MASTER DEVELOPMENT DRAINAGE PLAN
FOR
THE ESTATES AT MIDDLE CREEK

J R ENGINEERING
A Subsidiary of

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A Subsidiary of Westrian

MASTER DEVELOPMENT DRAINAGE PLAN
FOR
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July 2000
Revised March 2001
Revised June 2001

Prepared For:

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MASTER DEVELOPMENT DRAINAGE PLAN FOR THE ESTATES AT MIDDLE CREEK

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DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT:
The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

COLORADO REGISTERED AARON B. EGBERT 34208 PROFESSIONAL ENGINEER

Aaron B. Egbert, Colorado P.E. #34208
For and On Behalf of JR Engineering, LLC

6-22-01
Date

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

Business Name: 117, LLC dba RMC Corporation

By: Robert P. Osborne

Title: President

Address: P.O. Box 908

Colorado Springs, CO 80906

CITY OF COLORADO SPRINGS ONLY:
Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

City Engineer

July 16, 2001
Date

Conditions:

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MASTER DEVELOPMENT DRAINAGE PLAN FOR THE ESTATES AT MIDDLE CREEK

PURPOSE

This document is the Master Development Drainage Plan (M.D.D.P.) for The Estates at Middle Creek. The purpose of this report is to analyze the phased development and create the foundation for each final drainage report, which will be filed with the subdivision plats. This report will estimate peak rates of storm water runoff, recommend solutions for drainage problems resulting from development, and detail the proposed system along Middle Creek to enable the developer to construct single family residential lots as well as the drainage improvement along Middle Creek.

GENERAL DESCRIPTION

The Estates at Middle Creek is located in the southeast quarter of Section 8, the southwest quarter of Section 9 and the northeast quarter of Section 17, Township 12 South, Range 66 West of the Sixth Principal Meridian in the City of Colorado Springs, County of El Paso. The site is bounded to the north by unplatted county land, to the west by Middle Creek Manor and a future school site, to the south by Trailridge at Northgate, and to the east by unplatted county land. Zoning of this 116.8-acre site will be PUD hillside overlay. Proposed use is single family residential development containing 244 lots.

The Estates at Middle Creek is located in an existing valley, which slopes from the north and south to the main channel of Middle Creek. The grades range from 3:1 to 3%. Vegetation is native grass with pods of grambling oak and pine trees. The grading for this site lies within a hillside overlay zone to help minimize grading, however specific areas will be overlot graded. The soil condition reflects Hydrologic Group "B" (Crowfoot, Tomah, and Payton) and Group "C" (Kutch) soils as determined by the "Soil Survey of El Paso County Area," prepared by S.C.S. (See Appendix).

EXISTING DRAINAGE CONDITIONS

The Estates at Middle Creek is located within the Middle Tributary Drainage Basin and an insignificant portion of Monument Branch Drainage Basin. In the analysis of this site, JR Engineering used the "Middle Tributary Drainage Basin Planning Study," by URS Consultants, 1987, in combination with the "Master Development Drainage Plan for Middle Creek Manor at Northgate," by JR Engineering. Currently, the site drains into both the Monument Branch and Middle Tributary basins.

PROPOSED DRAINAGE CHARACTERISTICS

After construction of The Estates at Middle Creek, on-site and off-site runoff will be routed through a detention/retention system (existing stock ponds will be reconstructed and used as a water feature) to the existing drainage channel constructed with Trailridge. Per the Drainage Basin Planning Study (D.B.P.S.) prepared by URS, this development will require the construction of a regional detention facility (Design Point 4 per the D.B.P.S.) and a partially lined channel. At this time the developer is proposing to modify the existing stock ponds to detain a portion of the developed flows in each of the three detention ponds and route the storm event in a partially lined natural appearing channel (typical cross sections of the channel has been included in the appendix). A regional trail will be paralleling this main drainage channel. A future Development Plan will detail the location and size of this trail. Special efforts will be made to preserve and enhance the existing open spaces, drainage ways, ponds and vegetation since they will be a focal point for the project. The developer has plans to build out this development in four (4) phases. Starting on the west end and working east. The exact phase lines have not been determined at this time but will be by time the of the Development Plan submittal. A description of the off-site, on-site, detention facilities and channel improvements follows.

Off-Site Basins

There are four major off-site basins which will be routed through this site into Middle Creek Tributary. This report has calculated the runoff quantities as 1/4-acre residential densities and recreated the D.B.P.S. runoff rates at the east boundary line of The Estates at Middle Creek. The peak 100-year runoff rate is 247 cfs. This M.D.D.P. has anticipated that the developed flow rate

will not exceed 247 cfs (OS-3). The peak 100-year developed runoff from (OS-4) per the D.B.P.S. would be 148 cfs, but JR Engineering has calculated the developed 100-year flow rate to be 169 cfs. Based upon conversations with the adjacent property owners (Classic Homes), these calculations should be a conservative model for their future development runoff quantities. The runoff quantities could be less if their golf course development alternative is pursued. The Drainage Basin Planning Study anticipated some commercial development along Powers Boulevard. However, there is no planned interchange with Powers east of our site. Therefore commercial development in this area appears very unlikely. When the land develops, a Master Development Drainage Plan will be required and additional detention east of the site may be required if high developed runoff quantities are anticipated.

Basin OS-1 consists of 5.8 acres of assumed ¼-acre single family residential development as per the Drainage Basin Planning Study. Runoff (Q_5 = 5.8 cfs, Q_{100} = 18.0 cfs) will sheet flow to the north boundary and be conveyed via side lot line swales to Oak Pointe Drive. Curb and gutter or an on-site storm system designed at the time of final platting will route the flows south into Middle Creek Tributary.

Basin OS-2's 10.6 acres also consists of future ¼-acre single family residential development. Runoff (Q_5 = 13.4 cfs, Q_{100} = 36.9 cfs) will sheet flow on to the site via side lot line swales and be directed to the Creekhurst Drive street section.

Basin OS-3 is comprised of 73.7 acres of future ¼-acre single family development to the east of the site. Runoff (Q_5 = 71.5cfs, Q_{100} = 211.4 cfs) will be directed to the proposed lined channel at The Estates at Middle Creek's east boundary via the Middle Creek Tributary and any future storm drain systems needed at the time of final design. A majority of the flow from Basin OS-3 will enter the site from the east in the existing Middle Creek. A small portion of this basin will sheet flow onto Basin D. A proposed 50' drainage easement will take most of this flow, while a side yard swales will convey the rest of the runoff safely through the lots and onto Creekhurst Drive.

As with the previous three (3) off-site basins, Basin OS-4 consists of 49.4 acres of ¼-acre single family development. Runoff (Q_5 = 70.1 cfs, Q_{100} = 179.9 cfs) will be directed by a future storm

drain system to an existing rip-rap channel which was constructed by the City of Colorado Springs for the water tank. The lined channel will point discharge onto the site at the southeast corner of "The Estates at Middle Creek" to the proposed trapezoidal lined channel. A small portion of runoff will sheet flow to drainage easements and side lot line swales so that the runoff can safely be routed through the lots.

On-Site Basins

On-site basins will combine with the previously mentioned off-site basins and be routed into the main channel of Middle Creek where three (3) on-site detention facilities along the Middle Creek Tributary will work in conjunction with each other to release developed flows at or below historic levels at the southwest corner of the site.

Basin A1 consists of 2.9 acres and Basin A2 consists of 1.5 acres of residential development. Runoff (Q_5 = 3.9 cfs, Q_{100} = 12.7 cfs) will be conveyed via curb and gutter to proposed 12' at grade inlets, DP-0 and DP-00. These inlets are to help minimize the runoff onto "Middle Creek Manor Filing No. 1." See the Rational Method for Sizing Inlets calculations in the appendix for DP-0 and DP-00 for inlet pickup and flow-by. The captured flows (Q_5 = 4.9 cfs, Q_{100} = 7.2 cfs) are then directed to Pond 3 via a R.C.P. The flow-by (Q_5 = 2.4 cfs, Q_{100} = 7.6 cfs) is directed offsite to the existing "Middle Creek Manor Filing No. 1."

Basin A3's 3.0 acres consists of rear yards that sheet flow onto "Middle Creek Manor Filing No. 1." The runoff (Q_5 = 3.2 cfs, Q_{100} = 9.7 cfs) is directed to a low point in Bridle Oaks Drive where two existing 14' sump inlets will pickup the flow along with the flow-by from the at-grade inlets from Basins A1 and A2. To ensure that the existing storm sewer system and detention facility can adequately convey Basins A1, A2 and A3, a model of "Middle Creek Manor Filing No. 1." was setup and recalculated (see appendix) to check the extra flows. The existing system can handle these flows, which includes the existing sump inlets, storm drains, and detention facility. A more detailed look should be given to this existing system at the time of the Final Drainage Report.

Basin A4's 3.6 acres consists of single family development. Runoff (Q_5 = 3.1 cfs, Q_{100} = 10.0 cfs) is directed offsite and onto "Middle Creek Manor Filing No. 2." A model of "Middle Creek Manor Filing No. 2." was also setup to check how the extra flows would affect the existing system. The runoff is directed to the existing Design Points 1 and 2, a 4' and 12' sump inlet. Due to an error in the construction drawings of "Middle Creek Manor Filing No. 2" the 12' inlet at Design Point 2 sits about 0.8' higher than the 4' inlet. The 4' inlet can handle some of the extra flow before some of the runoff overtops the northwest flowline-flowline intersection of Brook Hill Drive and Rockbridge Circle. The runoff is then directed south to Design Points 3 and 4, two 4' sump inlets. The two 4' inlets can handle the extra flow with an increased ponding depth that should not effect any surrounding lots. Calculations for the above mentioned model can be found in the appendix. At the time of the Final Drainage Report more detail and as-builts should be preformed to verify the exact nature of the model.

Basin A5's 2.4 acres consists of open space, which will be a school site someday. Runoff (Q_5 = 2.5 cfs, Q_{100} = 7.5 cfs) sheet flows west offsite in natural path.

Basin B consists of 36.0 acres of residential lots. The west 1/4 of Basin B will be overlot graded while the east 3/4 will be graded as a hillside area to preserve natural features. The runoff (Q_5 = 30.8 cfs, Q_{100} = 100.1 cfs) from Basin B was calculated using Pondpack's SCS. Basin B was broken down into 5 sub-basins so street capacities and inlet location could be determined. Following is a description of the 5 sub-basins, Basins B1-B5.

Basin B1 is 6.11 acres of residential development located at the north boundary. Runoff (Q_5 = 12.6 cfs, Q_{100} = 25.0 cfs) will sheet flow to Oakmount Drive. The combined runoff (Q_5 = 24.7 cfs, Q_{100} = 53.4 cfs) of Basins B1 and OS-1 will be captured in a 20' sump inlet and then routed south to Pond 2 in a R.C.P. storm drain.

Basin B2's 7.24 acres also consists of single family development. Runoff (Q_5 = 15.9 cfs, Q_{100} = 31.8 cfs) sheet flows to Bridle Oaks Drive where it is directed to a 12' at-grade inlet (Design Point 2). The captured flows (Q_5 = 4.5 cfs, Q_{100} = 6.4 cfs) are then directed to Pond 2 via a R.C.P. The flow-by (Q_5 = 11.4 cfs, Q_{100} = 25.3 cfs) is directed west to Design Point 3.

Basin B3 is 8.38 acres of single family development. Runoff (Q_5 = 16.5 cfs, Q_{100} = 32.3 cfs) sheet flows to the street sections and is directed to a low point where two 18' sump inlets (Design Point 5) will collect the flow along with the flow-by from Design Points 2, 3, and 4.

Basin B4's 6.42 acres also are single family development. Runoff (Q_5 = 13.0 cfs, Q_{100} = 25.7 cfs) sheet flows to Broad Oaks Drive and then is routed south to Design Point 3, a 12' at-grade inlet. The captured flows (Q_5 = 4.1 cfs, Q_{100} = 5.8 cfs) are then directed to Pond 3 via a R.C.P. The flow-by (Q_5 = 9.0 cfs, Q_{100} = 19.9 cfs) is directed west to Design Point 3.

Basin B5's 4.39 acres also are single family development. Runoff (Q_5 = 8.9 cfs, Q_{100} = 17.6 cfs) sheet flows to Broad Oaks Drive and then is routed south to Design Point 4, a 12' at-grade inlet. The captured flows (Q_5 = 3.3 cfs, Q_{100} = 4.7 cfs) are then directed to Pond 3 via a R.C.P. The flow-by (Q_5 = 5.6 cfs, Q_{100} = 12.9 cfs) is directed west to Design Point 3.

Design Point 5 consists of two 18' sump inlets. The combined runoff (Q_5 = 42.6 cfs, Q_{100} = 90.9 cfs) from Basin 3 and the flow-by from Design Points 2-4 are captured and routed to Pond 3.

Basin C consists of 9.6 acres of residential lots. Runoff (Q_5 = 14.8 cfs, Q_{100} = 36.8 cfs) will collect at a sump location in Woodmont Drive, where a storm drain will convey runoff into the main channel.

Basin C1 consists of 1.2 acres of residential lots and street section. Runoff (Q_5 = 2.2 cfs, Q_{100} = 5.2 cfs) will sheet flow to the street section and be directed to a low point in a cul-de-sac where it will routed south to Channel No. 3

Basin D consists of 13.4 acres of residential lots. Developed runoff (Q_5 = 20.7 cfs, Q_{100} = 51.4 cfs) combines with previously mentioned off-site Basin OS-2 and is routed via Woodmont Drive and Creekhurst Drive to a sump location. Storm inlets will intercept surface runoff and direct it in to the proposed lined channel. A 5'x 5' box culvert or equivalent R.C.P. will be constructed under Creekhurst Drive to convey the previously mentioned off-site Basin OS-3.

Basin E consists of 8.7 acres of residential lots. Runoff (Q_5 = 14.2 cfs, Q_{100} = 36.4 cfs) will sheet flow to a sump location in Creekhurst Drive. An inlet system will intercept the developed flows and convey the runoff into the main channel.

Basin F consists of 4.5 acres of residential lots and open space (Pond 1). The developed runoff (Q_5 =6.5 cfs, Q_{100} = 16.7 cfs) will sheet flow into the main channel and detention/retention facility. The routing detention system will be discussed later in this report.

Basin G consists of 19.9 acres of residential lots and open space (Pond 2). The developed runoff (Q_5 = 28.0 cfs, Q_{100} = 72.6 cfs) will sheet flow into the main channel and detention/retention facility.

Basin H consists of 5.6 acres of residential lots. Developed runoff (Q_5 = 8.8 cfs, Q_{100} = 21.9 cfs) will sheet flow into Tenny Crags Road and collect at a sump inlet location and outfall into the main channel.

Basin I consists of 10.76 acres of open space (Pond 3) and residential lots. The developed runoff will be (Q_5 = 6.0 cfs, Q_{100} = 21.6 cfs) and will sheet flow into the main channel and pond.

Detention System

As mentioned earlier in the report, there are three (3) ponds along the channel. Pond 1 being at the east end of the channel on the site. Pond 2 located in the center of the site along the channel and Pond 3 being located at the southwest corner of the site along the channel where it will discharge offsite into an existing lined channel. The first two ponds (Pond 1 and Pond 2) will be built where existing stockponds are now located. Pond 1 and Pond 2 will also be retention /detention ponds, having permanent water in them. A water feature may be proposed by the client, which will allow a small flow in the lined channel between Pond 1 and Pond 2 (viewable areas). These two ponds will store storm runoff above the fixed permanent water surface elevation. Pond 1 and Pond 2's permanent water feature will be considered a private feature and therefore need to be maintained by the Homeowners' Association (all surface maintenance). The outlet works and inlet systems for Pond 1 and Pond 2 along with Pond 3 will be public and maintained by the city.

