Storm Water Pollution Prevention Plan for Summit Woods Subdivision

Location:
NYS Route 52
Town of East Fishkill
County of Dutchess

Date: June 15, 2005
Revised: December 11, 2017

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Certification Statements

Owner's/Operator's Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluated the information submitted. Based on my inquiry of the persons or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Name (please print) _____

Title _____ **Date** _____

Address _____

Phone _____ **Email** _____

Signature _____

Contractor's Certification

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of State of New York and could subject me to criminal, civil and/or administrative proceedings."

Contracting Firm Name (please print) ____

Address _____

Phone _____ **Fax** _____

Name (please print) _____

Title _____ **Date** _____

Signature _____

SWPPP Responsibilities _____

_____

_____

_____

Trained Individual Name (please print) _____

Title _____ **Date** _____

Signature_

SWPPP Responsibilities _____

_____

_____

_____

Note: All contractors involved with Stormwater related activities shall sign a contractor's certification form.

Qualified Professional's Credentials and Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-Construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print) _____

Title _____ **Date** _____

Address _____

Phone _____ **Email** _____

Signature _____

"Qualified Professional" means a person knowledgeable in the principles and practices of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

1 Introduction

This Stormwater Pollution Prevention Plan (SWPPP) for the 175-lot residential subdivision to be known as "Summit Woods Subdivision" has been developed in accordance with New York State Department of Environmental Conservation (NYSDEC) technical standards as presented in the New York Standards and Specifications for Sediment and Erosion Control Manual (July 2016), and the New York State Stormwater Management Design Manual (August 2015). This report has also been designed to meet the criteria requirements of the New York State Pollutant Discharge Elimination System (SPDES) General Permit GP-0-15-002.

1.1 Project Background

The proposed project site consists of a 329.84-acre parcel of land, located at the intersection of Depot Hill Road and Emma Road in the Town of East Fishkill, Dutchess County, New York. The project is located within the R-135, Residential zoning district and has frontage along Depot Hill Road.

The project consists of 6 separate parcels, located on State Route 52 near the intersection of Route 52 and Primrose Lane, Southern Drive, Stormville Road and Collarbark Road.

A location map has been provided in figure A below, which shows an aerial view of the site and the surrounding area.

1.2 Proposed Project

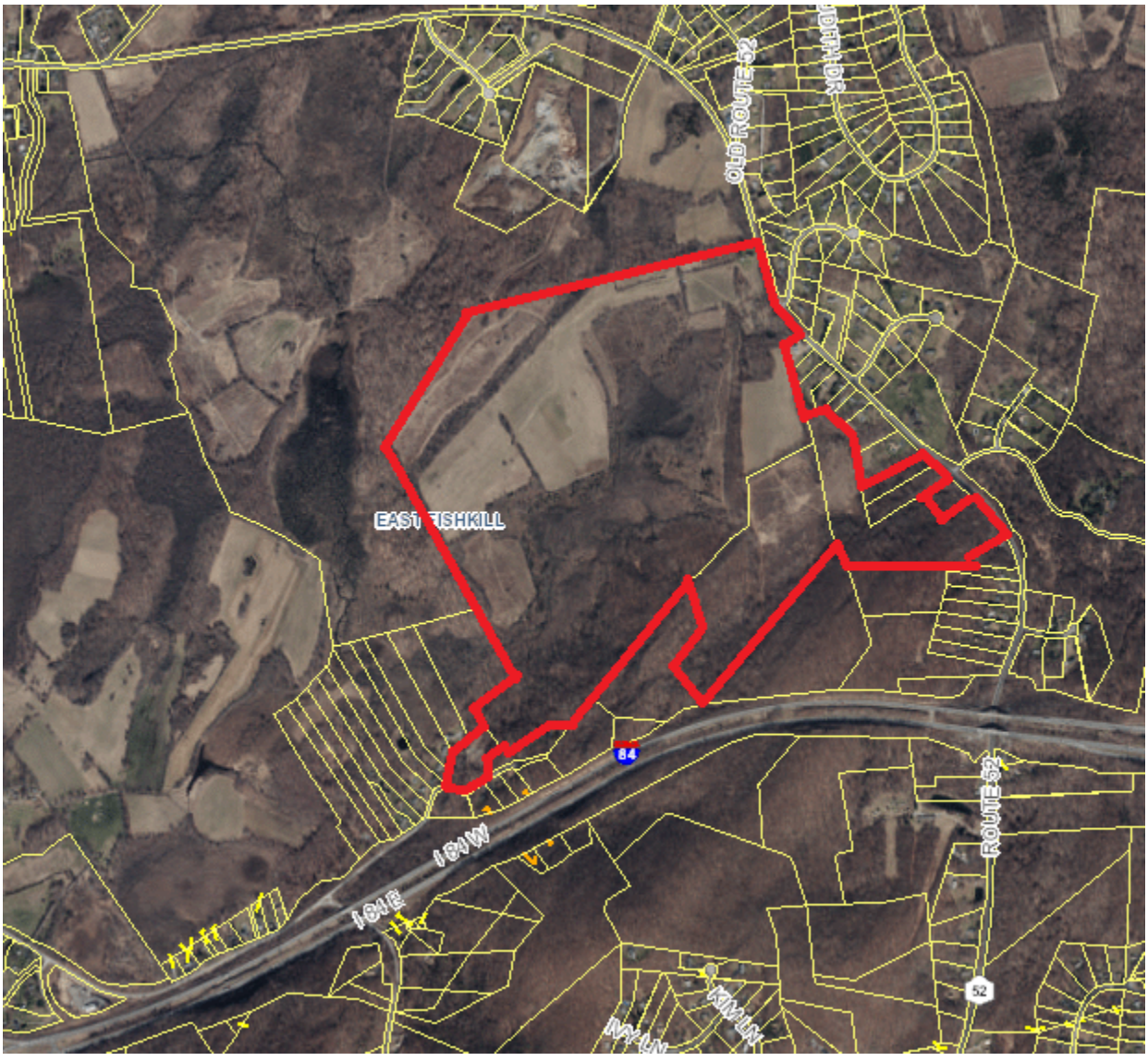
The proposed project include the development of the parcels for the creation of a 175-lot single-family residential development. The Applicant intends to develop the site, disturbing approximately 39% of the property and leaving the remaining land (steep slopes and wetlands) as open space. The Applicant is proposing to provide 201.42 acres of open space on the property inclusive of the mapped wetland area Other improvements to the site will include associated amenities for a single family subdivision such as driveways, lawns, landscaping etc.

A stormsewer system shall be constructed to direct runoff from the site into extended Extended Detention Ponds. The roof runoff from the proposed houses will be directed into drywells. Please refer to section 5.0, "Permanent Water Quality and Quantity Controls," of this report for further information.

This site will be served by onsite water and sewer facilities, which shall approved by the Dutchess County Department of Health and the DEC.

According to the NY SPDES General Permit, a SWPPP must be implemented for single family residential project greater than five (5) acre of disturbance. The total disturbance for this project shall be approximately 128.42 acres, therefore a complete SWPPP shall be provided. Disturbance to the site during construction will be minimized to every extent possible. Temporary erosion and sediment control measures have been provided and locations have been shown on the plan to indicate the limits of disturbance and to delineate the areas deemed necessary for regrading and clearing during construction. This report has been designed to offer both temporary and permanent mitigation practices during and after the construction phase in an effort to reduce the sediment laden runoff created by the disturbed areas.

Figure A - Location Map



2 Existing Site Features

The predominant existing land use on the site is open space with an isolated single-family residential site. The large majority of the open space consists of abandoned fields, woodlands, thickets, and a large NYSDEC wetland and stream. The single-family house site located on the site is dilapidated with frontage on Route 52. Several outbuildings also accompany this home. Existing land uses along Route 52 can be broken down into three general but distinct categories. Beginning on the western end of Route 52 off of Old Post Road, land uses are characterized by large fenced meadows and several large farmhouses and barns. Further east on Route 52 is old farmland where the project site is located. In this area, land uses consist of open space areas and formerly agricultural lands that have essentially become open space mixed with some single-family residences and new subdivisions. Route 52 continues east to Stormville Road, with older single-family residences along the southern side of the road and some open space along the northern and southern side of the road.

2.1 Historic Places

Base on the New York State Historic Preservation Office (NYSHPO) National Resister and Archeological Sensitivity Map, portions of the project site is located within an archeo sensitive area, the Van Orden Site Locus 1. The plans have been revised to avoid impacting this area. NYSHPO issued a letter stating that the project will have no adverse impact on the historic resources. A copy of the correspondence has been provide is Appendix "G" of the report.

2.2 Site Soils

The official soil type indicated by the USDA Soil Conservation Service for the Site is as follow;

Cc – Carlisle Muck (0.3%)

Hydrologic Soil Classification = A/D

Description: This is a very deep, nearly level, poorly drained organic soil. Slopes range from 0% to 3%. Permeability is moderately slow to moderately rapid. Depth to the water table is approximately 0.5 to 1.0 foot from September to June.

The erosion potential is generally moderate. The construction limitations for roads are wetness and frost action. .

ChB & ChD – Charlton loam (12.8%)

Hydrologic Soil Classification = B

Description: The Charlton soil is a very deep well drained loamy soil formed in till. Slopes are 3% to 8% and 15% to 25%. The erosion potential is generally high. The construction limitations for roads are moderate slope and frost action on slopes of less than 15% and severe slope on areas greater than 15%. The construction limitations for dwellings with

basements and shallow excavations are slight to moderate slope on areas less than 15% slope and severe slope on areas greater than 15%.

CuC - Copake gravelly silt loam (12.5%)

Hydrologic Soil Classification = B

Description: This is a very deep, well-drained sandy gravelly soil formed in outwash. Slopes are 5% to 16%. Permeability is rapid to moderately rapid in the solum and very rapid in the substratum.

The erosion potential is generally low. The construction limitations for roads and dwellings with basements are slight to moderate slope on areas less than 15% slope and severe slope on areas greater than 15%. The construction limitations for shallow excavations are severe caving of cutbanks in areas less than 15% slope and severe slope and caving of cutbanks in areas greater than 15%.

FcD - Farmington - Galway complex (5.9%)

Hydrologic Soil Classification = C

Description: This is a shallow to moderately deep, excessively well-drained loamy soil formed in till underlain by folded limestone bedrock. Permeability is moderate. This soil averages 10"-20" over bedrock and the depth to the seasonal high water table is 1.5 to 3.0 feet from March to April.

The erosion potential is moderate. The construction limitations for roads, dwellings with basements, and shallow excavations are severe due to depth to rock on slopes of less than 15% and severe slope and depth to rock on areas greater than 15%.

GfB – Galway - Farmington complex (4.5%)

Hydrologic Soil Classification = B

Description: This soil is about 40% Galway soils, 30% Farmington soils, and 30% other soils and rock outcrop.

The erosion potential is moderate. The construction limitations for roads, dwellings with basements, and shallow excavations are severe due to depth to rock on slopes of less than 15% and severe slope and depth to rock on areas greater than 15%.

HoD & HoE – Hollis - Chatfield- Rock Outcrop (7.8%)

Hydrologic Soil Classification = C/D

Description: This complex is a steep to very steep, well and excessively drained loamy soil formed in till underlain by granite. Permeability is moderate to moderately rapid.

The erosion potential is generally moderate. The construction limitations for roads are severe slopes and frost.

MnA & MnB – Massena silt loam (10.1%)

Hydrologic Soil Classification = C

Description: This is a very deep, nearly level, well-drained loamy soil formed in till. Permeability is moderate in the surface layer and the subsoil, and moderately slow in the substratum. Slopes are nearly level (0-3% and 3-8%). The depth to the seasonal high water table is 0.5 to 1.5 feet from November to May.

The erosion potential is generally moderate. The construction limitation for roads and for dwellings with basements is flooding.

SkB – Stockbridge silt loam (11.6%)

Hydrologic Soil Classification =

Description: This is a very deep, well-drained soil formed in till. Permeability is moderately slow to moderate in the surface layer and slow in the subsoil and the substratum. Slopes are (3-8%). This soil is classified as Prime Farmland.

Su – Sun silt loam (11.6%)

Hydrologic Soil Classification = D

Description: This is a very deep, nearly level, poorly and very poorly drained loamy soil formed in till. Permeability is moderate in the surface layer and slow in the substratum. Depth to the seasonal high water table is 1.0 to 0.5 feet from November to April. This soil is Hydric.

