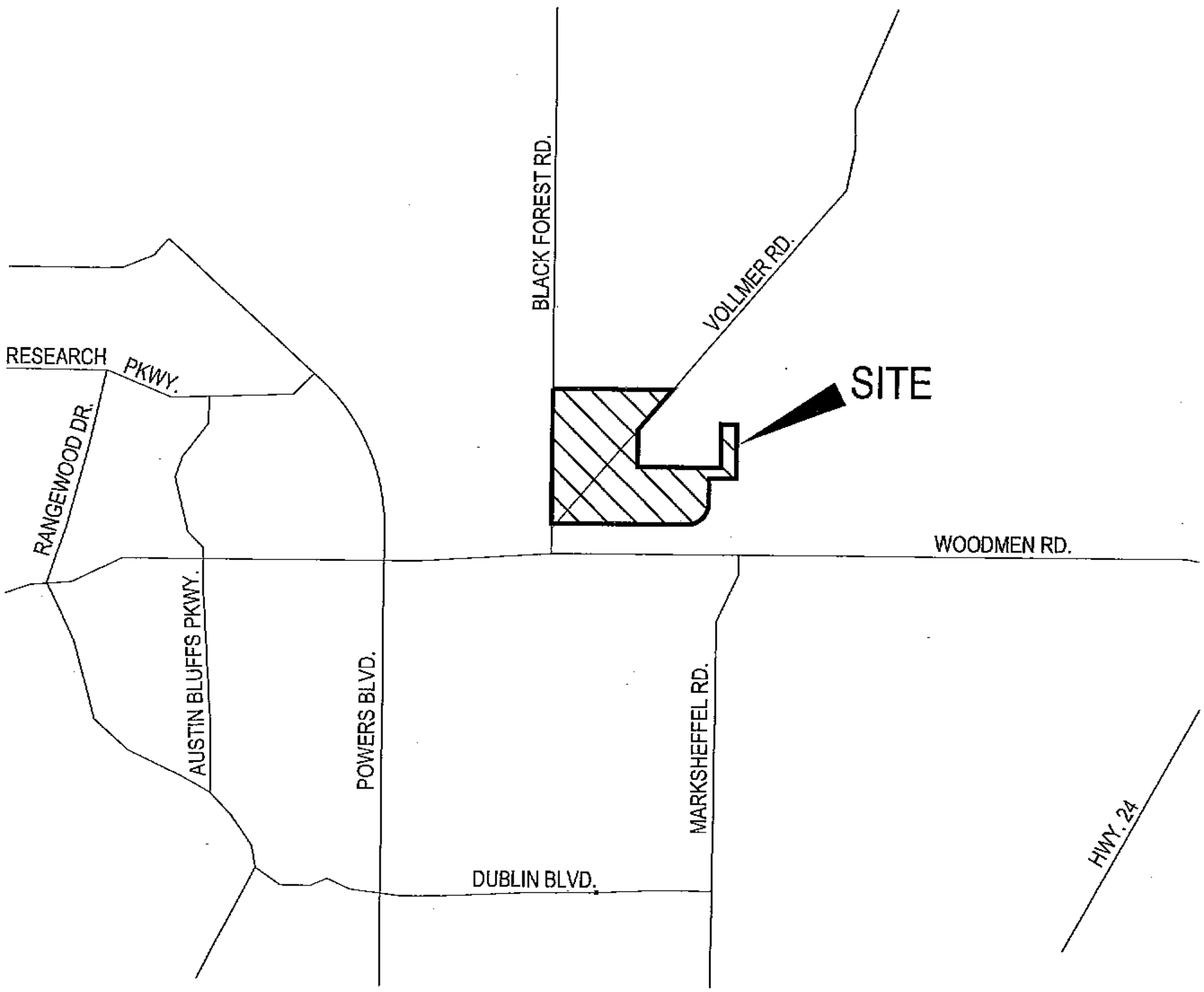
3. Master Development Drainage Plan for Woodmen Heights Master Plan, Classic Consulting Engineers and Surveyors, LLC, June 2004.

4. Sand Creek Drainage Basin Planning Study, Kiowa Engineering Corporation, March 1996

5. Preliminary/Final Drainage Report for Highland Park Filing No. 2, Law and Mariotti Consultants, Inc., July 2000, revised June 2002.

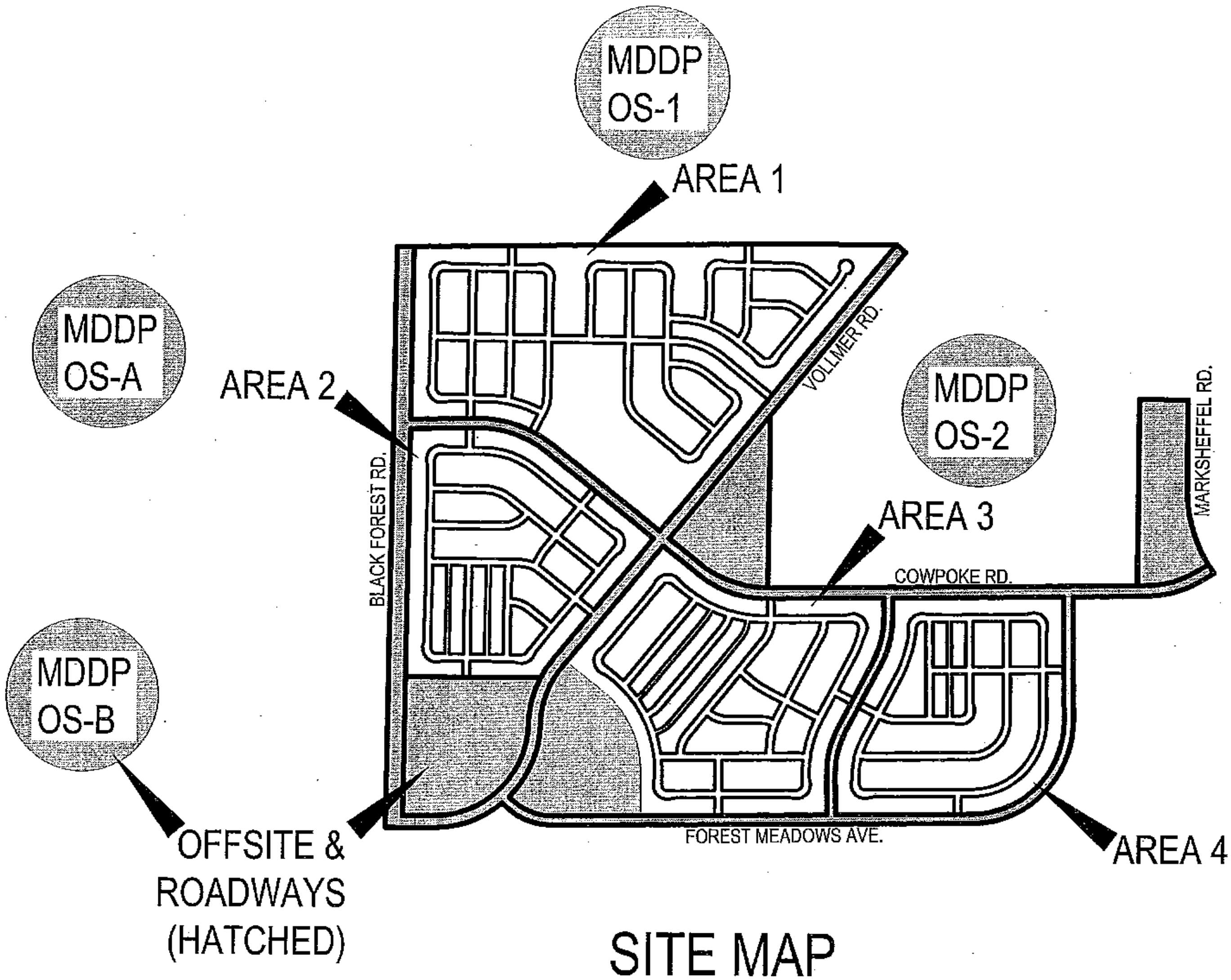
Appendix

Vicinity Map



VICINITY MAP

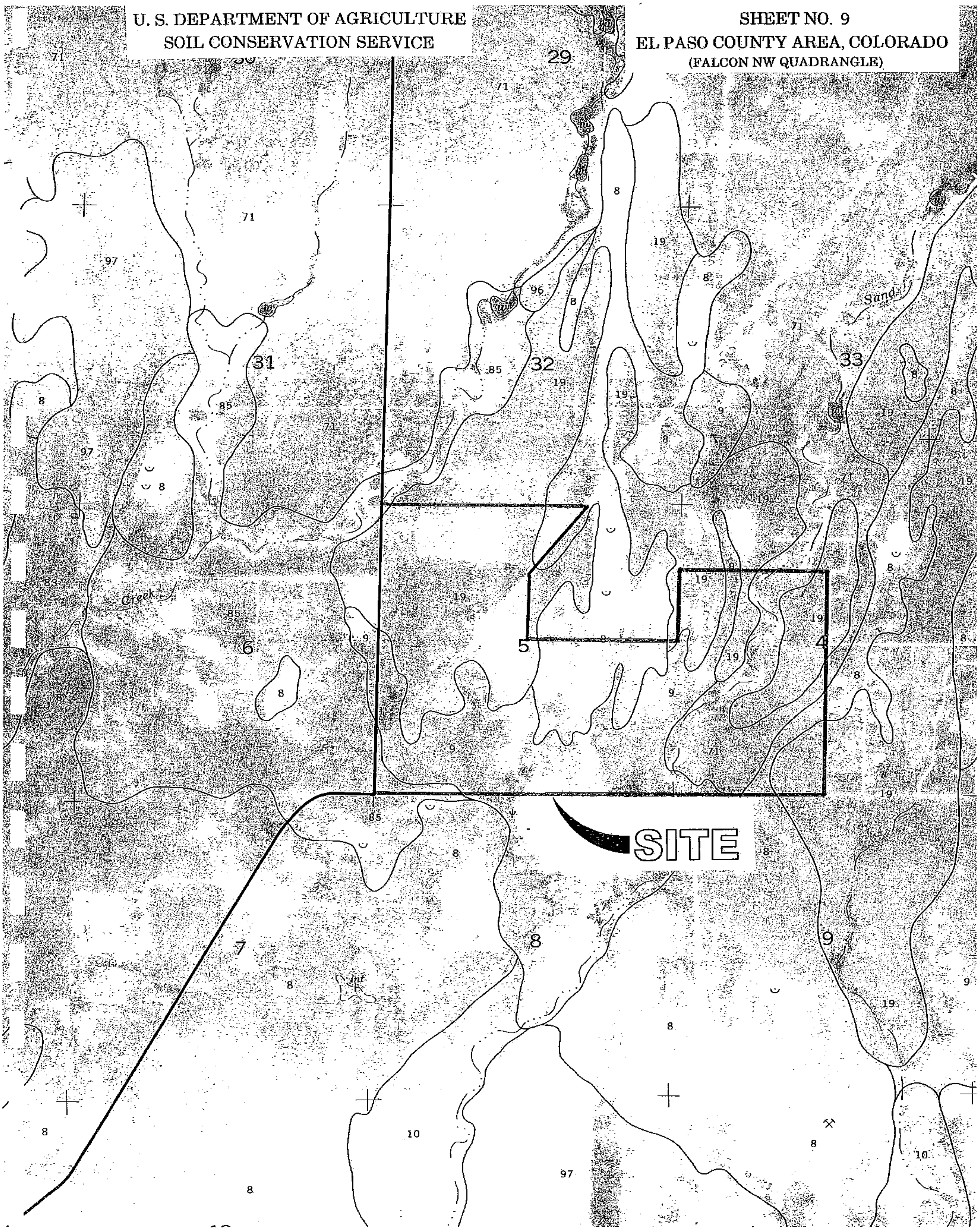
N.T.S.


MDDP OS-1
AREA 1
MDDP OS-A
AREA 2
VOLLMER RD.
MDDP OS-2
MARKSHEFFEL RD.
AREA 3
BLACK FOREST RD.
COWPOKE RD.
MDDP OS-B
OFFSITE & ROADWAYS (HATCHED)
FOREST MEADOWS AVE.
AREA 4

SITE MAP

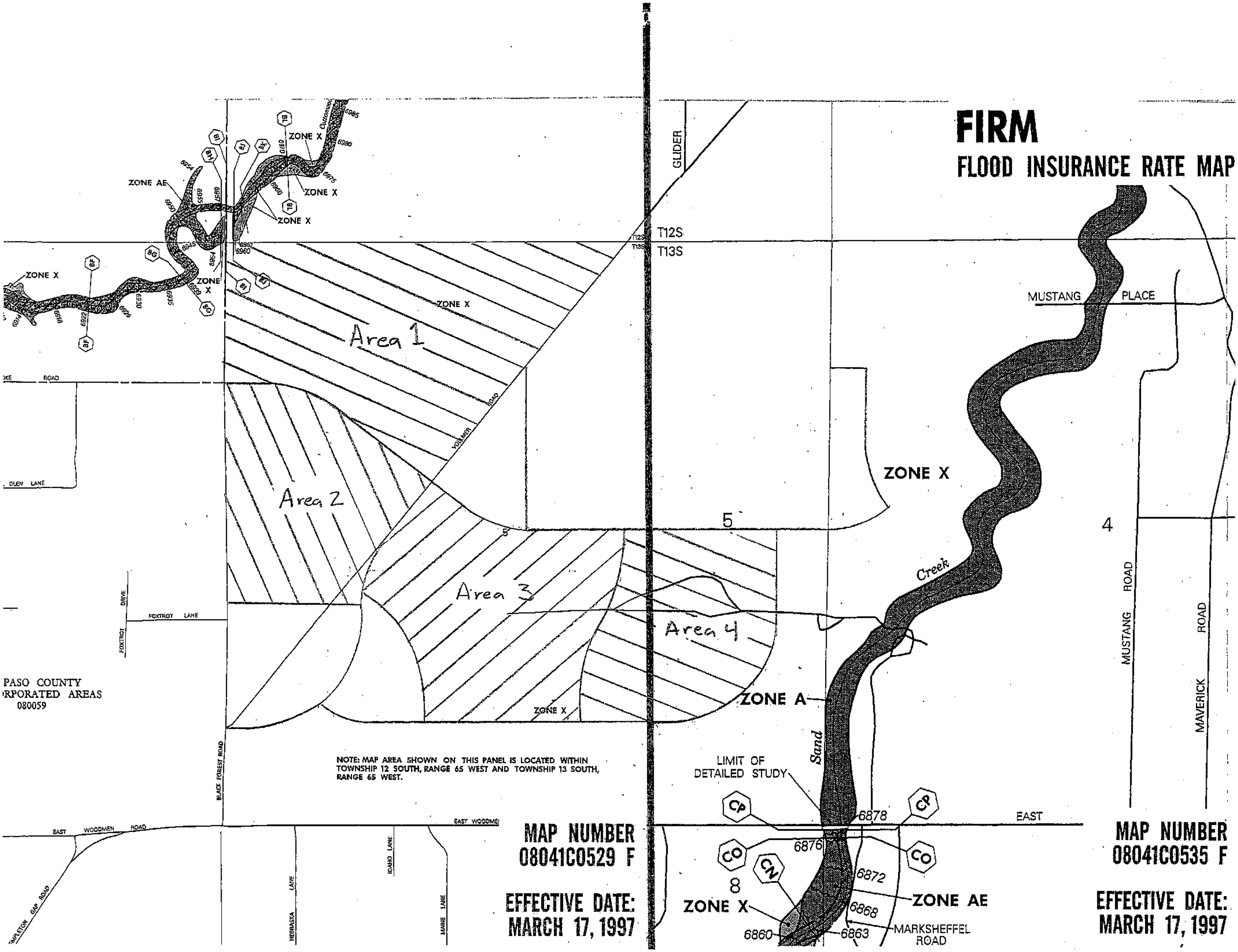
N.T.S.

Soils Map



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SHEET NO. 9
EL PASO COUNTY AREA, COLORADO
(FALCON NW QUADRANGLE)
SITE
Sand
Creek

Floodplain Map



FIRM
FLOOD INSURANCE RATE MAP
ZONE X
ZONE AE
ZONE A
Area 1
Area 2
Area 3
Area 4
T12S
T13S
GLIDER
MUSTANG PLACE
MUSTANG ROAD
MAVERICK ROAD
VOLLMER ROAD
BLACK FOREST ROAD
FOXTROT LANE
FOXTROT DRIVE
EAST WOODMEN ROAD
Sand Creek
LIMIT OF DETAILED STUDY
MARKSHEFFEL ROAD
EAST
PASO COUNTY
RPORATED AREAS
080059
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.
MAP NUMBER
08041C0529 F
EFFECTIVE DATE:
MARCH 17, 1997
MAP NUMBER
08041C0535 F
EFFECTIVE DATE:
MARCH 17, 1997

Hydrologic Calculations

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Area Drainage Summary)

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*				
BASIN	AREA TOTAL *(Acres)*	C_5 *From DCM Table 5-1*	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*	CA_5	Basin	CA_{100}
A	4.08	0.55	0.65	0.25	50	1	8.9	70 1200	2.0% 2.0%	4.9 4.9	0.2 4.0	13.2	3.7	6.5	***8.3***	***17.3***	2.25	A	2.66
B	2.89	0.57	0.67	0.25	50	1	8.9	70 650	2.0% 2.0%	4.9 4.9	0.2 2.2	11.4	3.9	6.9	***6.4***	***13.4***	1.64	B	1.93
C	2.16	0.56	0.66	0.25	70	1.4	10.6	70 400	2.0% 2.6%	4.9 5.6	0.2 1.2	12.0	3.8	6.8	***4.6***	***9.7***	1.21	C	1.42
D	1.36	0.58	0.68	0.25	50	1	8.9	70	2.0%	4.9	0.2	9.2	4.2	7.5	***3.3***	***7.0***	0.79	D	0.92
E	0.87	0.56	0.66	0.25	30	0.6	6.9	400	2.2%	5.2	1.3	8.2	4.4	7.8	***2.1***	***4.5***	0.49	E	0.57
F	1.28	0.58	0.68	0.25	50	1	8.9	70 420	2.0% 3.6%	4.9 6.6	0.2 1.1	10.2	4.1	7.2	***3.0***	***6.3***	0.74	F	0.87
G	1.85	0.56	0.66	0.25	70	1.4	10.6	70 400	2.0% 2.2%	4.9 5.2	0.2 1.3	12.1	3.8	6.8	***3.9***	***8.2***	1.03	G	1.22
H	1.32	0.58	0.68	0.25	50	1	8.9	70 420	2.0% 3.6%	4.9 6.6	0.2 1.1	10.2	4.1	7.2	***3.1***	***6.5***	0.76	H	0.90
I	1.21	0.56	0.66	0.25	50	1	8.9	70 150	2.0% 3.6%	4.9 6.6	0.2 0.4	9.6	4.2	7.4	***2.8***	***5.9***	0.68	I	0.80
J	1.37	0.58	0.68	0.25	50	1	8.9	70 350	2.0% 3.1%	4.9 6.2	0.2 0.9	10.1	4.1	7.3	***3.2***	***6.8***	0.79	J	0.93
K	2.23	0.56	0.66	0.25	50	1	8.9	70 420	2.0% 3.6%	4.9 6.6	0.2 1.1	10.2	4.1	7.2	***5.1***	***10.6***	1.25	K	1.47

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*
		From DCM Table 5-1														
L	1.46	0.57	0.67	0.25	50	1	8.9	70 430	2.0% 3.1%	4.9 6.2	0.2 1.2	10.3	4.0	7.2	***3.4***	***7.0***
M	0.80	0.56	0.66	0.25	30	0.6	6.9	370	2.8%	5.9	1.1	8.0	4.4	7.9	***2.0***	***4.2***
N	1.52	0.57	0.67	0.25	50	1	8.9	70 400	2.0% 4.0%	4.9 7.0	0.2 1.0	10.1	4.1	7.3	***3.5***	***7.4***
O	1.63	0.56	0.66	0.25	50	1	8.9	70 460	2.0% 2.0%	4.9 4.9	0.2 1.5	10.7	4.0	7.1	***3.6***	***7.6***
P	1.53	0.55	0.65	0.25	30	0.6	6.9	440	2.8%	5.9	1.3	8.2	4.4	7.9	***3.7***	***7.8***
Q	0.82	0.25	0.35	0.25	25	8	2.5	420	4.0%	7.0	1.0	5.0	5.1	9.1	***1.0***	***2.6***
R	9.27	0.90	0.90	0.90	300	6	5.2	320	2.0%	4.9	1.1	6.2	4.8	8.6	***40.1***	***71.4***
S	4.29	0.55	0.65	0.25	70	1.4	10.6	70 930	2.0% 1.3%	4.9 4.0	0.2 3.9	14.7	3.5	6.2	***8.2***	***17.2***
T	1.91	0.55	0.65	0.25	70	1.4	10.6	70 400	2.0% 1.0%	4.9 3.5	0.2 1.9	12.7	3.7	6.6	***3.9***	***8.2***
U	1.27	0.55	0.65	0.25	70	1.4	10.6	70	2.0%	4.9	0.2	10.8	4.0	7.1	***2.8***	***5.8***
V	0.85	0.25	0.35	0.25	25	0.5	6.3	520	1.8%	4.7	1.8	8.2	4.4	7.9	***0.9***	***2.3***
W	0.90	0.58	0.68	0.25	30	0.6	6.9	430	1.7%	4.6	1.6	8.5	4.4	7.7	***2.3***	***4.7***
X	2.26	0.55	0.65	0.25	70	1.4	10.6	70 400	2.0% 2.4%	4.9 5.4	0.2 1.2	12.0	3.8	6.8	***4.7***	***9.9***

CA_5	**Basin**	**CA_{100}**
0.83	L	0.98
0.45	M	0.53
0.86	N	1.02
0.91	O	1.07
0.83	P	0.99
0.21	Q	0.29
8.34	R	8.34
2.34	S	2.77
1.05	T	1.24
0.70	U	0.82
0.21	V	0.30
0.52	W	0.61
1.24	X	1.47

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*				
BASIN	AREA TOTAL *(Acres)*	C_5 (From DCM Table 5-1)	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*	CA_5	Basin	CA_{100}
Y	4.34	0.57	0.67	0.25	70	1.4	10.6	70 930	2.0% 1.8%	4.9 4.7	0.2 3.3	14.1	3.6	6.3	***8.8***	***18.4***	2.47	Y	2.90
Z	0.98	0.55	0.65	0.25	30	0.6	6.9	400	2.5%	5.5	1.2	8.1	4.4	7.9	***2.4***	***5.0***	0.54	Z	0.64
AA	1.48	0.57	0.67	0.25	30	0.6	6.9	730	1.6%	4.4	2.7	9.7	4.2	7.4	***3.5***	***7.3***	0.84	AA	0.99
BB	2.84	0.52	0.62	0.25	80	1.6	11.3	70 320	2.0% 2.5%	4.9 5.5	0.2 1.0	12.5	3.7	6.7	***5.6***	***11.8***	1.49	BB	1.77
CC	1.99	0.58	0.68	0.25	30	0.6	6.9	630	0.6%	2.7	3.9	10.8	4.0	7.1	***4.6***	***9.6***	1.15	CC	1.35
DD	0.99	0.58	0.68	0.25	50	1	8.9	70 210	2.0% 1.0%	4.9 3.5	0.2 1.0	10.2	4.1	7.3	***2.3***	***4.9***	0.57	DD	0.67
EE	0.40	0.56	0.66	0.25	30	0.6	6.9	210	1.0%	3.5	1.0	7.9	4.5	7.9	***1.0***	***2.1***	0.22	EE	0.26
FF	2.02	0.58	0.68	0.25	70	1.4	10.6	70 280	2.0% 1.2%	4.9 3.8	0.2 1.2	12.0	3.8	6.8	***4.5***	***9.3***	1.17	FF	1.37
GG	0.62	0.58	0.68	0.25	30	0.6	6.9	360	2.2%	5.2	1.2	8.1	4.4	7.9	***1.6***	***3.3***	0.36	GG	0.42
HH	2.57	0.58	0.68	0.25	50	1	8.9	70 780	2.0% 2.2%	4.9 5.2	0.2 2.5	11.7	3.9	6.9	***5.7***	***12.0***	1.49	HH	1.74
II	3.39	0.57	0.67	0.25	50	1	8.9	70 940	2.0% 1.4%	4.9 4.1	0.2 3.8	13.0	3.7	6.6	***7.1***	***14.9***	1.92	II	2.26
JJ	1.96	0.58	0.68	0.25	70	1.4	10.6	70 340	2.0% 2.5%	4.9 5.5	0.2 1.0	11.8	3.8	6.8	***4.4***	***9.1***	1.13	JJ	1.33
KK	0.95	0.58	0.68	0.25	30	0.6	6.9	420	2.4%	5.4	1.3	8.2	4.4	7.8	***2.4***	***5.1***	0.55	KK	0.64

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*				
BASIN	AREA TOTAL *(Acres)*	C_5	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*	CA_5	Basin	CA_{100}
		From DCM Table 5-1																	
LL	1.83	0.58	0.68	0.25	70	1.4	10.6	70 210	2.0% 1.9%	4.9 4.8	0.2 0.7	11.5	3.9	6.9	***4.1***	***8.6***	1.06	LL	1.24
MM	1.61	0.40	0.60	0.25	210	1.8	24.2	0	0.0%	0.0	0.0	24.2	2.7	4.9	***1.8***	***4.7***	0.64	MM	0.97
NN	1.30	0.55	0.65	0.25	70	1.4	10.6	70	2.0%	4.9	0.2	10.8	4.0	7.1	***2.9***	***6.0***	0.72	NN	0.85
OO	1.33	0.58	0.68	0.25	60	1.2	9.8	70	2.0%	4.9	0.2	10.0	4.1	7.3	***3.2***	***6.6***	0.77	OO	0.90
PP	3.98	0.47	0.59	0.25	170	1.4	22.1	530	1.3%	4.0	2.2	24.3	2.7	4.8	***5.1***	***11.3***	1.87	PP	2.33
QQ	0.97	0.57	0.67	0.25	30	0.6	6.9	400	1.0%	3.5	1.9	8.8	4.3	7.6	***2.4***	***5.0***	0.55	QQ	0.65
RR	0.97	0.58	0.68	0.25	30	0.6	6.9	330	1.0%	3.5	1.6	8.5	4.4	7.7	***2.4***	***5.1***	0.56	RR	0.66
SS	2.04	0.57	0.67	0.25	30	0.6	6.9	970	2.1%	5.1	3.2	10.1	4.1	7.3	***4.7***	***9.9***	1.16	SS	1.36
TT	1.09	0.57	0.67	0.25	30	0.6	6.9	650	2.6%	5.6	1.9	8.8	4.3	7.6	***2.7***	***5.6***	0.62	TT	0.73
UU	6.42	0.30	0.55	0.25 0.90	20 200	0.4 4	5.7 4.2	670	2.9%	6.0	1.9	11.7	3.9	6.9	***7.4***	***24.2***	1.93	UU	3.53
VV	0.67	0.56	0.66	0.25	30	0.6	6.9	220	0.8%	3.1	1.2	8.1	4.4	7.9	***1.7***	***3.5***	0.37	VV	0.44
WW	0.22	0.55	0.65	0.25	80	6.7	7.1	0	0.0%	0.0	0.0	7.1	4.6	8.2	***0.6***	***1.2***	0.12	WW	0.14

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Area Drainage Summary)

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5	C_{100} (*From DCM Table 5-1*)	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
A	2.17	0.57	0.67	0.25	70	1.4	10.6	70 250	2.0% 2.0%	4.9 4.9	0.2 0.8	11.7	3.9	6.9	***4.8***	***10.0***
B	1.67	0.57	0.67	0.25	50	1	8.9	70 500	2.0% 1.3%	4.9 4.0	0.2 2.1	11.3	3.9	7.0	***3.7***	***7.8***
C	3.43	0.57	0.67	0.25	50	1	8.9	70 960	2.0% 1.8%	4.9 4.7	0.2 3.4	12.6	3.7	6.7	***7.4***	***15.4***
D	0.53	0.58	0.68	0.25	30	0.6	6.9	180	1.3%	4.0	0.8	7.7	4.5	8.0	***1.4***	***2.9***
E	2.24	0.58	0.68	0.25	50	1	8.9	70 570	2.0% 2.0%	4.9 4.9	0.2 1.9	11.1	3.9	7.0	***5.1***	***10.7***
F	0.95	0.60	0.70	0.25	50	1	8.9	70 280	2.0% 1.0%	4.9 3.5	0.2 1.3	10.5	4.0	7.2	***2.3***	***4.7***
G	1.15	0.60	0.70	0.25	50	1	8.9	70 280	2.0% 1.4%	4.9 4.1	0.2 1.1	10.3	4.1	7.2	***2.8***	***5.8***
H	1.58	0.60	0.70	0.25	50	1	8.9	70 530	2.0% 1.4%	4.9 4.1	0.2 2.1	11.3	3.9	7.0	***3.7***	***7.7***
I	2.83	0.60	0.70	0.25	50	1	8.9	70 630	2.0% 2.5%	4.9 5.5	0.2 1.9	11.1	3.9	7.0	***6.7***	***13.9***
J	1.52	0.60	0.70	0.25	30	0.6	6.9	580	2.5%	5.5	1.7	8.7	4.3	7.7	***3.9***	***8.2***
K	2.84	0.60	0.70	0.25	50	1	8.9	70 630	2.0% 2.6%	4.9 5.6	0.2 1.9	11.0	3.9	7.0	***6.7***	***14.0***

CA_5	Basin	CA_{100}
1.23	A	1.45
0.96	B	1.12
1.97	C	2.31
0.31	D	0.36
1.30	E	1.52
0.57	F	0.66
0.69	G	0.80
0.94	H	1.10
1.70	I	1.98
0.91	J	1.06
1.70	K	1.99

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL (*Acres*)	C_5	C_{100}	C_5	Length (*ft*)	Height (*ft*)	T_C (*min*)	Length (*ft*)	Slope (*%*)	Velocity (*fps*)	T_t (*min*)	TOTAL (*min*)	I_5 (*in/hr*)	I_{100} (*in/hr*)	Q_5 (*c.f.s.*)	Q_{100} (*c.f.s.*)
		From DCM Table 5-1														
L	3.32	0.57	0.67	0.25	50	1	8.9	70 750	2.0% 1.5%	4.9 4.3	0.2 2.9	12.1	3.8	6.8	***7.2***	***15.1***
M	2.33	0.58	0.68	0.25	50	1	8.9	70 710	2.0% 1.5%	4.9 4.3	0.2 2.8	11.9	3.8	6.8	***5.2***	***10.8***
N	2.15	0.58	0.68	0.25	50	1	8.9	70 610	2.0% 1.3%	4.9 4.0	0.2 2.5	11.7	3.9	6.9	***4.8***	***10.0***
O	0.96	0.58	0.68	0.25	50	1	8.9	70 370	2.0% 1.3%	4.9 4.0	0.2 1.5	10.7	4.0	7.1	***2.2***	***4.7***
P	0.53	0.56	0.66	0.25	50	1	8.9	70 100	2.0% 1.0%	4.9 3.5	0.2 0.5	9.7	4.2	7.4	***1.2***	***2.6***
Q	1.37	0.49	0.65	0.25	50	1	8.9	70 520	2.0% 1.0%	4.9 3.5	0.2 2.5	11.7	3.9	6.9	***2.6***	***6.1***
R	2.28	0.60	0.70	0.25	50	1	8.9	70 560	2.0% 0.6%	4.9 2.7	0.2 3.4	12.6	3.7	6.6	***5.1***	***10.7***
S	1.47	0.60	0.70	0.25	50	1	8.9	70 420	2.0% 2.5%	4.9 5.5	0.2 1.3	10.4	4.0	7.2	***3.6***	***7.4***
T	1.00	0.58	0.68	0.25	50	1	8.9	70 350	2.0% 2.5%	4.9 5.5	0.2 1.1	10.2	4.1	7.2	***2.4***	***4.9***
U	2.37	0.59	0.69	0.25	50	1	8.9	70 390	2.0% 2.5%	4.9 5.5	0.2 1.2	10.4	4.0	7.2	***5.6***	***11.8***
V	1.26	0.60	0.70	0.25	50	1	8.9	70 300	2.0% 2.5%	4.9 5.5	0.2 0.9	10.1	4.1	7.3	***3.1***	***6.5***
W	2.10	0.44	0.62	0.25	50	1	8.9	70 620	2.0% 1.6%	4.9 4.4	0.2 2.3	11.5	3.9	6.9	***3.6***	***9.0***
X	1.09	0.60	0.70	0.25	30	0.6	6.9	580	2.4%	5.4	1.8	8.7	4.3	7.7	***2.8***	***5.9***

CA_5	Basin	CA_{100}
1.90	L	2.24
1.35	M	1.58
1.24	N	1.46
0.56	O	0.66
0.30	P	0.35
0.67	Q	0.89
1.38	R	1.60
0.89	S	1.03
0.58	T	0.68
1.40	U	1.63
0.76	V	0.89
0.92	W	1.30
0.65	X	0.76

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Height** *(ft)*	T_C *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		From DCM Table 5-1														
Y	1.18	0.60	0.70	0.25	50	1	8.9	70 400	2.0% 3.5%	4.9 6.5	0.2 1.0	10.2	4.1	7.2	***2.9***	***6.0***
Z	0.30	0.62	0.72	0.25	30	0.6	6.9	80	1.0%	3.5	0.4	7.3	4.6	8.2	***0.9***	***1.8***
AA	3.27	0.58	0.68	0.25	50	1	8.9	70 880	2.0% 1.6%	4.9 4.4	0.2 3.3	12.5	3.8	6.7	***7.1***	***14.8***
BB	1.77	0.57	0.67	0.25	50	1	8.9	70 440	2.0% 2.2%	4.9 5.2	0.2 1.4	10.6	4.0	7.1	***4.1***	***8.5***
CC	1.33	0.58	0.68	0.25	30	0.6	6.9	0	0.0%	0.0	0.0	6.9	4.7	8.3	***3.6***	***7.5***

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: BES
Date:
Checked by: VAS

CA_5	**Basin**	**CA_{100}**
0.70	Y	0.82
0.19	Z	0.22
1.89	AA	2.22
1.01	BB	1.19
0.77	CC	0.90

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Area Drainage Summary)

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 (*From DCM Table 5-1*)	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
A	0.75	0.57	0.67	0.25	40	0.8	8.0	270	2.2%	5.2	0.9	8.9	4.3	7.6	***1.8***	***3.9***
B	4.27	0.57	0.67	0.25	50	1	8.9	70 1600	2.0% 4.0%	4.9 7.0	0.2 3.8	13.0	3.7	6.6	***8.9***	***18.7***
C	1.48	0.60	0.70	0.25	30	0.6	6.9	810	4.0%	7.0	1.9	8.9	4.3	7.6	***3.8***	***7.9***
D	4.64	0.60	0.70	0.25	70	1.4	10.6	70 840	2.0% 5.0%	4.9 7.8	0.2 1.8	12.6	3.7	6.7	***10.5***	***21.7***
E	2.62	0.60	0.70	0.25	30	0.6	6.9	830	4.3%	7.3	1.9	8.8	4.3	7.6	***6.8***	***14.0***
F	3.07	0.60	0.70	0.25	30	0.6	6.9	800	4.2%	7.2	1.9	8.8	4.3	7.7	***7.9***	***16.5***
G	3.09	0.60	0.70	0.25	30	0.6	6.9	980	3.9%	6.9	2.4	9.3	4.2	7.5	***7.8***	***16.2***
H	4.10	0.15	0.20	0.25	30	0.6	6.9	730	1.3%	4.0	3.0	10.0	4.1	7.3	***2.5***	***6.0***
I	2.18	0.57	0.67	0.25	50	1	8.9	70 550	2.0% 0.9%	4.9 3.3	0.2 2.8	11.9	3.8	6.8	***4.8***	***10.0***
J	2.03	0.60	0.70	0.25	30	0.6	6.9	900	3.4%	6.5	2.3	9.3	4.2	7.5	***5.1***	***10.7***
K	1.74	0.57	0.67	0.25	50	1	8.9	70 490	2.0% 1.4%	4.9 4.1	0.2 2.0	11.1	3.9	7.0	***3.9***	***8.2***

CA_5	Basin	CA_{100}
0.43	A	0.50
2.42	B	2.85
0.89	C	1.03
2.80	D	3.26
1.57	E	1.83
1.84	F	2.15
1.85	G	2.16
0.62	H	0.82
1.25	I	1.47
1.22	J	1.42
1.00	K	1.17

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*				
BASIN	AREA TOTAL *(Acres)*	C_5	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*	CA_5	Basin	CA_{100}
		From DCM Table 5-1																	
L	2.08	0.58	0.68	0.25	50	1	8.9	70 350	2.0% 3.3%	4.9 6.4	0.2 0.9	10.1	4.1	7.3	***4.9***	***10.3***	1.21	L	1.42
M	1.91	0.43	0.62	0.25	170	7.5	12.7	70 180	2.0% 1.7%	4.9 4.6	0.2 0.7	13.6	3.6	6.4	***3.0***	***7.6***	0.82	M	1.18
N	1.36	0.60	0.70	0.25	50	1	8.9	70 460	2.0% 1.9%	4.9 4.8	0.2 1.6	10.8	4.0	7.1	***3.3***	***6.8***	0.82	N	0.96
O	1.97	0.60	0.70	0.25	50	1	8.9	70 530	2.0% 1.7%	4.9 4.6	0.2 1.9	11.1	3.9	7.0	***4.6***	***9.6***	1.18	O	1.38
P	2.43	0.57	0.67	0.25	50	1	8.9	70 480	2.0% 1.7%	4.9 4.6	0.2 1.8	10.9	4.0	7.1	***5.5***	***11.5***	1.39	P	1.63
Q	0.75	0.57	0.67	0.25	100	5	9.3	70 80	2.0% 2.0%	4.9 4.9	0.2 0.3	9.9	4.1	7.3	***1.8***	***3.7***	0.43	Q	0.50
R	0.30	0.55	0.65	0.25	50	1	8.9	70 90	2.0% 2.9%	4.9 6.0	0.2 0.3	9.4	4.2	7.5	***0.7***	***1.4***	0.16	R	0.19
S	2.87	0.57	0.67	0.25	70	1.4	10.6	70 310	2.0% 1.7%	4.9	0.2	10.8	4.0	7.1	***6.6***	***13.7***	1.65	S	1.94
T	3.56	0.57	0.67	0.25	70	1.4	10.6	70 920	2.0% 1.5%	4.9 4.3	0.2 3.6	14.4	3.5	6.3	***7.1***	***14.9***	2.02	T	2.38
U	1.04	0.60	0.70	0.25	30	0.6	6.9	490	0.7%	2.9	2.8	9.7	4.1	7.4	***2.6***	***5.4***	0.63	U	0.73
V	1.17	0.53	0.63	0.25	30	0.6	6.9	330	1.7%	4.6	1.2	8.1	4.4	7.9	***2.8***	***5.8***	0.63	V	0.74
W	2.88	0.56	0.66	0.25	80	1.6	11.3	70 550	2.0% 2.9%	4.9	0.2	11.5	3.9	6.9	***6.3***	***13.2***	1.62	W	1.91
X	2.70	0.58	0.68	0.25	50	1	8.9	70 1320	2.0% 1.7%	4.9 4.6	0.2 4.8	14.0	3.6	6.4	***5.6***	***11.7***	1.56	X	1.83

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*
		From DCM Table 5-1														
Y	4.47	0.57	0.67	0.25	70	1.4	10.6	70 870	2.0% 2.0%	4.9 4.9	0.2 2.9	13.7	3.6	6.4	***9.2***	***19.2***
Z	0.71	0.57	0.67	0.25	30	0.6	6.9	280	2.1%	5.1	0.9	7.8	4.5	8.0	***1.8***	***3.8***
AA	1.67	0.57	0.67	0.25	30	0.6	6.9	960	2.0%	4.9	3.2	10.2	4.1	7.3	***3.9***	***8.1***
BB	2.65	0.44	0.63	0.25	30	0.6	6.9	0	0.0%	0.0	0.0	6.9	4.7	8.3	***5.4***	***13.8***

CA_5	**Basin**	**CA_{100}**
2.54	Y	2.99
0.40	Z	0.47
0.95	AA	1.12
1.17	BB	1.67

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Area Drainage Summary)

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 (From DCM Table 5-1)	C_{100} (From DCM Table 5-1)	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
A	2.88	0.35	0.60	0.25	310	10	19.0	120	4.0%	7.0	0.3	19.3	3.1	5.5	***3.1***	***9.4***
B	0.91	0.60	0.70	0.25	30	0.6	6.9	430	1.8%	4.7	1.5	8.5	4.4	7.8	***2.4***	***5.0***
C	1.59	0.57	0.67	0.25	50	1	8.9	70 320	2.0% 1.0%	4.9 3.5	0.2 1.5	10.7	4.0	7.1	***3.6***	***7.6***
D	2.37	0.60	0.70	0.25	50	1	8.9	70 410	2.0% 2.9%	4.9 6.0	0.2 1.1	10.3	4.1	7.2	***5.8***	***12.0***
E	2.16	0.60	0.70	0.25	50	1	8.9	70 330	2.0% 3.4%	4.9 6.5	0.2 0.9	10.0	4.1	7.3	***5.3***	***11.0***
F	1.85	0.57	0.67	0.25	50	1	8.9	70 390	2.0% 0.9%	4.9 3.3	0.2 2.0	11.1	3.9	7.0	***4.2***	***8.7***
G	1.54	0.60	0.70	0.25	70	1.4	10.6	70 270	2.0% 4.0%	4.9 7.0	0.2 0.6	11.5	3.9	6.9	***3.6***	***7.5***
H	2.02	0.60	0.70	0.25	70	1.4	10.6	70 340	2.0% 2.5%	4.9 5.5	0.2 1.0	11.8	3.8	6.8	***4.7***	***9.7***
I	0.70	0.90	0.95	0.25	5	0.1	2.8	1000	1.8%	4.7	3.5	6.4	4.8	8.5	***3.0***	***5.7***
J	3.15	0.60	0.70	0.25	70	1.4	10.6	70 580	2.0% 1.1%	4.9 3.7	0.2 2.6	13.4	3.6	6.5	***6.9***	***14.3***

CA_5	Basin	CA_{100}
1.0080	A	1.7280
0.5493	B	0.6403
0.9115	C	1.0705
1.4220	D	1.6590
1.2960	E	1.5120
1.0606	F	1.2456
0.9295	G	1.0835
1.2192	H	1.4212
0.6300	I	0.6650
1.9013	J	2.2163

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		From DCM Table 5-1														
K	1.33	0.60	0.70	0.25	30	0.6	6.9	640	1.1%	3.7	2.9	9.8	4.1	7.3	***3.3***	***6.9***
L	0.66	0.60	0.70	0.25	30	0.6	6.9	280	4.0%	7.0	0.7	7.6	4.5	8.0	***1.8***	***3.7***
M	1.61	0.60	0.70	0.25	30	0.6	6.9	750	2.3%	5.3	2.4	9.3	4.2	7.5	***4.1***	***8.5***
N	1.56	0.60	0.70	0.25	70	1.4	10.6	70 280	2.0% 4.0%	4.9 7.0	0.2 0.7	11.5	3.9	6.9	***3.7***	***7.6***
O	2.56	0.60	0.70	0.25	70	1.4	10.6	70 830	2.0% 2.3%	4.9 5.3	0.2 2.6	13.4	3.6	6.5	***5.6***	***11.7***
P	2.40	0.57	0.67	0.25	70	1	11.8	70 700	2.0% 2.2%	4.9 5.2	0.2 2.2	14.3	3.5	6.3	***4.9***	***10.2***
Q	4.86	0.57	0.67	0.25	70	1	11.8	70 820	2.0% 1.3%	4.9 3.9	0.2 3.5	15.6	3.4	6.1	***9.5***	***19.8***
R	3.22	0.60	0.70	0.25	70	1.4	10.6	70 690	2.0% 1.0%	4.9 3.5	0.2 3.3	14.1	3.6	6.3	***6.9***	***14.4***
S	0.62	0.60	0.70	0.25	30	0.6	6.9	280	4.0%	7.0	0.7	7.6	4.5	8.0	***1.7***	***3.5***
T	3.33	0.60	0.70	0.25	70	1.4	10.6	70 550	2.0% 1.8%	4.9 4.7	0.2 2.0	12.8	3.7	6.6	***7.5***	***15.5***
U	0.86	0.57	0.67	0.25	30	0.6	6.9	330	4.0%	7.0	0.8	7.7	4.5	8.0	***2.2***	***4.6***

CA_5	Basin	CA_{100}
0.8028	K	0.9358
0.3984	L	0.4644
0.9718	M	1.1328
0.9416	N	1.0976
1.5452	O	1.8012
1.3759	P	1.6159
2.7861	Q	3.2721
1.9435	R	2.2655
0.3742	S	0.4362
2.0099	T	2.3429
0.4883	U	0.5743

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		From DCM Table 5-1														
V	2.22	0.57	0.67	0.25	30	0.6	6.9	1060	1.8%	4.7	3.8	10.7	4.0	7.1	***5.0***	***10.5***
W	0.79	0.57	0.67	0.25	30	0.6	6.9	350	2.2%	5.2	1.1	8.0	4.4	7.9	***2.0***	***4.2***
X	2.22	0.57	0.67	0.25	30	0.6	6.9	1200	2.1%	5.1	3.9	10.9	4.0	7.1	***5.0***	***10.5***
Y	0.50	0.57	0.67	0.25	30	0.6	6.9	240	2.0%	4.9	0.8	7.7	4.5	8.0	***1.3***	***2.7***

* Intensity equations assume a minimum travel time of 5 minutes.

CA_5	Basin	CA_{100}
1.2604	V	1.4824
0.4529	W	0.5319
1.2604	X	1.4824
0.2866	Y	0.3366

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Area Drainage Summary)

From Composite Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 *From DCM Table 5-1*	C_{100}	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
A	2.83	0.90	0.95	0.25	5	0.1	2.8	2680	2.5%	5.5	8.1	10.9	4.0	7.1	***10.1***	***19.0***
B	0.82	0.25	0.35	0.25	25	0.5	6.3	1140	2.5%	5.5	3.4	9.8	4.1	7.4	***0.8***	***2.1***
C	2.85	0.90	0.95	0.25	5	0.1	2.8	2670	2.5%	5.5	8.0	10.9	4.0	7.1	***10.2***	***19.1***
D	2.24	0.90	0.95	0.25	5	0.1	2.8	1490	1.4%	4.1	6.0	8.8	4.3	7.6	***8.7***	***16.3***
E	1.68	0.90	0.95	0.25	20	0.4	5.7	1110	1.9%	4.8	3.8	9.5	4.2	7.4	***6.3***	***11.9***
E1	1.14	0.90	0.95	0.25	5	0.1	2.8	1110	1.9%	4.8	3.8	6.7	4.7	8.4	***4.8***	***9.1***
F	2.90	0.90	0.95	0.25	5	0.1	2.8	1010	2.5%	5.5	3.0	5.9	4.9	8.7	***12.8***	***24.0***
G	0.54	0.25	0.35	0.25	25	0.5	6.3	910	1.9%	4.8	3.1	9.5	4.2	7.5	***0.6***	***1.4***
H	2.21	0.90	0.95	0.25	5	0.1	2.8	1340	1.3%	4.0	5.6	8.4	4.4	7.8	***8.7***	***16.3***
I	5.08	0.90	0.95	0.25	5	0.1	2.8	2650	1.8%	4.7	9.4	12.2	3.8	6.7	***17.3***	***32.5***
J	0.56	0.25	0.35	0.25	25	0.5	6.3	490	1.2%	3.8	2.1	8.5	4.4	7.8	***0.6***	***1.5***

CA_5	Basin	CA_{100}
2.55	A	2.69
0.21	B	0.29
2.57	C	2.71
2.02	D	2.13
1.51	E	1.60
1.03	E1	1.08
2.61	F	2.76
0.14	G	0.19
1.99	H	2.10
4.57	I	4.83
0.14	J	0.20

From *Composite Runoff Coefficient Summary*				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T_t)	INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5 (From DCM Table 5-1)	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
K	1.84	0.90	0.95	0.25	5	0.1	2.8	1340	1.3%	4.0	5.6	8.4	4.4	7.8	***7.2***	***13.6***
L	4.05	0.90	0.95	0.25	5	0.1	2.8	2260	1.8%	4.7	8.0	10.8	4.0	7.1	***14.5***	***27.2***
M	1.40	0.90	0.95	0.25	5	0.1	2.8	800	1.6%	4.4	3.0	5.8	4.9	8.7	***6.2***	***11.6***
N	1.31	0.90	0.95	0.25	5	0.1	2.8	800	1.6%	4.4	3.0	5.8	4.9	8.7	***5.8***	***10.8***
O	0.43	0.25	0.35	0.25	25	0.5	6.3	630	3.3%	6.4	1.7	8.0	4.4	7.9	***0.5***	***1.2***
P	1.22	0.90	0.95	0.25	5	0.1	2.8	630	3.3%	6.4	1.7	5.0	5.1	9.1	***5.6***	***10.5***
Q	0.36	0.25	0.35	0.25	25	0.5	6.3	630	3.3%	6.4	1.7	8.0	4.4	7.9	***0.4***	***1.0***
R	0.57	0.25	0.35	0.25	25	0.5	6.3	1010	1.9%	4.8	3.5	9.8	4.1	7.4	***0.6***	***1.5***
S	0.97	0.90	0.95	0.25	5	0.1	2.8	1010	1.9%	4.8	3.5	6.3	4.8	8.5	***4.2***	***7.9***
T	0.51	0.25	0.35	0.25	25	0.5	6.3	700	1.2%	3.8	3.0	9.4	4.2	7.5	***0.5***	***1.3***
U	1.10	0.90	0.95	0.25	5	0.1	2.8	700	1.8%	4.7	2.5	5.3	5.0	8.9	***5.0***	***9.3***

CA_5	Basin	CA_{100}
1.66	K	1.75
3.65	L	3.85
1.26	M	1.33
1.18	N	1.24
0.11	O	0.15
1.10	P	1.16
0.09	Q	0.13
0.14	R	0.20
0.87	S	0.92
0.13	T	0.18
0.99	U	1.05

From *Composite Runoff Coefficient Summary*				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 (From DCM Table 5-1)	C_{100} (From DCM Table 5-1)	C_5	Length *(ft)*	Height *(ft)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
V	2.66	0.90	0.95	0.25	5	0.1	2.8	1790	1.8%	4.7	6.4	9.2	4.2	7.5	***10.1***	***19.0***
W	0.96	0.25	0.35	0.25	25	0.5	6.3	1550	1.8%	4.7	5.5	11.8	3.8	6.8	***0.9***	***2.3***
X	0.30	0.25	0.35	0.25	25	0.5	6.3	340	1.0%	3.5	1.6	7.9	4.5	7.9	***0.3***	***0.8***
Y	1.29	0.90	0.95	0.25	5	0.1	2.8	710	1.0%	3.5	3.4	6.2	4.8	8.6	***5.6***	***10.5***
Z	1.75	0.90	0.95	0.25	5	0.1	2.8	800	1.5%	4.3	3.1	5.9	4.9	8.7	***7.7***	***14.4***
AA	4.11	0.90	0.95	0.25	5	0.1	2.8	1950	2.1%	5.1	6.4	9.2	4.2	7.5	***15.6***	***29.4***
BB	2.39	0.90	0.95	0.25	5	0.1	2.8	560	2.0%	4.9	1.9	5.0	5.1	9.1	***11.0***	***20.6***
CC	0.34	0.25	0.35	0.25	25	0.5	6.3	560	2.0%	4.9	1.9	8.2	4.4	7.8	***0.4***	***0.9***
DD	9.70	0.60	0.70	0.25 0.90	15 300	0.5 6	4.1 5.2	100	2.0%	4.9	0.3	9.6	4.2	7.4	***24.2***	***50.3***
EE	2.44	0.90	0.95	0.25	5	0.1	2.8	1570	2.0%	4.9	5.3	8.1	4.4	7.9	***9.7***	***18.2***
FF	16.47	0.60	0.70	0.25	50	1	8.9	70 400	2.0% 2.0%	4.9 4.9	0.2 1.3	10.5	4.0	7.2	***39.7***	***82.5***
GG	12.61	0.60	0.70	0.25 0.90	15 300	0.5 6	4.1 5.2	300	1.0%	3.5	1.4	10.7	4.0	7.1	***30.2***	***62.7***
OS1	10.76	0.60	0.70	0.25 0.90	15 200	0.5 6	4.1 3.7	700	2.0%	4.9	2.4	10.2	4.1	7.3	***26.3***	***54.6***

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: BES

Date: ______

CA_5	Basin	CA_{100}
2.39	V	2.53
0.24	W	0.34
0.08	X	0.11
1.16	Y	1.23
1.58	Z	1.66
3.70	AA	3.90
2.15	BB	2.27
0.09	CC	0.12
5.82	DD	6.79
2.20	EE	2.32
9.88	FF	11.53
7.57	GG	8.83
6.46	OS1	7.53

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Surface Routing Summary)

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}	Comments
1 West	A,B	3.89	4.59	15.4	3.4	6.1	13.3	27.9	2-10' D-10-R Sump Inlets
1A West	C,D	1.99	2.35	13.8	3.6	6.4	7.2	15.0	
1A East	E,F,G,H	3.02	3.56	13.2	3.7	6.5	11.1	23.2	
1 & 1A	A,B,C,D,E,F,G,H	8.91	10.49	15.4	3.4	6.1	30.5	63.9	
Design Point 1 & 1A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 15.1cfs; Q100 = 31.6cfs									
2 West	I,J,K,L,O	4.46	5.25	11.4	3.9	6.9	17.4	36.4	2-8' D-10-R Sump Inlets
2 North	M,N	1.31	1.54	10.1	4.1	7.3	5.4	11.2	
2A North	P,Q	1.04	1.27	9.2	4.2	7.5	4.4	9.6	
2 & 2A	I,J,K,L,M,N,O,P,Q	6.81	8.06	11.4	3.9	6.9	26.5	55.9	
Design Point 2 & 2A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 13.3cfs, Q100 = 28.0cfs									
4 West	II,JJ	3.06	3.59	15.4	3.4	6.1	10.5	21.9	2-6' D-10-R Sump Inlets
4 East	KK,LL,MM,NN,OO	3.74	4.60	24.2	2.7	4.9	10.2	22.3	
4A East	PP,QQ,RR	2.98	3.63	27.8	2.5	4.5	7.5	16.4	
4 & 4A	II,JJ,KK,LL,MM,NN, OO,PP,QQ,RR	9.78	11.83	27.8	2.5	4.5	24.7	53.3	
Design Point 4 & 4A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 12.4cfs, Q100 = 26.7cfs									
5 West	X,Y	3.71	4.37	14.1	3.6	6.3	13.2	27.7	2-20' D-10-R Sump Inlets
5 East	Z,AA,BB,CC,DD,EE,FF,GG	6.34	7.47	16.5	3.3	5.9	21.0	44.1	
5A West	S,T,U,V,W	4.82	5.74	18.9	3.1	5.5	14.9	31.7	
5A East	HH	1.49	1.74	11.7	3.9	6.9	5.7	12.0	
5 & 5A	S,T,U,V,W,X,Y,Z,AA,BB, CC,DD,EE,FF,GG,HH	16.36	19.33	18.9	3.1	5.5	50.7	106.6	
Design Point 5 & 5A flows from each direction have been split equally due to overtopping at the low point, Q5 = 25.4cfs, Q100 = 53.3cfs									

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Surface Routing Summary)

Design Point(s)	Contributing Basins/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}	Comments
1A North	A,B,1/2C	3.17	3.73	13.9	3.6	6.4	11.4	23.8	2-18' D-10-R At-Grade Inlets
1B North	E,F,G,H, 1/2 I	4.34	5.07	14.0	3.6	6.4	15.5	32.3	
Design Point 1A flowby Q5=3.9 cfs, Q100=10.6 cfs, DP1B flowby Q5=6.7 cfs, Q100=14.4 cfs									
2 West	DP(1A) flowby,1/2C,D	2.37	3.17	16.8	3.3	5.9	7.8	18.6	2-8' D-10-R Sump Inlets
2A West	DP(1B) flowby,1/2 I,J,K	5.34	6.30	14.1	3.6	6.3	19.0	39.9	
2 & 2A	DP(1A & 1B) flowby,1/2 C,D,1/2 I,J,K	7.72	9.48	16.8	3.3	5.9	25.4	55.5	
Design Point 2 & 2A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 12.7cfs, Q100 = 27.7cfs									
3	L,M,N,O,P,Q	6.02	7.17	13.8	3.6	6.4	21.7	45.9	1-20' D-10-R At-Grade Inlet
DP3 flowby Q5=12.1 cfs, Q100=36.3 cfs									
4	DP(4) flowby,R	4.73	7.28	14.3	3.5	6.3	16.7	45.8	1-12' D-10-R At-Grade Inlet
DP3 flowby Q5=10.8 cfs, Q100=39.9 cfs									
5 North	DP(4) flowby,S,T,U,V	8.35	11.51	15.3	3.4	6.1	28.7	70.3	2-12' D-10-R At-Grade Inlets
5A North	AA	1.89	2.22	12.5	3.8	6.7	7.1	14.8	
5 & 5A	DP(4) flowby,S,T,U,V,AA SPLIT FLOWS	10.25	13.73	15.3	3.4	6.1	35.2	83.9	
Design Point 5 & 5A flows from each direction have been split, SPLIT: Q5 = 17.6cfs, Q100 = 42.0cfs									
DP5 & 5A flowby Q5=11.7 cfs, Q100=24.6 cfs									
6 West	X,Y	1.36	1.58	10.2	4.1	7.2	5.5	11.5	2-12' D-10-R Sump Inlets
6 East	DP(5) flowby,W	4.33	5.33	16.9	3.3	5.8	14.2	31.1	
6A West	Z	0.19	0.22	7.3	4.6	8.2	0.9	1.8	
6A East	DP(5A) flowby,BB	4.42	5.22	16.9	3.3	5.8	14.5	30.4	
6 & 6A	DP(5&5A) flowby,W,X,Y,Z,BB	10.29	12.35	16.9	3.3	5.8	33.7	72.0	
Design Point 6 & 6A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 16.9cfs, Q100 = 36.0cfs									

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Surface Routing Summary)

Design Points	Contributing Basins/ Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity * I_5	Intensity * I_{100}	Flow Q_5	Flow Q_{100}	Comments
1 West	C,D	3.69	4.30	12.6	3.7	6.7	**13.8**	**28.6**	**1-16' D-10-R At-Grade Inlet**
1A West	DP(1) flowby,E	3.07	3.64	12.6	3.7	6.7	**11.5**	**24.2**	**2-4' D-10-R Sump Inlets**
1A East	1/2F	0.92	1.07	8.8	4.3	7.7	**4.0**	**8.2**	
1B East	1/2F	0.92	1.07	8.8	4.3	7.7	**4.0**	**8.2**	
1A & 1B	DP(1) flowby,E,F	4.92	5.78	12.6	3.7	6.7	**18.4**	**38.5**	
Design Point 1A & 1B flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 9.2cfs, Q100 = 19.3cfs									
3 North	I,J	2.47	2.89	14.3	3.5	6.3	**8.7**	**18.2**	**2-8' D-10-R Sump Inlets**
3A North	K,L,M,N	3.85	4.73	14.4	3.5	6.3	**13.6**	**29.7**	
3A South	O	1.18	1.38	11.1	3.9	7.0	**4.6**	**9.6**	
3 & 3A	I,J,K,L,M,N,O	7.50	8.99	14.4	3.5	6.3	**26.5**	**56.5**	
Design Point 3 & 3A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 13.3cfs, Q100 = 28.3cfs									
4 North	P,Q,R	1.98	2.33	11.7	3.9	6.9	**7.6**	**16.0**	**2-4' D-10-R Sump Inlets**
4A North	S	1.65	1.94	10.8	4.0	7.1	**6.6**	**13.7**	
4A East	2/3T	1.34	1.57	14.4	3.5	6.3	**4.7**	**9.9**	
4 & 4A	P,Q,R,S,2/3T	4.96	5.83	15.4	3.4	6.1	**17.0**	**35.5**	
Design Point 4 & 4A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 =8.5cfs, Q100 = 17.8cfs									
5 North	G,V,U	3.11	3.64	12.5	3.7	6.7	**11.6**	**24.3**	**2-14' D-10-R Sump Inlets**
5 East	1/3T,Y	3.22	3.78	18.3	3.2	5.6	**10.1**	**21.2**	
5A North	B	2.42	2.85	15.9	3.4	6.0	**8.2**	**17.1**	
5A East	W,X,Z	3.59	4.22	15.3	3.4	6.1	**12.3**	**25.7**	
5 & 5A	B,H,G,1/3T,U,V,W,X,Y,Z	12.33	14.49	18.3	3.2	5.6	**38.9**	**81.3**	
Design Point 5 & 5A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 19.5cfs, Q100 = 40.7cfs									

Calculated by: BES

Date: ____________

Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Surface Routing Summary)

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}	Comments
2 West	A,1/2D,1/2E	2.37	3.31	19.3	3.1	5.5	7.3	18.1	2-8' D-10-R Sump Inlets
2 East	C,1/2D,1/2E	2.27	2.66	12.9	3.7	6.6	8.4	17.5	
2A West	B	0.55	0.64	8.5	4.4	7.8	2.4	5.0	
2A East	F,G,H	3.21	3.75	13.3	3.6	6.5	11.7	24.4	
2 & 2A	A,B,C,D,E,F,G,H	8.40	10.36	19.3	3.1	5.5	25.8	56.6	
Design Point 2 & 2A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 12.9cfs, Q100 = 28.3cfs									
3 West	I,J	2.53	2.88	13.4	3.6	6.5	9.2	18.6	2-8' D-10-R Sump Inlets
3 East	L,M	1.37	1.60	9.9	4.1	7.3	5.6	11.7	
3A West	K	0.80	0.94	9.8	4.1	7.3	3.3	6.9	
3A East	N,O	2.49	2.90	14.2	3.6	6.3	8.8	18.3	
3 & 3A	I,J,K,L,M,N,O	7.19	8.31	14.2	3.6	6.3	25.5	52.5	
Design Point 3 & 3A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 12.8cfs, Q100 = 26.3cfs									
4 West	R	1.94	2.27	14.1	3.6	6.3	6.9	14.4	2-12' D-10-R Sump Inlets
4 East	S,T	2.38	2.78	12.8	3.7	6.6	8.9	18.4	
4A West	P,Q	4.16	4.89	15.6	3.4	6.1	14.2	29.6	
4A East	U,V	1.75	2.06	10.7	4.0	7.1	7.0	14.6	
4 & 4A	P,Q,R,S,T,U,V	10.24	11.99	15.6	3.4	6.1	34.9	72.7	
Design Point 4 & 4A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 17.5cfs, Q100 = 36.4cfs									

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Surface Routing Summary)

Design Point(s)	Contributing Basins/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}	Comments
1	Offsite flows from north, per Law and Mariotti	53.7	75.2	76	1.5	2.6	80.6	195.5	To enter proposed FES
2 West	1/2D,A1UU	2.94	4.59	8.8	4.3	7.6	12.6	35.1	2-10' D-10-R Sump Inlets
2A West	1/2D	1.01	1.06	8.8	4.3	7.6	4.3	8.1	
2A East	C,A1SS,A1TT	4.34	4.80	13.5	3.6	6.5	15.8	31.0	
2 & 2A	C,D,A1SS,A1TT,A1UU	8.29	10.46	13.5	3.6	6.5	30.1	67.5	
Design Point 2 & 2A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 15.1cfs, Q100 = 33.8cfs									
3 & 3A	A,B	2.75	2.98	10.9	4.0	7.1	10.9	21.0	2-4' D-10-R Sump Inlets
Design Point 3 & 3A flows from each direction have been split equally due to overtopping at the low point, SPLIT: Q5 = 5.5cfs, Q100 = 10.5cfs									
4 North	E	1.51	1.60	9.5	4.2	7.4	6.3	11.9	
4A North	E1,A3A	1.46	1.59	11.9	3.8	6.8	5.6	10.8	
7	K,L,M	6.56	6.93	16.2	3.3	5.9	21.9	41.2	2-16' D-10-R Sump Inlets
7A	A1VV,A1WW,H,I,J	7.05	7.14	17.4	3.2	5.7	22.8	41.1	
7 & 7A	A1VV,A1WW,H,I,J,K,L,M	13.62	14.07	17.4	3.2	5.7	44.0	80.9	
Design Point 7 & 7A flows from each direction have been split, SPLIT: Q5 = 22.0cfs, Q100 = 40.5cfs									
8 West	Q,1/2P	0.64	0.71	8.0	4.4	7.9	2.8	5.6	2-8' D-10-R Sump Inlets
8 East	E,F,G	4.26	4.54	12.5	3.7	6.7	16.0	30.3	
8A West	N,O,1/2P	1.84	1.97	8.0	4.4	7.9	8.2	15.6	
8 & 8A	E,F,G,N,O,P	6.73	7.22	12.5	3.7	6.7	25.2	48.2	
Design Point 8 & 8A flows from each direction have been split, SPLIT: Q5 = 12.6cfs, Q100 =24.1cfs									
10 West	A3A,E1,R,S,T,1/2U	3.09	3.41	17.1	3.3	5.8	10.1	19.8	2-10' D-10-R Sump Inlets
10 East	A3AA,1/2V,EE	4.34	4.70	10.2	4.1	7.3	17.7	34.1	
10A West	1/2U	0.50	0.52	5.3	5.0	8.9	2.5	4.7	
10A East	1/2V,W	1.44	1.60	11.8	3.8	6.8	5.5	10.9	
10 & 10A	A3A,E1,R,S,T,U,V,W,EE	9.37	10.23	17.1	3.3	5.8	30.5	59.3	
Design Point 10 & 10A flows from each direction have been split, SPLIT: Q5 = 15.3cfs, Q100 = 29.7cfs									
11 West	1/4BB,CC	0.62	0.69	8.2	4.4	7.8	2.7	5.4	
11 East	1/4BB	0.54	0.57	5.0	5.1	9.1	2.7	5.2	

11A West	1/4BB	0.54	0.57	5.0	5.1	9.1	***2.7***	***5.2***	***2-4' D-10-R Sump Inlets***
11A East	1/4BB	0.54	0.57	5.0	5.1	9.1	***2.7***	***5.2***	
11 & 11A	BB,CC	2.24	2.39	8.2	4.4	7.8	***9.9***	***18.7***	
Design Point 11 & 11A flows from each direction have been split, SPLIT: Q5 = 5.0cfs, Q100 = 9.4cfs									
13 West	1/8AA,A4Y	0.75	0.82	9.2	4.2	7.5	***3.2***	***6.2***	
13 East	3/8AA,A4W,A4X	3.10	3.48	11.7	3.9	6.9	***11.9***	***23.9***	
13A West	1/8AA	0.46	0.49	9.2	4.2	7.5	***2.0***	***3.7***	***2-6' D-10-R Sump Inlets***
13A East	3/8AA	1.39	1.46	9.2	4.2	7.5	***5.9***	***11.0***	
13 & 13A	AA,A4W,A4X,A4Y	5.70	6.26	11.7	3.9	6.9	***22.0***	***42.9***	
Design Point 13 & 13A flows from each direction have been split, SPLIT: Q5 = 11.0cfs, Q100 = 21.5cfs									
14 West	1/3Z	0.52	0.55	5.9	4.9	8.7	***2.6***	***4.8***	
14 East	1/6Z	0.26	0.28	5.9	4.9	8.7	***1.3***	***2.4***	
14A West	1/3Z	0.52	0.55	5.9	4.9	8.7	***2.6***	***4.8***	***2-4' D-10-R Sump Inlets***
14A East	1/6Z	0.26	0.28	5.9	4.9	8.7	***1.3***	***2.4***	
14 & 14A	Z	1.57	1.66	5.9	4.9	8.7	***7.7***	***14.4***	
Design Point 14 & 14A flows from each direction have been split, SPLIT: Q5 = 3.9cfs, Q100 = 7.2cfs									
16 East	1/2Y,X	0.66	0.72	6.2	4.8	8.6	***3.2***	***6.1***	
16A East	1/2Y,X	0.66	0.72	6.2	4.8	8.6	***3.2***	***6.1***	***2-4' D-10-R Sump Inlets***
16 & 16A	Y	1.31	1.44	6.2	4.8	8.6	***6.3***	***12.3***	
Design Point 16 & 16A flows from each direction have been split, SPLIT: Q5 = 3.2cfs, Q100 = 6.2cfs									

Note:

1. All basins from adjacent areas are designated as follows: Area 1, basin TT is A1TT.

Calculated by: BES

Date:

Checked by: VAS

F[redacted]CT[redacted] [redacted]TE [redacted]
FILE NO. Highland
CALC. BY BTL SHEET 2 OF 3
RETURN PERIOD 5/100yr

LAW & MARIOTTI
CONSULTANTS, INC.
CIVIL ENGINEERING • LAND SURVEYING
619 N. Cascade Ave., Suite 206 Colorado Springs, CO 80903 719-442-1541 voice 719-442-1542 fax

HYDROLOGIC COMPUTATIONS — RATIONAL METHOD

POINT OF CONCENTRATION	SUBAREA(S) CONTRIBUTING	AREA		FLOW PATH CHARACTERISTICS				Tc	C	C x A	I	Q	q FLOW (CFS)			REMARKS
		ACRE	SQ.MI.	FLOW DESCRIPTION	LENGHT (FT)	HEIGHT (FT)	AVG. V (FPS)	MIN.					TOTAL	PIPE	STREET	
DP 6 5yr	DP5 + (A-19-8)	20.8		O.L. + DITCH	900/1400	20	3	43	.3	6.24	1.8	11.2	11.2	11.2		24" CULVERT
DP 6 100yr	"	20.8		"	"	"	3	38	.4	8.32	3.6	30.0	30.0	30.0		24" CULVERT
DP 8 5yr	DP 6											11.2	11.2	11.2		24" CULVERT
DP 8 100yr	DP6											11.2	30.0	30.0		24" culvert
DP 9 5yr	DP9(al) + DP 8	179	-	O.L. + DITCH	800/3600	20	3	66	0.25	44.8	1.5	67.2	67.2	67.2		Volmer Ditch
DP9 100yr	"	179	-	"	"	"	3	66	0.35	62.6	2.6	162.8	162.8	162.8		Volmer Ditch
DP10 5yr	DP9 + A-19.5 + A-19.6	214.9	-	O.L. + DITCH	800/5500	20	3	76	0.25	53.7	1.5	80.6			80.6	OFFSITE
DP10 100yr	"	214.9	-	"	"	"	"	76	0.35	75.2	2.6	195.5			195.5	INTERSECTION W/ TAHITI DR.
DP 11 5yr	A20 + A-8.4 + A-19.3(50%)	23.0	-	O.L. + Ditch	800/900	18	3	35	0.3	6.9	2.2	15.2	15.2		15.2	OFFSITE TO
DP 11 100yr	"	"	-	"	"	"	3	32	0.4	9.2	4.0	36.8	36.8		36.8	EXISTING CULVERT
Cottonwood Ck.																
DP 2 5yr	A-19.2 + B4.4	5.2	-	O.L. + Ditch	500/1300	12	3	32	0.3	1.6	2.4	3.8	3.8	3.8		24" culvert
DP 2 100yr	"	"	-	"	"	"	"	29	0.4	2.1	4.7	9.9	9.9	9.9		24" culvert
DP 3 5yr	A-19.10 + B-4.3(1/3)	2.1	-	O.L. + Ditch	700	16	3	33	0.3	0.6	2.3	1.4	1.4	1.4		18" CULVERT
DP 3 100yr	"		-	"	"	"	"	29	0.4	0.84	4.7	3.9	3.9	3.9		18" CULVERT

Law & Mariotti Report

24" CMP culvert at the roadway intersection. Flow then conveys via ditch flow to DP 6.