Detention Pond 1 (easterly pond) collects the combined runoff (Q_5 = 107.8 cfs, Q_{100} = 313.1 cfs) of Basins D and E, and offsite Basins OS-2 and OS-3. From elevation 6840.00 to 6848.00 the pond will permanently retain water. From elevation 6848.00 to 6854.25 the 3.93 acre-foot of volume is used to store the runoff from storm events. A 4' wide by 2' high culvert box opening set at an elevation of 6848.00 will pass the minor events. A 4' x 4' grate inlet box set at 6850.75 will help to pass the major storms. The peak outflow for Pond 1 is (Q_5 = 69.0 cfs, Q_{100} = 191.8 cfs). The top of pond is set at 6856.00 with a 40' x 1.75' emergency spillway set at 6855.3 to help pass the developed 100-year event in case of failure.

Detention Pond Number 2 (central pond) has permanent water stored in it from elevation 6795.00 to 6803.00. From elevation 6803.00 to 6810.32 the pond stores storm runoff. The combined runoff (Q_5 = 171.0 cfs, Q_{100} = 494.0 cfs) at Basins C, E, G, OS-4A and OS-4 along with the release of Pond 1 are stored in this 6.59 acre-foot pond. The 100-year water surface elevation is 6810.32. A 2.5' high by 5' wide culvert box opening with an invert set at 6803.00 will pass the minor events. A 5' by 5' grated inlet set on top of the culvert box at an elevation of 6806.00. The peak outflow for Pond 2 is Q_5 = 90.0.3 cfs, Q_{100} = 302.5 cfs. A 55' by 2' emergency spillway set at 6810.7 will pass the 100-year developed flow in case of failure in the outlet structure.

Detention Pond 3 (westerly pond) is the last pond along the channel. This pond will not have permanent water in the bottom. It will act as the detention facility detailed in the "Middle Tributary Drainage Basin Planning Study" as Design Point 4. The peak inflow for this pond is Q_5 = 115.1 cfs, Q_{100} = 428.7 cfs. The allowable release rate per the D.B.P.S. is Q_{100} = 445 cfs. Per the historic model in Pondpack the allowable release rate for the 2-year is Q_2 = 25.3 cfs, 5-year is Q_5 = 87.9 cfs, 10-year is Q_{10} = 145.3 cfs, and the 50-year is Q_{50} = 324.1 cfs. The peak release rate for Pond 3 in the 100-year event is Q_{100} = 291.1 cfs. At the time of the Final Drainage Report the historic flows for the other storm events will need to be kept to historic levels. A 1' x 5' culvert box set at an elevation of 6760.00 will pass the minor flows. A 5' x 5' grate inlet box set at an elevation of 6763.00 will sit on top of the culvert box. A 2' x 55' emergency spillway set at 6770.5 will pass the complete 100-year developed flows in case of failure.

Channel Improvements

As mentioned earlier, the existing Middle Creek will need to some channel improvements per the D.B.P.S. Proposed cross sections of the channel can be found in the appendix. The creek will have installed a trickle channel and be partially lined while adding some drop structures to help minimize the velocities. A profile of Middle Creek can be found in the appendix. Using slopes of two percent and minimizing the discharge from Pond 1 and Pond 2, a target velocity of 6 to 7 fps was achieved. Middle Creek will have some road crossings. Box culverts and R.C.P. will be installed in several locations. Channels 1 through 4 cross public roads and carry public water therefore they will need to be maintained by the city. Channel 5 entering from the south, crosses under a private drive, and therefore should be maintained by the Homeowners Association. Sediment traps located along the creek are proposed in several locations. These sediment traps would help to eliminate sediment runoff downstream during the years of construction and while the creek banks have a chance to stabilize. For the first few years, the sediment traps would be considered private and be maintained by the Homeowners Association. After construction and the creek is stable, these sediment traps should not have to be maintained. They then can become public in a maintenance agreement. These agreements can be finalized at the time of the Final Drainage Report. A more detailed look at each channel reach and their improvements follows.

Channel 1 is roughly two hundred feet long and begins at the entrance of Pond 3. This part of the creek has a lot of vegetation alongside it therefore a smaller cross section (see appendix) for grading this channel will be used. Saving as much brush oak and trees is a goal for this reach of Middle Creek. The channel will carry a discharge of Q_5 = 91.2 cfs, Q_{100} = 306.0 cfs, and have a velocity of 7.8 fps in the 100-year event.

Channel 2 runs from Channel 1 to the outlet structure for Pond 2. This channel has a sixty-foot wide cross section (see appendix) and is partially lined and has drop structures. The channel will also carry a discharge of Q_5 = 91.2 cfs, Q_{100} = 306.0 cfs, and have a velocity of 6.3 fps in the 100-year event.

Channel 3's nine hundred feet of the 60' wide improved channel will consist of drop structures and a trickle channel. Middle Creek Channel 3 will run from the entrance of Pond 2 to the outlet structure of Pond 1. A private sediment trap located at the entrance for Pond 2 will help collect floating silt particles. The creek will follow its natural path and be regraded with side slopes of 4:1. The channel will carry a discharge of $Q_5 = 87.6$ cfs, $Q_{100} = 250.0$ cfs, and have a velocity of 6.3 fps in the 100-year event. A 6'x 6' box culvert or equivalent will carry the runoff under Creek Hurst Drive. A 42" R.C.P. or equivalent will discharge the runoff from Pond 1's outlet structure into Channel Reach 3.

Channel 4 runs from the entrance of Pond 1 to the east boundary of the site. T his portion of Middle Creek also contains a trickle channel and will be regraded to the proposed 50'cross section (see appendix). There are a couple of drop structures along this run and also a private sediment trap just upstream of the 5' x 5' box culvert crossing of Creek Hurst Drive. This portion of the channel is designed to carry a $Q_5 = 82.1$ cfs, $Q_{100} = 250.0$ cfs, and has a velocity of 6.3 fps in the 100-year event.

Channel 5 is the tributary to Middle Creek from the south. The twelve hundred feet of improved channel will also have the same cross section as channel 4. Channel 5 runs from the sediment trap at the entrance to Pond 2 southeast to Northgate Filing No. 2. The channel will cross under a private drive in a private 5' x 5' box culvert or equivalent R.C.P. A sediment trap will be placed just upstream of this crossing. This portion of the channel is designed to carry a $Q_5 = 98.6$ cfs, $Q_{100} = 253.0$ cfs, and has a velocity of 6.3 fps in the 100-year event.

REIMBURSABLE FACILITIES

JR Engineering has reviewed the Middle Tributary Drainage Basin Planning Study, which calculated the drainage fee including initial systems. The original drainage fee was calculated to be $2,766.00 in 1987, the current fee is $3938.00, that is a 1.424 multiplier. The following is a quantity list from the D.B.P.S. and associated cost estimate for 1987 and also adjusted by the multiplier for 2001 dollars.

	Description	Quantity	Unit Cost	Cost (1987)	Multiplier	Cost (2001)
1.	Drop structure	8 EACH	$17,00.00/EA	$ 136,000.00	1.424	$ 193,626.00
2.	Reach 1B.	1400 L.F.	$80.00/L.F.	$ 112,000.00	1.424	$ 159,456.00
3.	42" R.C.P.	160 L.F.	$125.00/L.F.	$ 20,000.00	1.424	$ 28,474.00
4.	5'x5" Culvert	160 L.F.	$160.00/L.F.	$ 25,600.00	1.424	$ 36,447.00
5.	54" R.C.P.	160 L.F.	$148.00/L.F.	$ 23,680.00	1.424	$ 33,713.00
6.	Design Point 4	1 POND		$ 190,000.00	1.424	$ 270,506.00
			Sub-Totals	**$ 507,280.00**		**$ 722,222.00**
			5% Construction Contingencies	$ 25,364.00		$ 36,111.00
			10% Engineering	$ 50,728.00		$ 72,222.00
			TOTALS	**$ 583,372.00**		**$ 830,555.00**

Based upon the D.B.P.S., there is $830,555.00 worth of reimbursable facilities required within this sub-basin. These facilities will be replaced with the improvements for "The Estates at Middle Creek."

HYDROLOGIC/HYDRAULIC CRITERIA

This report has been prepared in accordance with the 1991 City/County Drainage Criteria Manual. The S.C.S. Method was used to estimate storm water runoff anticipated from design storms with a 5-year and 100-year recurrence interval. (Current Criteria dated October 12, 1994). To check the capacity of the system for the adjacent developments to the west the Modified Rational Method was used to recreate that existing information.

FLOODPLAIN STATEMENT

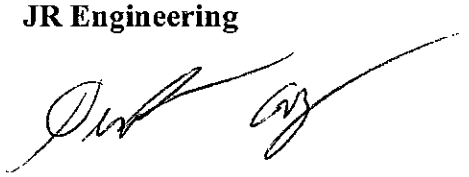
No portion of this site is located within the floodplain as determined by the Flood Insurance Rate Map (F. I .R .M.) Community Panel Number 0841C0295F, dated March 17, 1997.

SUMMARY

This Master Development Drainage Plan for The Estates at Middle Creek detailed the peak runoffs, solutions for drainage problems and laid the groundwork for the channel improvements and the detention/retention ponds. At the time of final platting and construction drawings for each individual filing a final drainage report will need to detail all final solutions in conformance with this M.D.D.P. Construction of this subdivision will affect the developments to the west. The capacities of the existing systems for these developments have been checked and should be detailed at the time of the Final Drainage Report. The 2, 5, 10, 50 and 100-year releases from Pond 3 will be kept at or below historic levels. All drainage facilities were sized using the 1991 City of Colorado Springs Drainage Criteria and will safely discharge storm water runoff to adequate outfalls.

PREPARED BY:

JR Engineering



Quentin N. Armijo, E.I.
Project Engineer

/kd/863944/mddp

REFERENCES

1. City of Colorado Springs/County of El Paso Drainage Criteria Manual, dated October 1991.

2. "Master Development Drainage Plan for Middle Creek Manor at Northgate," JR Engineering, Ltd., 1998.

3. "Middle Tributary Drainage Basin Planning Study," URS Consultants, 1987.

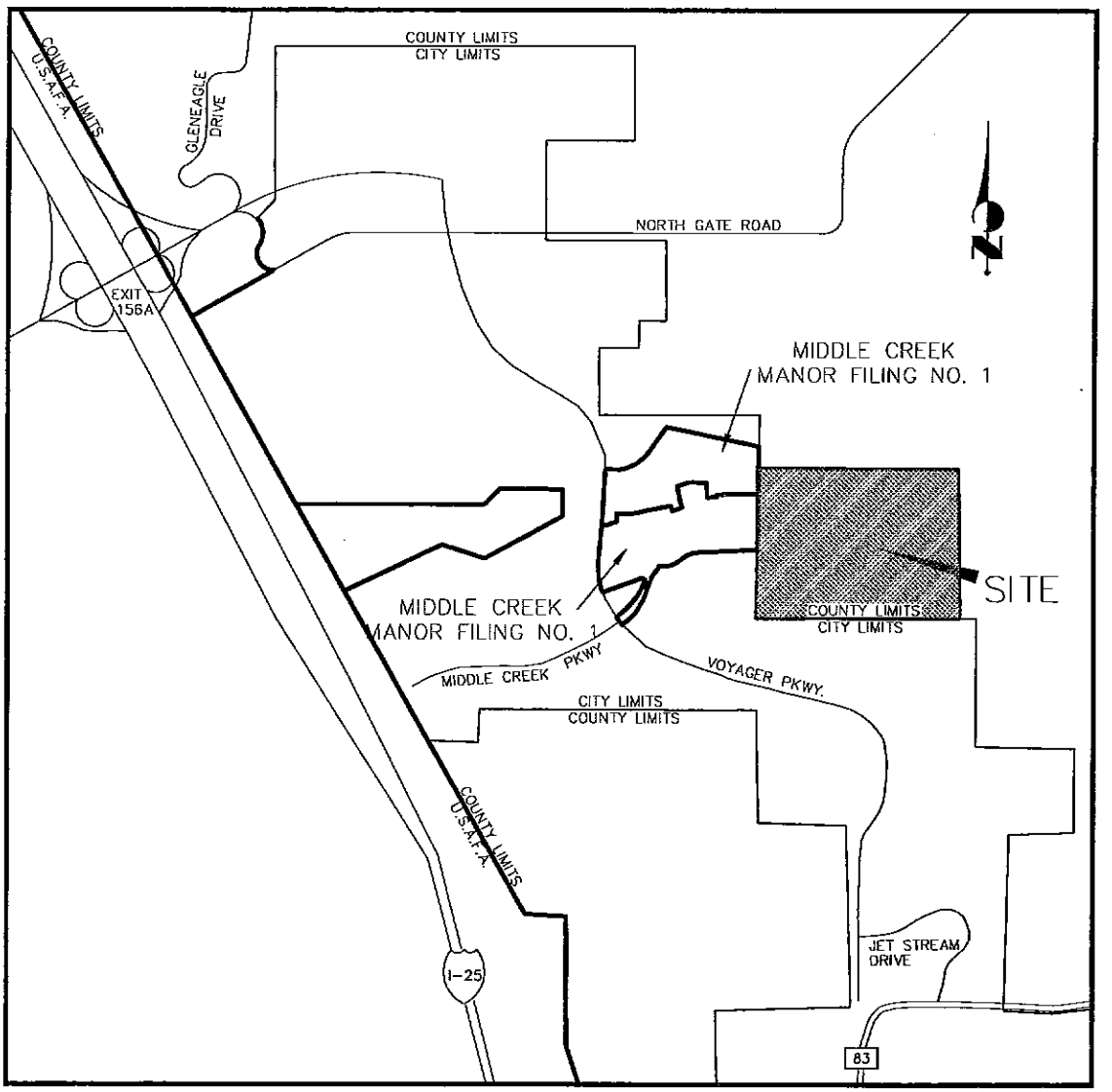
4. "M.D.D.P. for the Northgate Software Campus," JR Engineering, Ltd., 1998.

5. "Middle Creek Manor Filing No. 1," JR Engineering, Ltd., 1998.

6. "Middle Creek Manor Filing No. 2," JR Engineering, Ltd., 1999.

APPENDIX

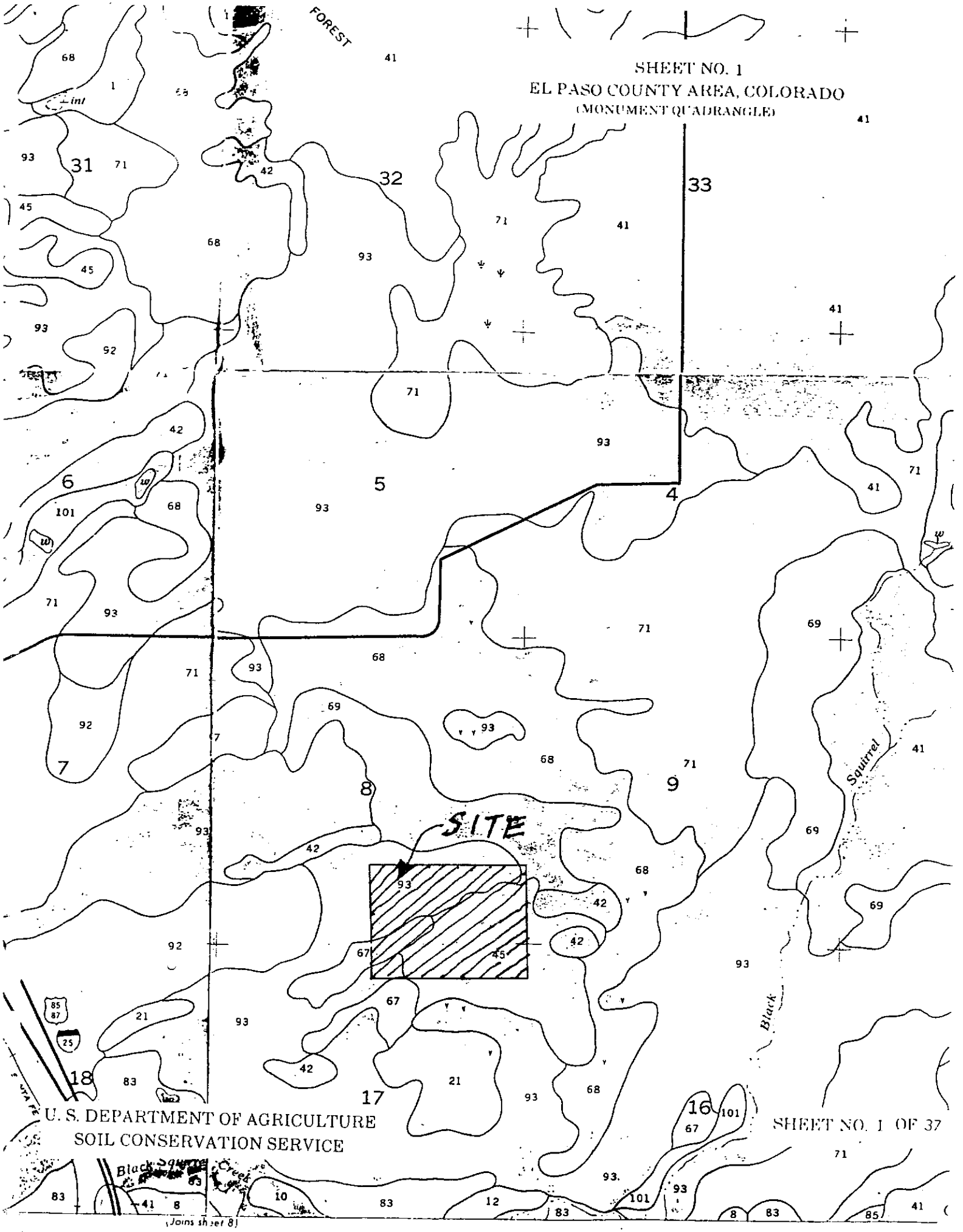
VICINITY MAP



VICINITY MAP

N.T.S.