The erosion potential is moderate. The construction limitations for roads, dwellings with basements, and shallow excavations are severe due to depth to water.

SmB - Stockbridge - Farmington complex (29.9%)

Hydrologic Soil Classification = C/D

Description: This soil is about 50% Stockbridge soils, 30% Farmington soils, and 20% other soils and rock outcrop.

The erosion potential is high. The construction limitations for roads, dwellings with basements, and shallow excavations are severe due to depth to rock on slopes of less than 15% and severe slope and depth to rock on areas greater than 15%.

Ra - Raynham silt loam (3.9%)

Hydrologic Soil Classification = C/D

Description: This is a very deep, nearly level, poorly and very poorly drained loamy soil formed in lake laid sediments. Permeability is moderate in the surface layer and moderately slow in the substratum. Depth to the seasonal high water table is 0.5 to 2.0 feet from November to May.

The erosion potential is moderate. The construction limitations for roads, dwellings with basements, and shallow excavations are severe due to depth to water.

As proposed, construction will predominantly occur on the Stockbridge Farmington soils (SmB). According to the Dutchess County Soil Conservation Service Soil Survey Users Guide, the primary constraint associated with construction within these soils is related to steep slopes.

Figure B - Soils Map

3 Existing Site Hydrology

A NYSDEC wetland constitutes the central portion of the property, which is generally level with an elevation between 314 feet msl and 324 feet msl. Large areas of steep slopes exist mainly in the southern portion of the site with an elevation between 324 feet msl and 582 feet msl. The remaining areas of the site are generally gently rolling old agricultural field. The majority of the

steep slopes is in the proposed open space area and will remain undisturbed under the current proposal.

Approximately 92% of the development will occur in the area of the property where the natural slopes are between 0% and 10%. About 6% will occur in the slopes from 10% to 20%. The remaining 2% of development will occur in the areas of the property where the slopes are greater than 20%.

3.1 Pre Development Drainage Areas

The site has been broken up into nine distinct drainage areas were used when analyzing the runoff from this project. For the post development analysis the same drainage points as in the pre development analysis were used. However to further study the effects of the proposed development the post drainage areas were further broken down into sub areas. To mitigate the impacts of the proposed development stormwater management practices (SMP) have been incorporated into the site development plan to treat both the quantity and quality of the post development runoff.

Refer to Appendix "A" for a detailed calculation of the Area, CN and T_c values. A summary of the pre development drainage input calculations can be found in Table 1 below.

Table 1: Pre Development Drainage Area Input Summary

Area	Total Area (acres)	CN	T_c (minutes)
#1	5.35	60.0	7.46
#2	8.05	59.9	8.72
#3	299.54	69.4	414.27
#4	4.90	71.1	14.13
#5	2.15	71.7	12.04
#6	40.43	68.6	206.30
#7	5.30	61.5	9.20
#8	6.96	72.8	11.77
#9	10.42	76.1	69.93

3.2 Pre Development Runoff Flow Rates

The pre development runoff rates were calculated using the Area, CN and T_c values as shown above. These values were then entered into HydroCAD, 1 and 2, 10, 25, & 100-year storm event flow rate values were obtained for a Type-III storm distribution. Refer to Appendix "A" for pre development hydrographs.

The following table is a summary of the pre development design flows:

Table 2: Pre Development Hydrograph Summary

Design Point	1-year Event	2-Year Event	10-Year Event	25-Year Event	100-Year Event
#1	1.98 c.f.s	3.88 c.f.s.	11.26 c.f.s.	17.07 c.f.s.	29.95 c.f.s.
#2	2.68 c.f.s.	5.36 c.f.s.	15.92 c.f.s.	24.29 c.f.s.	42.90 c.f.s.
#3	22.87 c.f.s.	33.58 c.f.s.	72.63 c.f.s.	102.58 c.f.s.	168.03 c.f.s.
#4	4.65 c.f.s.	6.76 c.f.s.	13.95 c.f.s.	19.23 c.f.s.	30.32 c.f.s.
#5	2.26 c.f.s.	3.25 c.f.s.	6.59 c.f.s.	9.02 c.f.s.	14.12 c.f.s.
#6	4.93 c.f.s.	7.44 c.f.s.	16.77 c.f.s.	23.97 c.f.s.	39.61 c.f.s.
#7	2.28 c.f.s.	4.20 c.f.s.	11.53 c.f.s.	17.23 c.f.s.	29.78 c.f.s.
#8	7.92 c.f.s.	11.20 c.f.s.	22.25 c.f.s.	30.23 c.f.s.	46.86 c.f.s.
#9	4.95 c.f.s.	6.87 c.f.s.	13.22 c.f.s.	17.76 c.f.s.	27.16 c.f.s.

4 Developed Site Hydrology

The proposed project include the development of the 128.42-acre parcel into 175 individual lots, the remaining 201.42-acres lot will remain undeveloped. Other improvements to the site will include associated amenities for a single family subdivision such as driveways, lawns, landscaping etc. and various land-grading. Ground cover changes will include wooded/grass areas being converted to impervious and grassed lawn areas.

Construction and regrading on the site will alter the existing topography and will therefore change the existing drainage patterns. While the same design point that was analyzed in the pre-development condition will be analyzed in the post-development condition, the drainage area and flow will be altered due to the improvements on the site. Please refer to Drainage Sheet 2 of 2, "Post Development Hydrology", included in the back of this report, for graphical representations of drainage flow paths and areas.

4.1 Green Infrastructure Planning

4.1.1 Preservation of Natural Resources

The following measures have been incorporated into the site design to preserve natural resources.

- **Preservation of Buffers** – NYSDEC wetland HJ49 encompasses 99.7 acres of the site. A 100-foot buffer will be maintained and delineated as open space

- **Reduction of Clearing and Grading –** The Applicant is proposing a cluster subdivision with lot ranging in size from 13,062 square feet to 5.47 acres. The site has been designed with the intent to limit clearing and grading required to the minimum amount necessary. By taking advantage of the existing topography, the clearing and grading will be kept to a minimum. This will decrease the amount of required site excavation.

- **Open Space Design** – It is the intent of the Applicant to preserve the open space in perpetuity. . In accordance with Article IX of the Subdivision Regulations of the Town of East Fishkill, at least 30% of the gross acreage of the subdivision shall be composed of land which is preserved as open space. This project will provide approximately 61% of its total area to open space. The open space land is to be permanently preserved as open space from future development or future use as part of a yard of any individual lot. In order to effectuate the preservation of open space, the land designated as open space will be owned by a homeowners association (HOA) with a conservation easement. The Applicant will offer a conservation easement to a qualified, not-for-profit corporation eligible to hold a conservation easement. If no such not-for-profit corporation is available to accept the easement, the Applicant will offer the easement to the Town of East Fishkill. The conservation easement will require the open space land to be permanently designated for use only as open space and will not be allowed to be used for future development or future use as part of a yard of any individual lot

4.1.2 Reduction of Impervious Cover

Throughout the site an effort has been made to reduce the amount of impervious cover proposed by this project. The following reductions have been integrated into the site layout:

- **Roadway Reduction** – the subdivision layout has been designed to provide access to the proposed lots via Depot Hill Road. This will eliminate the need for the construction of a new paved road to access the proposed lots.

4.1.3 Runoff Reduction Techniques

The site has been designed to manage the impacts by using natural features and runoff reduction practices to slow down the runoff and promote infiltration. The following manage practices have been integrated into the site layout:

- Incorporation of infiltration practices in the form of drywells and/or rain garden management system. This practice will capture and temporarily store the runoff before allowing it to be infiltrated into the surrounding soils.

4.2 Post Development Drainage Areas

The post-development condition for design points #3 and #6 have been further broken down into a smaller sub-area to properly analyze the overall drainage. Sub-areas shall consist of portions of the site where development is to take place and will therefore contain a stormwater management practice (SMP) to properly mitigate runoff for that area. Each of these sub-areas in the post-development condition contribute flow to a common design point (ex. Sub-area #3A, #3B etc., would all contribute flow to Design Point #3). The cumulative post development flows are then compared to the pre-development flows at each design point and the difference is noted. It is the goal of this report to demonstrate that the pre vs post development drainage impacts are adequately mitigated to a level which is at or below existing pre-development conditions.

Please refer to Appendix "B" for a detailed calculation of the Area, CN and T_c values. A summary of the post development drainage input can be found below in Table 5.

Table 3: Post Development Drainage Input Summary

Sub-Area	Total Area (acres)	CN	T_c (minutes)
1	5.35	60	7.46
2	8.05	59.9	8.72
3A	229.76	70.8	430.22
3B	2.80	79.7	6.00*
3C	3.08	78.1	11.30
3D	6.22	78.3	12.12
3E	9.67	80.0	11.92
3F	1.68	77.3	6.00*
3G	6.88	78.4	12.21
3H	0.96	67.5	6.00*
3I	6.09	71.1	22.92
3J	13.43	75.4	14.01
3K	8.59	69.7	12.35
3L	13.50	66.2	6.95
4	3.31	76.4	19.86
5	1.62	74.0	10.31
6A	27.91	71.5	204.20
6B	6.20	79.2	16.37
6C	1.68	74.3	6.00*
6D	3.98	79.2	9.36
7	2.99	67.0	10.74
8	6.79	72.8	21.09
9	7.44	76.6	62.70

* The Minimum Tc used in TR-55 is 0.1 hours (6 minutes)

4.3 Post Development Runoff Flow Rate

The post development runoff rates were calculated using the Area, CN and T_c values obtained as shown in the chart in above. These values were entered into HydroCAD, 1 and 2, 10, 25, & 100-year storm flow rate values were obtained for a Type-III storm distribution. Please refer to

the Appendix "B" for the hydrographs for sub-areas. Refer to the following chart for a summary of the un-mitigated post development design flows:

Table 4: Post Development Hydrograph Summary (Un-mitigated)

Design Pont	1-Year Event	2-Year Event	10-Year Event	25-Year Event	100-Year Event
1	1.98 c.f.s.	3.88 c.f.s.	11.26 c.f.s.	17.07 c.f.s.	29.95 c.f.s.
2	2.68 c.f.s.	5.36 c.f.s.	15.92 c.f.s.	24.29 c.f.s.	42.90 c.f.s.
3	113.95 c.f.s.	158.80 c.f.s.	309.75 c.f.s.	418.85 c.f.s.	647.14 c.f.s.
4	3.84 c.f.s.	5.24 c.f.s.	9.88 c.f.s.	13.16 c.f.s.	19.89 c.f.s.
5	2.17 c.f.s.	3.02 c.f.s.	5.85 c.f.s.	7.88 c.f.s.	12.08 c.f.s.
6	24.29 c.f.s.	32.86 c.f.s.	61.16 c.f.s.	84.19 c.f.s.	122.46 c.f.s.
7	2.30 c.f.s.	3.59 c.f.s.	8.13 c.f.s.	11.51 c.f.s.	18.83 c.f.s.
8	5.89 c.f.s.	8.42 c.f.s.	16.99 c.f.s.	23.21 c.f.s.	36.24 c.f.s.
9	4.02 c.f.s.	5.54 c.f.s.	10.57 c.f.s.	14.14 c.f.s.	21.52 c.f.s.

4.4 Pre vs. Post Runoff Flow Rates

4.4.1 Pre vs. Post Summary (Un-mitigated)

Table 5: Pre vs. Post Summary (Un-Mitigated)

Design Pont	1-Year Event	2-Year Event	10-Year Event	25-Year Event	100-Year Event
1	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.
2	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.
3	**91.08 c.f.s.**	**125.22 c.f.s.**	**237.12 c.f.s.**	**316.27 c.f.s.**	**479.11 c.f.s.**
4	-0.81 c.f.s.	-1.52 c.f.s.	-4.07 c.f.s.	-6.07 c.f.s.	-10.43 c.f.s.
5	-0.09 c.f.s.	-0.23 c.f.s.	-0.74 c.f.s.	-1.14 c.f.s.	-2.04 c.f.s.
6	**19.36 c.f.s.**	**25.42 c.f.s.**	**44.39 c.f.s.**	**57.22 c.f.s.**	**82.85 c.f.s.**
7	0.02 c.f.s.	-0.61 c.f.s.	-3.40 c.f.s.	-5.72 c.f.s.	-10.62 c.f.s.
8	-2.03 c.f.s.	-2.78 c.f.s.	-5.26 c.f.s.	-7.02 c.f.s.	-10.95 c.f.s.
9	-0.93 c.f.s.	-1.33 c.f.s.	-2.65 c.f.s.	-2.65 c.f.s.	5.64 c.f.s.