Design Point 6 –Flow from Design Point 5 and on-site sub-basins A-19-8 combine for a 5-year flow of 11.2 cfs and a 100-year flow of 30 cfs, which will be conveyed via a proposed 24" CMP culvert at the roadway intersection. Flow then conveys via ditch flow to DP 8.

Design Point 7 – Flow from Design Point 4 in addition to offsite basin O-17C(1/2) and on-site sub-basins A-19-6 and A-17-3 combine for a 5-year flow of 42.5 and a 100-year flow of 99.9cfs, which will be conveyed via a proposed 42" CMP culvert at the roadway intersection. Flow then conveys via ditch flow to DP 9.

Design Point 8 – Combined flow from Design Point 6 and sub-basin A-19-11 produce a 5-year flow of 11.2 cfs and a 100-year flow of 30cfs, which will be conveyed via a proposed 24" CMP culvert at the roadway intersection to an existing drainage swale. Flow then conveys via ditch flow to DP 9.

Off-site Design Points

Design Point 9 - Combined flows from Design Point 7, sub-basins A-17-2 and A19-7 and offsite basins O-A17C(1/2) and O-A17D produce a 5-year flow of 59.4 cfs and a 100-year flow of 144.0 cfs. This flow is conveyed primarily by ditch flow along Lochwinnoch and Vollmer Rd to a proposed 64"x43" arch CMP culvert at the roadway intersection. This flow will convey via the proposed improved ditch within Vollmer Road right of way to an existing 24" culvert at Tahiti Road within the Holiday Hills Subdivision being DP 10.

Design Point 10 – Runoff from DP 9 and DP 8 combines with sub-basin A-19-5 and A-19-6 for a 5-year flow of 80.6 cfs and a 100-year flow of 195.5 at a point offsite near Vollmer and Tahiti Road. The downstream end of the existing 24" was undetermined by field locates. The direction of this pipe appears to cross Tahiti Dr.. It is proposed to have the contractor remove the existing 24" and replace it with 2-48" cmp's. Currently the capacity of the 24" pipe is estimated to be 20.4 cfs with the balance of the flow overtopping Tahiti at Vollmer. Historically this culvert experiences 70.9/164.9 cfs. Under this overtopping condition it appears (from visual observations) as if most of the flow would follow the westerly ditch of Vollmer. This ditch flow continues to a point approximately ¾ of a mile to the south where 2-30" culverts exist. The Sand Creek DBPS calls out for 2 – 6'x10' cbc's at this location.

Design Point 11 - Combined flows from onsite basins A-20 and A-19-4 with a 5 year flow of 10.3 cfs and a 100 year flow of 25.3 cfs. This flow is conveyed via a ditch along existing Capital Road (Loch Fyne Ln) to an existing culvert at the end

Hydraulic
Calculations

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Storm Sewer Routing Summary)

Pipe Run	Contributing Design Points/Pipe Runs	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
100	INT(DP1)	4.46	5.25	15.4	3.4	6.1	15.2	31.9	24" RCP
101	INT(DP1A)	4.46	5.25	15.4	3.4	6.1	15.2	31.9	24" RCP
102	Pipe runs 100,101	8.91	10.49	15.4	3.4	6.1	30.5	63.9	48" RCP
103	INT(DP2)	3.40	4.03	11.4	3.9	6.9	13.3	28.0	18" RCP
104	INT(DP2A)	3.40	4.03	11.4	3.9	6.9	13.3	28.0	30" RCP
105	Pipe runs 102,103,104	15.72	18.56	16.2	3.3	5.9	52.5	110.3	48" RCP
106	INT(DP3) - MDDP OS-1 MODIFIED flows						34.0	84.0	36" RCP
107	INT(DP4)	4.89	5.92	27.8	2.5	4.5	12.4	26.6	30" RCP
108	INT(DP4A)	4.89	5.92	27.8	2.5	4.5	12.4	26.6	30" RCP
109	Pipe runs 107,108	9.78	11.83	27.8	2.5	4.5	24.7	53.3	36" RCP
110	Pipe run 109 added directly to 106						58.7	137.3	48" RCP
111	INT(DP5)	8.18	9.66	18.9	3.1	5.5	25.3	53.3	18" RCP
112	Pipe run 111 added directly to 110						84.1	190.6	54" RCP

Pipe Run	Contributing Design Points/Pipe Runs	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
	INT(DP5A)	8.18	9.66	18.9	3.1	5.5	***25.3***	***53.3***	xx" RCP
113	**INT(DP5A) added directly to Pipe run 112**						***109.4***	***243.9***	54" RCP

NOTES:

1. Pipe sizes per preliminary design and StormCad hydraulic model (see Hydraulic Computations in appendix).
2. MDDP OS-1 Tc unknown, therefore direct addition of Q and use known basins Tc (conservative).
3. Q, Tc and CA values tabulated for sump laterals reflect SPLIT conditions (i.e. - equal).

Calculated by: BES
Date:
Checked by: VAS

DP - Design Point
INT- Intercepted Flow from Design Point

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Storm Sewer Routing Summary)

Pipe Run	Contributing Design Points/Pipe Runs	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}	Comments
100	INT(DP1) - MDDP OS-B flows						41.0	96.0	54" RCP
100A	INT(DP1A)	2.09	2.07	13.9	3.6	6.4	7.5	13.2	18" RCP
100B	INT(DP1B)	1.88	2.81	14.0	3.6	6.4	6.7	17.9	18" RCP
100C	Pipe runs 100A,100B	3.97	4.88	14.0	3.6	6.4	14.2	31.0	24" RCP
101	Pipe run 100C added directly to 100						55.2	127.0	54" RCP
102	INT(DP2)	3.86	4.74	16.8	3.3	5.9	12.7	27.7	24" RCP
103	INT(DP2A)	3.86	4.74	16.8	3.3	5.9	12.7	27.7	30" RCP
104	Pipe runs 102,103 added directly to 101						80.5	182.5	72" RCP
105	INT(DP3)	2.67	1.50	13.8	3.6	6.4	9.6	9.6	18" RCP
106	INT(DP4)	1.67	0.94	14.3	3.5	6.3	5.9	5.9	18" RCP
107	Pipe runs 105,106	4.34	2.44	14.3	3.5	6.3	15.3	15.3	24" RCP
108	INT(DP5)	1.72	2.84	15.3	3.4	6.1	5.9	17.3	18" RCP
109	INT(DP5A)	1.72	2.84	15.3	3.4	6.1	5.9	17.3	18" RCP
109A	Pipe runs 107,108,109	7.78	8.11	15.3	3.4	6.1	26.7	49.6	36" RCP

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Storm Sewer Routing Summary)

Design Point(s)	Contributing Basins/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}	Comments
100	INT(DP1)	2.11	2.50	12.6	3.7	6.7	7.9	16.6	18" RCP
101	INT(DP1A)	2.46	2.89	12.6	3.7	6.7	9.2	19.2	24" RCP
102	INT(DP1B)	2.46	2.89	12.6	3.7	6.7	9.2	19.2	30" RCP
103	Pipe runs 101,102	4.92	5.78	12.6	3.7	6.7	18.4	38.5	36" RCP
104	Pipe runs 100,103	7.02	8.28	12.6	3.7	6.7	26.3	55.1	36" RCP
105	*Offsite and Roadway Basins (O.R.B.)* INT(DP11) & INT(DP11A) flows (pipe run 126) = Area 2 DP2	8.06	9.18	9.2	4.2	7.5	34.1	69.1	36" RCP
106	INT(DP3)	3.75	4.50	14.4	3.5	6.3	13.2	28.3	24" RCP
107	INT(DP3A)	3.75	4.50	14.4	3.5	6.3	13.2	28.3	24" RCP
108	Pipe Runs 105,106,107	15.56	18.17	14.4	3.5	6.3	54.9	114.2	48" RCP
109	INT(DP4)	2.48	2.92	15.4	3.4	6.1	8.5	17.8	24" RCP
110	INT(DP4A)	2.48	2.92	15.4	3.4	6.1	8.5	17.8	30" RCP
111	Pipe runs 109,110	4.96	5.83	15.4	3.4	6.1	17.0	35.5	30" RCP
112	Pipe runs 108,111	20.52	24.01	15.4	3.4	6.1	70.2	146.2	48" RCP
113	Pipe runs 104,112	27.54	32.29	15.4	3.4	6.1	94.2	196.7	54" RCP
114	INT(DP5)	6.17	7.24	18.3	3.2	5.6	19.4	40.6	30" RCP
115	INT(DP5A)	6.17	7.24	18.3	3.2	5.6	19.4	40.6	30" RCP
116	Pipe runs 114,115	12.33	14.49	18.3	3.2	5.6	38.9	81.3	36" RCP
117	Pipe runs 113,116	39.88	46.78	18.3	3.2	5.6	125.7	262.4	66" RCP

NOTES:
1. Pipe sizes per preliminary design and StormCad hydraulic model (see Hydraulic Computations in appendix).
2. MDDP OS-1 Tc unknown, therefore direct addition of Q and use known basins Tc (conservative).
3. Q, Tc and CA values tabulated for sump laterals reflect SPLIT conditions (i.e. - equal).

DP - Design Point
INT- Intercepted Flow from Design Point

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Storm Sewer Routing Summary)

Pipe Run	*Contributing Design Points/Pipe Runs*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C*	*Intensity*		*Flow*		*Comments*
					I_5	*I_{100}*	*Q_5*	*Q_{100}*	
100	**INT(DP1) - MDDP OS-2 flows**						***108.0***	***305.0***	66" RCP
101	**INT(DP2)**	4.20	5.18	19.3	3.1	5.5	***12.9***	***28.3***	18" RCP
102	**Pipe run 101 added directly to 100**						***120.9***	***333.3***	72" RCP
103	**Pipe run 102 added directly to INT(DP2A)**						***133.8***	***361.6***	72" RCP
104	**Pipe run 103 added directly to INT(DP3)**						***146.5***	***387.9***	72" RCP
105	**Pipe run 104 added directly to INT(DP3A)**						***159.3***	***414.1***	72" RCP
106	**INT(DP4)**	5.12	5.99	15.6	3.4	6.1	***17.4***	***36.3***	30" RCP
107	**Pipe run 106,INT(DP4A)**	10.24	11.99	15.6	3.4	6.1	***34.9***	***72.7***	36" RCP
108	**Pipe run 107 added directly to 105**						***194.2***	***486.8***	72" RCP

NOTES:
1. Pipe sizes per preliminary design and StormCad hydraulic model (see Hydraulic Computations in appendix).
2. MDDP OS-1 Tc unknown, therefore direct addition of Q and use known basins Tc (conservative).
3. Q, Tc and CA values tabulated for sump laterals reflect SPLIT conditions (i.e. - equal).

DP - Design Point
INT- Intercepted Flow from Design Point

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Storm Sewer Routing Summary)

Pipe Run	Contributing Design Points/Basins/Pipe Runs	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity*		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
100	INT(DP1) - MDDP OS-1 Partial	53.70	75.20	76.0	1.5	2.6	80.6	195.5	48" RCP
101	Area 1, Pipe 113						109.4	243.9	48" RCP
102	Pipe run 101 added directly to 100						190.0	439.4	66" RCP
103	Area 1, Pipe 105						52.5	110.3	48" RCP
103A	A1R	0.56	0.66	8.5	4.4	7.7	40.1	71.4	30" RCP
103B	Pipe runs 103A,103	16.28	19.21	16.2	3.3	5.9	92.6	181.7	54" RCP
104	INT(DP2A)	4.14	5.23	13.5	3.6	6.5	15.0	33.8	24" RCP
105	INT(DP2)	4.14	5.23	13.5	3.6	6.5	15.0	33.8	24" RCP
106	Pipe runs 103B,104,105						122.7	249.2	66" RCP
106A	INT(DP3)	1.38	1.49	10.9	4.0	7.1	5.5	10.5	24" RCP
106B	INT(DP3A)	1.38	1.49	10.9	4.0	7.1	5.5	10.5	24" RCP
106C	Pipe runs 106A,106B	2.75	2.98	10.9	4.0	7.1	10.9	21.0	30" RCP
107	Pipe runs 102B,106,106C						324.0	711.1	84" RCP
108	Area 2, Pipe 112						140.9	304.1	84" RCP
109	Pipe runs 107,108						464.9	1015.2	108" RCP

Pipe Run	Contributing Design Points/Basins/Pipe Runs	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity*		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
110	Area 3 Pipe 117						125.7	262.4	66" RCP
111	GG	7.57	8.83	10.7	4.0	7.1	30.2	62.7	36" RCP
BOX	Pipe run 109,110,111						620.8	1340.3	102" RCP
112	MDDP OS-B Partial						41.0	96.0	54" RCP
113	INT(DP7)	6.81	7.03	17.4	3.2	5.7	22.0	40.4	30" RCP
114	INT(DP7A)	6.81	7.03	17.4	3.2	5.7	22.0	40.4	30" RCP
115	Pipe runs 113,114	13.62	14.07	17.4	3.2	5.7	44.0	80.9	42" RCP
115A	FF	9.88	11.53	10.5	4.0	7.2	39.7	82.5	42" RCP
116	INT(DP8), Pipe run 115A	13.25	15.14	12.5	3.7	6.7	49.6	101.0	36" RCP
117	INT(DP8A)	3.37	3.61	12.5	3.7	6.7	12.6	24.1	18" RCP
118	Pipes 115,116,117	30.23	32.82	17.4	3.2	5.7	97.6	188.7	60" RCP
119	INT(DP10)	4.68	5.11	17.1	3.3	5.8	15.3	29.7	18" RCP
120	Pipe run 119,INT(DP10A)	9.37	10.23	17.1	3.3	5.8	30.5	59.3	18" RCP
121	DD	5.82	6.79	9.6	4.2	7.4	24.2	50.3	36" RCP
122	Pipe run 121,INT(DP11)	6.94	7.98	9.6	4.2	7.4	28.9	59.1	36" RCP
123	Pipe run 122,INT(DP11A)	8.06	9.18	9.6	4.2	7.4	33.5	68.0	36" RCP
124	INT(DP12) - 1/2 MDDP OS-2						108.0	305.0	60" RCP
125	1/2 MDDP OS-2						108.0	305.0	60" RCP
125A	Pipe run 125,INT(DP14)						111.8	312.2	60" RCP

Pipe Run	Contributing Design Points/Basins/Pipe Runs	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity*		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
126	Pipe run 125A,INT(DP14A)						***115.7***	***319.4***	66" RCP
127	**OS-1**	6.46	7.53	10.2	4.1	7.3	***26.3***	***54.6***	36" RCP
128	**INT(DP16)**	0.66	0.72	6.2	4.8	8.6	***3.2***	***6.1***	18" RCP
129	**INT(DP16A)**	0.66	0.72	6.2	4.8	8.6	***3.2***	***6.1***	18" RCP
130	**Pipe runs 127,128,129**	7.77	8.97	10.2	4.1	7.3	***31.7***	***65.0***	36" RCP
131	**Pipe runs 126,130**						***147.3***	***384.5***	72" RCP
132	**Area 4 Pipe 108**						***194.2***	***486.8***	72" RCP
133	**INT(DP13)**	2.85	3.13	11.7	3.9	6.9	***11.0***	***21.5***	30" RCP
134	**INT(DP13A)**	2.85	3.13	11.7	3.9	6.9	***11.0***	***21.5***	30" RCP
135	**Pipe runs 132,133,134**						***216.1***	***529.7***	84" RCP

NOTES:

1. Pipe sizes per preliminary design and StormCad hydraulic model (see Hydraulic Computations in appendix).
2. MDDP OS-1 Tc unknown, therefore direct addition of Q and use known basins Tc (conservative).
3. Q, Tc and CA values tabulated for sump laterals reflect SPLIT conditions (i.e. - equal).

DP - Design Point
INT- Intercepted Flow from Design Point

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Street Capacity Summary - Initial Storm)

Street Name	*Contributing Basins*	*Street Side (Cardinal Directions) at max Q5*	*Street Class*	*Curb Type*	*Street Slope (ft/ft)*	*Actual Q5 (cfs)*	*Max. Q5 (cfs) (10/12/94 Eq's)*	*Depth At Curb Face (ft) (Fig 7-12 Eq.)*	*Q5 Max. Check Max>Actual<20cfs (res ramp), 34cfs(other)*	*Q5 Depth Check*
Canary Cr.	A,B	S	Residential	Ramp	0.020	13.3	15.9	0.33	***OK***	***OK***
Canary Cr.	C,D	N	Residential	Ramp	0.020	7.2	15.9	0.26	***OK***	***OK***
Vanderwood Rd.	E,F	W	Residential	Ramp	0.036	5.2	21.4	0.21	***OK***	***OK***
Vanderwood Rd.	G,H	E	Residential	Ramp	0.036	7.0	21.4	0.24	***OK***	***OK***
Admiral Way	I,J	W	Residential	Ramp	0.031	6.1	19.8	0.23	***OK***	***OK***
Admiral Way	K,L	E	Residential	Ramp	0.031	8.4	19.8	0.26	***OK***	***OK***
Canary Cr.	I,J,K,L	N	Residential	Ramp	0.020	13.7	15.9	0.34	***OK***	***OK***
Canary Cr.	M,N	W	Residential	Ramp	0.040	5.4	22.5	0.21	***OK***	***OK***
Canary Cr.	O	S	Residential	Ramp	0.020	3.6	15.9	0.21	***OK***	***OK***
Canary Cr.	P,Q	E	Residential	Ramp	0.040	4.4	22.5	0.19	***OK***	***OK***
Calthea Way	II,JJ	N	Residential	Ramp	0.010	10.5	11.3	0.35	***OK***	***OK***
Early Sunset Tr.	KK	W	Residential	Ramp	0.024	2.4	17.4	0.17	***OK***	***OK***
Early Sunset Tr.	LL,MM	W	Residential	Ramp	0.024	5.9	17.4	0.24	***OK***	***OK***
Foray Circle	NN,OO	E	Residential	Ramp	0.040	6.0	22.5	0.22	***OK***	***OK***
Foray Circle	PP,QQ,RR	W	Residential	Ramp	0.010	9.9	11.3	0.34	***OK***	***OK***
Loftwood Road	S,T	N	Residential	Ramp	0.012	12.1	12.3	0.35	***OK***	***OK***
Loftwood Road	CC	S	Residential	Ramp	0.006	4.6	8.6	0.28	***OK***	***OK***
Emperor Drive	S,T,U,V,W	W	Residential	Ramp	0.018	14.9	15.1	0.36	***OK***	***OK***
Emperor Drive	X,Y	N	Residential	Ramp	0.018	13.2	15.1	0.34	***OK***	***OK***
Breezewood Cr.	Z,AA	S	Residential	Ramp	0.016	5.9	14.2	0.26	***OK***	***OK***
Breezewood Cr.	BB,CC,DD,EE,FF	N	Residential	Ramp	0.016	17.9	14.2	0.39	***Does Not Work, see below***	***OK***
Breezewood Cr.	Z,AA,BB,CC,DD,EE,FF *SPLIT FLOWS*	N & S	Residential	Ramp	0.016	11.9	14.2	0.33	***OK***	***OK***
Tarragon Pl.	Z,AA,BB,CC,DD,EE,FF,GG	W	Residential	Ramp	0.022	21.0	16.7	0.39	***Does Not Work, see below***	***OK***
Tarragon Pl.	HH	E	Residential	Ramp	0.022	5.7	16.7	0.24	***OK***	***OK***
Tarragon Pl.	Z,AA,BB,CC,DD,EE,FF,GG,HH SPLIT FLOWS	E & W	Residential	Ramp	0.022	13.4	16.7	0.33	***OK***	***OK***

Notes:
1. Cross slope of 2% assumed for all streets.
2. Data shown for critical location within basin.
3. Basin Q's for streets not determined by surface routing have been added together (conservative).

Calculated by: BES

Date:

Checked by: VAS

12/23/2005

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Street Capacity Summary - Initial Storm)

Street Name	Contributing Basins	Street Side (Cardinal Directions) at max Q5	Street Class	Curb Type	Street Slope (ft/ft)	Actual Q5 (cfs)	Max. Q5 (cfs) (10/12/94 Eq's)	Depth At Curb Face (ft) (Fig 7-12 Eq.)	Q5 Max. Check Max>Actual<20cfs (res ramp), 34cfs(other)	Q5 Depth Check
Chasewood Lp	A,B,C,D	S	Residential	Ramp	0.013	17.2	12.8	0.40	Does Not Work, see below	OK
Chasewood Lp	E,F,G,H,I,J,K	N	Residential	Ramp	0.013	31.2	12.8	0.50	Does Not Work, see below	OK
Chasewood Lp	A,B,C,D,E,F,G,H,I,J,K SPLIT FLOWS	N & S	Residential	Ramp	0.013	24.2	12.8	0.45	Does Not Work, see below	OK
ADD INLETS TO PICK UP ~7.4cfs ON EACH SIDE, WEST OF DP2 and DP2A TO AVOID VERTICAL CURB CONSTRUCTION										
Chasewood Lp	A,B,1/2C	W	Residential	Ramp	0.025	11.4	17.8	0.30	OK	OK
Chasewood Lp	E,F,G,H, 1/2 I	E	Residential	Ramp	0.025	15.5	17.8	0.34	OK	OK
Chasewood Lp	A,B,C,D,E,F,G,H,I,J,K SPLIT FLOWS	N & S	Residential	Ramp	0.013	12.7	12.8	0.36	OK	OK
Dry Needle Pl	L,M	W	Residential	Ramp	0.020	12.4	15.9	0.33	OK	OK
Dry Needle Pl	L,M,N,O,P,Q	W	Residential	Ramp	0.020	21.7	15.9	0.40	Does Not Work, see below	OK
ADD INLET TO PICK UP ~9.8cfs AT DP3 TO AVOID VERTICAL CURB CONSTRUCTION										
Dry Needle Pl	L,M,N,O,P,Q	W	Residential	Ramp	0.020	12.1	15.9	0.32	OK	OK
Sierra Mead Dr	L,M,N,O,P,Q,R	N	Residential	Ramp	0.023	16.7	17.1	0.35	OK	OK
ADD INLET TO PICK UP ~5.4cfs AT DP4 TO AVOID VERTICAL CURB CONSTRUCTION										
Sierra Mead Dr	L,M,N,O,P,Q,R,V	N	Residential	Ramp	0.023	19.9	17.1	0.38	Does Not Work, see below	OK
Sierra Mead Dr	S	S	Residential	Ramp	0.023	3.6	17.1	0.20	OK	OK
Sierra Mead Dr	L,M,N,O,P,Q,R,S,V SPLIT FLOWS	N & S	Residential	Ramp	0.023	11.7	17.1	0.31	OK	OK
Chasewood Lp	T,U	W	Residential	Ramp	0.010	8.0	11.3	0.31	OK	OK
Chasewood Lp	L,M,N,O,P,Q,R,S,T,U,V	W	Residential	Ramp	0.018	28.7	15.1	0.45	Does Not Work, see below	OK
Chasewood Lp	L,M,N,O,P,Q,R,S,T,U,V,AA SPLIT FLOWS	W & E	Residential	Ramp	0.020	17.6	15.9	0.37	Does Not Work, see below	OK
ADD INLETS TO PICK UP ~5.3cfs AT DP5 & 5A TO AVOID VERTICAL CURB CONSTRUCTION										
Chasewood Lp	L,M,N,O,P,Q,R,S,T,U,V,W,AA,BB SPLIT FLOWS	W & E	Residential	Ramp	0.020	16.8	15.9	0.37	Does Not Work, see below	OK
ADD SUMP INLETS AT DP6 & 6A										

Notes:
1. Cross slope of 2% assumed for all streets.
2. Data shown for critical location within basin.
3. Basin Q's for streets not determined by surface routing have been added together (conservative).

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Street Capacity Summary - Initial Storm)

Street Name	*Contributing Basins*	*Street Side (Cardinal Directions) at max Q5*	*Street Class*	*Curb Type*	*Street Slope (ft/ft)*	*Actual Q5 (cfs)*	*Max. Q5 (cfs) (10/12/94 Eq's)*	*Depth At Curb Face (ft) (Fig 7-12 Eq.)*	*Q5 Max. Check Max>Actual<20cfs (res ramp), 34cfs(other)*	*Q5 Depth Check*
Red Cardinal Lp	B	S	Residential	Ramp	0.014	8.9	13.3	0.31	*OK*	*OK*
Red Cardinal Lp	C	E	Residential	Ramp	0.014	3.8	13.3	0.22	*OK*	*OK*
Lightwood Wy	D	W	Residential	Ramp	0.050	10.5	25.2	0.26	*OK*	*OK*
(Public Alley)	E	E & W	Residential	Ramp	0.043	3.4	23.3	0.17	*OK*	*OK*
Red Cardinal Lp	C,D	N	Residential	Ramp	0.014	14.3	13.3	0.37	*Does Not Work, see below*	*OK*
ADD INLET TO PICK UP ~7.8cfs TO AVOID VERTICAL CURB CONSTRUCTION										
Red Cardinal Lp	C,D,E	N	Residential	Ramp	0.014	12.4	13.3	0.35	*OK*	*OK*
Morning Dew Rd	F	E & W	Residential	Ramp	0.042	4.0	23.1	0.18	*OK*	*OK*
(Public Alley)	G	E & W	Residential	Ramp	0.039	3.9	22.2	0.19	*OK*	*OK*
Red Cardinal Lp	B,H	W	Residential	Ramp	0.013	9.7	12.8	0.32	*OK*	*OK*
Red Cardinal Lp	G,V,U	E	Residential	Ramp	0.014	13.2	13.3	0.36	*OK*	*OK*
Smokewoord Dr	I,J	W	Residential	Ramp	0.034	8.7	20.8	0.26	*OK*	*OK*
Smokewoord Dr	K,L,M,N	E	Residential	Ramp	0.034	13.6	20.8	0.30	*OK*	*OK*
Pearly Heath Rd	O	N	Residential	Ramp	0.017	4.6	14.7	0.23	*OK*	*OK*
Superior Hill Pl	P,Q,R	W	Residential	Ramp	0.017	7.6	14.7	0.28	*OK*	*OK*
Superior Hill Pl	S	E	Residential	Ramp	0.017	6.6	14.7	0.26	*OK*	*OK*
Red Cardinal Lp	T	W	Residential	Ramp	0.015	7.1	13.8	0.28	*OK*	*OK*
Red Cardinal Lp	1/3T,Y	N	Residential	Ramp	0.020	10.1	15.9	0.30	*OK*	*OK*
Red Cardinal Lp	W,X,Z	S	Residential	Ramp	0.020	12.3	15.9	0.32	*OK*	*OK*

Notes:
1. Cross slope of 2% assumed for all streets.
2. Data shown for critical location within basin.
3. Basin Q's for streets not determined by surface routing have been added together (conservative).

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Street Capacity Summary - Initial Storm)

Street Name	Contributing Basins	Street Side (Cardinal Directions) at max Q5	Street Class	Curb Type	Street Slope (ft/ft)	Actual Q5 (cfs)	Max. Q5 (cfs) (10/12/94 Eq's)	Depth At Curb Face (ft) (Fig 7-12 Eq.)	Q5 Max. Check Max>Actual<20cfs (res ramp), 34cfs(other)	Q5 Depth Check
Martinwood Pl	A	W	Residential	Ramp	0.040	3.1	22.5	0.17	OK	OK
Dry Willow Wy	B	S	Residential	Ramp	0.018	2.4	15.1	0.18	OK	OK
Dry Willow Wy	C,D,E	W	Residential	Ramp	0.025	8.4	17.8	0.27	OK	OK
Dry Willow Wy	F,G,H	E	Residential	Ramp	0.025	11.7	17.8	0.31	OK	OK
Wagon Ter	I,J	N	Residential	Ramp	0.011	9.2	11.8	0.33	OK	OK
Wagon Ter	L,M	N	Residential	Ramp	0.023	5.6	17.1	0.24	OK	OK
Wagon Ter	N,O	S	Residential	Ramp	0.023	8.8	17.1	0.28	OK	OK
Hardwood Cr	P	W	Residential	Ramp	0.010	4.9	11.3	0.26	OK	OK
Hardwood Cr	P,Q	S	Residential	Ramp	0.015	14.2	13.8	0.36	Does Not Work, see below	OK
Hardwood Cr	P,Q,R SPLIT FLOWS	N & S	Residential	Ramp	0.015	10.5	13.8	0.32	OK	OK
Hardwood Cr	S,T	N	Residential	Ramp	0.011	8.9	11.8	0.32	OK	OK
Hardwood Cr	U,V	S	Residential	Ramp	0.011	7.0	11.8	0.29	OK	OK

Notes:
1. Cross slope of 2% assumed for all streets.
2. Data shown for critical location within basin.
3. Basin Q's for streets not determined by surface routing have been added together (conservative).

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Street Capacity Summary - Initial Storm)

Street Name	*Contributing Basins*	*Street Side (Cardinal Directions) at max Q5*	*Street Class*	*Curb Type*	*Street Slope (ft/ft)*	*Actual Q5 (cfs)*	*Max. Q5 (cfs) (10/12/94 Eq's)*	*Depth At Curb Face (ft) (Fig 7-12 Eq.)*	*Q5 Max. Check Max>Actual<20cfs (res ramp), 34cfs(other)*	*Q5 Depth Check*
Vollmer Rd	A1SS,A1TT,C	W	Residential	Vertical	0.025	15.8	26.9	0.34	OK	OK
Vollmer Rd	A,B	E	Residential	Vertical	0.025	10.9	26.9	0.30	OK	OK
Cowpoke Rd	1/2D,A1UU	N	Residential	Vertical	0.014	12.6	20.1	0.35	OK	OK
Cowpoke Rd	1/2D	S	Residential	Vertical	0.014	4.3	20.1	0.23	OK	OK
Vollmer Rd	E	W	Residential	Vertical	0.019	6.3	23.4	0.26	OK	OK
Vollmer Rd	E1,A3A	E	Residential	Vertical	0.019	5.6	23.4	0.24	OK	OK
Vollmer Rd	K,L	W	Residential	Vertical	0.018	21.7	22.8	0.41	OK	OK
Vollmer Rd	A1VV,A1WW,H,I,1/2J	E	Residential	Vertical	0.018	22.5	22.8	0.41	OK	OK
Vollmer Rd	E,F,G	W	Residential	Vertical	0.025	16.0	26.9	0.34	OK	OK
Vollmer Rd	A3A,E1,R,S	E	Residential	Vertical	0.019	11.4	23.4	0.32	OK	OK
Forest Mead Ave	A3A,E1,R,S,T	N	Residential	Vertical	0.012	12.0	18.6	0.35	OK	OK
Vollmer Rd	N,O,1/2P	S	Residential	Vertical	0.033	8.2	30.9	0.25	OK	OK
Black Forest Rd	H,A1VV,A1WW	E	Residential	Vertical	0.020	10.9	24.0	0.31	OK	OK
Black Forest Rd	H,A1VV,A1WW,I,1/2J	E	Residential	Vertical	0.020	22.8	24.0	0.41	OK	OK
Forest Mead Ave	1/2V,A3AA,EE	N	Residential	Vertical	0.020	17.7	24.0	0.37	OK	OK
Forest Mead Ave	1/2V,W	S	Residential	Vertical	0.020	5.5	24.0	0.24	OK	OK
Forest Mead Ave	1/3AA,A4W,A4X	N	Residential	Vertical	0.020	12.2	24.0	0.32	OK	OK
Logwood Rd	1/2EE	W	Residential	Vertical	0.010	4.9	17.0	0.26	OK	OK
Cowpoke Rd	1/2BB,CC	N	Residential	Vertical	0.020	1.4	24.0	0.15	OK	OK
Cowpoke Rd	1/2Y,X	N	Residential	Vertical	0.010	3.1	17.0	0.22	OK	OK

Notes:
1. Cross slope of 2% assumed for all streets.
2. Data shown for critical location within basin.
3. Basin Q's for streets not determined by surface routing have been added together (conservative).
4. All basins from adjacent areas are designated as follows: Area 1, basin TT is A1TT.

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP1 & 1A

Total Flow: Q_5 = **15.2** cfs
Q_{100} = **31.9** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'
$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : Qi = $1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$
For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5
where: W = 3 feet
w = 4 inches

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: **10** foot inlet required

100-Year Event: **10** foot inlet required

(Install a Public 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP2 & 2A

Total Flow: Q_5 = **13.3** cfs

Q_{100} = **28.0** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **8** foot inlet required

(Install a Public 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP4 & 4A

Total Flow: Q_5 = **12.4** cfs

Q_{100} = **26.6** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **6** foot inlet required

(Install a Public 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 1
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP5 & 5A

Total Flow: Q_5 = **25.3** cfs

Q_{100} = **53.3** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **20** foot inlet required

100-Year Event: **20** foot inlet required

(Install a Public 20' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - At-Grade)

Proposed 18' Inlet at DP1A

5-YR FLOW

Q(5)	11.4 cfs	I(5)	3.6	Inlet size (Li) = 18 feet
Q overtop	15.9 cfs			
				Li >= L(2) then Qi = 7.5 cfs
Depth	0.36 '	Fw	2.09	Qi- CA(eqv.) = 2.09
Spread	14.8 '	L(1)	27.6	Flow-by = 3.9 cfs
				FB- CA(eqv.) = 1.08
CROSS SLOPE	2.0%	L(2)	16.6	
				Overtop Flow-By = 0
STREET SLOPE	2.5%	L(3)	51.1	Overtop FB- CA(eqv.) = 0.00

100-YR FLOW

Q(100)	23.8 cfs	I(100)	6.4	Inlet size (Li) = 18 feet
Q overtop	15.9 cfs			
				Li < L(2) then Qi = 13.2 cfs
Depth	0.46 '	Fw	2.15	Qi- CA(eqv.)= 2.07
Spread	17.0 '	L(1)	32.5	Flow-by = 10.6 cfs
				FB- CA(eqv.) = 1.66
CROSS SLOPE	2.0%	L(2)	19.5	
				Overtop Flow-By = 0
STREET SLOPE	2.5%	L(3)	60.2	Overtop FB- CA(eqv.) = 0.00

Calculated by: BES
Date: ______
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - At-Grade)

Proposed 18' Inlet at DP1B

5-YR FLOW

Q(5)	15.5 cfs	I(5)	3.6	Inlet size (Li) = 18 feet
Q overtop	15.9 cfs			Li < L(2) then Qi = 8.8 cfs
Depth	0.40 '	Fw	2.14	Qi- CA(eqv.) = 2.46
Spread	16.7 '	L(1)	31.7	Flow-by = 6.7 cfs FB- CA(eqv.) = 1.88
CROSS SLOPE	2.0%	L(2)	19.1	Overtop Flow-By = 0
STREET SLOPE	2.5%	L(3)	58.8	Overtop FB- CA(eqv.) = 0.00

100-YR FLOW

Q(100)	32.3 cfs	I(100)	6.4	Inlet size (Li) = 18 feet
Q overtop	15.9 cfs			Li < L(2) then Qi = 17.9 cfs
Depth	0.51 '	Fw	2.15	Qi- CA(eqv.)= 2.81
Spread	17.0 '	L(1)	32.5	Flow-by = 14.4 cfs FB- CA(eqv.) = 2.26
CROSS SLOPE	2.0%	L(2)	19.5	Overtop Flow-By = 0
STREET SLOPE	2.5%	L(3)	60.2	Overtop FB- CA(eqv.) = 0.00

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP2 & 2A

Total Flow: Q_5 = **12.7** cfs
Q_{100} = **27.7** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'
$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$
For d >= 0.94 feet : $Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^{0.5}$
where: W = 3 feet
w = 4 inches

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **8** foot inlet required

(Install a Public 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - At-Grade)

Proposed 20' Inlet at DP3

5-YR FLOW

Q(5)	21.7 cfs	I(5)	3.6	Inlet size (Li) = 20 feet
Q overtop	14.2 cfs			Li >= L(2) then Qi = 9.6 cfs
Depth	0.41 '	Fw	1.92	Qi- CA(eqv.) = 2.67
Spread	16.9 '	L(1)	28.9	Flow-by = 4.6 cfs
				FB- CA(eqv.) = 1.29
CROSS SLOPE	2.0%	L(2)	17.4	Overtop Flow-By = 7.4 cfs
STREET SLOPE	2.0%	L(3)	53.6	Overtop FB- CA(eqv.) = 2.07

100-YR FLOW

Q(100)	45.9 cfs	I(100)	6.4	Inlet size (Li) = 20 feet
Q overtop	14.2 cfs			Li >= L(2) then Qi = 9.6 cfs
Depth	0.41 '	Fw	1.92	Qi- CA(eqv.)= 1.50
Spread	16.9 '	L(1)	28.9	Flow-by = 4.6 cfs
				FB- CA(eqv.) = 0.72
CROSS SLOPE	2.0%	L(2)	17.4	Overtop Flow-By = 31.7 cfs
STREET SLOPE	2.0%	L(3)	53.6	Overtop FB- CA(eqv.) = 4.95

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - At-Grade)

Proposed 12' Inlet at DP4

5-YR FLOW

Q(5)	16.7 cfs	I(5)	3.5	Inlet size (Li) = 12 feet
Q overtop	15.3 cfs			
				Li < L(2) then Qi = 5.9 cfs
Depth	0.41 '	Fw	2.06	Qi- CA(eqv.) = 1.67
Spread	16.9 '	L(1)	31.0	Flow-by = 9.3 cfs
				FB- CA(eqv.) = 2.64
CROSS SLOPE	2.0%	L(2)	18.6	
				Overtop Flow-By = 1.5 cfs
STREET SLOPE	2.3%	L(3)	57.4	Overtop FB- CA(eqv.) = 0.42

100-YR FLOW

Q(100)	45.8 cfs	I(100)	6.3	Inlet size (Li) = 12 feet
Q overtop	15.3 cfs			
				Li < L(2) then Qi = 5.9 cfs
Depth	0.41 '	Fw	2.06	Qi- CA(eqv.)= 0.94
Spread	16.9 '	L(1)	31.0	Flow-by = 9.3 cfs
				FB- CA(eqv.) = 1.48
CROSS SLOPE	2.0%	L(2)	18.6	
				Overtop Flow-By = 30.6 cfs
STREET SLOPE	2.3%	L(3)	57.4	Overtop FB- CA(eqv.) = 4.86

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - At-Grade)

Proposed 12' Inlet at DP5 & 5A

5-YR FLOW

Q(5)	17.6 cfs	I(5)	3.4	Inlet size (Li) = 12 feet
Q overtop	14.2 cfs			Li < L(2) then Qi = 5.9 cfs
Depth	0.41 '	Fw	1.92	Qi- CA(eqv.) = 1.72
Spread	16.9 '	L(1)	28.9	Flow-by = 8.3 cfs FB- CA(eqv.) = 2.42
CROSS SLOPE	2.0%	L(2)	17.4	Overtop Flow-By = 3.4 cfs
STREET SLOPE	2.0%	L(3)	53.6	Overtop FB- CA(eqv.) = 0.98

100-YR FLOW

Q(100)	41.9 cfs	I(100)	6.1	Inlet size (Li) = 12 feet
Q overtop	14.2 cfs			Li < L(2) then Qi = 17.3 cfs
Depth	0.59 '	Fw	1.92	Qi- CA(eqv.)= 2.84
Spread	17.0 '	L(1)	29.0	Flow-by = 24.6 cfs FB- CA(eqv.) = 4.03
CROSS SLOPE	2.0%	L(2)	17.5	Overtop Flow-By = 0
STREET SLOPE	2.0%	L(3)	53.8	Overtop FB- CA(eqv.) = 0.00

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 2
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP6 & 6A

Total Flow: Q_5 = **16.8** cfs

Q_{100} = **36.0** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **12** foot inlet required

100-Year Event: **12** foot inlet required

(Install a Public 12' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date: #REF!

Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Inlet Calculations - At-Grade)

Proposed 16' Inlet at DP1

5-YR FLOW

Q(5)	13.8 cfs	I(5)	3.7	Inlet size (Li) =	16 feet
Q overtop	13.5 cfs				
				Li < L(2) then Qi =	7.9 cfs
Depth	0.41 '	Fw	1.82	Qi- CA(eqv.) =	2.11
Spread	16.9 '	L(1)	27.4	Flow-by =	5.6 cfs
				FB- CA(eqv.) =	1.50
CROSS SLOPE	2.0%	L(2)	16.5		
				Overtop Flow-By =	0.3 cfs
STREET SLOPE	1.8%	L(3)	50.8	Overtop FB- CA(eqv.) =	0.08

Flow overtopping crown: Assuming 0.3 cfs is crossing the crown and a spread of 16.9 feet.
Depth and Qi based on a street capacity prior to overtopping the crown. (Qovertop)

100-YR FLOW

Q(100)	28.6 cfs	I(100)	6.7	Inlet size (Li) =	16 feet
Q overtop	13.5 cfs				
				Li < L(2) then Qi =	16.6 cfs
Depth	0.52 '	Fw	1.82	Qi- CA(eqv.)=	2.50
Spread	17.0 '	L(1)	27.5	Flow-by =	12.0 cfs
				FB- CA(eqv.) =	1.80
CROSS SLOPE	2.0%	L(2)	16.6		
				Overtop Flow-By =	0
STREET SLOPE	1.8%	L(3)	51.1	Overtop FB- CA(eqv.) =	0.00

Flow overtopping crown: Assuming Q(100) contained from flowline to crown and a spread of 17 feet.
Depth and Qi based on a symmetrical section carrying the same flow on the other side of the crown.

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP1 & 1A

Total Flow: Q_5 = **9.2** cfs

Q_{100} = **19.2** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : Qi = $1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a Public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP3 & 3A

Total Flow: Q_5 = **13.2** cfs

Q_{100} = **28.3** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : Qi = $1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **8** foot inlet required

(Install a Public 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP4 & 4A

Total Flow: Q_5 = **8.5** cfs
Q_{100} = **17.8** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'
$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : Qi = $1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$
For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5
where: W = 3 feet
w = 4 inches

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

(Install a Public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 3
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP5 & 5A

Total Flow: Q_5 = **19.4** cfs
Q_{100} = **40.6** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'
$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$
For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5
where: W = 3 feet
w = 4 inches

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: **14** foot inlet required

100-Year Event: **14** foot inlet required

(Install a Public 14' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP2 & 2A

Total Flow: Q_5 = **12.9** cfs

Q_{100} = **28.3** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **8** foot inlet required

(Install a Public 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP3 & 3A

Total Flow: Q_5 = **12.8** cfs
Q_{100} = **26.3** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'
$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$
For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5
where: W = 3 feet
w = 4 inches

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **6** foot inlet required

(Install a Public 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows - Area No. 4
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP4 & 4A

Total Flow: Q_5 = **17.4** cfs

Q_{100} = **36.3** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **12** foot inlet required

100-Year Event: **12** foot inlet required

(Install a Public 12' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP2 & 2A

Total Flow: Q_5 = **15.0** cfs
Q_{100} = **33.8** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'
$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$
For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5
where: W = 3 feet
w = 4 inches

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: **10** foot inlet required

100-Year Event: **10** foot inlet required

(Install a Public 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES
Date:
Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP3 & 3A

Total Flow: Q_5 = **5.5** cfs

Q_{100} = **10.5** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a Public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP7 & 7A

Total Flow: Q_5 = **22.0** cfs

Q_{100} = **40.4** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : Qi = $1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **16** foot inlet required

100-Year Event: **14** foot inlet required

(Install a Public 16' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP8 & 8A

Total Flow: Q_5 = **12.6** cfs

Q_{100} = **24.1** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **6** foot inlet required

(Install a Public 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP10 & 10A

Total Flow: Q_5 = **15.3** cfs

Q_{100} = **29.7** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **10** foot inlet required

100-Year Event: **8** foot inlet required

(Install a Public 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP11 & 11A

Total Flow: Q_5 = **4.9** cfs

Q_{100} = **9.4** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a Public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP13 & 13A

Total Flow: Q_5 = **11.0** cfs

Q_{100} = **21.5** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **4** foot inlet required

(Install a Public 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP14 & 14A

Total Flow: Q_5 = **3.8** cfs

Q_{100} = **7.2** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : Qi = $1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

(Install a Public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Forest Meadows Offsite and Roadway Basins
FINAL DRAINAGE REPORT
(Inlet Calculations - Sump Condition)

DP16 & 16A

Total Flow: Q_5 = **3.2** cfs

Q_{100} = **6.1** cfs

Maximum allowable ponding depth at sump:

$Dmax_5$ = 0.50'

$Dmax_{100}$ = 0.93'

For d <= 0.67 feet : $Qi = 1.7(Li+1.8(W))(Dmax + w/12)^{1.85}$

For d >= 0.94 feet : Qi = 3.6 * Li * (Dmax - 0.33 + w/12)^0.5

where: W = 3 feet

w = 4 inches

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

(Install a Public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: BES

Date:

Checked by: VAS

Area 1 Design Point 5A - Tract Overflow Channel
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

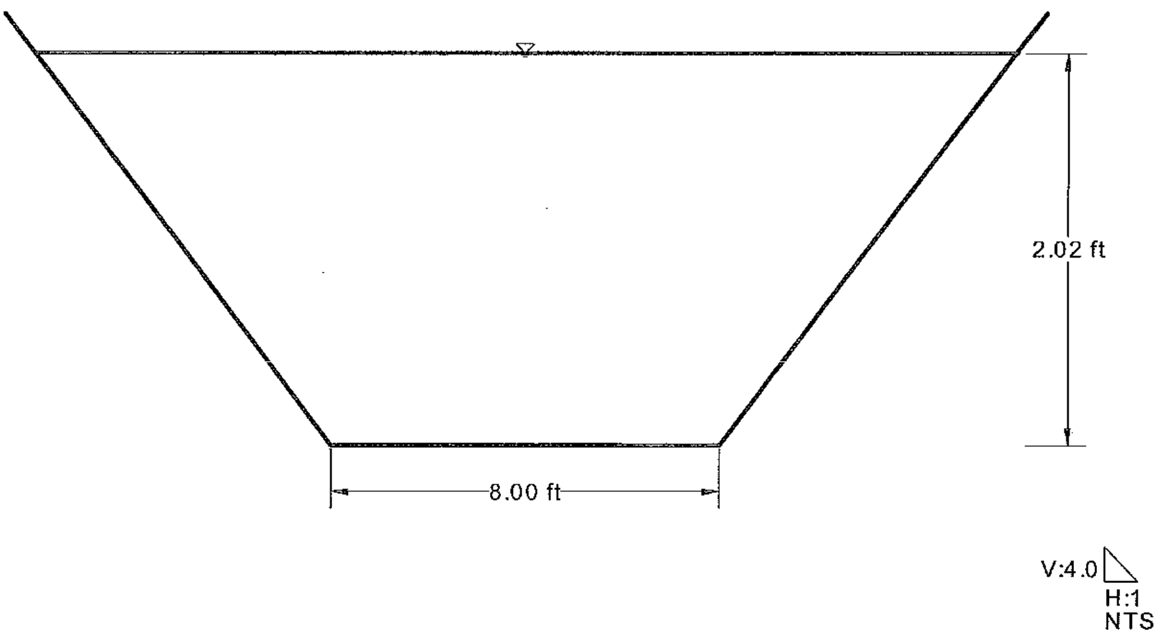
Input Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	243.90	cfs

Results		
Depth	2.02	ft
Flow Area	28.3	ft²
Wetted Perim	20.75	ft
Top Width	20.09	ft
Critical Depth	2.30	ft
Critical Slope	0.011796	ft/ft
Velocity	8.62	ft/s
Velocity Head	1.15	ft
Specific Energ	3.17	ft
Froude Numb	1.28	
Flow Type	Supercritical	

Area 1 Design Point 5A - Tract Overflow Channel
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Depth	2.02	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	243.90	cfs



Area 2 Design Point 6A - Tract Overflow Channel
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Channel Depth

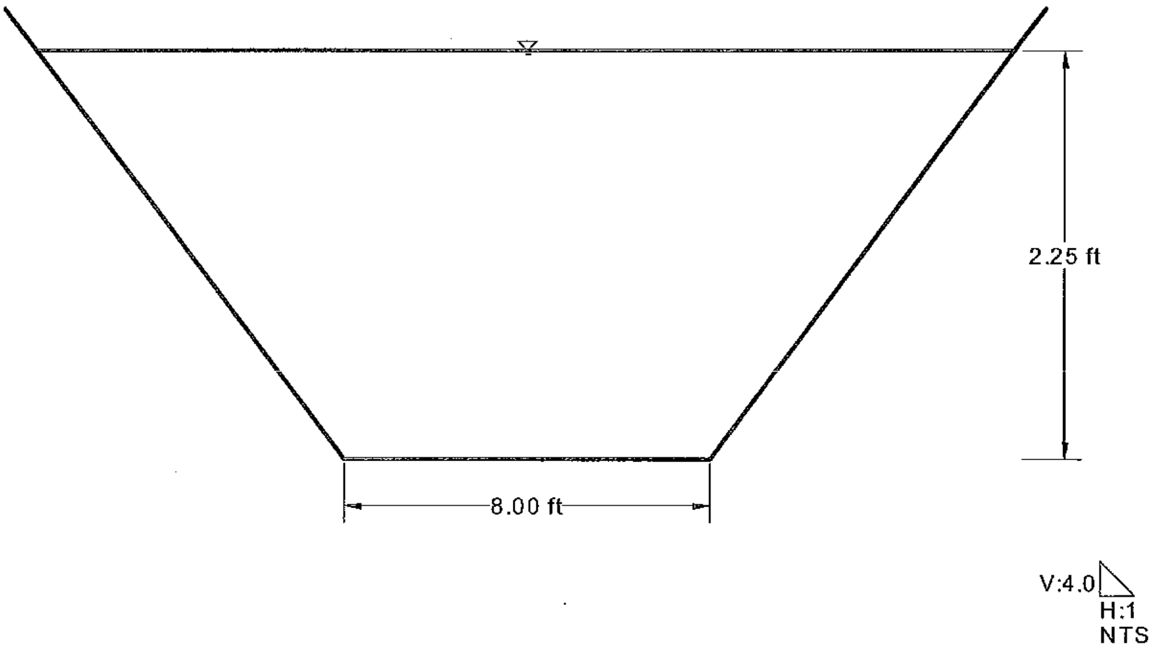
Input Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	304.10	cfs

Results		
Depth	2.25	ft
Flow Area	33.2	ft²
Wetted Perim	22.24	ft
Top Width	21.51	ft
Critical Depth	2.59	ft
Critical Slope	0.011442	ft/ft
Velocity	9.15	ft/s
Velocity Head	1.30	ft
Specific Energ	3.55	ft
Froude Numb	1.30	
Flow Type	Supercritical	

Area 2 Design Point 6A - Tract Overflow Channel
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Depth	2.25	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	304.10	cfs



Area 3 Design Point 5A - Tract Overflow Channel
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

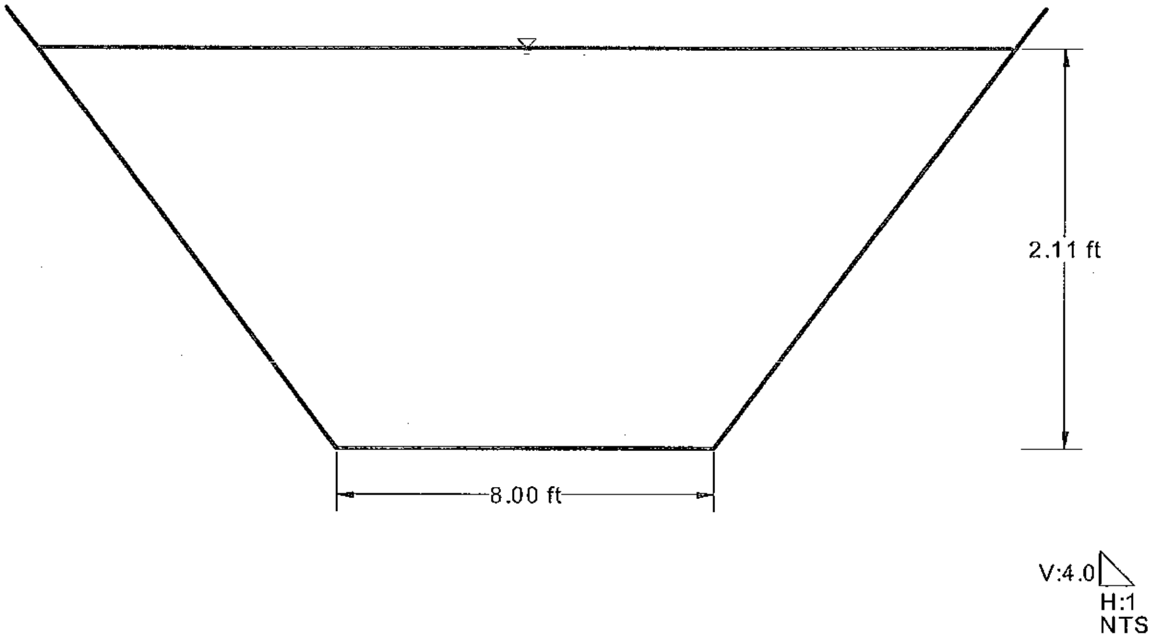
Input Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	267.20	cfs

Results		
Depth	2.11	ft
Flow Area	30.2	ft²
Wetted Perimı	21.35	ft
Top Width	20.66	ft
Critical Depth	2.42	ft
Critical Slope	0.011648	ft/ft
Velocity	8.84	ft/s
Velocity Head	1.21	ft
Specific Enerç	3.32	ft
Froude Numbı	1.29	
Flow Type	ͻupercritical	

Area 3 Design Point 5A - Tract Overflow Channel
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Depth	2.11	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	267.20	cfs



Area 4 Design Point 2A - Tract Overflow Channel
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

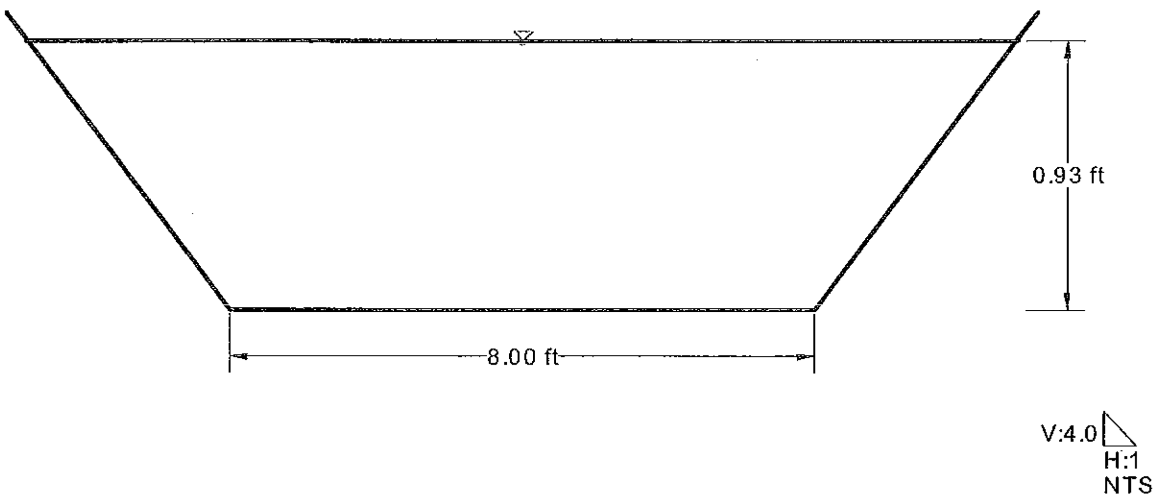
Input Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	56.60	cfs

Results		
Depth	0.93	ft
Flow Area	10.0	ft²
Wetted Perim	13.88	ft
Top Width	13.58	ft
Critical Depth	1.01	ft
Critical Slope	0.014601	ft/ft
Velocity	5.64	ft/s
Velocity Head	0.49	ft
Specific Enerç	1.42	ft
Froude Numb	1.16	
Flow Type	Supercritical	

Area 4 Design Point 2A - Tract Overflow Channel
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Depth	0.93	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	56.60	cfs



Area 4 Design Point 3A - Tract Overflow Channel
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

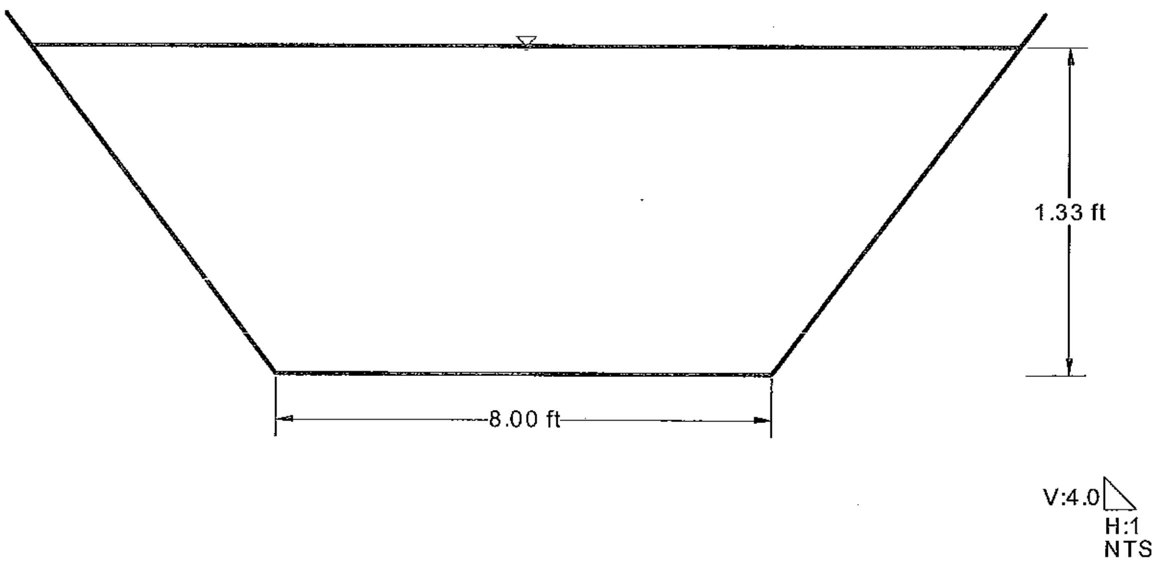
Input Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	109.10	cfs

Results		
Depth	1.33	ft
Flow Area	15.9	ft^2
Wetted Perim	16.39	ft
Top Width	15.96	ft
Critical Depth	1.48	ft
Critical Slope	0.013226	ft/ft
Velocity	6.86	ft/s
Velocity Head	0.73	ft
Specific Enerç	2.06	ft
Froude Numb	1.21	
Flow Type	Supercritical	

Area 4 Design Point 3 - Tract Overflow Channel
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Tract Overflow
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.030	
Slope	020000	ft/ft
Depth	1.33	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	8.00	ft
Discharge	109.10	cfs



Offsite and Roadways - Basin GG Open Channel
Worksheet for Irregular Channel

Project Description	
Worksheet	Irregular Channel
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Slope	008300	ft/ft
Discharg	,015.10	cfs

Options	
Current Roughness Methc	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficiel	0.045	
Water Surface Elev	6,887.18	ft
Elevation Range	34.00 to 6,894.00	
Flow Area	193.6	ft²
Wetted Perimeter	84.13	ft
Top Width	83.51	ft
Actual Depth	3.18	ft
Critical Elevation	6,886.45	ft
Critical Slope	0.024595	ft/ft
Velocity	5.24	ft/s
Velocity Head	0.43	ft
Specific Energy	6,887.61	ft
Froude Number	0.61	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	2+45	0.045

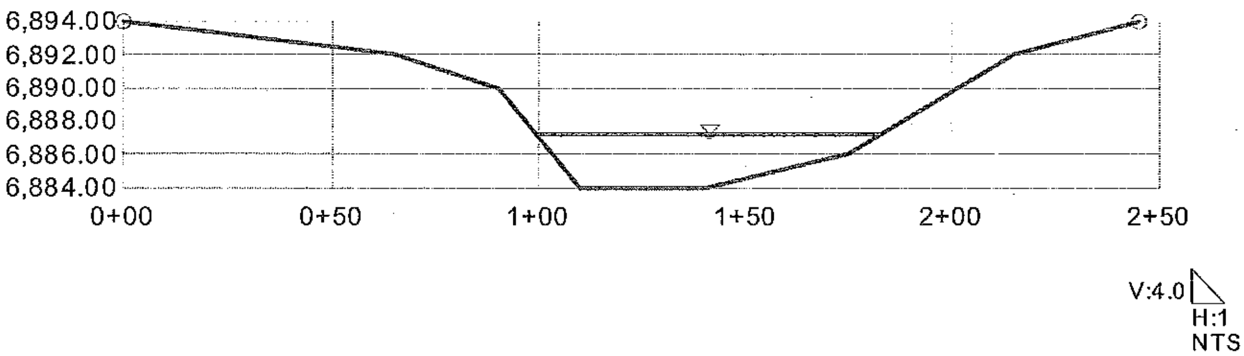
Natural Channel Points

Station (ft)	Elevation (ft)
0+00	6,894.00
0+65	6,892.00
0+90	6,890.00
1+10	6,884.00
1+40	6,884.00
1+75	6,886.00
2+15	6,892.00
2+45	6,894.00

Offsite and Roadways - Basin GG Open Channel
Cross Section for Irregular Channel

Project Description	
Worksheet	Irregular Channel
Flow Element	Irregular Channel
Method	Manning's Formul
Solve For	Channel Depth

Section Data		
Mannings Coefficiei	0.045	
Slope	0.008300	ft/ft
Water Surface Elev	6,887.18	ft
Elevation Range	34.00 to 6,894.00	
Discharge	1,015.10	cfs



Culvert Calculator Report
Forest Meadows Avenue - Box Culvert

Comments: A freeboard value of 1' minimum has been maintained.