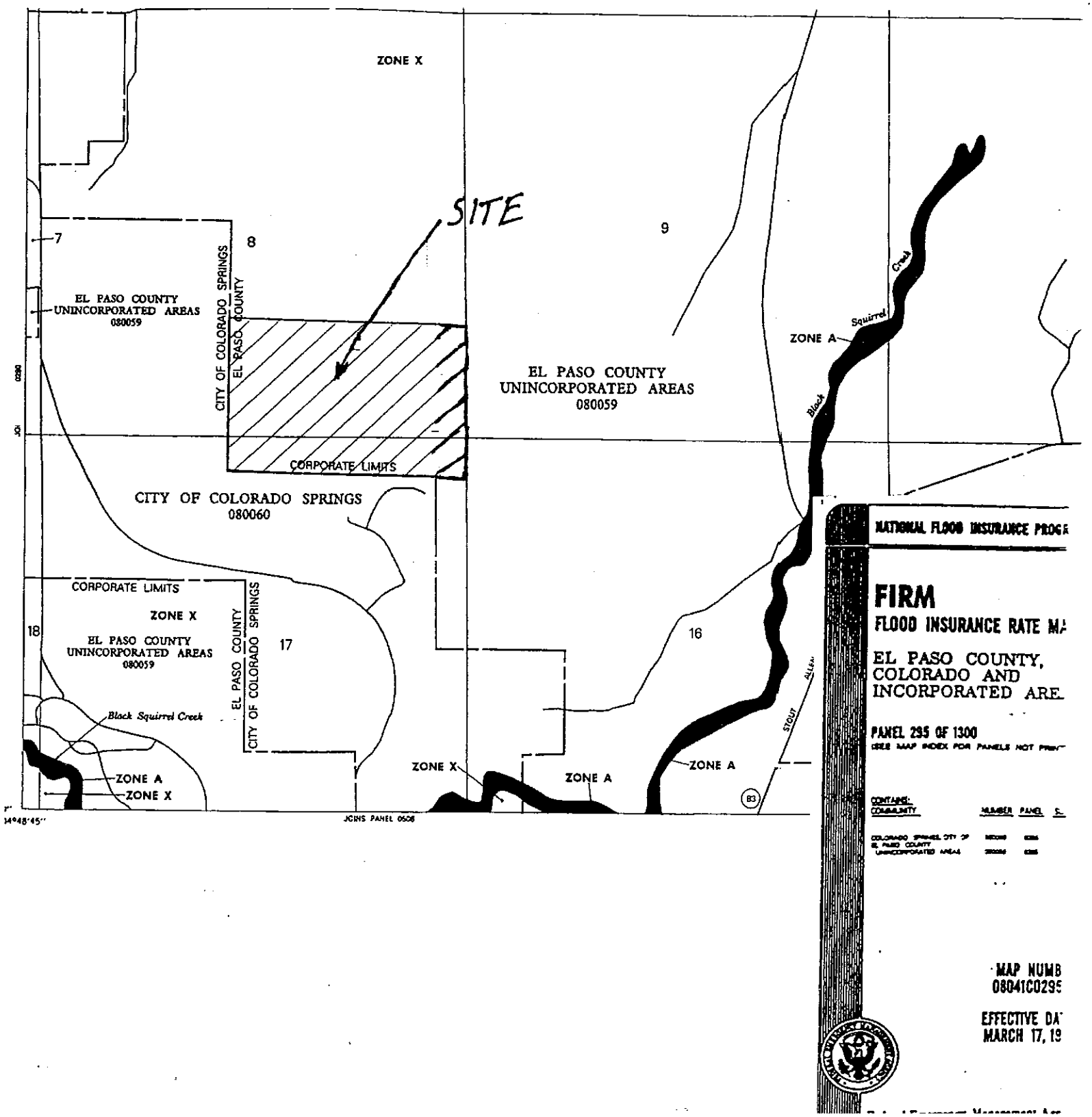
S. C. S. SOIL MAP


SHEET NO. 1
EL PASO COUNTY AREA, COLORADO
(MONUMENT QUADRANGLE)
FOREST
SITE
Squirrel
Black
Black Squirrel Creek
(Joins sheet 8)
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SHEET NO. 1 OF 37

F. E. M. A. FLOODPLAIN MAP

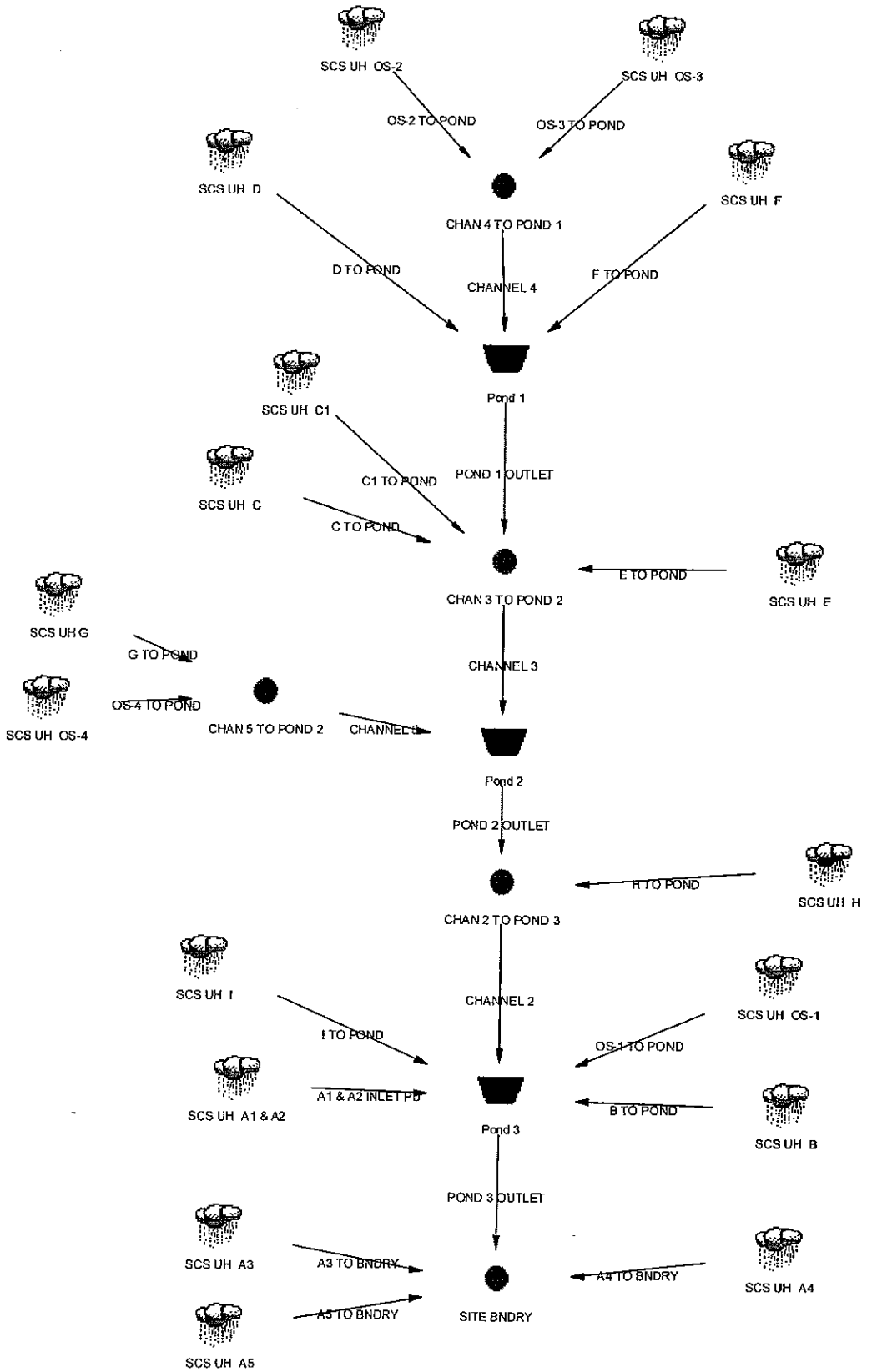
Community-Panel Number
08041C 0295 F

Effective Date:
March 17, 1997



HYDROLOGIC & HYDRAULIC CALCULATIONS

Overall Routing Plan


SCS UH OS-2
SCS UH OS-3
OS-2 TO POND
OS-3 TO POND
SCS UH D
SCS UH F
CHAN 4 TO POND 1
D TO POND
CHANNEL 4
F TO POND
Pond 1
SCS UH C1
SCS UH C
C1 TO POND
POND 1 OUTLET
C TO POND
CHAN 3 TO POND 2
E TO POND
SCS UH E
SCS UH G
G TO POND
CHANNEL 3
SCS UH OS-4
OS-4 TO POND
CHAN 5 TO POND 2
CHANNEL 5
Pond 2
POND 2 OUTLET
H TO POND
SCS UH H
CHAN 2 TO POND 3
SCS UH I
CHANNEL 2
SCS UH OS-1
I TO POND
OS-1 TO POND
SCS UH A1 & A2
A1 & A2 INLET PD
B TO POND
SCS UH B
Pond 3
POND 3 OUTLET
SCS UH A3
A3 TO BNDRY
SCS UH A4
A4 TO BNDRY
SITE BNDRY
A5 TO BNDRY
SCS UH A5

THE ESTATES AT MIDDLE CREEK
BASIN RUNOFF SUMMARY

BASIN	TOTAL AREA *(Acres)*	Q_5	Q_{100}
A1 & A2	4.4	3.9	12.7
A3	3.0	3.2	9.7
A4	3.6	3.1	10.0
A5	2.4	2.5	7.5
B	36.0	30.8	100.1
C	9.6	14.8	36.8
C1	1.2	2.2	5.2
D	13.4	20.7	51.4
E	8.7	14.2	36.4
F	4.5	6.5	16.7
G	19.9	28.0	72.6
H	5.6	8.8	21.9
I	8.3	6.0	21.6
OS-1	5.8	5.8	18.0
OS-2	10.6	13.4	36.9
OS-3	73.7	71.5	211.4
OS-4	49.4	70.1	179.9

THE ESTATES AT MIDDLE CREEK
MDDP
(Developed Area Curve Number Summary)

		DEVELOPED		UNDEVELOPED		WEIGHTED
BASIN	TOTAL AREA (Acres)	AREA (Acres)	CN	AREA (Acres)	CN	CN
A1	2.9	2.9	75	0.0	69	75
A2	1.5	1.5	75	0.0	69	75
A3	3.0	3.0	75	0.0	69	75
A4	3.6	3.6	75	0.0	69	75
A5	2.4	2.4	75	0.0	69	75
B	36.0	35.5	75	0.5	69	75
C	9.6	9.1	83	0.6	79	83
C1	1.2	1.2	83	0.0	79	83
D	13.4	12.2	83	1.1	79	83
E	8.7	8.1	83	0.5	79	83
F	4.5	2.7	83	1.7	79	81
G	19.9	10.6	83	9.3	79	81
H	5.6	4.4	83	1.2	79	82
I	8.3	3.3	75	5.0	69	71
OS-1	5.8	5.8	75	0.0	69	75
OS-2	10.6	10.6	75	0.0	69	75
OS-3	73.7	73.7	75	0.0	69	75
OS-4	49.4	49.4	83	0.0	79	83

DESIGN BY: QNA
DATE: 6/19/01
CHECHKED BY

THE ESTATES AT MIDDLE CREEK
MDDP
(Historic Area Curve Number Summary)

		"B" SOIL		*"C" SOIL*		*WEIGHTED*
BASIN	**TOTAL AREA**	**AREA**	**CN**	**AREA**	**CN**	**CN**
	(Acres)	*(Acres)*		*(Acres)*		
HIST-ON	116.8	58.8	61	58.0	74	***67***
HIST-OFF	139.8	90.4	61	49.4	74	***66***

DESIGN BY: QNA

DATE: 6/19/01

CHECHKED BY

5-Year Event

Job File: X:\2860000.ALL\2863944\SPREADSHEETS\5Y-DEV.PPW
Rain Dir: H:\PPKW\RAINFALL\

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

5YR DEVELOPED CALCULATIONS
ESTATES AT MIDDLE CREEK.
PONDS WITH DEAD STORAGE.
ORIGINAL RUN DONE IN MARCH
REVISED MAY 15, 2001 WITH NEW GRADING
AND NEW BASINS
REVISED AGAIN 6/19/01 WITH NEW BASINS FOR FINAL APPROVAL
QUENTIN ARMIJO

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********** DESIGN STORMS SUMMARY **********

2.6in-5yr-24hr.. Design Storms 1.01

********** RUNOFF HYDROGRAPHS **********

SCS UH A1 & A2 24hr
SCS Unit Hyd. Summary 2.01

SCS UH A3..... 24hr
SCS Unit Hyd. Summary 2.02

SCS UH A4..... 24hr
SCS Unit Hyd. Summary 2.03

SCS UH A5..... 24hr
SCS Unit Hyd. Summary 2.04

SCS UH B..... 24hr
SCS Unit Hyd. Summary 2.05

SCS UH C..... 24hr
SCS Unit Hyd. Summary 2.06

SCS UH C1..... 24hr
SCS Unit Hyd. Summary 2.07

SCS UH D..... 24hr
SCS Unit Hyd. Summary 2.08

SCS UH E..... 24hr
SCS Unit Hyd. Summary 2.09

SCS UH F..... 24hr
SCS Unit Hyd. Summary 2.10

SCS UH H..... 24hr
SCS Unit Hyd. Summary 2.11

SCS UH I..... 24hr
SCS Unit Hyd. Summary 2.12

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SCS UH OS-1.... 24hr
SCS Unit Hyd. Summary 2.13

SCS UH OS-2.... 24hr
SCS Unit Hyd. Summary 2.14

SCS UH OS-3.... 24hr
SCS Unit Hyd. Summary 2.15

SCS UH OS-4.... 24hr
SCS Unit Hyd. Summary 2.16

SCS UH G..... 24hr
SCS Unit Hyd. Summary 2.17

********** HYG ADDITION **********

CHAN 2 TO POND 3 24hr
Node: Addition Summary 3.01

CHAN 3 TO POND 2 24hr
Node: Addition Summary 3.05

CHAN 4 TO POND 1 24hr
Node: Addition Summary 3.09

CHAN 5 TO POND 2 24hr
Node: Addition Summary 3.12

SITE BNDRY..... 24hr
Node: Addition Summary 3.15

********** OUTLET STRUCTURES **********

POND 1 OUTLETA.. Outlet Input Data 4.01

POND 2 OULETA... Outlet Input Data 4.04

POND 3 OUTLETA.. Outlet Input Data 4.07

********** POND ROUTING **********

POND 1 OUT 24hr
Pond Routing Summary 5.01

Table of Contents (continued)