Bold numbers indicate increase in flow

4.4.2 Pre vs. Post Summary (Mitigated)

Design points #3 and #6 will experience a net increase in imperious area, and therefore an increase stormwater runoff will occur between the pre and post development conditions. This net increase is due to the development of the site and the increase of impervious ground cover within the drainage area. The proposed storm sewer system will capture runoff in the post-development condition and direct it towards the proposed storm basins. This storm sewer basins will provide water quality and quantity.

A summary of the mitigated post development drainage input can be found below in Table 6.

Table 6: Pre vs. Post Summary (Mitigated)

Design Pont	1-Year Event	2-Year Event	10-Year Event	25-Year Event	100-Year Event
1	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.
2	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.	0.00 c.f.s.
3	-3.97 c.f.s.	-6.27 c.f.s.	-14.37 c.f.s.	-18.53 c.f.s.	-7.42 c.f.s.
4	-0.81 c.f.s.	-1.52 c.f.s.	-4.07 c.f.s.	-6.07 c.f.s.	-10.43 c.f.s.
5	-0.09 c.f.s.	-0.23 c.f.s.	-0.74 c.f.s.	-1.14 c.f.s.	-2.04 c.f.s.
6	-0.74 c.f.s.	-1.33 c.f.s.	-3.72 c.f.s.	-5.15 c.f.s.	-5.26 c.f.s.
7	0.02 c.f.s.	-0.61 c.f.s.	-3.40 c.f.s.	-5.72 c.f.s.	-10.62 c.f.s.
8	-2.03 c.f.s.	-2.78 c.f.s.	-5.26 c.f.s.	-7.02 c.f.s.	-10.95 c.f.s.
9	-0.93 c.f.s.	-1.33 c.f.s.	-2.65 c.f.s.	-2.65 c.f.s.	5.64 c.f.s.

5 Unified Stormwater Sizing Criteria

The New York State Stormwater Management Design Manual outlines the guidelines, requirements and waivers for implementation of permanent water quality and quantity control measures on a given constructions site. The unified stormwater sizing criteria has been used to develop stormwater management practices (SMP's) that meet pollutant removal goals, reduce channel erosion, prevent overbank flooding, and help control extreme floods. Since the drainage area for DP#1 experiences an increase in impervious area in the post development condition, the use of stormwater management practices is required. Stormwater management basin systems are being proposed to satisfy the requirements for water quality. In accordance with Chapter 4: Unified Stormwater Sizing Criteria of the New York State Stormwater Management Design Manual June 2015. The New York State Stormwater Management Design

Manual outlines the guidelines, requirements and waivers for implementation of permanent water quality and quantity control measures on a given constructions site. The unified stormwater sizing criteria has been used to develop stormwater management practices (SMP's) that meet pollutant removal goals, reduce channel erosion, prevent overbank flooding, and help control extreme floods.

Since the drainage area for DP#3 andDP#6 will experience an increase in peak flow in the post development condition, the use of stormwater management practices is required. Stormwater management basin systems are being proposed to satisfy both the requirements for water quality and quantity. Water quality (WQ_v), stream channel protection (CP_v), overbank flood protection (QP_v) and extreme flood protection (Q_f) volumes, shall all be accounted for within the proposed stormwater management basin system. The following is an outline of the criteria for the stormwater management practices of this project site

5.1 Water Quality Volume (WQv)

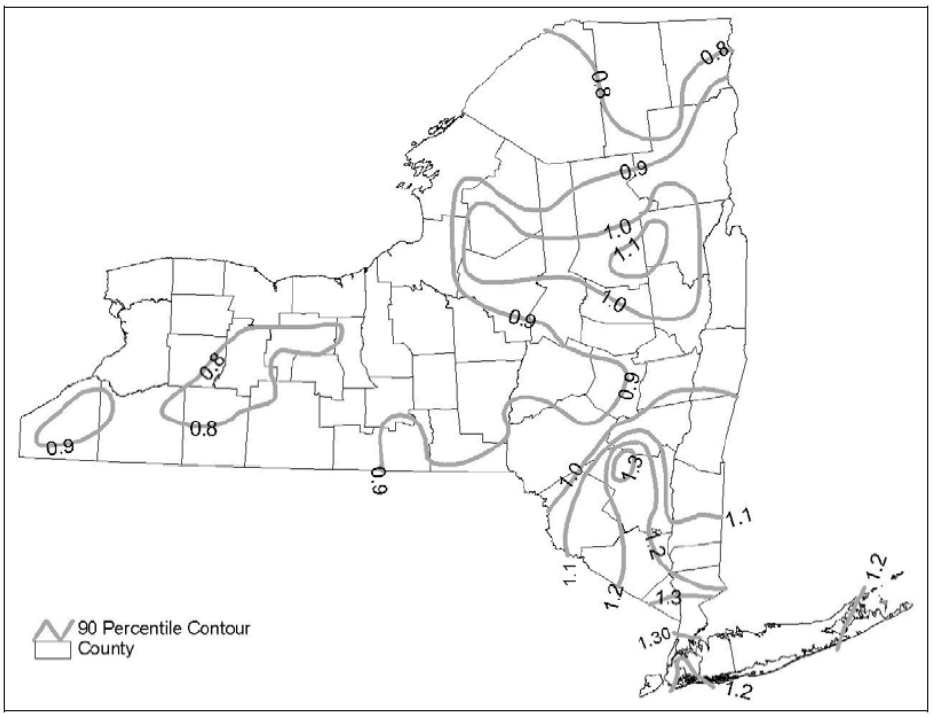
The Water Quality Volume (WQ_V) is designed to improve water quality and is sized to capture and treat 90% of the average annual stormwater runoff volume. The WQ_V is directly related to the amount of impervious cover created on a site. Water quality storage volume can be calculated using the following equation:

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Where:

WQ_V = Water Quality Volume (acre-feet)
P = 90% Rainfall Event Number (See Figure D)
R_v = 0.05 + 0.009(I), where I is percent impervious cover
A = Contributing area (acres)

Figure C– 90% Rainfall in New York State



- The required WQ_V for the combined drainage #3 has been calculated to be 1.85 ac-ft. The calculations can be found in Appendix C.
- The required WQ_V for the combined drainage #6 has been calculated to be 0.32 ac-ft. The calculations can be found in Appendix C

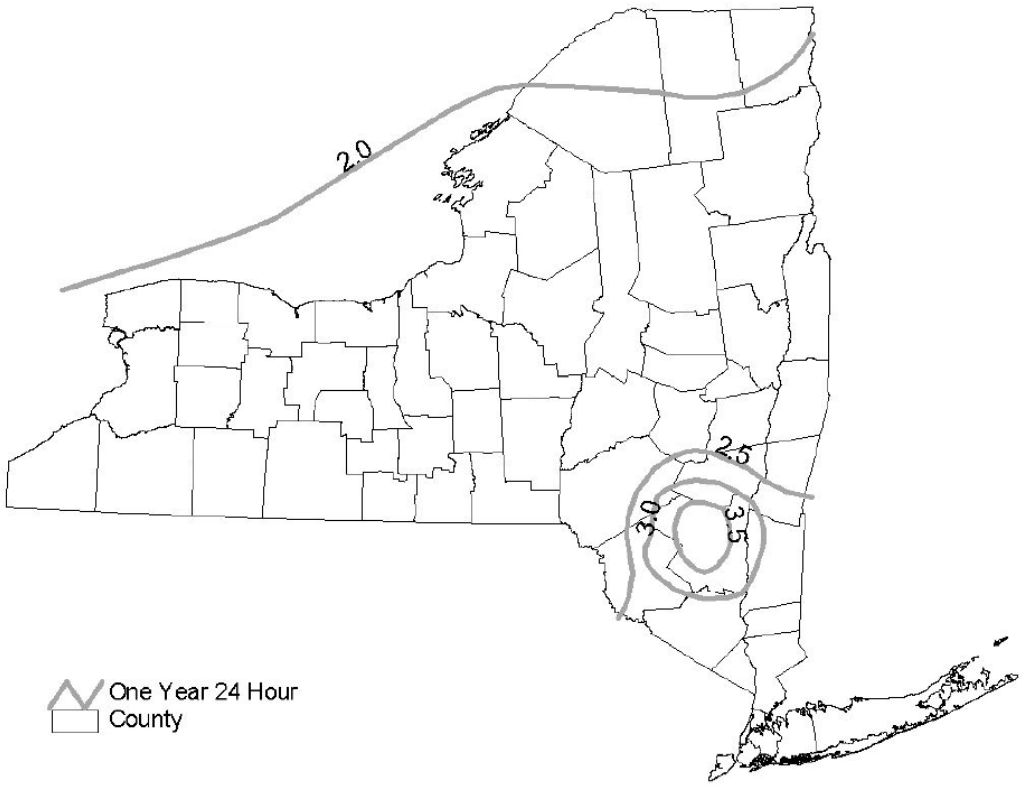
Sub-Area	WQv	CPv	Qr
3B	0.08 ac-ft	0.18 ac-ft	0.09 c.f.s.
3C	0.07 ac-ft	0.20 ac-ft	0.10 c.f.s.
3D	0.14 ac-ft	0.37 ac-ft	0.19 c.f.s.
3E	0.27 ac-ft	0.63 ac-ft	0.32 c.f.s.
3F	0.04 ac-ft	0.09 ac-ft	0.05 c.f.s.
3G	0.21 ac-ft	0.42 ac-ft	0.21 c.f.s.
3H	0.24 ac-ft	0.03 ac-ft	0.02 c.f.s.
3I	0.11 ac-ft	0.24 ac-ft	0.12 c.f.s.
3J	0.30 ac-ft	0.70 ac-ft	0.35 c.f.s.
3K	0.14 ac-ft	0.31 ac-ft	0.16 c.f.s.
3L	0.25 ac-ft	0.39 ac-ft	0.20 c.f.s.
6B	0.15 ac-ft	0.40 ac-ft	0.20 c.f.s.
6C	0.07 ac-ft	0.08 ac-ft	0.04 c.f.s.
6D	0.10 ac-ft	0.26 ac-ft	0.13 c.f.s.

5.2 Stream Channel Protection

Unified Stormwater Sizing Criteria is used to determine the required stream Channel Protection Volume (CPv). In accordance with the New York State Stormwater Management Design Manual, stream channel protection is accomplished by providing 24 hour extended detention of the one-year, 24 hour storm event. The average release rate for CPv calculations (V_s) shall be released over a 12-hour period as the downstream receiving water is a trout stream.

The CPv detention time for the one year storm is defined as the time difference between the center of mass of the inflow hydrograph (entering the SMP) and the center of mass of the outflow hydrograph (leaving the SMP). A modified version of the United States Department of Agriculture Technical Release 55 (TR-55) “Short-Cut Method” was used to relate the required storage volume to the required reduction in the peak flow and storm inflow volume. This method is primarily used to estimate a storage volume given a storm run-off volume and resulting peak discharge and has been modified to incorporate the small flows necessary to provide stream channel protection. Average rainfall depth for the one year, 24 hour storm event is approximately 2.90” for the project site area as shown in Figure D below.

Figure D – One Year, Design Storm for New York State



- The calculations for the required CPV for Drainage Area #3 and #6 can be found in Appendix "C".

5.3 Overbank Flood Protection

Overbank flood protection (Qp_{10}) requirements are imposed to prevent an increase in the frequency and magnitude of overbank flooding generated by urban development. Overbank control requires storage to attenuate the post development 10-year, 24-hour peak discharge rate to or below that of the 10-year, 24 hour peak discharge rate in the pre development condition.

All of the proposed ponds have been designed to attenuated the 10-year storm

5.4 Extreme Flood Protection

Extreme flood protection (Qp_f) requirements are imposed to prevent the increased risk of flood damage from large storm events and maintain the boundaries of the pre-development 100-year floodplain. 100 year flood controls requires storage to attenuate the post development 100-year, 24-hour peak discharge rate to or below that of pre-development rates

All of the proposed ponds have been designed to attenuated the 100-year storm

6 Stormwater Management Practices

6.1 Drywells

Dry Well infiltration systems will mitigate the roof runoff from each of the proposed houses. An 10 foot diameter precast concrete drywells with a 12" ring of stone to provide ample volume for a 25-year storm. Each drywell shall consist of a Woodard's precast drywell model DW4X10 drywells (or equal) and have an available storage volume of 415 ft^3. A surcharge pipe shall be provided on the roof leader in the event the chamber is clogged or the system in overwhelmed (storm events greater the 25-year event). The surcharge pipe shall discharge on a splash block at grade and direct the flow away for the structure to a vegetated area. Every effort shall be made to limit the amount of overland flow on to adjacent properties. It shall be the home owner's responsibly to maintain the dry well in proper working order.