Solve For: Section Size

Culvert Summary

Allowable HW Elevation	6,887.00	ft	Headwater Depth/Height	1.54	
Computed Headwater Eleva	6,886.72	ft	Discharge	1,345.00	cfs
Inlet Control HW Elev.	6,886.72	ft	Tailwater Elevation	6,881.65	ft
Outlet Control HW Elev.	6,886.45	ft	Control Type	Inlet Control	

Grades

Upstream Invert	6,879.00	ft	Downstream Invert	6,877.65	ft
Length	135.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	3.26	ft
Slope Type	Steep		Normal Depth	2.96	ft
Flow Regime	Supercritical		Critical Depth	4.26	ft
Velocity Downstream	15.27	ft/s	Critical Slope	0.003692	ft/ft

Section

Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	9.00	ft
Section Size	9 x 5 ft		Rise	5.00	ft
Number Sections	3				

Outlet Control Properties

Outlet Control HW Elev.	6,886.45	ft	Upstream Velocity Head	2.13	ft
Ke	0.50		Entrance Loss	1.06	ft

Inlet Control Properties

Inlet Control HW Elev.	6,886.72	ft	Flow Control	Submerged	
Inlet Type	30 to 75° wingwall flares		Area Full	135.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

KNUCKLE CALCULATIONS
Worksheet for Irregular Channel

Project Description	
Worksheet	Knuckle Sectio
Flow Element	Irregular Chan
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Slope	005000	ft/ft
Discharg	19.70	cfs

Options	
Current Roughness Methc	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.016	
Water Surface Elev	100.00	ft
Elevation Range	.40 to 100.03	
Flow Area	7.9	ft²
Wetted Perimeter	33.67	ft
Top Width	33.49	ft
Actual Depth	0.60	ft
Critical Elevation	99.98	ft
Critical Slope	0.006240	ft/ft
Velocity	2.48	ft/s
Velocity Head	0.10	ft
Specific Energy	100.10	ft
Froude Number	0.90	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.16877477e-3 ft.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+28	0.015
0+28	0+35	0.022

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	100.00
0+26	99.48
0+27	99.40
0+27	99.53
0+28	99.90
0+35	100.03

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Knuckle Sectio
Flow Element	Irregular Chan
Method	Manning's Forr
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.016	
Slope	0.005000	ft/ft
Water Surface Elev	100.00	ft
Elevation Range	.40 to 100.03	
Discharge	19.70	cfs

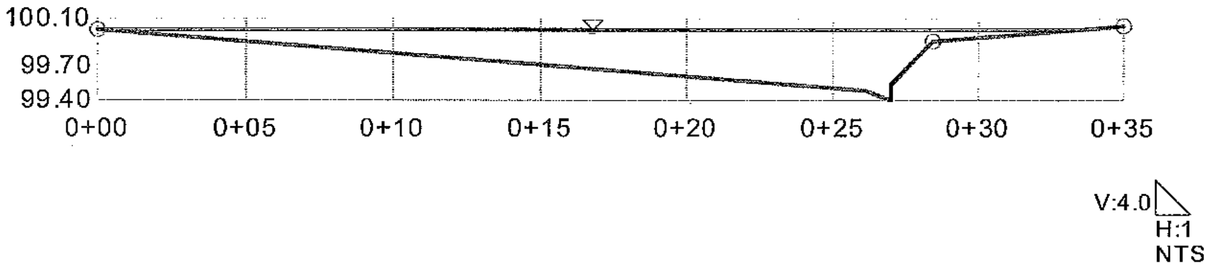


Table
Rating Table for Irregular Channel

Project Description	
Worksheet	Knuckle Sectio
Flow Element	Irregular Chanı
Method	Manning's Forr
Solve For	Channel Depth

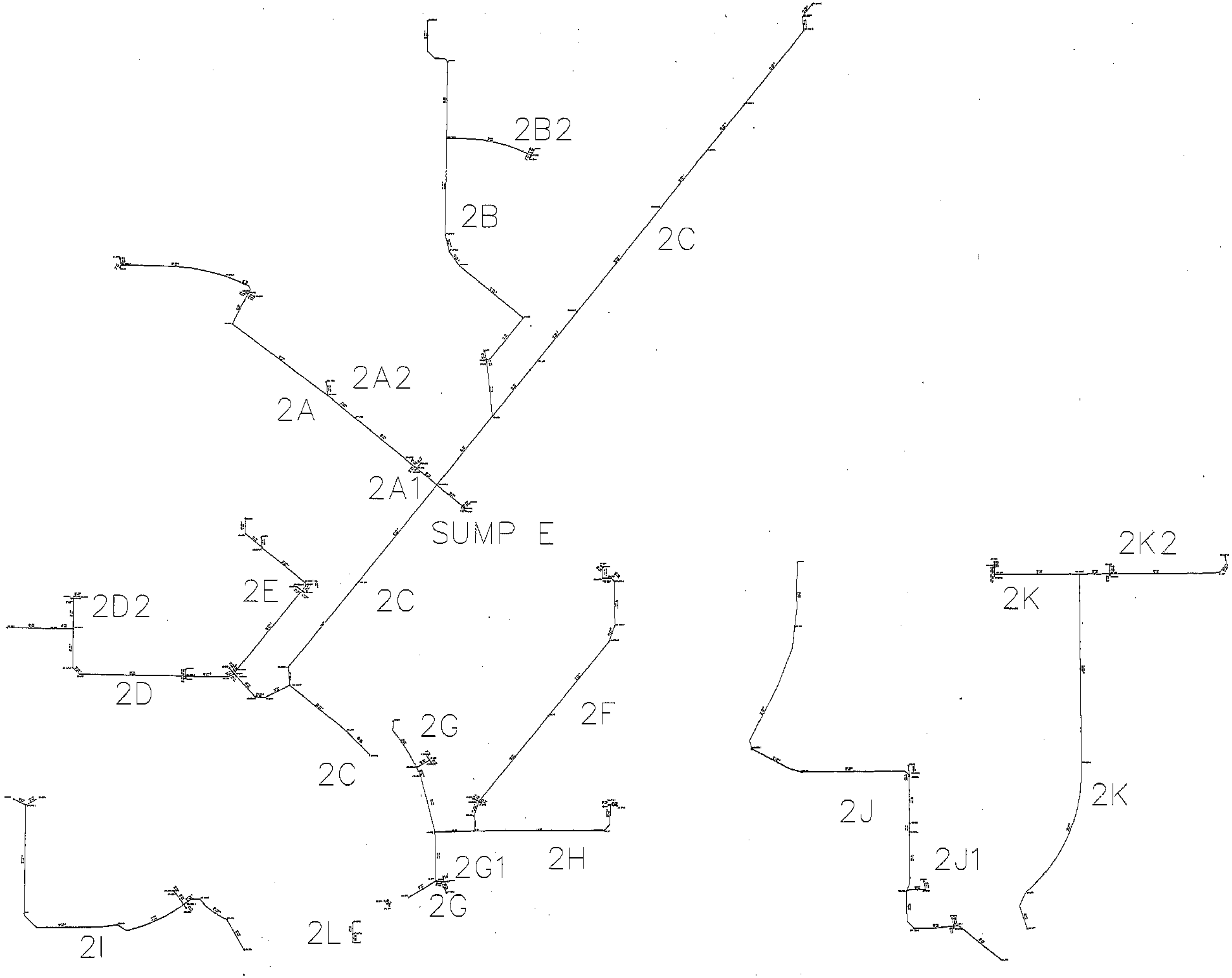
Input Data	
Discharg	19.70 cfs

Options	
Current Roughness Metho	ɔved Lotter's Method
Open Channel Weighting	ɔved Lotter's Method
Closed Channel Weightin	Horton's Method

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.040000	0.005000

Slope (ft/ft)	Water Surface Elevation (ft)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.005000	100.00	2.48	7.9	33.67	33.49
0.010000	99.92	3.51	5.6	25.72	25.54
0.015000	99.88	4.24	4.6	22.53	22.35
0.020000	99.86	4.72	4.2	21.34	21.17
0.025000	99.84	5.13	3.8	20.46	20.30
0.030000	99.83	5.50	3.6	19.77	19.61
0.035000	99.82	5.82	3.4	19.21	19.04
0.040000	99.81	6.12	3.2	18.73	18.57

Hydraulic Calculations
(StormCAD)


2B2
2B
2C
2A2
2A
2A1
SUMP E
2E
2D2
2C
2D
2G
2F
2C
2G1
2H
2G
2L E
2I
2K2
2K
2J
2J1
2K

Calculation Results Summary

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Scenario: 100YR

>>>> Info: Subsurface Network Rooted by: OR-109A
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: OR-J120
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: OR-J111
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: OR-DP17
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: OR-J117
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: OR-J135
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: OR-DP9
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
OR-DP10A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP10	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP3A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP2A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-J101	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-J101-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP4A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP13	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP13A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A4-DP1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J127-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP16	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP16A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP14A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP14	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J125	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

OR-DP3A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP2A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP6A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP6	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP2A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP1A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP1B	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP5	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A2-DP5A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J112	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP2A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J103A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP1A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-J113	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP5	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-J106-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A1-DP4A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J100-8	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J111	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP5A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP5	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP1B	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP1A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP11A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP3A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP11	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J121	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
A3-DP4A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP8	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-J116-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP8A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP7	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
OR-DP7A	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-J120

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
OR-120	1	18 inch	Circular	34.90	59.40	33.61	6,882.36	6,871.20
OR-119	1	18 inch	Circular	49.30	29.70	16.81	6,886.30	6,882.36

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
OR-J120	59.40	6,873.00	6,869.70	6,869.70

OR-DP10A	59.40	6,884.00	6,882.36	6,882.36
OR-DP10	29.70	6,884.00	6,884.00	6,884.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-J135

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
OR-135	1	84 inch	Circular	262.30	529.80	29.69	6,885.30	6,876.47
OR-132	1	72 inch	Circular	179.30	486.80	34.80	6,895.29	6,893.52
OR-134	1	30 inch	Circular	8.70	21.50	50.85	6,895.35	6,893.52
OR-133	1	30 inch	Circular	36.60	21.50	30.67	6,895.50	6,893.52
A4-108	1	72 inch	Circular	182.20	486.80	17.22	6,902.59	6,900.18
A4-107	1	36 inch	Circular	88.50	72.60	10.27	6,906.40	6,905.35
A4-105	1	72 inch	Circular	270.30	414.20	14.65	6,907.94	6,905.35
A4-106	1	30 inch	Circular	38.10	36.30	7.39	6,907.30	6,907.00
A4-104	1	72 inch	Circular	39.10	387.90	13.72	6,909.93	6,909.60
A4-103	1	72 inch	Circular	211.00	361.60	12.79	6,912.54	6,911.00
A4-102	1	72 inch	Circular	7.50	333.30	11.79	6,913.86	6,913.81
A4-100-3	1	66 inch	Circular	488.00	305.00	12.84	6,918.03	6,914.00
A4-101	1	18 inch	Circular	40.10	28.30	16.01	6,916.91	6,914.00
A4-100-2	1	66 inch	Circular	247.00	305.00	12.84	6,921.60	6,919.56
A4-100-1	1	60 inch	Circular	598.20	305.00	23.87	6,931.10	6,921.60
A4-100	1	54 inch	Circular	292.30	305.00	19.18	6,942.56	6,935.53

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
OR-J135	529.80	6,884.00	6,873.17	6,873.17
OR-J135-1	529.80	6,902.00	6,893.52	6,885.30
OR-J135-2	486.80	6,904.75	6,900.18	6,895.29
OR-DP13A	21.50	6,901.00	6,915.44	6,895.35
OR-DP13	21.50	6,901.00	6,902.81	6,895.50
A4-J108	486.80	6,908.00	6,905.35	6,902.59
A4-DP4A	72.60	6,907.00	6,907.71	6,906.40
A4-DP3A	414.20	6,911.00	6,909.60	6,907.94
A4-DP4	36.30	6,907.00	6,907.42	6,907.00
A4-DP3	387.90	6,911.00	6,911.40	6,909.93
A4-DP2A	361.60	6,914.00	6,913.81	6,912.54
A4-J103-2	333.30	6,914.00	6,915.58	6,913.86
A4-J101	305.00	6,921.79	6,919.56	6,918.03
A4-DP2	28.30	6,914.00	6,915.99	6,914.00
A4-J101-2	305.00	6,923.15	6,921.60	6,921.60
A4-J100	305.00	6,939.04	6,935.53	6,931.10
A4-DP1	305.00	6,947.00	6,942.56	6,942.56

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-DP17

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
OR-131	1	72 inch	Circular	179.50	386.20	42.55	6,894.08	6,874.14

OR-131-2	1	66 inch	Circular	651.50	386.20	26.19	6,916.59	6,908.15
OR-131-3	1	66 inch	Circular	855.90	386.20	20.13	6,929.14	6,918.79
OR-126	1	66 inch	Circular	382.10	319.40	13.44	6,937.63	6,934.18
OR-130	1	36 inch	Circular	136.10	66.80	9.45	6,935.54	6,934.18
OR-125B	1	24 inch	Circular	5.50	7.20	2.29	6,937.44	6,937.43
OR-125A	1	60 inch	Circular	32.70	312.20	15.90	6,937.90	6,937.43
OR-129	1	18 inch	Circular	6.00	6.10	34.53	6,936.95	6,936.93
OR-128	1	18 inch	Circular	35.30	6.10	18.47	6,937.04	6,936.93
OR-127	1	36 inch	Circular	495.30	54.60	7.72	6,940.25	6,936.93
OR-125	1	60 inch	Circular	24.60	305.00	15.53	6,938.24	6,937.90
OR-127-2	1	30 inch	Circular	80.80	54.60	11.12	6,942.24	6,940.81

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
OR-DP17	386.20	6,881.00	6,872.00	6,872.00
OR-J131	386.20	6,908.45	6,908.15	6,894.08
OR-J131-2	386.20	6,922.72	6,918.79	6,916.59
OR-J131-3	386.20	6,942.60	6,934.18	6,929.14
OR-J126	319.40	6,937.43	6,939.96	6,937.43
OR-J130	66.80	6,942.00	6,936.93	6,935.54
OR-DP14A	7.20	6,938.00	6,937.48	6,937.44
OR-DP14	312.20	6,938.00	6,937.90	6,937.90
OR-DP16A	6.10	6,942.00	6,937.16	6,936.95
OR-DP16	6.10	6,942.00	6,937.21	6,937.04
OR-J127	54.60	6,946.61	6,940.81	6,940.25
OR-J125	305.00	6,938.00	6,938.00	6,938.00
OR-J127-2	54.60	6,948.00	6,942.24	6,942.24

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-109A

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
OR-109	1	108 inch	Circular	148.90	1,015.70	24.38	6,901.61	6,899.66
OR-109-2	1	108 inch	Circular	326.20	1,015.70	24.51	6,905.91	6,901.61
OR-109-4	1	84 inch	Circular	82.30	711.10	18.48	6,912.53	6,911.51
OR-108	1	84 inch	Circular	124.70	304.60	7.91	6,911.80	6,911.51
OR-107	1	84 inch	Circular	502.70	711.10	27.20	6,920.45	6,915.19
OR-108-2	1	84 inch	Circular	43.90	304.60	7.91	6,912.38	6,912.28
OR-107-2	1	84 inch	Circular	555.80	711.10	25.56	6,930.60	6,920.45
A2-112	1	84 inch	Circular	122.60	304.60	7.91	6,913.15	6,912.87
OR-106C	1	30 inch	Circular	161.30	21.00	4.28	6,937.12	6,936.69
OR-102	1	66 inch	Circular	397.30	439.30	28.53	6,944.06	6,936.69
OR-106	1	66 inch	Circular	119.60	250.80	10.56	6,937.36	6,936.69
A2-111	1	84 inch	Circular	16.00	268.60	6.98	6,913.24	6,913.21
OR-106A	1	24 inch	Circular	32.10	10.50	3.34	6,936.56	6,936.49
OR-106B	1	24 inch	Circular	11.30	10.50	3.34	6,936.51	6,936.49
A1-113	1	54 inch	Circular	241.80	243.80	15.33	6,955.36	6,951.64
OR-100	1	48 inch	Circular	324.20	195.50	23.71	6,957.49	6,951.64
OR-104	1	24 inch	Circular	32.00	30.20	9.61	6,937.45	6,936.88
OR-105	1	24 inch	Circular	9.60	30.20	9.61	6,937.05	6,936.88
OR-103D	1	54 inch	Circular	56.10	190.40	11.97	6,937.41	6,936.88
A2-110	1	30 inch	Circular	34.60	36.00	7.33	6,913.57	6,913.30
A2-104	1	72 inch	Circular	34.40	182.50	6.45	6,913.88	6,913.82
A2-109A	1	36 inch	Circular	24.50	50.10	7.09	6,913.52	6,913.38
A1-112	1	54 inch	Circular	14.00	190.50	11.98	6,957.68	6,957.55

Calculation Results Summary

OR-100-2	1	48 inch	Circular	281.50	195.50	19.64	6,964.44	6,957.94
OR-103C	1	54 inch	Circular	310.50	190.40	19.77	6,939.71	6,937.40
A2-104-2	1	72 inch	Circular	187.50	182.50	6.45	6,914.23	6,913.88
A2-109A-2	1	30 inch	Circular	460.60	50.10	14.02	6,920.18	6,913.52
A1-110	1	48 inch	Circular	256.40	137.20	10.92	6,961.36	6,959.02
A1-111	1	18 inch	Circular	36.40	53.30	30.16	6,968.39	6,959.02
OR-100-3	1	48 inch	Circular	600.00	195.50	19.65	6,978.30	6,964.44
OR-103B	1	54 inch	Circular	163.80	190.40	11.97	6,942.44	6,940.90
A2-101	1	54 inch	Circular	473.20	127.10	7.99	6,916.79	6,914.81
A2-103	1	30 inch	Circular	29.70	27.70	5.64	6,914.95	6,914.81
A2-102	1	24 inch	Circular	10.80	27.70	8.82	6,914.97	6,914.81
A2-108	1	18 inch	Circular	28.50	17.30	9.79	6,922.84	6,922.07
A2-107	1	24 inch	Circular	25.50	15.50	4.93	6,922.19	6,922.07
A2-109	1	18 inch	Circular	11.30	17.30	9.79	6,922.38	6,922.07
A1-110-2	1	48 inch	Circular	371.30	137.20	10.92	6,966.23	6,962.84
OR-100-4	1	48 inch	Circular	325.40	195.50	19.46	6,985.68	6,978.33
OR-103	1	48 inch	Circular	535.60	119.00	9.47	6,947.45	6,943.78
OR-103A	1	30 inch	Circular	62.10	71.40	14.55	6,945.66	6,943.78
A2-101-2	1	54 inch	Circular	43.50	127.10	7.99	6,917.57	6,917.38
A2-107-2	1	24 inch	Circular	16.20	15.50	4.93	6,922.49	6,922.42
A1-110-3	1	48 inch	Circular	78.80	137.20	10.92	6,966.95	6,966.23
OR-100-5	1	48 inch	Circular	274.40	195.50	18.75	6,991.50	6,985.79
A1-105	1	48 inch	Circular	153.60	119.00	9.47	6,949.62	6,948.57
A2-101-3	1	54 inch	Circular	174.30	127.10	7.99	6,918.29	6,917.57
A2-107-3	1	24 inch	Circular	248.40	15.50	10.36	6,925.60	6,922.72
A1-110-4	1	48 inch	Circular	75.80	137.20	10.92	6,968.57	6,967.87
OR-100-6	1	48 inch	Circular	427.00	195.50	18.83	7,000.46	6,991.50
A1-103	1	18 inch	Circular	9.80	27.60	15.62	6,951.38	6,950.70
A1-104	1	30 inch	Circular	30.80	27.60	5.62	6,950.84	6,950.70
A1-102	1	48 inch	Circular	152.80	63.80	5.08	6,951.00	6,950.70
A2-100	1	54 inch	Circular	105.40	96.00	6.04	6,919.14	6,918.89
A2-100C	1	24 inch	Circular	138.30	31.10	18.48	6,921.29	6,918.89
A2-105	1	18 inch	Circular	97.20	9.60	5.43	6,927.42	6,926.60
A2-106	1	18 inch	Circular	45.00	5.90	7.66	6,927.63	6,926.81
A1-110-5	1	42 inch	Circular	430.60	137.20	21.70	6,977.69	6,968.57
OR-100-7	1	48 inch	Circular	63.10	195.50	15.56	7,004.38	7,003.22
A1-102-2	1	42 inch	Circular	469.20	63.80	6.63	6,952.89	6,951.00
OR-112	1	54 inch	Circular	189.70	96.00	6.04	6,919.59	6,919.14
A2-100B	1	18 inch	Circular	28.70	17.90	10.13	6,924.09	6,923.25
A2-100A	1	18 inch	Circular	9.20	13.20	7.47	6,923.40	6,923.25
A2-105-2	1	18 inch	Circular	67.90	9.60	5.43	6,928.26	6,927.69
A1-106	1	36 inch	Circular	345.00	84.00	17.08	6,987.19	6,982.08
A1-109	1	36 inch	Circular	393.30	53.20	7.53	6,984.58	6,982.08
OR-100-8	1	48 inch	Circular	68.90	195.50	15.56	7,006.16	7,004.88
A1-100	1	24 inch	Circular	12.70	31.90	10.15	6,953.76	6,953.50
A1-101	1	24 inch	Circular	30.90	31.90	10.15	6,954.12	6,953.50
A1-106-2	1	36 inch	Circular	244.70	84.00	11.88	6,992.87	6,988.99
A1-108	1	30 inch	Circular	12.10	26.60	5.42	6,985.16	6,985.11
A1-107	1	30 inch	Circular	27.40	26.60	5.42	6,985.22	6,985.11

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
OR-109A	1,015.70	6,904.00	6,894.05	6,894.05
OR-J109	1,015.70	6,907.30	6,901.61	6,901.61
OR-J109-2	1,015.70	6,916.20	6,911.51	6,905.91
OR-J109-4	711.10	6,916.20	6,915.19	6,912.53
OR-J108	304.60	6,914.23	6,912.28	6,911.80
OR-J107	711.10	6,926.06	6,920.45	6,920.45
OR-J108-2	304.60	6,915.08	6,912.87	6,912.38
OR-J107-2	711.10	6,938.45	6,936.69	6,930.60
A2-DP6A	304.60	6,915.56	6,913.21	6,913.15

OR-J106C	21.00	6,936.49	6,936.75	6,936.49
OR-J102	439.30	6,952.48	6,951.64	6,944.06
OR-J106	250.80	6,936.88	6,938.61	6,936.88
A2-J111	268.60	6,915.24	6,913.30	6,913.24
OR-DP3	10.50	6,936.49	6,936.58	6,936.49
OR-DP3A	10.50	6,936.90	6,936.60	6,936.51
A1-J113	243.80	6,959.00	6,957.55	6,955.36
OR-J100	195.50	6,962.20	6,957.49	6,957.49
OR-DP2	30.20	6,937.33	6,938.05	6,937.33
OR-DP2A	30.20	6,937.33	6,937.77	6,937.05
OR-J103D	190.40	6,937.40	6,937.40	6,937.40
A2-DP6	36.00	6,915.54	6,913.99	6,913.57
A2-J104	182.50	6,915.06	6,913.88	6,913.88
A2-J109A	50.10	6,915.54	6,913.52	6,913.52
A1-J112	190.50	6,959.50	6,959.02	6,957.68
OR-J100-2	195.50	6,968.70	6,964.44	6,964.44
OR-J103C	190.40	6,945.70	6,939.71	6,939.71
A2-J104-2	182.50	6,916.20	6,914.81	6,914.23
A2-J109A-2	50.10	6,924.00	6,922.07	6,920.18
A1-J110	137.20	6,966.00	6,962.84	6,961.36
A1-DP5	53.30	6,959.00	6,966.07	6,959.00
OR-J100-3	195.50	6,982.80	6,978.30	6,978.30
OR-J103B	190.40	6,948.21	6,943.78	6,942.44
A2-J101	127.10	6,920.11	6,917.38	6,916.79
A2-DP2A	27.70	6,916.33	6,915.19	6,914.95
A2-DP2	27.70	6,916.35	6,915.58	6,914.97
A2-DP5	17.30	6,924.00	6,923.59	6,922.84
A2-J107	15.50	6,924.86	6,922.42	6,922.19
A2-DP5A	17.30	6,924.00	6,923.12	6,922.38
A1-J110-2	137.20	6,966.50	6,966.23	6,966.23
OR-J100-4	195.50	6,990.00	6,985.68	6,985.68
OR-J103	119.00	6,953.57	6,948.57	6,947.45
OR-J103A	71.40	6,949.00	6,947.30	6,945.66
A2-J101-2	127.10	6,920.69	6,917.57	6,917.57
A2-J107-2	15.50	6,925.32	6,922.72	6,922.49
A1-J110-3	137.20	6,968.20	6,967.87	6,966.95
OR-J100-5	195.50	6,995.80	6,991.50	6,991.50
A1-J102	119.00	6,950.70	6,951.02	6,949.62
A2-J101-3	127.10	6,924.38	6,918.89	6,918.29
A2-J107-3	15.50	6,930.64	6,926.60	6,925.60
A1-J110-4	137.20	6,971.20	6,968.57	6,968.57
OR-J100-6	195.50	7,004.80	7,003.22	7,000.46
A1-DP2	27.60	6,950.90	6,952.80	6,950.90
A1-DP2A	27.60	6,950.90	6,951.09	6,950.84
A1-J102-2	63.80	6,953.46	6,951.00	6,951.00
A2-J100	96.00	6,922.00	6,919.14	6,919.14
A2-J100C	31.10	6,927.37	6,923.25	6,921.29
A2-J105	9.60	6,931.55	6,927.69	6,927.42
A2-DP4	5.90	6,931.46	6,928.09	6,927.63
A1-J110-5	137.20	6,982.70	6,982.08	6,977.69
OR-J100-7	195.50	7,005.00	7,004.88	7,004.38
A1-J102-3	63.80	6,956.20	6,953.50	6,952.89
OR-J112	96.00	6,920.00	6,919.59	6,919.59
A2-DP1B	17.90	6,927.37	6,924.88	6,924.09
A2-DP1A	13.20	6,927.37	6,923.83	6,923.40
A2-DP3	9.60	6,931.89	6,928.49	6,928.26
A1-J106	84.00	6,991.50	6,988.99	6,987.19
A1-J109	53.20	6,986.20	6,985.11	6,984.58
OR-J100-8	195.50	7,011.00	7,009.17	7,006.16
A1-DP1	31.90	6,956.53	6,954.56	6,953.76
A1-DP1A	31.90	6,956.65	6,954.92	6,954.12
A1-J106-2	84.00	6,994.50	6,992.87	6,992.87
A1-DP4A	26.60	6,986.00	6,985.39	6,985.16
A1-DP4	26.60	6,986.00	6,985.45	6,985.22

Calculation Results Summary

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-J111

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
OR-111	1	42 inch	Circular	31.90	62.70	20.76	6,881.23	6,879.47

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
OR-J111	62.70	6,888.00	6,872.54	6,872.54
OR-J111	62.70	6,888.60	6,881.23	6,881.23

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-J117

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
A3-117	1	66 inch	Circular	142.10	302.50	12.73	6,883.67	6,882.52
A3-113	1	54 inch	Circular	220.30	216.30	13.60	6,888.37	6,885.71
A3-116	1	36 inch	Circular	24.80	86.20	12.19	6,886.12	6,885.71
A3-112	1	48 inch	Circular	175.70	161.30	12.84	6,892.89	6,890.67
A3-104	1	36 inch	Circular	266.00	55.00	15.80	6,893.28	6,890.67
A3-115	1	30 inch	Circular	55.80	43.10	8.78	6,888.58	6,887.97
A3-114	1	30 inch	Circular	29.30	43.10	8.78	6,888.29	6,887.97
A3-111	1	30 inch	Circular	587.30	35.60	13.12	6,902.61	6,894.42
A3-108	1	48 inch	Circular	66.90	125.70	10.00	6,894.93	6,894.42
A3-104-2	1	36 inch	Circular	35.80	55.00	10.44	6,894.44	6,894.09
A3-111-2	1	24 inch	Circular	123.00	35.60	11.33	6,907.27	6,904.22
A3-108-2	1	48 inch	Circular	67.80	125.70	10.00	6,895.45	6,894.93
A3-103	1	36 inch	Circular	66.80	38.40	5.43	6,895.78	6,895.56
A3-100	1	18 inch	Circular	239.40	16.60	9.39	6,901.44	6,895.46
A3-109	1	24 inch	Circular	9.50	17.80	5.67	6,908.92	6,908.86
A3-110	1	30 inch	Circular	31.00	17.80	3.63	6,908.92	6,908.86
A3-105	1	36 inch	Circular	498.60	69.10	16.82	6,908.19	6,897.01
A3-107	1	24 inch	Circular	12.70	28.30	9.01	6,897.21	6,897.01
A3-106	1	24 inch	Circular	27.80	28.30	9.01	6,897.44	6,897.01
A3-102	1	30 inch	Circular	11.80	19.20	11.85	6,896.11	6,896.11
A3-101	1	24 inch	Circular	29.80	19.20	8.29	6,896.12	6,896.11
A3-105-2	1	36 inch	Circular	436.90	69.10	18.78	6,924.91	6,910.39
A3-105-3	1	36 inch	Circular	75.00	69.10	10.54	6,926.99	6,926.18
A3-105-4	1	36 inch	Circular	202.10	69.10	9.78	6,929.92	6,927.75
OR-122	1	36 inch	Circular	18.90	69.10	9.78	6,930.12	6,929.92
OR-122-2	1	36 inch	Circular	38.80	69.10	9.78	6,930.54	6,930.12
OR-122-3	1	36 inch	Circular	47.90	59.70	8.45	6,932.11	6,931.72
OR-121	1	36 inch	Circular	11.90	50.30	7.12	6,932.84	6,932.77

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)

Calculation Results Summary

OR-J117	302.50	6,892.00	6,874.68	6,874.68
A3-J117	302.50	6,891.98	6,885.71	6,883.67
A3-J113	216.30	6,896.28	6,890.67	6,888.37
A3-J116	86.20	6,892.00	6,887.97	6,886.12
J-94	161.30	6,901.81	6,894.42	6,892.89
A3-J104	55.00	6,899.56	6,893.28	6,893.28
A3-DP5A	43.10	6,892.00	6,889.18	6,888.58
A3-DP5	43.10	6,892.21	6,888.89	6,888.29
A3-J111	35.60	6,909.12	6,904.22	6,902.61
A3-J108	125.70	6,899.99	6,894.93	6,894.93
A3-J104-2	55.00	6,899.66	6,895.46	6,894.44
A3-J111-2	35.60	6,909.16	6,908.86	6,907.27
A3-J108-2	125.70	6,899.11	6,897.01	6,895.45
A3-J103	38.40	6,899.42	6,896.11	6,895.78
A3-DP1	16.60	6,902.22	6,902.13	6,901.44
A3-DP4	17.80	6,908.98	6,909.17	6,908.92
A3-DP4A	17.80	6,909.00	6,909.02	6,908.92
A3-J105	69.10	6,914.83	6,910.39	6,908.19
A3-DP3A	28.30	6,899.35	6,897.84	6,897.21
A3-DP3	28.30	6,899.38	6,898.07	6,897.44
A3-DP1B	19.20	6,899.74	6,896.30	6,896.11
A3-DP1A	19.20	6,899.74	6,896.65	6,896.12
A3-J105-2	69.10	6,929.61	6,924.91	6,924.91
A3-J105-3	69.10	6,931.47	6,927.75	6,926.99
OR-J104-4	69.10	6,934.14	6,929.92	6,929.92
OR-J122	69.10	6,933.50	6,930.12	6,930.12
OR-DP11A	69.10	6,933.50	6,931.72	6,930.54
OR-DP11	59.70	6,933.50	6,932.77	6,932.11
OR-J121	50.30	6,934.00	6,933.23	6,932.84

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: OR-DP9

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
OR-118	1	54 inch	Circular	157.40	206.40	12.98	6,885.91	6,884.18
OR-118-2	1	54 inch	Circular	151.30	206.40	12.98	6,889.02	6,887.35
OR-118-3	1	54 inch	Circular	80.10	206.40	12.98	6,891.47	6,890.59
OR-116	1	42 inch	Circular	59.10	101.50	10.55	6,893.44	6,892.84
OR-117	1	18 inch	Circular	18.20	24.10	13.64	6,893.80	6,892.84
OR-115	1	42 inch	Circular	332.50	80.80	17.21	6,895.13	6,892.84
OR-115A	1	36 inch	Circular	17.50	82.50	11.67	6,893.85	6,893.58
OR-115-2	1	42 inch	Circular	447.80	80.80	11.66	6,900.29	6,897.89
OR-115-3	1	36 inch	Circular	488.80	80.80	11.43	6,908.73	6,901.56
OR-114	1	30 inch	Circular	50.80	40.40	8.23	6,909.25	6,908.76
OR-113	1	30 inch	Circular	59.80	40.40	8.23	6,909.34	6,908.76

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
OR-DP9	206.40	6,886.00	6,879.89	6,879.89
OR-J118	206.40	6,890.00	6,887.35	6,885.91
OR-J118-2	206.40	6,892.87	6,890.59	6,889.02
OR-J118-3	206.40	6,892.84	6,893.57	6,891.47
OR-DP8	101.50	6,893.58	6,894.31	6,893.44
OR-DP8A	24.10	6,892.93	6,893.94	6,892.93

Calculation Results Summary

OR-J115	80.80	6,901.44	6,897.89	6,895.13
OR-J116-2	82.50	6,896.00	6,893.85	6,893.85
J-91	80.80	6,911.17	6,901.56	6,900.29
OR-J115-3	80.80	6,908.76	6,910.35	6,908.73
OR-DP7A	40.40	6,908.80	6,909.33	6,908.80
OR-DP7	40.40	6,908.41	6,908.94	6,908.41

Completed: 02/13/2006 11:50:02 AM

Scenario: 100YR

Inlet Report

Label	Calculated Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Sump Elevation (ft)	Hydraulic Grade Line Out (ft)
A1-DP1	35+90	6,956.53	true	6,956.53	31.90	6,954.56	6,950.53	6,953.76
A1-DP1A	36+08	6,956.65	true	6,956.65	31.90	6,954.92	6,950.65	6,954.12
A1-DP2	29+65	6,950.90	true	6,950.90	27.60	6,952.80	6,946.21	6,950.90
A1-DP2A	29+86	6,950.90	true	6,950.90	27.60	6,951.09	6,945.13	6,950.84
A1-DP4	39+03	6,986.00	true	6,986.00	26.60	6,985.45	6,980.50	6,985.22
A1-DP4A	38+87	6,986.00	true	6,986.00	26.60	6,985.39	6,980.50	6,985.16
A1-DP5	23+05	6,959.00	true	6,959.00	53.30	6,966.07	6,953.00	6,959.00
A1-J106-2	40+72	6,994.50	true	6,994.50	84.00	6,992.87	6,988.00	6,992.87
A1-J113	22+55	6,959.00	true	6,959.00	53.30	6,957.55	6,948.00	6,955.36
A2-DP1A	18+43	6,927.37	true	6,927.37	13.20	6,923.83	6,921.37	6,923.40
A2-DP1B	18+62	6,927.37	true	6,927.37	17.90	6,924.88	6,921.37	6,924.09
A2-DP2	10+15	6,916.35	true	6,916.35	27.70	6,915.58	6,908.85	6,914.97
A2-DP2A	10+34	6,916.33	true	6,916.33	27.70	6,915.19	6,911.19	6,914.95
A2-DP3	17+23	6,931.89	true	6,931.89	9.60	6,928.49	6,925.89	6,928.26
A2-DP4	16+03	6,931.46	true	6,931.46	5.90	6,928.09	6,926.96	6,927.63
A2-DP5	12+96	6,924.00	true	6,924.00	17.30	6,923.59	6,919.00	6,922.84
A2-DP5A	12+79	6,924.00	true	6,924.00	17.30	6,923.12	6,918.50	6,922.38
A2-DP6	8+17	6,915.54	true	6,915.54	36.00	6,913.99	6,909.66	6,913.57
A2-DP6A	7+66	6,915.56	true	6,915.56	36.00	6,913.21	6,903.26	6,913.15
A3-DP1	9+04	6,902.22	true	6,902.22	16.60	6,902.13	6,896.22	6,901.44
A3-DP1A	7+61	6,899.74	true	6,899.74	19.20	6,896.65	6,894.74	6,896.12
A3-DP1B	7+43	6,899.74	true	6,899.74	19.20	6,896.30	6,894.74	6,896.11
A3-DP3	7+01	6,899.38	true	6,899.38	28.30	6,898.07	6,893.38	6,897.44
A3-DP3A	6+86	6,899.35	true	6,899.35	28.30	6,897.84	6,893.40	6,897.21
A3-DP4	12+58	6,908.98	true	6,908.98	17.80	6,909.17	6,903.98	6,908.92
A3-DP4A	12+79	6,909.00	true	6,909.00	17.80	6,909.02	6,904.00	6,908.92
A3-DP5	1+96	6,892.21	true	6,892.21	43.10	6,888.89	6,884.00	6,888.29
A3-DP5A	2+23	6,892.00	true	6,892.00	43.10	6,889.18	6,885.00	6,888.58
A4-DP1	27+77	6,947.00	true	6,947.00	305.00	6,942.56	6,937.50	6,942.56
A4-DP2	11+92	6,914.00	true	6,914.00	28.30	6,915.99	6,904.50	6,914.00
A4-DP2A	11+44	6,914.00	true	6,914.00	28.30	6,913.81	6,903.68	6,912.54
A4-DP3	9+33	6,911.00	true	6,911.00	26.30	6,911.40	6,901.10	6,909.93
A4-DP3A	8+94	6,911.00	true	6,911.00	26.30	6,909.60	6,900.70	6,907.94
A4-DP4	7+50	6,907.00	true	6,907.00	36.30	6,907.42	6,896.00	6,907.00
A4-DP4A	7+12	6,907.00	true	6,907.00	36.30	6,907.71	6,895.25	6,906.40
A4-J101	16+40	6,921.79	true	6,921.79	0.00	6,919.56	6,908.50	6,918.03
A4-J101-2	18+87	6,923.15	true	6,923.15	0.00	6,921.60	6,911.50	6,921.60
OR-DP2	17+68	6,937.33	true	6,937.33	30.20	6,938.05	6,932.88	6,937.33
OR-DP2A	17+45	6,937.33	true	6,937.33	30.20	6,937.77	6,932.88	6,937.05
OR-DP3	18+09	6,936.49	true	6,936.49	10.50	6,936.58	6,932.49	6,936.49
OR-DP3A	17+89	6,936.90	true	6,936.90	10.50	6,936.60	6,932.49	6,936.51
OR-DP7	17+18	6,908.41	true	6,908.41	40.40	6,908.94	6,904.61	6,908.41
OR-DP7A	17+09	6,908.80	true	6,908.80	40.40	6,909.33	6,902.80	6,908.80
OR-DP8	4+48	6,893.58	true	6,893.58	19.00	6,894.31	6,887.79	6,893.44
OR-DP8A	4+07	6,892.93	true	6,892.93	24.10	6,893.94	6,888.93	6,892.93
OR-DP10	0+84	6,884.00	true	6,884.00	29.70	6,884.00	6,880.00	6,884.00
OR-DP10A	0+35	6,884.00	true	6,884.00	29.70	6,882.36	6,878.00	6,882.36
OR-DP11	19+91	6,933.50	true	6,933.50	9.40	6,932.77	6,927.50	6,932.11
OR-DP11A	19+43	6,933.50	true	6,933.50	9.40	6,931.72	6,927.00	6,930.54
OR-DP13	2+99	6,901.00	true	6,901.00	21.50	6,902.81	6,895.00	6,895.50
OR-DP13A	2+71	6,901.00	true	6,901.00	21.50	6,915.44	6,895.00	6,895.35

Scenario: 100YR

Inlet Report

Label	Calculated Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Sump Elevation (ft)	Hydraulic Grade Line Out (ft)
OR-DP14	21+02	6,938.00	true	6,938.00	7.20	6,937.90	6,929.00	6,937.90
OR-DP14A	20+75	6,938.00	true	6,938.00	7.20	6,937.48	6,932.00	6,937.44
OR-DP16	18+58	6,942.00	true	6,942.00	6.10	6,937.21	6,936.00	6,937.04
OR-DP16A	18+29	6,942.00	true	6,942.00	6.10	6,937.16	6,936.00	6,936.95
OR-J100-8	43+78	7,011.00	true	7,011.00	195.50	7,009.17	7,001.98	7,006.16
OR-J103A	23+28	6,949.00	true	6,949.00	71.40	6,947.30	6,941.25	6,945.66
OR-J111	0+32	6,888.60	true	6,888.60	62.70	6,881.23	6,880.00	6,881.23
OR-J112	19+90	6,920.00	true	6,920.00	96.00	6,919.59	6,913.00	6,919.59
OR-J116-2	4+65	6,896.00	true	6,896.00	82.50	6,893.85	6,888.36	6,893.85
OR-J121	20+03	6,934.00	true	6,934.00	50.30	6,933.23	6,927.80	6,932.84
OR-J125	21+26	6,938.00	true	6,938.00	305.00	6,938.00	6,929.50	6,938.00
OR-J127-2	23+99	6,948.00	true	6,948.00	54.60	6,942.24	6,937.56	6,942.24

Scenario: 100YR

Junction Report

Label	Calculated Station (ft)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Sump Elevation (ft)	Total Flow Out (cfs)
A1-J102	29+55	6,950.70	6,950.70	6,951.02	6,949.62	6,942.78	119.00
A1-J102-2	31+08	6,953.46	6,953.46	6,951.00	6,951.00	6,946.05	63.80
A1-J102-3	35+77	6,956.20	6,956.20	6,953.50	6,952.89	6,949.20	63.80
A1-J106	38+27	6,991.50	6,991.50	6,988.99	6,987.19	6,984.80	84.00
A1-J109	38+75	6,986.20	6,986.20	6,985.11	6,984.58	6,978.80	53.20
A1-J110	25+25	6,966.00	6,966.00	6,962.84	6,961.36	6,955.50	137.20
A1-J110-2	28+97	6,966.50	6,966.50	6,966.23	6,966.23	6,956.54	137.20
A1-J110-3	29+76	6,968.20	6,968.20	6,967.87	6,966.95	6,958.00	137.20
A1-J110-4	30+51	6,971.20	6,971.20	6,968.57	6,968.57	6,959.59	137.20
A1-J110-5	34+82	6,982.70	6,982.70	6,982.08	6,977.69	6,975.50	137.20
A1-J112	22+69	6,959.50	6,959.50	6,959.02	6,957.68	6,948.50	190.50
A2-J100	18+01	6,922.00	6,922.00	6,919.14	6,919.14	6,912.00	96.00
A2-J100C	18+34	6,927.37	6,927.37	6,923.25	6,921.29	6,920.00	31.10
A2-J101	14+77	6,920.11	6,920.11	6,917.38	6,916.79	6,910.09	127.10
A2-J101-2	15+21	6,920.69	6,920.69	6,917.57	6,917.57	6,910.50	127.10
A2-J101-3	16+95	6,924.38	6,924.38	6,918.89	6,918.29	6,911.29	127.10
A2-J104	8+17	6,915.06	6,915.06	6,913.88	6,913.88	6,904.51	182.50
A2-J104-2	10+04	6,916.20	6,916.20	6,914.81	6,914.23	6,905.45	182.50
A2-J105	16+55	6,931.55	6,931.55	6,927.69	6,927.42	6,925.35	9.60
A2-J107	12+93	6,924.86	6,924.86	6,922.42	6,922.19	6,918.66	15.50
A2-J107-2	13+09	6,925.32	6,925.32	6,922.72	6,922.49	6,919.32	15.50
A2-J107-3	15+58	6,930.64	6,930.64	6,926.60	6,925.60	6,924.64	15.50
A2-J109A	8+07	6,915.54	6,915.54	6,913.52	6,913.52	6,907.54	50.10
A2-J109A-2	12+67	6,924.00	6,924.00	6,922.07	6,920.18	6,918.00	50.10
A2-J111	7+82	6,915.24	6,915.24	6,913.30	6,913.24	6,903.34	268.60
A3-J103	7+31	6,899.42	6,899.42	6,896.11	6,895.78	6,893.22	38.40
A3-J104	6+28	6,899.56	6,899.56	6,893.28	6,893.28	6,891.80	55.00
A3-J104-2	6+64	6,899.66	6,899.66	6,895.46	6,894.44	6,892.35	55.00
A3-J105	11+71	6,914.83	6,914.83	6,910.39	6,908.19	6,906.50	69.10
A3-J105-2	16+08	6,929.61	6,929.61	6,924.91	6,924.91	6,923.36	69.10
A3-J105-3	16+83	6,931.47	6,931.47	6,927.75	6,926.99	6,924.09	69.10
A3-J108	6+05	6,899.99	6,899.99	6,894.93	6,894.93	6,889.39	125.70
A3-J108-2	6+73	6,899.11	6,899.11	6,897.01	6,895.45	6,890.91	125.70
A3-J111	11+25	6,909.12	6,909.12	6,904.22	6,902.61	6,901.26	35.60
A3-J111-2	12+48	6,909.16	6,909.16	6,908.86	6,907.27	6,902.08	35.60
A3-J113	3+62	6,896.28	6,896.28	6,890.67	6,888.37	6,883.06	216.30
A3-J116	1+67	6,892.00	6,892.00	6,887.97	6,886.12	6,880.00	86.20
A3-J117	1+42	6,891.98	6,891.98	6,885.71	6,883.67	6,878.27	302.50
A4-J100	24+85	6,939.04	6,939.04	6,935.53	6,931.10	6,928.00	305.00
A4-J103-2	11+52	6,914.00	6,914.00	6,915.58	6,913.86	6,904.00	333.30
A4-J108	6+24	6,908.00	6,908.00	6,905.35	6,902.59	6,894.50	486.80
J-91	11+69	6,911.17	6,911.17	6,901.56	6,900.29	6,897.92	80.80
J-94	5+38	6,901.81	6,901.81	6,894.42	6,892.89	6,887.69	161.30
OR-J100	23+37	6,962.20	6,962.20	6,957.49	6,957.49	6,954.99	195.50
OR-J100-2	26+19	6,968.70	6,968.70	6,964.44	6,964.44	6,961.49	195.50
OR-J100-3	32+19	6,982.80	6,982.80	6,978.30	6,978.30	6,975.35	195.50
OR-J100-4	35+44	6,990.00	6,990.00	6,985.68	6,985.68	6,982.70	195.50
OR-J100-5	38+19	6,995.80	6,995.80	6,991.50	6,991.50	6,988.41	195.50
OR-J100-6	42+46	7,004.80	7,004.80	7,003.22	7,000.46	6,997.38	195.50
OR-J100-7	43+09	7,005.00	7,005.00	7,004.88	7,004.38	6,999.74	195.50
OR-J102	20+13	6,952.48	6,952.48	6,951.64	6,944.06	6,940.66	439.30

Scenario: 100YR

Junction Report

Label	Calculated Station (ft)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Sump Elevation (ft)	Total Flow Out (cfs)
OR-J103	28+02	6,953.57	6,953.57	6,948.57	6,947.45	6,940.74	119.00
OR-J103B	22+66	6,948.21	6,948.21	6,943.78	6,942.44	6,937.60	190.40
OR-J103C	21+02	6,945.70	6,945.70	6,939.71	6,939.71	6,936.67	190.40
OR-J103D	17+92	6,937.40	6,937.40	6,937.40	6,937.40	6,929.63	190.40
OR-J104-4	18+85	6,934.14	6,934.14	6,929.92	6,929.92	6,926.11	69.10
OR-J106	17+36	6,936.88	6,936.88	6,938.61	6,936.88	6,929.19	250.80
OR-J106C	17+77	6,936.49	6,936.49	6,936.75	6,936.49	6,931.15	21.00
OR-J107	10+60	6,926.06	6,926.06	6,920.45	6,920.45	6,915.19	711.10
OR-J107-2	16+16	6,938.45	6,938.45	6,936.69	6,930.60	6,925.85	711.10
OR-J108	6+00	6,914.23	6,914.23	6,912.28	6,911.80	6,902.45	304.60
OR-J108-2	6+44	6,915.08	6,915.08	6,912.87	6,912.38	6,902.60	304.60
OR-J109	1+49	6,907.30	6,907.30	6,901.61	6,901.61	6,896.00	1,015.70
OR-J109-2	4+75	6,916.20	6,916.20	6,911.51	6,905.91	6,900.33	1,015.70
OR-J109-4	5+57	6,916.20	6,916.20	6,915.19	6,912.53	6,903.95	711.10
OR-J115	7+21	6,901.44	6,901.44	6,897.89	6,895.13	6,893.41	80.80
OR-J115-3	16+58	6,908.76	6,908.76	6,910.35	6,908.73	6,900.85	80.80
OR-J118	1+57	6,890.00	6,890.00	6,887.35	6,885.91	6,880.66	206.40
OR-J118-2	3+09	6,892.87	6,892.87	6,890.59	6,889.02	6,883.46	206.40
OR-J118-3	3+89	6,892.84	6,892.84	6,893.57	6,891.47	6,883.25	206.40
OR-J122	19+04	6,933.50	6,933.50	6,930.12	6,930.12	6,926.50	69.10
OR-J126	20+69	6,937.43	6,937.43	6,939.96	6,937.43	6,928.43	319.40
OR-J127	23+18	6,946.61	6,946.61	6,940.81	6,940.25	6,935.74	54.60
OR-J130	18+23	6,942.00	6,942.00	6,936.93	6,935.54	6,928.80	66.80
OR-J131	1+80	6,908.45	6,908.45	6,908.15	6,894.08	6,891.94	386.20
OR-J131-2	8+31	6,922.72	6,922.72	6,918.79	6,916.59	6,911.50	386.20
OR-J131-3	16+87	6,942.60	6,942.60	6,934.18	6,929.14	6,925.00	386.20
OR-J135-1	2+62	6,902.00	6,902.00	6,893.52	6,885.30	6,882.00	529.80
OR-J135-2	4+42	6,904.75	6,904.75	6,900.18	6,895.29	6,891.75	486.80

Scenario: 100YR

Node Report

Label	Additional Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total Flow (cfs)	Gravity Element Headloss (ft)
A1-DP1	31.90	0.00	31.90	6,956.53	6,956.53	6,954.56	6,953.76	31.90	0.80
A1-DP1A	31.90	0.00	31.90	6,956.65	6,956.65	6,954.92	6,954.12	31.90	0.80
A1-DP2	27.60	0.00	27.60	6,950.90	6,950.90	6,952.80	6,950.90	27.60	1.90
A1-DP2A	27.60	0.00	27.60	6,950.90	6,950.90	6,951.09	6,950.84	27.60	0.25
A1-DP4	26.60	0.00	26.60	6,986.00	6,986.00	6,985.45	6,985.22	26.60	0.23
A1-DP4A	26.60	0.00	26.60	6,986.00	6,986.00	6,985.39	6,985.16	26.60	0.23
A1-DP5	53.30	0.00	53.30	6,959.00	6,959.00	6,966.07	6,959.00	53.30	7.07
A1-J102			119.00	6,950.70	6,950.70	6,951.02	6,949.62	119.00	1.39
A1-J102-2			63.80	6,953.46	6,953.46	6,951.00	6,951.00	63.80	0.00
A1-J102-3			63.80	6,956.20	6,956.20	6,953.50	6,952.89	63.80	0.62
A1-J106			84.00	6,991.50	6,991.50	6,988.99	6,987.19	84.00	1.80
A1-J106-2	84.00	0.00	84.00	6,994.50	6,994.50	6,992.87	6,992.87	84.00	0.00
A1-J109			53.20	6,986.20	6,986.20	6,985.11	6,984.58	53.20	0.53
A1-J110			137.20	6,966.00	6,966.00	6,962.84	6,961.36	137.20	1.48
A1-J110-2			137.20	6,966.50	6,966.50	6,966.23	6,966.23	137.20	0.00
A1-J110-3			137.20	6,968.20	6,968.20	6,967.87	6,966.95	137.20	0.93
A1-J110-4			137.20	6,971.20	6,971.20	6,968.57	6,968.57	137.20	0.00
A1-J110-5			137.20	6,982.70	6,982.70	6,982.08	6,977.69	137.20	4.39
A1-J112			190.50	6,959.50	6,959.50	6,959.02	6,957.68	190.50	1.34
A1-J113	53.30	190.50	243.80	6,959.00	6,959.00	6,957.55	6,955.36	243.80	2.19
A2-DP1A	13.20	0.00	13.20	6,927.37	6,927.37	6,923.83	6,923.40	13.20	0.43
A2-DP1B	17.90	0.00	17.90	6,927.37	6,927.37	6,924.88	6,924.09	17.90	0.80
A2-DP2	27.70	0.00	27.70	6,916.35	6,916.35	6,915.58	6,914.97	27.70	0.60
A2-DP2A	27.70	0.00	27.70	6,916.33	6,916.33	6,915.19	6,914.95	27.70	0.25
A2-DP3	9.60	0.00	9.60	6,931.89	6,931.89	6,928.49	6,928.26	9.60	0.23
A2-DP4	5.90	0.00	5.90	6,931.46	6,931.46	6,928.09	6,927.63	5.90	0.46
A2-DP5	17.30	0.00	17.30	6,924.00	6,924.00	6,923.59	6,922.84	17.30	0.74
A2-DP5A	17.30	0.00	17.30	6,924.00	6,924.00	6,923.12	6,922.38	17.30	0.74
A2-DP6	36.00	0.00	36.00	6,915.54	6,915.54	6,913.99	6,913.57	36.00	0.42
A2-DP6A	36.00	268.60	304.60	6,915.56	6,915.56	6,913.21	6,913.15	304.60	0.06
A2-J100			96.00	6,922.00	6,922.00	6,919.14	6,919.14	96.00	0.00
A2-J100C			31.10	6,927.37	6,927.37	6,923.25	6,921.29	31.10	1.96
A2-J101			127.10	6,920.11	6,920.11	6,917.38	6,916.79	127.10	0.60
A2-J101-2			127.10	6,920.69	6,920.69	6,917.57	6,917.57	127.10	0.00
A2-J101-3			127.10	6,924.38	6,924.38	6,918.89	6,918.29	127.10	0.60
A2-J104			182.50	6,915.06	6,915.06	6,913.88	6,913.88	182.50	0.00
A2-J104-2			182.50	6,916.20	6,916.20	6,914.81	6,914.23	182.50	0.58
A2-J105			9.60	6,931.55	6,931.55	6,927.69	6,927.42	9.60	0.28
A2-J107			15.50	6,924.86	6,924.86	6,922.42	6,922.19	15.50	0.23
A2-J107-2			15.50	6,925.32	6,925.32	6,922.72	6,922.49	15.50	0.23
A2-J107-3			15.50	6,930.64	6,930.64	6,926.60	6,925.60	15.50	1.00
A2-J109A			50.10	6,915.54	6,915.54	6,913.52	6,913.52	50.10	0.00
A2-J109A-2			50.10	6,924.00	6,924.00	6,922.07	6,920.18	50.10	1.89
A2-J111			268.60	6,915.24	6,915.24	6,913.30	6,913.24	268.60	0.06
A3-DP1	16.60	0.00	16.60	6,902.22	6,902.22	6,902.13	6,901.44	16.60	0.69
A3-DP1A	19.20	0.00	19.20	6,899.74	6,899.74	6,896.65	6,896.12	19.20	0.53
A3-DP1B	19.20	0.00	19.20	6,899.74	6,899.74	6,896.30	6,896.11	19.20	0.18
A3-DP3	28.30	0.00	28.30	6,899.38	6,899.38	6,898.07	6,897.44	28.30	0.63
A3-DP3A	28.30	0.00	28.30	6,899.35	6,899.35	6,897.84	6,897.21	28.30	0.63
A3-DP4	17.80	0.00	17.80	6,908.98	6,908.98	6,909.17	6,908.92	17.80	0.25
A3-DP4A	17.80	0.00	17.80	6,909.00	6,909.00	6,909.02	6,908.92	17.80	0.10

Scenario: 100YR

Node Report

Label	Additional Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total Flow (cfs)	Gravity Element Headloss (ft)
A3-DP5	43.10	0.00	43.10	6,892.21	6,892.21	6,888.89	6,888.29	43.10	0.60
A3-DP5A	43.10	0.00	43.10	6,892.00	6,892.00	6,889.18	6,888.58	43.10	0.60
A3-J103			38.40	6,899.42	6,899.42	6,896.11	6,895.78	38.40	0.33
A3-J104			55.00	6,899.56	6,899.56	6,893.28	6,893.28	55.00	0.00
A3-J104-2			55.00	6,899.66	6,899.66	6,895.46	6,894.44	55.00	1.02
A3-J105			69.10	6,914.83	6,914.83	6,910.39	6,908.19	69.10	2.20
A3-J105-2			69.10	6,929.61	6,929.61	6,924.91	6,924.91	69.10	0.00
A3-J105-3			69.10	6,931.47	6,931.47	6,927.75	6,926.99	69.10	0.76
A3-J108			125.70	6,899.99	6,899.99	6,894.93	6,894.93	125.70	0.00
A3-J108-2			125.70	6,899.11	6,899.11	6,897.01	6,895.45	125.70	1.55
A3-J111			35.60	6,909.12	6,909.12	6,904.22	6,902.61	35.60	1.61
A3-J111-2			35.60	6,909.16	6,909.16	6,908.86	6,907.27	35.60	1.60
A3-J113			216.30	6,896.28	6,896.28	6,890.67	6,888.37	216.30	2.30
A3-J116			86.20	6,892.00	6,892.00	6,887.97	6,886.12	86.20	1.85
A3-J117			302.50	6,891.98	6,891.98	6,885.71	6,883.67	302.50	2.03
A4-DP1	305.00	0.00	305.00	6,947.00	6,947.00	6,942.56	6,942.56	305.00	0.00
A4-DP2	28.30	0.00	28.30	6,914.00	6,914.00	6,915.99	6,914.00	28.30	1.99
A4-DP2A	28.30	333.30	361.60	6,914.00	6,914.00	6,913.81	6,912.54	361.60	1.27
A4-DP3	26.30	361.60	387.90	6,911.00	6,911.00	6,911.40	6,909.93	387.90	1.46
A4-DP3A	26.30	387.90	414.20	6,911.00	6,911.00	6,909.60	6,907.94	414.20	1.67
A4-DP4	36.30	0.00	36.30	6,907.00	6,907.00	6,907.42	6,907.00	36.30	0.42
A4-DP4A	36.30	36.30	72.60	6,907.00	6,907.00	6,907.71	6,906.40	72.60	1.31
A4-J100			305.00	6,939.04	6,939.04	6,935.53	6,931.10	305.00	4.43
A4-J101	0.00	305.00	305.00	6,921.79	6,921.79	6,919.56	6,918.03	305.00	1.54
A4-J101-2	0.00	305.00	305.00	6,923.15	6,923.15	6,921.60	6,921.60	305.00	0.00
A4-J103-2			333.30	6,914.00	6,914.00	6,915.58	6,913.86	333.30	1.73
A4-J108			486.80	6,908.00	6,908.00	6,905.35	6,902.59	486.80	2.76
J-91			80.80	6,911.17	6,911.17	6,901.56	6,900.29	80.80	1.27
J-94			161.30	6,901.81	6,901.81	6,894.42	6,892.89	161.30	1.54
OR-109A			1,015.70	6,904.00	6,904.00	6,894.05	6,894.05	1,015.70	0.00
OR-DP2	30.20	0.00	30.20	6,937.33	6,937.33	6,938.05	6,937.33	30.20	0.72
OR-DP2A	30.20	0.00	30.20	6,937.33	6,937.33	6,937.77	6,937.05	30.20	0.72
OR-DP3	10.50	0.00	10.50	6,936.49	6,936.49	6,936.58	6,936.49	10.50	0.09
OR-DP3A	10.50	0.00	10.50	6,936.90	6,936.90	6,936.60	6,936.51	10.50	0.09
OR-DP7	40.40	0.00	40.40	6,908.41	6,908.41	6,908.94	6,908.41	40.40	0.53
OR-DP7A	40.40	0.00	40.40	6,908.80	6,908.80	6,909.33	6,908.80	40.40	0.53
OR-DP8	19.00	82.50	101.50	6,893.58	6,893.58	6,894.31	6,893.44	101.50	0.86
OR-DP8A	24.10	0.00	24.10	6,892.93	6,892.93	6,893.94	6,892.93	24.10	1.01
OR-DP9			206.40	6,886.00	6,886.00	6,879.89	6,879.89	206.40	0.00
OR-DP10	29.70	0.00	29.70	6,884.00	6,884.00	6,884.00	6,884.00	29.70	0.00
OR-DP10A	29.70	29.70	59.40	6,884.00	6,884.00	6,882.36	6,882.36	59.40	0.00
OR-DP11	9.40	50.30	59.70	6,933.50	6,933.50	6,932.77	6,932.11	59.70	0.67
OR-DP11A	9.40	59.70	69.10	6,933.50	6,933.50	6,931.72	6,930.54	69.10	1.19
OR-DP13	21.50	0.00	21.50	6,901.00	6,901.00	6,902.81	6,895.50	21.50	7.31
OR-DP13A	21.50	0.00	21.50	6,901.00	6,901.00	6,915.44	6,895.35	21.50	20.09
OR-DP14	7.20	305.00	312.20	6,938.00	6,938.00	6,937.90	6,937.90	312.20	0.00
OR-DP14A	7.20	0.00	7.20	6,938.00	6,938.00	6,937.48	6,937.44	7.20	0.04
OR-DP16	6.10	0.00	6.10	6,942.00	6,942.00	6,937.21	6,937.04	6.10	0.17
OR-DP16A	6.10	0.00	6.10	6,942.00	6,942.00	6,937.16	6,936.95	6.10	0.21
OR-DP17			386.20	6,881.00	6,881.00	6,872.00	6,872.00	386.20	0.00
OR-J100			195.50	6,962.20	6,962.20	6,957.49	6,957.49	195.50	0.00

Scenario: 100YR

Node Report

Label	Additional Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total Flow (cfs)	Gravity Element Headloss (ft)
OR-J100-2			195.50	6,968.70	6,968.70	6,964.44	6,964.44	195.50	0.00
OR-J100-3			195.50	6,982.80	6,982.80	6,978.30	6,978.30	195.50	0.00
OR-J100-4			195.50	6,990.00	6,990.00	6,985.68	6,985.68	195.50	0.00
OR-J100-5			195.50	6,995.80	6,995.80	6,991.50	6,991.50	195.50	0.00
OR-J100-6			195.50	7,004.80	7,004.80	7,003.22	7,000.46	195.50	2.76
OR-J100-7			195.50	7,005.00	7,005.00	7,004.88	7,004.38	195.50	0.50
OR-J100-8	195.50	0.00	195.50	7,011.00	7,011.00	7,009.17	7,006.16	195.50	3.01
OR-J102			439.30	6,952.48	6,952.48	6,951.64	6,944.06	439.30	7.59
OR-J103			119.00	6,953.57	6,953.57	6,948.57	6,947.45	119.00	1.11
OR-J103A	71.40	0.00	71.40	6,949.00	6,949.00	6,947.30	6,945.66	71.40	1.64
OR-J103B			190.40	6,948.21	6,948.21	6,943.78	6,942.44	190.40	1.34
OR-J103C			190.40	6,945.70	6,945.70	6,939.71	6,939.71	190.40	0.00
OR-J103D			190.40	6,937.40	6,937.40	6,937.40	6,937.40	190.40	0.00
OR-J104-4			69.10	6,934.14	6,934.14	6,929.92	6,929.92	69.10	0.00
OR-J106			250.80	6,936.88	6,936.88	6,938.61	6,936.88	250.80	1.73
OR-J106C			21.00	6,936.49	6,936.49	6,936.75	6,936.49	21.00	0.26
OR-J107			711.10	6,926.06	6,926.06	6,920.45	6,920.45	711.10	0.00
OR-J107-2			711.10	6,938.45	6,938.45	6,936.69	6,930.60	711.10	6.09
OR-J108			304.60	6,914.23	6,914.23	6,912.28	6,911.80	304.60	0.49
OR-J108-2			304.60	6,915.08	6,915.08	6,912.87	6,912.38	304.60	0.49
OR-J109			1,015.70	6,907.30	6,907.30	6,901.61	6,901.61	1,015.70	0.00
OR-J109-2			1,015.70	6,916.20	6,916.20	6,911.51	6,905.91	1,015.70	5.60
OR-J109-4			711.10	6,916.20	6,916.20	6,915.19	6,912.53	711.10	2.65
OR-J111			62.70	6,888.00	6,888.00	6,872.54	6,872.54	62.70	0.00
OR-J111	62.70	0.00	62.70	6,888.60	6,888.60	6,881.23	6,881.23	62.70	0.00
OR-J112	96.00	0.00	96.00	6,920.00	6,920.00	6,919.59	6,919.59	96.00	0.00
OR-J115			80.80	6,901.44	6,901.44	6,897.89	6,895.13	80.80	2.76
OR-J115-3			80.80	6,908.76	6,908.76	6,910.35	6,908.73	80.80	1.62
OR-J116-2	82.50	0.00	82.50	6,896.00	6,896.00	6,893.85	6,893.85	82.50	0.00
OR-J117			302.50	6,892.00	6,892.00	6,874.68	6,874.68	302.50	0.00
OR-J118			206.40	6,890.00	6,890.00	6,887.35	6,885.91	206.40	1.44
OR-J118-2			206.40	6,892.87	6,892.87	6,890.59	6,889.02	206.40	1.57
OR-J118-3			206.40	6,892.84	6,892.84	6,893.57	6,891.47	206.40	2.09
OR-J120			59.40	6,873.00	6,873.00	6,869.70	6,869.70	59.40	0.00
OR-J121	50.30	0.00	50.30	6,934.00	6,934.00	6,933.23	6,932.84	50.30	0.39
OR-J122			69.10	6,933.50	6,933.50	6,930.12	6,930.12	69.10	0.00
OR-J125	305.00	0.00	305.00	6,938.00	6,938.00	6,938.00	6,938.00	305.00	0.00
OR-J126			319.40	6,937.43	6,937.43	6,939.96	6,937.43	319.40	2.53
OR-J127			54.60	6,946.61	6,946.61	6,940.81	6,940.25	54.60	0.56
OR-J127-2	54.60	0.00	54.60	6,948.00	6,948.00	6,942.24	6,942.24	54.60	0.00
OR-J130			66.80	6,942.00	6,942.00	6,936.93	6,935.54	66.80	1.39
OR-J131			386.20	6,908.45	6,908.45	6,908.15	6,894.08	386.20	14.07
OR-J131-2			386.20	6,922.72	6,922.72	6,918.79	6,916.59	386.20	2.20
OR-J131-3			386.20	6,942.60	6,942.60	6,934.18	6,929.14	386.20	5.04
OR-J135			529.80	6,884.00	6,884.00	6,873.17	6,873.17	529.80	0.00
OR-J135-1			529.80	6,902.00	6,902.00	6,893.52	6,885.30	529.80	8.22
OR-J135-2			486.80	6,904.75	6,904.75	6,900.18	6,895.29	486.80	4.89