POND 2 OUT 24hr
Pond Routing Summary 5.02

POND 3 OUT 24hr
Pond Routing Summary 5.03

File.... H:\PPKW\RAINFALL\COLOSPGS.RNQ
Title... 5YR DEVELOPED CALCULATIONS
ESTATES AT MIDDLE CREEK.
PONDS WITH DEAD STORAGE.
ORIGINAL RUN DONE IN MARCH
REVISED MAY 15, 2001 WITH NEW GRADING
AND NEW BASINS
REVISED AGAIN 6/19/01 WITH NEW BASINS FOR FINAL
APPROVAL
QUENTIN ARMIJO

DESIGN STORMS SUMMARY

Design Storm File,ID = COLOSPGS.RNQ 2.6in-5yr-24hr

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiia-24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 2.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A1 & A2 24hr
Tc = .2600 hrs
Drainage Area = 4.440 acres Runoff CN= 75

==========
Computational Time Increment = .03467 hrs
Computed Peak Time = 6.0667 hrs
Computed Peak Flow = 4.04 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 3.93 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 4.440 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

.7097 in
.263 ac-ft

HYG Volume... .263 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .26000 hrs (ID: None Selected)
Computational Incr, Tm = .03467 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 = 19.35 cfs
Unit peak time Tp = .17333 hrs
Unit receding limb, Tr = .69333 hrs
Total unit time, Tb = .86667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A3 24hr
Tc = .1600 hrs
Drainage Area = 3.010 acres Runoff CN= 75

==========
Computational Time Increment = .02133 hrs
Computed Peak Time = 6.0373 hrs
Computed Peak Flow = 3.27 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 3.18 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 3.010 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

.7097 in
.178 ac-ft

HYG Volume... .178 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .16000 hrs (ID: None Selected)
Computational Incr, Tm = .02133 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 = 21.32 cfs
Unit peak time Tp = .10667 hrs
Unit receding limb, Tr = .42667 hrs
Total unit time, Tb = .53333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A4 24hr
Tc = .2800 hrs
Drainage Area = 3.600 acres Runoff CN= 75

==========
Computational Time Increment = .03733 hrs
Computed Peak Time = 6.0853 hrs
Computed Peak Flow = 3.14 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.1000 hrs
Peak Flow, Interpolated Output = 3.08 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 3.600 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

.7097 in
.213 ac-ft

HYG Volume... .213 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .28000 hrs (ID: None Selected)
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 = 14.57 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: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A5 24hr
Tc = .2000 hrs
Drainage Area = 2.430 acres Runoff CN= 75

==========
Computational Time Increment = .02667 hrs
Computed Peak Time = 6.0533 hrs
Computed Peak Flow = 2.47 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 2.47 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 2.430 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

.7097 in
.144 ac-ft

HYG Volume... .144 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .20000 hrs (ID: None Selected)
Computational Incr, Tm = .02667 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 = 13.77 cfs
Unit peak time Tp = .13333 hrs
Unit receding limb, Tr = .53333 hrs
Total unit time, Tb = .66667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH B 24hr
Tc = .2800 hrs
Drainage Area = 36.000 acres Runoff CN= 75

==========
Computational Time Increment = .03733 hrs
Computed Peak Time = 6.0853 hrs
Computed Peak Flow = 31.44 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.1000 hrs
Peak Flow, Interpolated Output = 30.82 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 36.000 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

.7097 in
2.129 ac-ft

HYG Volume... 2.129 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .28000 hrs (ID: None Selected)
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 = 145.68 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: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH C 24hr
Tc = .2500 hrs
Drainage Area = 9.600 acres Runoff CN= 83

==========
Computational Time Increment = .03333 hrs
Computed Peak Time = 6.0667 hrs
Computed Peak Flow = 14.87 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 14.80 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 9.600 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

1.1319 in
.906 ac-ft

HYG Volume... .906 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: None Selected)
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 = 43.51 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: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH C1 24hr
Tc = .1000 hrs
Drainage Area = 1.200 acres Runoff CN= 83

==========
Computational Time Increment = .01333 hrs
Computed Peak Time = 6.0133 hrs
Computed Peak Flow = 2.24 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0000 hrs
Peak Flow, Interpolated Output = 2.23 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 1.200 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

1.1319 in
.113 ac-ft

HYG Volume... .113 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .10000 hrs (ID: None Selected)
Computational Incr, Tm = .01333 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 = 13.60 cfs
Unit peak time Tp = .06667 hrs
Unit receding limb, Tr = .26667 hrs
Total unit time, Tb = .33333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH D 24hr
Tc = .2500 hrs
Drainage Area = 13.400 acres Runoff CN= 83

==========
Computational Time Increment = .03333 hrs
Computed Peak Time = 6.0667 hrs
Computed Peak Flow = 20.76 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 20.65 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 13.400 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

1.1319 in
1.264 ac-ft

HYG Volume... 1.264 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: None Selected)
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 = 60.73 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: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH E 24hr
Tc = .3000 hrs
Drainage Area = 10.000 acres Runoff CN= 83

==========
Computational Time Increment = .04000 hrs
Computed Peak Time = 6.0800 hrs
Computed Peak Flow = 14.51 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 14.19 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 10.000 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

1.1319 in
.943 ac-ft

HYG Volume... .943 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .30000 hrs (ID: None Selected)
Computational Incr, Tm = .04000 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 = 37.77 cfs
Unit peak time Tp = .20000 hrs
Unit receding limb, Tr = .80000 hrs
Total unit time, Tb = 1.00000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH F 24hr
Tc = .2100 hrs
Drainage Area = 4.500 acres Runoff CN= 81

==========
Computational Time Increment = .02800 hrs
Computed Peak Time = 6.0480 hrs
Computed Peak Flow = 6.56 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 6.54 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 81
Area = 4.500 acres
S = 2.3457 in
0.2S = .4691 in

Cumulative Runoff

1.0143 in
.380 ac-ft

HYG Volume... .380 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .21000 hrs (ID: None Selected)
Computational Incr, Tm = .02800 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 = 24.28 cfs
Unit peak time Tp = .14000 hrs
Unit receding limb, Tr = .56000 hrs
Total unit time, Tb = .70000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH G 24hr
Tc = .2300 hrs
Drainage Area = 19.900 acres Runoff CN= 81

==========
Computational Time Increment = .03067 hrs
Computed Peak Time = 6.0413 hrs
Computed Peak Flow = 28.10 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 27.98 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 81
Area = 19.900 acres
S = 2.3457 in
0.2S = .4691 in

Cumulative Runoff

1.0143 in
1.682 ac-ft

HYG Volume... 1.682 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .23000 hrs (ID: None Selected)
Computational Incr, Tm = .03067 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 = 98.03 cfs
Unit peak time Tp = .15333 hrs
Unit receding limb, Tr = .61333 hrs
Total unit time, Tb = .76667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH H 24hr
Tc = .1900 hrs
Drainage Area = 5.600 acres Runoff CN= 82

==========
Computational Time Increment = .02533 hrs
Computed Peak Time = 6.0293 hrs
Computed Peak Flow = 8.89 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 8.77 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 82
Area = 5.600 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

1.0720 in
.500 ac-ft

HYG Volume... .500 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .19000 hrs (ID: None Selected)
Computational Incr, Tm = .02533 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 = 33.39 cfs
Unit peak time Tp = .12667 hrs
Unit receding limb, Tr = .50667 hrs
Total unit time, Tb = .63333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH I 24hr
Tc = .2100 hrs
Drainage Area = 8.300 acres Runoff CN= 71

==========
Computational Time Increment = .02800 hrs
Computed Peak Time = 6.0480 hrs
Computed Peak Flow = 5.99 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 5.98 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 71
Area = 8.300 acres
S = 4.0845 in
0.2S = .8169 in

Cumulative Runoff

.5419 in
.375 ac-ft

HYG Volume... .375 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .21000 hrs (ID: None Selected)
Computational Incr, Tm = .02800 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 = .14000 hrs
Unit receding limb, Tr = .56000 hrs
Total unit time, Tb = .70000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-1 24hr
Tc = .2300 hrs
Drainage Area = 6.100 acres Runoff CN= 75

==========
Computational Time Increment = .03067 hrs
Computed Peak Time = 6.0720 hrs
Computed Peak Flow = 5.80 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 5.77 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 6.100 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

.7097 in
.361 ac-ft

HYG Volume... .361 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .23000 hrs (ID: None Selected)
Computational Incr, Tm = .03067 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 = 30.05 cfs
Unit peak time Tp = .15333 hrs
Unit receding limb, Tr = .61333 hrs
Total unit time, Tb = .76667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-2 24hr
Tc = .1800 hrs
Drainage Area = 10.600 acres Runoff CN= 78

==========
Computational Time Increment = .02400 hrs
Computed Peak Time = 6.0480 hrs
Computed Peak Flow = 13.52 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 13.44 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 78
Area = 10.600 acres
S = 2.8205 in
0.2S = .5641 in

Cumulative Runoff

.8535 in
.754 ac-ft

HYG Volume... .754 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .18000 hrs (ID: None Selected)
Computational Incr, Tm = .02400 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 = 66.72 cfs
Unit peak time Tp = .12000 hrs
Unit receding limb, Tr = .48000 hrs
Total unit time, Tb = .60000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-3 24hr
Tc = .3400 hrs
Drainage Area = 73.700 acres Runoff CN= 78

==========
Computational Time Increment = .04533 hrs
Computed Peak Time = 6.1200 hrs
Computed Peak Flow = 71.94 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.1000 hrs
Peak Flow, Interpolated Output = 71.45 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 78
Area = 73.700 acres
S = 2.8205 in
0.2S = .5641 in

Cumulative Runoff

.8535 in
5.242 ac-ft

HYG Volume... 5.236 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .34000 hrs (ID: None Selected)
Computational Incr, Tm = .04533 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 = 245.60 cfs
Unit peak time Tp = .22667 hrs
Unit receding limb, Tr = .90667 hrs
Total unit time, Tb = 1.13333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-4 24hr
Tc = .3000 hrs
Drainage Area = 49.400 acres Runoff CN= 83

==========
Computational Time Increment = .04000 hrs
Computed Peak Time = 6.0800 hrs
Computed Peak Flow = 71.67 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 70.08 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 49.400 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

1.1319 in
4.660 ac-ft

HYG Volume... 4.659 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .30000 hrs (ID: None Selected)
Computational Incr, Tm = .04000 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 = 186.57 cfs
Unit peak time Tp = .20000 hrs
Unit receding limb, Tr = .80000 hrs
Total unit time, Tb = 1.00000 hrs

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 2 TO POND 3

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
POND 2 OUTLET H TO POND	POND 2 SCS UH H	IN	POND 2 OUTLET SCS UH H	24hr 24hr

INFLOWS TO: CHAN 2 TO POND 3

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
POND 2 OUTLET	24hr		15.937	6.3500	89.97
SCS UH H	24hr		.500	6.0500	8.77

TOTAL FLOW INTO: CHAN 2 TO POND 3

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
CHAN 2 TO POND 3	24hr		16.438	6.3500	91.19

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 3 TO POND 2

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
C TO POND	SCS UH C		SCS UH C	24hr
C1 TO POND	SCS UH C1		SCS UH C1	24hr
E TO POND	SCS UH E		SCS UH E	24hr
POND 1 OUTLET	POND 1	IN	POND 1 OUTLET	24hr

INFLOWS TO: CHAN 3 TO POND 2

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	SCS UH C	24hr	.906	6.0500	14.80
	SCS UH C1	24hr	.113	6.0000	2.23
	SCS UH E	24hr	.943	6.0500	14.19
	POND 1 OUTLET	24hr	7.635	6.2500	68.98

TOTAL FLOW INTO: CHAN 3 TO POND 2

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	CHAN 3 TO POND 2	24hr	9.597	6.2000	87.16

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 4 TO POND 1

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OS-3 TO POND	SCS UH OS-3	SCS UH	OS-3	24hr
OS-2 TO POND	SCS UH OS-2	SCS UH	OS-2	24hr

INFLOWS TO: CHAN 4 TO POND 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
SCS UH	OS-3	24hr	5.236	6.1000	71.45
SCS UH	OS-2	24hr	.754	6.0500	13.44

TOTAL FLOW INTO: CHAN 4 TO POND 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
CHAN 4 TO POND 1		24hr	5.990	6.1000	82.07

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 5 TO POND 2

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OS-4 TO POND	SCS UH	OS-4	SCS UH	OS-4 24hr
G TO POND	SCS UH	G	SCS UH	G 24hr

INFLOWS TO: CHAN 5 TO POND 2

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
SCS UH	OS-4	24hr	4.659	6.0500	70.08
SCS UH	G	24hr	1.682	6.0500	27.98

TOTAL FLOW INTO: CHAN 5 TO POND 2

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
CHAN 5 TO POND 2		24hr	6.341	6.0500	98.06

SUMMARY FOR HYDROGRAPH ADDITION
at Node: SITE BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
POND 3 OUTLET	POND 3	IN	POND 3 OUTLET	24hr
A4 TO BNDRY	SCS UH A4		SCS UH A4	24hr
A5 TO BNDRY	SCS UH A5		SCS UH A5	24hr
A3 TO BNDRY	SCS UH A3		SCS UH A3	24hr

INFLOWS TO: SITE BNDRY

		Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
POND 3 OUTLET	24hr	19.565	6.3000	106.69
SCS UH A4	24hr	.213	6.1000	3.08
SCS UH A5	24hr	.144	6.0500	2.47
SCS UH A3	24hr	.178	6.0500	3.18

TOTAL FLOW INTO: SITE BNDRY

		Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
SITE BNDRY	24hr	20.100	6.3000	108.80

File.... X:\2860000.ALL\2863944\SPREADSHEETS\5Y-DEV.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6848.00 ft
Increment = .50 ft
Max. Elev.= 6856.00 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	---> TW	6850.750	6856.000
Culvert-Box		---> TW	6848.000	6856.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = IB
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 6850.75 ft
Orifice Area = 9.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 12.00 ft
Weir Coeff. = 3.400
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Culvert-Box

No. Barrels = 1
Barrel Height = 2.00 ft
Barrel Width = 4.00 ft
Upstream Invert = 6848.00 ft
Dnstream Invert = 6847.00 ft
Horiz. Length = 10.00 ft
Barrel Length = 10.05 ft
Barrel Slope = .10000 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .008457 (per ft of full flow)
Kr = .5000 (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 = .03850
Inlet Control Y = .8100
T1 ratio (HW/D) = 1.128
T2 ratio (HW/D) = 1.376
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 = 6850.26 ft ---> Flow = 39.60 cfs
At T2 Elev = 6850.75 ft ---> Flow = 45.25 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

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6803.00 ft
Increment = .50 ft
Max. Elev.= 6812.00 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	---> TW	6807.000	6812.000
Culvert-Box	CB	---> TW	6803.000	6812.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = IB
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 6807.00 ft
Orifice Area = 16.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 16.00 ft
Weir Coeff. = 3.400
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

OUTLET STRUCTURE INPUT DATA

Structure ID = CB
Structure Type = Culvert-Box

No. Barrels = 1
Barrel Height = 2.50 ft
Barrel Width = 5.00 ft
Upstream Invert = 6803.00 ft
Dnstream Invert = 6802.00 ft
Horiz. Length = 10.00 ft
Barrel Length = 10.05 ft
Barrel Slope = .10000 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .006281 (per ft of full flow)
Kr = .5000 (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 = .03850
Inlet Control Y = .8100
T1 ratio (HW/D) = 1.128
T2 ratio (HW/D) = 1.376
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 = 6805.82 ft ---> Flow = 69.17 cfs
At T2 Elev = 6806.44 ft ---> Flow = 79.06 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

File.... X:\2860000.ALL\2863944\SPREADSHEETS\5Y-DEV.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6760.00 ft
Increment = .50 ft
Max. Elev.= 6772.00 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	---> TW	6763.000	6772.000
Culvert-Box	cb	---> TW	6760.000	6772.000

TW SETUP, DS Channel

File.... X:\2860000.ALL\2863944\SPREADSHEETS\5Y-DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = ib
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 6763.00 ft
Orifice Area = 16.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 16.00 ft
Weir Coeff. = 3.400
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