6.2 Extended Detention Stormwater Ponds (P-3)

To insure the quality of the stormwater, Extended Detention ponds (P-3) will be implemented to properly mitigate stormwater quality and quantity for the drainage areas. These systems shall be designed to mitigate stormwater quality and quantity before discharging into the adjacent stream.

Details of each pond can be found in Appendix of this report.

7 Temporary Erosion & Sediment Control Measures

This SWPPP adheres to the erosion and sediment control requirements as described in the New York State Standards and Specifications for Erosion and Sediment Control. Construction on the project site involves the disturbance of greater than one (1) acre of soil and, therefore, requires GP-0-15-001 permit coverage. Coverage under this permit requires that a comprehensive Erosion and Sediment Control Plan be developed for the site during the construction phase. Please refer to the following items concerning temporary erosion & sediment control practices:

STANDARDS AND SPECIFICATIONS FOR SILT FENCE

7.1 Silt Fence:

All silt fencing locations have been shown on the SWPPP insert in the back of this report and shall be installed in accordance with the detail shown in Figure F below:

Definition

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence placed on a slope are:

Slope Maximum	Steepness Length (ft.)
2:1	25
3:1	50
4:1	75
5:1 or flatter	100

2. Maximum drainage area for overland flow to a silt fence shall not exceed ¼ acre per 100 feet of fence, with maximum ponding depth of 1.5 feet behind the fence.
3. Erosion would occur in the form of sheet erosion.
4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff. All silt fences shall be placed as close to the areas as possible, but at least 10 feet from the toe of a slope to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized. Sensitive areas to be protected by silt fence may need to be reinforced by using heavy wire fencing for added support to prevent collapse. Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass.
A detail of the silt fence shall be shown on the plan. See Figure below for details.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Table 7: Silt Fence Requirements

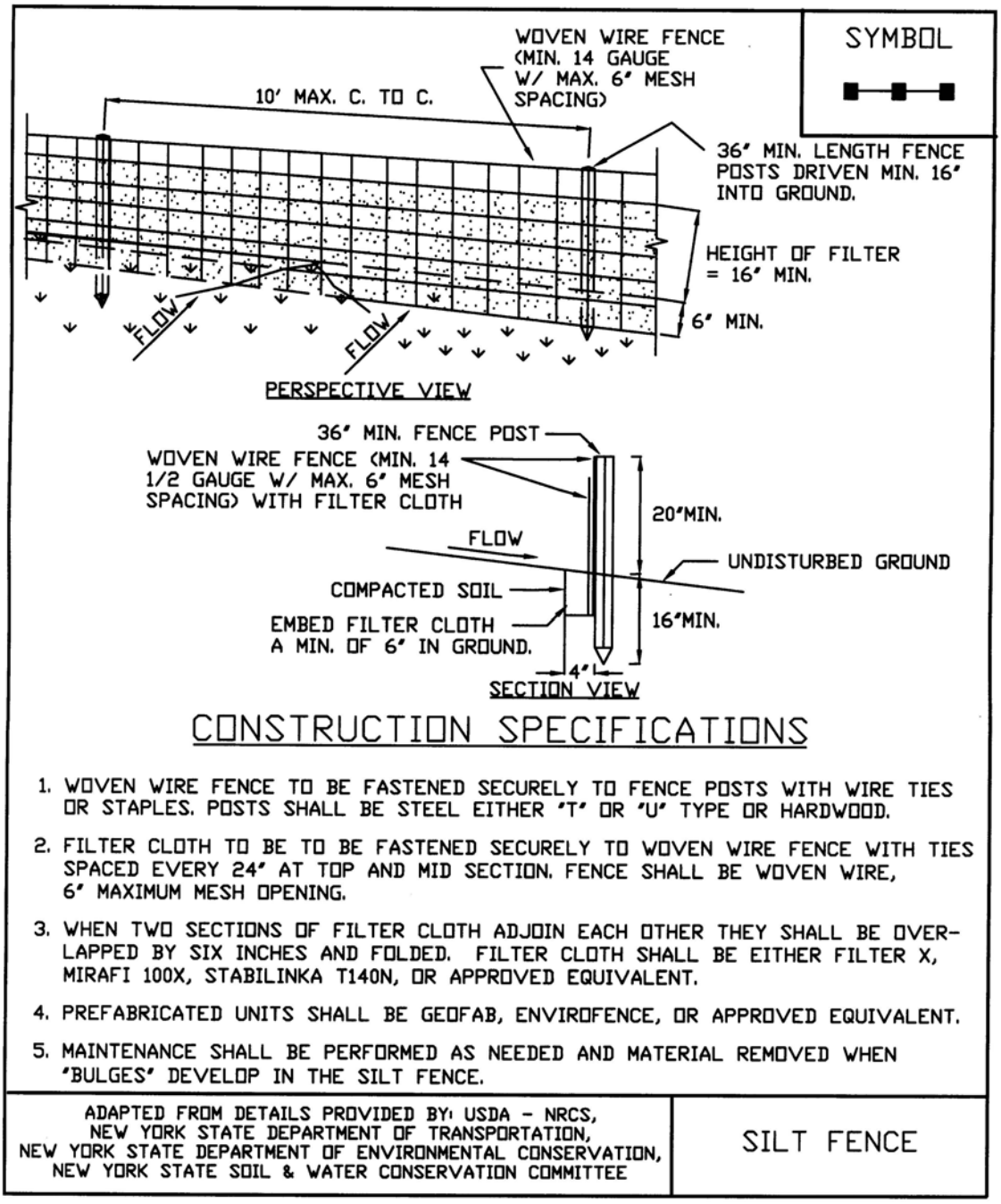
Fabric Properties	Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 2

square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.
4. Prefabricated Units: Envirofence, Geofab, or approved equal, may be used in lieu of the above method providing the unit is installed per the detail shown below

Figure E - Silt Fence Detail



STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ENTRANCE

7.2 Construction Entrance:

A construction entrance location has been shown on the SWPPP insert in the back of this report and shall be installed and maintained in accordance with the detail shown in Figure I below; until such time that the driveway has been stabilized by pavement.

Definition

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area.

Purpose

The purpose of stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights-of way or streets.

Conditions Where Practice Applies

A stabilized construction entrance shall be used at all points of construction ingress and egress.

Design Criteria

Aggregate Size: Use a matrix of 1-4 inch stone, or reclaimed or recycled concrete equivalent.

Thickness: Not less than six (6) inches.

Width: 12-foot minimum but not less than the full width of points where ingress or egress occurs. 24-foot minimum if there is only one access to the site.
Length: As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

Geotextile: To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single-family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

Criteria for Geotextile
The geotextile shall be woven or non-woven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown

Table 8: Criteria for Geotextile Material in Construction Entrance

Fabric Properties[3]	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Brust Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 modified
Equivalent Opening Size	40-80	40-80	US Std Sieve CW-02215
Aggregate Depth	6	10	--

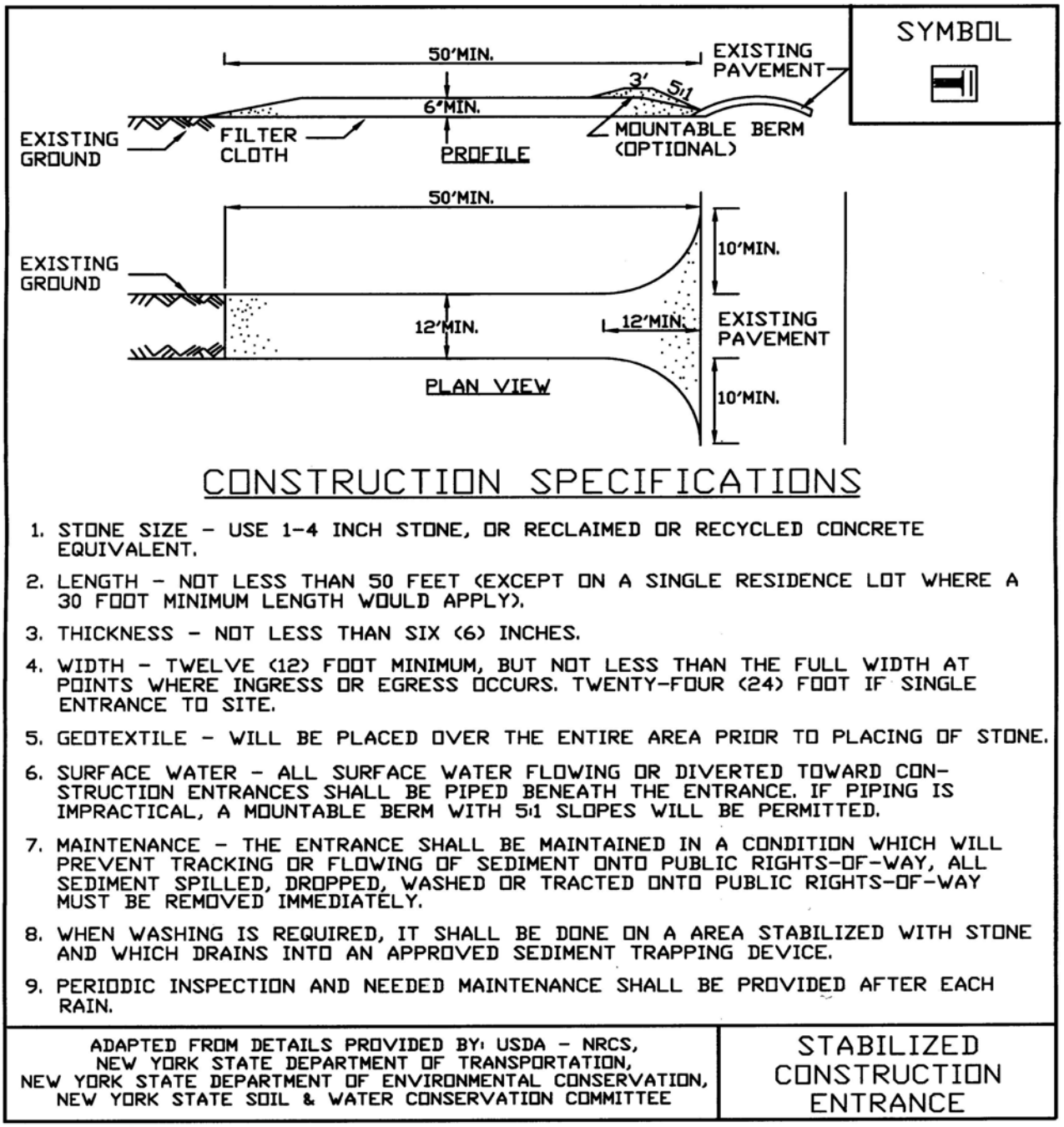
[1] Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.
[2] Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.
[3] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be

removed immediately. When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Figure F – Construction Entrance Detail



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

ADAPTED FROM DETAILS PROVIDED BY: USDA – NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STABILIZED CONSTRUCTION ENTRANCE

STANDARD AND SPECIFICATIONS FOR DUST CONTROL

7.3 Dust Control:

During the construction phase of the project, approximately 4.50 acres of soil will be disturbed to facilitate land regrading and general building construction. The time interval from initial excavation of the proposed disturbed area to the seeding and mulching stabilization phase shall be kept to a minimum. During this window of time during construction of bare soil exposure, dust control may be necessary. Refer to the following specifications regarding dust control.

Definition

The control of dust resulting from land-disturbing activities.

Purpose

To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria are given;

see construction specifications below for common methods of dust control. Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the local permitting authority.

Construction Specifications

A.

Non-driving Areas – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B.

Driving Areas – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geo-textiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

August 2005 Page 5A.87 New York Standards and Specifications for Erosion and Sediment Control All Stormwater Pollution Prevention Plans must contain the NYS DEC issued "Conditions for Use" and "Application Instructions" for any polymers used on the site. This information can be obtained from the NYS DEC website.

Maintenance

Maintain dust control measures through dry weather periods until all disturbed areas are stabilized.