Scenario: 100YR

Pipe Report

Label	US Node	DS Node	Total System Flow (cfs)	Length (ft)	Slope (%)	Size	"n"	Full Cap (cfs)	US Invert Elevation (ft)	DS Invert Elevation (ft)	HGL In (ft)	HGL Out (ft)	Mat Desc
A1-100	A1-DP1	A1-J102-3	31.90	12.70	2.5984	24 inch	0.013	36.46	6,950.78	6,950.45	6,953.76	6,953.50	Concrete
A1-101	A1-DP1A	A1-J102-3	31.90	30.90	4.6926	24 inch	0.013	49.00	6,951.15	6,949.70	6,954.12	6,953.50	Concrete
A1-102	A1-J102-2	A1-J102	63.80	152.80	0.8181	48 inch	0.013	129.91	6,946.05	6,944.80	6,951.00	6,950.70	Concrete
A1-102-2	A1-J102-3	A1-J102-2	63.80	469.20	0.6714	42 inch	0.013	82.43	6,949.20	6,946.05	6,952.89	6,951.00	Concrete
A1-103	A1-DP2	A1-J102	27.60	9.80	9.4898	18 inch	0.013	32.36	6,946.21	6,945.28	6,951.38	6,950.70	Concrete
A1-104	A1-DP2A	A1-J102	27.60	30.80	2.7597	30 inch	0.013	68.14	6,945.13	6,944.28	6,950.84	6,950.70	Concrete
A1-105	A1-J102	OR-J103	119.00	153.60	2.4805	48 inch	0.013	226.22	6,944.80	6,940.99	6,949.62	6,948.57	Concrete
A1-106	A1-J106	A1-J110-5	84.00	345.00	2.6957	36 inch	0.013	109.50	6,984.80	6,975.50	6,987.19	6,982.08	Concrete
A1-106-2	A1-J106-2	A1-J106	84.00	244.70	1.2260	36 inch	0.013	73.85	6,988.00	6,985.00	6,992.87	6,988.99	Concrete
A1-107	A1-DP4	A1-J109	26.60	27.40	6.2044	30 inch	0.013	102.16	6,980.50	6,978.80	6,985.22	6,985.11	Concrete
A1-108	A1-DP4A	A1-J109	26.60	12.10	4.1322	30 inch	0.013	83.37	6,980.50	6,980.00	6,985.16	6,985.11	Concrete
A1-109	A1-J109	A1-J110-5	53.20	393.30	0.8391	36 inch	0.013	61.09	6,978.80	6,975.50	6,984.58	6,982.08	Concrete
A1-110	A1-J110	A1-J112	137.20	256.40	2.7301	48 inch	0.013	237.33	6,955.50	6,948.50	6,961.36	6,959.02	Concrete
A1-110-2	A1-J110-2	A1-J110	137.20	371.30	0.2801	48 inch	0.013	76.02	6,956.54	6,955.50	6,966.23	6,962.84	Concrete
A1-110-3	A1-J110-3	A1-J110-2	137.20	78.80	1.5990	48 inch	0.013	181.63	6,958.00	6,956.74	6,966.95	6,966.23	Concrete
A1-110-4	A1-J110-4	A1-J110-3	137.20	75.80	1.8338	48 inch	0.013	194.51	6,959.59	6,958.20	6,968.57	6,967.87	Concrete
A1-110-5	A1-J110-5	A1-J110-4	137.20	430.60	3.6484	42 inch	0.013	192.16	6,975.50	6,959.79	6,977.69	6,968.57	Concrete
A1-111	A1-DP5	A1-J112	53.30	36.40	12.3626	18 inch	0.013	36.93	6,953.00	6,948.50	6,968.39	6,959.02	Concrete
A1-112	A1-J112	A1-J113	190.50	14.00	3.5714	54 inch	0.013	371.61	6,948.50	6,948.00	6,957.68	6,957.55	Concrete
A1-113	A1-J113	OR-J102	243.80	241.80	3.0356	54 inch	0.013	342.60	6,948.00	6,940.66	6,955.36	6,951.64	Concrete
A2-100	A2-J100	A2-J101-3	96.00	105.40	0.6736	54 inch	0.013	161.39	6,912.00	6,911.29	6,919.14	6,918.89	Concrete
A2-100A	A2-DP1A	A2-J100C	13.20	9.20	14.8913	18 inch	0.013	40.53	6,921.37	6,920.00	6,923.40	6,923.25	Concrete
A2-100B	A2-DP1B	A2-J100C	17.90	28.70	4.7735	18 inch	0.013	22.95	6,921.37	6,920.00	6,924.09	6,923.25	Concrete
A2-100C	A2-J100C	A2-J101-3	31.10	138.30	6.2979	24 inch	0.013	56.77	6,920.00	6,911.29	6,921.29	6,918.89	Concrete
A2-101	A2-J101	A2-J104-2	127.10	473.20	0.6213	54 inch	0.013	155.00	6,910.09	6,907.15	6,916.79	6,914.81	Concrete
A2-101-2	A2-J101-2	A2-J101	127.10	43.50	0.4828	54 inch	0.013	136.63	6,910.50	6,910.29	6,917.57	6,917.38	Concrete
A2-101-3	A2-J101-3	A2-J101-2	127.10	174.30	0.4532	54 inch	0.013	132.38	6,911.29	6,910.50	6,918.29	6,917.57	Concrete
A2-102	A2-DP2	A2-J104-2	27.70	10.80	3.1481	24 inch	0.013	40.14	6,910.05	6,909.71	6,914.97	6,914.81	Concrete
A2-103	A2-DP2A	A2-J104-2	27.70	29.70	5.4545	30 inch	0.013	95.79	6,910.83	6,909.21	6,914.95	6,914.81	Concrete
A2-104	A2-J104	A2-J111	182.50	34.40	0.4942	72 inch	0.013	297.70	6,904.51	6,904.34	6,913.88	6,913.82	Concrete
A2-104-2	A2-J104-2	A2-J104	182.50	187.50	0.5013	72 inch	0.013	299.85	6,905.45	6,904.51	6,914.23	6,913.88	Concrete
A2-105	A2-J105	A2-J107-3	9.60	97.20	0.7305	18 inch	0.013	8.98	6,925.35	6,924.64	6,927.42	6,926.60	Concrete
A2-105-2	A2-DP3	A2-J105	9.60	67.90	0.7953	18 inch	0.013	9.37	6,925.89	6,925.35	6,928.26	6,927.69	Concrete
A2-106	A2-DP4	A2-J107-3	5.90	45.00	1.8222	18 inch	0.013	14.18	6,926.96	6,926.14	6,927.63	6,926.81	Concrete
A2-107	A2-J107	A2-J109A-	15.50	25.50	2.5882	24 inch	0.013	36.39	6,918.66	6,918.00	6,922.19	6,922.07	Concrete
A2-107-2	A2-J107-2	A2-J107	15.50	16.20	2.8395	24 inch	0.013	38.12	6,919.32	6,918.86	6,922.49	6,922.42	Concrete
A2-107-3	A2-J107-3	A2-J107-2	15.50	248.40	2.1417	24 inch	0.013	33.11	6,924.64	6,919.32	6,925.60	6,922.72	Concrete
A2-108	A2-DP5	A2-J109A-	17.30	28.50	3.5088	18 inch	0.013	19.68	6,919.00	6,918.00	6,922.84	6,922.07	Concrete
A2-109	A2-DP5A	A2-J109A-	17.30	11.30	4.4248	18 inch	0.013	22.09	6,918.50	6,918.00	6,922.38	6,922.07	Concrete
A2-109A	A2-J109A	A2-J111	50.10	24.50	17.1429	36 inch	0.013	276.14	6,907.54	6,903.34	6,913.52	6,913.38	Concrete
A2-109A-2	A2-J109A-2	A2-J109A	50.10	460.60	2.2710	30 inch	0.013	61.81	6,918.00	6,907.54	6,920.18	6,913.52	Concrete
A2-110	A2-DP6	A2-J111	36.00	34.60	18.2659	30 inch	0.013	175.29	6,909.66	6,903.34	6,913.57	6,913.30	Concrete
A2-111	A2-J111	A2-DP6A	268.60	16.00	0.5000	84 inch	0.013	451.70	6,903.34	6,903.26	6,913.24	6,913.21	Concrete
A2-112	A2-DP6A	OR-J108-2	304.60	122.60	0.5383	84 inch	0.013	468.69	6,903.26	6,902.60	6,913.15	6,912.87	Concrete
A3-100	A3-DP1	A3-J104-2	16.60	239.40	1.6165	18 inch	0.013	13.35	6,896.22	6,892.35	6,901.44	6,895.46	Concrete
A3-101	A3-DP1A	A3-J103	19.20	29.80	1.0632	24 inch	0.013	23.32	6,894.74	6,894.42	6,896.12	6,896.11	Concrete
A3-102	A3-DP1B	A3-J103	19.20	11.80	2.7119	30 inch	0.013	67.54	6,894.24	6,893.92	6,896.11	6,896.11	Concrete
A3-103	A3-J103	A3-J104-2	38.40	66.80	0.2545	36 inch	0.013	33.65	6,893.22	6,893.05	6,895.78	6,895.56	Concrete
A3-104	A3-J104	A3-J113	55.00	266.00	2.8346	36 inch	0.013	112.29	6,891.80	6,884.26	6,893.28	6,890.67	Concrete
A3-104-2	A3-J104-2	A3-J104	55.00	35.80	0.9777	36 inch	0.013	65.95	6,892.35	6,892.00	6,894.44	6,894.09	Concrete
A3-105	A3-J105	A3-J108-2	69.10	498.60	2.8861	36 inch	0.013	113.30	6,906.50	6,892.11	6,908.19	6,897.01	Concrete

Scenario: 100YR

Pipe Report

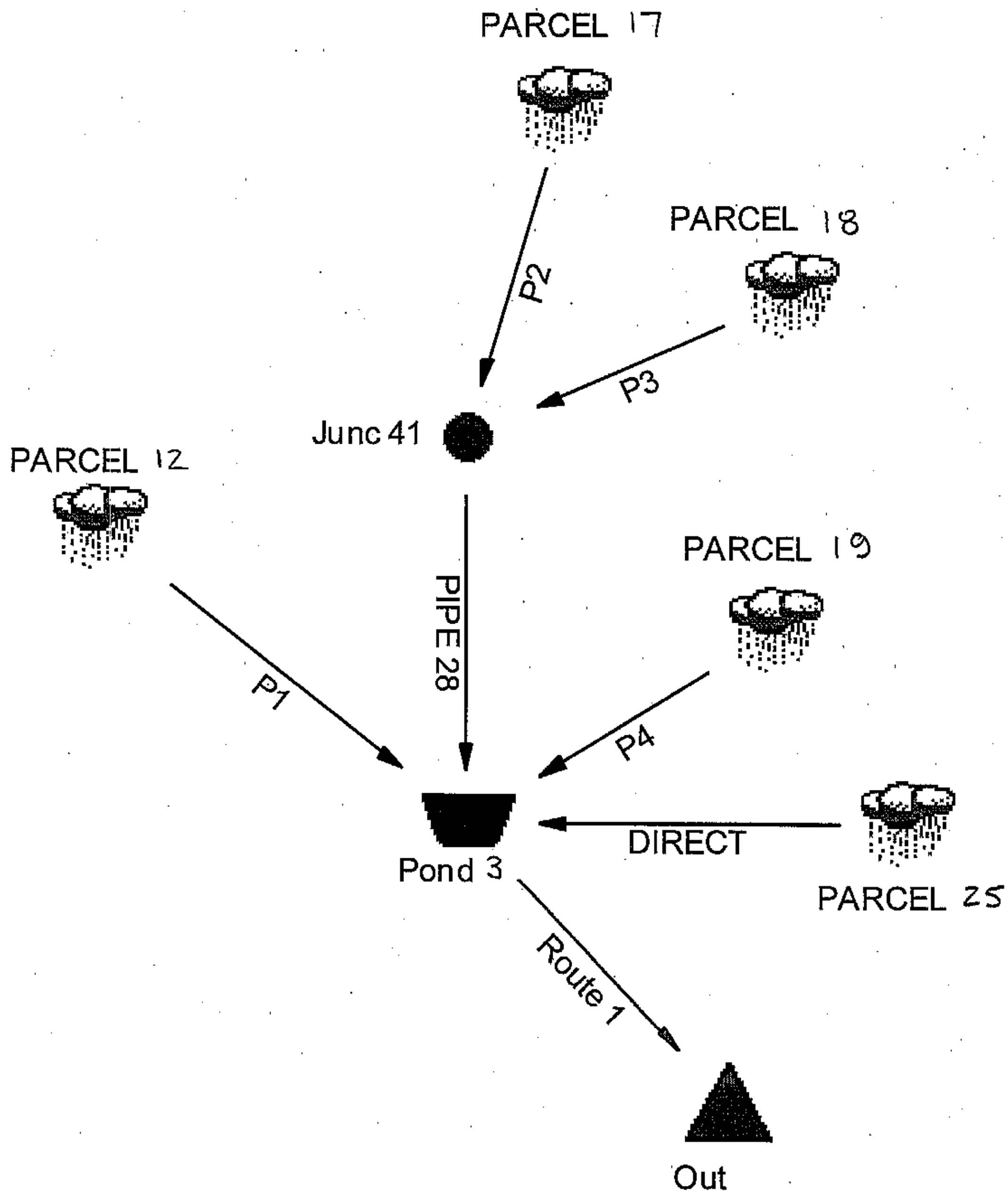
Label	US Node	DS Node	Total System Flow (cfs)	Length (ft)	Slope (%)	Size	"n"	Full Cap (cfs)	US Invert Elevation (ft)	DS Invert Elevation (ft)	HGL In (ft)	HGL Out (ft)	Mat Desc
A3-105-2	A3-J105-2	A3-J105	69.10	436.90	3.8590	36 inch	0.013	131.02	6,923.36	6,906.50	6,924.91	6,910.39	Concrete
A3-105-3	A3-J105-3	A3-J105-2	69.10	75.00	0.9733	36 inch	0.013	65.80	6,924.09	6,923.36	6,926.99	6,926.18	Concrete
A3-105-4	OR-J104-4	A3-J105-3	69.10	202.10	0.9995	36 inch	0.013	66.68	6,926.11	6,924.09	6,929.92	6,927.75	Concrete
A3-106	A3-DP3	A3-J108-2	28.30	27.80	0.9880	24 inch	0.013	22.48	6,893.38	6,893.11	6,897.44	6,897.01	Concrete
A3-107	A3-DP3A	A3-J108-2	28.30	12.70	2.2835	24 inch	0.013	34.18	6,893.40	6,893.11	6,897.21	6,897.01	Concrete
A3-108	A3-J108	J-94	125.70	66.90	2.5411	48 inch	0.013	228.97	6,889.39	6,887.69	6,894.93	6,894.42	Concrete
A3-108-2	A3-J108-2	A3-J108	125.70	67.80	2.2419	48 inch	0.013	215.06	6,890.91	6,889.39	6,895.45	6,894.93	Concrete
A3-109	A3-DP4	A3-J111-2	17.80	9.50	2.0636	24 inch	0.013	32.50	6,903.98	6,903.78	6,908.92	6,908.86	Concrete
A3-110	A3-DP4A	A3-J111-2	17.80	31.00	0.7097	30 inch	0.013	34.55	6,903.50	6,903.28	6,908.92	6,908.86	Concrete
A3-111	A3-J111	J-94	35.60	587.30	2.3106	30 inch	0.013	62.34	6,901.26	6,887.69	6,902.61	6,894.42	Concrete
A3-111-2	A3-J111-2	A3-J111	35.60	123.00	0.6667	24 inch	0.013	18.47	6,902.08	6,901.26	6,907.27	6,904.22	Concrete
A3-112	J-94	A3-J113	161.30	175.70	2.6352	48 inch	0.013	233.17	6,887.69	6,883.06	6,892.89	6,890.67	Concrete
A3-113	A3-J113	A3-J117	216.30	220.30	1.4934	54 inch	0.013	240.30	6,883.06	6,879.77	6,888.37	6,885.71	Concrete
A3-114	A3-DP5	A3-J116	43.10	29.30	4.4369	30 inch	0.013	86.39	6,884.00	6,882.70	6,888.29	6,887.97	Concrete
A3-115	A3-DP5A	A3-J116	43.10	55.80	8.9606	30 inch	0.013	122.77	6,885.00	6,880.00	6,888.58	6,887.97	Concrete
A3-116	A3-J116	A3-J117	86.20	24.80	6.9758	36 inch	0.013	176.15	6,880.00	6,878.27	6,886.12	6,885.71	Concrete
A3-117	A3-J117	OR-J117	302.50	142.10	0.6263	66 inch	0.013	265.75	6,878.27	6,877.38	6,883.67	6,882.52	Concrete
A4-100	A4-DP1	A4-J100	305.00	292.30	3.2501	54 inch	0.013	354.50	6,937.50	6,928.00	6,942.56	6,935.53	Concrete
A4-100-1	A4-J100	A4-J101-2	305.00	598.20	2.7583	60 inch	0.013	432.52	6,928.00	6,911.50	6,931.10	6,921.60	Concrete
A4-100-2	A4-J101-2	A4-J101	305.00	247.00	1.2146	66 inch	0.013	370.07	6,911.50	6,908.50	6,921.60	6,919.56	Concrete
A4-100-3	A4-J101	A4-J103-2	305.00	488.00	0.9221	66 inch	0.013	322.45	6,908.50	6,904.00	6,918.03	6,914.00	Concrete
A4-101	A4-DP2	A4-J103-2	28.30	40.10	1.2469	18 inch	0.013	11.73	6,904.50	6,904.00	6,916.91	6,914.00	Concrete
A4-102	A4-J103-2	A4-DP2A	333.30	7.50	4.2667	72 inch	0.013	874.75	6,904.00	6,903.68	6,913.86	6,913.81	Concrete
A4-103	A4-DP2A	A4-DP3	361.60	211.00	1.2227	72 inch	0.013	468.28	6,903.68	6,901.10	6,912.54	6,911.00	Concrete
A4-104	A4-DP3	A4-DP3A	387.90	39.10	1.0230	72 inch	0.013	428.33	6,901.10	6,900.70	6,909.93	6,909.60	Concrete
A4-105	A4-DP3A	A4-J108	414.20	270.30	2.2937	72 inch	0.013	641.37	6,900.70	6,894.50	6,907.94	6,905.35	Concrete
A4-106	A4-DP4	A4-DP4A	36.30	38.10	1.9685	30 inch	0.013	57.55	6,896.00	6,895.25	6,907.30	6,907.00	Concrete
A4-107	A4-DP4A	A4-J108	72.60	88.50	0.8475	36 inch	0.013	61.40	6,895.25	6,894.50	6,906.40	6,905.35	Concrete
A4-108	A4-J108	OR-J135-2	486.80	182.20	1.5093	72 inch	0.013	520.27	6,894.50	6,891.75	6,902.59	6,900.18	Concrete
OR-100	OR-J100	OR-J102	195.50	324.20	3.6490	48 inch	0.013	274.38	6,954.99	6,943.16	6,957.49	6,951.64	Concrete
OR-100-2	OR-J100-2	OR-J100	195.50	281.50	2.3091	48 inch	0.013	218.26	6,961.49	6,954.99	6,964.44	6,957.94	Concrete
OR-100-3	OR-J100-3	OR-J100-2	195.50	600.00	2.3100	48 inch	0.013	218.31	6,975.35	6,961.49	6,978.30	6,964.44	Concrete
OR-100-4	OR-J100-4	OR-J100-3	195.50	325.40	2.2588	48 inch	0.013	215.87	6,982.70	6,975.35	6,985.68	6,978.33	Concrete
OR-100-5	OR-J100-5	OR-J100-4	195.50	274.40	2.0809	48 inch	0.013	207.20	6,988.41	6,982.70	6,991.50	6,985.79	Concrete
OR-100-6	OR-J100-6	OR-J100-5	195.50	427.00	2.1007	48 inch	0.013	208.18	6,997.38	6,988.41	7,000.46	6,991.50	Concrete
OR-100-7	OR-J100-7	OR-J100-6	195.50	63.10	3.7401	48 inch	0.013	277.78	6,999.74	6,997.38	7,004.38	7,003.22	Concrete
OR-100-8	OR-J100-8	OR-J100-7	195.50	68.90	3.2511	48 inch	0.013	258.99	7,001.98	6,999.74	7,006.16	7,004.88	Concrete
OR-102	OR-J102	OR-J107-2	439.30	397.30	3.4760	66 inch	0.013	626.05	6,940.66	6,926.85	6,944.06	6,936.69	Concrete
OR-103	OR-J103	OR-J103B	119.00	535.60	0.4929	48 inch	0.013	100.84	6,940.74	6,938.10	6,947.45	6,943.78	Concrete
OR-103A	OR-J103A	OR-J103B	71.40	62.10	2.0129	30 inch	0.013	58.19	6,941.25	6,940.00	6,945.66	6,943.78	Concrete
OR-103B	OR-J103B	OR-J103C	190.40	163.80	0.5678	54 inch	0.013	148.17	6,937.60	6,936.67	6,942.44	6,940.90	Concrete
OR-103C	OR-J103C	OR-J103D	190.40	310.50	2.2673	54 inch	0.013	296.09	6,936.67	6,929.63	6,939.71	6,937.40	Concrete
OR-103D	OR-J103D	OR-J106	190.40	56.10	0.7843	54 inch	0.013	174.15	6,929.63	6,929.19	6,937.41	6,936.88	Concrete
OR-104	OR-DP2	OR-J106	30.20	32.00	1.6250	24 inch	0.013	28.84	6,932.88	6,932.36	6,937.45	6,936.88	Concrete
OR-105	OR-DP2A	OR-J106	30.20	9.60	5.4167	24 inch	0.013	52.65	6,932.88	6,932.36	6,937.05	6,936.88	Concrete
OR-106	OR-J106	OR-J107-2	250.80	119.60	0.7023	66 inch	0.013	281.41	6,929.19	6,928.35	6,937.36	6,936.69	Concrete
OR-106A	OR-DP3	OR-J106C	10.50	32.10	2.6168	24 inch	0.013	36.59	6,932.49	6,931.65	6,936.56	6,936.49	Concrete
OR-106B	OR-DP3A	OR-J106C	10.50	11.30	7.4336	24 inch	0.013	61.68	6,932.49	6,931.65	6,936.51	6,936.49	Concrete
OR-106C	OR-J106C	OR-J107-2	21.00	161.30	0.4960	30 inch	0.013	28.88	6,931.15	6,930.35	6,937.12	6,936.69	Concrete
OR-107	OR-J107	OR-J109-4	711.10	502.70	2.2359	84 inch	0.013	955.19	6,915.19	6,903.95	6,920.45	6,915.19	Concrete
OR-107-2	OR-J107-2	OR-J107	711.10	555.80	1.9180	84 inch	0.013	884.67	6,925.85	6,915.19	6,930.60	6,920.45	Concrete

Scenario: 100YR

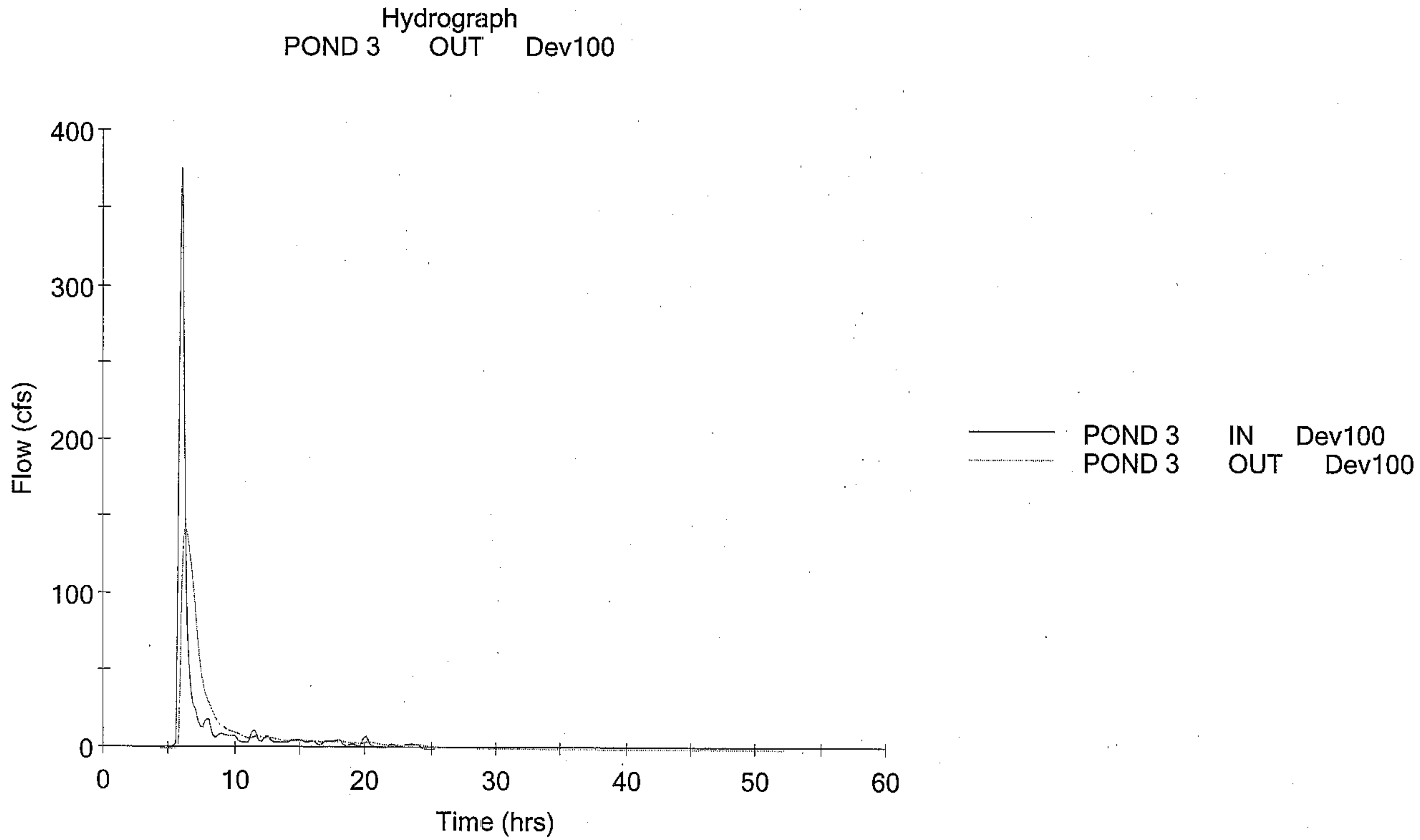
Pipe Report

Label	US Node	DS Node	Total System Flow (cfs)	Length (ft)	Slope (%)	Size	"n"	Full Cap (cfs)	US Invert Elevation (ft)	DS Invert Elevation (ft)	HGL In (ft)	HGL Out (ft)	Mat Desc
OR-108	OR-J108	OR-J109-2	304.60	124.70	0.0962	84 inch	0.013	198.16	6,902.45	6,902.33	6,911.80	6,911.51	Concrete
OR-108-2	OR-J108-2	OR-J108	304.60	43.90	0.3417	84 inch	0.013	373.40	6,902.60	6,902.45	6,912.38	6,912.28	Concrete
OR-109	OR-J109	OR-109A	1,015.70	148.90	1.3096	108 inch	0.013	1,428.84	6,896.00	6,894.05	6,901.61	6,899.66	Concrete
OR-109-2	OR-J109-2	OR-J109	1,015.70	326.20	1.3274	108 inch	0.013	1,438.52	6,900.33	6,896.00	6,905.91	6,901.61	Concrete
OR-109-4	OR-J109-4	OR-J109-2	711.10	82.30	1.9684	84 inch	0.013	896.23	6,903.95	6,902.33	6,912.53	6,911.51	Concrete
OR-111	OR-J111	OR-J111	62.70	31.90	5.5172	42 inch	0.013	236.31	6,880.00	6,878.24	6,881.23	6,879.47	Concrete
OR-112	OR-J112	A2-J100	96.00	189.70	0.5271	54 inch	0.013	142.77	6,913.00	6,912.00	6,919.59	6,919.14	Concrete
OR-113	OR-DP7	OR-J115-3	40.40	59.80	6.2876	30 inch	0.013	102.85	6,904.61	6,900.85	6,909.34	6,908.76	Concrete
OR-114	OR-DP7A	OR-J115-3	40.40	50.80	3.8386	30 inch	0.013	80.36	6,902.80	6,900.85	6,909.25	6,908.76	Concrete
OR-115	OR-J115	OR-J118-3	80.80	332.50	2.7549	42 inch	0.013	166.98	6,893.41	6,884.25	6,895.13	6,892.84	Concrete
OR-115-2	J-91	OR-J115	80.80	447.80	1.0071	42 inch	0.013	100.96	6,897.92	6,893.41	6,900.29	6,897.89	Concrete
OR-115-3	OR-J115-3	J-91	80.80	488.80	0.5994	36 inch	0.013	51.64	6,900.85	6,897.92	6,908.73	6,901.56	Concrete
OR-115A	OR-J116-2	OR-DP8	82.50	17.50	0.4000	36 inch	0.013	42.18	6,888.36	6,888.29	6,893.85	6,893.58	Concrete
OR-116	OR-DP8	OR-J118-3	101.50	59.10	5.9898	42 inch	0.013	246.22	6,887.79	6,884.25	6,893.44	6,892.84	Concrete
OR-117	OR-DP8A	OR-J118-3	24.10	18.20	14.7253	18 inch	0.013	40.31	6,888.93	6,886.25	6,893.80	6,892.84	Concrete
OR-118	OR-J118	OR-DP9	206.40	157.40	0.4892	54 inch	0.013	137.53	6,880.66	6,879.89	6,885.91	6,884.18	Concrete
OR-118-2	OR-J118-2	OR-J118	206.40	151.30	1.8506	54 inch	0.013	267.50	6,883.46	6,880.66	6,889.02	6,887.35	Concrete
OR-118-3	OR-J118-3	OR-J118-2	206.40	80.10	-0.2622	54 inch	0.013	-100.68	6,883.25	6,883.46	6,891.47	6,890.59	Concrete
OR-119	OR-DP10	OR-DP10A	29.70	49.30	4.0568	18 inch	0.013	21.16	6,880.00	6,878.00	6,886.30	6,882.36	Concrete
OR-120	OR-DP10A	OR-J120	59.40	34.90	23.7822	18 inch	0.013	51.22	6,878.00	6,869.70	6,882.36	6,871.20	Concrete
OR-121	OR-J121	OR-DP11	50.30	11.90	2.5210	36 inch	0.013	105.90	6,927.80	6,927.50	6,932.84	6,932.77	Concrete
OR-122	OR-J122	OR-J104-4	69.10	18.90	2.0635	36 inch	0.013	95.81	6,926.50	6,926.11	6,930.12	6,929.92	Concrete
OR-122-2	OR-DP11A	OR-J122	69.10	38.80	1.2887	36 inch	0.013	75.71	6,927.00	6,926.50	6,930.54	6,930.12	Concrete
OR-122-3	OR-DP11	OR-DP11A	59.70	47.90	1.0438	36 inch	0.013	68.14	6,927.50	6,927.00	6,932.11	6,931.72	Concrete
OR-125	OR-J125	OR-DP14	305.00	24.60	2.0325	60 inch	0.013	371.28	6,929.50	6,929.00	6,938.24	6,937.90	Concrete
OR-125A	OR-DP14	OR-J126	312.20	32.70	1.7431	60 inch	0.013	343.84	6,929.00	6,928.43	6,937.90	6,937.43	Concrete
OR-125B	OR-DP14A	OR-J126	7.20	5.50	64.9091	24 inch	0.013	182.25	6,932.00	6,928.43	6,937.44	6,937.43	Concrete
OR-126	OR-J126	OR-J131-3	319.40	382.10	0.8977	66 inch	0.013	318.15	6,928.43	6,925.00	6,937.63	6,934.18	Concrete
OR-127	OR-J127	OR-J130	54.60	495.30	1.4012	36 inch	0.013	78.95	6,935.74	6,928.80	6,940.25	6,936.93	Concrete
OR-127-2	OR-J127-2	OR-J127	54.60	80.80	2.2525	30 inch	0.013	61.56	6,937.56	6,935.74	6,942.24	6,940.81	Concrete
OR-128	OR-DP16	OR-J130	6.10	35.30	20.3966	18 inch	0.013	47.44	6,936.00	6,928.80	6,937.04	6,936.93	Concrete
OR-129	OR-DP16A	OR-J130	6.10	6.00	20.0000	18 inch	0.013	115.06	6,936.00	6,928.80	6,936.95	6,936.93	Concrete
OR-130	OR-J130	OR-J131-3	66.80	136.10	2.7921	36 inch	0.013	111.44	6,928.80	6,925.00	6,935.54	6,934.18	Concrete
OR-131	OR-J131	OR-DP17	386.20	179.50	11.1086	72 inch	0.013	1,411.46	6,891.94	6,872.00	6,894.08	6,874.14	Concrete
OR-131-2	OR-J131-2	OR-J131	386.20	651.50	3.0023	66 inch	0.013	581.83	6,911.50	6,891.94	6,916.59	6,908.15	Concrete
OR-131-3	OR-J131-3	OR-J131-2	386.20	855.90	1.5773	66 inch	0.013	421.72	6,925.00	6,911.50	6,929.14	6,918.79	Concrete
OR-132	OR-J135-2	OR-J135-1	486.80	179.30	5.4378	72 inch	0.013	987.53	6,891.75	6,882.00	6,895.29	6,893.52	Concrete
OR-133	OR-DP13	OR-J135-1	21.50	36.60	35.5191	30 inch	0.013	244.44	6,895.00	6,882.00	6,895.50	6,893.52	Concrete
OR-134	OR-DP13A	OR-J135-1	21.50	8.70	49.4253	30 inch	0.013	501.36	6,895.00	6,882.00	6,895.35	6,893.52	Concrete
OR-135	OR-J135-1	OR-J135	529.80	262.30	3.3664	84 inch	0.013	1,172.05	6,882.00	6,873.17	6,885.30	6,876.47	Concrete

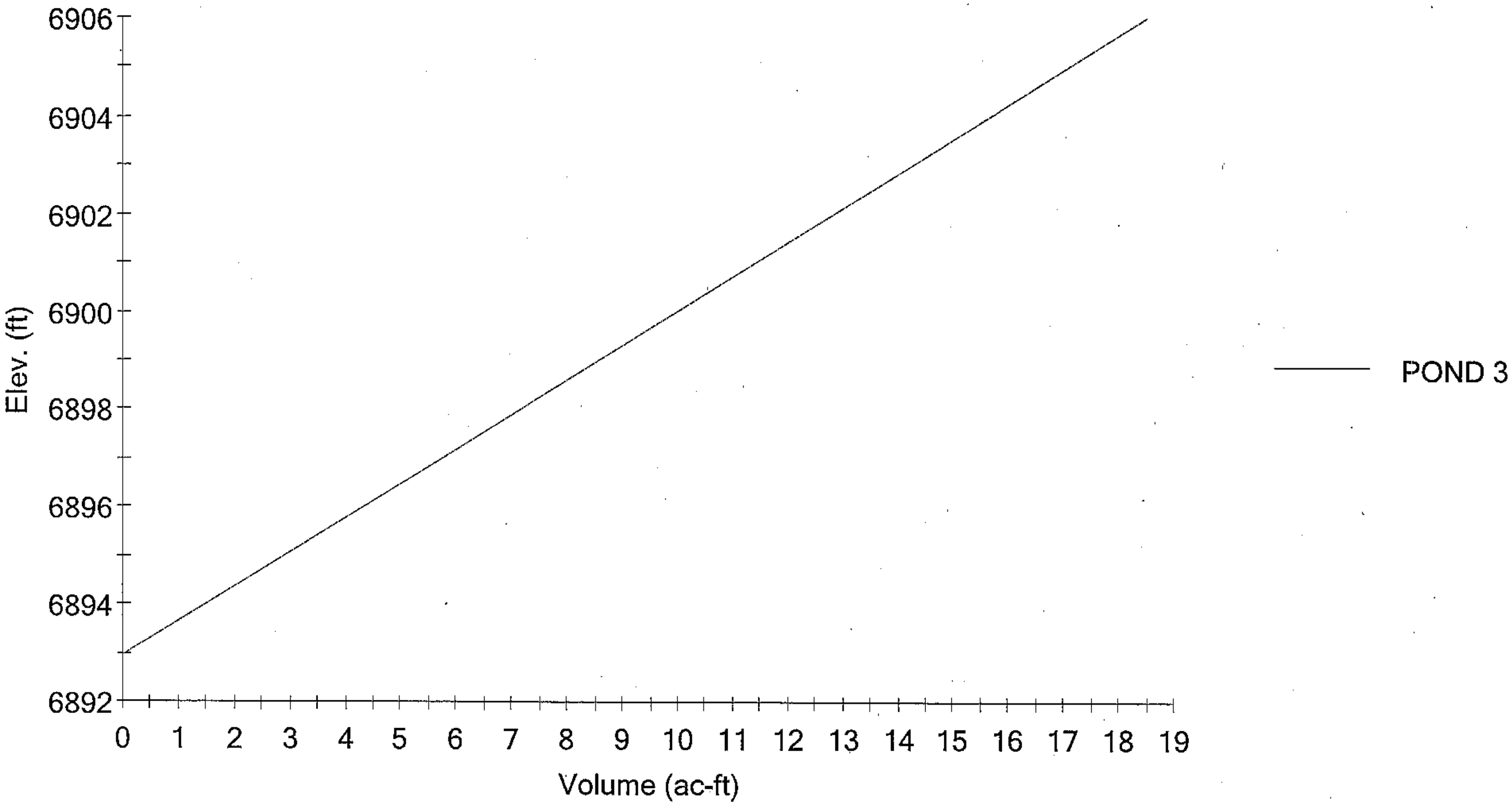
Pond Calculations

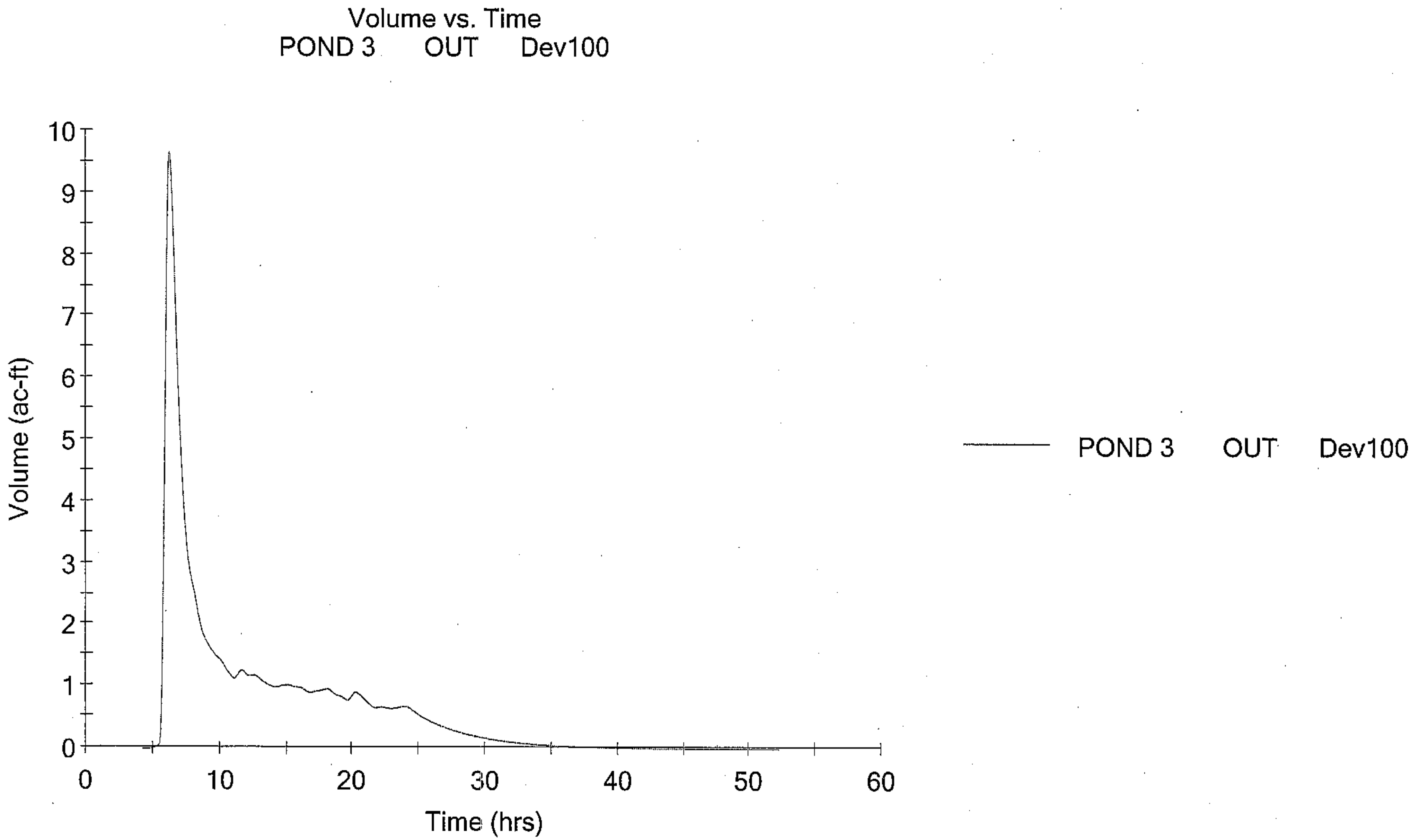


PARCEL 17
P2
PARCEL 18
P3
Junc 41
PARCEL 12
PIPE 28
PARCEL 19
P1
P4
DIRECT
Pond 3
PARCEL 25
Route 1
Out

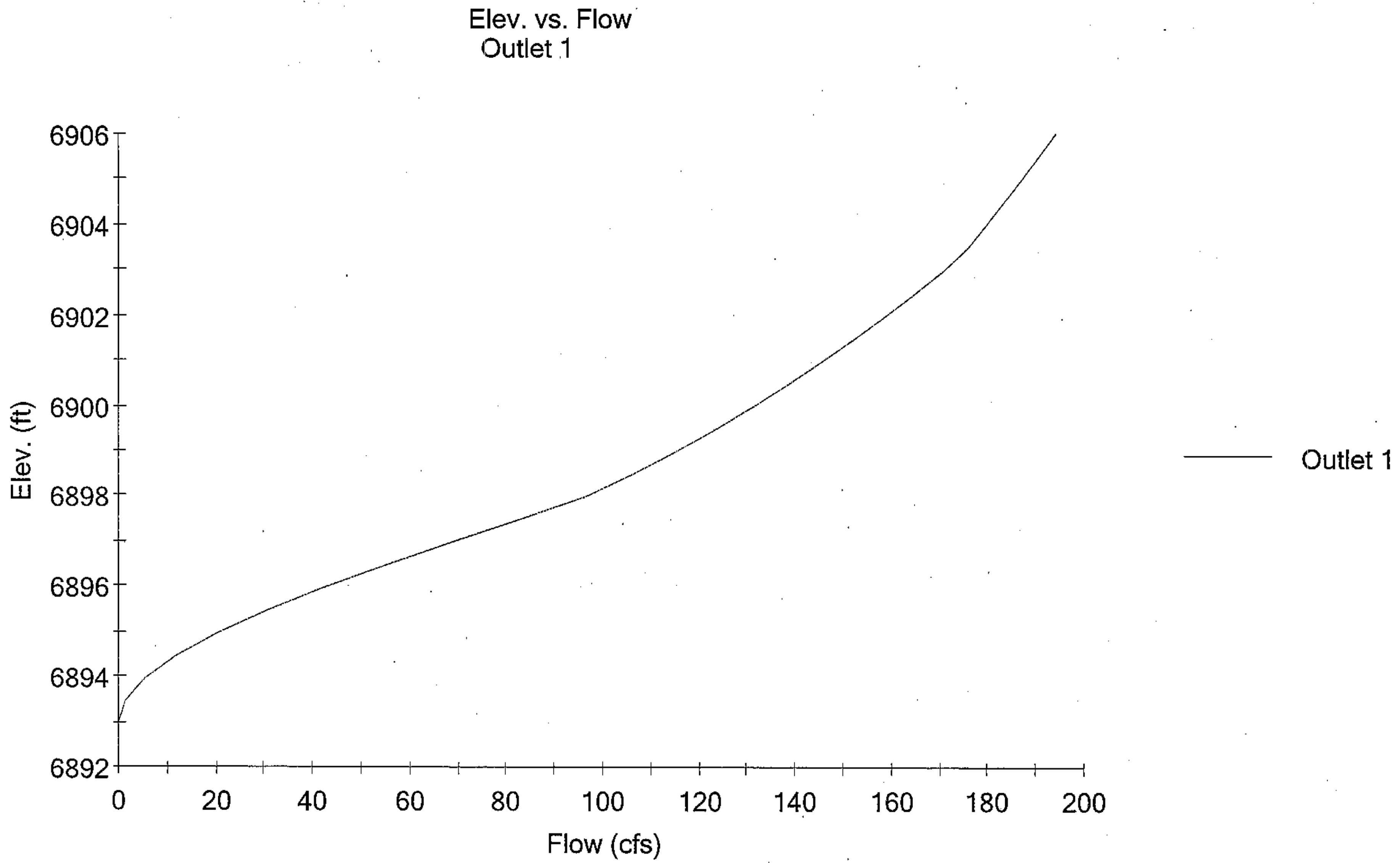

Hydrograph
POND 3 OUT Dev100
400
300
200
100
0
Flow (cfs)
0
10
20
30
40
50
60
Time (hrs)
POND 3 IN Dev100
POND 3 OUT Dev100

Elev. vs. Volume
POND 3

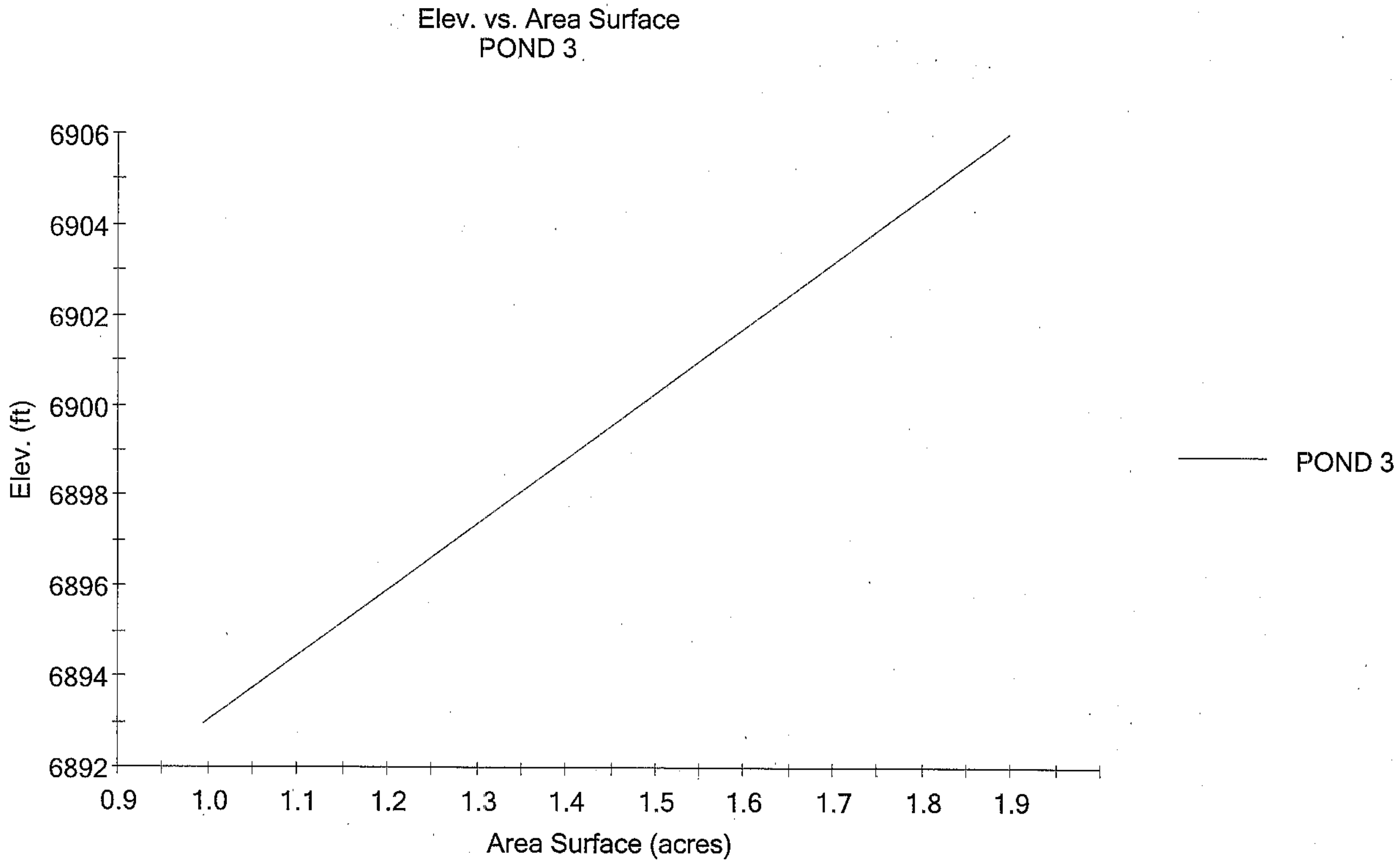




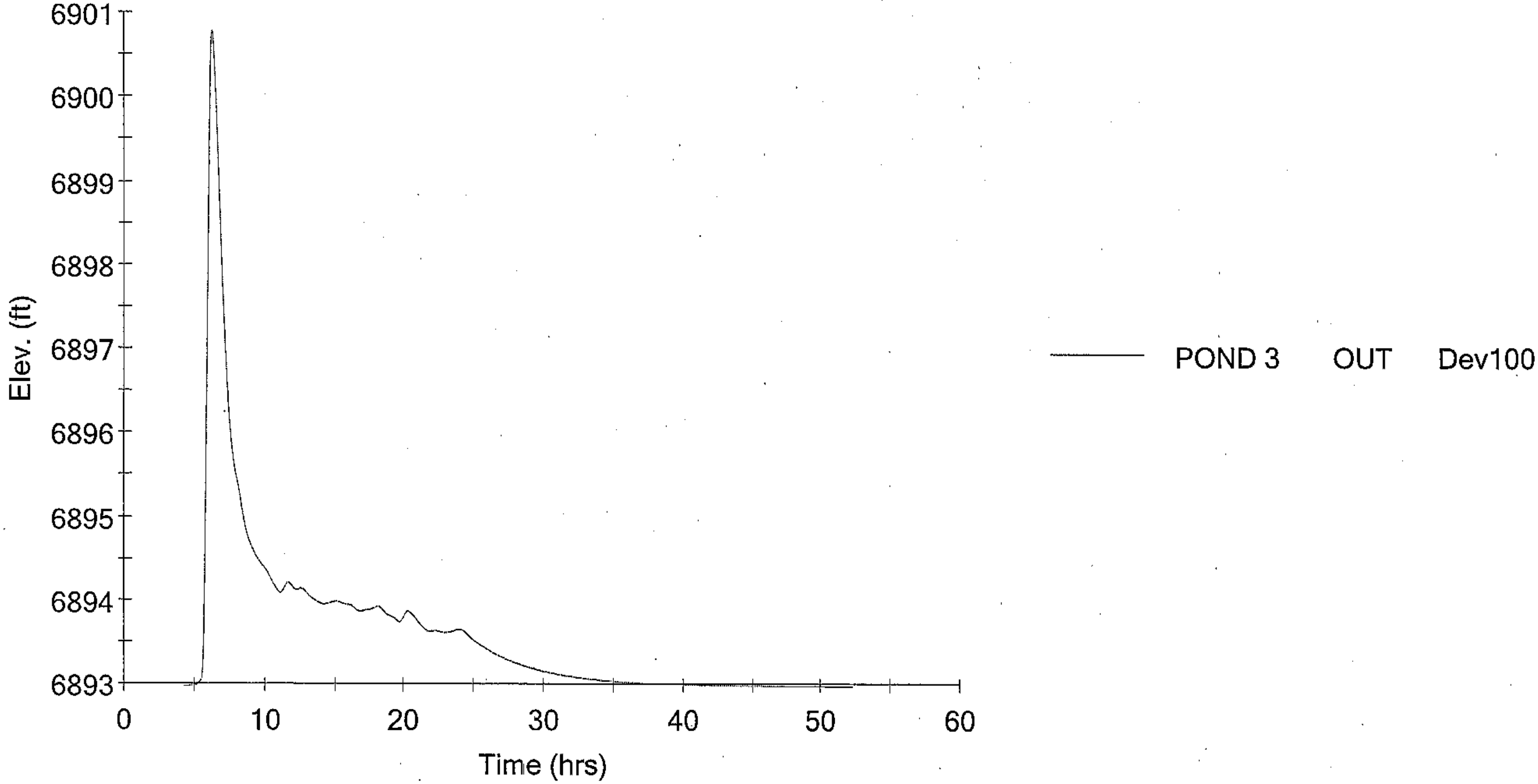
Volume vs. Time
POND 3 OUT Dev100
Volume (ac-ft)
0
1
2
3
4
5
6
7
8
9
10
Time (hrs)
0
10
20
30
40
50
60
POND 3 OUT Dev100

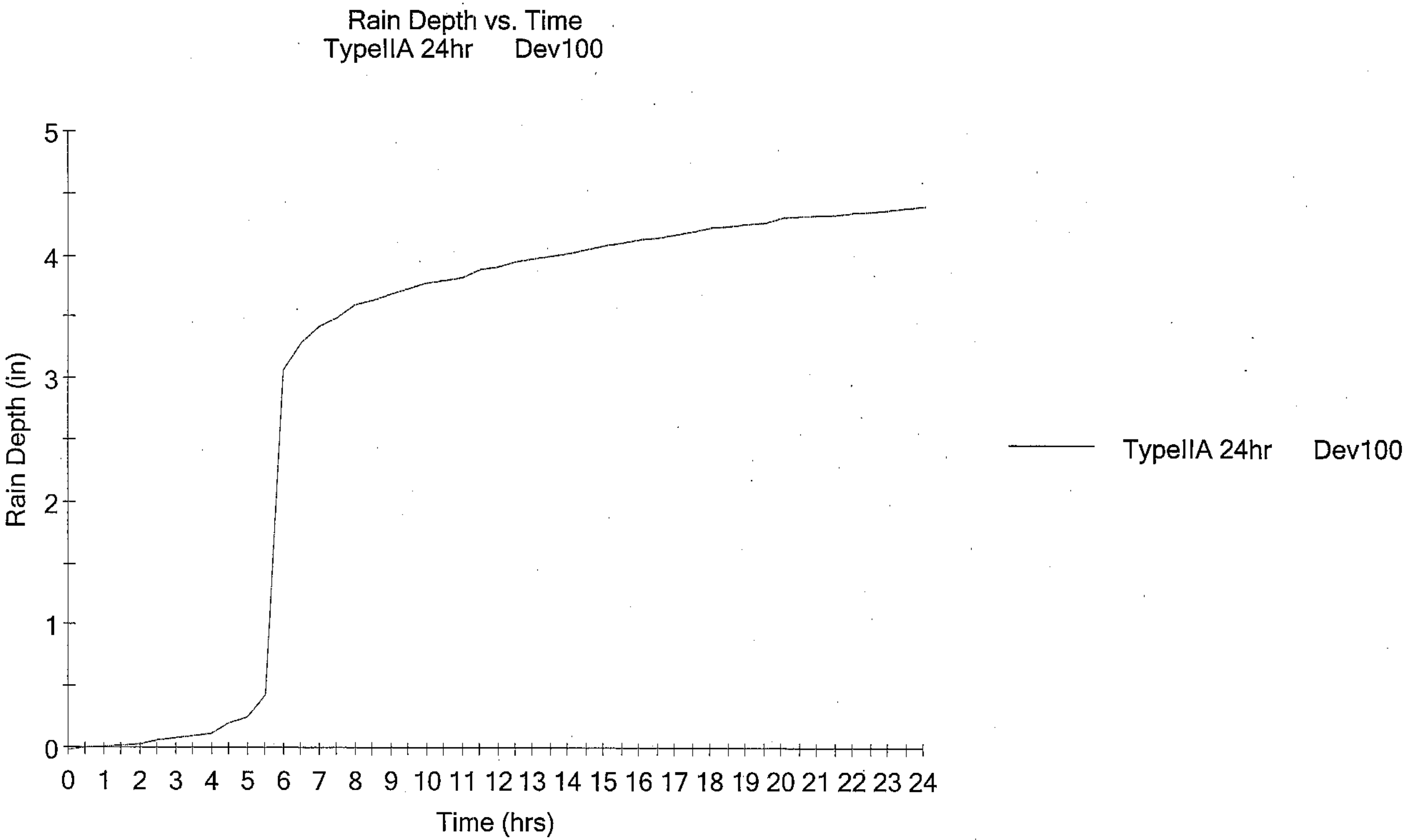


Elev. vs. Flow
Outlet 1
Elev. (ft)
6906
6904
6902
6900
6898
6896
6894
6892
0
20
40
60
80
100
120
140
160
180
200
Flow (cfs)
Outlet 1


Elev. vs. Area Surface
POND 3
6906
6904
6902
6900
6898
6896
6894
6892
Elev. (ft)
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
Area Surface (acres)
POND 3

Elev. vs. Time
POND 3 OUT Dev100





Rain Depth vs. Time
TypeIIA 24hr Dev100
Rain Depth (in)
0
1
2
3
4
5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hrs)
TypeIIA 24hr Dev100

Job File: G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW
Rain Dir: G:\Projects\08001\Woodmen Heights\Pondpack\ESI\

=========================
JOB TITLE
=========================

Project Date: 12/22/2005
Project Engineer: Benjamin E. Sheets
Project Title: WOODMEN HEIGHTS
Project Comments:
INTERIM CONDITIONS

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

MASTER DESIGN STORM SUMMARY

Network Storm Collection: El Paso County

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev100	4.4000	Synthetic Curve	TypeIIA 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
JUNC 41		JCT	100	9.064		6.0000	148.93		
*OUT 10		JCT	100	25.093		6.2750	142.58		
PARCEL 12.		AREA	100	14.325		6.0750	214.80		
PARCEL 17.		AREA	100	3.222		6.0250	52.61		
PARCEL 18.		AREA	100	5.842		6.0000	97.25		
PARCEL 19.		AREA	100	.427		6.0000	8.91		
PARCEL 25		AREA	100	1.278		6.2000	14.21		
POND 3	IN	POND	100	25.094		6.0250	375.79		
POND 3	OUT	POND	100	25.093		6.2750	142.58	6900.79	9.646

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	JUNC 41		JCT	9.064		6.0000	148.93	
Outfall	OUT 10		JCT	25.093		6.2750	142.58	
	PARCEL 12.		AREA	14.325		6.0750	214.80	
	PARCEL 17.		AREA	3.222		6.0250	52.61	
	PARCEL 18.		AREA	5.842		6.0000	97.25	
	PARCEL 19.		AREA	.427		6.0000	8.91	
	PARCEL 25		AREA	1.278		6.2000	14.21	
	POND 3	IN	POND	25.094		6.0250	375.79	
	POND 3	OUT	POND	25.093		6.2750	142.58	6900.79

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
DIRECT	ADD	UN	1.278		6.2000	14.21	PARCEL 25	
		DL	1.278		6.2000	14.21		
		DN	25.094		6.0250	375.79	POND 3	IN
P1	ADD	UN	14.325		6.0750	214.80	PARCEL 12.	
		DL	14.325		6.0750	214.80		
		DN	25.094		6.0250	375.79	POND 3	IN
P2	ADD	UN	3.222		6.0250	52.61	PARCEL 17.	
		DL	3.222		6.0250	52.61		
		DN	9.064		6.0000	148.93	JUNC 41	
P3	ADD	UN	5.842		6.0000	97.25	PARCEL 18.	
		DL	5.842		6.0000	97.25		
		DN	9.064		6.0000	148.93	JUNC 41	
P4	ADD	UN	.427		6.0000	8.91	PARCEL 19.	
		DL	.427		6.0000	8.91		
		DN	25.094		6.0250	375.79	POND 3	IN
PIPE 28	ADD	UN	9.064		6.0000	148.93	JUNC 41	
		DL	9.064		6.0000	148.93		
		DN	25.094		6.0250	375.79	POND 3	IN
ROUTE 1	PONDrt	UN	25.094		6.0250	375.79	POND 3	IN
ROUTE 1			25.093		6.2750	142.58	POND 3	OUT
		DL	25.093		6.2750	142.58		
		DN	25.093		6.2750	142.58	OUT 10	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
SCS UH PARCEL 25	Subarea PARCEL 25	Add Hyd PARCEL 25
SCS UH PARCEL 18.	Subarea PARCEL 18.	Add Hyd PARCEL 18.
SCS UH PARCEL 19.	Subarea PARCEL 19.	Add Hyd PARCEL 19.
SCS UH PARCEL 17.	Subarea PARCEL 17.	Add Hyd PARCEL 17.
SCS UH PARCEL 12.	Subarea PARCEL 12.	Add Hyd PARCEL 12.

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd P3	Subarea	PARCEL 18.		Jct	JUNC 41	
Add Hyd P2	Subarea	PARCEL 17.		Jct	JUNC 41	
Add Hyd P1	Subarea	PARCEL 12.		Pond	POND 3	IN
Add Hyd P4	Subarea	PARCEL 19.		Pond	POND 3	IN
Add Hyd DIRECT	Subarea	PARCEL 25		Pond	POND 3	IN
Add Hyd PIPE 28	Jct	JUNC 41		Pond	POND 3	IN
POND ROUTE TOTAL OUTFLOW...						
Total Pond Outflow	Pond	POND 3	IN	Outflow	POND 3	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 1	Outflow	POND 3	OUT	Jct	OUT 10	

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Title... Project Date: 12/22/2005
Project Engineer: Benjamin E. Sheets
Project Title: WOODMEN HEIGHTS
Project Comments:
INTERIM CONDITIONS

DESIGN STORMS SUMMARY

Design Storm File,ID = El Paso County

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

DESIGN STORMS SUMMARY

Design Storm File,ID = El Paso County

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

CUMULATIVE RAINFALL FRACTIONS
Output Time increment = .5000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.000	.004	.006	.008	.010
2.5000	.018	.022	.026	.030	.050
5.0000	.060	.100	.700	.750	.780
7.5000	.796	.820	.828	.840	.850
10.0000	.860	.865	.870	.885	.890
12.5000	.900	.905	.910	.915	.922
15.0000	.929	.934	.940	.943	.949
17.5000	.955	.962	.964	.968	.970
20.0000	.980	.982	.983	.984	.988
22.5000	.990	.993	.997	1.000	

CUMULATIVE RAINFALL DEPTHS (in)
Output Time increment = .5000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.0000	.0176	.0264	.0352	.0440
2.5000	.0792	.0968	.1144	.1320	.2200
5.0000	.2640	.4400	3.0800	3.3000	3.4320
7.5000	3.5024	3.6080	3.6432	3.6960	3.7400
10.0000	3.7840	3.8060	3.8280	3.8940	3.9160
12.5000	3.9600	3.9820	4.0040	4.0260	4.0568
15.0000	4.0876	4.1096	4.1360	4.1492	4.1756
17.5000	4.2020	4.2328	4.2416	4.2592	4.2680
20.0000	4.3120	4.3208	4.3252	4.3296	4.3472
22.5000	4.3560	4.3692	4.3868	4.4000	

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

::

TIME OF CONCENTRATION CALCULATOR

::

Segment #1: Tc: User Defined

Segment #1 Time: .3333 hrs

========================

Total Tc: .3333 hrs

========================

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: User Defined

Segment #1 Time: .2500 hrs

========================
Total Tc: .2500 hrs
========================

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .1667 hrs

Total Tc: .1667 hrs

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .0833 hrs

Total Tc: .0833 hrs

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

Tc Equations used...

==== User Defined ==

Tc = Value entered by user

Where: Tc = Time of concentration

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .5000 hrs

Total Tc: .5000 hrs

Tc Equations used...