File.... X:\2860000.ALL\2863944\SPREADSHEETS\5Y-DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = cb
Structure Type = Culvert-Box

No. Barrels = 1
Barrel Height = 1.00 ft
Barrel Width = 5.00 ft
Upstream Invert = 6760.00 ft
Dnstream Invert = 6758.00 ft
Horiz. Length = 70.00 ft
Barrel Length = 70.03 ft
Barrel Slope = .02857 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .015826 (per ft of full flow)
Kr = .5000 (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 = .03850
Inlet Control Y = .8100
T1 ratio (HW/D) = 1.164
T2 ratio (HW/D) = 1.412
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 = 6761.16 ft ---> Flow = 17.50 cfs
At T2 Elev = 6761.41 ft ---> Flow = 20.00 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 = X:\2860000.ALL\2863944\SPREADSHEETS\
Inflow HYG file = NONE STORED - POND 1 IN 24hr
Outflow HYG file = NONE STORED - POND 1 OUT 24hr

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

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6848.00 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 = 107.58 cfs at 6.0500 hrs
Peak Outflow = 68.98 cfs at 6.2500 hrs

Peak Elevation = 6851.25 ft
Peak Storage = 1.789 ac-ft

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 7.635
- Infiltration = .000
- HYG Vol OUT = 7.635
- Retained Vol = .000

Unrouted Vol = .000 ac-ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
Inflow HYG file = NONE STORED - POND 2 IN 24hr
Outflow HYG file = NONE STORED - POND 2 OUT 24hr

Pond Node Data = POND 2
Pond Volume Data = POND 2
Pond Outlet Data = POND 2 OULETA

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6803.00 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 = 170.99 cfs at 6.1000 hrs
Peak Outflow = 89.97 cfs at 6.3500 hrs

Peak Elevation = 6806.90 ft
Peak Storage = 3.664 ac-ft

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 15.938
- Infiltration = .000
- HYG Vol OUT = 15.937
- Retained Vol = .000

Unrouted Vol = .000 ac-ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
Inflow HYG file = NONE STORED - POND 3 IN 24hr
Outflow HYG file = NONE STORED - POND 3 OUT 24hr

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

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6760.00 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 = 115.09 cfs at 6.1500 hrs
Peak Outflow = 106.69 cfs at 6.3000 hrs

Peak Elevation = 6764.08 ft
Peak Storage = .841 ac-ft

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 19.565
- Infiltration = .000
- HYG Vol OUT = 19.565
- Retained Vol = .000

Unrouted Vol = -.000 ac-ft (.000% of Inflow Volume)

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----- C -----
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CHAN 4 TO POND 1 24hr... 3.09
CHAN 5 TO POND 2 24hr... 3.12, 5.01

----- P -----
POND 1 OUTLETA... 4.01, 5.02
POND 2 OULETA... 4.04, 5.03
POND 3 OUTLETA... 4.07

----- S -----
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SCS UH A3 24hr... 2.02
SCS UH A4 24hr... 2.03
SCS UH A5 24hr... 2.04
SCS UH B 24hr... 2.05
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SCS UH OS-4 24hr... 2.16
SCS UH G 24hr... 2.17
SITE BNDRY 24hr... 3.15

100-Year Event

Job File: X:\2860000.ALL\2863944\SPREADSHEETS\100Y-DEV.PPW
Rain Dir: H:\PPKW\RAINFALL\

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

100YR DEVELOPED CALCULATIONS
ESTATES AT MIDDLE CREEK.
PONDS WITH DEAD STORAGE.
ORIGINAL RUN DONE IN MARCH
REVISED MAY 15, 2001 WITH NEW GRADING
AND NEW BASINS
REVISED AGAIN 6/19/01 WITH NEW BASINS FOR FINAL APPROVAL
QUENTIN ARMIJO

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SCS Unit Hyd. Summary 2.01

SCS UH A3..... 24hr
SCS Unit Hyd. Summary 2.02

SCS UH A4..... 24hr
SCS Unit Hyd. Summary 2.03

SCS UH A5..... 24hr
SCS Unit Hyd. Summary 2.04

SCS UH B..... 24hr
SCS Unit Hyd. Summary 2.05

SCS UH C..... 24hr
SCS Unit Hyd. Summary 2.06

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SCS Unit Hyd. Summary 2.08

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SCS Unit Hyd. Summary 2.09

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SCS UH I..... 24hr
SCS Unit Hyd. Summary 2.12

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SCS Unit Hyd. Summary 2.13

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SCS UH OS-3.... 24hr
SCS Unit Hyd. Summary 2.15

SCS UH OS-4.... 24hr
SCS Unit Hyd. Summary 2.16

SCS UH G..... 24hr
SCS Unit Hyd. Summary 2.17

********** HYG ADDITION **********

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CHAN 3 TO POND 2 24hr
Node: Addition Summary 3.05

CHAN 4 TO POND 1 24hr
Node: Addition Summary 3.09

CHAN 5 TO POND 2 24hr
Node: Addition Summary 3.12

SITE BNDRY..... 24hr
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********** OUTLET STRUCTURES **********

POND 1 OUTLETA.. Outlet Input Data 4.01

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********** POND ROUTING **********

POND 1 OUT 24hr
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POND 2 OUT 24hr
Pond Routing Summary 5.02

POND 3 OUT 24hr
Pond Routing Summary 5.03

File.... H:\PPKW\RAINFALL\COLOSPGS.RNQ
Title... 100YR DEVELOPED CALCULATIONS
ESTATES AT MIDDLE CREEK.
PONDS WITH DEAD STORAGE.
ORIGINAL RUN DONE IN MARCH
REVISED MAY 15, 2001 WITH NEW GRADING
AND NEW BASINS
REVISED AGAIN 6/19/01 WITH NEW BASINS FOR FINAL
APPROVAL
QUENTIN ARMIJO

DESIGN STORMS SUMMARY

Design Storm File,ID = COLOSPGS.RNQ 4.6in-100yr-24hr

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiia-24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 4.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Title... BASIN A1 AND A2 COMPRISED OF THE FLOW PICKED UP IN AT GRADE INLETS OVER CONSERVATIVE.
Storm... scsiia-24hr Tag: 24hr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A1 & A2 24hr
Tc = .2600 hrs
Drainage Area = 4.440 acres Runoff CN= 75

==========
Computational Time Increment = .03467 hrs
Computed Peak Time = 6.0667 hrs
Computed Peak Flow = 12.79 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 12.71 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 4.440 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

2.1291 in
.788 ac-ft

HYG Volume... .788 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .26000 hrs (ID: None Selected)
Computational Incr, Tm = .03467 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 = 19.35 cfs
Unit peak time Tp = .17333 hrs
Unit receding limb, Tr = .69333 hrs
Total unit time, Tb = .86667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A3 24hr
Tc = .1600 hrs
Drainage Area = 3.010 acres Runoff CN= 75

==========
Computational Time Increment = .02133 hrs
Computed Peak Time = 6.0160 hrs
Computed Peak Flow = 9.81 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0000 hrs
Peak Flow, Interpolated Output = 9.66 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 3.010 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

2.1291 in
.534 ac-ft

HYG Volume... .534 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .16000 hrs (ID: None Selected)
Computational Incr, Tm = .02133 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 = 21.32 cfs
Unit peak time Tp = .10667 hrs
Unit receding limb, Tr = .42667 hrs
Total unit time, Tb = .53333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A4 24hr
Tc = .2800 hrs
Drainage Area = 3.600 acres Runoff CN= 75

==========
Computational Time Increment = .03733 hrs
Computed Peak Time = 6.0480 hrs
Computed Peak Flow = 10.01 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 10.01 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 3.600 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

2.1291 in
.639 ac-ft

HYG Volume... .639 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .28000 hrs (ID: None Selected)
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 = 14.57 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 = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH A5 24hr
Tc = .2000 hrs
Drainage Area = 2.430 acres Runoff CN= 75

==========
Computational Time Increment = .02667 hrs
Computed Peak Time = 6.0267 hrs
Computed Peak Flow = 7.57 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 7.50 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 2.430 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

2.1291 in
.431 ac-ft

HYG Volume... .431 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .20000 hrs (ID: None Selected)
Computational Incr, Tm = .02667 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 = 13.77 cfs
Unit peak time Tp = .13333 hrs
Unit receding limb, Tr = .53333 hrs
Total unit time, Tb = .66667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH B 24hr
Tc = .2800 hrs
Drainage Area = 36.000 acres Runoff CN= 75

==========
Computational Time Increment = .03733 hrs
Computed Peak Time = 6.0480 hrs
Computed Peak Flow = 100.12 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 100.10 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 36.000 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

2.1291 in
6.387 ac-ft

HYG Volume... 6.387 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .28000 hrs (ID: None Selected)
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 = 145.68 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 = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH C 24hr
Tc = .2500 hrs
Drainage Area = 9.600 acres Runoff CN= 83

==========
Computational Time Increment = .03333 hrs
Computed Peak Time = 6.0333 hrs
Computed Peak Flow = 37.06 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 36.82 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 9.600 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

2.8146 in
2.252 ac-ft

HYG Volume... 2.252 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: None Selected)
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 = 43.51 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 = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH C1 24hr
Tc = .1000 hrs
Drainage Area = 1.200 acres Runoff CN= 83

==========
Computational Time Increment = .01333 hrs
Computed Peak Time = 6.0000 hrs
Computed Peak Flow = 5.23 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0000 hrs
Peak Flow, Interpolated Output = 5.23 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 1.200 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

2.8146 in
.281 ac-ft

HYG Volume... .281 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .10000 hrs (ID: None Selected)
Computational Incr, Tm = .01333 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 = 13.60 cfs
Unit peak time Tp = .06667 hrs
Unit receding limb, Tr = .26667 hrs
Total unit time, Tb = .33333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH D 24hr
Tc = .2500 hrs
Drainage Area = 13.400 acres Runoff CN= 83

==========
Computational Time Increment = .03333 hrs
Computed Peak Time = 6.0333 hrs
Computed Peak Flow = 51.73 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 51.40 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 13.400 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

2.8146 in
3.143 ac-ft

HYG Volume... 3.143 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: None Selected)
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 = 60.73 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 = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH E 24hr
Tc = .3000 hrs
Drainage Area = 10.000 acres Runoff CN= 83

==========
Computational Time Increment = .04000 hrs
Computed Peak Time = 6.0800 hrs
Computed Peak Flow = 36.44 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 36.42 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 10.000 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

2.8146 in
2.346 ac-ft

HYG Volume... 2.345 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .30000 hrs (ID: None Selected)
Computational Incr, Tm = .04000 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 = 37.77 cfs
Unit peak time Tp = .20000 hrs
Unit receding limb, Tr = .80000 hrs
Total unit time, Tb = 1.00000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH F 24hr
Tc = .2100 hrs
Drainage Area = 4.500 acres Runoff CN= 81

==========
Computational Time Increment = .02800 hrs
Computed Peak Time = 6.0200 hrs
Computed Peak Flow = 16.93 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 16.73 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 81
Area = 4.500 acres
S = 2.3457 in
0.2S = .4691 in

Cumulative Runoff

2.6347 in
.988 ac-ft

HYG Volume... .988 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .21000 hrs (ID: None Selected)
Computational Incr, Tm = .02800 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 = 24.28 cfs
Unit peak time Tp = .14000 hrs
Unit receding limb, Tr = .56000 hrs
Total unit time, Tb = .70000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH G 24hr
Tc = .2300 hrs
Drainage Area = 19.900 acres Runoff CN= 81

==========
Computational Time Increment = .03067 hrs
Computed Peak Time = 6.0413 hrs
Computed Peak Flow = 73.36 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 72.63 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 81
Area = 19.900 acres
S = 2.3457 in
0.2S = .4691 in

Cumulative Runoff

2.6347 in
4.369 ac-ft

HYG Volume... 4.369 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .23000 hrs (ID: None Selected)
Computational Incr, Tm = .03067 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 = 98.03 cfs
Unit peak time Tp = .15333 hrs
Unit receding limb, Tr = .61333 hrs
Total unit time, Tb = .76667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH H 24hr
Tc = .1900 hrs
Drainage Area = 5.600 acres Runoff CN= 82

==========
Computational Time Increment = .02533 hrs
Computed Peak Time = 6.0293 hrs
Computed Peak Flow = 22.17 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0000 hrs
Peak Flow, Interpolated Output = 21.93 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 82
Area = 5.600 acres
S = 2.1951 in
0.2S = .4390 in

Cumulative Runoff

2.7240 in
1.271 ac-ft

HYG Volume... 1.271 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .19000 hrs (ID: None Selected)
Computational Incr, Tm = .02533 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 = 33.39 cfs
Unit peak time Tp = .12667 hrs
Unit receding limb, Tr = .50667 hrs
Total unit time, Tb = .63333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH I 24hr
Tc = .2100 hrs
Drainage Area = 8.300 acres Runoff CN= 71

==========
Computational Time Increment = .02800 hrs
Computed Peak Time = 6.0480 hrs
Computed Peak Flow = 21.71 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 21.63 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 71
Area = 8.300 acres
S = 4.0845 in
0.2S = .8169 in

Cumulative Runoff

1.8191 in
1.258 ac-ft

HYG Volume... 1.259 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .21000 hrs (ID: None Selected)
Computational Incr, Tm = .02800 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 = .14000 hrs
Unit receding limb, Tr = .56000 hrs
Total unit time, Tb = .70000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-1 24hr
Tc = .2300 hrs
Drainage Area = 6.100 acres Runoff CN= 75

==========
Computational Time Increment = .03067 hrs
Computed Peak Time = 6.0413 hrs
Computed Peak Flow = 18.23 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 18.10 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 75
Area = 6.100 acres
S = 3.3333 in
0.2S = .6667 in

Cumulative Runoff

2.1291 in
1.082 ac-ft

HYG Volume... 1.082 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .23000 hrs (ID: None Selected)
Computational Incr, Tm = .03067 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 = 30.05 cfs
Unit peak time Tp = .15333 hrs
Unit receding limb, Tr = .61333 hrs
Total unit time, Tb = .76667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-2 24hr
Tc = .1800 hrs
Drainage Area = 10.600 acres Runoff CN= 78

==========
Computational Time Increment = .02400 hrs
Computed Peak Time = 6.0240 hrs
Computed Peak Flow = 37.56 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0000 hrs
Peak Flow, Interpolated Output = 36.94 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:None Selected
CN = 78
Area = 10.600 acres
S = 2.8205 in
0.2S = .5641 in

Cumulative Runoff

2.3757 in
2.098 ac-ft

HYG Volume... 2.100 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .18000 hrs (ID: None Selected)
Computational Incr, Tm = .02400 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 = 66.72 cfs
Unit peak time Tp = .12000 hrs
Unit receding limb, Tr = .48000 hrs
Total unit time, Tb = .60000 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-3 24hr
Tc = .3400 hrs
Drainage Area = 73.700 acres Runoff CN= 78

==========
Computational Time Increment = .04533 hrs
Computed Peak Time = 6.0747 hrs
Computed Peak Flow = 214.08 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.1000 hrs
Peak Flow, Interpolated Output = 211.44 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 78
Area = 73.700 acres
S = 2.8205 in
0.2S = .5641 in

Cumulative Runoff

2.3757 in
14.590 ac-ft

HYG Volume... 14.579 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .34000 hrs (ID: None Selected)
Computational Incr, Tm = .04533 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 = 245.60 cfs
Unit peak time Tp = .22667 hrs
Unit receding limb, Tr = .90667 hrs
Total unit time, Tb = 1.13333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 4.6000 in
Rain Dir = H:\PPKW\RAINFALL\
Rain File -ID = SCS IIA.RNF - scsiia-24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
HYG File - ID = - SCS UH OS-4 24hr
Tc = .3000 hrs
Drainage Area = 49.400 acres Runoff CN= 83

==========
Computational Time Increment = .04000 hrs
Computed Peak Time = 6.0800 hrs
Computed Peak Flow = 180.01 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 6.0500 hrs
Peak Flow, Interpolated Output = 179.91 cfs
==========