STANDARD AND SPECIFICATIONS FOR TEMPORARY SWALE

7.4 Temporary Swale:

Definition
A temporary excavated drainage way.

Purpose
The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

Conditions Where Practice Applies

Temporary swales are constructed:

1. to divert flows from entering a disturbed area.
2. intermittently across disturbed areas to shorten overland flow distances.
3. to direct sediment laden water along the base of slopes to a trapping device.
4. to transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 5A.2 on page 5A.5 for details.

	Swale A	Swale B
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow channel	1 ft	1 ft
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to theStandard and Specification for Waterways on page 5B.11.

Stabilization

Stabilization of the swale shall be completed within 7 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade1	Flow Channel A (<5 Ac.)	Flow Channel B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, Sod, or lined with plastic or 2 in. stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. or stone or Recycled Concrete Equivalent[2] or geotextile
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent[2] or geotextile	Site Specific Engineering Design

[1] In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.

[2] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

Outlet

Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

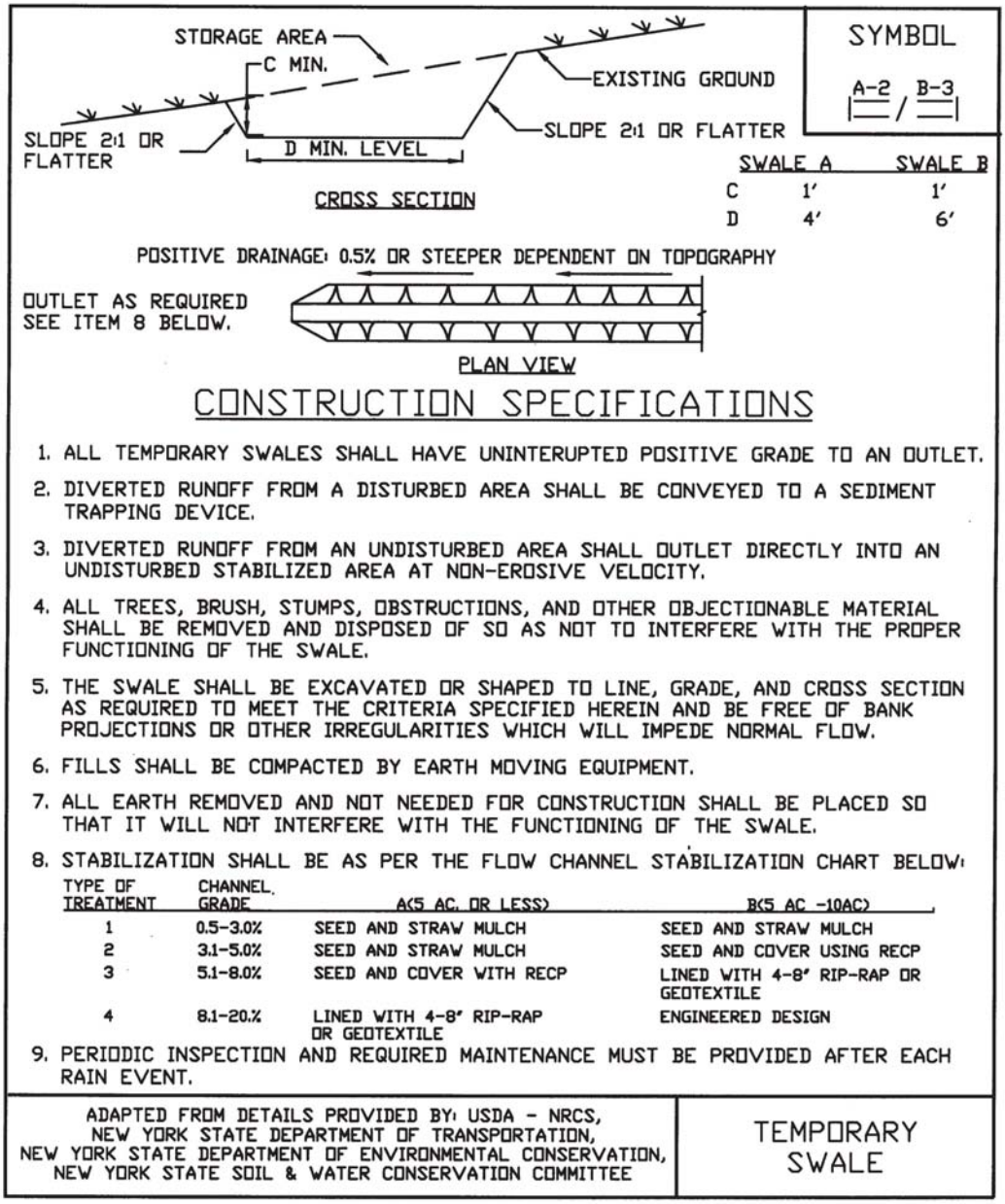
Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment

basin until the drainage area above the swale is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.

If a swale is used to divert clean water flows from entering a disturbed area, a sediment trapping device may not be needed.

Figure 5A.2
Temporary Swale



8 Permanent Erosion & Sediment Control Measures

STANDARDS AND SPECIFICATIONS
FOR
LANDGRADING

8.1 Landgrading:

Definition

Reshaping of the existing land surface in accordance with a plan as determined by engineering survey and layout.

Purpose

The purpose of a landgrading specification is to provide for erosion control and vegetative establishment on those areas where the existing land surface is to be reshaped by grading according to plan.

Design Criteria

The grading plan should be based upon the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surrounding to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, effect on adjacent properties and drainage patterns, measures for drainage and water removal and vegetative treatment, etc.

Many counties have regulations and design procedures already established for land grading and cut and fill slopes. Where these requirements exist, they shall be followed.
The plan must show existing and proposed contours of the area(s) to be graded. The plan shall also include practices for erosion control, slope stabilization, safe disposal of runoff water and drainage, such as waterways, lined ditches, reverse slope benches (include grade and cross section), grade stabilization structures, retaining walls, and surface and subsurface drains. The plan shall also include phasing of these practices. The following shall be incorporated into the plan:

1. Provisions shall be made to safely conduct surface runoff to storm drains, protected outlets, or to stable water courses to ensure that surface runoff will not damage slopes or other graded areas.
2. Cut and fill slopes that are to be stabilized with grasses shall not be steeper that 2:1.

When slopes exceed 2:1, special design and stabilization considerations are required and shall be adequately shown on the plans. (Note: Where the slope is to be mowed, the slope should be no steeper that 3:1, although 4:1 is preferred because of safety factors related to mowing steep slopes.

3. Reverse slope benches or diversion shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for a 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designed benches.

   A. Benches shall be a minimum of 6 feet wide to provide ease for maintenance.
   B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.
   C. The flow length within a bench shall not exceed 800 feet unless accompanied by appropriate design and computations.

4. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of diversions, ditches and swales or conveyed downslope by the use of a designed structure, except where:
   A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.
   B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainage ways, graded swales, downspouts, etc.
   C. The face of the slope will be protected by special erosion control materials, sod, gravel, riprap, or other stabilization method.
5. Cut slopes occurring in ripable rock shall be serrated. The serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be

constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1.5:1. These steps will weather and act to hold moisture, lime, fertilizer, and seed thus producing a much quicker and longer-lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carries to a suitable outlet.

6. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.
7. Slopes shall no be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.
8. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two inches in diameter where compacted by hand or mechanical tempers or over eight inches in diameter where compacted by rollers or other equipment. Frozen materials shall no be placed in the fill nor shall the fill material be place on a frozen foundation.
9. Stockpiles, borrowed areas, and spoil shall be shown on the plans and shall be subject to the provision of this Standards and Specifications.
10. All disturbed areas shall be stabilized structurally or vegetatively in compliance with the Critical Area Treatment section of the New York State Standards and Specifications for Erosion and Sediment Control Manual.

Construction Specifications

See Figure N below for the list of Construction Specifications. This list can also be found on the SWPPP details sheet included in the back of this report.

Figure G – Landgrading Detail

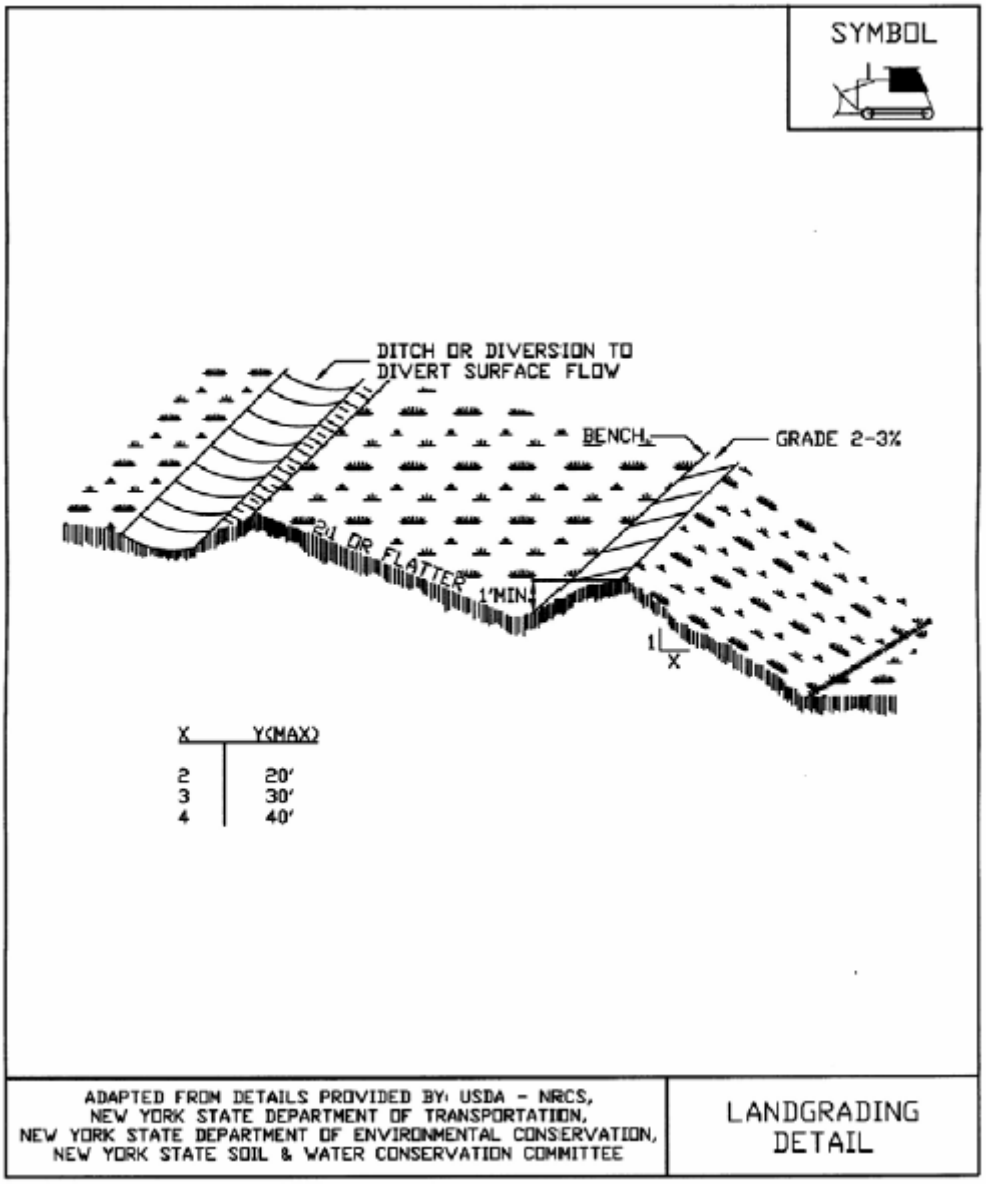


Figure H – Landgrading Construction Specifications Detail

CONSTRUCTION SPECIFICATIONS

1. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
2. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED SEDIMENT CONTROL PLAN AND THE 'STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL IN DEVELOPING AREAS'.
3. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
4. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
5. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
6. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
7. ALL FILL TO BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
8. EXCEPT FOR APPROVED LANDFILLS, FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
9. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
10. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
11. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
12. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
13. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
14. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.

ADAPTED FROM DETAILS PROVIDED BY: USDA – NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

LANDGRADING SPECIFICATIONS

STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

8.2 Rock Outlet Protection

Definition

A section of rock protection placed at the outlet end of the culverts, conduits, or channels.