==== User Defined ==

Tc = Value entered by user

Where: Tc = Time of concentration

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
RESIDENTIAL 3.5-7.99	85	61.000			85.00
COMPOSITE AREA & WEIGHTED CN --->		61.000			85.00 (85)

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
MULTI FAMILY 8-11.99	85	13.720			85.00
COMPOSITE AREA & WEIGHTED CN --->		13.720			85.00 (85)

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
SCHOOL	92	20.000			92.00
COMPOSITE AREA & WEIGHTED CN --->		20.000			92.00 (92)

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
PARK	61	5.000			61.00
COMPOSITE AREA & WEIGHTED CN --->		5.000			61.00 (61)

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

RUNOFF CURVE NUMBER DATA

::

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
POND	69	10.000			69.00
COMPOSITE AREA & WEIGHTED CN --->		10.000			69.00 (69)

::

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

DEFINITION OF TERMS: ---

```
At      = Total area (acres):  At = Ai+Ap
Ai      = Impervious area (acres)
Ap      = Pervious area (acres)
CNi     = Runoff curve number for impervious area
CNp     = Runoff curve number for pervious area
fLoss   = f loss constant infiltration (depth/time)
gKs     = Saturated Hydraulic Conductivity (depth/time)
Md      = Volumetric Moisture Deficit
Psi     = Capillary Suction (length)
hK      = Horton Infiltration Decay Rate (time^-1)
fo      = Initial Infiltration Rate (depth/time)
fc      = Ultimate(capacity)Infiltration Rate (depth/time)
Ia      = Initial Abstraction (length)
dt      = Computational increment (duration of unit excess rainfall)
          Default dt is smallest value of 0.1333Tc, rtm, and th
          (Smallest dt is then adjusted to match up with Tp)
UDdt    = User specified override computational main time increment
          (only used if UDdt is => .1333Tc)
D(t)    = Point on distribution curve (fraction of P) for time step t

K       = 2 / (1 + (Tr/Tp)):  default K = 0.75: (for Tr/Tp = 1.67)
Ks      = Hydrograph shape factor
        = Unit Conversions * K:
        = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K
          Default Ks = 645.333 * 0.75 = 484

Lag     = Lag time from center of excess runoff (dt) to Tp:  Lag = 0.6Tc
P       = Total precipitation depth, inches
Pa(t)   = Accumulated rainfall at time step t
Pi(t)   = Incremental rainfall at time step t
qp      = Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi.
        = (Ks * A * Q) / Tp   (where Q = 1in. runoff, A=sq.mi.)
Qu(t)   = Unit hydrograph ordinate (cfs) at time step t
Q(t)    = Final hydrograph ordinate (cfs) at time step t
Rai(t)= Accumulated runoff (inches) at time step t for impervious area
Rap(t)= Accumulated runoff (inches) at time step t for pervious area
Rii(t)= Incremental runoff (inches) at time step t for impervious area
Rip(t)= Incremental runoff (inches) at time step t for pervious area
R(t)    = Incremental weighted total runoff (inches)
Rtm     = Time increment for rainfall table
Si      = S for impervious area:  Si = (1000/CNi) - 10
Sp      = S for pervious area:    Sp = (1000/CNp) - 10
t       = Time step (row) number
Tc      = Time of concentration
Tb      = Time (hrs) of entire unit hydrograph:  Tb = Tp + Tr
Tp      = Time (hrs) to peak of a unit hydrograph:  Tp = (dt/2) + Lag
Tr      = Time (hrs) of receding limb of unit hydrograph:  Tr = ratio of Tp
```

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

```
PRECIPITATION: ------------------------------------------------------------
Column (1):  Time for time step t
Column (2):  D(t)  = Point on distribution curve for time step t
Column (3):  Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4):  Pa(t) = D(t) x P:        Col.(2) x P


PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) ------------------------
Column (5):  Rap(t) = Accumulated pervious runoff for time step t
             If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
             If (Pa(t) is >  0.2Sp) then use:

             Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6):  Rip(t) = Incremental pervious runoff for time step t
             Rip(t) =         Rap(t)          -         Rap(t-1)
             Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF ----------------------------------------------------
Column (7 & 8)... Did not specify to use impervious areas.


INCREMENTAL WEIGHTED RUNOFF: ----------------------------------------------
Column (9):  R(t)  = (Ap/At) x Rip(t)   +  (Ai/At) x Rii(t)
             R(t)  = (Ap/At) x Col.(6)  +  (Ai/At) x Col.(8)


SCS UNIT HYDROGRAPH METHOD: -----------------------------------------------
Column (10): Q(t)    is computed with the SCS unit hydrograph method
                     using R() and Qu().
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 12. Dev100
Tc             = .3333 hrs
Drainage Area = 61.000 acres  Runoff CN= 85

============================================
Computational Time Increment  =   .04444 hrs
Computed Peak Time            =   6.0883 hrs
Computed Peak Flow            =   215.27 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =  6.0750 hrs
Peak Flow, Interpolated Output =  214.80 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:PARCEL 12.
              CN    =    85
              Area =       61.000 acres
              S     =   1.7647 in
              0.2S =     .3529 in

               Cumulative Runoff
              -------------------
                      2.8182 in
                      14.326 ac-ft

HYG Volume...         14.325 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .33330 hrs (ID: PARCEL 12.)
Computational Incr, Tm =    .04444 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,            qp =   207.37 cfs
Unit peak time        Tp =   .22220 hrs
Unit receding limb, Tr =   .88880 hrs
Total unit time,      Tb =  1.11100 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - PARCEL 17. Dev100
Tc             = .2500 hrs
Drainage Area  = 13.720 acres  Runoff CN= 85

============================================
Computational Time Increment    =   .03333 hrs
Computed Peak Time              =   6.0333 hrs
Computed Peak Flow              =    52.92 cfs

Time Increment for HYG File     =    .0250 hrs
Peak Time, Interpolated Output  =   6.0250 hrs
Peak Flow, Interpolated Output  =    52.61 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:PARCEL 17.
              CN    =    85
              Area  =       13.720 acres
              S     =    1.7647 in
              0.2S  =     .3529 in

               Cumulative Runoff
              -------------------
                      2.8182 in
                       3.222 ac-ft

HYG Volume...          3.222 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .25000 hrs (ID: PARCEL 17.)
Computational Incr, Tm =    .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    62.18 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

SCS UNIT HYDROGRAPH METHOD

```
STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 18. Dev100
Tc             = .1667 hrs
Drainage Area = 20.000 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .02223 hrs
Computed Peak Time             =   6.0012 hrs
Computed Peak Flow             =    97.29 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    97.25 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:PARCEL 18.
             CN   =   92
             Area =       20.000 acres
             S    =     .8696 in
             0.2S =     .1739 in

              Cumulative Runoff
             -------------------
                     3.5049 in
                      5.842 ac-ft

HYG Volume...           5.842 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16670 hrs (ID: PARCEL 18.)
Computational Incr, Tm =   .02223 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   135.94 cfs
Unit peak time      Tp =   .11113 hrs
Unit receding limb, Tr =   .44453 hrs
Total unit time,    Tb =   .55567 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 19. Dev100
Tc             = .0833 hrs
Drainage Area = 5.000 acres  Runoff CN= 61

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time              =   6.0111 hrs
Computed Peak Flow              =     9.02 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =     8.91 cfs
============================================

              DRAINAGE AREA
            ------------------
            ID:PARCEL 19.
            CN   =   61
            Area =        5.000 acres
            S    =   6.3934 in
            0.2S =   1.2787 in

             Cumulative Runoff
            ------------------
                   1.0239 in
                     .427 ac-ft

HYG Volume...            .427 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08333 hrs (ID: PARCEL 19.)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    67.98 cfs
Unit peak time      Tp =   .05556 hrs
Unit receding limb, Tr =   .22222 hrs
Total unit time,    Tb =   .27778 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - PARCEL 25 Dev100
Tc             = .5000 hrs
Drainage Area  = 10.000 acres  Runoff CN= 69

============================================
Computational Time Increment   =   .06667 hrs
Computed Peak Time             =   6.2000 hrs
Computed Peak Flow             =    14.21 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.2000 hrs
Peak Flow, Interpolated Output =    14.21 cfs
============================================

              DRAINAGE AREA
              -------------------
              ID:PARCEL 25
              CN   =   69
              Area =       10.000 acres
              S    =   4.4928 in
              0.2S =    .8986 in

              Cumulative Runoff
              -------------------
                      1.5336 in
                       1.278 ac-ft

HYG Volume...          1.278 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .50000 hrs (ID: PARCEL 25)
Computational Incr, Tm =   .06667 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =    22.66 cfs
Unit peak time       Tp =   .33333 hrs
Unit receding limb,  Tr =  1.33333 hrs
Total unit time,     Tb =  1.66667 hrs
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
6893.00	-----	.9950	.0000	.000	.000
6906.00	-----	1.8950	4.2631	18.474	18.474

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6893.00 ft
Increment = .50 ft
Max. Elev.= 6906.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	Cv	--->	TW	6893.000	6906.000
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID        = Cv
Structure Type      = Culvert-Circular
------------------------------------
No. Barrels         =        1
Barrel Diameter     =    4.0000 ft
Upstream Invert     =   6893.00 ft
Dnstream Invert     =   6888.25 ft
Horiz. Length       =    475.00 ft
Barrel Length       =    475.02 ft
Barrel Slope        =    .01000 ft/ft

OUTLET CONTROL DATA...
Mannings n          =     .0130
Ke                  =     .4000  (forward entrance loss)
Kb                  =   .004925  (per ft of full flow)
Kr                  =     .0200  (reverse entrance loss)
HW Convergence      =      .001  +/- ft

INLET CONTROL DATA...
Equation form       =         1
Inlet Control K     =     .0098
Inlet Control M     =    2.0000
Inlet Control c     =    .03980
Inlet Control Y     =     .6700
T1 ratio (HW/D)     =     1.155
T2 ratio (HW/D)     =     1.302
Slope Factor        =     -.500
```

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 6897.62 ft ---> Flow = 87.96 cfs
At T2 Elev = 6898.21 ft ---> Flow = 100.53 cfs

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

```
                RATING TABLE FOR ONE OUTLET TYPE

                Structure ID  = Cv  (Culvert-Circular)
                -------------------------------------
                Mannings open channel maximum capacity: 154.51 cfs
                Upstream  ID  =     (Pond Water Surface)
                DNstream  ID  = TW  (Pond Outfall)


 WS Elev,Device Q    Tail Water             Notes
 ----------------  ---------------  --------------------------
 WS Elev.    Q      TW Elev Converge
   ft       cfs        ft    +/-ft   Computation Messages
--------  -------  --------  -----  --------------------------
6893.00       .00   Free Outfall
                 Upstream HW & DNstream TW < Inv.El
6893.50      1.40   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .115ft  Dcr= .339ft   CRIT.DEPTH
6894.00      5.42   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .234ft  Dcr= .674ft   CRIT.DEPTH
6894.50     11.79   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .356ft  Dcr= 1.002ft   CRIT.DEPTH
6895.00     20.22   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .482ft  Dcr= 1.324ft   CRIT.DEPTH
6895.50     30.46   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .615ft  Dcr= 1.638ft   CRIT.DEPTH
6896.00     42.21   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .757ft  Dcr= 1.942ft   CRIT.DEPTH
6896.50     55.02   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= .907ft  Dcr= 2.230ft   CRIT.DEPTH
6897.00     68.63   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= 1.069ft  Dcr= 2.503ft   CRIT.DEPTH
6897.50     82.65   Free Outfall
                 CRIT.DEPTH CONTROL  Vh= 1.246ft  Dcr= 2.755ft   CRIT.DEPTH
6898.00     96.09   Free Outfall
                 INLET CONTROL...  Transition: HW =5.00
6898.50    106.14   Free Outfall
                 INLET CONTROL...  Submerged:  HW =5.50
6899.00    115.11   Free Outfall
                 INLET CONTROL...  Submerged:  HW =6.00
6899.50    123.45   Free Outfall
                 INLET CONTROL...  Submerged:  HW =6.50
6900.00    131.23   Free Outfall
                 INLET CONTROL...  Submerged:  HW =7.00
6900.50    138.57   Free Outfall
                 INLET CONTROL...  Submerged:  HW =7.50
6901.00    145.55   Free Outfall
                 INLET CONTROL...  Submerged:  HW =8.00
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Cv (Culvert-Circular)

Mannings open channel maximum capacity: 154.51 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

```
 WS Elev,Device Q    Tail Water              Notes
 ----------------   --------------  -------------------------
 WS Elev.    Q      TW Elev Converge
   ft       cfs        ft    +/-ft   Computation Messages
--------  -------   --------  -----  -------------------------
6901.50    152.21   Free Outfall
                   INLET CONTROL...  Submerged:  HW =8.50
6902.00    158.60   Free Outfall
                   INLET CONTROL...  Submerged:  HW =9.00
6902.50    164.75   Free Outfall
                   INLET CONTROL...  Submerged:  HW =9.50
6903.00    170.66   Free Outfall
                   INLET CONTROL...  Submerged:  HW =10.00
6903.50    175.76   Free Outfall
                   FULL FLOW...Lfull=451.13ft  Vh=3.040ft  HL=11.011ft
6904.00    179.49   Free Outfall
                   FULL FLOW...Lfull=456.01ft  Vh=3.171ft  HL=11.560ft
6904.50    183.16   Free Outfall
                   FULL FLOW...Lfull=459.78ft  Vh=3.302ft  HL=12.099ft
6905.00    186.75   Free Outfall
                   FULL FLOW...Lfull=462.68ft  Vh=3.432ft  HL=12.627ft
6905.50    190.29   Free Outfall
                   FULL FLOW...Lfull=464.80ft  Vh=3.564ft  HL=13.147ft
6906.00    193.80   Free Outfall
                   FULL FLOW...Lfull=466.30ft  Vh=3.696ft  HL=13.663ft
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 INT DEV ESI.PPW

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
6893.00	.00	Free Outfall		None contributing
6893.50	1.40	Free Outfall		Cv
6894.00	5.42	Free Outfall		Cv
6894.50	11.79	Free Outfall		Cv
6895.00	20.22	Free Outfall		Cv
6895.50	30.46	Free Outfall		Cv
6896.00	42.21	Free Outfall		Cv
6896.50	55.02	Free Outfall		Cv
6897.00	68.63	Free Outfall		Cv
6897.50	82.65	Free Outfall		Cv
6898.00	96.09	Free Outfall		Cv
6898.50	106.14	Free Outfall		Cv
6899.00	115.11	Free Outfall		Cv
6899.50	123.45	Free Outfall		Cv
6900.00	131.23	Free Outfall		Cv
6900.50	138.57	Free Outfall		Cv
6901.00	145.55	Free Outfall		Cv
6901.50	152.21	Free Outfall		Cv
6902.00	158.60	Free Outfall		Cv
6902.50	164.75	Free Outfall		Cv
6903.00	170.66	Free Outfall		Cv
6903.50	175.76	Free Outfall		Cv
6904.00	179.49	Free Outfall		Cv
6904.50	183.16	Free Outfall		Cv
6905.00	186.75	Free Outfall		Cv
6905.50	190.29	Free Outfall		Cv
6906.00	193.80	Free Outfall		Cv

LEVEL POOL ROUTING DATA

HYG Dir = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow HYG file = work_pad.hyg - POND 3 IN Dev100
Outflow HYG file = work_pad.hyg - POND 3 OUT Dev100

Pond Node Data = POND 3
Pond Volume Data = POND 3
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	6893.00 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
6893.00	.00	.000	.9950	.00	.00	.00
6893.50	1.40	.505	1.0243	.00	1.40	490.05
6894.00	5.42	1.024	1.0540	.00	5.42	997.01
6894.50	11.79	1.559	1.0842	.00	11.79	1520.81
6895.00	20.22	2.109	1.1148	.00	20.22	2061.37
6895.50	30.46	2.674	1.1458	.00	30.46	2618.63
6896.00	42.21	3.254	1.1772	.00	42.21	3192.52
6896.50	55.02	3.851	1.2090	.00	55.02	3782.77
6897.00	68.63	4.464	1.2413	.00	68.63	4389.35
6897.50	82.65	5.092	1.2740	.00	82.65	5012.06
6898.00	96.09	5.738	1.3071	.00	96.09	5650.12
6898.50	106.14	6.400	1.3407	.00	106.14	6300.93
6899.00	115.11	7.078	1.3747	.00	115.11	6967.00
6899.50	123.45	7.774	1.4091	.00	123.45	7648.99
6900.00	131.23	8.488	1.4439	.00	131.23	8347.16
6900.50	138.57	9.218	1.4792	.00	138.57	9061.87
6901.00	145.55	9.967	1.5148	.00	145.55	9793.38
6901.50	152.21	10.733	1.5509	.00	152.21	10541.93
6902.00	158.60	11.518	1.5875	.00	158.60	11307.79
6902.50	164.75	12.321	1.6244	.00	164.75	12091.20

LEVEL POOL ROUTING DATA

HYG Dir = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow HYG file = work_pad.hyg - POND 3 IN Dev100
Outflow HYG file = work_pad.hyg - POND 3 OUT Dev100

Pond Node Data = POND 3
Pond Volume Data = POND 3
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

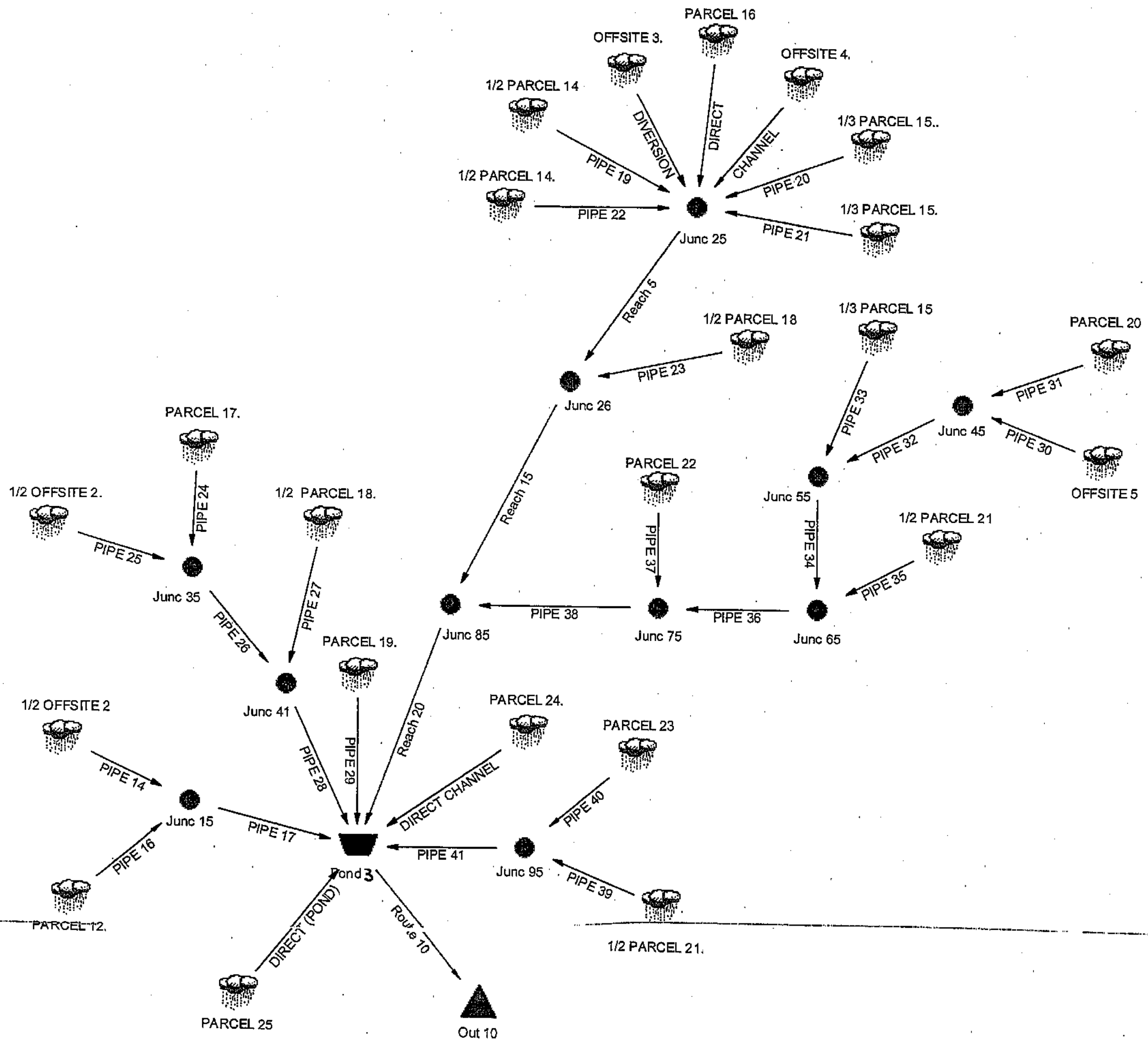
Starting WS Elev = 6893.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0250 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
6903.00	170.66	13.142	1.6618	.00	170.66	12892.36
6903.50	175.76	13.983	1.6996	.00	175.76	13710.90
6904.00	179.49	14.842	1.7378	.00	179.49	14546.48
6904.50	183.16	15.720	1.7765	.00	183.16	15400.60
6905.00	186.75	16.618	1.8156	.00	186.75	16273.45
6905.50	190.29	17.536	1.8551	.00	190.29	17165.26
6906.00	193.80	18.474	1.8950	.00	193.80	18076.27

LEVEL POOL ROUTING SUMMARY

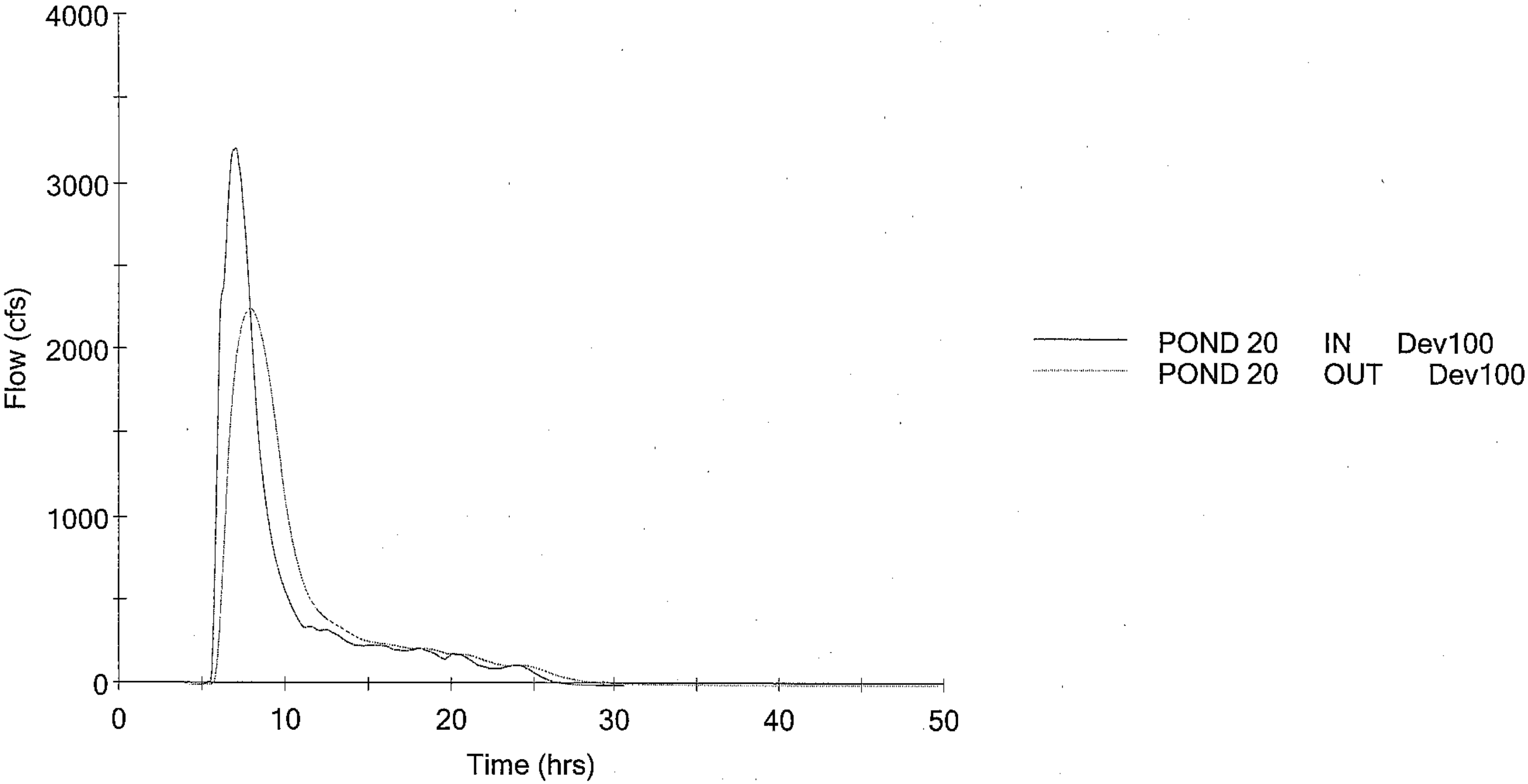
```
HYG Dir             = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file = work_pad.hyg - POND 3       IN  Dev100
Outflow HYG file = work_pad.hyg - POND 3       OUT Dev100

Pond Node   Data = POND 3
Pond Volume Data = POND 3
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =  6893.00 ft
Starting Volume    =      .000 ac-ft
Starting Outflow   =       .00 cfs
Starting Infiltr.  =       .00 cfs
Starting Total Qout=       .00 cfs
Time Increment     =     .0250 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow        =    375.79 cfs    at    6.0250 hrs
Peak Outflow       =    142.58 cfs    at    6.2750 hrs
-----------------------------------------------------
Peak Elevation     =   6900.79 ft
Peak Storage =           9.646 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      25.094
- Infiltration =        .000
- HYG Vol OUT  =      25.093
- Retained Vol =        .001
                  ----------
Unrouted Vol =         -.000 ac-ft  (.001% of Inflow Volume)
```

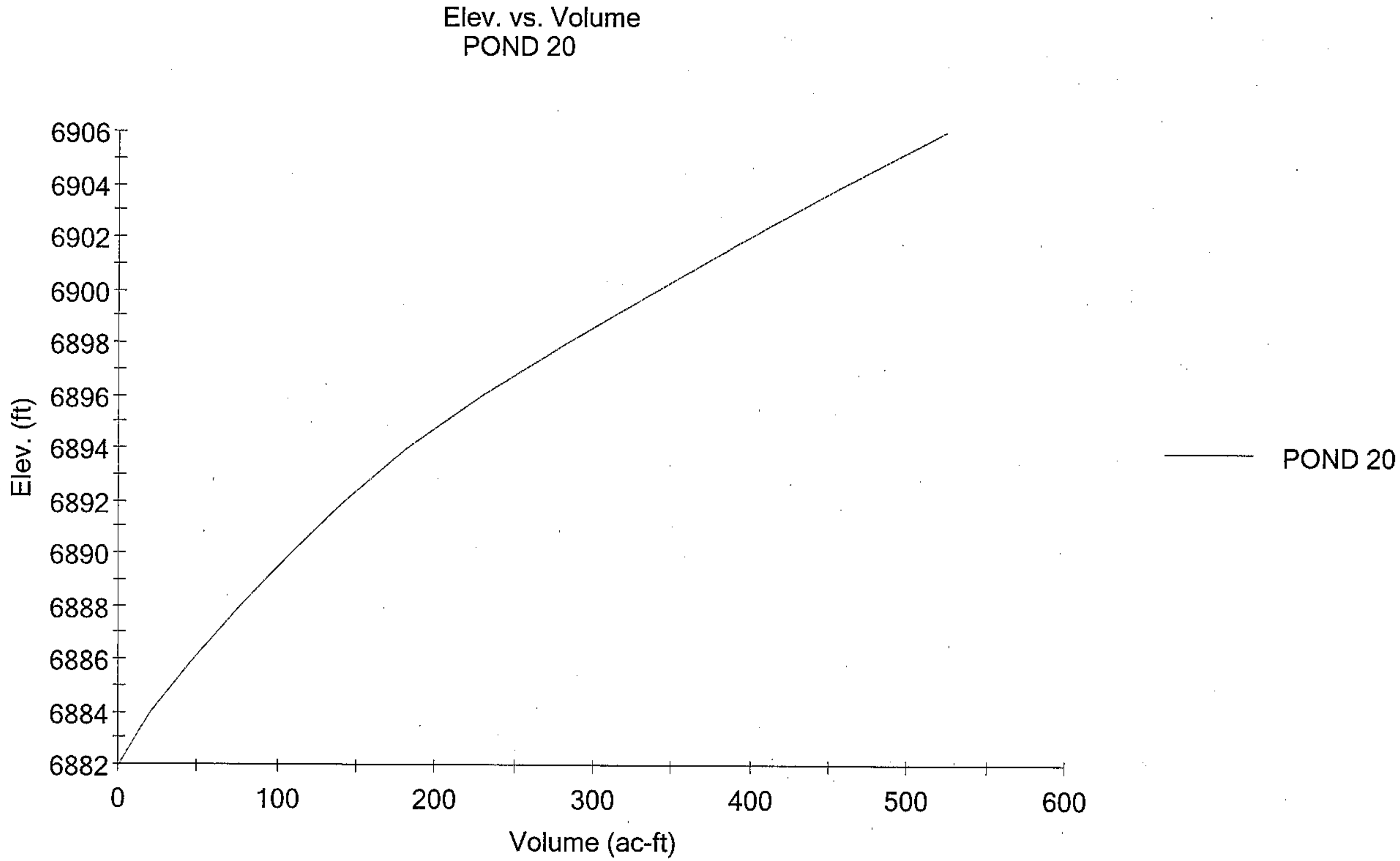
Index of Starting Page Numbers for ID Names



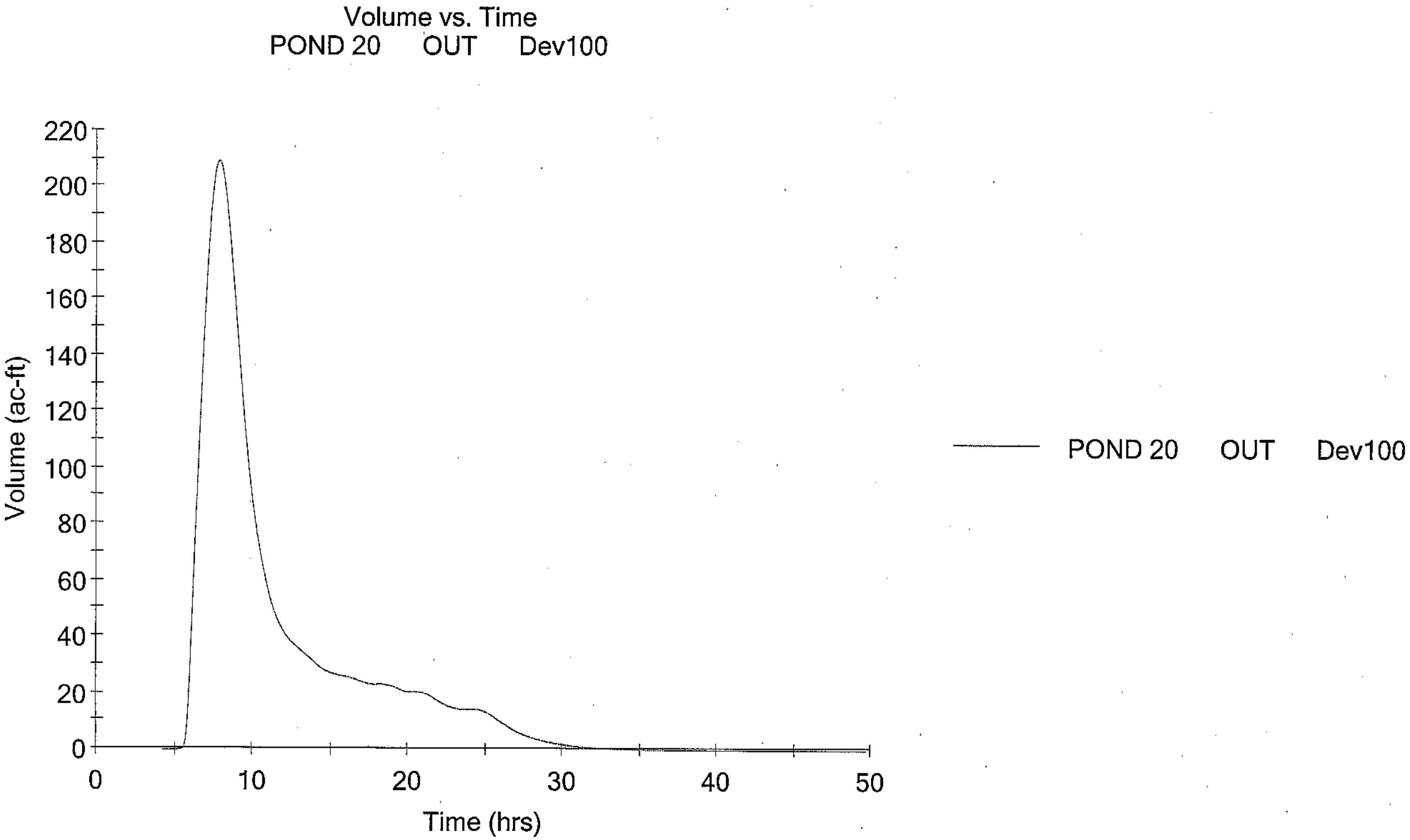
PARCEL 16
OFFSITE 3.
OFFSITE 4.
1/2 PARCEL 14
DIVERSION
DIRECT
CHANNEL
1/3 PARCEL 15..
PIPE 19
PIPE 20
1/2 PARCEL 14.
PIPE 22
1/3 PARCEL 15.
PIPE 21
Junc 25
Reach 5
1/2 PARCEL 18
1/3 PARCEL 15
PARCEL 20
PIPE 23
Junc 26
PIPE 31
PIPE 33
Junc 45
PIPE 32
PIPE 30
PARCEL 17.
Junc 55
OFFSITE 5
PARCEL 22
Reach 15
1/2 OFFSITE 2.
PIPE 24
1/2 PARCEL 18.
PIPE 37
PIPE 34
1/2 PARCEL 21
PIPE 25
Junc 35
PIPE 27
PIPE 35
PIPE 38
PIPE 36
PIPE 26
Junc 85
Junc 75
Junc 65
PARCEL 19.
Junc 41
1/2 OFFSITE 2
PARCEL 24.
PARCEL 23
PIPE 28
PIPE 29
Reach 20
DIRECT CHANNEL
PIPE 14
PIPE 40
Junc 15
PIPE 17
PIPE 41
Junc 95
PIPE 16
Pond 3
PIPE 39
PARCEL 12.
DIRECT (POND)
Route 10
1/2 PARCEL 21.
PARCEL 25
Out 10

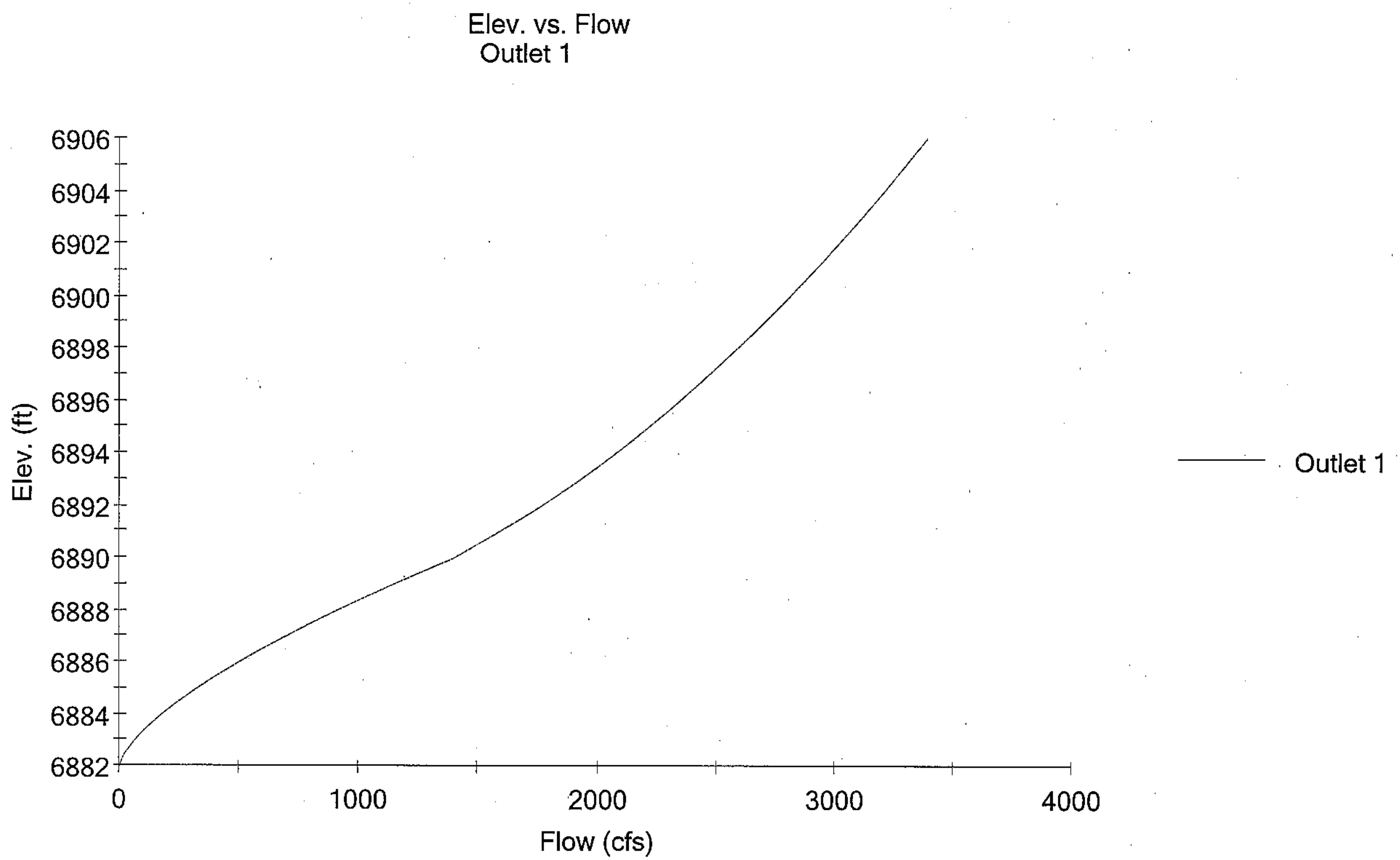
Hydrograph
POND 20 OUT Dev100



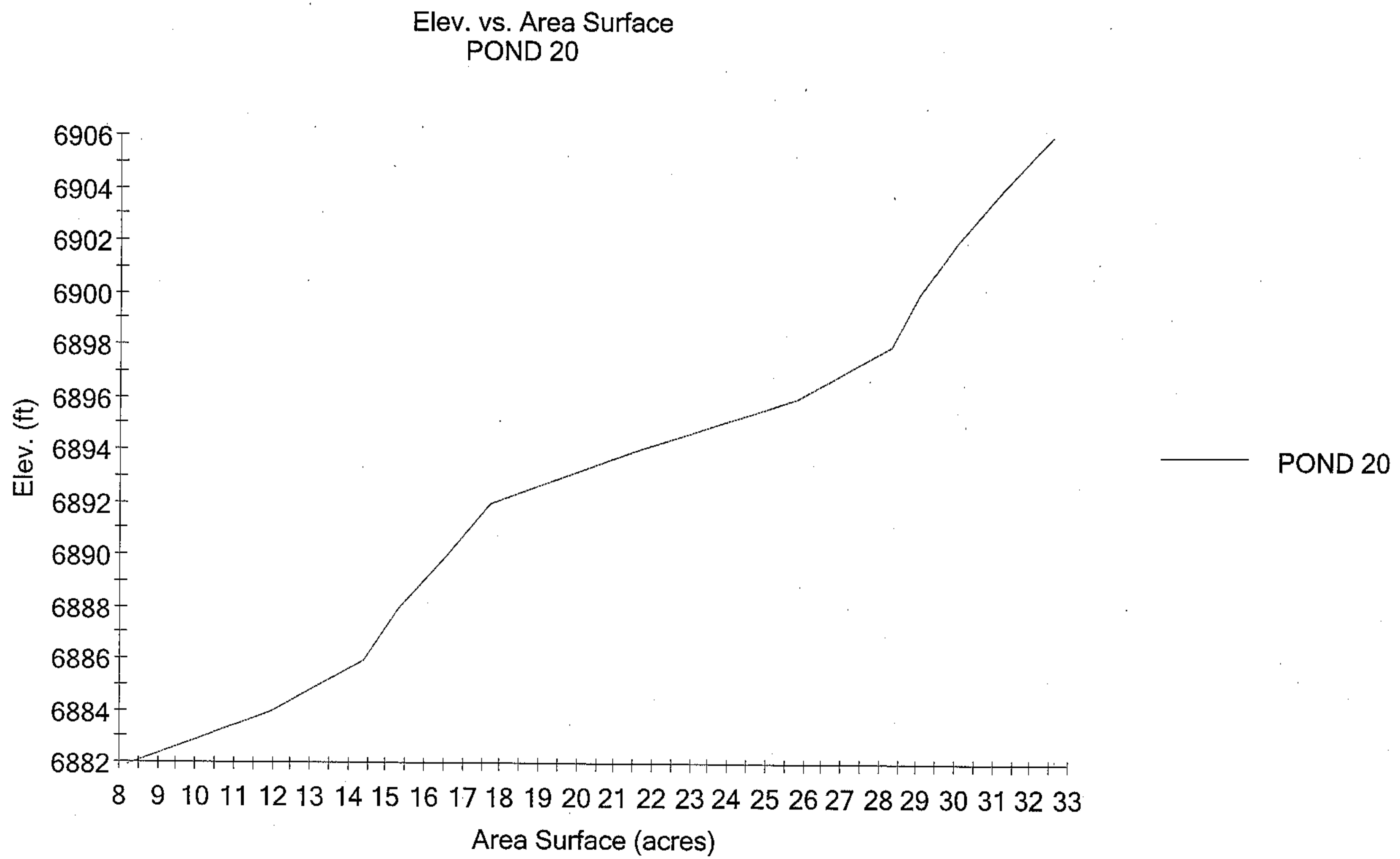


Elev. vs. Volume
POND 20
Elev. (ft)
6906
6904
6902
6900
6898
6896
6894
6892
6890
6888
6886
6884
6882
0
100
200
300
400
500
600
Volume (ac-ft)
POND 20

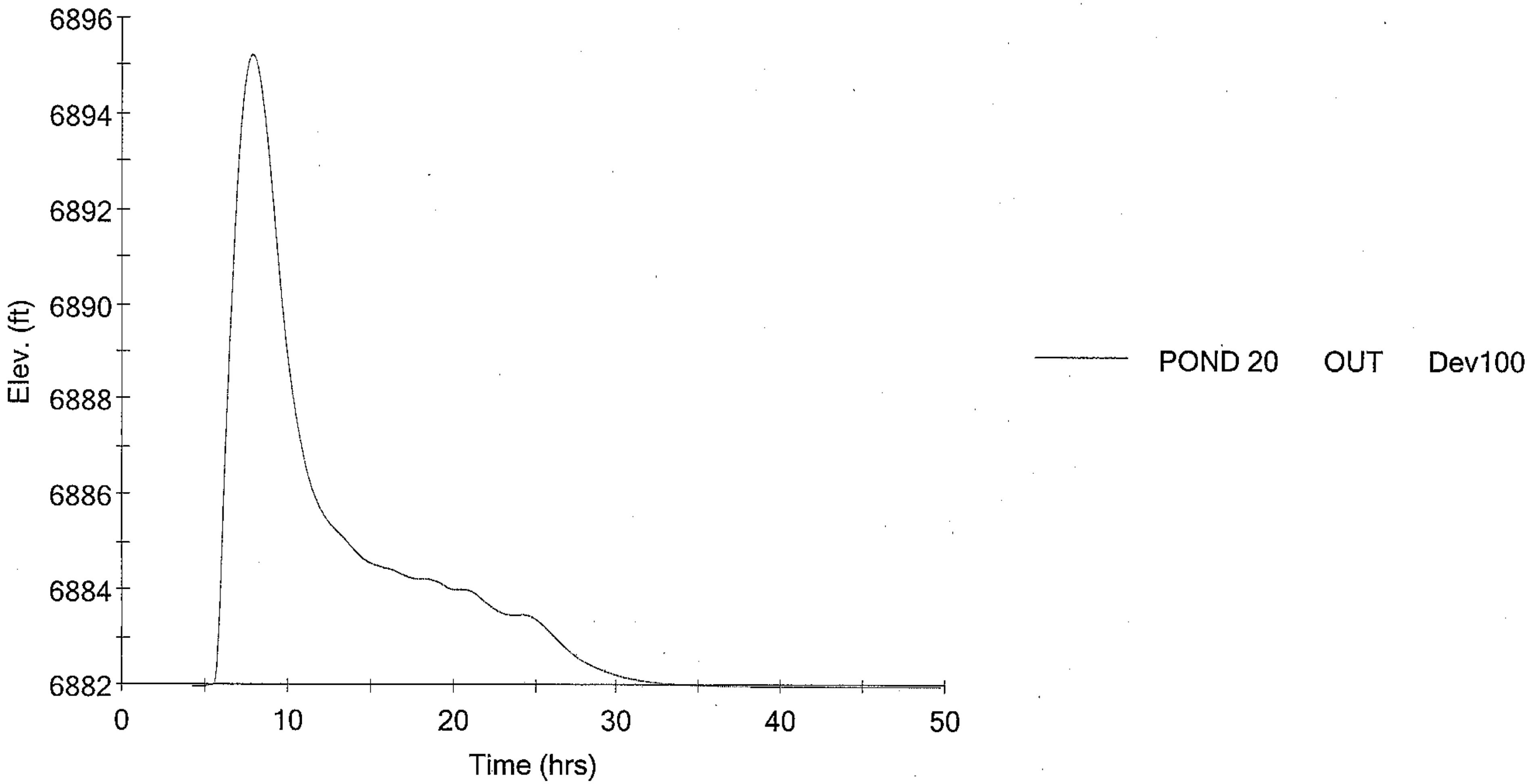

Volume vs. Time
POND 20 OUT Dev100
Volume (ac-ft)
220
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
Time (hrs)
POND 20 OUT Dev100



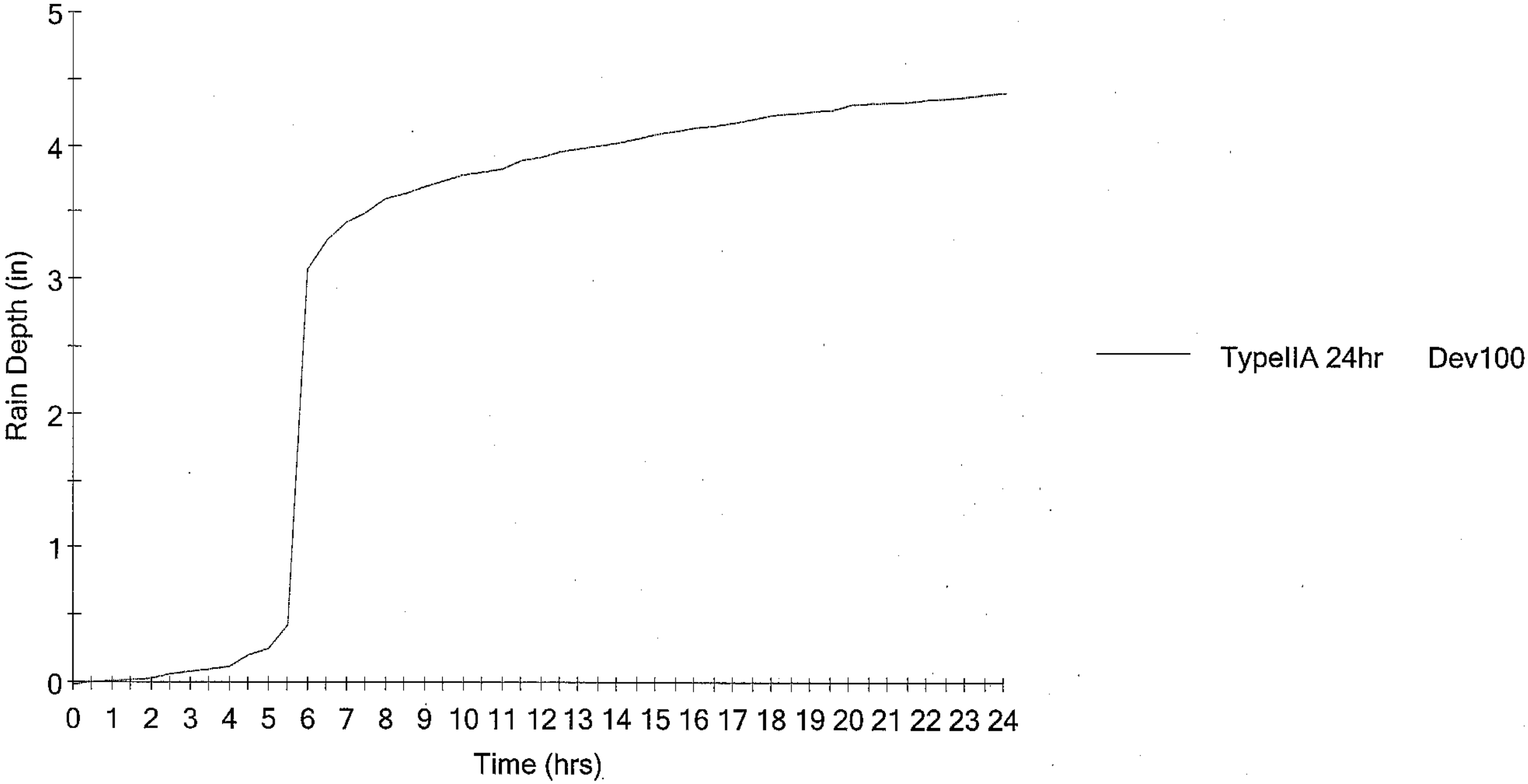
Elev. vs. Flow
Outlet 1
6906
6904
6902
6900
6898
6896
6894
6892
6890
6888
6886
6884
6882
Elev. (ft)
0
1000
2000
3000
4000
Flow (cfs)
Outlet 1


Elev. vs. Area Surface
POND 20
Elev. (ft)
6906
6904
6902
6900
6898
6896
6894
6892
6890
6888
6886
6884
6882
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Area Surface (acres)
POND 20

Elev. vs. Time
POND 20 OUT Dev100



Rain Depth vs. Time
TypeIIA 24hr   Dev100



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=========================
        JOB TITLE
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Project Date: 12/22/2005
Project Engineer: Benjamin E. Sheets
Project Title: WOODMEN HEIGHTS
Project Comments:
ULTIMATE CONDITIONS

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Table of Contents (continued)

MASTER DESIGN STORM SUMMARY

Network Storm Collection: El Paso County

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev100	4.4000	Synthetic Curve	TypeIIA 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
1/2 PARCEL 18.	AREA	100	2.921		6.0000	48.63		
1/2 OFFSITE 2	AREA	100	49.309		6.5250	343.80		
1/2 OFFSITE 2.	AREA	100	49.309		6.5250	343.80		
1/2 PARCEL 14	AREA	100	3.993		6.0250	65.19		
1/2 PARCEL 14.	AREA	100	3.993		6.0250	65.19		
1/2 PARCEL 18	AREA	100	3.689		6.0000	61.42		
1/2 PARCEL 21	AREA	100	7.355		6.0250	116.93		
1/2 PARCEL 21.	AREA	100	7.355		6.0250	116.93		
1/3 PARCEL 15	AREA	100	4.345		6.0000	72.31		
1/3 PARCEL 15.	AREA	100	3.768		6.0000	62.73		
1/3 PARCEL 15..	AREA	100	3.409		6.0000	56.54		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
JUNC 15	JCT	100	63.634		6.2500	404.64		
JUNC 25	JCT	100	738.691		6.9500	2781.53		
JUNC 26	JCT	100	742.381		7.0000	2779.84		
JUNC 35	JCT	100	52.531		6.4000	350.09		
JUNC 41	JCT	100	55.452		6.4000	354.63		
JUNC 45	JCT	100	39.173		6.1500	441.75		
JUNC 55	JCT	100	43.518		6.1000	483.28		
JUNC 65	JCT	100	50.872		6.1000	586.96		
JUNC 75	JCT	100	55.742		6.0750	648.71		
JUNC 85	JCT	100	798.123		7.0500	2845.28		
JUNC 95	JCT	100	14.474		6.0000	234.99		
OFFSITE 3.	AREA	100	98.617		6.5250	687.59		
OFFSITE 4.	AREA	100	624.572		7.2000	2457.30		
OFFSITE 5	AREA	100	34.135		6.1500	386.63		
*OUT 10	JCT	100	935.622		7.9000	2242.32		
PARCEL 12.	AREA	100	14.325		6.0750	214.80		
PARCEL 16	AREA	100	.340		6.1250	2.18		
PARCEL 17.	AREA	100	3.222		6.0250	52.61		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
PARCEL 19.		AREA	100	.427		6.0000	8.91		
PARCEL 20.		AREA	100	5.038		6.0250	80.10		
PARCEL 22		AREA	100	4.870		6.0000	81.06		
PARCEL 23		AREA	100	7.119		6.0000	118.54		
PARCEL 24.		AREA	100	.322		6.1250	2.07		
PARCEL 25		AREA	100	3.195		6.2000	35.54		
POND 20	IN	POND	100	935.626		7.0500	3206.52		
POND 20	OUT	POND	100	935.622		7.9000	2242.32	6895.22	208.940

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	1/2 PARCEL 18.	AREA	2.921		6.0000	48.63	
	1/2 OFFSITE 2	AREA	49.309		6.5250	343.80	
	1/2 OFFSITE 2.	AREA	49.309		6.5250	343.80	
	1/2 PARCEL 14	AREA	3.993		6.0250	65.19	
	1/2 PARCEL 14.	AREA	3.993		6.0250	65.19	
	1/2 PARCEL 18	AREA	3.689		6.0000	61.42	
	1/2 PARCEL 21	AREA	7.355		6.0250	116.93	
	1/2 PARCEL 21.	AREA	7.355		6.0250	116.93	
	1/3 PARCEL 15	AREA	4.345		6.0000	72.31	
	1/3 PARCEL 15.	AREA	3.768		6.0000	62.73	
	1/3 PARCEL 15..	AREA	3.409		6.0000	56.54	
	JUNC 15	JCT	63.634		6.2500	404.64	
	JUNC 25	JCT	738.691		6.9500	2781.53	
	JUNC 26	JCT	742.381		7.0000	2779.84	
	JUNC 35	JCT	52.531		6.4000	350.09	
	JUNC 41	JCT	55.452		6.4000	354.63	
	JUNC 45	JCT	39.173		6.1500	441.75	
	JUNC 55	JCT	43.518		6.1000	483.28	
	JUNC 65	JCT	50.872		6.1000	586.96	
	JUNC 75	JCT	55.742		6.0750	648.71	
	JUNC 85	JCT	798.123		7.0500	2845.28	
	JUNC 95	JCT	14.474		6.0000	234.99	
	OFFSITE 3.	AREA	98.617		6.5250	687.59	
	OFFSITE 4.	AREA	624.572		7.2000	2457.30	
	OFFSITE 5	AREA	34.135		6.1500	386.63	
Outfall	OUT 10	JCT	935.622		7.9000	2242.32	
	PARCEL 12.	AREA	14.325		6.0750	214.80	
	PARCEL 16	AREA	.340		6.1250	2.18	
	PARCEL 17.	AREA	3.222		6.0250	52.61	
	PARCEL 19.	AREA	.427		6.0000	8.91	
	PARCEL 20.	AREA	5.038		6.0250	80.10	
	PARCEL 22	AREA	4.870		6.0000	81.06	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
PARCEL 23		AREA	7.119		6.0000	118.54	
PARCEL 24.		AREA	.322		6.1250	2.07	
PARCEL 25		AREA	3.195		6.2000	35.54	
POND 20	IN	POND	935.626		7.0500	3206.52	
POND 20	OUT	POND	935.622		7.9000	2242.32	6895.22

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
CHANNEL	ADD	UN	624.572		7.2000	2457.30	OFFSITE 4.	
		DL	624.572		7.2000	2457.30		
		DN	738.691		6.9500	2781.53	JUNC 25	
DIRECT	ADD	UN	.340		6.1250	2.18	PARCEL 16	
		DL	.340		6.1250	2.18		
		DN	738.691		6.9500	2781.53	JUNC 25	
DIRECT (POND)	ADD	UN	3.195		6.2000	35.54	PARCEL 25	
		DL	3.195		6.2000	35.54		
		DN	935.626		7.0500	3206.52	POND 20	IN
DIRECT CHANNEL	ADD	UN	.322		6.1250	2.07	PARCEL 24.	
		DL	.322		6.1250	2.07		
		DN	935.626		7.0500	3206.52	POND 20	IN
DIVERSION	ADD	UN	98.617		6.5250	687.59	OFFSITE 3.	
		DL	98.617		6.5250	687.59		
		DN	738.691		6.9500	2781.53	JUNC 25	
PIPE 14	ADD	UN	49.309		6.5250	343.80	1/2 OFFSITE 2	
		DL	49.309		6.5250	343.80		
		DN	63.634		6.2500	404.64	JUNC 15	
PIPE 16	ADD	UN	14.325		6.0750	214.80	PARCEL 12.	
		DL	14.325		6.0750	214.80		
		DN	63.634		6.2500	404.64	JUNC 15	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
PIPE 17	ADD	UN	63.634		6.2500	404.64	JUNC 15	
		DL	63.634		6.2500	404.64		
		DN	935.626		7.0500	3206.52	POND 20	IN
PIPE 19	ADD	UN	3.993		6.0250	65.19	1/2 PARCEL 14	
		DL	3.993		6.0250	65.19		
		DN	738.691		6.9500	2781.53	JUNC 25	
PIPE 20	ADD	UN	3.409		6.0000	56.54	1/3 PARCEL 15..	
		DL	3.409		6.0000	56.54		
		DN	738.691		6.9500	2781.53	JUNC 25	
PIPE 21	ADD	UN	3.768		6.0000	62.73	1/3 PARCEL 15.	
		DL	3.768		6.0000	62.73		
		DN	738.691		6.9500	2781.53	JUNC 25	
PIPE 22	ADD	UN	3.993		6.0250	65.19	1/2 PARCEL 14.	
		DL	3.993		6.0250	65.19		
		DN	738.691		6.9500	2781.53	JUNC 25	
PIPE 23	ADD	UN	3.689		6.0000	61.42	1/2 PARCEL 18	
		DL	3.689		6.0000	61.42		
		DN	742.381		7.0000	2779.84	JUNC 26	
PIPE 24	ADD	UN	3.222		6.0250	52.61	PARCEL 17.	
		DL	3.222		6.0250	52.61		
		DN	52.531		6.4000	350.09	JUNC 35	
PIPE 25	ADD	UN	49.309		6.5250	343.80	1/2 OFFSITE 2.	
		DL	49.309		6.5250	343.80		
		DN	52.531		6.4000	350.09	JUNC 35	
PIPE 26	ADD	UN	52.531		6.4000	350.09	JUNC 35	
		DL	52.531		6.4000	350.09		
		DN	55.452		6.4000	354.63	JUNC 41	
PIPE 27	ADD	UN	2.921		6.0000	48.63	1/2 PARCEL 18.	
		DL	2.921		6.0000	48.63		
		DN	55.452		6.4000	354.63	JUNC 41	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
PIPE 28	ADD	UN	55.452		6.4000	354.63	JUNC 41	
		DL	55.452		6.4000	354.63		
		DN	935.626		7.0500	3206.52	POND 20	IN
PIPE 29	ADD	UN	.427		6.0000	8.91	PARCEL 19.	
		DL	.427		6.0000	8.91		
		DN	935.626		7.0500	3206.52	POND 20	IN
PIPE 30	ADD	UN	34.135		6.1500	386.63	OFFSITE 5	
		DL	34.135		6.1500	386.63		
		DN	39.173		6.1500	441.75	JUNC 45	
PIPE 31	ADD	UN	5.038		6.0250	80.10	PARCEL 20.	
		DL	5.038		6.0250	80.10		
		DN	39.173		6.1500	441.75	JUNC 45	
PIPE 32	ADD	UN	39.173		6.1500	441.75	JUNC 45	
		DL	39.173		6.1500	441.75		
		DN	43.518		6.1000	483.28	JUNC 55	
PIPE 33	ADD	UN	4.345		6.0000	72.31	1/3 PARCEL 15	
		DL	4.345		6.0000	72.31		
		DN	43.518		6.1000	483.28	JUNC 55	
PIPE 34	ADD	UN	43.518		6.1000	483.28	JUNC 55	
		DL	43.518		6.1000	483.28		
		DN	50.872		6.1000	586.96	JUNC 65	
PIPE 35	ADD	UN	7.355		6.0250	116.93	1/2 PARCEL 21	
		DL	7.355		6.0250	116.93		
		DN	50.872		6.1000	586.96	JUNC 65	
PIPE 36	ADD	UN	50.872		6.1000	586.96	JUNC 65	
		DL	50.872		6.1000	586.96		
		DN	55.742		6.0750	648.71	JUNC 75	
PIPE 37	ADD	UN	4.870		6.0000	81.06	PARCEL 22	
		DL	4.870		6.0000	81.06		
		DN	55.742		6.0750	648.71	JUNC 75	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
PIPE 38	ADD	UN	55.742		6.0750	648.71	JUNC 75	
		DL	55.742		6.0750	648.71		
		DN	798.123		7.0500	2845.28	JUNC 85	
PIPE 39	ADD	UN	7.355		6.0250	116.93	1/2 PARCEL 21.	
		DL	7.355		6.0250	116.93		
		DN	14.474		6.0000	234.99	JUNC 95	
PIPE 40	ADD	UN	7.119		6.0000	118.54	PARCEL 23	
		DL	7.119		6.0000	118.54		
		DN	14.474		6.0000	234.99	JUNC 95	
PIPE 41	ADD	UN	14.474		6.0000	234.99	JUNC 95	
		DL	14.474		6.0000	234.99		
		DN	935.626		7.0500	3206.52	POND 20	IN
REACH 15	REACH	UN	742.381		7.0000	2779.84	JUNC 26	
		DL	742.381		7.0500	2776.02		
		DN	798.123		7.0500	2845.28	JUNC 85	
REACH 20	REACH	UN	798.123		7.0500	2845.28	JUNC 85	
		DL	798.123		7.1000	2841.97		
		DN	935.626		7.0500	3206.52	POND 20	IN
REACH 5	REACH	UN	738.691		6.9500	2781.53	JUNC 25	
		DL	738.691		7.0000	2776.63		
		DN	742.381		7.0000	2779.84	JUNC 26	
ROUTE 10	PONDrt	UN	935.626		7.0500	3206.52	POND 20	IN
ROUTE 10			935.622		7.9000	2242.32	POND 20	OUT
		DL	935.622		7.9000	2242.32		
		DN	935.622		7.9000	2242.32	OUT 10	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data		Apply to Node		Receiving Link	
SCS UH	1/2 PARCEL 14	Subarea	1/2 PARCEL 14	Add Hyd	1/2 PARCEL 14
SCS UH	PARCEL 25	Subarea	PARCEL 25	Add Hyd	PARCEL 25
SCS UH	OFFSITE 4.	Subarea	OFFSITE 4.	Add Hyd	OFFSITE 4.
SCS UH	OFFSITE 3.	Subarea	OFFSITE 3.	Add Hyd	OFFSITE 3.
SCS UH	PARCEL 12.	Subarea	PARCEL 12.	Add Hyd	PARCEL 12.
SCS UH	1/2 OFFSITE 2.	Subarea	1/2 OFFSITE 2.	Add Hyd	1/2 OFFSITE 2.
SCS UH	PARCEL 17.	Subarea	PARCEL 17.	Add Hyd	PARCEL 17.
SCS UH	OFFSITE 5	Subarea	OFFSITE 5	Add Hyd	OFFSITE 5
SCS UH	PARCEL 22	Subarea	PARCEL 22	Add Hyd	PARCEL 22
SCS UH	1/2 PARCEL 21.	Subarea	1/2 PARCEL 21.	Add Hyd	1/2 PARCEL 21.
SCS UH	PARCEL 23	Subarea	PARCEL 23	Add Hyd	PARCEL 23
SCS UH	1/2 PARCEL 14.	Subarea	1/2 PARCEL 14.	Add Hyd	1/2 PARCEL 14.
SCS UH	1/3 PARCEL 15..	Subarea	1/3 PARCEL 15..	Add Hyd	1/3 PARCEL 15..
SCS UH	1/3 PARCEL 15.	Subarea	1/3 PARCEL 15.	Add Hyd	1/3 PARCEL 15.
SCS UH	PARCEL 20.	Subarea	PARCEL 20.	Add Hyd	PARCEL 20.
SCS UH	1/3 PARCEL 15	Subarea	1/3 PARCEL 15	Add Hyd	1/3 PARCEL 15
SCS UH	1/2 PARCEL 21	Subarea	1/2 PARCEL 21	Add Hyd	1/2 PARCEL 21
SCS UH	PARCEL 24.	Subarea	PARCEL 24.	Add Hyd	PARCEL 24.
SCS UH	PARCEL 16	Subarea	PARCEL 16	Add Hyd	PARCEL 16
SCS UH	1/2 PARCEL 18	Subarea	1/2 PARCEL 18	Add Hyd	1/2 PARCEL 18
SCS UH	1/2 PARCEL 18.	Subarea	1/2 PARCEL 18.	Add Hyd	1/2 PARCEL 18.
SCS UH	PARCEL 19.	Subarea	PARCEL 19.	Add Hyd	PARCEL 19.
SCS UH	1/2 OFFSITE 2	Subarea	1/2 OFFSITE 2	Add Hyd	1/2 OFFSITE 2

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd PIPE 30	Subarea	OFFSITE 5		Jct	JUNC 45	
Add Hyd PIPE 31	Subarea	PARCEL 20.		Jct	JUNC 45	
Add Hyd PIPE 33	Subarea	1/3 PARCEL 15		Jct	JUNC 55	
Add Hyd PIPE 32	Jct	JUNC 45		Jct	JUNC 55	
Add Hyd PIPE 20	Subarea	1/3 PARCEL 15..		Jct	JUNC 25	
Add Hyd PIPE 19	Subarea	1/2 PARCEL 14		Jct	JUNC 25	
Add Hyd PIPE 22	Subarea	1/2 PARCEL 14.		Jct	JUNC 25	
Add Hyd DIVERSION	Subarea	OFFSITE 3.		Jct	JUNC 25	
Add Hyd CHANNEL	Subarea	OFFSITE 4.		Jct	JUNC 25	
Add Hyd PIPE 21	Subarea	1/3 PARCEL 15.		Jct	JUNC 25	
Add Hyd DIRECT	Subarea	PARCEL 16		Jct	JUNC 25	
Add Hyd PIPE 35	Subarea	1/2 PARCEL 21		Jct	JUNC 65	
Add Hyd PIPE 34	Jct	JUNC 55		Jct	JUNC 65	
Add Hyd PIPE 24	Subarea	PARCEL 17.		Jct	JUNC 35	
Add Hyd PIPE 25	Subarea	1/2 OFFSITE 2.		Jct	JUNC 35	
Reach REACH 5	Jct	JUNC 25		Jct	JUNC 26	
Add Hyd PIPE 23	Subarea	1/2 PARCEL 18		Jct	JUNC 26	
Add Hyd PIPE 37	Subarea	PARCEL 22		Jct	JUNC 75	
Add Hyd PIPE 36	Jct	JUNC 65		Jct	JUNC 75	
Add Hyd PIPE 27	Subarea	1/2 PARCEL 18.		Jct	JUNC 41	
Add Hyd PIPE 26	Jct	JUNC 35		Jct	JUNC 41	
Add Hyd PIPE 38	Jct	JUNC 75		Jct	JUNC 85	
Reach REACH 15	Jct	JUNC 26		Jct	JUNC 85	
Add Hyd PIPE 40	Subarea	PARCEL 23		Jct	JUNC 95	
Add Hyd PIPE 39	Subarea	1/2 PARCEL 21.		Jct	JUNC 95	
Add Hyd PIPE 16	Subarea	PARCEL 12.		Jct	JUNC 15	
Add Hyd PIPE 14	Subarea	1/2 OFFSITE 2		Jct	JUNC 15	
Add Hyd PIPE 17	Jct	JUNC 15		Pond	POND 20	IN
Add Hyd PIPE 41	Jct	JUNC 95		Pond	POND 20	IN
Reach REACH 20	Jct	JUNC 85		Pond	POND 20	IN
Add Hyd PIPE 28	Jct	JUNC 41		Pond	POND 20	IN
Add Hyd PIPE 29	Subarea	PARCEL 19.		Pond	POND 20	IN
Add Hyd DIRECT (POND)	Subarea	PARCEL 25		Pond	POND 20	IN
Add Hyd DIRECT CHANNEL	Subarea	PARCEL 24.		Pond	POND 20	IN
POND ROUTE TOTAL OUTFLOW...						
Total Pond Outflow	Pond	POND 20	IN	Outflow	POND 20	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 10	Outflow	POND 20	OUT	Jct	OUT 10	

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Title... Project Date: 12/22/2005
Project Engineer: Benjamin E. Sheets
Project Title: WOODMEN HEIGHTS
Project Comments:
ULTIMATE CONDITIONS

DESIGN STORMS SUMMARY

Design Storm File,ID =   El Paso County

Storm Tag Name   = Dev100

Data Type, File, ID = Synthetic Storm   TypeIIA 24hr
Storm Frequency   = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

DESIGN STORMS SUMMARY

```
Design Storm File,ID =                El Paso County


Storm Tag Name       = Dev100
----------------------------------------------------------------------
Data Type, File, ID = Synthetic Storm    TypeIIA 24hr
Storm Frequency     = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier =  1
Resulting Duration  = 24.0000 hrs
Resulting Start Time= .0000 hrs  Step= .5000 hrs  End= 24.0000 hrs
```

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

DEFINITION OF TERMS: ---

```
  At      = Total area (acres):  At = Ai+Ap
  Ai      = Impervious area (acres)
  Ap      = Pervious area (acres)
  CNi     = Runoff curve number for impervious area
  CNp     = Runoff curve number for pervious area
  fLoss   = f loss constant infiltration (depth/time)
  gKs     = Saturated Hydraulic Conductivity (depth/time)
  Md      = Volumetric Moisture Deficit
  Psi     = Capillary Suction (length)
  hK      = Horton Infiltration Decay Rate (time^-1)
  fo      = Initial Infiltration Rate (depth/time)
  fc      = Ultimate(capacity)Infiltration Rate (depth/time)
  Ia      = Initial Abstraction (length)
  dt      = Computational increment (duration of unit excess rainfall)
            Default dt is smallest value of 0.1333Tc, rtm, and th
            (Smallest dt is then adjusted to match up with Tp)
UDdt      = User specified override computational main time increment
            (only used if UDdt is => .1333Tc)
  D(t)    = Point on distribution curve (fraction of P) for time step t

  K       = 2 / (1 + (Tr/Tp)):  default K = 0.75: (for Tr/Tp = 1.67)
  Ks      = Hydrograph shape factor
          = Unit Conversions * K:
          = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K
            Default Ks = 645.333 * 0.75 = 484

  Lag     = Lag time from center of excess runoff (dt) to Tp:  Lag = 0.6Tc
  P       = Total precipitation depth, inches
  Pa(t)   = Accumulated rainfall at time step t
  Pi(t)   = Incremental rainfall at time step t
  qp      = Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi.
          = (Ks * A * Q) / Tp   (where Q = 1in. runoff, A=sq.mi.)
  Qu(t)   = Unit hydrograph ordinate (cfs) at time step t
  Q(t)    = Final hydrograph ordinate (cfs) at time step t
  Rai(t)  = Accumulated runoff (inches) at time step t for impervious area
  Rap(t)  = Accumulated runoff (inches) at time step t for pervious area
  Rii(t)  = Incremental runoff (inches) at time step t for impervious area
  Rip(t)  = Incremental runoff (inches) at time step t for pervious area
  R(t)    = Incremental weighted total runoff (inches)
  Rtm     = Time increment for rainfall table
  Si      = S for impervious area:  Si = (1000/CNi) - 10
  Sp      = S for pervious area:    Sp = (1000/CNp) - 10
  t       = Time step (row) number
  Tc      = Time of concentration
  Tb      = Time (hrs) of entire unit hydrograph:  Tb = Tp + Tr
  Tp      = Time (hrs) to peak of a unit hydrograph:  Tp = (dt/2) + Lag
  Tr      = Time (hrs) of receding limb of unit hydrograph:  Tr = ratio of Tp
```

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

```
PRECIPITATION: --------------------------------------------------------------
Column (1):  Time for time step t
Column (2):  D(t)  = Point on distribution curve for time step t
Column (3):  Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4):  Pa(t) = D(t) x P:        Col.(2) x P


PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) ------------------------
Column (5):  Rap(t) = Accumulated pervious runoff for time step t
             If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
             If (Pa(t) is >  0.2Sp) then use:

             Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6):  Rip(t) = Incremental pervious runoff for time step t
             Rip(t) =          Rap(t)          -          Rap(t-1)
             Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF ---------------------------------------------------
Column (7 & 8)... Did not specify to use impervious areas.