DRAINAGE AREA

ID:None Selected
CN = 83
Area = 49.400 acres
S = 2.0482 in
0.2S = .4096 in

Cumulative Runoff

2.8146 in
11.587 ac-ft

HYG Volume... 11.585 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .30000 hrs (ID: None Selected)
Computational Incr, Tm = .04000 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 = 186.57 cfs
Unit peak time Tp = .20000 hrs
Unit receding limb, Tr = .80000 hrs
Total unit time, Tb = 1.00000 hrs

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 2 TO POND 3

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
POND 2 OUTLET H TO POND	POND 2 SCS UH	IN H	POND 2 OUTLET SCS UH	24hr H 24hr

INFLOWS TO: CHAN 2 TO POND 3

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
POND 2 OUTLET	H	24hr	41.642	6.3000	302.47
SCS UH	H	24hr	1.271	6.0000	21.93

TOTAL FLOW INTO: CHAN 2 TO POND 3

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
CHAN 2 TO POND 3		24hr	42.914	6.2500	306.24

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 3 TO POND 2

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
C TO POND	SCS UH C	SCS UH C		24hr
C1 TO POND	SCS UH C1	SCS UH C1		24hr
E TO POND	SCS UH E	SCS UH E		24hr
POND 1 OUTLET	POND 1	IN	POND 1 OUTLET	24hr

INFLOWS TO: CHAN 3 TO POND 2

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
SCS UH C		24hr	2.252	6.0500	36.82
SCS UH C1		24hr	.281	6.0000	5.23
SCS UH E		24hr	2.345	6.0500	36.42
POND 1 OUTLET		24hr	20.810	6.2000	191.82

TOTAL FLOW INTO: CHAN 3 TO POND 2

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
CHAN 3 TO POND 2		24hr	25.689	6.1000	249.25

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 4 TO POND 1

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OS-3 TO POND	SCS UH OS-3	SCS UH	OS-3	24hr
OS-2 TO POND	SCS UH OS-2	SCS UH	OS-2	24hr

INFLOWS TO: CHAN 4 TO POND 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
SCS UH	OS-3	24hr	14.579	6.1000	211.44
SCS UH	OS-2	24hr	2.100	6.0000	36.94

TOTAL FLOW INTO: CHAN 4 TO POND 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
CHAN 4 TO POND 1		24hr	16.679	6.0500	244.93

SUMMARY FOR HYDROGRAPH ADDITION
at Node: CHAN 5 TO POND 2

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OS-4 TO POND	SCS UH OS-4	SCS UH OS-4	SCS UH OS-4	24hr
G TO POND	SCS UH G	SCS UH G	SCS UH G	24hr

INFLOWS TO: CHAN 5 TO POND 2

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
SCS UH OS-4	24hr		11.585	6.0500	179.91
SCS UH G	24hr		4.369	6.0500	72.63

TOTAL FLOW INTO: CHAN 5 TO POND 2

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
CHAN 5 TO POND 2	24hr		15.954	6.0500	252.54

SUMMARY FOR HYDROGRAPH ADDITION
at Node: SITE BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
POND 3 OUTLET	POND 3	IN	POND 3 OUTLET	24hr
A4 TO BNDRY	SCS UH A4		SCS UH A4	24hr
A5 TO BNDRY	SCS UH A5		SCS UH A5	24hr
A3 TO BNDRY	SCS UH A3		SCS UH A3	24hr

INFLOWS TO: SITE BNDRY

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POND 3 OUTLET	24hr	52.430	6.5500	291.06
	SCS UH A4	24hr	.639	6.0500	10.01
	SCS UH A5	24hr	.431	6.0500	7.50
	SCS UH A3	24hr	.534	6.0000	9.66

TOTAL FLOW INTO: SITE BNDRY

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	SITE BNDRY	24hr	54.034	6.5500	294.18

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6848.00 ft
Increment = .50 ft
Max. Elev.= 6856.00 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	---> TW	6850.750	6856.000
Culvert-Box		---> TW	6848.000	6856.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = IB
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 6850.75 ft
Orifice Area = 9.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 12.00 ft
Weir Coeff. = 3.400
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Culvert-Box

No. Barrels = 1
Barrel Height = 2.00 ft
Barrel Width = 4.00 ft
Upstream Invert = 6848.00 ft
Dnstream Invert = 6847.00 ft
Horiz. Length = 10.00 ft
Barrel Length = 10.05 ft
Barrel Slope = .10000 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .008457 (per ft of full flow)
Kr = .5000 (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 = .03850
Inlet Control Y = .8100
T1 ratio (HW/D) = 1.128
T2 ratio (HW/D) = 1.376
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 = 6850.26 ft ---> Flow = 39.60 cfs
At T2 Elev = 6850.75 ft ---> Flow = 45.25 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

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6803.00 ft
Increment = .50 ft
Max. Elev.= 6812.00 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	---> TW	6807.000	6812.000
Culvert-Box	CB	---> TW	6803.000	6812.000

TW SETUP, DS Channel

File.... X:\2860000.ALL\2863944\SPREADSHEETS\100Y-DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = IB
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 6807.00 ft
Orifice Area = 16.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 16.00 ft
Weir Coeff. = 3.400
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

OUTLET STRUCTURE INPUT DATA

Structure ID = CB
Structure Type = Culvert-Box

No. Barrels = 1
Barrel Height = 2.50 ft
Barrel Width = 5.00 ft
Upstream Invert = 6803.00 ft
Dnstream Invert = 6802.00 ft
Horiz. Length = 10.00 ft
Barrel Length = 10.05 ft
Barrel Slope = .10000 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .006281 (per ft of full flow)
Kr = .5000 (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 = .03850
Inlet Control Y = .8100
T1 ratio (HW/D) = 1.128
T2 ratio (HW/D) = 1.376
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 = 6805.82 ft ---> Flow = 69.17 cfs
At T2 Elev = 6806.44 ft ---> Flow = 79.06 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

File.... X:\2860000.ALL\2863944\SPREADSHEETS\100Y-DEV.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6760.00 ft
Increment = .50 ft
Max. Elev.= 6772.00 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	---> TW	6763.000	6772.000
Culvert-Box	cb	---> TW	6760.000	6772.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = ib
Structure Type = Inlet Box

# of Openings = 1
Invert Elev. = 6763.00 ft
Orifice Area = 16.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 16.00 ft
Weir Coeff. = 3.400
K, Submerged = .000
K, Reverse = 1.000
Kb,Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

File.... X:\2860000.ALL\2863944\SPREADSHEETS\100Y-DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = cb
Structure Type = Culvert-Box

No. Barrels = 1
Barrel Height = 1.00 ft
Barrel Width = 5.00 ft
Upstream Invert = 6760.00 ft
Dnstream Invert = 6758.00 ft
Horiz. Length = 70.00 ft
Barrel Length = 70.03 ft
Barrel Slope = .02857 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .015826 (per ft of full flow)
Kr = .5000 (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 = .03850
Inlet Control Y = .8100
T1 ratio (HW/D) = 1.164
T2 ratio (HW/D) = 1.412
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 = 6761.16 ft ---> Flow = 17.50 cfs
At T2 Elev = 6761.41 ft ---> Flow = 20.00 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 = X:\2860000.ALL\2863944\SPREADSHEETS\
Inflow HYG file = NONE STORED - POND 1 IN 24hr
Outflow HYG file = NONE STORED - POND 1 OUT 24hr

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

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6848.00 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 = 313.06 cfs at 6.0500 hrs
Peak Outflow = 191.82 cfs at 6.2000 hrs

Peak Elevation = 6855.38 ft
Peak Storage = 4.878 ac-ft

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 20.810
- Infiltration = .000
- HYG Vol OUT = 20.810
- Retained Vol = .000

Unrouted Vol = .000 ac-ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
Inflow HYG file = NONE STORED - POND 2 IN 24hr
Outflow HYG file = NONE STORED - POND 2 OUT 24hr

Pond Node Data = POND 2
Pond Volume Data = POND 2
Pond Outlet Data = POND 2 OULETA

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6803.00 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 = 494.01 cfs at 6.0500 hrs
Peak Outflow = 302.47 cfs at 6.3000 hrs

Peak Elevation = 6810.73 ft
Peak Storage = 9.072 ac-ft

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 41.643
- Infiltration = .000
- HYG Vol OUT = 41.642
- Retained Vol = .000

Unrouted Vol = .000 ac-ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2860000.ALL\2863944\SPREADSHEETS\
Inflow HYG file = NONE STORED - POND 3 IN 24hr
Outflow HYG file = NONE STORED - POND 3 OUT 24hr

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

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6760.00 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 = 428.65 cfs at 6.1000 hrs
Peak Outflow = 291.06 cfs at 6.5500 hrs

Peak Elevation = 6770.54 ft
Peak Storage = 6.537 ac-ft

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 52.430
- Infiltration = .000
- HYG Vol OUT = 52.430
- Retained Vol = .000

Unrouted Vol = .000 ac-ft (.000% of Outflow Volume)

Index of Starting Page Numbers for ID Names

----- 4 -----
4.6in-100yr-24hr... 1.01

----- C -----
CHAN 2 TO POND 3 24hr... 3.01
CHAN 3 TO POND 2 24hr... 3.05
CHAN 4 TO POND 1 24hr... 3.09
CHAN 5 TO POND 2 24hr... 3.12, 5.01

----- P -----
POND 1 OUTLETA... 4.01, 5.02
POND 2 OULETA... 4.04, 5.03
POND 3 OUTLETA... 4.07

----- S -----
SCS UH A1 & A2 24hr... 2.01
SCS UH A3 24hr... 2.02
SCS UH A4 24hr... 2.03
SCS UH A5 24hr... 2.04
SCS UH B 24hr... 2.05
SCS UH C 24hr... 2.06
SCS UH C1 24hr... 2.07
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SCS UH I 24hr... 2.12
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SCS UH OS-3 24hr... 2.15
SCS UH OS-4 24hr... 2.16
SCS UH G 24hr... 2.17
SITE BNDRY 24hr... 3.15

Pond 3 Outlet Historic 2, 5, 10, 50, & 100 Year Event

SUMMARY FOR HYDROGRAPH ADDITION
at Node: WEST BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OFFSITE TO BNDRY	HIST OFFSITE		HIST OFFSITE	24hr
HIST. TO BNDRY	HIST ONSITE		HIST ONSITE	24hr

INFLOWS TO: WEST BNDRY

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
	HIST OFFSITE	24hr	1.789	6.2000	11.58
	HIST ONSITE	24hr	1.687	6.1500	13.78

TOTAL FLOW INTO: WEST BNDRY

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
	WEST BNDRY	24hr	3.476	6.1500	25.29

SUMMARY FOR HYDROGRAPH ADDITION
at Node: WEST BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OFFSITE TO BNDRY	HIST OFFSITE		HIST OFFSITE	24hr
HIST. TO BNDRY	HIST ONSITE		HIST ONSITE	24hr

INFLOWS TO: WEST BNDRY

		Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag ac-ft	hrs	cfs
	HIST OFFSITE	24hr 4.267	6.1500	43.96
	HIST ONSITE	24hr 3.881	6.1000	45.61

TOTAL FLOW INTO: WEST BNDRY

		Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag ac-ft	hrs	cfs
	WEST BNDRY	24hr 8.147	6.1500	87.94

SUMMARY FOR HYDROGRAPH ADDITION
at Node: WEST BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OFFSITE TO BNDRY	HIST OFFSITE		HIST OFFSITE	24hr
HIST. TO BNDRY	HIST ONSITE		HIST ONSITE	24hr

INFLOWS TO: WEST BNDRY

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
	HIST OFFSITE	24hr	6.340	6.1500	72.61
	HIST ONSITE	24hr	5.693	6.1000	73.81

TOTAL FLOW INTO: WEST BNDRY

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
	WEST BNDRY	24hr	12.032	6.1000	145.28

SUMMARY FOR HYDROGRAPH ADDITION
at Node: WEST BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OFFSITE TO BNDRY	HIST OFFSITE		HIST OFFSITE	24
HIST. TO BNDRY	HIST ONSITE		HIST ONSITE	24

INFLOWS TO: WEST BNDRY

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
	HIST OFFSITE	24	12.636	6.1000	164.86
	HIST ONSITE	24	11.140	6.1000	159.20

TOTAL FLOW INTO: WEST BNDRY

			Volume	Peak Time	Peak Flow
HYG file	HYG ID	HYG tag	ac-ft	hrs	cfs
	WEST BNDRY	24	23.776	6.1000	324.07

SUMMARY FOR HYDROGRAPH ADDITION
at Node: WEST BNDRY

HYG Directory: X:\2860000.ALL\2863944\SPREADSHEETS\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
OFFSITE TO BNDRY	HIST OFFSITE		HIST OFFSITE	24hr
HIST. TO BNDRY	HIST ONSITE		HIST ONSITE	24hr

INFLOWS TO: WEST BNDRY

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	HIST OFFSITE	24hr	17.002	6.1000	230.42
	HIST ONSITE	24hr	14.891	6.1000	217.81

TOTAL FLOW INTO: WEST BNDRY

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	WEST BNDRY	24hr	31.893	6.1000	448.23

- **Rational Method for Sizing Inlets At Design Points**

THE ESTATES AT MIDDLE CREEK
Area Runoff Coefficient Summary
For Inlet Sizing

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA**	**AREA**	**C_5**	**C_{100}**	**AREA**	**C_5**	**C_{100}**	**C_5**	**C_{100}**
	(Acres)	*(Acres)*			*(Acres)*				
A1	2.93	2.93	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
A2	1.51	1.51	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
B1	6.11	6.11	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
B2	7.24	7.24	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
B3	8.38	8.38	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
B4	6.42	6.42	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
B5	4.39	4.39	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***
OS-1	5.82	5.82	0.60	0.70	0.00	0.25	0.35	***0.60***	***0.70***

Calculated by: QNA
Date: 6/22/01
Checked by: _____

ESTATES AT MIDDLE CREEK
Area Drainage Summary
For Inlet Sizing

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				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.)
		* For Calcs See Runoff Summary														
A1	2.93	0.60	0.70	0.25	120	2.4	13.9	970	7.7%	9.7	1.7	15.5	3.4	5.8	*6.0*	*11.9*
A2	1.51	0.60	0.70	0.25	120	2.4	13.9	970	7.7%	9.7	1.7	15.5	3.4	5.8	*3.1*	*6.1*
B1	6.11	0.60	0.70	0.25	160	6.4	12.7	1300	6.0%	8.6	2.5	15.3	3.4	5.8	*12.6*	*25.0*
B2	7.24	0.60	0.70	0.25	120	4.0	11.7	870	8.0%	9.9	1.5	13.2	3.7	6.3	*15.9*	*31.8*
B3	8.38	0.60	0.70	0.25	300	20.0	14.7	1250	6.0%	8.6	2.4	17.2	3.3	5.5	*16.5*	*32.3*
B4	6.42	0.60	0.70	0.25	125	2.5	14.1	920	6.0%	8.6	1.8	15.9	3.4	5.7	*13.0*	*25.7*
B5	4.39	0.60	0.70	0.25	125	2.5	14.1	920	6.0%	8.6	1.8	15.9	3.4	5.7	*8.9*	*17.6*
OS-1	5.82	0.60	0.70	0.25	300	28.0	13.2	250	6.0%	8.6	0.5	13.7	3.6	6.2	*12.6*	*25.1*

Calculated by: QNA
Date: 6/22/01
Checked by: _____

THE ESTATES AT MIDDLE CREEK
Surface Routing Summary
For Inlet Sizing

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
0	**A1**	1.76	2.05	15.5	3.4	5.8	***6.0***	***11.9***
00	**A1 FLOW BY & A2**	1.99	2.56	15.5	3.4	5.8	***6.8***	***14.8***
1	**B1 & OS-1**	7.16	9.14	15.3	3.4	5.8	***24.7***	***53.4***
2	**B2**	4.34	5.07	13.2	3.7	6.3	***15.9***	***31.8***
3	**B4**	3.85	4.49	15.9	3.4	5.7	***13.0***	***25.7***
4	**B5**	2.63	3.07	15.9	3.4	5.7	***8.9***	***17.6***
5	**B2, B4, B5, FLOWBY & B3**	12.61	15.90	15.9	3.4	5.7	***42.6***	***90.9***