Purpose

The purpose of the rock outlet protection is to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Scope

This standard applies to the planning, design, and construction of rock riprap and gabions for protection of downstream areas. It does not apply to rock lining of channels or streams.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.
2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.
3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron. Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 5B.13 on page 5B.26 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater **–** Use Figure 5B.12 on page 5B.25
Maximum Tailwater – Use Figure 5B.13 on page 5B.26

If the pipe discharges directly into a well-defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less. The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions. Riprap shall be composed of a well-graded mixture of stone size so that 50 percent of the pieces, by weight, shall be larger than the d50 size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger stone sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d50 size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum stone diameter for d50 of 15 inches or less; and 1.2 times the maximum stone size for d50 greater than 15 inches. The following chart lists some examples:

Stone Quality

Stone for riprap shall consist of field stone or rough unhewn quarry stone. The stone shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5. Recycled concrete equivalent may be used provided it has a density of at least 150 pounds per cubic foot, and does not have any exposed steel or reinforcing bars.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases. A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D- 1682. Gravel filter blanket, when used, shall be designed by
comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Riprap Slope Protection on page 5B.57.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches. Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturers recommendations. The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions
shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the
main gabion structure

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged stones. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.

2. Determine the tailwater condition at the outlet to establish which curve to use.

3. Enter the appropriate chart with the design discharge to determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.

4. Calculate apron width at the downstream end if a flare section is to be employed

Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

2. The rock or gravel shall conform to the specified grading limits when installed respectively in the rip rap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the

damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Stone for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

Figure I – Rip-rap Outlet Design

Figure 5B.13
Outlet Protection Design—Maximum Tailwater Condition
(Design of Outlet Protection from a Round Pipe Flowing Full, Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)

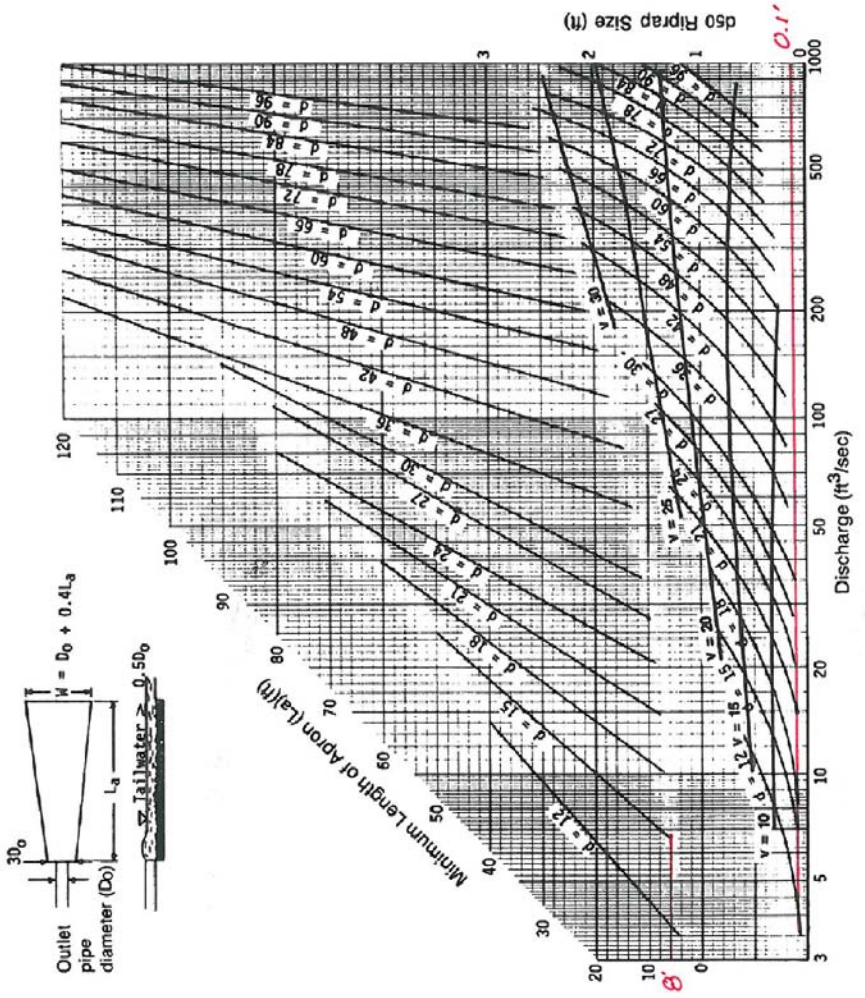
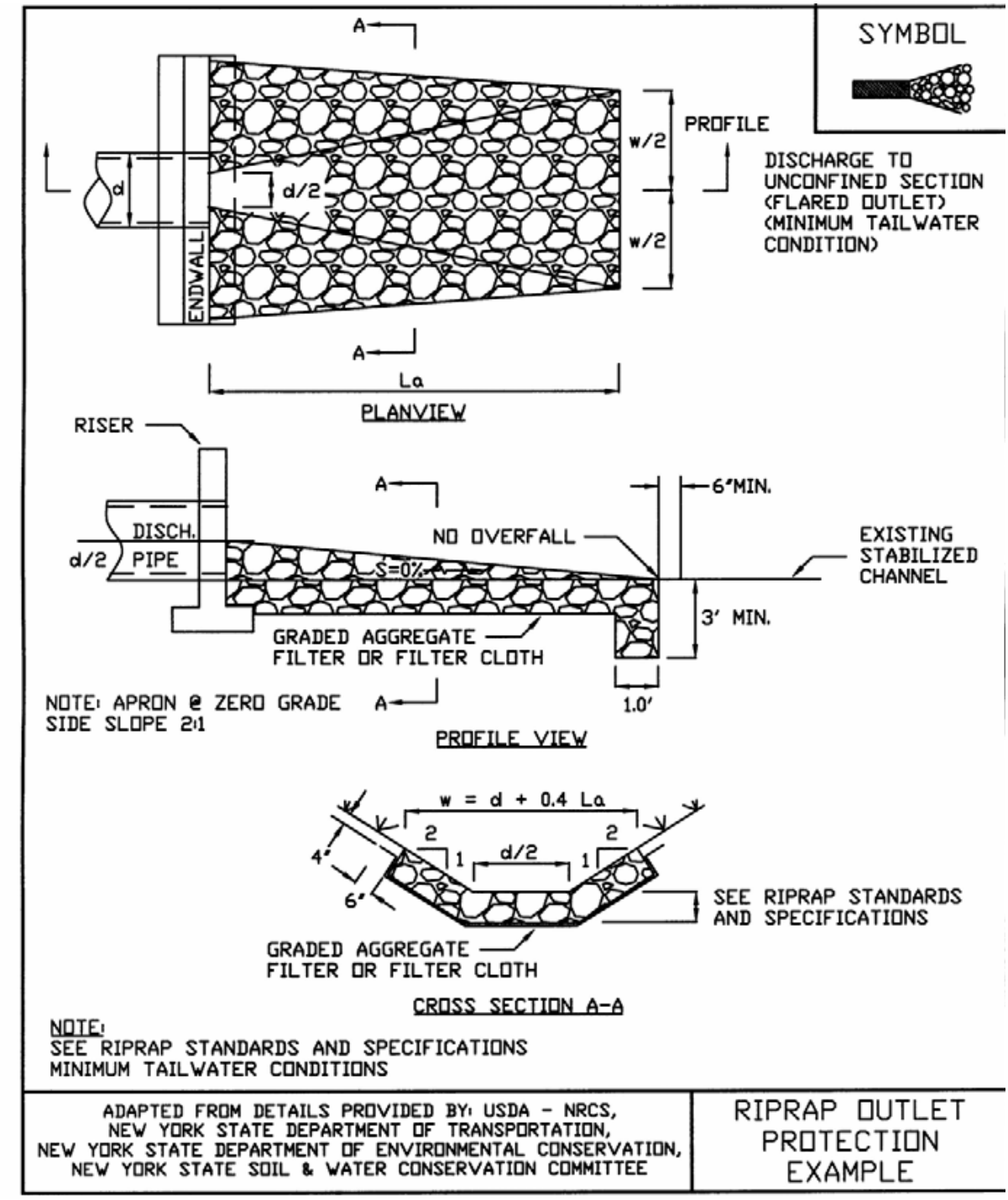


Figure J– Rip-rap Outlet Protection Detail



STANDARD AND SPECIFICATIONS FOR LINED WATERWAY OR OUTLET

Definition

A waterway or outlet with a lining of concrete, stone, or other permanent material. The lined section extends up the side slopes to the designed depth. The earth above the permanent lining may be vegetated or otherwise protected.

Purpose

To provide for the disposal of concentrated runoff without damage from erosion or flooding, where grassed waterways would be inadequate due to high velocities.

Scope

This standard applies to waterways or outlets with linings of cast-in-place concrete, flagstone mortared in place, rock riprap, gabions, or similar permanent linings. It does not apply to irrigation ditch or canal linings, grassed waterways with stone centers or small lined sections that carry prolonged low flows, or to reinforced concrete channels. The maximum capacity of the waterway flowing at design depth shall not exceed 100 cubic feet per second.

Conditions Where Practice Applies

This practice applies where the following or similar conditions exist:

1. Concentrated runoff is such that a lining is required to control erosion.
2. Steep grades, wetness, prolonged base flow, seepage, or piping that would cause erosion
3. The location is such that damage from use by people or animals precludes use of vegetated waterways or outlets.
4. Soils are highly erosive or other soil and climate conditions preclude using vegetation.
5. High value property or adjacent facilities warrant the extra cost to contain design runoff in a limited space.

Design Criteria

Capacity

1. The minimum capacity shall be adequate to carry the peak rate of runoff from a 10-year, 24-hour storm. Velocity shall be computed using Manning's equation with a coefficient of roughness "n" as follows:

Lined Material "n"
Concrete (Type):

Trowel Finish	0.015
Float Finish	0.019
Gunite	0.019
Flagstone	0.022
Riprap	Determine from Figure 5B.11 on page 5B.19
Gabion	0.030

2. Riprap gradation and filter (bedding) are generally designed in accordance with criteria set forth in the National Cooperative Highway Research Program Report 108, available from the University Microfilm International, 300 N. Ree Road, Ann Arbor, Michigan 48016, Publication No. PB-00839; or the Hydraulic Engineering Circular No. 11, prepared by the U.S. Bureau of Public Roads, available from Federal Highway Administration, 400 7th Street, S.W., Washington, D.C. 20590, HNG-31, or the procedure in the USDA-NRCS's Engineering Field Manual, Chapter 16.

Velocity

1. Maximum design velocity shall be as shown below. Except for short transition sections, flow with a channel gradient within the range of 0.7 to 1.3 of this flow's critical slope must be avoided unless the channel is straight. Velocities exceeding critical will be restricted to straight reaches.

Design Flow Depth (ft.)	Maximum Velocity (ft./sec.)
0.0 – 0.5	25
0.5 – 1.0	15
Greater than 1.0	10

2. Waterways or outlets with velocities exceeding critical shall discharge into an energy dissipater to reduce velocity to less than critical, or to a velocity the downstream soil and vegetative conditions will allow.

Cross Section

The cross section shall be triangular, parabolic, or trapezoidal. Monolithic concrete or gabions may be rectangular.

Freeboard

The minimum freeboard for lined waterways or outlets shall be 0.25 feet above design high water in areas where erosion resistant vegetation cannot be grown adjacent to the paved side slopes. No freeboard is required where good vegetation can be grown and is maintained.

Side Slope

Steepest permissible side slopes, horizontal to vertical will be as follows:

1. Non-Reinforced Concrete
    Hand-placed, formed concrete
    Height of lining, 1.5 ft or less……. Vertical
    Hand placed screened concrete or mortared
    In-place flagstone
    Height of lining, less than 2 ft……. 1 to 1
    Height of lining, more than 2 ft…….. 2 to 1
2. Slip form concrete:
    Height of lining, less than 3 ft…… 1 to 1
3. Rock Riprap……. 2 to 1
4. Gabions…… Vertical
5. Pre-cast Concrete Sections…….. Vertical

Lining Thickness

Minimum lining thickness shall be as follows:

1. Concrete……..4 in. (In most problem areas, shall be 5 in. with welded wire fabric reinforcing.)
2. Rock Riprap……1.5 x maximum stone size plus thickness of filter or bedding.
3. Flagstone……..4 in. including mortar bed.

Related Structures

Side inlets, drop structures, and energy dissipaters shall meet the hydraulic and structural requirements of the site.