INCREMENTAL WEIGHTED RUNOFF: ---------------------------------------------
Column (9):  R(t)  = (Ap/At) x Rip(t)   +  (Ai/At) x Rii(t)
             R(t)  = (Ap/At) x Col.(6)  +  (Ai/At) x Col.(8)


SCS UNIT HYDROGRAPH METHOD: ----------------------------------------------
Column (10): Q(t)   is computed with the SCS unit hydrograph method
                    using R() and Qu().
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/2  PARCEL 18. Dev100
Tc             = .1667 hrs
Drainage Area = 10.000 acres  Runoff CN= 92

============================================
Computational Time Increment  =   .02223 hrs
Computed Peak Time            =   6.0012 hrs
Computed Peak Flow            =    48.65 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =   48.63 cfs
============================================

                DRAINAGE AREA
             -------------------
             ID:1/2  PARCEL 18.
             CN   =   92
             Area =       10.000 acres
             S    =     .8696 in
             0.2S =     .1739 in

              Cumulative Runoff
             -------------------
                     3.5049 in
                      2.921 ac-ft

HYG Volume...          2.921 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16670 hrs (ID: 1/2  PARCEL 18.)
Computational Incr, Tm =   .02223 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =    67.97 cfs
Unit peak time       Tp =   .11113 hrs
Unit receding limb, Tr =   .44453 hrs
Total unit time,     Tb =   .55567 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/2 OFFSITE 2 Dev100
Tc             = 1.0000 hrs
Drainage Area = 300.000 acres  Runoff CN= 75

============================================
Computational Time Increment   =   .13333 hrs
Computed Peak Time             =   6.5333 hrs
Computed Peak Flow             =   343.92 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.5250 hrs
Peak Flow, Interpolated Output =   343.80 cfs
============================================

                  DRAINAGE AREA
               -------------------
               ID:1/2 OFFSITE 2
               CN   =    75
               Area =      300.000 acres
               S    =    3.3333 in
               0.2S =     .6667 in

                Cumulative Runoff
               -------------------
                       1.9723 in
                       49.308 ac-ft

HYG Volume...          49.309 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =  1.00000 hrs (ID: 1/2 OFFSITE 2)
Computational Incr, Tm =   .13333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =   339.91 cfs
Unit peak time       Tp =   .66667 hrs
Unit receding limb, Tr =  2.66667 hrs
Total unit time,     Tb =  3.33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - 1/2 OFFSITE 2. Dev100
Tc             = 1.0000 hrs
Drainage Area  = 300.000 acres  Runoff CN= 75

============================================
Computational Time Increment   =    .13333 hrs
Computed Peak Time             =    6.5333 hrs
Computed Peak Flow             =    343.92 cfs

Time Increment for HYG File    =     .0250 hrs
Peak Time, Interpolated Output =    6.5250 hrs
Peak Flow, Interpolated Output =    343.80 cfs
============================================

                  DRAINAGE AREA
              -------------------
              ID:1/2 OFFSITE 2.
              CN   =   75
              Area =     300.000 acres
              S    =   3.3333 in
              0.2S =    .6667 in

               Cumulative Runoff
              -------------------
                      1.9723 in
                      49.308 ac-ft

HYG Volume...         49.309 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =  1.00000 hrs (ID: 1/2 OFFSITE 2.)
Computational Incr, Tm =   .13333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   339.91 cfs
Unit peak time      Tp =   .66667 hrs
Unit receding limb, Tr =  2.66667 hrs
Total unit time,    Tb =  3.33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/2 PARCEL 14 Dev100
Tc            = .2500 hrs
Drainage Area = 17.000 acres  Runoff CN= 85

============================================
Computational Time Increment    =   .03333 hrs
Computed Peak Time              =   6.0333 hrs
Computed Peak Flow              =    65.57 cfs

Time Increment for HYG File     =    .0250 hrs
Peak Time, Interpolated Output  =   6.0250 hrs
Peak Flow, Interpolated Output  =    65.19 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:1/2 PARCEL 14
              CN   =   85
              Area =      17.000 acres
              S    =   1.7647 in
              0.2S =    .3529 in

               Cumulative Runoff
              -------------------
                     2.8182 in
                      3.992 ac-ft

HYG Volume...         3.993 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: 1/2 PARCEL 14)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    77.05 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs    Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - 1/2 PARCEL 14. Dev100
Tc             = .2500 hrs
Drainage Area  = 17.000 acres  Runoff CN= 85

============================================
Computational Time Increment    =    .03333 hrs
Computed Peak Time              =    6.0333 hrs
Computed Peak Flow              =     65.57 cfs

Time Increment for HYG File     =     .0250 hrs
Peak Time, Interpolated Output  =    6.0250 hrs
Peak Flow, Interpolated Output  =     65.19 cfs
============================================

                DRAINAGE AREA
              ------------------
              ID:1/2 PARCEL 14.
              CN    =   85
              Area  =      17.000 acres
              S     =   1.7647 in
              0.2S  =    .3529 in

               Cumulative Runoff
              ------------------
                     2.8182 in
                      3.992 ac-ft

HYG Volume...           3.993 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: 1/2 PARCEL 14.)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    77.05 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/2 PARCEL 18 Dev100
Tc            = .1667 hrs
Drainage Area = 12.630 acres  Runoff CN= 92

============================================
Computational Time Increment  =   .02223 hrs
Computed Peak Time            =   6.0012 hrs
Computed Peak Flow            =    61.44 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =   61.42 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:1/2 PARCEL 18
              CN   =   92
              Area =       12.630 acres
              S    =     .8696 in
              0.2S =     .1739 in

                Cumulative Runoff
              -------------------
                      3.5049 in
                       3.689 ac-ft

HYG Volume...          3.689 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16670 hrs (ID: 1/2 PARCEL 18)
Computational Incr, Tm =   .02223 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =    85.84 cfs
Unit peak time       Tp =   .11113 hrs
Unit receding limb,  Tr =   .44453 hrs
Total unit time,     Tb =   .55567 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - 1/2 PARCEL 21 Dev100
Tc             = .2500 hrs
Drainage Area  = 25.180 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03333 hrs
Computed Peak Time             =   6.0333 hrs
Computed Peak Flow             =   117.09 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0250 hrs
Peak Flow, Interpolated Output =   116.93 cfs
============================================

                  DRAINAGE AREA
                 -------------------
                 ID:1/2 PARCEL 21
                 CN   =   92
                 Area =      25.180 acres
                 S    =     .8696 in
                 0.2S =     .1739 in

                  Cumulative Runoff
                 -------------------
                         3.5049 in
                          7.354 ac-ft

HYG Volume...            7.355 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: 1/2 PARCEL 21)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   114.12 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/2 PARCEL 21. Dev100
Tc            = .2500 hrs
Drainage Area = 25.180 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03333 hrs
Computed Peak Time             =   6.0333 hrs
Computed Peak Flow             =   117.09 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0250 hrs
Peak Flow, Interpolated Output =   116.93 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:1/2 PARCEL 21.
              CN   =   92
              Area =      25.180 acres
              S    =     .8696 in
              0.2S =     .1739 in

               Cumulative Runoff
              -------------------
                     3.5049 in
                      7.354 ac-ft

HYG Volume...         7.355 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: 1/2 PARCEL 21.)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =   114.12 cfs
Unit peak time       Tp =   .16667 hrs
Unit receding limb,  Tr =   .66667 hrs
Total unit time,     Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/3 PARCEL 15 Dev100
Tc             = .1666 hrs
Drainage Area = 14.880 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .02221 hrs
Computed Peak Time             =   5.9976 hrs
Computed Peak Flow             =    72.35 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    72.31 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:1/3 PARCEL 15
              CN   =   92
              Area =      14.880 acres
              S    =    .8696 in
              0.2S =    .1739 in

              Cumulative Runoff
              -------------------
                     3.5049 in
                      4.346 ac-ft

HYG Volume...         4.345 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16660 hrs (ID: 1/3 PARCEL 15)
Computational Incr, Tm =   .02221 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   101.20 cfs
Unit peak time      Tp =   .11107 hrs
Unit receding limb, Tr =   .44427 hrs
Total unit time,    Tb =   .55533 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - 1/3 PARCEL 15. Dev100
Tc             = .1667 hrs
Drainage Area = 12.900 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .02223 hrs
Computed Peak Time             =   6.0012 hrs
Computed Peak Flow             =    62.75 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    62.73 cfs
============================================

                DRAINAGE AREA
              ------------------
              ID:1/3 PARCEL 15.
              CN   =   92
              Area =       12.900 acres
              S    =     .8696 in
              0.2S =     .1739 in

               Cumulative Runoff
              ------------------
                      3.5049 in
                       3.768 ac-ft

HYG Volume...          3.768 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .16670 hrs (ID: 1/3 PARCEL 15.)
Computational Incr, Tm =    .02223 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =    87.68 cfs
Unit peak time       Tp =   .11113 hrs
Unit receding limb,  Tr =   .44453 hrs
Total unit time,     Tb =   .55567 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - 1/3 PARCEL 15.. Dev100
Tc             = .1700 hrs
Drainage Area  = 11.670 acres  Runoff CN= 92

============================================
Computational Time Increment  =   .02267 hrs
Computed Peak Time            =   6.0067 hrs
Computed Peak Flow            =    56.61 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =   56.54 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:1/3 PARCEL 15..
             CN   =   92
             Area =      11.670 acres
             S    =     .8696 in
             0.2S =     .1739 in

              Cumulative Runoff
             -------------------
                    3.5049 in
                     3.409 ac-ft

HYG Volume...           3.409 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .17000 hrs (ID: 1/3 PARCEL 15..)
Computational Incr, Tm =    .02267 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    77.78 cfs
Unit peak time      Tp =   .11333 hrs
Unit receding limb, Tr =   .45333 hrs
Total unit time,    Tb =   .56667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - OFFSITE 3. Dev100
Tc             = 1.0000 hrs
Drainage Area = 600.000 acres  Runoff CN= 75

============================================
Computational Time Increment   =   .13333 hrs
Computed Peak Time             =   6.5333 hrs
Computed Peak Flow             =   687.84 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.5250 hrs
Peak Flow, Interpolated Output =   687.59 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:OFFSITE 3.
              CN   =   75
              Area =     600.000 acres
              S    =   3.3333 in
              0.2S =    .6667 in

               Cumulative Runoff
              -------------------
                      1.9723 in
                      98.616 ac-ft

HYG Volume...         98.617 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =  1.00000 hrs (ID: OFFSITE 3.)
Computational Incr, Tm =   .13333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   679.83 cfs
Unit peak time      Tp =   .66667 hrs
Unit receding limb, Tr =  2.66667 hrs
Total unit time,    Tb =  3.33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - OFFSITE 4. Dev100
Tc             = 2.0000 hrs
Drainage Area = 3800.000 acres  Runoff CN= 75

============================================
Computational Time Increment  =    .26667 hrs
Computed Peak Time            =   7.2000 hrs
Computed Peak Flow            =  2457.31 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  7.2000 hrs
Peak Flow, Interpolated Output =  2457.30 cfs
============================================

                  DRAINAGE AREA
              -------------------
              ID:OFFSITE 4.
              CN    =    75
              Area =     3800.000 acres
              S     =    3.3333 in
              0.2S =      .6667 in

               Cumulative Runoff
              -------------------
                      1.9723 in
                     624.570 ac-ft

HYG Volume...          624.572 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =  2.00000 hrs (ID: OFFSITE 4.)
Computational Incr, Tm =   .26667 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =  2152.78 cfs
Unit peak time       Tp =  1.33333 hrs
Unit receding limb, Tr =  5.33333 hrs
Total unit time,     Tb =  6.66667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - OFFSITE 5 Dev100
Tc             = .4400 hrs
Drainage Area = 323.000 acres  Runoff CN= 65

============================================
Computational Time Increment  =   .05867 hrs
Computed Peak Time            =   6.1600 hrs
Computed Peak Flow            =   391.01 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.1500 hrs
Peak Flow, Interpolated Output =  386.63 cfs
============================================

              DRAINAGE AREA
            -------------------
            ID:OFFSITE 5
            CN   =   65
            Area =     323.000 acres
            S    =   5.3846 in
            0.2S =   1.0769 in

             Cumulative Runoff
            -------------------
                    1.2682 in
                    34.135 ac-ft

HYG Volume...        34.135 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .44000 hrs (ID: OFFSITE 5)
Computational Incr, Tm =   .05867 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   831.76 cfs
Unit peak time      Tp =   .29333 hrs
Unit receding limb, Tr =  1.17333 hrs
Total unit time,    Tb =  1.46667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 12. Dev100
Tc             = .3333 hrs
Drainage Area = 61.000 acres  Runoff CN= 85

============================================
Computational Time Increment  =   .04444 hrs
Computed Peak Time            =   6.0883 hrs
Computed Peak Flow            =   215.27 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.0750 hrs
Peak Flow, Interpolated Output =  214.80 cfs
============================================

                  DRAINAGE AREA
              -------------------
              ID:PARCEL 12.
              CN   =   85
              Area =      61.000 acres
              S    =   1.7647 in
              0.2S =    .3529 in

               Cumulative Runoff
              -------------------
                      2.8182 in
                      14.326 ac-ft

HYG Volume...         14.325 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .33330 hrs (ID: PARCEL 12.)
Computational Incr, Tm =   .04444 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   207.37 cfs
Unit peak time      Tp =   .22220 hrs
Unit receding limb, Tr =   .88880 hrs
Total unit time,    Tb =  1.11100 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 16 Dev100
Tc             = .2500 hrs
Drainage Area = 15.120 acres  Runoff CN= 45

============================================
Computational Time Increment   =   .03333 hrs
Computed Peak Time             =   6.1333 hrs
Computed Peak Flow             =     2.19 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.1250 hrs
Peak Flow, Interpolated Output =     2.18 cfs
============================================

              DRAINAGE AREA
             ------------------
             ID:PARCEL 16
             CN   =   45
             Area =       15.120 acres
             S    =  12.2222 in
             0.2S =   2.4444 in

              Cumulative Runoff
             ------------------
                     .2697 in
                      .340 ac-ft

HYG Volume...            .340 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: PARCEL 16)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    68.53 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - PARCEL 17. Dev100
Tc             = .2500 hrs
Drainage Area  = 13.720 acres  Runoff CN= 85

============================================
Computational Time Increment  =   .03333 hrs
Computed Peak Time            =   6.0333 hrs
Computed Peak Flow            =    52.92 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.0250 hrs
Peak Flow, Interpolated Output =   52.61 cfs
============================================

              DRAINAGE AREA
              -------------------
              ID:PARCEL 17.
              CN   =   85
              Area =       13.720 acres
              S    =   1.7647 in
              0.2S =    .3529 in

              Cumulative Runoff
              -------------------
                      2.8182 in
                       3.222 ac-ft

HYG Volume...         3.222 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: PARCEL 17.)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =    62.18 cfs
Unit peak time       Tp =   .16667 hrs
Unit receding limb,  Tr =   .66667 hrs
Total unit time,     Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 19. Dev100
Tc             = .0833 hrs
Drainage Area = 5.000 acres  Runoff CN= 61

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time             =   6.0111 hrs
Computed Peak Flow             =     9.02 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =     8.91 cfs
============================================

              DRAINAGE AREA
           -------------------
           ID:PARCEL 19.
           CN   =   61
           Area =        5.000 acres
           S    =   6.3934 in
           0.2S =   1.2787 in

            Cumulative Runoff
           -------------------
                   1.0239 in
                     .427 ac-ft

HYG Volume...            .427 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08333 hrs (ID: PARCEL 19.)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    67.98 cfs
Unit peak time      Tp =   .05556 hrs
Unit receding limb, Tr =   .22222 hrs
Total unit time,    Tb =   .27778 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 20. Dev100
Tc            = .2500 hrs
Drainage Area = 17.250 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03333 hrs
Computed Peak Time             =   6.0333 hrs
Computed Peak Flow             =    80.21 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.0250 hrs
Peak Flow, Interpolated Output =    80.10 cfs
============================================

                  DRAINAGE AREA
               -------------------
               ID:PARCEL 20.
               CN    =    92
               Area =       17.250 acres
               S     =     .8696 in
               0.2S =     .1739 in

                Cumulative Runoff
               -------------------
                       3.5049 in
                        5.038 ac-ft

HYG Volume...           5.038 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: PARCEL 20.)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =  .7491)

Unit peak,          qp =    78.18 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 22 Dev100
Tc             = .1666 hrs
Drainage Area = 16.680 acres  Runoff CN= 92

============================================
Computational Time Increment    =   .02221 hrs
Computed Peak Time              =   5.9976 hrs
Computed Peak Flow              =    81.10 cfs

Time Increment for HYG File     =    .0250 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    81.06 cfs
============================================

                  DRAINAGE AREA
                -------------------
                ID:PARCEL 22
                CN    =    92
                Area =       16.680 acres
                S     =    .8696 in
                0.2S =    .1739 in

                  Cumulative Runoff
                -------------------
                        3.5049 in
                         4.872 ac-ft

HYG Volume...           4.870 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16660 hrs (ID: PARCEL 22)
Computational Incr, Tm =   .02221 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,            qp =   113.44 cfs
Unit peak time        Tp =   .11107 hrs
Unit receding limb, Tr =   .44427 hrs
Total unit time,      Tb =   .55533 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  = work_pad.hyg - PARCEL 23 Dev100
Tc             = .1660 hrs
Drainage Area  = 24.380 acres  Runoff CN= 92

============================================
Computational Time Increment  =   .02213 hrs
Computed Peak Time            =   5.9981 hrs
Computed Peak Flow            =   118.60 cfs

Time Increment for HYG File   =    .0250 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =  118.54 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:PARCEL 23
              CN   =   92
              Area =      24.380 acres
              S    =     .8696 in
              0.2S =     .1739 in

               Cumulative Runoff
              -------------------
                      3.5049 in
                       7.121 ac-ft

HYG Volume...          7.119 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16600 hrs (ID: PARCEL 23)
Computational Incr, Tm =   .02213 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =   166.41 cfs
Unit peak time       Tp =   .11067 hrs
Unit receding limb,  Tr =   .44267 hrs
Total unit time,     Tb =   .55333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 24. Dev100
Tc             = .2500 hrs
Drainage Area = 14.310 acres  Runoff CN= 45

============================================
Computational Time Increment   =   .03333 hrs
Computed Peak Time             =   6.1333 hrs
Computed Peak Flow             =     2.08 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =   6.1250 hrs
Peak Flow, Interpolated Output =     2.07 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:PARCEL 24.
              CN   =   45
              Area =        14.310 acres
              S    =  12.2222 in
              0.2S =   2.4444 in

               Cumulative Runoff
              -------------------
                       .2697 in
                        .322 ac-ft

HYG Volume...             .322 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25000 hrs (ID: PARCEL 24.)
Computational Incr, Tm =   .03333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    64.86 cfs
Unit peak time      Tp =   .16667 hrs
Unit receding limb, Tr =   .66667 hrs
Total unit time,    Tb =   .83333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID = work_pad.hyg - PARCEL 25 Dev100
Tc             = .5000 hrs
Drainage Area = 25.000 acres  Runoff CN= 69

============================================
Computational Time Increment    =   .06667 hrs
Computed Peak Time              =   6.2000 hrs
Computed Peak Flow              =    35.54 cfs

Time Increment for HYG File     =    .0250 hrs
Peak Time, Interpolated Output =   6.2000 hrs
Peak Flow, Interpolated Output =    35.54 cfs
============================================

                 DRAINAGE AREA
             ------------------
             ID:PARCEL 25
             CN   =   69
             Area =       25.000 acres
             S    =   4.4928 in
             0.2S =    .8986 in

              Cumulative Runoff
             ------------------
                     1.5336 in
                      3.195 ac-ft

HYG Volume...          3.195 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .50000 hrs (ID: PARCEL 25)
Computational Incr, Tm =   .06667 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    56.65 cfs
Unit peak time      Tp =   .33333 hrs
Unit receding limb, Tr =  1.33333 hrs
Total unit time,    Tb =  1.66667 hrs
```

REACH ROUTING SUMMARY
(Muskingum Reach Routing)

```
HYG Directory        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file-ID = work_pad.hyg - JUNC 26          Dev100
Outflow HYG file-ID = work_pad.hyg - REACH 15         Dev100

Base Flow     =       .00 cfs
No Infiltration

Time Step     =     .0250 hrs
Muskingum K   =     .0500 hrs      (Each subreach K = .0250 hrs)
Muskingum X   =    .25000

# Subreaches =     2
(Range = 1 to 3 subreaches for given K, X, and time step.)
```

	Inflow Hydrograph	Outflow Hydrograph
Time Start...	4.2750 hrs	4.2750 hrs
Time Step....	.0250 hrs	.0250 hrs
Time End.....	30.4500 hrs	30.4500 hrs
Peak Time....	7.0000 hrs	7.0500 hrs
Peak Flow....	2779.84 cfs	2776.02 cfs

```
Inflow/Outflow Volumes
--------------------------------
Inflow         =     742.381 ac-ft

- Unrouted     =       -.000 ac-ft
+ Base Flow    =        .000 ac-ft
- Infiltration =        .000 ac-ft
                 ---------------
Outflow        =     742.381 ac-ft
```

REACH ROUTING SUMMARY
(Muskingum Reach Routing)

```
HYG Directory          = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file-ID = work_pad.hyg - JUNC 85          Dev100
Outflow HYG file-ID = work_pad.hyg - REACH 20         Dev100

Base Flow     =        .00 cfs
No Infiltration

Time Step     =      .0250 hrs
Muskingum K   =      .0500 hrs       (Each subreach K = .0250 hrs)
Muskingum X   =     .25000

# Subreaches =     2
(Range = 1 to 3 subreaches for given K, X, and time step.)

                  Inflow Hydrograph        Outflow Hydrograph
                  -----------------        ------------------
Time Start...        4.2500 hrs                4.2500 hrs
Time Step....         .0250 hrs                 .0250 hrs
Time End.....       30.4500 hrs               30.4500 hrs

Peak Time....        7.0500 hrs                7.1000 hrs
Peak Flow....       2845.28 cfs               2841.97 cfs


Inflow/Outflow Volumes
--------------------------------
Inflow         =     798.123 ac-ft

- Unrouted      =        .000 ac-ft
+ Base Flow     =        .000 ac-ft
- Infiltration =        .000 ac-ft
                   ---------------
Outflow         =     798.123 ac-ft
```

REACH ROUTING SUMMARY
(Muskingum Reach Routing)

```
HYG Directory         = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file-ID = work_pad.hyg - JUNC 25          Dev100
Outflow HYG file-ID = work_pad.hyg - REACH 5          Dev100

Base Flow     =       .00 cfs
No Infiltration

Time Step     =     .0250 hrs
Muskingum K   =     .0500 hrs       (Each subreach K = .0250 hrs)
Muskingum X   =    .25000

# Subreaches =     2
(Range = 1 to 3 subreaches for given K, X, and time step.)

                   Inflow Hydrograph          Outflow Hydrograph
                   -----------------          ------------------
Time Start...         4.2500 hrs                  4.2500 hrs
Time Step.....         .0250 hrs                   .0250 hrs
Time End.....        30.4000 hrs                 30.4750 hrs

Peak Time....         6.9500 hrs                  7.0000 hrs
Peak Flow....        2781.53 cfs                 2776.63 cfs

Inflow/Outflow Volumes
--------------------------------
Inflow         =     738.691 ac-ft

- Unrouted     =        .000 ac-ft
+ Base Flow    =        .000 ac-ft
- Infiltration =        .000 ac-ft
                 ---------------
Outflow        =     738.691 ac-ft
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
6882.00	-----	8.2180	.0000	.000	.000
6884.00	-----	11.9350	30.0566	20.038	20.038
6886.00	-----	14.3850	39.4229	26.282	46.320
6888.00	-----	15.3010	44.5219	29.681	76.001
6890.00	-----	16.5330	47.7391	31.826	107.827
6892.00	-----	17.7110	51.3559	34.237	142.064
6894.00	-----	21.5250	58.7611	39.174	181.238
6896.00	-----	25.7810	70.8631	47.242	228.480
6898.00	-----	28.2740	81.0537	54.036	282.516
6900.00	-----	29.0040	85.9147	57.276	339.793
6902.00	-----	30.0130	88.5212	59.014	398.807
6904.00	-----	31.2140	91.8346	61.223	460.030
6906.00	-----	32.5100	95.5794	63.720	523.749

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6882.00 ft
Increment = .50 ft
Max. Elev.= 6906.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Box	BX	--->	TW	6882.000	6906.000
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = BX
Structure Type     = Culvert-Box
------------------------------------
No. Barrels        =        3
Barrel Height      =     6.00 ft
Barrel Width       =     8.00 ft
Upstream Invert    =  6882.00 ft
Dnstream Invert    =  6878.00 ft
Horiz. Length      =   200.00 ft
Barrel Length      =   200.04 ft
Barrel Slope       =   .02000 ft/ft

OUTLET CONTROL DATA...
Mannings n         =    .0130
Ke                 =    .4000  (forward entrance loss)
Kb                 =  .002401  (per ft of full flow)
Kr                 =    .0200  (reverse entrance loss)
HW Convergence     =     .001  +/- ft

INLET CONTROL DATA...
Equation form      =        1
Inlet Control K    =    .0260
Inlet Control M    =   1.0000
Inlet Control c    =   .03470
Inlet Control Y    =    .8100
T1 ratio (HW/D)    =    1.168
T2 ratio (HW/D)    =    1.355
Slope Factor       =    -.500
```

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =   6889.01 ft ---> Flow =   411.51 cfs
At T2 Elev =   6890.13 ft ---> Flow =   470.30 cfs

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = BX (Culvert-Box)

Mannings open channel maximum capacity: 1390.86 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
6882.00	.00	Free Outfall		
		Upstream HW & DNstream TW < Inv.El		
6882.50	21.71	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .147ft Dcr= .294ft CRIT.DEPTH
6883.00	61.33	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .294ft Dcr= .588ft CRIT.DEPTH
6883.50	112.78	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .441ft Dcr= .882ft CRIT.DEPTH
6884.00	173.64	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .588ft Dcr= 1.176ft CRIT.DEPTH
6884.50	242.76	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .735ft Dcr= 1.471ft CRIT.DEPTH
6885.00	319.22	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .883ft Dcr= 1.765ft CRIT.DEPTH
6885.50	402.16	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.029ft Dcr= 2.059ft CRIT.DEPTH
6886.00	491.24	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.176ft Dcr= 2.353ft CRIT.DEPTH
6886.50	586.33	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.324ft Dcr= 2.647ft CRIT.DEPTH
6887.00	686.45	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.470ft Dcr= 2.940ft CRIT.DEPTH
6887.50	791.99	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.617ft Dcr= 3.235ft CRIT.DEPTH
6888.00	902.79	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.765ft Dcr= 3.530ft CRIT.DEPTH
6888.50	1017.98	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 1.912ft Dcr= 3.824ft CRIT.DEPTH
6889.00	1137.44	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 2.059ft Dcr= 4.118ft CRIT.DEPTH

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = BX (Culvert-Box)

Mannings open channel maximum capacity: 1390.86 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
6889.50	1261.42	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 2.206ft Dcr= 4.412ft CRIT.DEPTH
6890.00	1389.78	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= 2.353ft Dcr= 4.706ft CRIT.DEPTH
6890.50	1487.16	Free Outfall		
		INLET CONTROL...		Submerged: HW =8.50
6891.00	1584.44	Free Outfall		
		INLET CONTROL...		Submerged: HW =9.00
6891.50	1675.99	Free Outfall		
		INLET CONTROL...		Submerged: HW =9.50
6892.00	1762.96	Free Outfall		
		INLET CONTROL...		Submerged: HW =10.00
6892.50	1845.65	Free Outfall		
		INLET CONTROL...		Submerged: HW =10.50
6893.00	1924.90	Free Outfall		
		INLET CONTROL...		Submerged: HW =11.00
6893.50	2001.00	Free Outfall		
		INLET CONTROL...		Submerged: HW =11.50
6894.00	2074.24	Free Outfall		
		INLET CONTROL...		Submerged: HW =12.00
6894.50	2145.20	Free Outfall		
		INLET CONTROL...		Submerged: HW =12.50
6895.00	2213.57	Free Outfall		
		INLET CONTROL...		Submerged: HW =13.00
6895.50	2280.24	Free Outfall		
		INLET CONTROL...		Submerged: HW =13.50
6896.00	2344.61	Free Outfall		
		INLET CONTROL...		Submerged: HW =14.00
6896.50	2407.55	Free Outfall		
		INLET CONTROL...		Submerged: HW =14.50

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = BX (Culvert-Box)

Mannings open channel maximum capacity: 1390.86 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
6897.00	2468.78	Free Outfall		
		INLET CONTROL...		Submerged: HW =15.00
6897.50	2528.57	Free Outfall		
		INLET CONTROL...		Submerged: HW =15.50
6898.00	2586.94	Free Outfall		
		INLET CONTROL...		Submerged: HW =16.00
6898.50	2644.16	Free Outfall		
		INLET CONTROL...		Submerged: HW =16.50
6899.00	2700.09	Free Outfall		
		INLET CONTROL...		Submerged: HW =17.00
6899.50	2754.88	Free Outfall		
		INLET CONTROL...		Submerged: HW =17.50
6900.00	2808.67	Free Outfall		
		INLET CONTROL...		Submerged: HW =18.00
6900.50	2861.31	Free Outfall		
		INLET CONTROL...		Submerged: HW =18.50
6901.00	2913.09	Free Outfall		
		INLET CONTROL...		Submerged: HW =19.00
6901.50	2963.73	Free Outfall		
		INLET CONTROL...		Submerged: HW =19.50
6902.00	3013.80	Free Outfall		
		INLET CONTROL...		Submerged: HW =20.00
6902.50	3063.01	Free Outfall		
		INLET CONTROL...		Submerged: HW =20.50
6903.00	3111.36	Free Outfall		
		INLET CONTROL...		Submerged: HW =21.00
6903.50	3159.14	Free Outfall		
		INLET CONTROL...		Submerged: HW =21.50
6904.00	3206.06	Free Outfall		
		INLET CONTROL...		Submerged: HW =22.00

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = BX (Culvert-Box)

Mannings open channel maximum capacity: 1390.86 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
6904.50	3252.27	Free Outfall		
		INLET CONTROL...		Submerged: HW =22.50
6905.00	3297.90	Free Outfall		
		INLET CONTROL...		Submerged: HW =23.00
6905.50	3342.82	Free Outfall		
		INLET CONTROL...		Submerged: HW =23.50
6906.00	3387.17	Free Outfall		
		INLET CONTROL...		Submerged: HW =24.00

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
6882.00	.00	Free Outfall		None contributing
6882.50	21.71	Free Outfall		BX
6883.00	61.33	Free Outfall		BX
6883.50	112.78	Free Outfall		BX
6884.00	173.64	Free Outfall		BX
6884.50	242.76	Free Outfall		BX
6885.00	319.22	Free Outfall		BX
6885.50	402.16	Free Outfall		BX
6886.00	491.24	Free Outfall		BX
6886.50	586.33	Free Outfall		BX
6887.00	686.45	Free Outfall		BX
6887.50	791.99	Free Outfall		BX
6888.00	902.79	Free Outfall		BX
6888.50	1017.98	Free Outfall		BX
6889.00	1137.44	Free Outfall		BX
6889.50	1261.42	Free Outfall		BX
6890.00	1389.78	Free Outfall		BX
6890.50	1487.16	Free Outfall		BX
6891.00	1584.44	Free Outfall		BX
6891.50	1675.99	Free Outfall		BX
6892.00	1762.96	Free Outfall		BX
6892.50	1845.65	Free Outfall		BX
6893.00	1924.90	Free Outfall		BX
6893.50	2001.00	Free Outfall		BX
6894.00	2074.24	Free Outfall		BX
6894.50	2145.20	Free Outfall		BX
6895.00	2213.57	Free Outfall		BX
6895.50	2280.24	Free Outfall		BX
6896.00	2344.61	Free Outfall		BX
6896.50	2407.55	Free Outfall		BX
6897.00	2468.78	Free Outfall		BX
6897.50	2528.57	Free Outfall		BX
6898.00	2586.94	Free Outfall		BX
6898.50	2644.16	Free Outfall		BX
6899.00	2700.09	Free Outfall		BX
6899.50	2754.88	Free Outfall		BX
6900.00	2808.67	Free Outfall		BX
6900.50	2861.31	Free Outfall		BX

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 3 ULT DEV ESI.PPW

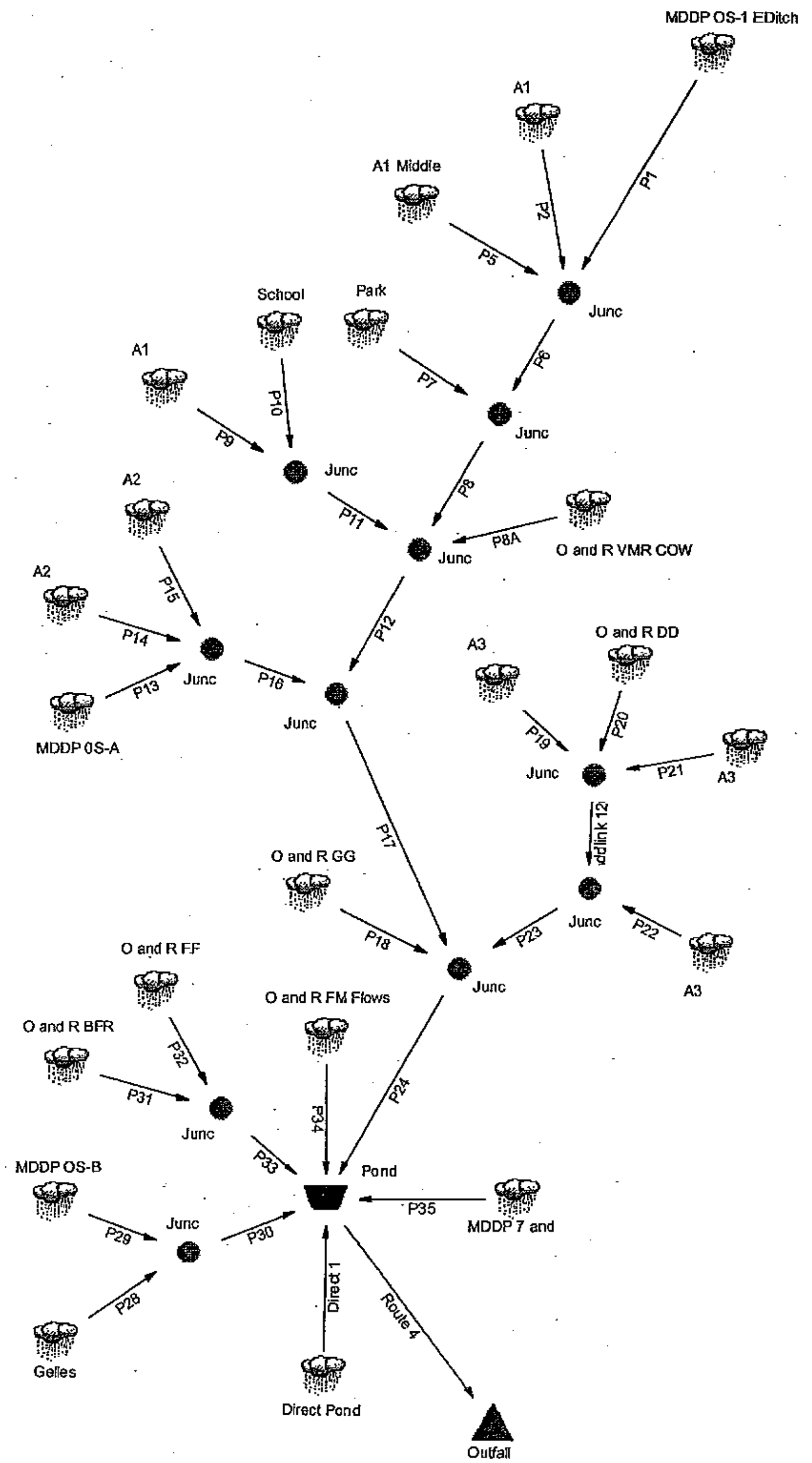
***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
6901.00	2913.09	Free Outfall		BX
6901.50	2963.73	Free Outfall		BX
6902.00	3013.80	Free Outfall		BX
6902.50	3063.01	Free Outfall		BX
6903.00	3111.36	Free Outfall		BX
6903.50	3159.14	Free Outfall		BX
6904.00	3206.06	Free Outfall		BX
6904.50	3252.27	Free Outfall		BX
6905.00	3297.90	Free Outfall		BX
6905.50	3342.82	Free Outfall		BX
6906.00	3387.17	Free Outfall		BX

LEVEL POOL ROUTING SUMMARY

```
HYG Dir           = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file  = work_pad.hyg - POND 20       IN  Dev100
Outflow HYG file  = work_pad.hyg - POND 20       OUT Dev100

Pond Node   Data  = POND 20
Pond Volume Data  = POND 20
Pond Outlet Data  = Outlet 1

No Infiltration

INITIAL CONDITIONS
---------------------------------
Starting WS Elev   =  6882.00 ft
Starting Volume    =      .000 ac-ft
Starting Outflow   =       .00 cfs
Starting Infiltr.  =       .00 cfs
Starting Total Qout=       .00 cfs
Time Increment     =     .0250 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =   3206.52 cfs    at    7.0500 hrs
Peak Outflow      =   2242.32 cfs    at    7.9000 hrs
-----------------------------------------------------
Peak Elevation    =   6895.22 ft
Peak Storage =        208.940 ac-ft
=====================================================

MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =     935.626
- Infiltration =        .000
- HYG Vol OUT  =     935.622
- Retained Vol =        .000
                  ----------
Unrouted Vol =         -.005 ac-ft   (.000% of Inflow Volume)
```

Index of Starting Page Numbers for ID Names



MDDP OS-1 EDitch
A1
A1 Middle
P1
P2
P5
Junc
School
Park
A1
P6
P7
Junc
P10
P9
Junc
P8
A2
P11
Junc
P8A
O and R VMR COW
A2
P15
P12
P14
O and R DD
A3
Junc
P16
P13
Junc
MDDP 0S-A
P20
P19
A3
P21
Junc
ddlink 12
P17
O and R GG
Junc
P22
P18
P23
Junc
A3
O and R FF
O and R FM Flows
O and R BFR
P32
P24
P31
P34
Junc
P33
Pond
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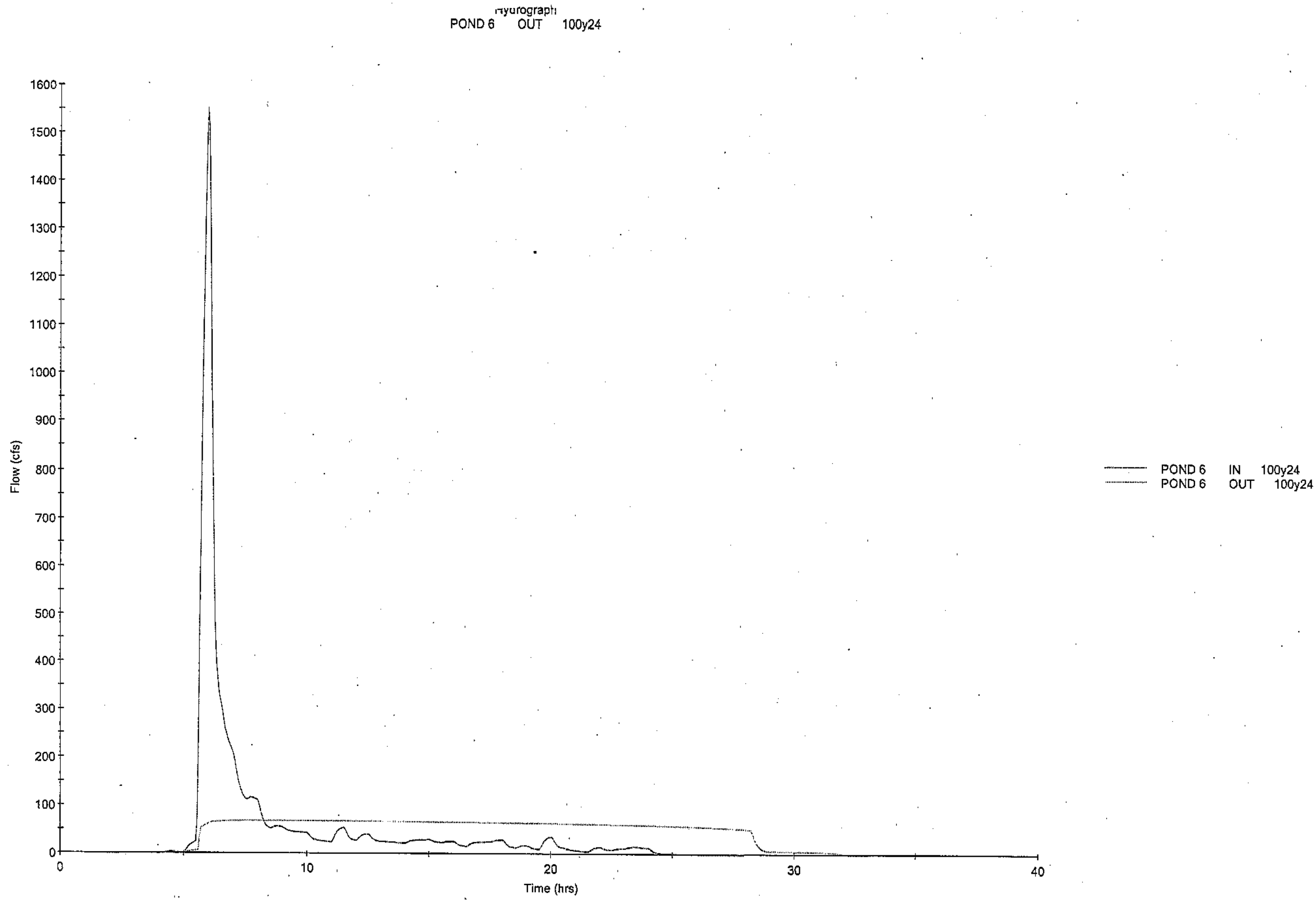
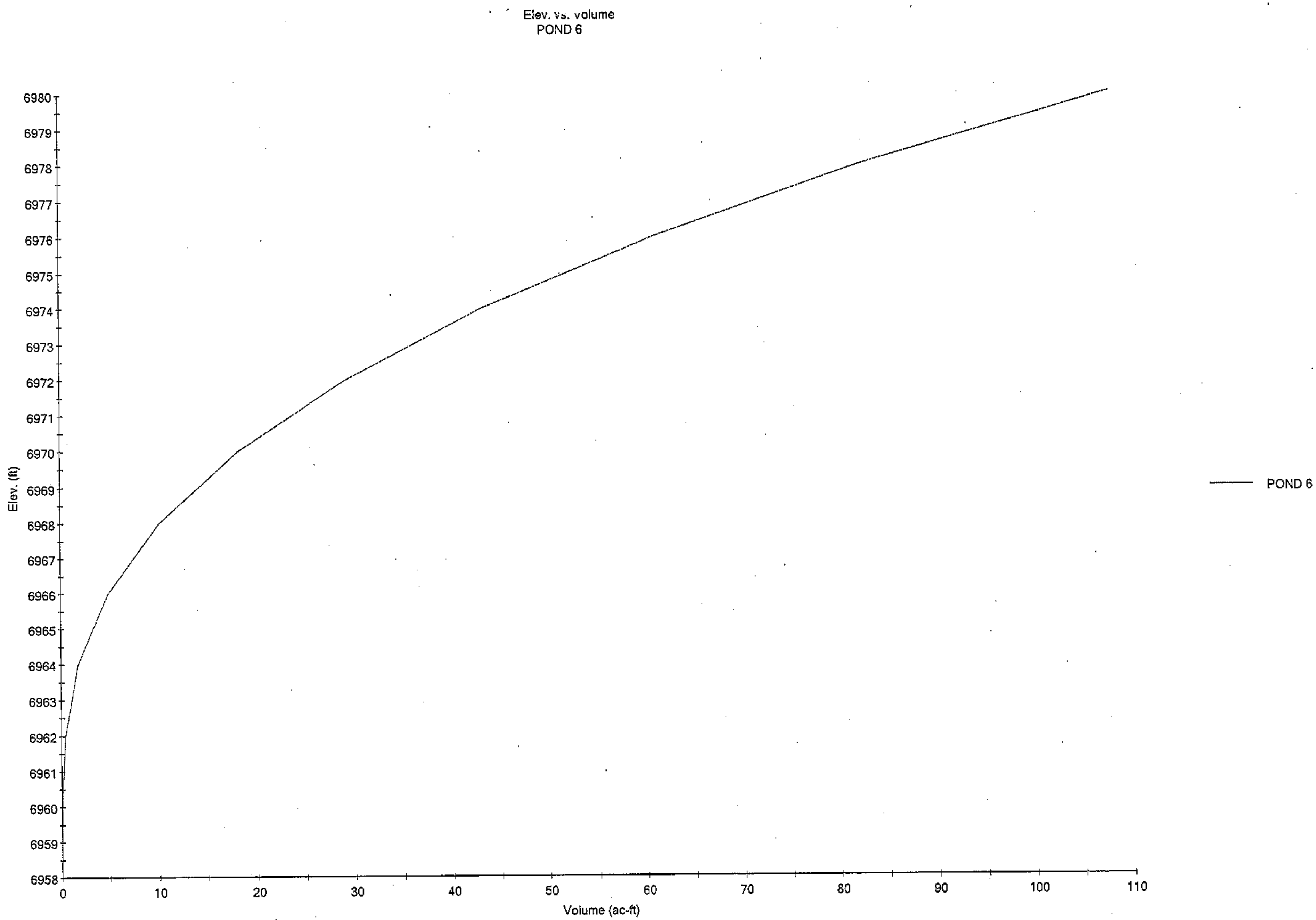
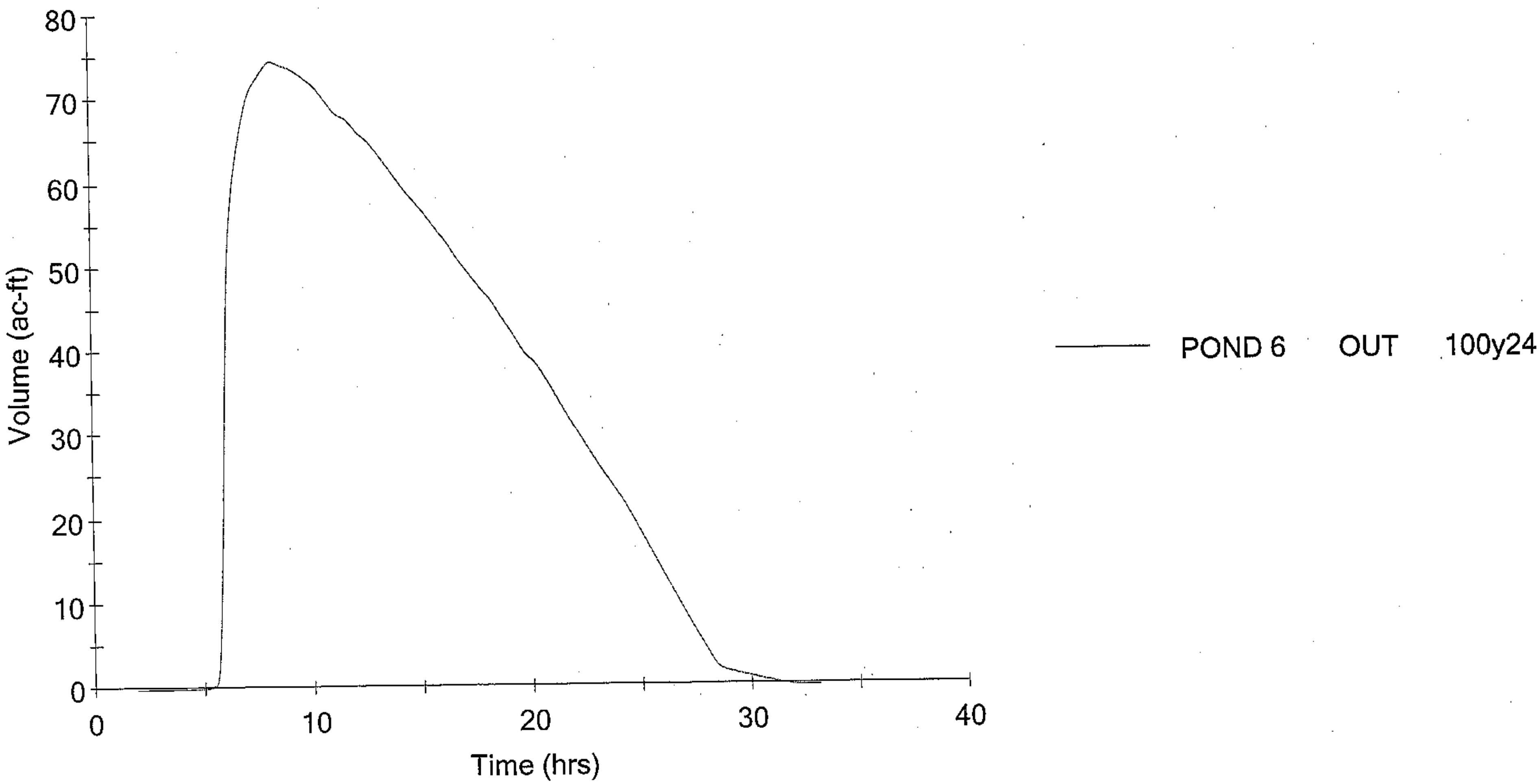
Junc
P29
P30
P28
Direct 1
Route 4
Gelles
Direct Pond
Outfall

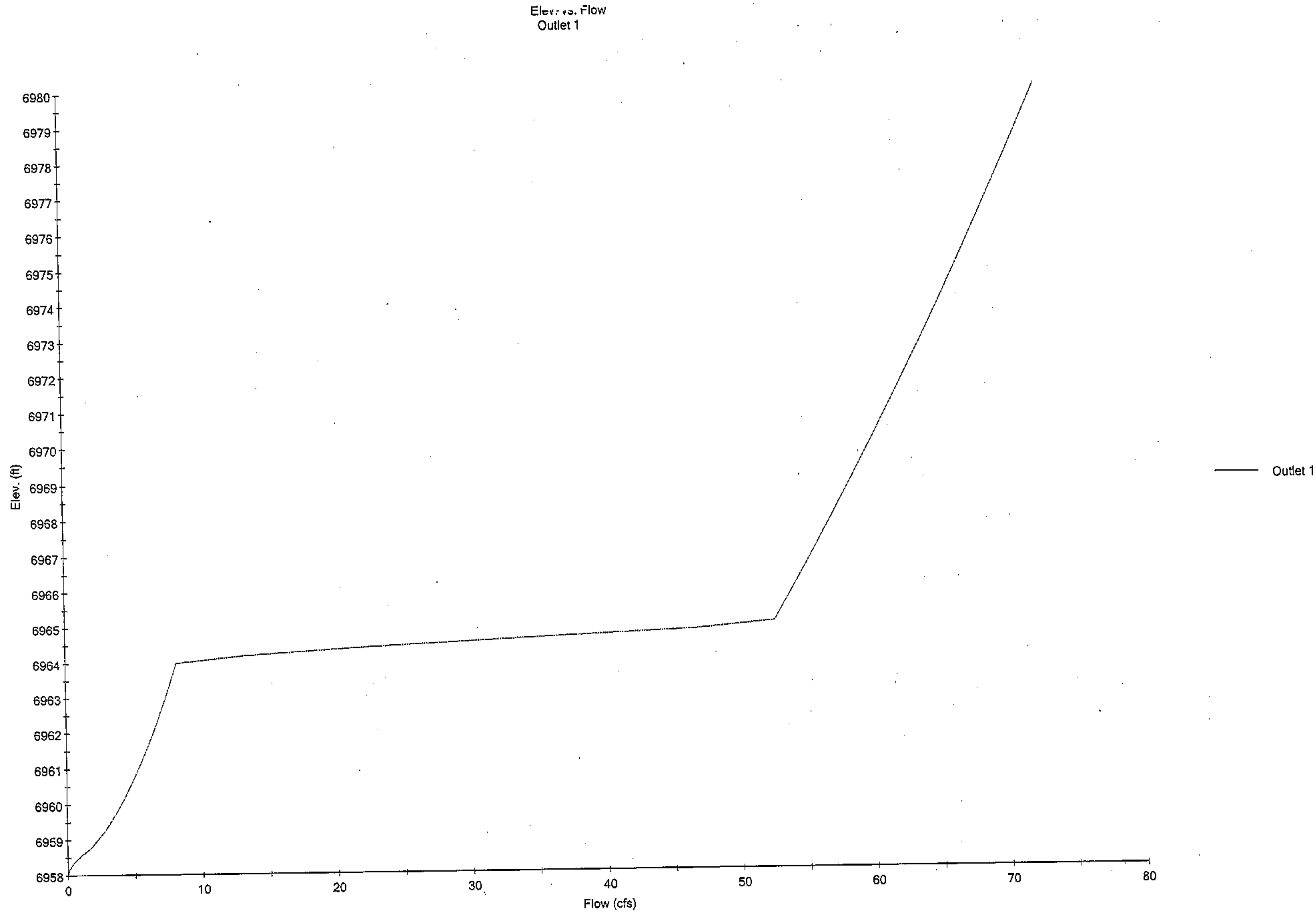

Hydrograph
POND 6 OUT 100y24
Flow (cfs)
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
Time (hrs)
POND 6 IN 100y24
POND 6 OUT 100y24



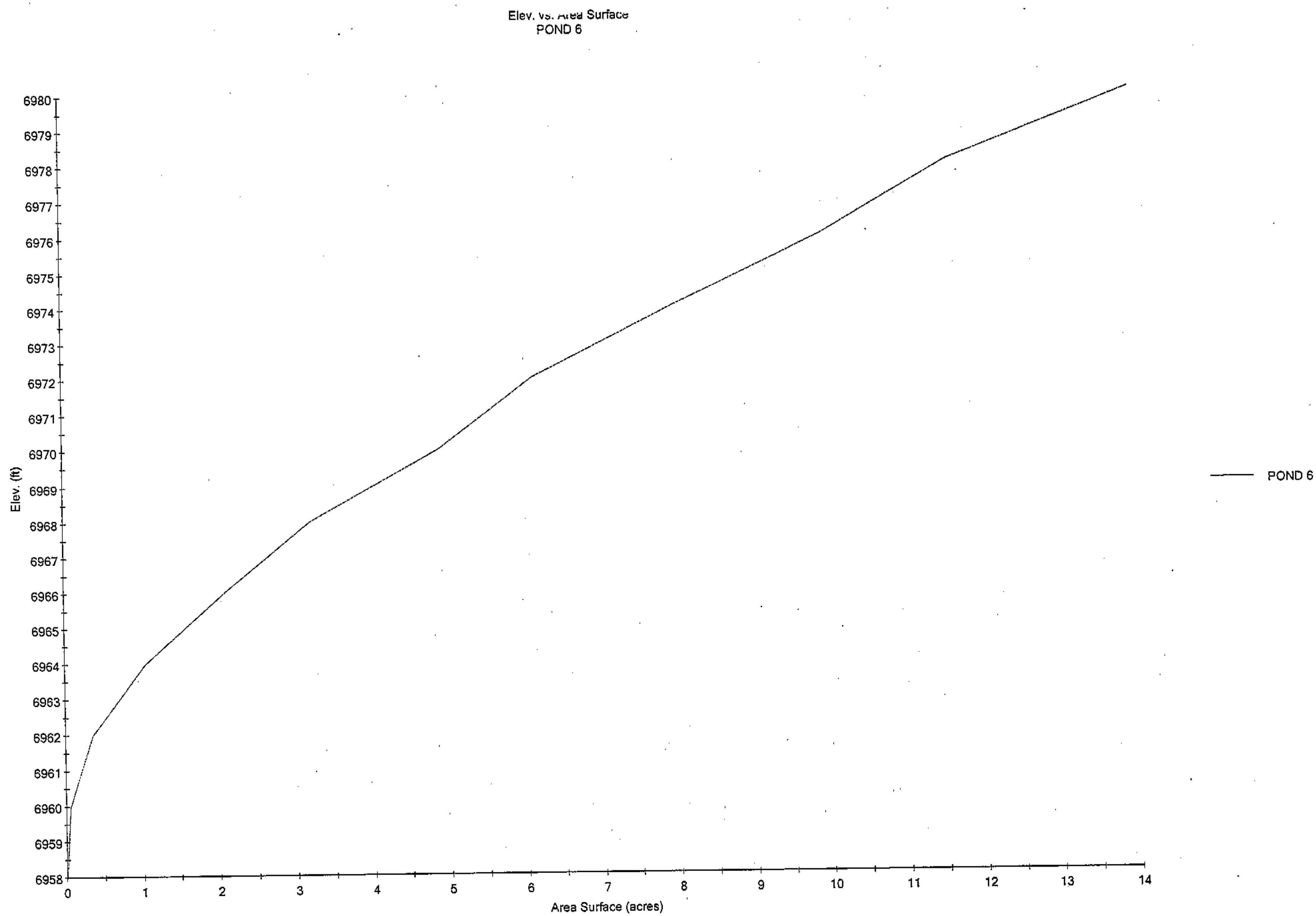
Elev. vs. volume
POND 6
Elev. (ft)
6980
6979
6978
6977
6976
6975
6974
6973
6972
6971
6970
6969
6968
6967
6966
6965
6964
6963
6962
6961
6960
6959
6958
0
10
20
30
40
50
60
70
80
90
100
110
Volume (ac-ft)
POND 6

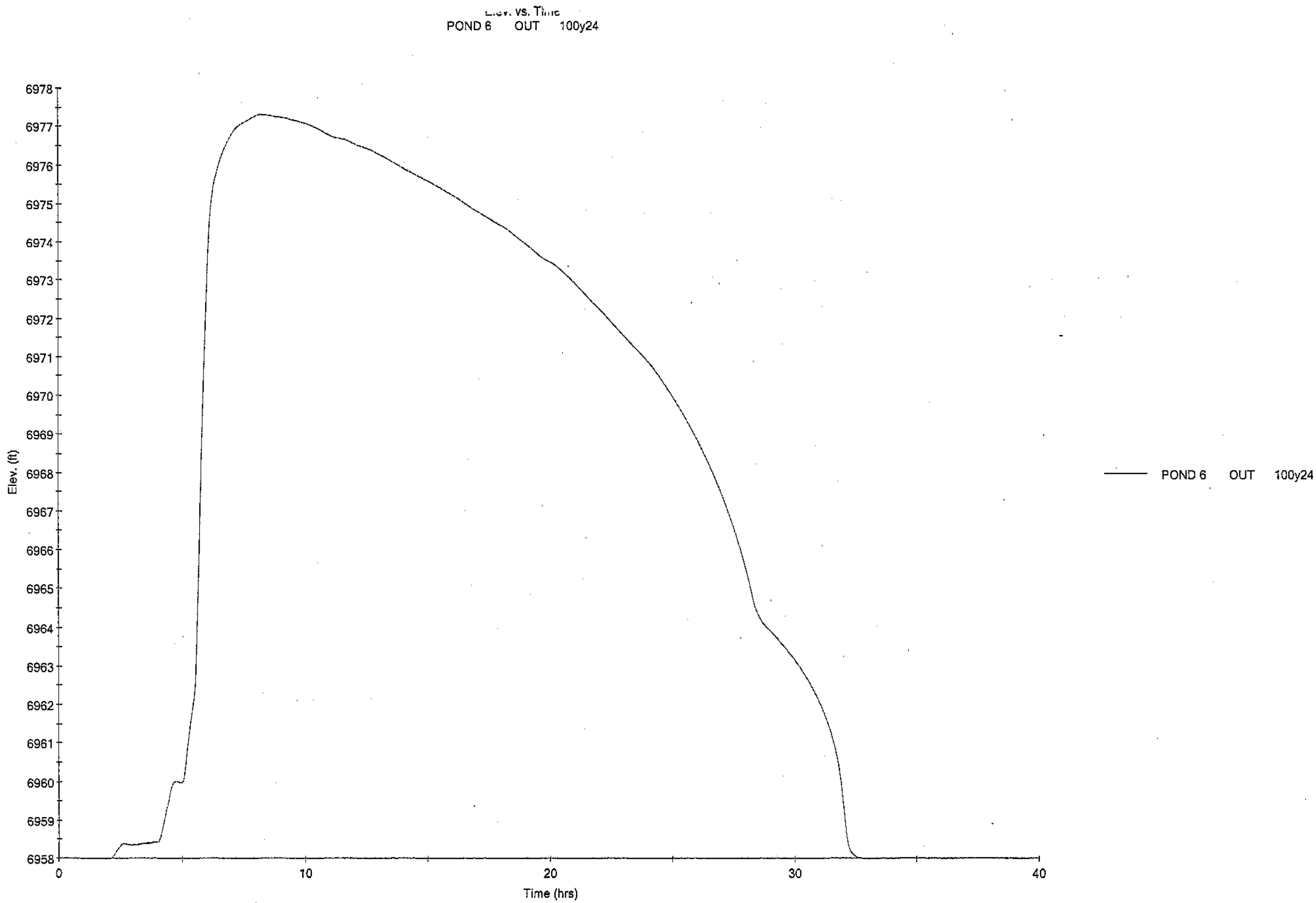
Volume vs. Time
POND 6 OUT 100y24

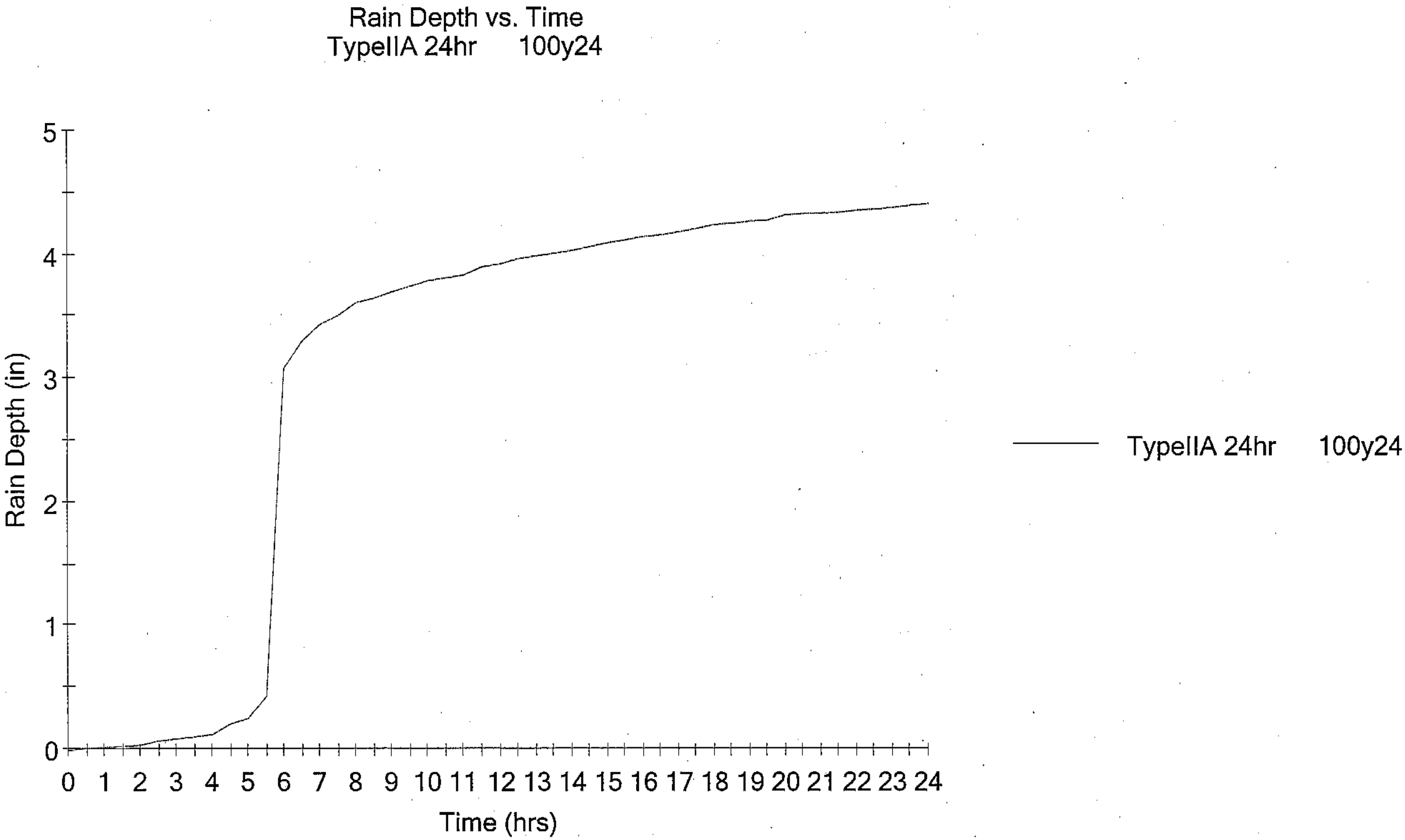




Elev. vs. Flow
Outlet 1
Elev. (ft)
6980
6979
6978
6977
6976
6975
6974
6973
6972
6971
6970
6969
6968
6967
6966
6965
6964
6963
6962
6961
6960
6959
6958
0
10
20
30
40
50
60
70
80
Flow (cfs)
Outlet 1


Elev. vs. Area Surface
POND 6
Elev. (ft)
6980
6979
6978
6977
6976
6975
6974
6973
6972
6971
6970
6969
6968
6967
6966
6965
6964
6963
6962
6961
6960
6959
6958
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Area Surface (acres)
POND 6


Elev. vs. Time
POND 6 OUT 100y24
Elev. (ft)
6978
6977
6976
6975
6974
6973
6972
6971
6970
6969
6968
6967
6966
6965
6964
6963
6962
6961
6960
6959
6958
0
10
20
30
40
Time (hrs)
POND 6 OUT 100y24


Rain Depth vs. Time
TypeIIA 24hr 100y24
Rain Depth (in)
0
1
2
3
4
5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hrs)
TypeIIA 24hr 100y24

=========================
JOB TITLE
=========================

Project Date: 12/22/2005
Project Engineer: Benjamin E. Sheets
Project Title: Woodmen Heights - Forest Meadows Final Drainage Report
Project Comments:
INTERIM CONDITIONS

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MASTER DESIGN STORM SUMMARY

Network Storm Collection: El Paso County

Return Event	Total Depth in	Rainfall Type	RNF ID
100y24	4.4000	Synthetic Curve	TypeIIA 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
A1 EAST	AREA	100	3.755		6.1500	47.34		
A1 MIDDLE	AREA	100	5.823		6.0500	87.86		
A1 WEST	AREA	100	6.115		6.0500	93.21		
A2 EAST	AREA	100	6.197		6.0500	98.06		
A2 WEST	AREA	100	4.680		6.0500	74.32		
A3 EAST	AREA	100	5.885		6.0500	91.18		
A3 SOUTH	AREA	100	2.463		6.0000	46.20		
A3 WEST	AREA	100	5.271		6.0500	86.91		
DIRECT POND	AREA	100	1.475		6.0000	30.74		
GELLES	AREA	100	4.818		6.0000	81.93		
JUNC 10	JCT	100	16.423		6.0000	263.68		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
JUNC 11	JCT	100	85.773		6.0500	949.00		
JUNC 13	JCT	100	8.031		6.0000	132.11		
JUNC 14	JCT	100	11.278		6.0000	178.93		
JUNC 2	JCT	100	35.818		6.1500	179.39		
JUNC 3	JCT	100	36.494		6.1000	186.57		
JUNC 4	JCT	100	8.467		6.0000	129.22		
JUNC 5	JCT	100	48.120		6.0500	351.93		
JUNC 6	JCT	100	16.820		6.0500	269.41		
JUNC 7	JCT	100	64.939		6.0500	621.34		
JUNC 9	JCT	100	13.960		6.0500	222.18		
MDDP OS-A	AREA	100	5.942		6.0500	97.03		
MDDP 7 AND 13	AREA	100	13.026		6.0000	216.22		
MDDP OS-1 EDITCH	AREA	100	26.241		6.7500	137.96		
MDDP OS-B	AREA	100	3.213		6.0000	50.18		
O AND R BFR	AREA	100	7.773		6.0000	117.04		
O AND R DD	AREA	100	2.804		6.0000	44.73		
O AND R FF	AREA	100	3.505		6.0000	61.88		
O AND R FM FLOWS	AREA	100	4.442		6.0000	64.75		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
O AND R GG	AREA	100	4.411		6.0000	72.95		
O AND R VMR COW	AREA	100	3.159		6.0000	50.65		
*OUTFALL	JCT	100	124.026		8.2000	69.11		
PARK	AREA	100	.676		6.0500	11.64		
POND 6 IN	POND	100	124.026		6.0000	1553.46		
POND 6 OUT	POND	100	124.026		8.2000	69.11	6977.31	74.417
SCHOOL	AREA	100	2.352		6.0000	41.85		

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID =   El Paso County

Storm Tag Name   = 100y24

Data Type, File, ID = Synthetic Storm   TypeIIA 24hr
Storm Frequency   = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration   = 24.0000 hrs
Resulting Start Time= .0000 hrs   Step= .5000 hrs   End= 24.0000 hrs

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	A1 EAST	AREA	3.755		6.1500	47.34	
	A1 MIDDLE	AREA	5.823		6.0500	87.86	
	A1 WEST	AREA	6.115		6.0500	93.21	
	A2 EAST	AREA	6.197		6.0500	98.06	
	A2 WEST	AREA	4.680		6.0500	74.32	
	A3 EAST	AREA	5.885		6.0500	91.18	
	A3 SOUTH	AREA	2.463		6.0000	46.20	
	A3 WEST	AREA	5.271		6.0500	86.91	
	DIRECT POND	AREA	1.475		6.0000	30.74	
	GELLES	AREA	4.818		6.0000	81.93	
	JUNC 10	JCT	16.423		6.0000	263.68	
	JUNC 11	JCT	85.773		6.0500	949.00	
	JUNC 13	JCT	8.031		6.0000	132.11	
	JUNC 14	JCT	11.278		6.0000	178.93	
	JUNC 2	JCT	35.818		6.1500	179.39	
	JUNC 3	JCT	36.494		6.1000	186.57	
	JUNC 4	JCT	8.467		6.0000	129.22	
	JUNC 5	JCT	48.120		6.0500	351.93	
	JUNC 6	JCT	16.820		6.0500	269.41	
	JUNC 7	JCT	64.939		6.0500	621.34	
	JUNC 9	JCT	13.960		6.0500	222.18	
	MDDP OS-A	AREA	5.942		6.0500	97.03	
	MDDP 7 AND 13	AREA	13.026		6.0000	216.22	
	MDDP OS-1 EDITCH	AREA	26.241		6.7500	137.96	
	MDDP OS-B	AREA	3.213		6.0000	50.18	
	O AND R BFR	AREA	7.773		6.0000	117.04	
	O AND R DD	AREA	2.804		6.0000	44.73	
	O AND R FF	AREA	3.505		6.0000	61.88	
	O AND R FM FLOWS	AREA	4.442		6.0000	64.75	
	O AND R GG	AREA	4.411		6.0000	72.95	
	O AND R VMR COW	AREA	3.159		6.0000	50.65	
Outfall	OUTFALL	JCT	124.026		8.2000	69.11	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
PARK		AREA	.676		6.0500	11.64	
POND 6	IN	POND	124.026		6.0000	1553.46	
POND 6	OUT	POND	124.026		8.2000	69.11	6977.31
SCHOOL		AREA	2.352		6.0000	41.85	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = 100y24

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
ADDLINK 120	ADD	UN	13.960		6.0500	222.18	JUNC 9
		DL	13.960		6.0500	222.18	
		DN	16.423		6.0000	263.68	JUNC 10
DIRECT 1	ADD	UN	1.475		6.0000	30.74	DIRECT POND
		DL	1.475		6.0000	30.74	
		DN	124.026		6.0000	1553.46	POND 6 IN
P1	ADD	UN	26.241		6.7500	137.96	MDDP OS-1 EDITCH
		DL	26.241		6.7500	137.96	
		DN	35.818		6.1500	179.39	JUNC 2
P10	ADD	UN	2.352		6.0000	41.85	SCHOOL
		DL	2.352		6.0000	41.85	
		DN	8.467		6.0000	129.22	JUNC 4
P11	ADD	UN	8.467		6.0000	129.22	JUNC 4
		DL	8.467		6.0000	129.22	
		DN	48.120		6.0500	351.93	JUNC 5
P12	ADD	UN	48.120		6.0500	351.93	JUNC 5
		DL	48.120		6.0500	351.93	
		DN	64.939		6.0500	621.34	JUNC 7
P13	ADD	UN	5.942		6.0500	97.03	MDDP OS-A
		DL	5.942		6.0500	97.03	
		DN	16.820		6.0500	269.41	JUNC 6

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
P14	ADD	UN	4.680		6.0500	74.32	A2 WEST
		DL	4.680		6.0500	74.32	
		DN	16.820		6.0500	269.41	JUNC 6
P15	ADD	UN	6.197		6.0500	98.06	A2 EAST
		DL	6.197		6.0500	98.06	
		DN	16.820		6.0500	269.41	JUNC 6
P16	ADD	UN	16.820		6.0500	269.41	JUNC 6
		DL	16.820		6.0500	269.41	
		DN	64.939		6.0500	621.34	JUNC 7
P17	ADD	UN	64.939		6.0500	621.34	JUNC 7
		DL	64.939		6.0500	621.34	
		DN	85.773		6.0500	949.00	JUNC 11
P18	ADD	UN	4.411		6.0000	72.95	O AND R GG
		DL	4.411		6.0000	72.95	
		DN	85.773		6.0500	949.00	JUNC 11
P19	ADD	UN	5.271		6.0500	86.91	A3 WEST
		DL	5.271		6.0500	86.91	
		DN	13.960		6.0500	222.18	JUNC 9
P2	ADD	UN	3.755		6.1500	47.34	A1 EAST
		DL	3.755		6.1500	47.34	
		DN	35.818		6.1500	179.39	JUNC 2
P20	ADD	UN	2.804		6.0000	44.73	O AND R DD
		DL	2.804		6.0000	44.73	
		DN	13.960		6.0500	222.18	JUNC 9
P21	ADD	UN	5.885		6.0500	91.18	A3 EAST
		DL	5.885		6.0500	91.18	
		DN	13.960		6.0500	222.18	JUNC 9
P22	ADD	UN	2.463		6.0000	46.20	A3 SOUTH
		DL	2.463		6.0000	46.20	
		DN	16.423		6.0000	263.68	JUNC 10

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
P23	ADD	UN	16.423		6.0000	263.68	JUNC 10	
		DL	16.423		6.0000	263.68		
		DN	85.773		6.0500	949.00	JUNC 11	
P24	ADD	UN	85.773		6.0500	949.00	JUNC 11	
		DL	85.773		6.0500	949.00		
		DN	124.026		6.0000	1553.46	POND 6	IN
P28	ADD	UN	4.818		6.0000	81.93	GELLES	
		DL	4.818		6.0000	81.93		
		DN	8.031		6.0000	132.11	JUNC 13	
P29	ADD	UN	3.213		6.0000	50.18	MDDP OS-B	
		DL	3.213		6.0000	50.18		
		DN	8.031		6.0000	132.11	JUNC 13	
P30	ADD	UN	8.031		6.0000	132.11	JUNC 13	
		DL	8.031		6.0000	132.11		
		DN	124.026		6.0000	1553.46	POND 6	IN
P31	ADD	UN	7.773		6.0000	117.04	O AND R BFR	
		DL	7.773		6.0000	117.04		
		DN	11.278		6.0000	178.93	JUNC 14	
P32	ADD	UN	3.505		6.0000	61.88	O AND R FF	
		DL	3.505		6.0000	61.88		
		DN	11.278		6.0000	178.93	JUNC 14	
P33	ADD	UN	11.278		6.0000	178.93	JUNC 14	
		DL	11.278		6.0000	178.93		
		DN	124.026		6.0000	1553.46	POND 6	IN
P34	ADD	UN	4.442		6.0000	64.75	O AND R FM FLOWS	
		DL	4.442		6.0000	64.75		
		DN	124.026		6.0000	1553.46	POND 6	IN
P35	ADD	UN	13.026		6.0000	216.22	MDDP 7 AND 13	
		DL	13.026		6.0000	216.22		
		DN	124.026		6.0000	1553.46	POND 6	IN

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
P5	ADD	UN	5.823		6.0500	87.86	A1 MIDDLE	
		DL	5.823		6.0500	87.86		
		DN	35.818		6.1500	179.39	JUNC 2	
P6	ADD	UN	35.818		6.1500	179.39	JUNC 2	
		DL	35.818		6.1500	179.39		
		DN	36.494		6.1000	186.57	JUNC 3	
P7	ADD	UN	.676		6.0500	11.64	PARK	
		DL	.676		6.0500	11.64		
		DN	36.494		6.1000	186.57	JUNC 3	
P8	ADD	UN	36.494		6.1000	186.57	JUNC 3	
		DL	36.494		6.1000	186.57		
		DN	48.120		6.0500	351.93	JUNC 5	
P8A	ADD	UN	3.159		6.0000	50.65	O AND R VMR COW	
		DL	3.159		6.0000	50.65		
		DN	48.120		6.0500	351.93	JUNC 5	
P9	ADD	UN	6.115		6.0500	93.21	A1 WEST	
		DL	6.115		6.0500	93.21		
		DN	8.467		6.0000	129.22	JUNC 4	
ROUTE 4	PONDrt	UN	124.026		6.0000	1553.46	POND 6	IN
ROUTE 4			124.026		8.2000	69.11	POND 6	OUT
		DL	124.026		8.2000	69.11		
		DN	124.026		8.2000	69.11	OUTFALL	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data		Apply to Node		Receiving Link	
SCS UH	MDDP OS-1 EDITCH	Subarea	MDDP OS-1 EDITCH	Add Hyd	MDDP OS-1 EDITCH
SCS UH	A1 MIDDLE	Subarea	A1 MIDDLE	Add Hyd	A1 MIDDLE
SCS UH	PARK	Subarea	PARK	Add Hyd	PARK
SCS UH	SCHOOL	Subarea	SCHOOL	Add Hyd	SCHOOL
SCS UH	A1 WEST	Subarea	A1 WEST	Add Hyd	A1 WEST
SCS UH	A2 EAST	Subarea	A2 EAST	Add Hyd	A2 EAST
SCS UH	A2 WEST	Subarea	A2 WEST	Add Hyd	A2 WEST
SCS UH	A3 WEST	Subarea	A3 WEST	Add Hyd	A3 WEST
SCS UH	O AND R DD	Subarea	O AND R DD	Add Hyd	O AND R DD
SCS UH	A3 EAST	Subarea	A3 EAST	Add Hyd	A3 EAST
SCS UH	A3 SOUTH	Subarea	A3 SOUTH	Add Hyd	A3 SOUTH
SCS UH	O AND R GG	Subarea	O AND R GG	Add Hyd	O AND R GG
SCS UH	O AND R FM FLOWS	Subarea	O AND R FM FLOWS	Add Hyd	O AND R FM FLOWS
SCS UH	O AND R FF	Subarea	O AND R FF	Add Hyd	O AND R FF
SCS UH	O AND R BFR	Subarea	O AND R BFR	Add Hyd	O AND R BFR
SCS UH	MDDP 7 AND 13	Subarea	MDDP 7 AND 13	Add Hyd	MDDP 7 AND 13
SCS UH	DIRECT POND	Subarea	DIRECT POND	Add Hyd	DIRECT POND
SCS UH	GELLES	Subarea	GELLES	Add Hyd	GELLES
SCS UH	O AND R VMR COW	Subarea	O AND R VMR COW	Add Hyd	O AND R VMR COW
SCS UH	MDDP OS-A	Subarea	MDDP OS-A	Add Hyd	MDDP OS-A
SCS UH	MDDP OS-B	Subarea	MDDP OS-B	Add Hyd	MDDP OS-B
SCS UH	A1 EAST	Subarea	A1 EAST	Add Hyd	A1 EAST

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd P5	Subarea	A1 MIDDLE		Jct	JUNC 2	
Add Hyd P2	Subarea	A1 EAST		Jct	JUNC 2	
Add Hyd P1	Subarea	MDDP OS-1 EDITCH		Jct	JUNC 2	
Add Hyd P6	Jct	JUNC 2		Jct	JUNC 3	
Add Hyd P7	Subarea	PARK		Jct	JUNC 3	
Add Hyd P10	Subarea	SCHOOL		Jct	JUNC 4	
Add Hyd P9	Subarea	A1 WEST		Jct	JUNC 4	
Add Hyd P20	Subarea	O AND R DD		Jct	JUNC 9	
Add Hyd P19	Subarea	A3 WEST		Jct	JUNC 9	
Add Hyd P21	Subarea	A3 EAST		Jct	JUNC 9	
Add Hyd P8A	Subarea	O AND R VMR COW		Jct	JUNC 5	
Add Hyd P11	Jct	JUNC 4		Jct	JUNC 5	
Add Hyd P8	Jct	JUNC 3		Jct	JUNC 5	
Add Hyd P14	Subarea	A2 WEST		Jct	JUNC 6	
Add Hyd P15	Subarea	A2 EAST		Jct	JUNC 6	
Add Hyd P13	Subarea	MDDP OS-A		Jct	JUNC 6	
Add Hyd P22	Subarea	A3 SOUTH		Jct	JUNC 10	
Add Hyd ADDLINK 120	Jct	JUNC 9		Jct	JUNC 10	
Add Hyd P16	Jct	JUNC 6		Jct	JUNC 7	
Add Hyd P12	Jct	JUNC 5		Jct	JUNC 7	
Add Hyd P18	Subarea	O AND R GG		Jct	JUNC 11	
Add Hyd P17	Jct	JUNC 7		Jct	JUNC 11	
Add Hyd P23	Jct	JUNC 10		Jct	JUNC 11	
Add Hyd P32	Subarea	O AND R FF		Jct	JUNC 14	
Add Hyd P31	Subarea	O AND R BFR		Jct	JUNC 14	
Add Hyd P28	Subarea	GELLES		Jct	JUNC 13	
Add Hyd P29	Subarea	MDDP OS-B		Jct	JUNC 13	
Add Hyd P35	Subarea	MDDP 7 AND 13		Pond	POND 6	IN
Add Hyd P30	Jct	JUNC 13		Pond	POND 6	IN
Add Hyd P33	Jct	JUNC 14		Pond	POND 6	IN
Add Hyd P24	Jct	JUNC 11		Pond	POND 6	IN
Add Hyd P34	Subarea	O AND R FM FLOWS		Pond	POND 6	IN
Add Hyd DIRECT 1	Subarea	DIRECT POND		Pond	POND 6	IN
POND ROUTE TOTAL OUTFLOW...						
Total Pond Outflow	Pond	POND 6	IN	Outflow	POND 6	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 4	Outflow	POND 6	OUT	Jct	OUTFALL	

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Title... Project Date: 12/22/2005
Project Engineer: Benjamin E. Sheets
Project Title: Woodmen Heights - Forest Meadows
Final Drainage Report
Project Comments:
INTERIM CONDITIONS

DESIGN STORMS SUMMARY

Design Storm File,ID = El Paso County

Storm Tag Name = 100y24

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