Calculated by: QNA
Date: 6/22/01
Checked by: _____

THE ESTATES AT MIDDLE CREEK
At Grade Inlets

PROPOSED10' INLET DESIGN POINT 0

5-YR FLOW

Q(5)	6	I(5)	3.4		
DEPTH	0.31	Fr	3.03	Inlet size ? L(i) =	10
SPREAD	11.3	L(1)	26.2	If Li < L(2) then Qi =	2.3
CROSS SLOPE	2.0%	L(2)	15.8	If Li > L(2) then Qi =	3.0
STREET SLOPE	6.0%	L(3)	56.2	FB =	3.7
				CA(eqv.)=	1.09

100-YR FLOW

Q(100)	12	I(100)	5.8		
DEPTH	0.39	Fr	3.21	Inlet size ? L(i) =	10
SPREAD	15.1	L(1)	37.2	If Li < L(2) then Qi =	3.2
CROSS SLOPE	2.0%	L(2)	22.3	If Li > L(2) then Qi =	5.2
STREET SLOPE	6.0%	L(3)	79.6	FB =	8.7
				CA(eqv.)=	1.50

THE ESTATES AT MIDDLE CREEK
At Grade Inlets

PROPOSED 20' INLET DESIGN POINT 00

5-YR FLOW

Q(5)	7	I(5)	3.4		
DEPTH	0.32	Fr	3.05	Inlet size ? L(i) =	20
SPREAD	11.8	L(1)	27.6	If Li < L(2) then Qi =	4.9
CROSS SLOPE	2.0%	L(2)	16.6	If Li > L(2) then Qi =	4.4
STREET SLOPE	6.0%	L(3)	59.2	FB =	2.4
				CA(eqv.)=	0.70

100-YR FLOW

Q(100)	15	I(100)	5.8		
DEPTH	0.41	Fr	3.26	Inlet size ? L(i) =	20
SPREAD	16.4	L(1)	41.2	If Li < L(2) then Qi =	7.2
CROSS SLOPE	2.0%	L(2)	24.7	If Li > L(2) then Qi =	8.2
STREET SLOPE	6.0%	L(3)	88.2	FB =	7.6
				CA(eqv.)=	1.31

THE ESTATES AT MIDDLE CREEK
Sump Inlet

DESIGN POINT 1

Total Flow:

Q_5 = **25** cfs

Q_{100} = **53** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.51

D_{100} = 0.90 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

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 inlets accept both 5 yr. & 100 yr. developed flows at this design point within the maximum allowable ponding depth.)

Calculated by: QNA

Date: 6/22/01

Checked by: _____

THE ESTATES AT MIDDLE CREEK
At Grade Inlets

PROPOSED 12' INLET DESIGN POINT 2

5-YR FLOW

Q(5)	16	I(5)	3.4		
DEPTH	0.42	Fr	3.28	Inlet size ? L(i) =	12
SPREAD	16.9	L(1)	42.5	If Li < L(2) then Qi =	4.5
CROSS SLOPE	2.0%	L(2)	25.5	If Li > L(2) then Qi =	7.1
STREET SLOPE	6.0%	L(3)	91.1	FB =	11.4
				CA(eqv.)=	3.34

100-YR FLOW

Q(100)	32	I(100)	5.8		
DEPTH	0.53	Fr	3.45	Inlet size ? L(i) =	12
SPREAD	22.3	L(1)	59.1	If Li < L(2) then Qi =	6.4
CROSS SLOPE	2.0%	L(2)	35.5	If Li > L(2) then Qi =	12.4
STREET SLOPE	6.0%	L(3)	126.7	FB =	25.3
				CA(eqv.)=	4.37

THE ESTATES AT MIDDLE CREEK
At Grade Inlets

PROPOSED 12' INLET DESIGN POINT 3

5-YR FLOW

Q(5)	13	I(5)	3.4		
DEPTH	0.40	Fr	3.22	Inlet size ? L(i) =	12
SPREAD	15.5	L(1)	38.5	If Li < L(2) then Qi =	4.1
CROSS SLOPE	2.0%	L(2)	23.1	If Li > L(2) then Qi =	6.0
STREET SLOPE	6.0%	L(3)	82.5	FB =	9.0
				CA(eqv.)=	2.62

100-YR FLOW

Q(100)	26	I(100)	5.8		
DEPTH	0.49	Fr	3.40	Inlet size ? L(i) =	12
SPREAD	20.5	L(1)	53.5	If Li < L(2) then Qi =	5.8
CROSS SLOPE	2.0%	L(2)	32.1	If Li > L(2) then Qi =	10.4
STREET SLOPE	6.0%	L(3)	114.6	FB =	19.9
				CA(eqv.)=	3.44

THE ESTATES AT MIDDLE CREEK
At Grade Inlets

PROPOSED 12' INLET DESIGN POINT 4

5-YR FLOW

Q(5)	9	I(5)	3.4		
DEPTH	0.35	Fr	3.13	Inlet size ? L(i) =	12
SPREAD	13.3	L(1)	31.9	If Li < L(2) then Qi =	3.3
CROSS SLOPE	2.0%	L(2)	19.2	If Li > L(2) then Qi =	4.4
STREET SLOPE	6.0%	L(3)	68.4	FB =	5.6
				CA(eqv.)=	1.63

100-YR FLOW

Q(100)	18	I(100)	5.8		
DEPTH	0.44	Fr	3.30	Inlet size ? L(i) =	12
SPREAD	17.6	L(1)	44.8	If Li < L(2) then Qi =	4.7
CROSS SLOPE	2.0%	L(2)	26.9	If Li > L(2) then Qi =	7.7
STREET SLOPE	6.0%	L(3)	95.9	FB =	12.9
				CA(eqv.)=	2.22

THE ESTATES AT MIDDLE CREEK
Sump Inlet

DESIGN POINT 5

Total Flow: Q_5 = **21** cfs
Q_{100} = **45** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.51
D_{100} = 0.87 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

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

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

100-Year Event: **18** foot inlet required

(Install 2 public 18' D-10-R inlets accept both 5 yr. & 100 yr. developed flows at this design point within the maximum allowable ponding depth.)

Calculated by: QNA
Date: 6/22/01
Checked by:

"Middle Creek Manor Filing No. 1" Revised Hydrology

MIDDLE CREEK MANOR FILING NO. 1
(Area Runoff Coefficient Summary)

BASIN	TOTAL AREA *(Acres)*	*WEIGHTED* C_5	*WEIGHTED* C_{100}
A	2.29	*0.40*	*0.55*
B	0.80	*0.65*	*0.75*
C	4.04	*0.50*	*0.60*
D	1.87	*0.50*	*0.60*
E	2.25	*0.55*	*0.65*
F	0.50	*0.50*	*0.60*
G	3.21	*0.55*	*0.65*
I	0.89	*0.90*	*0.95*
J	3.00	*0.50*	*0.60*
K	1.98	*0.60*	*0.70*
L	0.78	*0.55*	*0.65*
M	1.87	*0.55*	*0.65*
N	2.38	*0.25*	*0.35*
OS-1	2.93	*0.45*	*0.55*
OS-11	1.51	*0.45*	*0.55*
OS-111	3.01	*0.45*	*0.55*
OS-2	2.40	*0.45*	*0.55*
OS-3	0.45	*0.60*	*0.70*
OS-4	0.84	*0.60*	*0.70*
OS-5	2.73	*0.60*	*0.70*
OS-6	1.60	*0.60*	*0.70*

Calculated by: QNA

Date: 6/19/01

Checked by: _____

ORIGINAL OS-1 & OS-2 BROKE INTO 0S-1, OS-11, OS-111,
& OS-2 PER LAYOUT FOR "MIDDLE CREEK ESTATES"
ALL OTHER INFORMATION PER ORIGINAL REPORT.

MIDDLE CREEK MANOR FILING NO. 1
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 * For Calcs See Runoff Summary	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	2.29	0.40	0.55									14.8	3.5	5.9	*3.2*	*7.5*
B	0.80	0.65	0.75									9.0	4.2	7.4	*2.2*	*4.4*
C	4.04	0.50	0.60									15.0	3.5	5.9	*7.0*	*14.3*
D	1.87	0.50	0.60									13.3	3.6	6.2	*3.4*	*7.0*
E	2.25	0.55	0.65									14.8	3.5	5.9	*4.3*	*8.7*
F	0.50	0.50	0.60									8.9	4.2	7.4	*1.1*	*2.2*

MIDDLE CREEK MANOR FILING NO. 1
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				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.)*
		* For Calcs See Runoff Summary														
G	3.21	0.55	0.65									14.4	3.5	6.0	*6.2*	*12.5*
I	0.89	0.90	0.95									5.0	5.0	9.1	*4.0*	*7.7*
J	3.00	0.50	0.60									14.4	3.5	6.0	*5.3*	*10.8*
K	1.98	0.60	0.70									13.8	3.6	6.1	*4.3*	*8.5*
L	0.78	0.55	0.65									15.5	3.4	5.8	*1.5*	*2.9*
M	1.87	0.55	0.65									14.7	3.5	5.9	*3.6*	*7.2*

MIDDLE CREEK MANOR FILING NO. 1
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 * For Colex See Runoff Summary	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.)*
N	2.38	0.25	0.35									5.0	5.0	9.1	*3.0*	*7.5*
OS-1	2.93	0.45	0.55	0.25	120	2.4	13.9	970	7.7%	9.7	1.7	15.5	3.4	5.8	*4.5*	*9.3*
OS-11	1.51	0.45	0.55	0.25	50	0.5	11.2	970	7.7%	9.7	1.7	12.9	3.7	6.3	*2.5*	*5.2*
OS-111	3.01	0.45	0.55	0.25	125	8	9.6					9.6	4.1	7.2	*5.6*	*11.9*
OS-2	2.40	0.45	0.55									13.8	3.6	6.1	*3.9*	*8.1*
OS-3	0.45	0.60	0.70									12.6	3.7	6.4	*1.0*	*2.0*

MIDDLE CREEK MANOR FILING NO. 1
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_i	*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.)*
		* For Calcs See Runoff Summary														
OS-4	0.84	0.60	0.70									13.7	3.6	6.2	*1.8*	*3.6*
OS-5	2.73	0.60	0.70									14.5	3.5	6.0	*5.8*	*11.4*
OS-6	1.60	0.60	0.70									14.4	3.5	6.0	*3.4*	*6.7*

Calculated by: QNA
Date: 6/19/01
Checked by: _____

ORIGINAL Tc'S USED FOR ALL BASINS EXCEPT OS-1, OS-11 AND OS-111. THESE BASINS Tc WERE RECALCULATED.

MIDDLE CREEK MANOR FILING NO. 1
(Surface Routing Summary)

Design Point(s)	*Contributing Basins*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C**	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
0	**OS-11**	0.68	0.83	12.9	3.7	6.3	*2.5*	*5.2*
00	**OS-1 & DP-0 FLOW BY**	1.58	2.10	15.5	3.4	5.8	*5.4*	*12.2*
1&2	**A,B,C,D,E,F,G,I,OS-111,OS-2,OS-3,OS-4, AND DP-0 & DP-00 FLOW BY**	12.17	14.95	20.0	3.0	5.1	*37.1*	*76.1*
3&4	**J,K,L,OS-5&OS-6**	5.72	6.72	15.5	3.4	5.8	*19.6*	*39.0*
5	**BASINS A-G, I-L, N, AND 0S-1-OS-6**	18.48	22.50	21.0	3.0	5.0	*55.0*	*111.6*

Calculated by: QNA
Date: 6/19/01
Checked by: _____

*Tc used per original "Final Drainage Report For Middle Creek Manor Filing No. 2"

EXISITNG MIDDLE CREEK MANOR FILING NO. 1
(Inlet Calculations - At-Grade)

PROPOSED 10' INLET DESIGN POINT 0

5-YR FLOW

Q(5)	3	I(5)	3.7		
DEPTH	0.24	Fr	2.78	Inlet size ? L(i) =	10
SPREAD	7.5	L(1)	16.0	If Li < L(2) then Qi =	2
CROSS SLOPE	2.0%	L(2)	9.6	If Li > L(2) then Qi =	2
STREET SLOPE	6.0%	L(3)	34.4	FB =	1
				CA(eqv.)=	0.26

100-YR FLOW

Q(100)	5	I(100)	6.3		
DEPTH	0.30	Fr	2.99	Inlet size ? L(i) =	10
SPREAD	10.5	L(1)	24.1	If Li < L(2) then Qi =	2
CROSS SLOPE	2.0%	L(2)	14.5	If Li > L(2) then Qi =	3
STREET SLOPE	6.0%	L(3)	51.7	FB =	3
				CA(eqv.)=	0.48

EXISITNG MIDDLE CREEK MANOR FILING NO. 1
(Inlet Calculations - At-Grade)

PROPOSED 20' INLET DESIGN POINT 00

5-YR FLOW					
Q(5)	5	I(5)	3.4		
DEPTH	0.30	Fr	3.00	Inlet size ? L(i) =	20
SPREAD	10.8	L(1)	24.8	If Li < L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	14.9	If Li > L(2) then Qi =	4
STREET SLOPE	6.0%	L(3)	53.2	FB =	2
				CA(eqv.)=	0.51

100-YR FLOW					
Q(100)	12	I(100)	5.8		
DEPTH	0.39	Fr	3.21	Inlet size ? L(i) =	20
SPREAD	15.1	L(1)	37.2	If Li < L(2) then Qi =	7
CROSS SLOPE	2.0%	L(2)	22.3	If Li > L(2) then Qi =	7
STREET SLOPE	6.0%	L(3)	79.6	FB =	6
				CA(eqv.)=	0.97

EXISTING MIDDLE CREEK MANOR FILING NO. 1
(Inlet Calculations - Sump Condition)

EXISTING DESIGN POINTS 1 & 2

Total Flow: Q_5 = **18.5** cfs
Q_{100} = **38.0** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50
D_{100} = 0.90 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

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

(2 Existing public 14' D-10-R inlets accept both 5 yr. & 100 yr. developed flows at this design point within the maximum allowable ponding depth.)

Calculated by: QNA
Date: 6/18/01
Checked by: _____

"Middle Creek Manor Filing No. 2" Revised Hydrology

MIDDLE CREEK MANOR FILING NO. 2
(Area Runoff Coefficient Summary)

		WEIGHTED	
BASIN	**TOTAL AREA** *(Acres)*	C_5	C_{100}
O	0.12	***0.75***	***0.85***
P	3.82	***0.45***	***0.55***
Q	5.33	***0.45***	***0.55***
R	2.75	***0.60***	***0.70***
S	0.65	***0.75***	***0.85***
T	1.98	***0.60***	***0.70***
U	1.00	***0.60***	***0.70***
V	0.82	***0.25***	***0.35***
W	0.17	***0.60***	***0.70***
X	1.96	***0.45***	***0.55***
Y	1.58	***0.25***	***0.35***
OS-2	3.56	***0.45***	***0.55***

Calculated by: QNA

Date: 6/19/01

Checked by: _____

ORIGINAL OS-2 HAS INCREASED IN AREA. ALL OTHER INFORMATION PER ORIGINAL REPORT.

MIDDLE CREEK MANOR FILING NO. 2
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				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.)*
		* For Calcs See Runoff Summary														
O	0.12	0.75	0.85									12.8	3.7	6.4	*0.3*	*0.6*
P	3.82	0.45	0.55									17.3	3.3	5.5	*5.6*	*11.5*
Q	5.33	0.45	0.55									14.6	3.5	6.0	*8.4*	*17.5*
R	2.75	0.60	0.70									13.6	3.6	6.2	*6.0*	*11.9*
S	0.65	0.75	0.85									8.9	4.2	7.4	*2.1*	*4.1*
T	1.98	0.60	0.70									14.7	3.5	5.9	*4.2*	*8.2*

MIDDLE CREEK MANOR FILING NO. 2
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				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.)*
		* For Calcs See Runoff Summary														
U	1.00	0.60	0.70									13.8	3.6	6.1	*2.2*	*4.3*
V	0.82	0.25	0.35									8.9	4.2	7.4	*0.9*	*2.1*
W	0.17	0.60	0.70									8.9	4.2	7.4	*0.4*	*0.9*
X	1.96	0.45	0.55									12.6	3.7	6.4	*3.3*	*6.9*
Y	1.58	0.25	0.35									8.9	4.2	7.4	*1.7*	*4.1*
OS-2	3.6	0.45	0.55	0.25	135	2.7	14.7	803	3.5%	6.5	2.0	16.7	3.3	5.6	*5.3*	*10.9*

Calculated by: QNA
Date: 6/19/01
Checked by: _____

ORIGINAL Tc'S USED FOR ALL BASINS EXCEPT OS-2. THIS BASIN'S Tc WAS RECALCULATED.

MIDDLE CREEK MANOR FILING NO. 2
(Surface Routing Summary)

Design Point(s)	*Contributing Basins*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C **	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
1	**UPDATED DP-1**	7.37	8.92	24.0	2.8	4.6	***20.5***	***41.1***
2	**DP-2**	0.09	0.10	24.0	2.8	4.6	***0.3***	***0.5***
1 & 2	**UPDATED DP-1 & DP-2**	7.46	9.02	24.0	2.8	4.6	***20.8***	***41.5***

Calculated by: QNA
Date: 6/19/01
Checked by: _____

*Tc used per original "Final Drainage Report For Middle Creek Manor Filing No. 2"

Client: _____ Job No: _____

Project: Middle Creek Estates By: QNA Chk. By: _____ Date: 6/19/01

Subject: Middle Creek Manor No. 2 revised per extra flow from Middle Creek Estates Sheet No: 1 of 1

J·R ENGINEERING
A Subsidiary of Westrian

Middle Creek Manor Filing No. 2 Design Points 1 and 2

Due to original flows in the Design of MCM No 2 the 4' sump inlet at DP-2 sits Lower than the 12' sump inlet at DP-1, The Flowline-flowline intersection of Rockbridge Cr. and Brookhill Dr. is 0.66' above DP-2. Therefore water will pond to 0.66' then overtop and head south down Rockbridge Cr. to Design Points 3 and 4. Below is the Hydraulic calcations to prove the water will be captured.

- At DP-2

$$Q_i = 1.7(L_i + 1.8W)(d_{max} + w/12)^{1.85}$$

$L_i \times 1.25 = L$ W = width of Pan, d_{max} = maximum ponding, w = flowline depression

$$Q_{100} \text{ or } Q_5 = 1.7(3.2 + 1.8(3))(0.66 + 3/12)^{1.85}$$
$$= 12.3 \text{ cfs}$$

- Overtopping

$Q_{100} = 41.5 - 12.3 = 29.2$ cfs

$Q_5 = 20.8 - 12.3 = 8.5$ cfs

$CA_{100} = Q/I = 29.2/4.6 = 6.35$ $CA_5 = 8.5/2.7 = 3.15$

At DP-3 and DP-4 from Original report DP3 and DP4

100 Year $CA_{TOT} = 6.35 + 1.94 + 0.70 = 8.99$

5 Year $CA_{TOT} = 3.15 + 1.68 + 0.60 = 5.43$

- Tc = 25 min $Q_{100} = 8.99 \times 4.5 = \underline{40.5 \text{ cfs}}$

$Q_5 = 5.43 \times 2.7 = \underline{14.1 \text{ cfs}}$

- Sump Inlet Pickup 2-4' sump inlets

100 year $40.5/2 = 1.7(3.2 + 1.8(3))(d_{max} + 3/12)^{1.85}$

$d_{max} = 0.94$ ∴ ok w/ 2-4' inlets

5 year $14.1/2 = 1.7(3.2 + 1.8(3))(d_{max} + 3/12)^{1.85}$

$d_{max} = 0.42$

Channel Hydraulics

30' WIDE CHANNEL 1 TO POND 3
Worksheet for Irregular Channel

Project Description	
Project File	x:\2860000.all\2863944\hydro\channel.fm2
Worksheet	PROP. CHANNEL 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	2.00 %			
Elevation range: 0.00 ft to 5.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
-15.00	5.00	-15.00	15.00	0.040
-3.00	0.00			
3.00	0.00			
15.00	5.00			
Discharge	306.00 cfs			

Results		
Wtd. Mannings Coefficient	0.040	
Water Surface Elevation	2.97	ft
Flow Area	39.07	ft^2
Wetted Perimeter	21.46	ft
Top Width	20.28	ft
Height	2.97	ft
Critical Depth	2.97	ft
Critical Slope	0.020230	ft/ft
Velocity	7.83	ft/s
Velocity Head	0.95	ft
Specific Energy	3.93	ft
Froude Number	0.99	
Flow is subcritical.		

60' WIDE CHANNEL 2 TO POND 3
Worksheet for Irregular Channel

Project Description	
Project File	x:\2860000.all\2863944\hydro\channel.fm2
Worksheet	PROP. CHANNEL 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
Channel Slope	2.00 %
Elevation range: 0.00 ft to 3.89 ft.	

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
-30.00	3.89	-30.00	-2.50	0.030
-22.00	1.89	-2.50	2.50	0.040
-2.50	1.50	2.50	30.00	0.030
-2.50	0.00			
0.00	0.00			
2.50	0.00			
2.50	1.50			
22.00	1.89			
30.00	3.89			

Discharge	306.00 cfs

Results		
Wtd. Mannings Coefficient	0.031	
Water Surface Elevation	2.56	ft
Flow Area	48.32	ft²
Wetted Perimeter	52.53	ft
Top Width	49.36	ft
Height	2.56	ft
Critical Depth	2.65	ft
Critical Slope	0.015400	ft/ft
Velocity	6.33	ft/s
Velocity Head	0.62	ft
Specific Energy	3.18	ft
Froude Number	1.13	
Flow is supercritical.		

50' WIDE CHANNEL 3 TO POND 2
Worksheet for Irregular Channel

Project Description	
Project File	x:\2860000.all\2863944\hydro\channel.fm2
Worksheet	PROP. CHANNEL 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
Channel Slope	2.00 %
Elevation range: 0.00 ft to 3.79 ft.	

Station (ft)	Elevation (ft)
-25.00	3.79
-17.00	1.79
-2.50	1.50
-2.50	0.00
2.50	0.00
2.50	1.50
17.00	1.79
25.00	3.79

Discharge	250.00 cfs

Start Station	End Station	Roughness
-25.00	-2.50	0.030
-2.50	2.50	0.040
2.50	25.00	0.030

Results		
Wtd. Mannings Coefficient	0.032	
Water Surface Elevation	2.51	ft
Flow Area	39.73	ft²
Wetted Perimeter	42.95	ft
Top Width	39.76	ft
Height	2.51	ft
Critical Depth	2.59	ft
Critical Slope	0.015964	ft/ft
Velocity	6.29	ft/s
Velocity Head	0.62	ft
Specific Energy	3.13	ft
Froude Number	1.11	
Flow is supercritical.		

50' WIDE CHANNEL 4 TO POND 1
Worksheet for Irregular Channel

Project Description	
Project File	x:\2860000.all\2863944\hydro\channel.fm2
Worksheet	PROP. CHANNEL 4
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
Channel Slope	2.00 %
Elevation range: 0.00 ft to 3.79 ft.	

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
-25.00	3.79	-25.00	-2.50	0.030
-17.00	1.79	-2.50	2.50	0.040
-2.50	1.50	2.50	25.00	0.030
-2.50	0.00			
2.50	0.00			
2.50	1.50			
17.00	1.79			
25.00	3.79			

Discharge	245.00 cfs

Results		
Wtd. Mannings Coefficient	0.032	
Water Surface Elevation	2.50	ft
Flow Area	39.20	ft²
Wetted Perimeter	42.84	ft
Top Width	39.66	ft
Height	2.50	ft
Critical Depth	2.57	ft
Critical Slope	0.016017	ft/ft
Velocity	6.25	ft/s
Velocity Head	0.61	ft
Specific Energy	3.10	ft
Froude Number	1.11	
Flow is supercritical.		

50' WIDE CHANNEL 5 TO POND 2
Worksheet for Irregular Channel

Project Description	
Project File	x:\2860000.all\2863944\hydro\channel.fm2
Worksheet	PROP. CHANNEL 5
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

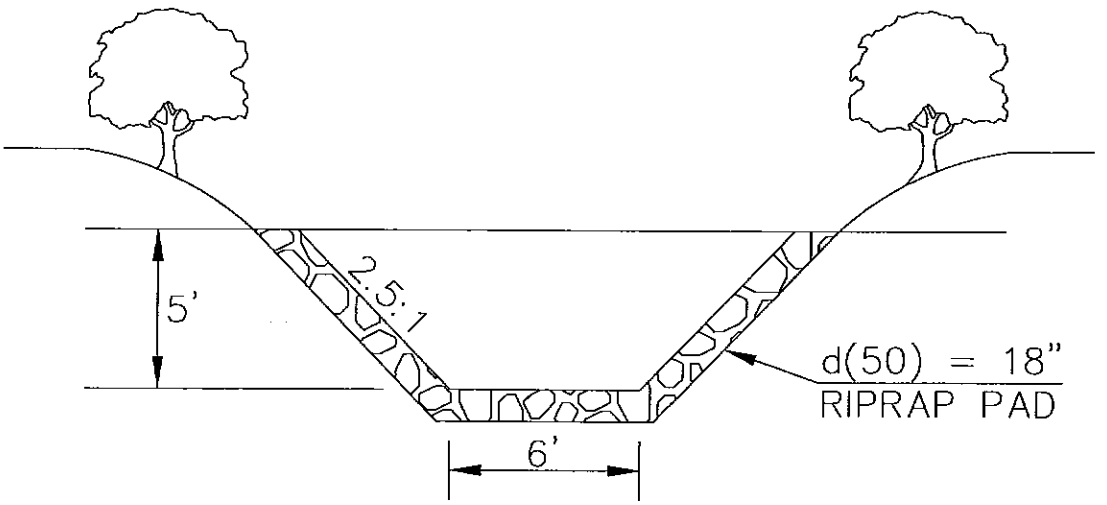
Input Data	
Channel Slope	2.00 %
Elevation range: 0.00 ft to 3.79 ft.	

Station (ft)	Elevation (ft)
-25.00	3.79
-17.00	1.79
-2.50	1.50
-2.50	0.00
2.50	0.00
2.50	1.50
17.00	1.79
25.00	3.79
Discharge	253.00 cfs

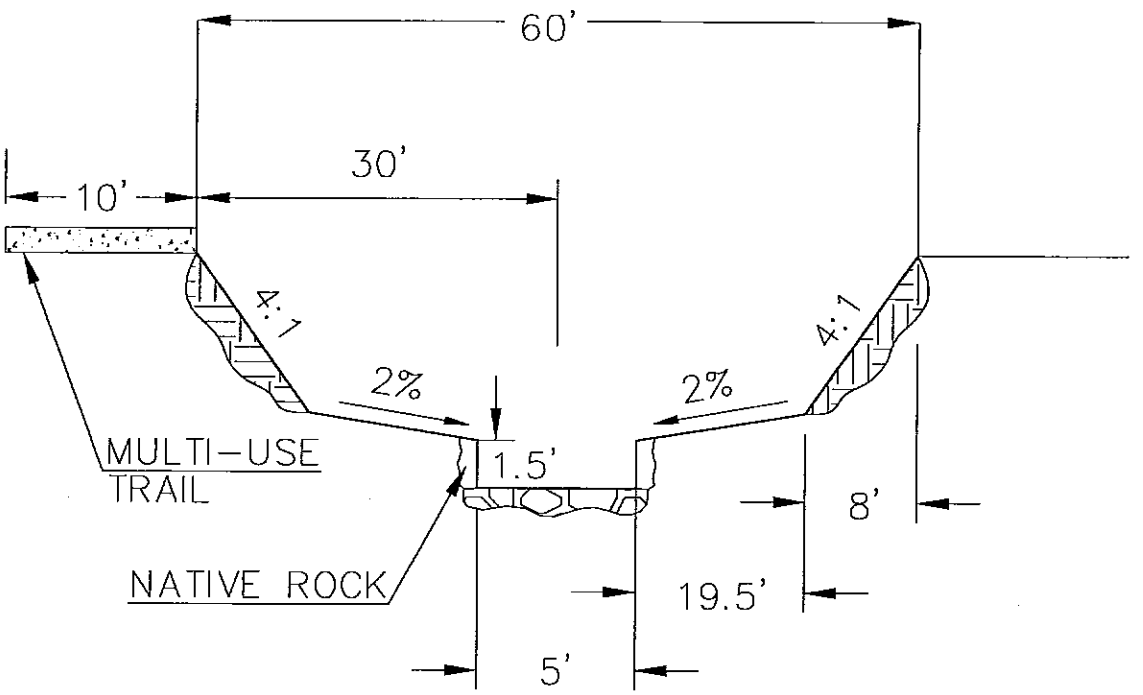
Start Station	End Station	Roughness
-25.00	-2.50	0.030
-2.50	2.50	0.040
2.50	25.00	0.030

Results		
Wtd. Mannings Coefficient	0.032	
Water Surface Elevation	2.52	ft
Flow Area	40.04	ft²
Wetted Perimeter	43.01	ft
Top Width	39.83	ft
Height	2.52	ft
Critical Depth	2.60	ft
Critical Slope	0.015932	ft/ft
Velocity	6.32	ft/s
Velocity Head	0.62	ft
Specific Energy	3.14	ft
Froude Number	1.11	
Flow is supercritical.		

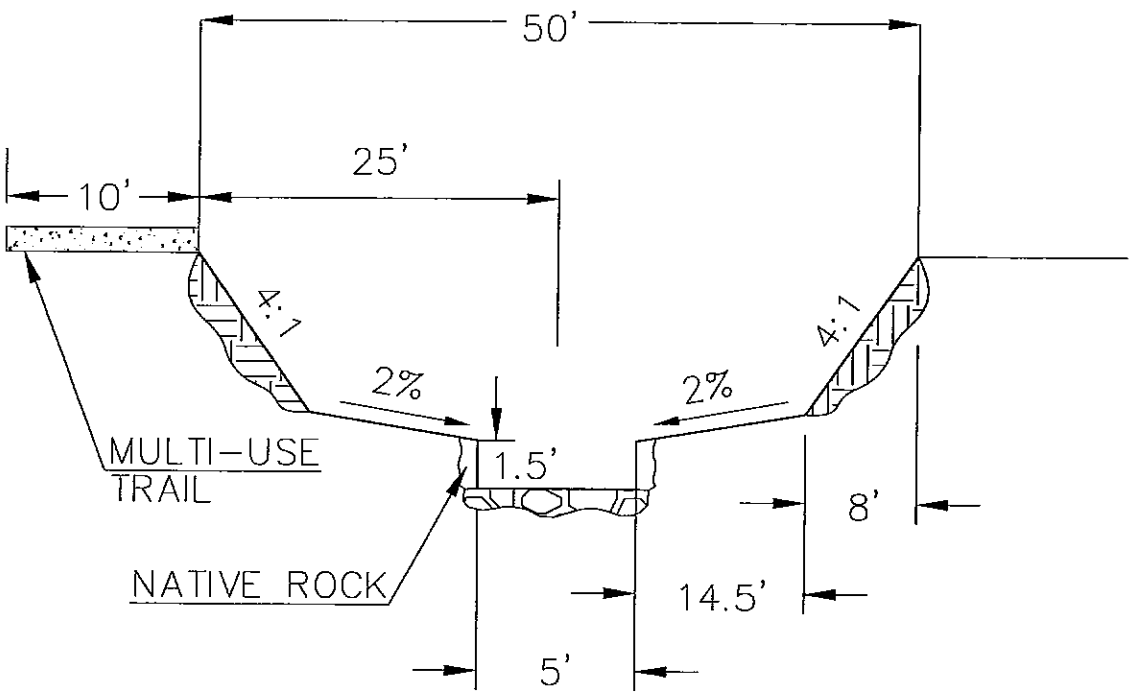
CHANNEL CROSS SECTIONS



30' TYPICAL CHANNEL 1 CROSS SECTION



60' TYPICAL CHANNEL 2 & 3 CROSS SECTIONS



50' TYPICAL CHANNEL 4 & 5 CROSS SECTIONS

DRAINAGE MAPS