```
                DESIGN STORMS SUMMARY

 Design Storm File,ID =               El Paso County


 Storm Tag Name       = 100y24
 ----------------------------------------------------------------------
 Data Type, File, ID = Synthetic Storm    TypeIIA 24hr
 Storm Frequency     = 100 yr
 Total Rainfall Depth= 4.4000 in
 Duration Multiplier =  1
 Resulting Duration  = 24.0000 hrs
 Resulting Start Time= .0000 hrs  Step= .5000 hrs  End= 24.0000 hrs
```

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

DEFINITION OF TERMS: ---

```
At      = Total area (acres):  At = Ai+Ap
Ai      = Impervious area (acres)
Ap      = Pervious area (acres)
CNi     = Runoff curve number for impervious area
CNp     = Runoff curve number for pervious area
fLoss   = f loss constant infiltration (depth/time)
gKs     = Saturated Hydraulic Conductivity (depth/time)
Md      = Volumetric Moisture Deficit
Psi     = Capillary Suction (length)
hK      = Horton Infiltration Decay Rate (time^-1)
fo      = Initial Infiltration Rate (depth/time)
fc      = Ultimate(capacity)Infiltration Rate (depth/time)
Ia      = Initial Abstraction (length)
dt      = Computational increment (duration of unit excess rainfall)
          Default dt is smallest value of 0.1333Tc, rtm, and th
          (Smallest dt is then adjusted to match up with Tp)
UDdt    = User specified override computational main time increment
          (only used if UDdt is => .1333Tc)
D(t)    = Point on distribution curve (fraction of P) for time step t

K       = 2 / (1 + (Tr/Tp)):  default K = 0.75: (for Tr/Tp = 1.67)
Ks      = Hydrograph shape factor
        = Unit Conversions * K:
        = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K
          Default Ks = 645.333 * 0.75 = 484

Lag     = Lag time from center of excess runoff (dt) to Tp:  Lag = 0.6Tc
P       = Total precipitation depth, inches
Pa(t)   = Accumulated rainfall at time step t
Pi(t)   = Incremental rainfall at time step t
qp      = Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi.
        = (Ks * A * Q) / Tp   (where Q = 1in. runoff, A=sq.mi.)
Qu(t)   = Unit hydrograph ordinate (cfs) at time step t
Q(t)    = Final hydrograph ordinate (cfs) at time step t
Rai(t)= Accumulated runoff (inches) at time step t for impervious area
Rap(t)= Accumulated runoff (inches) at time step t for pervious area
Rii(t)= Incremental runoff (inches) at time step t for impervious area
Rip(t)= Incremental runoff (inches) at time step t for pervious area
R(t)    = Incremental weighted total runoff (inches)
Rtm     = Time increment for rainfall table
Si      = S for impervious area:  Si = (1000/CNi) - 10
Sp      = S for pervious area:    Sp = (1000/CNp) - 10
t       = Time step (row) number
Tc      = Time of concentration
Tb      = Time (hrs) of entire unit hydrograph:  Tb = Tp + Tr
Tp      = Time (hrs) to peak of a unit hydrograph:  Tp = (dt/2) + Lag
Tr      = Time (hrs) of receding limb of unit hydrograph:  Tr = ratio of Tp
```

```
                    SCS UNIT HYDROGRAPH METHOD
                      (Computational Notes)

PRECIPITATION: ---------------------------------------------------------
Column (1):  Time for time step t
Column (2):  D(t)  = Point on distribution curve for time step t
Column (3):  Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4):  Pa(t) = D(t) x P:        Col.(2) x P


PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) ----------------------
Column (5):  Rap(t) = Accumulated pervious runoff for time step t
             If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
             If (Pa(t) is >  0.2Sp) then use:

             Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6):  Rip(t) = Incremental pervious runoff for time step t
             Rip(t) =          Rap(t)          -         Rap(t-1)
             Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF -------------------------------------------------
Column (7 & 8)... Did not specify to use impervious areas.


INCREMENTAL WEIGHTED RUNOFF: -------------------------------------------
Column (9):  R(t)  = (Ap/At) x Rip(t)   +  (Ai/At) x Rii(t)
             R(t)  = (Ap/At) x Col.(6)  +  (Ai/At) x Col.(8)


SCS UNIT HYDROGRAPH METHOD: --------------------------------------------
Column (10): Q(t)    is computed with the SCS unit hydrograph method
                     using R() and Qu().
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A1 EAST 100y24
Tc             = .4630 hrs
Drainage Area = 18.300 acres  Runoff CN= 81

============================================
Computational Time Increment   =    .06173 hrs
Computed Peak Time             =   6.1116 hrs
Computed Peak Flow             =    47.53 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.1500 hrs
Peak Flow, Interpolated Output =    47.34 cfs
============================================

              DRAINAGE AREA
              -------------------
              ID:A1 EAST
              CN   =   81
              Area =       18.300 acres
              S    =   2.3457 in
              0.2S =    .4691 in

              Cumulative Runoff
              -------------------
                      2.4618 in
                       3.754 ac-ft

HYG Volume...          3.755 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .46300 hrs (ID: A1 EAST)
Computational Incr, Tm =   .06173 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =      .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =    44.78 cfs
Unit peak time       Tp =   .30867 hrs
Unit receding limb, Tr =  1.23467 hrs
Total unit time,     Tb =  1.54333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A1 MIDDLE 100y24
Tc             = .3150 hrs
Drainage Area = 29.400 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .04200 hrs
Computed Peak Time             =   6.0900 hrs
Computed Peak Flow             =    88.35 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    87.86 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:A1 MIDDLE
             CN   =   80
             Area =       29.400 acres
             S    =   2.5000 in
             0.2S =    .5000 in

              Cumulative Runoff
             -------------------
                     2.3766 in
                      5.823 ac-ft

HYG Volume...         5.823 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .31500 hrs (ID: A1 MIDDLE)
Computational Incr, Tm =   .04200 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =   105.75 cfs
Unit peak time       Tp =   .21000 hrs
Unit receding limb,  Tr =   .84000 hrs
Total unit time,     Tb =  1.05000 hrs
```

```
              SCS UNIT HYDROGRAPH METHOD

              STORM EVENT: 100 year storm
              Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
              Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
              Rain File -ID =  - TypeIIA 24hr
              Unit Hyd Type = Default Curvilinear
              HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
              HYG File - ID =  - A1 WEST 100y24
              Tc            = .3070 hrs
              Drainage Area = 29.800 acres  Runoff CN= 81

              ============================================
              Computational Time Increment   =   .04093 hrs
              Computed Peak Time             =   6.0581 hrs
              Computed Peak Flow             =    93.93 cfs

              Time Increment for HYG File    =    .0500 hrs
              Peak Time, Interpolated Output =   6.0500 hrs
              Peak Flow, Interpolated Output =    93.21 cfs
              ============================================

                            DRAINAGE AREA
                         -------------------
                         ID:A1 WEST
                         CN    =    81
                         Area  =       29.800 acres
                         S     =    2.3457 in
                         0.2S  =     .4691 in

                          Cumulative Runoff
                         -------------------
                                 2.4618 in
                                  6.114 ac-ft

              HYG Volume...          6.115 ac-ft (area under HYG curve)

              ***** SCS UNIT HYDROGRAPH PARAMETERS *****

              Time Concentration, Tc =    .30700 hrs (ID: A1 WEST)
              Computational Incr, Tm =    .04093 hrs = 0.20000 Tp

              Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
              K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
              Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

              Unit peak,          qp =   109.98 cfs
              Unit peak time      Tp =   .20467 hrs
              Unit receding limb, Tr =   .81867 hrs
              Total unit time,    Tb =  1.02333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - A2 EAST 100y24
Tc             = .2820 hrs
Drainage Area  = 28.200 acres  Runoff CN= 83

============================================
Computational Time Increment  =   .03760 hrs
Computed Peak Time            =   6.0536 hrs
Computed Peak Flow            =    98.27 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0500 hrs
Peak Flow, Interpolated Output =   98.06 cfs
============================================

                 DRAINAGE AREA
             -------------------
             ID:A2 EAST
             CN   =    83
             Area =       28.200 acres
             S    =    2.0482 in
             0.2S =     .4096 in

              Cumulative Runoff
             -------------------
                     2.6369 in
                      6.197 ac-ft

HYG Volume...          6.197 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28200 hrs (ID: A2 EAST)
Computational Incr, Tm =   .03760 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   113.30 cfs
Unit peak time      Tp =   .18800 hrs
Unit receding limb, Tr =   .75200 hrs
Total unit time,    Tb =   .94000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs    Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - A2 WEST 100y24
Tc             = .2800 hrs
Drainage Area  = 21.300 acres  Runoff CN= 83

============================================
Computational Time Increment    =    .03733 hrs
Computed Peak Time              =    6.0480 hrs
Computed Peak Flow              =     74.41 cfs

Time Increment for HYG File     =     .0500 hrs
Peak Time, Interpolated Output  =    6.0500 hrs
Peak Flow, Interpolated Output  =     74.32 cfs
============================================

                  DRAINAGE AREA
                -------------------
                ID:A2 WEST
                CN    =    83
                Area  =        21.300 acres
                S     =    2.0482 in
                0.2S  =     .4096 in

                 Cumulative Runoff
                -------------------
                        2.6369 in
                         4.680 ac-ft

HYG Volume...            4.680 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .28000 hrs (ID: A2 WEST)
Computational Incr, Tm =    .03733 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =    1.6698 (solved from K =   .7491)

Unit peak,          qp =     86.19 cfs
Unit peak time      Tp =    .18667 hrs
Unit receding limb, Tr =    .74667 hrs
Total unit time,    Tb =    .93333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A3 EAST 100y24
Tc             = .3020 hrs
Drainage Area = 25.900 acres  Runoff CN= 84

============================================
Computational Time Increment    =   .04027 hrs
Computed Peak Time              =   6.0803 hrs
Computed Peak Flow              =    91.22 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    91.18 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:A3 EAST
             CN   =   84
             Area =       25.900 acres
             S    =   1.9048 in
             0.2S =    .3810 in

             Cumulative Runoff
             -------------------
                    2.7267 in
                     5.885 ac-ft

HYG Volume...          5.885 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .30200 hrs (ID: A3 EAST)
Computational Incr, Tm =   .04027 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =    97.17 cfs
Unit peak time       Tp =   .20133 hrs
Unit receding limb, Tr =   .80533 hrs
Total unit time,     Tb =  1.00667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - A3 SOUTH 100y24
Tc             = .1020 hrs
Drainage Area  = 11.600 acres  Runoff CN= 82

============================================
Computational Time Increment      =   .01360 hrs
Computed Peak Time                =   5.9976 hrs
Computed Peak Flow                =    46.20 cfs

Time Increment for HYG File       =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    46.20 cfs
============================================

                  DRAINAGE AREA
              -------------------
              ID:A3 SOUTH
              CN   =   82
              Area =       11.600 acres
              S    =   2.1951 in
              0.2S =    .4390 in

               Cumulative Runoff
              -------------------
                      2.5486 in
                       2.464 ac-ft

HYG Volume...           2.463 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10200 hrs (ID: A3 SOUTH)
Computational Incr, Tm =   .01360 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   128.86 cfs
Unit peak time      Tp =   .06800 hrs
Unit receding limb, Tr =   .27200 hrs
Total unit time,    Tb =   .34000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A3 WEST 100y24
Tc            = .2380 hrs
Drainage Area = 23.200 acres  Runoff CN= 84

============================================
Computational Time Increment   =   .03173 hrs
Computed Peak Time             =   6.0293 hrs
Computed Peak Flow             =    87.67 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    86.91 cfs
============================================

                  DRAINAGE AREA
             -------------------
             ID:A3 WEST
             CN   =   84
             Area =      23.200 acres
             S    =   1.9048 in
             0.2S =    .3810 in

               Cumulative Runoff
             -------------------
                     2.7267 in
                      5.272 ac-ft

HYG Volume...         5.271 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .23800 hrs (ID: A3 WEST)
Computational Incr, Tm =   .03173 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   110.45 cfs
Unit peak time      Tp =   .15867 hrs
Unit receding limb, Tr =   .63467 hrs
Total unit time,    Tb =   .79333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - DIRECT POND 100y24
Tc (Min. Tc)  = .0833 hrs
Drainage Area = 17.300 acres  Runoff CN= 61

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time             =   6.0087 hrs
Computed Peak Flow             =    31.14 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    30.74 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:DIRECT POND
              CN   =   61
              Area =      17.300 acres
              S    =   6.3934 in
              0.2S =   1.2787 in

               Cumulative Runoff
              -------------------
                      1.0239 in
                       1.476 ac-ft

HYG Volume...          1.475 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08330 hrs (ID: DIRECT POND)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   235.31 cfs
Unit peak time      Tp =   .05553 hrs
Unit receding limb, Tr =   .22213 hrs
Total unit time,    Tb =   .27767 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - GELLES 100y24
Tc (Min. Tc)  = .0833 hrs
Drainage Area = 16.500 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time             =   5.9976 hrs
Computed Peak Flow             =    82.08 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    81.93 cfs
============================================

             DRAINAGE AREA
             -------------------
             ID:GELLES
             CN    =    92
             Area =        16.500 acres
             S     =     .8696 in
             0.2S =     .1739 in

              Cumulative Runoff
             -------------------
                     3.5049 in
                      4.819 ac-ft

HYG Volume...          4.818 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08330 hrs (ID: GELLES)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =   224.43 cfs
Unit peak time       Tp =   .05553 hrs
Unit receding limb, Tr =   .22213 hrs
Total unit time,     Tb =   .27767 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - MDDP OS-A 100y24
Tc            = .2550 hrs
Drainage Area = 30.000 acres  Runoff CN= 80

========================================
Computational Time Increment   =   .03400 hrs
Computed Peak Time             =   6.0520 hrs
Computed Peak Flow             =    97.13 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    97.03 cfs
========================================

                DRAINAGE AREA
             ------------------
             ID:MDDP OS-A
             CN   =   80
             Area =       30.000 acres
             S    =   2.5000 in
             0.2S =    .5000 in

              Cumulative Runoff
             ------------------
                    2.3766 in
                     5.941 ac-ft

HYG Volume...           5.942 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .25500 hrs (ID: MDDP OS-A)
Computational Incr, Tm =   .03400 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   133.30 cfs
Unit peak time      Tp =   .17000 hrs
Unit receding limb, Tr =   .68000 hrs
Total unit time,    Tb =   .85000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - MDDP 7 AND 13 100y24
Tc             = .1670 hrs
Drainage Area = 44.600 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .02227 hrs
Computed Peak Time             =   6.0120 hrs
Computed Peak Flow             =   216.26 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =   216.22 cfs
============================================

              DRAINAGE AREA
            ------------------
            ID:MDDP 7 AND 13
            CN   =    92
            Area =       44.600 acres
            S    =     .8696 in
            0.2S =     .1739 in

             Cumulative Runoff
            ------------------
                   3.5049 in
                   13.027 ac-ft

HYG Volume...          13.026 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16700 hrs (ID: MDDP 7 AND 13)
Computational Incr, Tm =   .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   302.60 cfs
Unit peak time      Tp =   .11133 hrs
Unit receding limb, Tr =   .44533 hrs
Total unit time,    Tb =   .55667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - MDDP OS-1 EDITCH 100y24
Tc             = 1.2660 hrs
Drainage Area = 214.900 acres  Runoff CN= 68

============================================
Computational Time Increment   =   .16880 hrs
Computed Peak Time             =   6.7520 hrs
Computed Peak Flow             =   137.99 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.7500 hrs
Peak Flow, Interpolated Output =   137.96 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:MDDP OS-1 EDITCH
              CN   =   68
              Area =      214.900 acres
              S    =   4.7059 in
              0.2S =    .9412 in

               Cumulative Runoff
              -------------------
                      1.4653 in
                      26.240 ac-ft

HYG Volume...         26.241 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =  1.26600 hrs (ID: MDDP OS-1 EDITCH)
Computational Incr, Tm =   .16880 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   192.33 cfs
Unit peak time      Tp =   .84400 hrs
Unit receding limb, Tr =  3.37600 hrs
Total unit time,    Tb =  4.22000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - MDDP OS-B 100y24
Tc             = .2620 hrs
Drainage Area  = 11.000 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03493 hrs
Computed Peak Time             =   6.0085 hrs
Computed Peak Flow             =    50.46 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    50.18 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:MDDP OS-B
              CN   =   92
              Area =      11.000 acres
              S    =     .8696 in
              0.2S =     .1739 in

                Cumulative Runoff
              -------------------
                      3.5049 in
                       3.213 ac-ft

HYG Volume...          3.213 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26200 hrs (ID: MDDP OS-B)
Computational Incr, Tm =   .03493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    47.57 cfs
Unit peak time      Tp =   .17467 hrs
Unit receding limb, Tr =   .69867 hrs
Total unit time,    Tb =   .87333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R BFR 100y24
Tc             = .2080 hrs
Drainage Area = 22.400 acres  Runoff CN= 98

============================================
Computational Time Increment  =   .02773 hrs
Computed Peak Time            =   5.9904 hrs
Computed Peak Flow            =   117.27 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =  117.04 cfs
============================================

              DRAINAGE AREA
           -------------------
           ID:O AND R BFR
           CN   =   98
           Area =       22.400 acres
           S    =     .2041 in
           0.2S =     .0408 in

             Cumulative Runoff
           -------------------
                   4.1642 in
                    7.773 ac-ft

HYG Volume...           7.773 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .20800 hrs (ID: O AND R BFR)
Computational Incr, Tm =   .02773 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =   122.02 cfs
Unit peak time       Tp =   .13867 hrs
Unit receding limb,  Tr =   .55467 hrs
Total unit time,     Tb =   .69333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R DD 100y24
Tc             = .2350 hrs
Drainage Area = 9.600 acres  Runoff CN= 92

============================================
Computational Time Increment    =    .03133 hrs
Computed Peak Time              =   6.0160 hrs
Computed Peak Flow              =    45.00 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    44.73 cfs
============================================

              DRAINAGE AREA
              -------------------
              ID:O AND R DD
              CN   =    92
              Area =        9.600 acres
              S    =     .8696 in
              0.2S =     .1739 in

              Cumulative Runoff
              -------------------
                     3.5049 in
                      2.804 ac-ft

HYG Volume...           2.804 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .23500 hrs (ID: O AND R DD)
Computational Incr, Tm =    .03133 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =      .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =    46.29 cfs
Unit peak time       Tp =   .15667 hrs
Unit receding limb, Tr =   .62667 hrs
Total unit time,     Tb =   .78333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - O AND R FF 100y24
Tc             = .1750 hrs
Drainage Area  = 17.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .02333 hrs
Computed Peak Time             =   6.0200 hrs
Computed Peak Flow             =    62.72 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    61.88 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:O AND R FF
              CN    =   80
              Area  =      17.700 acres
              S     =   2.5000 in
              0.2S  =    .5000 in

               Cumulative Runoff
              -------------------
                     2.3766 in
                      3.505 ac-ft

HYG Volume...           3.505 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .17500 hrs (ID: O AND R FF)
Computational Incr, Tm =   .02333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   114.60 cfs
Unit peak time      Tp =   .11667 hrs
Unit receding limb, Tr =   .46667 hrs
Total unit time,    Tb =   .58333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R FM FLOWS 100y24
Tc             = .2850 hrs
Drainage Area = 12.800 acres  Runoff CN= 98

============================================
Computational Time Increment   =    .03800 hrs
Computed Peak Time             =    6.0040 hrs
Computed Peak Flow             =     64.85 cfs

Time Increment for HYG File    =     .0500 hrs
Peak Time, Interpolated Output =    6.0000 hrs
Peak Flow, Interpolated Output =     64.75 cfs
============================================

              DRAINAGE AREA
            -------------------
            ID:O AND R FM FLOWS
            CN   =   98
            Area =      12.800 acres
            S    =     .2041 in
            0.2S =     .0408 in

             Cumulative Runoff
            -------------------
                   4.1642 in
                    4.442 ac-ft

HYG Volume...          4.442 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28500 hrs (ID: O AND R FM FLOWS)
Computational Incr, Tm =   .03800 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    50.89 cfs
Unit peak time      Tp =   .19000 hrs
Unit receding limb, Tr =   .76000 hrs
Total unit time,    Tb =   .95000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - O AND R GG 100y24
Tc             = .1780 hrs
Drainage Area = 15.100 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .02373 hrs
Computed Peak Time             =   6.0045 hrs
Computed Peak Flow             =    73.05 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    72.95 cfs
============================================

                   DRAINAGE AREA
                 -------------------
                 ID:O AND R GG
                 CN    =    92
                 Area =       15.100 acres
                 S     =     .8696 in
                 0.2S =      .1739 in

                  Cumulative Runoff
                 -------------------
                         3.5049 in
                          4.410 ac-ft

HYG Volume...            4.411 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .17800 hrs (ID: O AND R GG)
Computational Incr, Tm =    .02373 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =    96.12 cfs
Unit peak time       Tp =   .11867 hrs
Unit receding limb,  Tr =   .47467 hrs
Total unit time,     Tb =   .59333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R VMR COW 100y24
Tc            = .2170 hrs
Drainage Area = 10.500 acres  Runoff CN= 93

============================================
Computational Time Increment   =   .02893 hrs
Computed Peak Time             =   6.0181 hrs
Computed Peak Flow             =    50.77 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    50.65 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:O AND R VMR COW
             CN   =   93
             Area =      10.500 acres
             S    =     .7527 in
             0.2S =     .1505 in

              Cumulative Runoff
             -------------------
                    3.6100 in
                     3.159 ac-ft

HYG Volume...          3.159 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .21700 hrs (ID: O AND R VMR COW)
Computational Incr, Tm =   .02893 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    54.82 cfs
Unit peak time      Tp =   .14467 hrs
Unit receding limb, Tr =   .57867 hrs
Total unit time,    Tb =   .72333 hrs
```

SCS UNIT HYDROGRAPH METHOD

```
STORM EVENT: 100 year storm
Duration       = 24.0000 hrs    Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - PARK 100y24
Tc             = .1950 hrs
Drainage Area = 6.400 acres  Runoff CN= 65

============================================
Computational Time Increment   =   .02600 hrs
Computed Peak Time             =  6.0320 hrs
Computed Peak Flow             =   11.66 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =  6.0500 hrs
Peak Flow, Interpolated Output =   11.64 cfs
============================================

             DRAINAGE AREA
          -------------------
          ID:PARK
          CN   =    65
          Area =        6.400 acres
          S    =    5.3846 in
          0.2S =    1.0769 in

           Cumulative Runoff
          -------------------
                1.2682 in
                  .676 ac-ft

HYG Volume...            .676 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .19500 hrs (ID: PARK)
Computational Incr, Tm =   .02600 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    37.19 cfs
Unit peak time      Tp =   .13000 hrs
Unit receding limb, Tr =   .52000 hrs
Total unit time,    Tb =   .65000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - SCHOOL 100y24
Tc             = .1030 hrs
Drainage Area  = 9.100 acres  Runoff CN= 88

============================================
Computational Time Increment    =   .01373 hrs
Computed Peak Time              =   6.0015 hrs
Computed Peak Flow              =    41.88 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output  =   6.0000 hrs
Peak Flow, Interpolated Output  =    41.85 cfs
============================================

              DRAINAGE AREA
           -------------------
           ID:SCHOOL
           CN    =    88
           Area  =        9.100 acres
           S     =    1.3636 in
           0.2S  =     .2727 in

            Cumulative Runoff
           -------------------
                  3.1023 in
                   2.353 ac-ft

HYG Volume...          2.352 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10300 hrs (ID: SCHOOL)
Computational Incr, Tm =   .01373 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   100.10 cfs
Unit peak time      Tp =   .06867 hrs
Unit receding limb, Tr =   .27467 hrs
Total unit time,    Tb =   .34333 hrs
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 INT DEV ESI.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
6958.00	-----	.0090	.0000	.000	.000
6960.00	-----	.0580	.0898	.060	.060
6962.00	-----	.3550	.5565	.371	.431
6964.00	-----	1.0500	2.0155	1.344	1.775
6966.00	-----	2.0800	4.6078	3.072	4.846
6968.00	-----	3.1950	7.8529	5.235	10.082
6970.00	-----	4.8700	12.0096	8.006	18.088
6972.00	-----	6.1000	16.4204	10.947	29.035
6974.00	-----	7.9430	21.0038	14.003	43.038
6976.00	-----	9.8870	26.6919	17.795	60.832
6978.00	-----	11.5070	32.0603	21.374	82.206
6980.00	-----	13.8980	38.0511	25.367	107.573

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 INT DEV ESI.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6958.00 ft
Increment = .20 ft
Max. Elev.= 6980.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Inlet Box	Ib	--->	CV	6964.000	6980.000
Orifice-Circular	Or	--->	CV	6958.000	6980.000
Culvert-Circular	Cv	--->	TW	6958.000	6980.000
TW SETUP, DS Channel					

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 INT DEV ESI.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = Ib
Structure Type     = Inlet Box
------------------------------------
# of Openings      =        1
Invert Elev.       =   6964.00 ft
Orifice Area       =   25.0000 sq.ft
Orifice Coeff.     =      .600
Weir Length        =     20.00 ft
Weir Coeff.        =     3.000
K, Submerged       =      .000
K, Reverse         =     1.000
Kb,Barrel          =   .000000  (per ft of full flow)
Barrel Length      =       .00 ft
Mannings n         =     .0000


Structure ID       = Or
Structure Type     = Orifice-Circular
------------------------------------
# of Openings      =        1
Invert Elev.       =   6958.00 ft
Diameter           =    1.0000 ft
Orifice Coeff.     =      .600
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID        = Cv
Structure Type      = Culvert-Circular
------------------------------------
No. Barrels         =        1
Barrel Diameter     =    2.4000 ft
Upstream Invert     =   6958.00 ft
Dnstream Invert     =   6946.00 ft
Horiz. Length       =    538.00 ft
Barrel Length       =    538.13 ft
Barrel Slope        =    .02230 ft/ft

OUTLET CONTROL DATA...
Mannings n          =     .0150
Ke                  =     .0000  (forward entrance loss)
Kb                  =   .012958  (per ft of full flow)
Kr                  =     .0200  (reverse entrance loss)
HW Convergence      =      .001  +/- ft

INLET CONTROL DATA...
Equation form       =         1
Inlet Control K     =     .0098
Inlet Control M     =    2.0000
Inlet Control c     =    .03980
Inlet Control Y     =     .6700
T1 ratio (HW/D)     =     1.149
T2 ratio (HW/D)     =     1.296
Slope Factor        =     -.500
```

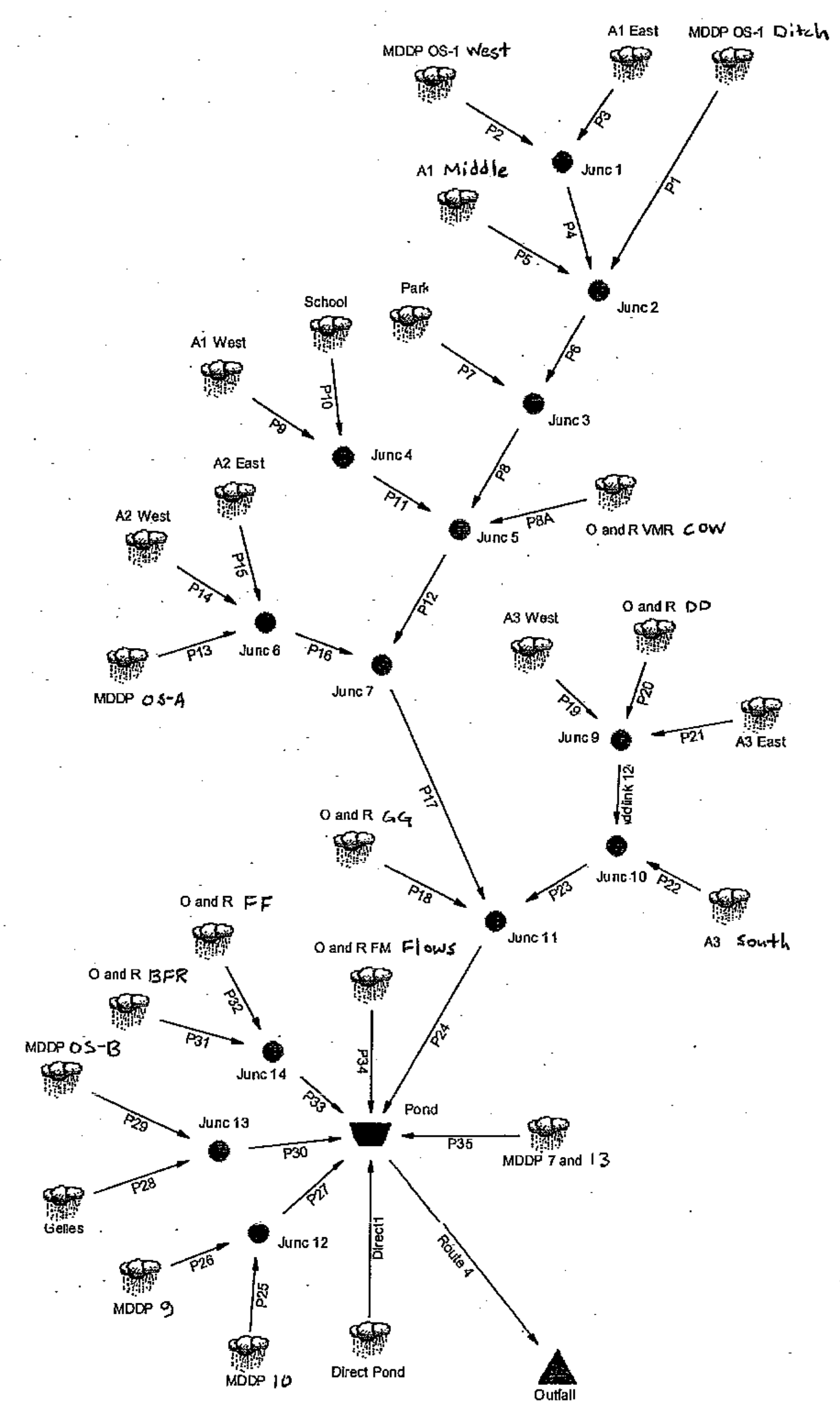
```
Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    6960.76 ft  --->  Flow =      24.53 cfs
At T2 Elev =    6961.11 ft  --->  Flow =      28.03 cfs
```

```
Structure ID        = TW
Structure Type      = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

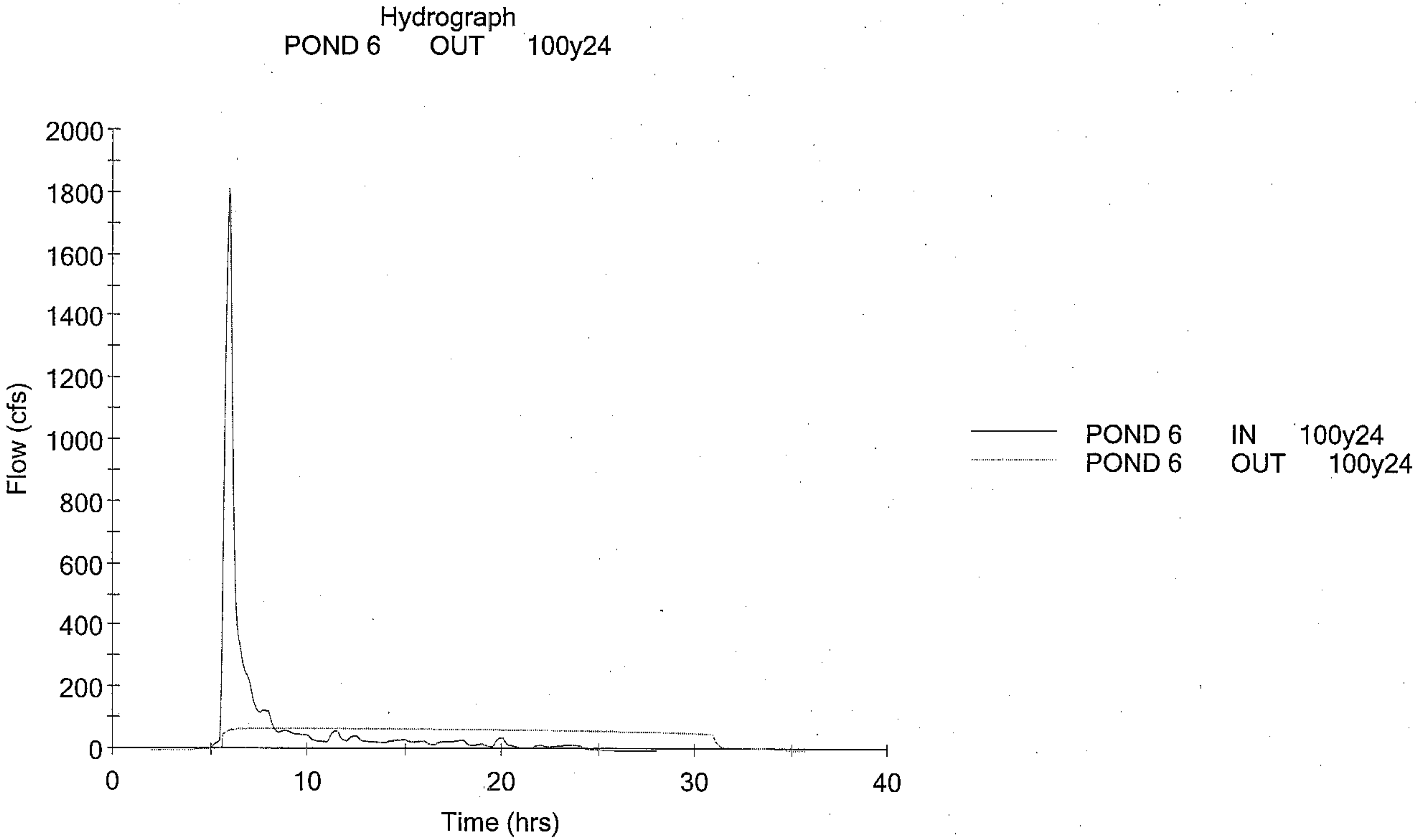
LEVEL POOL ROUTING SUMMARY

```
HYG Dir           = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file = NONE STORED - POND 6        IN  100y24
Outflow HYG file = NONE STORED - POND 6        OUT 100y24

Pond Node   Data = POND 6
Pond Volume Data = POND 6
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =  6958.00 ft
Starting Volume    =      .000 ac-ft
Starting Outflow   =       .00 cfs
Starting Infiltr.  =       .00 cfs
Starting Total Qout=       .00 cfs
Time Increment     =     .0500 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =   1553.46 cfs    at    6.0000 hrs
Peak Outflow      =     69.11 cfs    at    8.2000 hrs
-----------------------------------------------------
Peak Elevation    =   6977.31 ft
Peak Storage =         74.417 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =     124.026
- Infiltration  =        .000
- HYG Vol OUT   =     124.026
- Retained Vol  =        .000
                  ----------
Unrouted Vol =           .000 ac-ft  (.000% of Outflow Volume)
```

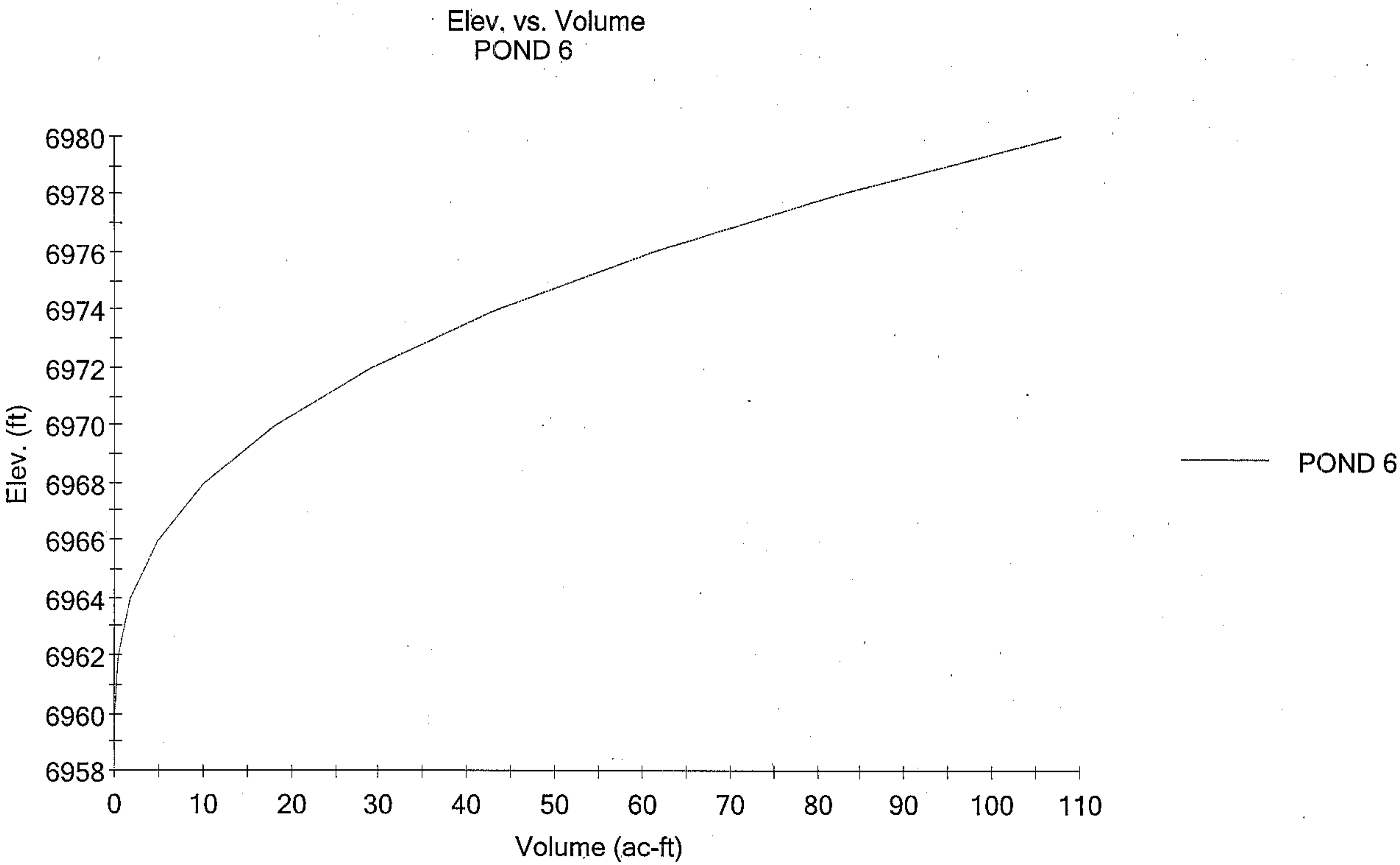
Index of Starting Page Numbers for ID Names

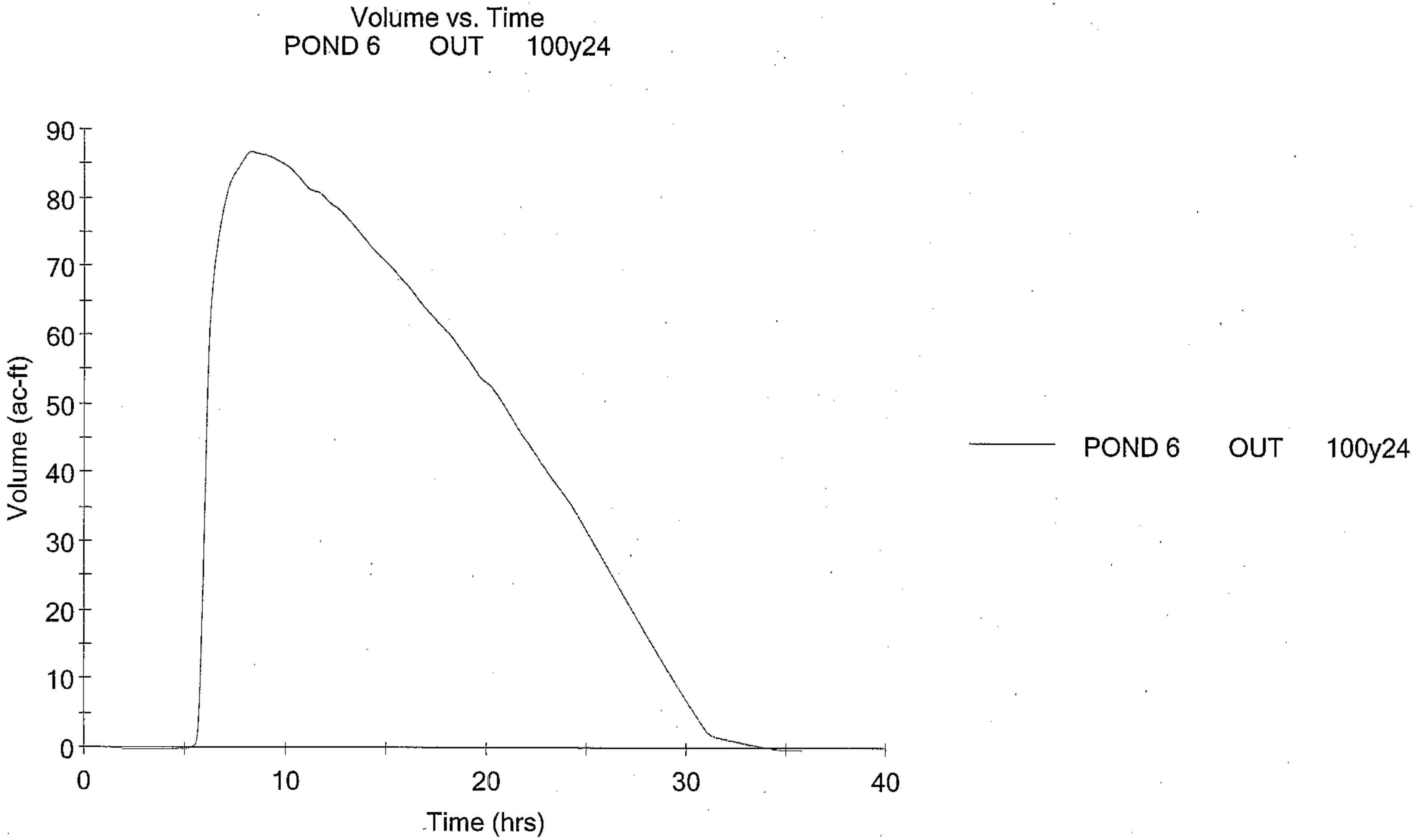


MDDP OS-1 West
A1 East
MDDP OS-1 Ditch
P2
P3
P1
Junc 1
A1 Middle
P4
P5
Junc 2
School
Park
A1 West
P6
P10
P7
P9
Junc 3
Junc 4
P8
A2 East
P11
P8A
Junc 5
O and R VMR COW
A2 West
P15
P14
P12
Junc 6
P13
P16
Junc 7
MDDP OS-A
A3 West
O and R DD
P19
P20
Junc 9
P21
A3 East
P17
ddlink 12
O and R GG
Junc 10
P18
P23
P22
Junc 11
A3 South
O and R FF
O and R FM Flows
O and R BFR
P32
P31
MDDP OS-B
Junc 14
P34
P24
P33
Pond
P29
Junc 13
P30
P35
MDDP 7 and 13
P28
Gelles
P27
Junc 12
Direct1
Route 4
P26
MDDP 9
P25
MDDP 10
Direct Pond
Outfall

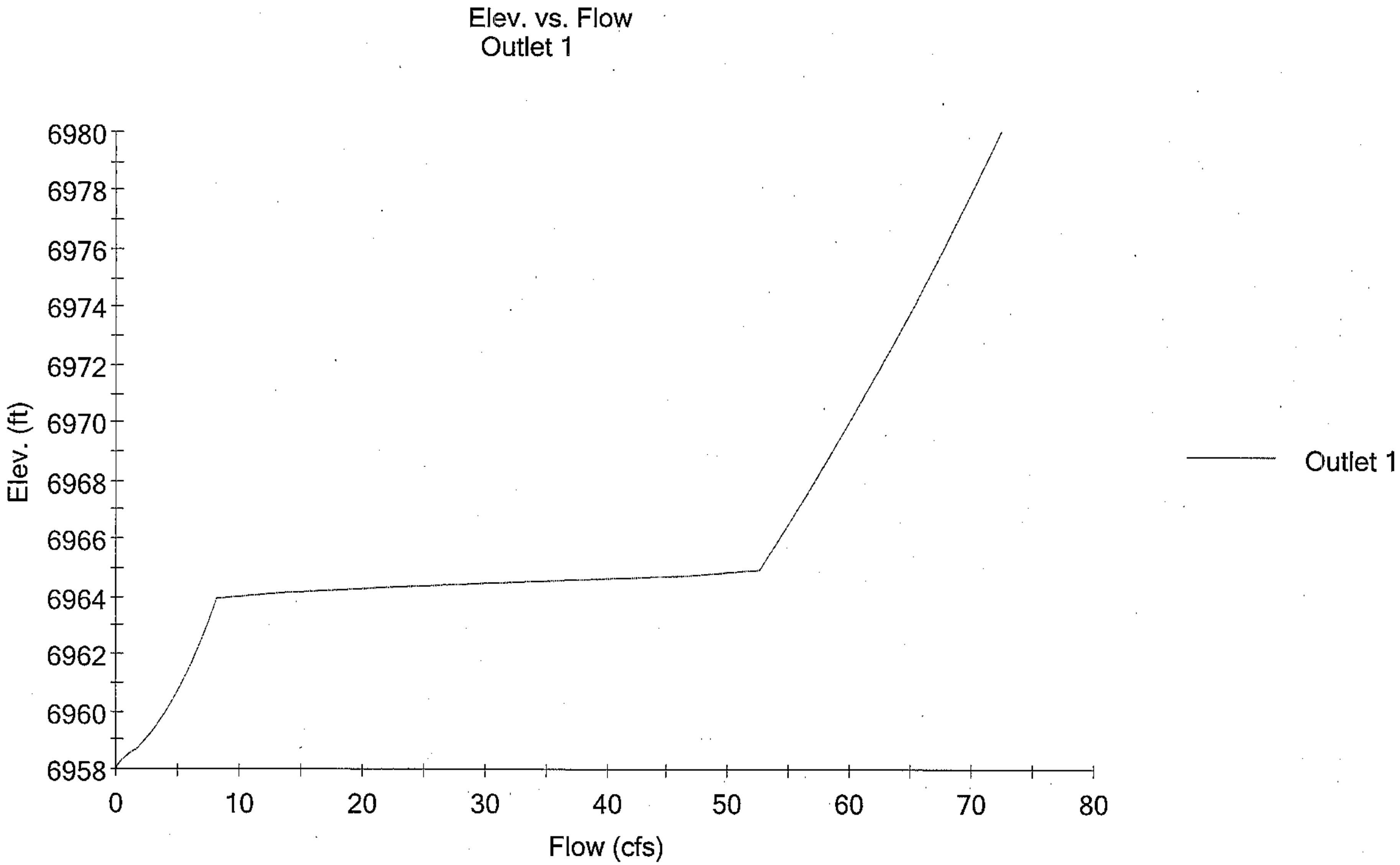


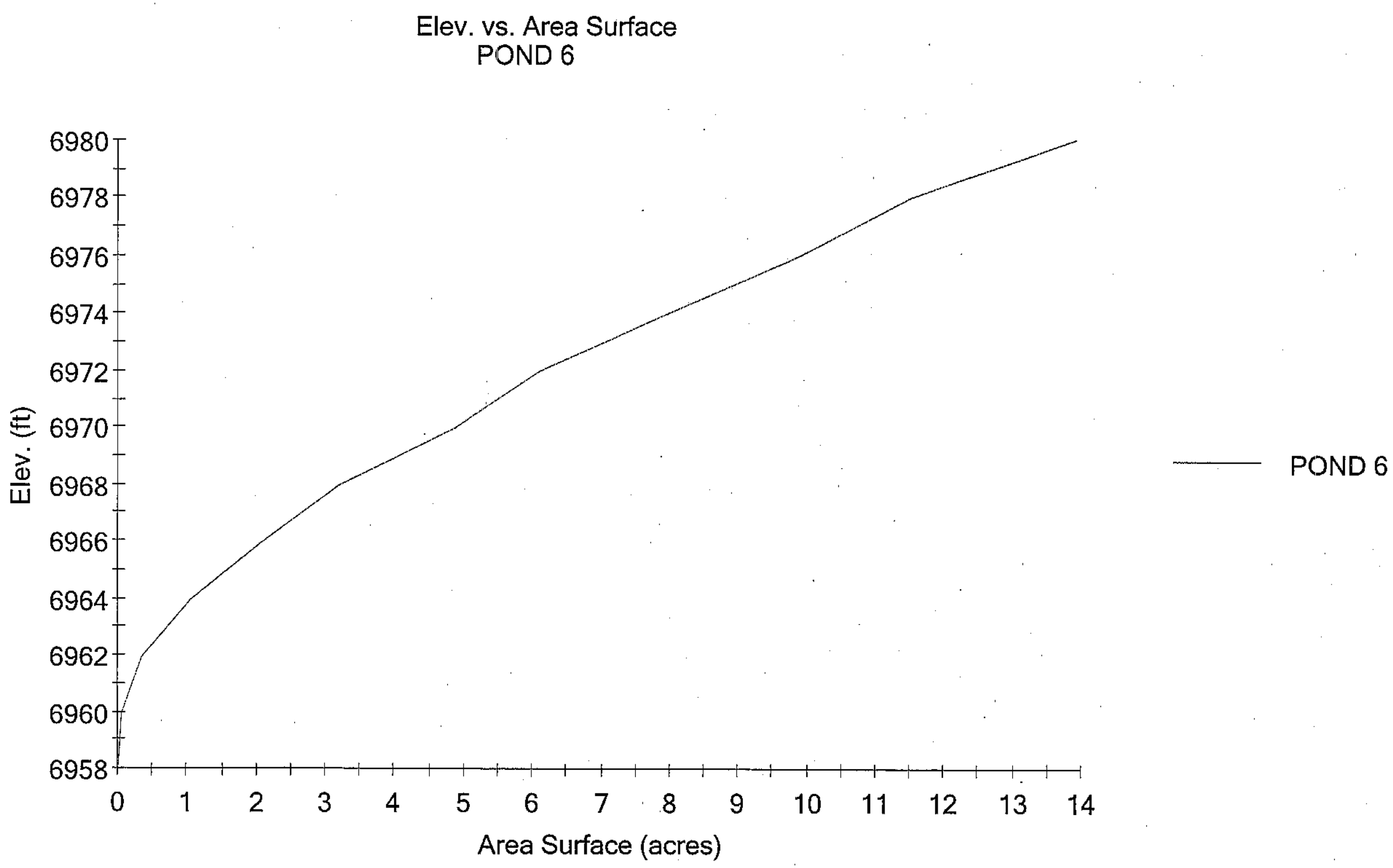
Hydrograph
POND 6 OUT 100y24
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Flow (cfs)
0
10
20
30
40
Time (hrs)
POND 6 IN 100y24
POND 6 OUT 100y24

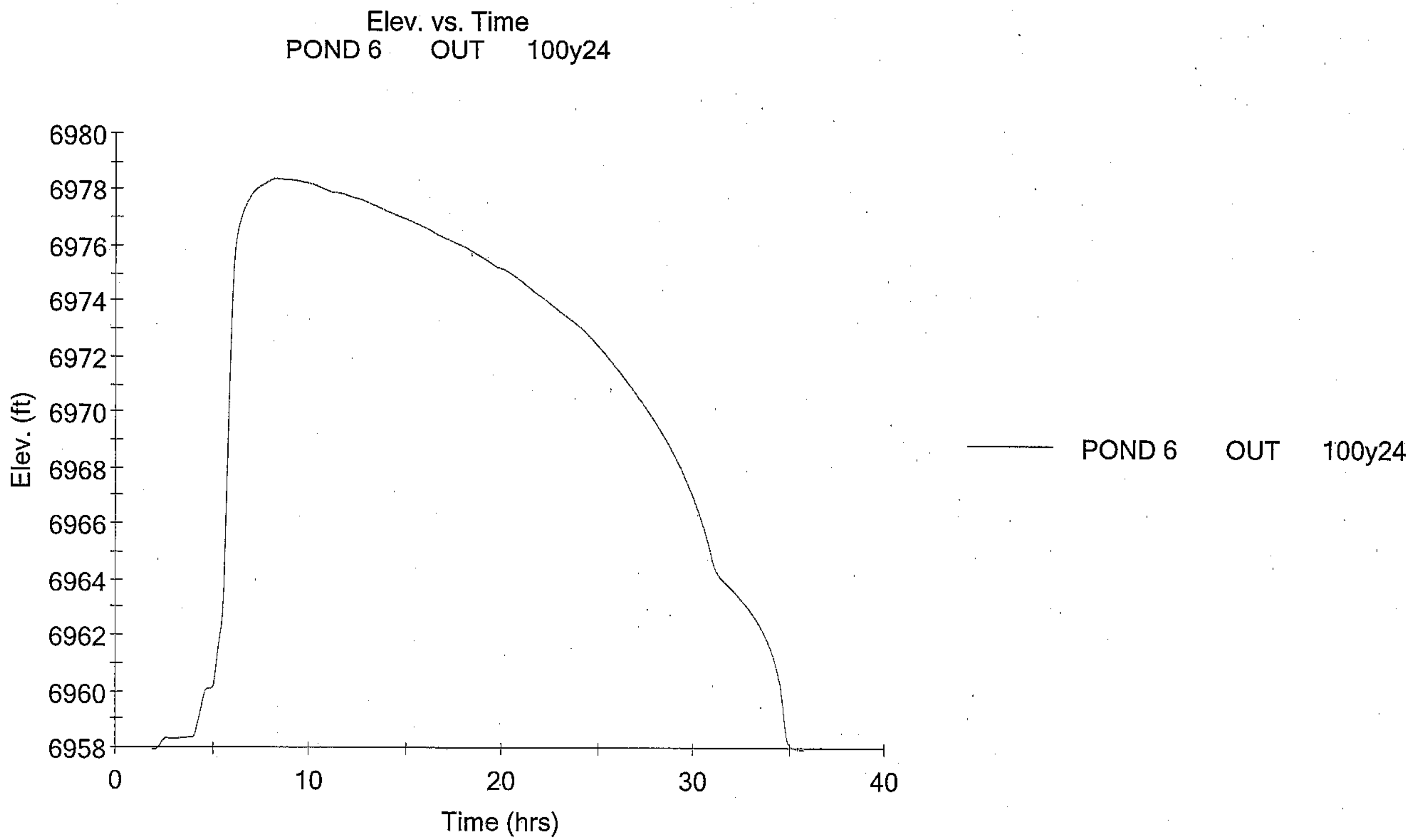

Elev. vs. Volume
POND 6
Elev. (ft)
6980
6978
6976
6974
6972
6970
6968
6966
6964
6962
6960
6958
0
10
20
30
40
50
60
70
80
90
100
110
Volume (ac-ft)
POND 6



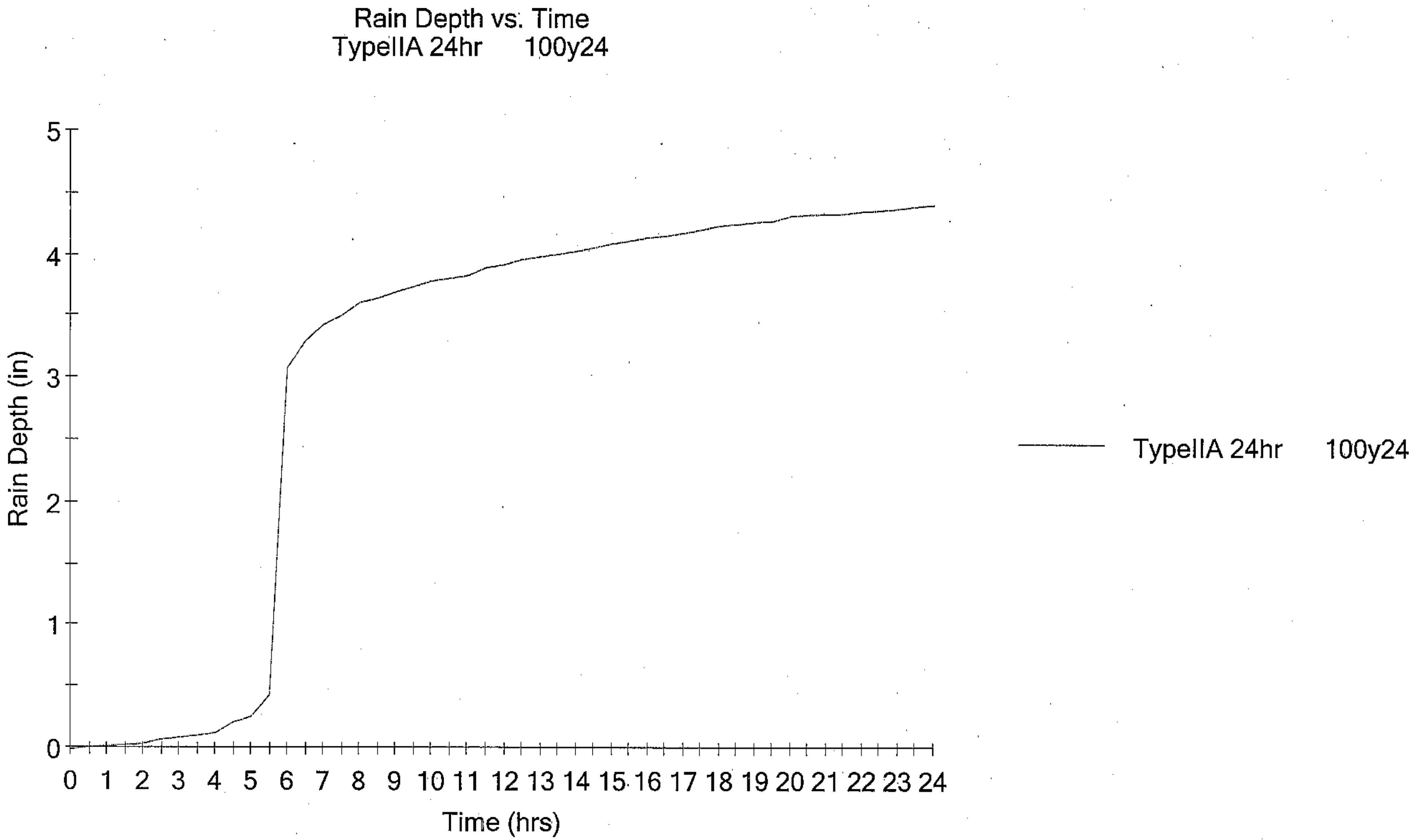
Volume vs. Time
POND 6 OUT 100y24
90
80
70
60
50
40
30
20
10
0
Volume (ac-ft)
0
10
20
30
40
Time (hrs)
POND 6 OUT 100y24


Elev. vs. Flow
Outlet 1
6980
6978
6976
6974
6972
6970
6968
6966
6964
6962
6960
6958
Elev. (ft)
0
10
20
30
40
50
60
70
80
Flow (cfs)
Outlet 1


Elev. vs. Area Surface
POND 6
6980
6978
6976
6974
6972
6970
6968
6966
6964
6962
6960
6958
Elev. (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Area Surface (acres)
POND 6



Elev. vs. Time
POND 6 OUT 100y24
Elev. (ft)
6980
6978
6976
6974
6972
6970
6968
6966
6964
6962
6960
6958
0
10
20
30
40
Time (hrs)
POND 6 OUT 100y24



Rain Depth vs. Time
TypeIIA 24hr 100y24
Rain Depth (in)
0
1
2
3
4
5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hrs)
TypeIIA 24hr 100y24

=========================
JOB TITLE
=========================

Project Date: 12/8/2005
Project Engineer: Benjamin E. Sheets
Project Title: Woodmen Heights - Forest Meadows Final Drainage Report
Project Comments:
ULTIMATE CONDITIONS

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Table of Contents (continued)

MASTER DESIGN STORM SUMMARY

Network Storm Collection: El Paso County

Return Event	Total Depth in	Rainfall Type	RNF ID
100y24	4.4000	Synthetic Curve	TypeIIA 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
A1 EAST	AREA	100	3.755		6.1500	47.34		
A1 MIDDLE	AREA	100	5.823		6.0500	87.86		
A1 WEST	AREA	100	6.115		6.0500	93.21		
A2 EAST	AREA	100	6.197		6.0500	98.06		
A2 WEST	AREA	100	4.680		6.0500	74.32		
A3 EAST	AREA	100	5.885		6.0500	91.18		
A3 SOUTH	AREA	100	2.463		6.0000	46.20		
A3 WEST	AREA	100	5.271		6.0500	86.91		
DIRECT POND	AREA	100	1.475		6.0000	30.74		
GELLES	AREA	100	4.818		6.0000	81.93		
JUNC 1	JCT	100	9.298		6.1000	127.33		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
JUNC 10	JCT	100	16.423		6.0000	263.68		
JUNC 11	JCT	100	91.317		6.0500	1028.57		
JUNC 12	JCT	100	10.982		6.0000	184.14		
JUNC 13	JCT	100	8.031		6.0000	132.11		
JUNC 14	JCT	100	11.278		6.0000	178.93		
JUNC 2	JCT	100	41.362		6.1000	257.27		
JUNC 3	JCT	100	42.038		6.1000	267.15		
JUNC 4	JCT	100	8.467		6.0000	129.22		
JUNC 5	JCT	100	53.664		6.0500	431.51		
JUNC 6	JCT	100	16.820		6.0500	269.41		
JUNC 7	JCT	100	70.483		6.0500	700.92		
JUNC 9	JCT	100	13.960		6.0500	222.18		
MDDP OS-A	AREA	100	5.942		6.0500	97.03		
MDDP 10	AREA	100	1.402		6.0000	23.54		
MDDP 7 AND 13	AREA	100	13.026		6.0000	216.22		
MDDP 9	AREA	100	9.580		6.0000	160.60		
MDDP OS-1 EDITCH	AREA	100	26.241		6.7500	137.96		
MDDP OS-1 WEST	AREA	100	5.544		6.1000	80.57		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
MDDP OS-B	AREA	100	3.213		6.0000	50.18		
O AND R BFR	AREA	100	7.773		6.0000	117.04		
O AND R DD	AREA	100	2.804		6.0000	44.73		
O AND R FF	AREA	100	3.505		6.0000	61.88		
O AND R FM FLOWS	AREA	100	4.442		6.0000	64.75		
O AND R GG	AREA	100	4.411		6.0000	72.95		
O AND R VMR COW	AREA	100	3.159		6.0000	50.65		
*OUTFALL	JCT	100	140.551		8.2500	70.39		
PARK	AREA	100	.676		6.0500	11.64		
POND 6 IN	POND	100	140.551		6.0000	1810.68		
POND 6 OUT	POND	100	140.551		8.2500	70.39	6978.38	86.689
SCHOOL	AREA	100	2.352		6.0000	41.85		

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = 100y24

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
A1 EAST	AREA	3.755		6.1500	47.34	
A1 MIDDLE	AREA	5.823		6.0500	87.86	
A1 WEST	AREA	6.115		6.0500	93.21	
A2 EAST	AREA	6.197		6.0500	98.06	
A2 WEST	AREA	4.680		6.0500	74.32	
A3 EAST	AREA	5.885		6.0500	91.18	
A3 SOUTH	AREA	2.463		6.0000	46.20	
A3 WEST	AREA	5.271		6.0500	86.91	
DIRECT POND	AREA	1.475		6.0000	30.74	
GELLES	AREA	4.818		6.0000	81.93	
JUNC 1	JCT	9.298		6.1000	127.33	
JUNC 10	JCT	16.423		6.0000	263.68	
JUNC 11	JCT	91.317		6.0500	1028.57	
JUNC 12	JCT	10.982		6.0000	184.14	
JUNC 13	JCT	8.031		6.0000	132.11	
JUNC 14	JCT	11.278		6.0000	178.93	
JUNC 2	JCT	41.362		6.1000	257.27	
JUNC 3	JCT	42.038		6.1000	267.15	
JUNC 4	JCT	8.467		6.0000	129.22	
JUNC 5	JCT	53.664		6.0500	431.51	
JUNC 6	JCT	16.820		6.0500	269.41	
JUNC 7	JCT	70.483		6.0500	700.92	
JUNC 9	JCT	13.960		6.0500	222.18	
MDDP OS-A	AREA	5.942		6.0500	97.03	
MDDP 10	AREA	1.402		6.0000	23.54	
MDDP 7 AND 13	AREA	13.026		6.0000	216.22	
MDDP 9	AREA	9.580		6.0000	160.60	
MDDP OS-1 EDITCH	AREA	26.241		6.7500	137.96	
MDDP OS-1 WEST	AREA	5.544		6.1000	80.57	
MDDP OS-B	AREA	3.213		6.0000	50.18	
O AND R BFR	AREA	7.773		6.0000	117.04	
O AND R DD	AREA	2.804		6.0000	44.73	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	O AND R FF	AREA	3.505		6.0000	61.88	
	O AND R FM FLOWS	AREA	4.442		6.0000	64.75	
	O AND R GG	AREA	4.411		6.0000	72.95	
	O AND R VMR COW	AREA	3.159		6.0000	50.65	
Outfall	OUTFALL	JCT	140.551		8.2500	70.39	
	PARK	AREA	.676		6.0500	11.64	
	POND 6 IN	POND	140.551		6.0000	1810.68	
	POND 6 OUT	POND	140.551		8.2500	70.39	6978.38
	SCHOOL	AREA	2.352		6.0000	41.85	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = El Paso County

Storm Tag Name = 100y24

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
ADDLINK 120	ADD	UN	13.960		6.0500	222.18	JUNC 9
		DL	13.960		6.0500	222.18	
		DN	16.423		6.0000	263.68	JUNC 10
DIRECT 1	ADD	UN	1.475		6.0000	30.74	DIRECT POND
		DL	1.475		6.0000	30.74	
		DN	140.551		6.0000	1810.68	POND 6 IN
P1	ADD	UN	26.241		6.7500	137.96	MDDP OS-1 EDITCH
		DL	26.241		6.7500	137.96	
		DN	41.362		6.1000	257.27	JUNC 2
P10	ADD	UN	2.352		6.0000	41.85	SCHOOL
		DL	2.352		6.0000	41.85	
		DN	8.467		6.0000	129.22	JUNC 4
P11	ADD	UN	8.467		6.0000	129.22	JUNC 4
		DL	8.467		6.0000	129.22	
		DN	53.664		6.0500	431.51	JUNC 5
P12	ADD	UN	53.664		6.0500	431.51	JUNC 5
		DL	53.664		6.0500	431.51	
		DN	70.483		6.0500	700.92	JUNC 7
P13	ADD	UN	5.942		6.0500	97.03	MDDP OS-A
		DL	5.942		6.0500	97.03	
		DN	16.820		6.0500	269.41	JUNC 6

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
P14	ADD	UN	4.680		6.0500	74.32	A2 WEST
		DL	4.680		6.0500	74.32	
		DN	16.820		6.0500	269.41	JUNC 6
P15	ADD	UN	6.197		6.0500	98.06	A2 EAST
		DL	6.197		6.0500	98.06	
		DN	16.820		6.0500	269.41	JUNC 6
P16	ADD	UN	16.820		6.0500	269.41	JUNC 6
		DL	16.820		6.0500	269.41	
		DN	70.483		6.0500	700.92	JUNC 7
P17	ADD	UN	70.483		6.0500	700.92	JUNC 7
		DL	70.483		6.0500	700.92	
		DN	91.317		6.0500	1028.57	JUNC 11
P18	ADD	UN	4.411		6.0000	72.95	O AND R GG
		DL	4.411		6.0000	72.95	
		DN	91.317		6.0500	1028.57	JUNC 11
P19	ADD	UN	5.271		6.0500	86.91	A3 WEST
		DL	5.271		6.0500	86.91	
		DN	13.960		6.0500	222.18	JUNC 9
P2	ADD	UN	5.544		6.1000	80.57	MDDP OS-1 WEST
		DL	5.544		6.1000	80.57	
		DN	9.298		6.1000	127.33	JUNC 1
P20	ADD	UN	2.804		6.0000	44.73	O AND R DD
		DL	2.804		6.0000	44.73	
		DN	13.960		6.0500	222.18	JUNC 9
P21	ADD	UN	5.885		6.0500	91.18	A3 EAST
		DL	5.885		6.0500	91.18	
		DN	13.960		6.0500	222.18	JUNC 9
P22	ADD	UN	2.463		6.0000	46.20	A3 SOUTH
		DL	2.463		6.0000	46.20	
		DN	16.423		6.0000	263.68	JUNC 10

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
P23	ADD	UN	16.423		6.0000	263.68	JUNC 10	
		DL	16.423		6.0000	263.68		
		DN	91.317		6.0500	1028.57	JUNC 11	
P24	ADD	UN	91.317		6.0500	1028.57	JUNC 11	
		DL	91.317		6.0500	1028.57		
		DN	140.551		6.0000	1810.68	POND 6	IN
P25	ADD	UN	1.402		6.0000	23.54	MDDP 10	
		DL	1.402		6.0000	23.54		
		DN	10.982		6.0000	184.14	JUNC 12	
P26	ADD	UN	9.580		6.0000	160.60	MDDP 9	
		DL	9.580		6.0000	160.60		
		DN	10.982		6.0000	184.14	JUNC 12	
P27	ADD	UN	10.982		6.0000	184.14	JUNC 12	
		DL	10.982		6.0000	184.14		
		DN	140.551		6.0000	1810.68	POND 6	IN
P28	ADD	UN	4.818		6.0000	81.93	GELLES	
		DL	4.818		6.0000	81.93		
		DN	8.031		6.0000	132.11	JUNC 13	
P29	ADD	UN	3.213		6.0000	50.18	MDDP OS-B	
		DL	3.213		6.0000	50.18		
		DN	8.031		6.0000	132.11	JUNC 13	
P3	ADD	UN	3.755		6.1500	47.34	A1 EAST	
		DL	3.755		6.1500	47.34		
		DN	9.298		6.1000	127.33	JUNC 1	
P30	ADD	UN	8.031		6.0000	132.11	JUNC 13	
		DL	8.031		6.0000	132.11		
		DN	140.551		6.0000	1810.68	POND 6	IN
P31	ADD	UN	7.773		6.0000	117.04	O AND R BFR	
		DL	7.773		6.0000	117.04		
		DN	11.278		6.0000	178.93	JUNC 14	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
P32	ADD	UN	3.505		6.0000	61.88	O AND R FF	
		DL	3.505		6.0000	61.88		
		DN	11.278		6.0000	178.93	JUNC 14	
P33	ADD	UN	11.278		6.0000	178.93	JUNC 14	
		DL	11.278		6.0000	178.93		
		DN	140.551		6.0000	1810.68	POND 6	IN
P34	ADD	UN	4.442		6.0000	64.75	O AND R FM FLOWS	
		DL	4.442		6.0000	64.75		
		DN	140.551		6.0000	1810.68	POND 6	IN
P35	ADD	UN	13.026		6.0000	216.22	MDDP 7 AND 13	
		DL	13.026		6.0000	216.22		
		DN	140.551		6.0000	1810.68	POND 6	IN
P4	ADD	UN	9.298		6.1000	127.33	JUNC 1	
		DL	9.298		6.1000	127.33		
		DN	41.362		6.1000	257.27	JUNC 2	
P5	ADD	UN	5.823		6.0500	87.86	A1 MIDDLE	
		DL	5.823		6.0500	87.86		
		DN	41.362		6.1000	257.27	JUNC 2	
P6	ADD	UN	41.362		6.1000	257.27	JUNC 2	
		DL	41.362		6.1000	257.27		
		DN	42.038		6.1000	267.15	JUNC 3	
P7	ADD	UN	.676		6.0500	11.64	PARK	
		DL	.676		6.0500	11.64		
		DN	42.038		6.1000	267.15	JUNC 3	
P8	ADD	UN	42.038		6.1000	267.15	JUNC 3	
		DL	42.038		6.1000	267.15		
		DN	53.664		6.0500	431.51	JUNC 5	
P8A	ADD	UN	3.159		6.0000	50.65	O AND R VMR COW	
		DL	3.159		6.0000	50.65		
		DN	53.664		6.0500	431.51	JUNC 5	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
P9	ADD	UN	6.115		6.0500	93.21	A1 WEST	
		DL	6.115		6.0500	93.21		
		DN	8.467		6.0000	129.22	JUNC 4	
ROUTE 4	PONDrt	UN	140.551		6.0000	1810.68	POND 6	IN
ROUTE 4			140.551		8.2500	70.39	POND 6	OUT
		DL	140.551		8.2500	70.39		
		DN	140.551		8.2500	70.39	OUTFALL	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data		Apply to Node		Receiving Link	
SCS UH	MDDP OS-1 EDITCH	Subarea	MDDP OS-1 EDITCH	Add Hyd	MDDP OS-1 EDITCH
SCS UH	A1 EAST	Subarea	A1 EAST	Add Hyd	A1 EAST
SCS UH	A1 MIDDLE	Subarea	A1 MIDDLE	Add Hyd	A1 MIDDLE
SCS UH	PARK	Subarea	PARK	Add Hyd	PARK
SCS UH	SCHOOL	Subarea	SCHOOL	Add Hyd	SCHOOL
SCS UH	A1 WEST	Subarea	A1 WEST	Add Hyd	A1 WEST
SCS UH	A2 EAST	Subarea	A2 EAST	Add Hyd	A2 EAST
SCS UH	A2 WEST	Subarea	A2 WEST	Add Hyd	A2 WEST
SCS UH	A3 WEST	Subarea	A3 WEST	Add Hyd	A3 WEST
SCS UH	O AND R DD	Subarea	O AND R DD	Add Hyd	O AND R DD
SCS UH	A3 EAST	Subarea	A3 EAST	Add Hyd	A3 EAST
SCS UH	A3 SOUTH	Subarea	A3 SOUTH	Add Hyd	A3 SOUTH
SCS UH	O AND R GG	Subarea	O AND R GG	Add Hyd	O AND R GG
SCS UH	O AND R FM FLOWS	Subarea	O AND R FM FLOWS	Add Hyd	O AND R FM FLOWS
SCS UH	O AND R FF	Subarea	O AND R FF	Add Hyd	O AND R FF
SCS UH	O AND R BFR	Subarea	O AND R BFR	Add Hyd	O AND R BFR
SCS UH	MDDP 7 AND 13	Subarea	MDDP 7 AND 13	Add Hyd	MDDP 7 AND 13
SCS UH	DIRECT POND	Subarea	DIRECT POND	Add Hyd	DIRECT POND
SCS UH	MDDP 10	Subarea	MDDP 10	Add Hyd	MDDP 10
SCS UH	MDDP 9	Subarea	MDDP 9	Add Hyd	MDDP 9
SCS UH	GELLES	Subarea	GELLES	Add Hyd	GELLES
SCS UH	O AND R VMR COW	Subarea	O AND R VMR COW	Add Hyd	O AND R VMR COW
SCS UH	MDDP OS-A	Subarea	MDDP OS-A	Add Hyd	MDDP OS-A
SCS UH	MDDP OS-B	Subarea	MDDP OS-B	Add Hyd	MDDP OS-B
SCS UH	MDDP OS-1 WEST	Subarea	MDDP OS-1 WEST	Add Hyd	MDDP OS-1 WEST

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd P3	Subarea	A1 EAST		Jct	JUNC 1	
Add Hyd P2	Subarea	MDDP OS-1 WEST		Jct	JUNC 1	
Add Hyd P1	Subarea	MDDP OS-1 EDITCH		Jct	JUNC 2	
Add Hyd P4	Jct	JUNC 1		Jct	JUNC 2	
Add Hyd P5	Subarea	A1 MIDDLE		Jct	JUNC 2	
Add Hyd P6	Jct	JUNC 2		Jct	JUNC 3	
Add Hyd P7	Subarea	PARK		Jct	JUNC 3	
Add Hyd P10	Subarea	SCHOOL		Jct	JUNC 4	
Add Hyd P9	Subarea	A1 WEST		Jct	JUNC 4	
Add Hyd P19	Subarea	A3 WEST		Jct	JUNC 9	
Add Hyd P21	Subarea	A3 EAST		Jct	JUNC 9	
Add Hyd P20	Subarea	O AND R DD		Jct	JUNC 9	
Add Hyd P11	Jct	JUNC 4		Jct	JUNC 5	
Add Hyd P8	Jct	JUNC 3		Jct	JUNC 5	
Add Hyd P8A	Subarea	O AND R VMR COW		Jct	JUNC 5	
Add Hyd P14	Subarea	A2 WEST		Jct	JUNC 6	
Add Hyd P13	Subarea	MDDP OS-A		Jct	JUNC 6	
Add Hyd P15	Subarea	A2 EAST		Jct	JUNC 6	
Add Hyd P22	Subarea	A3 SOUTH		Jct	JUNC 10	
Add Hyd ADDLINK 120	Jct	JUNC 9		Jct	JUNC 10	
Add Hyd P16	Jct	JUNC 6		Jct	JUNC 7	
Add Hyd P12	Jct	JUNC 5		Jct	JUNC 7	
Add Hyd P32	Subarea	O AND R FF		Jct	JUNC 14	
Add Hyd P31	Subarea	O AND R BFR		Jct	JUNC 14	
Add Hyd P17	Jct	JUNC 7		Jct	JUNC 11	
Add Hyd P23	Jct	JUNC 10		Jct	JUNC 11	
Add Hyd P18	Subarea	O AND R GG		Jct	JUNC 11	
Add Hyd P25	Subarea	MDDP 10		Jct	JUNC 12	
Add Hyd P26	Subarea	MDDP 9		Jct	JUNC 12	
Add Hyd P28	Subarea	GELLES		Jct	JUNC 13	
Add Hyd P29	Subarea	MDDP OS-B		Jct	JUNC 13	
Add Hyd P30	Jct	JUNC 13		Pond	POND 6	IN
Add Hyd P35	Subarea	MDDP 7 AND 13		Pond	POND 6	IN
Add Hyd P27	Jct	JUNC 12		Pond	POND 6	IN
Add Hyd P24	Jct	JUNC 11		Pond	POND 6	IN
Add Hyd DIRECT 1	Subarea	DIRECT POND		Pond	POND 6	IN
Add Hyd P34	Subarea	O AND R FM FLOWS		Pond	POND 6	IN
Add Hyd P33	Jct	JUNC 14		Pond	POND 6	IN
POND ROUTE TOTAL OUTFLOW...						
Total Pond Outflow	Pond	POND 6	IN	Outflow	POND 6	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 4	Outflow	POND 6	OUT	Jct	OUTFALL	

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Title... Project Date: 12/8/2005
Project Engineer: Benjamin E. Sheets
Project Title: Woodmen Heights - Forest Meadows
Final Drainage Report
Project Comments:
ULTIMATE CONDITIONS

DESIGN STORMS SUMMARY

Design Storm File,ID = El Paso County

Storm Tag Name = 100y24

Data Type, File, ID = Synthetic Storm TypeIIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .5000 hrs End= 24.0000 hrs

DESIGN STORMS SUMMARY

```
Design Storm File,ID =                El Paso County


Storm Tag Name       = 100y24
------------------------------------------------------------------------
Data Type, File, ID = Synthetic Storm    TypeIIA 24hr
Storm Frequency     = 100 yr
Total Rainfall Depth= 4.4000 in
Duration Multiplier =  1
Resulting Duration  = 24.0000 hrs
Resulting Start Time= .0000 hrs  Step= .5000 hrs  End= 24.0000 hrs
```

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

DEFINITION OF TERMS: ---

```
  At    = Total area (acres):  At = Ai+Ap
  Ai    = Impervious area (acres)
  Ap    = Pervious area (acres)
  CNi   = Runoff curve number for impervious area
  CNp   = Runoff curve number for pervious area
  fLoss = f loss constant infiltration (depth/time)
  gKs   = Saturated Hydraulic Conductivity (depth/time)
  Md    = Volumetric Moisture Deficit
  Psi   = Capillary Suction (length)
  hK    = Horton Infiltration Decay Rate (time^-1)
  fo    = Initial Infiltration Rate (depth/time)
  fc    = Ultimate(capacity)Infiltration Rate (depth/time)
  Ia    = Initial Abstraction (length)
  dt    = Computational increment (duration of unit excess rainfall)
          Default dt is smallest value of 0.1333Tc, rtm, and th
          (Smallest dt is then adjusted to match up with Tp)
UDdt    = User specified override computational main time increment
          (only used if UDdt is => .1333Tc)
  D(t)  = Point on distribution curve (fraction of P) for time step t

  K     = 2 / (1 + (Tr/Tp)):  default K = 0.75: (for Tr/Tp = 1.67)
  Ks    = Hydrograph shape factor
        = Unit Conversions * K:
        = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K
          Default Ks = 645.333 * 0.75 = 484

  Lag   = Lag time from center of excess runoff (dt) to Tp:  Lag = 0.6Tc
  P     = Total precipitation depth, inches
  Pa(t) = Accumulated rainfall at time step t
  Pi(t) = Incremental rainfall at time step t
  qp    = Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi.
        = (Ks * A * Q) / Tp   (where Q = 1in. runoff, A=sq.mi.)
  Qu(t) = Unit hydrograph ordinate (cfs) at time step t
  Q(t)  = Final hydrograph ordinate (cfs) at time step t
  Rai(t)= Accumulated runoff (inches) at time step t for impervious area
  Rap(t)= Accumulated runoff (inches) at time step t for pervious area
  Rii(t)= Incremental runoff (inches) at time step t for impervious area
  Rip(t)= Incremental runoff (inches) at time step t for pervious area
  R(t)  = Incremental weighted total runoff (inches)
  Rtm   = Time increment for rainfall table
  Si    = S for impervious area:  Si = (1000/CNi) - 10
  Sp    = S for pervious area:    Sp = (1000/CNp) - 10
  t     = Time step (row) number
  Tc    = Time of concentration
  Tb    = Time (hrs) of entire unit hydrograph:  Tb = Tp + Tr
  Tp    = Time (hrs) to peak of a unit hydrograph:  Tp = (dt/2) + Lag
  Tr    = Time (hrs) of receding limb of unit hydrograph:  Tr = ratio of Tp
```

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

```
PRECIPITATION: ------------------------------------------------------------
Column (1):  Time for time step t
Column (2):  D(t)  = Point on distribution curve for time step t
Column (3):  Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4):  Pa(t) = D(t) x P:        Col.(2) x P


PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) ------------------------
Column (5):  Rap(t) = Accumulated pervious runoff for time step t
             If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
             If (Pa(t) is >  0.2Sp) then use:

             Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6):  Rip(t) = Incremental pervious runoff for time step t
             Rip(t) =         Rap(t)          -          Rap(t-1)
             Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF ----------------------------------------------------
Column (7 & 8)... Did not specify to use impervious areas.


INCREMENTAL WEIGHTED RUNOFF: ---------------------------------------------
Column (9):  R(t)  = (Ap/At) x Rip(t)   +  (Ai/At) x Rii(t)
             R(t)  = (Ap/At) x Col.(6)  +  (Ai/At) x Col.(8)


SCS UNIT HYDROGRAPH METHOD: ----------------------------------------------
Column (10): Q(t)   is computed with the SCS unit hydrograph method
                    using R() and Qu().
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A1 EAST 100y24
Tc             = .4630 hrs
Drainage Area = 18.300 acres  Runoff CN= 81

============================================
Computational Time Increment  =    .06173 hrs
Computed Peak Time            =   6.1116 hrs
Computed Peak Flow            =    47.53 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.1500 hrs
Peak Flow, Interpolated Output =    47.34 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:A1 EAST
             CN    =   81
             Area =        18.300 acres
             S     =   2.3457 in
             0.2S =     .4691 in

              Cumulative Runoff
             -------------------
                     2.4618 in
                      3.754 ac-ft

HYG Volume...          3.755 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .46300 hrs (ID: A1 EAST)
Computational Incr, Tm =    .06173 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =    1.6698 (solved from K =    .7491)

Unit peak,          qp =    44.78 cfs
Unit peak time      Tp =   .30867 hrs
Unit receding limb, Tr =  1.23467 hrs
Total unit time,    Tb =  1.54333 hrs
```

```
              SCS UNIT HYDROGRAPH METHOD

              STORM EVENT: 100 year storm
              Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
              Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
              Rain File -ID =  - TypeIIA 24hr
              Unit Hyd Type = Default Curvilinear
              HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
              HYG File - ID =  - A1 MIDDLE 100y24
              Tc            = .3150 hrs
              Drainage Area = 29.400 acres  Runoff CN= 80

              ============================================
              Computational Time Increment  =   .04200 hrs
              Computed Peak Time            =   6.0900 hrs
              Computed Peak Flow            =    88.35 cfs

              Time Increment for HYG File   =    .0500 hrs
              Peak Time, Interpolated Output =  6.0500 hrs
              Peak Flow, Interpolated Output =   87.86 cfs
              ============================================

                           DRAINAGE AREA
                     -------------------
                     ID:A1 MIDDLE
                     CN   =   80
                     Area =      29.400 acres
                     S    =   2.5000 in
                     0.2S =    .5000 in

                      Cumulative Runoff
                     -------------------
                             2.3766 in
                              5.823 ac-ft

              HYG Volume...           5.823 ac-ft (area under HYG curve)

              ***** SCS UNIT HYDROGRAPH PARAMETERS *****

              Time Concentration, Tc =   .31500 hrs (ID: A1 MIDDLE)
              Computational Incr, Tm =   .04200 hrs = 0.20000 Tp

              Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
              K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
              Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

              Unit peak,          qp =   105.75 cfs
              Unit peak time      Tp =   .21000 hrs
              Unit receding limb, Tr =   .84000 hrs
              Total unit time,    Tb =  1.05000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A1 WEST 100y24
Tc             = .3070 hrs
Drainage Area = 29.800 acres  Runoff CN= 81

============================================
Computational Time Increment   =   .04093 hrs
Computed Peak Time             =   6.0581 hrs
Computed Peak Flow             =    93.93 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    93.21 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:A1 WEST
             CN   =   81
             Area =      29.800 acres
             S    =   2.3457 in
             0.2S =    .4691 in

              Cumulative Runoff
             -------------------
                     2.4618 in
                      6.114 ac-ft

HYG Volume...         6.115 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .30700 hrs (ID: A1 WEST)
Computational Incr, Tm =   .04093 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =   109.98 cfs
Unit peak time       Tp =   .20467 hrs
Unit receding limb, Tr =   .81867 hrs
Total unit time,     Tb =  1.02333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - A2 EAST 100y24
Tc             = .2820 hrs
Drainage Area  = 28.200 acres  Runoff CN= 83

============================================
Computational Time Increment   =   .03760 hrs
Computed Peak Time             =   6.0536 hrs
Computed Peak Flow             =    98.27 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    98.06 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:A2 EAST
              CN    =   83
              Area =      28.200 acres
              S     =   2.0482 in
              0.2S =     .4096 in

               Cumulative Runoff
              -------------------
                      2.6369 in
                       6.197 ac-ft

HYG Volume...          6.197 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28200 hrs (ID: A2 EAST)
Computational Incr, Tm =   .03760 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   113.30 cfs
Unit peak time      Tp =   .18800 hrs
Unit receding limb, Tr =   .75200 hrs
Total unit time,    Tb =   .94000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A2 WEST 100y24
Tc             = .2800 hrs
Drainage Area = 21.300 acres  Runoff CN= 83

============================================
Computational Time Increment    =   .03733 hrs
Computed Peak Time              =   6.0480 hrs
Computed Peak Flow              =    74.41 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output =   6.0500 hrs
Peak Flow, Interpolated Output =    74.32 cfs
============================================

                 DRAINAGE AREA
             -------------------
             ID:A2 WEST
             CN    =   83
             Area =        21.300 acres
             S     =    2.0482 in
             0.2S =     .4096 in

              Cumulative Runoff
             -------------------
                     2.6369 in
                      4.680 ac-ft

HYG Volume...           4.680 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .28000 hrs (ID: A2 WEST)
Computational Incr, Tm =    .03733 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =   483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    86.19 cfs
Unit peak time      Tp =   .18667 hrs
Unit receding limb, Tr =   .74667 hrs
Total unit time,    Tb =   .93333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - A3 EAST 100y24
Tc             = .3020 hrs
Drainage Area  = 25.900 acres  Runoff CN= 84

============================================
Computational Time Increment  =   .04027 hrs
Computed Peak Time            =   6.0803 hrs
Computed Peak Flow            =    91.22 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0500 hrs
Peak Flow, Interpolated Output =   91.18 cfs
============================================

                DRAINAGE AREA
              ------------------
              ID:A3 EAST
              CN   =   84
              Area =      25.900 acres
              S    =   1.9048 in
              0.2S =    .3810 in

               Cumulative Runoff
              ------------------
                      2.7267 in
                       5.885 ac-ft

HYG Volume...          5.885 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .30200 hrs (ID: A3 EAST)
Computational Incr, Tm =   .04027 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    97.17 cfs
Unit peak time      Tp =   .20133 hrs
Unit receding limb, Tr =   .80533 hrs
Total unit time,    Tb =  1.00667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A3 SOUTH 100y24
Tc             = .1020 hrs
Drainage Area = 11.600 acres  Runoff CN= 82

============================================
Computational Time Increment   =   .01360 hrs
Computed Peak Time             =   5.9976 hrs
Computed Peak Flow             =    46.20 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    46.20 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:A3 SOUTH
              CN   =    82
              Area =       11.600 acres
              S    =    2.1951 in
              0.2S =     .4390 in

                Cumulative Runoff
              -------------------
                      2.5486 in
                       2.464 ac-ft

HYG Volume...          2.463 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10200 hrs (ID: A3 SOUTH)
Computational Incr, Tm =   .01360 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   128.86 cfs
Unit peak time      Tp =   .06800 hrs
Unit receding limb, Tr =   .27200 hrs
Total unit time,    Tb =   .34000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - A3 WEST 100y24
Tc            = .2380 hrs
Drainage Area = 23.200 acres  Runoff CN= 84

============================================
Computational Time Increment  =   .03173 hrs
Computed Peak Time            =   6.0293 hrs
Computed Peak Flow            =    87.67 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0500 hrs
Peak Flow, Interpolated Output =   86.91 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:A3 WEST
              CN   =   84
              Area =        23.200 acres
              S    =   1.9048 in
              0.2S =    .3810 in

               Cumulative Runoff
              -------------------
                      2.7267 in
                       5.272 ac-ft

HYG Volume...          5.271 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .23800 hrs (ID: A3 WEST)
Computational Incr, Tm =   .03173 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   110.45 cfs
Unit peak time      Tp =   .15867 hrs
Unit receding limb, Tr =   .63467 hrs
Total unit time,    Tb =   .79333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - DIRECT POND 100y24
Tc (Min. Tc)  = .0833 hrs
Drainage Area = 17.300 acres  Runoff CN= 61

============================================
Computational Time Increment  =   .01111 hrs
Computed Peak Time            =   6.0087 hrs
Computed Peak Flow            =    31.14 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =   30.74 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:DIRECT POND
              CN    =   61
              Area =       17.300 acres
              S     =   6.3934 in
              0.2S =   1.2787 in

               Cumulative Runoff
              -------------------
                     1.0239 in
                      1.476 ac-ft

HYG Volume...           1.475 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08330 hrs (ID: DIRECT POND)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   235.31 cfs
Unit peak time      Tp =   .05553 hrs
Unit receding limb, Tr =   .22213 hrs
Total unit time,    Tb =   .27767 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - GELLES 100y24
Tc (Min. Tc)   = .0833 hrs
Drainage Area  = 16.500 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time             =   5.9976 hrs
Computed Peak Flow             =    82.08 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    81.93 cfs
============================================

                DRAINAGE AREA
             -------------------
             ID:GELLES
             CN    =    92
             Area =       16.500 acres
             S     =     .8696 in
             0.2S =      .1739 in

              Cumulative Runoff
             -------------------
                    3.5049 in
                     4.819 ac-ft

HYG Volume...           4.818 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08330 hrs (ID: GELLES)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   224.43 cfs
Unit peak time      Tp =   .05553 hrs
Unit receding limb, Tr =   .22213 hrs
Total unit time,    Tb =   .27767 hrs
```

```
File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 ULT DEV ESI.PPW
Title... Acreage adjusted to provide proper historic discharge
         rates at approximate time of future pond discharge.
Storm... TypeIIA 24hr   Tag: 100y24

              SCS UNIT HYDROGRAPH METHOD

              STORM EVENT: 100 year storm
              Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
              Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
              Rain File -ID =  - TypeIIA 24hr
              Unit Hyd Type = Default Curvilinear
              HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
              HYG File - ID =  - MDDP OS-A 100y24
              Tc            = .2550 hrs
              Drainage Area = 30.000 acres  Runoff CN= 80

              ============================================
              Computational Time Increment   =   .03400 hrs
              Computed Peak Time             =   6.0520 hrs
              Computed Peak Flow             =    97.13 cfs

              Time Increment for HYG File    =    .0500 hrs
              Peak Time, Interpolated Output =   6.0500 hrs
              Peak Flow, Interpolated Output =    97.03 cfs
              ============================================

                             DRAINAGE AREA
                            -------------------
                            ID:MDDP OS-A
                            CN    =   80
                            Area =       30.000 acres
                            S     =   2.5000 in
                            0.2S =     .5000 in

                             Cumulative Runoff
                            -------------------
                                   2.3766 in
                                    5.941 ac-ft

              HYG Volume...          5.942 ac-ft (area under HYG curve)

              ***** SCS UNIT HYDROGRAPH PARAMETERS *****

              Time Concentration, Tc =   .25500 hrs (ID: MDDP OS-A)
              Computational Incr, Tm =   .03400 hrs = 0.20000 Tp

              Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
              K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
              Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

              Unit peak,           qp =   133.30 cfs
              Unit peak time       Tp =   .17000 hrs
              Unit receding limb,  Tr =   .68000 hrs
              Total unit time,     Tb =   .85000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - MDDP 10 100y24
Tc             = .1330 hrs
Drainage Area = 4.800 acres  Runoff CN= 92

============================================
Computational Time Increment    =   .01773 hrs
Computed Peak Time              =   5.9939 hrs
Computed Peak Flow              =    23.58 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    23.54 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:MDDP 10
              CN    =    92
              Area =        4.800 acres
              S     =     .8696 in
              0.2S =     .1739 in

               Cumulative Runoff
              -------------------
                      3.5049 in
                       1.402 ac-ft

HYG Volume...           1.402 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .13300 hrs (ID: MDDP 10)
Computational Incr, Tm =   .01773 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,           qp =    40.89 cfs
Unit peak time       Tp =   .08867 hrs
Unit receding limb, Tr =   .35467 hrs
Total unit time,     Tb =   .44333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - MDDP 7 AND 13 100y24
Tc             = .1670 hrs
Drainage Area  = 44.600 acres  Runoff CN= 92

============================================
Computational Time Increment  =   .02227 hrs
Computed Peak Time            =   6.0120 hrs
Computed Peak Flow            =   216.26 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =  216.22 cfs
============================================

              DRAINAGE AREA
            -------------------
            ID:MDDP 7 AND 13
            CN    =   92
            Area =       44.600 acres
            S     =     .8696 in
            0.2S =      .1739 in

             Cumulative Runoff
            -------------------
                    3.5049 in
                    13.027 ac-ft

HYG Volume...       13.026 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .16700 hrs (ID: MDDP 7 AND 13)
Computational Incr, Tm =   .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   302.60 cfs
Unit peak time      Tp =   .11133 hrs
Unit receding limb, Tr =   .44533 hrs
Total unit time,    Tb =   .55667 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - MDDP 9 100y24
Tc             = .1500 hrs
Drainage Area  = 32.800 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .02000 hrs
Computed Peak Time             =   6.0000 hrs
Computed Peak Flow             =   160.60 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =   160.60 cfs
============================================

                DRAINAGE AREA
             -------------------
             ID:MDDP 9
             CN    =    92
             Area =        32.800 acres
             S     =     .8696 in
             0.2S =      .1739 in

              Cumulative Runoff
             -------------------
                     3.5049 in
                      9.580 ac-ft

HYG Volume...         9.580 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .15000 hrs (ID: MDDP 9)
Computational Incr, Tm =   .02000 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   247.76 cfs
Unit peak time      Tp =   .10000 hrs
Unit receding limb, Tr =   .40000 hrs
Total unit time,    Tb =   .50000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - MDDP OS-1 EDITCH 100y24
Tc             = 1.2660 hrs
Drainage Area  = 214.900 acres  Runoff CN= 68

============================================
Computational Time Increment   =    .16880 hrs
Computed Peak Time             =    6.7520 hrs
Computed Peak Flow             =    137.99 cfs

Time Increment for HYG File    =     .0500 hrs
Peak Time, Interpolated Output =    6.7500 hrs
Peak Flow, Interpolated Output =    137.96 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:MDDP OS-1 EDITCH
              CN    =    68
              Area  =     214.900 acres
              S     =    4.7059 in
              0.2S  =     .9412 in

               Cumulative Runoff
              -------------------
                      1.4653 in
                      26.240 ac-ft

HYG Volume...         26.241 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   1.26600 hrs (ID: MDDP OS-1 EDITCH)
Computational Incr, Tm =    .16880 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =    1.6698 (solved from K =   .7491)

Unit peak,          qp =    192.33 cfs
Unit peak time      Tp =    .84400 hrs
Unit receding limb, Tr =   3.37600 hrs
Total unit time,    Tb =   4.22000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - MDDP OS-1 WEST 100y24
Tc            = .3430 hrs
Drainage Area = 28.000 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .04573 hrs
Computed Peak Time             =   6.0825 hrs
Computed Peak Flow             =    81.73 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.1000 hrs
Peak Flow, Interpolated Output =    80.57 cfs
============================================

                 DRAINAGE AREA
             -------------------
             ID:MDDP OS-1 WEST
             CN   =   80
             Area =      28.000 acres
             S    =   2.5000 in
             0.2S =    .5000 in

              Cumulative Runoff
             -------------------
                    2.3766 in
                     5.545 ac-ft

HYG Volume...           5.544 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .34300 hrs (ID: MDDP OS-1 WEST)
Computational Incr, Tm =    .04573 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    92.49 cfs
Unit peak time      Tp =   .22867 hrs
Unit receding limb, Tr =   .91467 hrs
Total unit time,    Tb =  1.14333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - MDDP OS-B 100y24
Tc             = .2620 hrs
Drainage Area  = 11.000 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03493 hrs
Computed Peak Time             =   6.0085 hrs
Computed Peak Flow             =    50.46 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    50.18 cfs
============================================

              DRAINAGE AREA
             -------------------
             ID:MDDP OS-B
             CN    =    92
             Area  =       11.000 acres
             S     =     .8696 in
             0.2S  =     .1739 in

              Cumulative Runoff
             -------------------
                     3.5049 in
                      3.213 ac-ft

HYG Volume...            3.213 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26200 hrs (ID: MDDP OS-B)
Computational Incr, Tm =   .03493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    47.57 cfs
Unit peak time      Tp =   .17467 hrs
Unit receding limb, Tr =   .69867 hrs
Total unit time,    Tb =   .87333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R BFR 100y24
Tc             = .2080 hrs
Drainage Area = 22.400 acres  Runoff CN= 98

============================================
Computational Time Increment   =   .02773 hrs
Computed Peak Time             =   5.9904 hrs
Computed Peak Flow             =   117.27 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =   117.04 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:O AND R BFR
              CN   =   98
              Area =      22.400 acres
              S    =    .2041 in
              0.2S =    .0408 in

               Cumulative Runoff
              -------------------
                    4.1642 in
                     7.773 ac-ft

HYG Volume...           7.773 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .20800 hrs (ID: O AND R BFR)
Computational Incr, Tm =   .02773 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   122.02 cfs
Unit peak time      Tp =   .13867 hrs
Unit receding limb, Tr =   .55467 hrs
Total unit time,    Tb =   .69333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R DD 100y24
Tc             = .2350 hrs
Drainage Area = 9.600 acres  Runoff CN= 92

============================================
Computational Time Increment    =   .03133 hrs
Computed Peak Time              =   6.0160 hrs
Computed Peak Flow              =    45.00 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    44.73 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:O AND R DD
              CN   =   92
              Area =       9.600 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                      3.5049 in
                       2.804 ac-ft

HYG Volume...          2.804 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .23500 hrs (ID: O AND R DD)
Computational Incr, Tm =   .03133 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =   46.29 cfs
Unit peak time       Tp =  .15667 hrs
Unit receding limb, Tr =  .62667 hrs
Total unit time,     Tb =  .78333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - O AND R FF 100y24
Tc             = .1750 hrs
Drainage Area = 17.700 acres  Runoff CN= 80

============================================
Computational Time Increment  =   .02333 hrs
Computed Peak Time            =   6.0200 hrs
Computed Peak Flow            =    62.72 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =   61.88 cfs
============================================

                  DRAINAGE AREA
               ------------------
               ID:O AND R FF
               CN   =   80
               Area =      17.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               ------------------
                       2.3766 in
                        3.505 ac-ft

HYG Volume...           3.505 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .17500 hrs (ID: O AND R FF)
Computational Incr, Tm =   .02333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =   114.60 cfs
Unit peak time       Tp =   .11667 hrs
Unit receding limb,  Tr =   .46667 hrs
Total unit time,     Tb =   .58333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R FM FLOWS 100y24
Tc             = .2850 hrs
Drainage Area = 12.800 acres  Runoff CN= 98

============================================
Computational Time Increment   =   .03800 hrs
Computed Peak Time             =   6.0040 hrs
Computed Peak Flow             =    64.85 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    64.75 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:O AND R FM FLOWS
              CN   =   98
              Area =      12.800 acres
              S    =     .2041 in
              0.2S =     .0408 in

                Cumulative Runoff
              -------------------
                      4.1642 in
                       4.442 ac-ft

HYG Volume...          4.442 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28500 hrs (ID: O AND R FM FLOWS)
Computational Incr, Tm =   .03800 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    50.89 cfs
Unit peak time      Tp =   .19000 hrs
Unit receding limb, Tr =   .76000 hrs
Total unit time,    Tb =   .95000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir      = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - O AND R GG 100y24
Tc            = .1780 hrs
Drainage Area = 15.100 acres  Runoff CN= 92

============================================
Computational Time Increment  =   .02373 hrs
Computed Peak Time            =   6.0045 hrs
Computed Peak Flow            =    73.05 cfs

Time Increment for HYG File   =    .0500 hrs
Peak Time, Interpolated Output =  6.0000 hrs
Peak Flow, Interpolated Output =   72.95 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:O AND R GG
              CN   =   92
              Area =      15.100 acres
              S    =     .8696 in
              0.2S =     .1739 in

               Cumulative Runoff
              -------------------
                      3.5049 in
                       4.410 ac-ft

HYG Volume...          4.411 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .17800 hrs (ID: O AND R GG)
Computational Incr, Tm =   .02373 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    96.12 cfs
Unit peak time      Tp =   .11867 hrs
Unit receding limb, Tr =   .47467 hrs
Total unit time,    Tb =   .59333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - O AND R VMR COW 100y24
Tc             = .2170 hrs
Drainage Area  = 10.500 acres  Runoff CN= 93

============================================
Computational Time Increment   =   .02893 hrs
Computed Peak Time             =   6.0181 hrs
Computed Peak Flow             =    50.77 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    50.65 cfs
============================================

                  DRAINAGE AREA
                 -------------------
                 ID:O AND R VMR COW
                 CN   =   93
                 Area =      10.500 acres
                 S    =     .7527 in
                 0.2S =     .1505 in

                  Cumulative Runoff
                 -------------------
                         3.6100 in
                          3.159 ac-ft

HYG Volume...             3.159 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .21700 hrs (ID: O AND R VMR COW)
Computational Incr, Tm =    .02893 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    54.82 cfs
Unit peak time      Tp =   .14467 hrs
Unit receding limb, Tr =   .57867 hrs
Total unit time,    Tb =   .72333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID  =  - TypeIIA 24hr
Unit Hyd Type  = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID  =  - PARK 100y24
Tc             = .1950 hrs
Drainage Area  = 6.400 acres  Runoff CN= 65

============================================
Computational Time Increment   =    .02600 hrs
Computed Peak Time             =    6.0320 hrs
Computed Peak Flow             =     11.66 cfs

Time Increment for HYG File    =     .0500 hrs
Peak Time, Interpolated Output =    6.0500 hrs
Peak Flow, Interpolated Output =     11.64 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:PARK
              CN    =    65
              Area  =        6.400 acres
              S     =    5.3846 in
              0.2S  =    1.0769 in

               Cumulative Runoff
              -------------------
                      1.2682 in
                        .676 ac-ft

HYG Volume...            .676 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .19500 hrs (ID: PARK)
Computational Incr, Tm =   .02600 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,           qp =    37.19 cfs
Unit peak time       Tp =   .13000 hrs
Unit receding limb,  Tr =   .52000 hrs
Total unit time,     Tb =   .65000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration       = 24.0000 hrs     Rain Depth = 4.4000 in
Rain Dir       = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Rain File -ID =  - TypeIIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir        = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
HYG File - ID =  - SCHOOL 100y24
Tc             = .1030 hrs
Drainage Area = 9.100 acres  Runoff CN= 88

============================================
Computational Time Increment    =   .01373 hrs
Computed Peak Time              =   6.0015 hrs
Computed Peak Flow              =    41.88 cfs

Time Increment for HYG File     =    .0500 hrs
Peak Time, Interpolated Output =   6.0000 hrs
Peak Flow, Interpolated Output =    41.85 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:SCHOOL
              CN   =    88
              Area =        9.100 acres
              S    =    1.3636 in
              0.2S =     .2727 in

               Cumulative Runoff
              -------------------
                      3.1023 in
                       2.353 ac-ft

HYG Volume...           2.352 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .10300 hrs (ID: SCHOOL)
Computational Incr, Tm =    .01373 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =    1.6698 (solved from K =    .7491)

Unit peak,          qp =    100.10 cfs
Unit peak time      Tp =    .06867 hrs
Unit receding limb, Tr =    .27467 hrs
Total unit time,    Tb =    .34333 hrs
```

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 ULT DEV ESI.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
6958.00	-----	.0090	.0000	.000	.000
6960.00	-----	.0580	.0898	.060	.060
6962.00	-----	.3550	.5565	.371	.431
6964.00	-----	1.0500	2.0155	1.344	1.775
6966.00	-----	2.0800	4.6078	3.072	4.846
6968.00	-----	3.1950	7.8529	5.235	10.082
6970.00	-----	4.8700	12.0096	8.006	18.088
6972.00	-----	6.1000	16.4204	10.947	29.035
6974.00	-----	7.9430	21.0038	14.003	43.038
6976.00	-----	9.8870	26.6919	17.795	60.832
6978.00	-----	11.5070	32.0603	21.374	82.206
6980.00	-----	13.8980	38.0511	25.367	107.573

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 ULT DEV ESI.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6958.00 ft
Increment = .20 ft
Max. Elev.= 6980.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Inlet Box	Ib	--->	CV	6964.000	6980.000
Orifice-Circular	Or	--->	CV	6958.000	6980.000
Culvert-Circular	Cv	--->	TW	6958.000	6980.000
TW SETUP, DS Channel					

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 ULT DEV ESI.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = Ib
Structure Type = Inlet Box

# of Openings	=	1
Invert Elev.	=	6964.00 ft
Orifice Area	=	25.0000 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	20.00 ft
Weir Coeff.	=	3.000
K, Submerged	=	.000
K, Reverse	=	1.000
Kb,Barrel	=	.000000 (per ft of full flow)
Barrel Length	=	.00 ft
Mannings n	=	.0000

Structure ID = Or
Structure Type = Orifice-Circular

# of Openings	=	1
Invert Elev.	=	6958.00 ft
Diameter	=	1.0000 ft
Orifice Coeff.	=	.600

File.... G:\Projects\08001\Woodmen Heights\Pondpack\ESI\POND 6 ULT DEV ESI.PPW

```
OUTLET STRUCTURE INPUT DATA


Structure ID       = Cv
Structure Type     = Culvert-Circular
------------------------------------
No. Barrels        =        1
Barrel Diameter    =   2.4000 ft
Upstream Invert    =  6958.00 ft
Dnstream Invert    =  6946.00 ft
Horiz. Length      =   538.00 ft
Barrel Length      =   538.13 ft
Barrel Slope       =   .02230 ft/ft

OUTLET CONTROL DATA...
Mannings n         =    .0150
Ke                 =    .0000  (forward entrance loss)
Kb                 =  .012958  (per ft of full flow)
Kr                 =    .0200  (reverse entrance loss)
HW Convergence     =     .001  +/- ft

INLET CONTROL DATA...
Equation form      =        1
Inlet Control K    =    .0098
Inlet Control M    =   2.0000
Inlet Control c    =   .03980
Inlet Control Y    =    .6700
T1 ratio (HW/D)    =    1.149
T2 ratio (HW/D)    =    1.296
Slope Factor       =    -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =   6960.76 ft  --->  Flow =     24.53 cfs
At T2 Elev =   6961.11 ft  --->  Flow =     28.03 cfs


Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir           = G:\Projects\08001\Woodmen Heights\Pondpack\ESI\
Inflow  HYG file = NONE STORED - POND 6        IN  100y24
Outflow HYG file = NONE STORED - POND 6        OUT 100y24

Pond Node   Data = POND 6
Pond Volume Data = POND 6
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev    =  6958.00 ft
Starting Volume     =     .000 ac-ft
Starting Outflow    =      .00 cfs
Starting Infiltr.   =      .00 cfs
Starting Total Qout=       .00 cfs
Time Increment      =    .0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY
====================================================
Peak Inflow       =   1810.68 cfs    at    6.0000 hrs
Peak Outflow      =     70.39 cfs    at    8.2500 hrs
----------------------------------------------------
Peak Elevation    =   6978.38 ft
Peak Storage =          86.689 ac-ft
====================================================

MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =     140.551
- Infiltration  =        .000
- HYG Vol OUT   =     140.551
- Retained Vol  =        .000
                   ----------
  Unrouted Vol  =        .000 ac-ft  (.000% of Inflow Volume)
```

Index of Starting Page Numbers for ID Names

REGIONAL DETENTION POND
WATER QUALITY CAPTURE VOLUME

Pond No. 3

- Ia = 62%
- I = 0.62
- Area = 1050 acres
- WQCV = 0.24 watershed inches

- Volume = **27.9** acre-feet

Pond No. 6

- Ia = 65%
- I = 0.65
- Area = 650 acres
- WQCV = 0.26 watershed inches

- Volume = **16.9** acre-feet