Filters or Bedding

Filters or bedding to prevent piping, reduce uplift pressure, and collect water will be used as required and will be designed in accordance with sound engineering principles. Weep holes and drains should be provided as needed.

Concrete

Concrete used for lining shall be so proportioned that it is plastic enough for thorough consolidation and stiff enough to stay in place on side slopes. A dense product will be required. A mix that can be certified as suitable to produce a minimum strength of at least 3,000 pounds per square inch will be required. Cement used shall be Portland Cement, Type I, II, IV, or V. Aggregate used shall have a maximum diameter of 1 ½ inches.

Weep holes should be provided in concrete footings and retaining walls to allow free drainage of water. Pipe used for weep holes shall be non-corrosive.

Mortar

Mortar used for mortared in-place flagstone shall consist of a mix of cement, sand, and water. Follow directions on the bag of mortar for proper mixing of mortar and water.

Contraction Joints

Contraction joints in concrete linings, where required, shall be formed transversely to a depth of about one third the thickness of the lining at a uniform spacing in the range of 10 to 15 feet.

Rock Riprap or Flagstone

Stone used for riprap or gabions shall be dense and hard enough to withstand exposure to air, water, freezing, and thawing. Flagstone shall be flat for ease of placement and have the strength to resist exposure and breaking. Rock riprap maximum size shall be as follows:

Velocity, f.p.s.	dmax, inches
5.0	6
8.5	12
10	18
12	24
15	36

A complete riprap gradations is provided in Table 5B.4, page 5B.38.

Cutoff Walls

Cutoff walls shall be used at the beginning and ending of concrete lining. For rock riprap lining, cutoff walls shall be keyed into the channel bottom and at both ends of the lining.

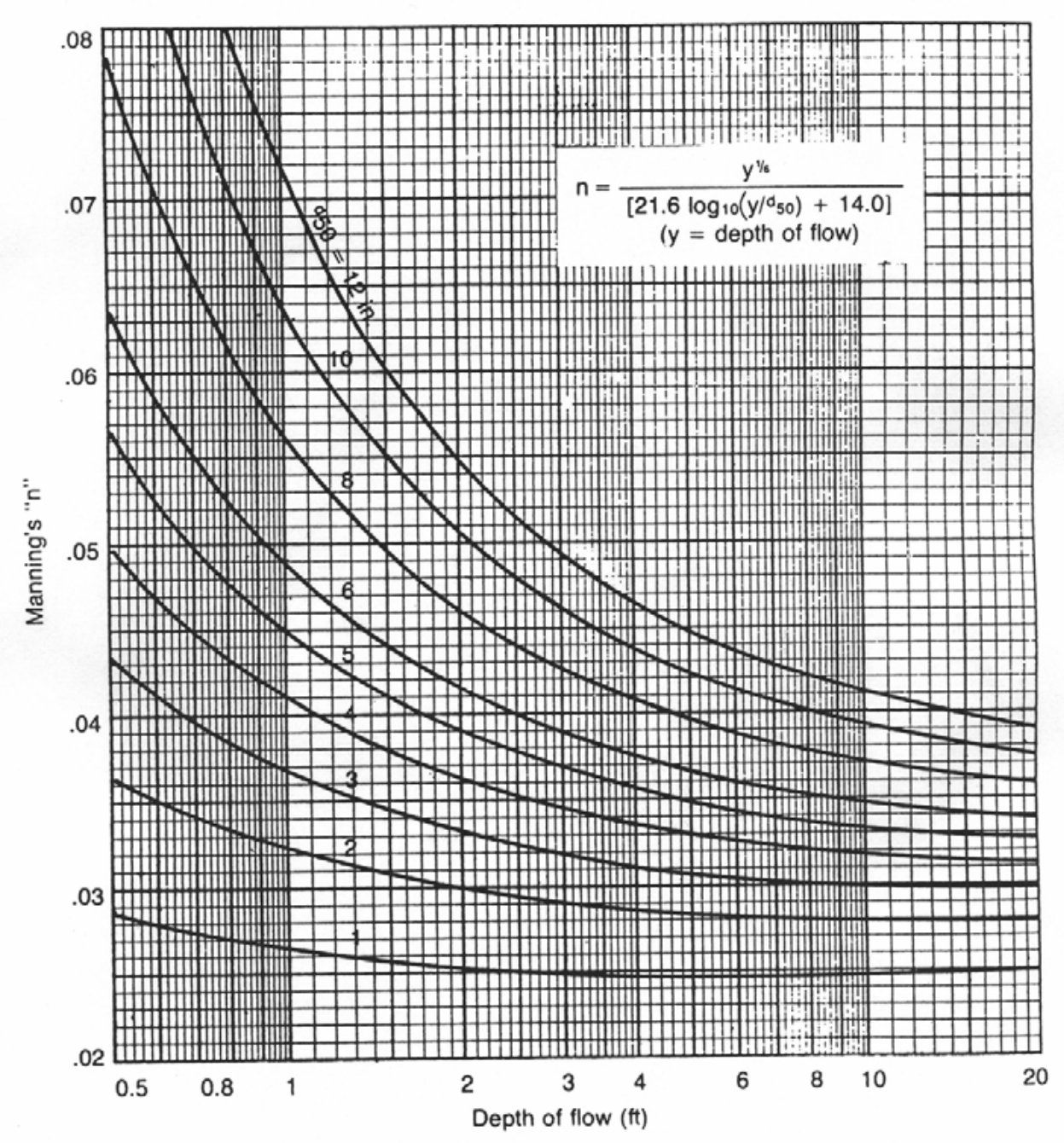
Construction Specifications

1. The foundation area shall be cleared of trees, stumps, roots, sod, loose rock, or other objectionable material.
2. The cross-section shall be excavated to the neat lines and grades as shown on the plans. Over-excavated areas shall be backfilled with moist soil compacted to the density of the surrounding material.
3. No abrupt deviations from design grade or horizontal alignment shall be permitted.
4. Concrete linings shall be placed to the thickness shown on the plans and finished in a workmanlike manner. Adequate precautions shall be taken to protect freshly placed concrete from extreme (hot or cold) temperatures, to ensure proper curing.
5. Filter bedding and rock riprap shall be placed to line and grade in the manner specified.
6. Construction operation shall be done in such a manner that erosion, air pollution, and water pollution will be minimized and held within legal limits. The completed job shall present a workmanlike appearance. All disturbed areas shall be vegetated or otherwise protected against soil erosion.

Maintenance

Pavement or lining should be maintained as built to prevent undermining and deterioration. Existing trees next to pavements should be removed, as roots can cause uplift damage. Vegetation next to pavement should be maintained in good condition to prevent scouring if the pavement is overtopped. See Standard and Specifications for Permanent Critical Area Seeding on page 3.5

Figure K– Determining “n” for Riprap Lined Channel using Depth of Flow



9 Construction Schedule

As required under GP-0-15-002 permit coverage, a construction schedule for the site is required and must be strictly followed. This project is able to be done in a single phases and still to adhere to the NYS DEC policy of disturbing less than five (5) acres of land at any given time. Please refer to the construction schedule outlined below:
The construction sequence will be strictly followed unless a modified plan is submitted for review and approval by the Town. Limits of disturbance for each sequence should be clearly marked out to the Town Engineer's satisfaction prior to construction of that sequence. Coverage for the preliminary work shall be obtained and terminated by the subdivider. Individual lot owners must obtain their own coverage.

9.1 Pre-Construction Schedule (Duplicate on SWPPP Plan Sheet)

As required under GP-0-15-002 permit coverage, a construction schedule for the site is required and must be strictly adhered to. This project will adhere to the NYS DEC policy of disturbing less than five (5) acres of land at any given time. Please refer to the construction schedule outlined below: Any deviations to this schedule must receive prior approval by the applicant's Engineer and shall be noticed to the Town. Limits of disturbance for each sequence should be clearly marked to the Town Engineer's satisfaction prior to construction of that sequence. coverage for the preliminary work shall be obtained and terminated by the Subdivider. Individual lot owner must obtain their own coverage.

PRE-CONSTRUCTION SEQUENCE:

1. Submit N.O.I. accompanied by an executed MS4 SWPPP acceptance form to bureau of water permits, Albany NY.
2. Receive acknowledgement back from NYSDEC.
3. Non-disturbance areas shall be marked with 4-ft orange snow fencing to town engineer's satisfaction prior to site disturbance, and shall be maintained until issuance of a Certificate-of-Occupancy for that lot.
4. Hold a pre-construction meeting with the site engineer, Town engineer, contractor, erosion control inspector and building inspector. Place a copy of the SWPPP report on site along with a copy of the inspector's log book containing copies of the weekly inspections. (applicant's erosion & sediment control inspection agent shall conduct an inspection on a weekly basis)

9.2 Construction Schedule (Duplicate on SWPPP Plan Sheet)

CONSTRUCTION SEQUENCE:

1. Install silt fencing and other temporary controls on all downhill slopes as shown on the Erosion and Sediment Control plan.
2. Install and stabilize temporary construction entrance for the pond area.
3. Commence initial site clearing and grub areas of disturbance of the proposed pond area.
4. Rough grade the roadway and site utilities.
5. Construct the drainage ponds as shown on the plans.
6. Construction of the individual lots may commence once the temporary sediment trap and drainage swale has been completed. The total disturbance at any one time shall not exceed 5 acres.
7. Once all major site disturbance activities have completed and the site has been stabilized, all swales, yard drains and culverts shall be cleaned of all debris and sediment. All grassed areas shall be seeded and mulched. The temporary sedimentation basin shall be cleaned to its bottom elevation and converted to a permanent basin.
8. Once an MS4 Acceptance letter has been issued an N.O.T. (notice of termination) can be filled with NYSDEC.
9. Terminate erosion control inspection

Construction on the Individual Lots:

1) Install/construct the temporary construction entrance into the lot.
2) Install all silt fencing, diversion swales and all other necessary erosion control measures necessary to prevent sediment-laden runoff from leaving the lot.
4) Construct all improvements on the lot. Final grading shall be completed as soon as practicable.
5) Inlet protection shall be provided for the drywell until the lot is stabilized.
6) Topsoil, seed and mulch shall be applied as soon as final grading is completed.
7) Once the completed lawn has been established and stabilized, the erosion control measures shall be removed.
8) The individual who files the Notice of Intent (NOI) shall be responsible for maintenance of the erosion control measures while construction on the lot is underway. This person shall also be responsible for any clean-up or damage due to failure of erosion control measures on the respective lot.

9.3 Construction waste management plan

Construction waste management practices are designed to maintain a clean and orderly work environment. This will reduce the potential for significant materials to come into contact with stormwater. A maintenance schedule shall be developed for these areas. The general contractor shall implement the following practices:

1. Material resulting from the clearing and grubbing operation will be stockpiled up slope from adequate sedimentation controls.

2. Equipment cleaning, maintenance, and repair areas shall be designated and protected by a temporary perimeter berm.

3. The use of detergents for large scale washing is prohibited (i.e., vehicles, buildings, pavement surfaces, etc.).

4. Spill Prevention and Response
   A Spill Prevention and Response Plan shall be developed for the site by the general contractor. The plan shall detail the steps needed to be followed in the event of an accidental spill and shall identify contact names and phone numbers of people and agencies that must be notified.

   The plan shall include Material Safety Data Sheets (MSDS) for all materials to be stored on-site. All workers on-site will be required to be trained on safe handling and spill prevention procedures for all materials used during construction. Regular tailgate safety meetings shall be held and all workers that are expected on the site during the week shall be required to attend.

5. Material Storage
   Construction materials shall be stored in a dedicated staging area. The staging area shall be located in an area that minimizes the impacts of the construction materials effecting stormwater quality.

   Chemicals, paints, solvents, fertilizers, and other toxic material must be stored in waterproof containers. Except during application, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated and disposed at an approved solid waste or chemical disposal facility.

6. Temporary Concrete Washout Facility

Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking. A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

When temporary concrete washout facilities are no longer required for the work, the hardened concrete shall be removed and disposed of. Materials used to construct the temporary concrete washout facilities shall be removed from the site and disposed of. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and/or repaired and seeded and mulched for final stabilization.

7. Solid Waste Disposal
   No solid materials, including building materials, are allowed to be discharged from the site with stormwater. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied periodically by a contract trash disposal service and hauled away from the site.

   Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during equipment fueling and servicing operations. If a spill occurs, it must be contained and disposed so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil. In this regard, potentially polluting substances should be handled in a manner consistent with the impact they represent.

8. Water Source
   Non-stormwater components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in the ponds until it infiltrates and evaporates.

10 Conclusions

The SWPPP (Stormwater Pollution Prevention Plan) for the site to be known as "Summit Woods Subdivision", has been designed in accordance with the *New York Standards and Specifications for Sediment and Erosion Control Manual August 2016*, and the *New York State Stormwater Management Design Manual 2015*. All BMP (Best Management Practices) have been applied to the site to ensure the proper control of any erosion and sediment created on site from disturbance activities. The Town of East Fishkill building inspector, Town Engineer and NYSDEC representative have the authority to modify, add or eliminate any erosion control practice on the construction site. The site's owner shall file an NOI, included in Appendix F of this report, as required by the NYSDEC before starting construction.

Appendix

Appendix A

Pre-Development Cn, Tc Calculations & Pre-Development Summary

Summit Woods

PRE CN & Tc Calculations

AREA#1

Runoff Curve Number Calculations:

Area	Description	Soils	CN
2.77	Woods	B	60
0.62	Woods	C	73
1.96	Brush/Weeds/Grass	B	56
	Total Acreage =		**5.35**
	Weighted CN =		**60.0**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	WOODS/LIGHTBRUSH		
Manning's roughness coeff., n	0.40		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 6.95 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	30.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#1**

Flow Length, L	338 ft		
Unpaved Land Slope, s	29.6 %	Vunpaved= 11.06 fps	Tt= 0.51 Min.
Paved Land Slope, s	0.0 %	Vpaved= 0.00 fps	Tt= 0.00 Min.

Tc= 7.46 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#2

Runoff Curve Number Calculations:

Area	Description	Soils	CN
7.77	Woods	B	60
0.28	Brush/Weeds/Grass	B	56
	Total Acreage =		**8.05**
	Weighted CN =		**59.9**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	WOODS/LIGHTBRUSH		
Manning's roughness coeff., n	0.40		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 7.60 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	24.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#2**

Flow Length, L	612 ft	Vunpaved= 9.07 fps	Tt= 1.12 Min.
Unpaved Land Slope, s	19.9 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 8.72 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#3

Runoff Curve Number Calculations:

Area	Description	Soils	CN
4.04	Woods	A	36
6.75	Wetland	A	78
68.11	Woods	B	60
23.54	Brush/Weeds/Grass	B	56
73.27	Woods	C	73
35.32	Brush/Weeds/Grass	C	70
31.20	Wetland	C	78
17.50	Residential	C	77
7.31	Woods	D	79
32.5	Wetland	D	78
Total Acreage =			**299.54**
Weighted CN =			**69.4**

Time of Concentration Calculations:

SHEET FLOW #1 — A-B

Surface decription	WOODS		
Manning's roughness coeff., n	0.60		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 12.36 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	16.0 %		

SHALLOW CONCENTRATED FLOW #2 — B-C

Flow Length, L	611 ft	Vunpaved= 9.23 fps	Tt= 1.10 Min.
Unpaved Land Slope, s	20.6 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

OPEN CHANNEL FLOW #3 — C-D

Flow Length, L	3669 ft	V = 1.49 r^2/3 s^1/2 / n = 0.59 fps	Tt= 103.98 Min.
Land Slope, s	1.3 %		
Channel Bottom	10 ft		
Side Slopes	6		
Area of Flow, A	26 s.f.		
Wetted Perimeter, WP	34.33 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	2 ft		

OPEN CHANNEL FLOW #4 — D-DP#3

Flow Length, L	3608 ft	V = 1.49 r^2/3 s^1/2 / n = 0.20 fps	Tt= 296.82 Min.
Land Slope, s	0.2 %		
Channel Bottom	20 ft		
Side Slopes	10		
Area of Flow, A	25 s.f.		
Wetted Perimeter, WP	40.10 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	1 ft		

Tc= 414.27 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#4

Runoff Curve Number Calculations:

Area	Description	Soils	CN
1.76	Woods	C	73
3.14	Brush/Weeds/Grass	C	70
	Total Acreage =		**4.9**
	Weighted CN =		**71.1**

Time of Concentration Calculations:

SHEET FLOW #1

A-B

Surface decription	Grass		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 11.60 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	3.0 %		

SHALLOW CONCENTRATED FLOW #2

B-DP#4

Flow Length, L	425 ft	Vunpaved= 2.80 fps	Tt= 2.53 Min.
Unpaved Land Slope, s	1.9 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 14.13 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#5

Runoff Curve Number Calculations:

Area	Description	Soils	CN
1.25	Woods	C	73
0.90	Brush/Weeds/Grass	C	70
	Total Acreage =		**2.15**
	Weighted CN =		**71.7**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	Grass		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 11.17 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	3.3 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#5**

Flow Length, L	248 ft	Vunpaved= 4.77 fps	Tt= 0.87 Min.
Unpaved Land Slope, s	5.5 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 12.04 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#6

Runoff Curve Number Calculations:

Area	Description	Soils	CN
7.00	Brush/Weeds/Grass	B	56
28.15	Brush/Weeds/Grass	C	70
5.28	Wetland	C	78

Total Acreage = 40.43
Weighted CN = 68.6

Time of Concentration Calculations:

SHEET FLOW #1 — A-B

Surface decription	Grass		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 7.84 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	8.0 %		

SHALLOW CONCENTRATED FLOW #2 — B-C

Flow Length, L	269 ft	Vunpaved= 5.53 fps	Tt= 0.81 Min.
Unpaved Land Slope, s	7.4 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

OPEN CHANNEL FLOW #3 — C-DP#6

Flow Length, L	2062 ft	V = 1.49 r^2/3 s^1/2 / n = 0.17 fps	Tt= 197.65 Min.
Land Slope, s	0.5 %		
Channel Bottom	6 ft		
Side Slopes	10		
Area of Flow, A	2.75 s.f.		
Wetted Perimeter, WP	11.02 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	0.25 ft		

Tc= 206.30 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#7

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.93	Woods	B	60
2.57	Brush/Weeds/Grass	B	56
1.80	Brush/Weeds/Grass	C	70
	Total Acreage =		**5.30**
	Weighted CN =		**61.5**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	Grass		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= $\frac{.007\ (nL)^{0.8}}{(P2)^{0.5}\ s^{0.4}}$	Tt= 8.13 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	7.3 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#7**

Flow Length, L	293 ft	Vunpaved= 4.55 fps	Tt= 1.07 Min.
Unpaved Land Slope, s	5.0 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		
			Tc= 9.20 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#8

Runoff Curve Number Calculations:

Area	Description	Soils	CN
1.73	Woods	C	73
1.82	Wetland	C	78
3.41	Brush/Weeds/Grass	C	70
	Total Acreage =		**6.96**
	Weighted CN =		**72.8**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	Grass		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 7.48 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	9.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#8**

Flow Length, L	812 ft	Vunpaved= 3.15 fps	Tt= 4.30 Min.
Unpaved Land Slope, s	2.4 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 11.77 Min.

Summit Woods

PRE CN & Tc Calculations

AREA#9

Runoff Curve Number Calculations:

Area	Description	Soils	CN
1.47	Woods	C	73
8.50	Residential	C	77
0.45	Brush/Weeds/Grass	C	70

Total Acreage = 10.42
Weighted CN = 76.1

Time of Concentration Calculations:

SHEET FLOW #1 — A-B

Surface decription	WOODS/LIGHTBRUSH		
Manning's roughness coeff., n	0.40		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 20.53 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	2.0 %		

SHALLOW CONCENTRATED FLOW #2 — B-C

Flow Length, L	187 ft	Vunpaved= 2.57 fps	Tt= 1.21 Min.
Unpaved Land Slope, s	1.6 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

OPEN CHANNEL FLOW #3 — C-DP#9

Flow Length, L	1474 ft	V = 1.49 r^2/3 s^1/2 / n = 0.51 fps	Tt= 48.18 Min.
Land Slope, s	4.3 %		
Channel Bottom	6 ft		
Side Slopes	10		
Area of Flow, A	2.75 s.f.		
Wetted Perimeter, WP	11.02 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	0.25 ft		

Tc= 69.93 Min.

Appendix B

Post-Development Cn, Tc Calculations & Post-Development Summary

Summit Woods

POST CN & Tc Calculations

AREA#1

Runoff Curve Number Calculations:

Area	Description	Soils	CN
2.77	Woods	B	60
0.62	Woods	C	73
1.96	Brush/Weeds/Grass	B	56
	Total Acreage =		**5.35**
	Weighted CN =		**60.0**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	WOODS/LIGHTBRUSH		
Manning's roughness coeff., n	0.40		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 6.95 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	30.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#1**

Flow Length, L	338 ft	Vunpaved= 11.06 fps	Tt= 0.51 Min.
Unpaved Land Slope, s	29.6 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 7.46 Min.

Summit Woods

POST CN & Tc Calculations

AREA#2

Runoff Curve Number Calculations:

Area	Description	Soils	CN
7.77	Woods	B	60
0.28	Brush/Weeds/Grass	B	56
	Total Acreage =		**8.05**
	Weighted CN =		**59.9**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	WOODS/LIGHTBRUSH		
Manning's roughness coeff., n	0.40		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 7.60 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	24.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#2**

Flow Length, L	612 ft	Vunpaved= 9.07 fps	Tt= 1.12 Min.
Unpaved Land Slope, s	19.9 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 8.72 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3A

Runoff Curve Number Calculations:

Area	Description	Soils	CN
4.50	Brush/Weeds/Grass	A	35
6.25	Wetland	A	78
0.20	Impervious	B	98
0.23	Gravel	B	85
23.65	Residential	B	68
36.87	Woods	B	60
6.54	Brush/Weeds/Grass	B	56
0.24	Impervious	C	98
29.26	Woods	C	73
38.54	Brush/Weeds/Grass	C	70
31.25	Wetland	C	78
13.38	Residential	C	79
4.15	Woods	D	79
32.78	Wetland	D	78
0.33	Impervious	D	98
0.11	Gravel	D	91
1.48	Brush/Weeds/Grass	D	77
	Total Acreage =		**229.76**
	Weighted CN =		**70.8**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	WOODS		
Manning's roughness coeff., n	0.60		
Flow length, L	100 ft	Tt= $\frac{.007\ (nL)^{0.8}}{(P2)^{0.5}\ s^{0.4}}$	Tt= 12.36 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	16.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	611 ft	Vunpaved=	9.23	fps	Tt= 1.10 Min.
Unpaved Land Slope, s	20.6 %	Vpaved=	0.00	fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %				

OPEN CHANNEL FLOW #3 — **C-D**

Flow Length, L	748 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	1.21	fps	Tt= 10.31 Min.
Land Slope, s	5.5 %				
Channel Bottom	10 ft				
Side Slopes	6				
Area of Flow, A	26 s.f.				
Wetted Perimeter, WP	34.33 ft				
Manning's roughness coeff., n	0.24				
Depth of Flow, d	2 ft				

PIPE FLOW #4 — **D-E**

Flow Length, L	100 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	16.79	fps	Tt= 0.10 Min.
Land Slope, s	3.2 %				
Pipe Diameter	24 in				
Area of Flow, A	3.14 s.f.				
Wetted Perimeter, WP	6.28 ft				
Manning's roughness coeff., n	0.01				

OPEN CHANNEL FLOW #5

E-F

Flow Length, L	2060 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	0.75	fps	Tt= 45.94 Min.
Land Slope, s	2.1 %				
Channel Bottom	10 ft				
Side Slopes	6				
Area of Flow, A	26 s.f.				
Wetted Perimeter, WP	34.33 ft				
Manning's roughness coeff., n	0.24				
Depth of Flow, d	2 ft				

PIPE FLOW #6

F-G

Flow Length, L	100 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	30.13	fps	Tt= 0.06 Min.
Land Slope, s	6.0 %				
Pipe Diameter	36 in				
Area of Flow, A	7.065 s.f.				
Wetted Perimeter, WP	9.42 ft				
Manning's roughness coeff., n	0.01				

OPEN CHANNEL FLOW #7

G-H

Flow Length, L	819 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	0.61	fps	Tt= 22.21 Min.
Land Slope, s	2.5 %				
Channel Bottom	6 ft				
Side Slopes	6				
Area of Flow, A	9 s.f.				
Wetted Perimeter, WP	18.17 ft				
Manning's roughness coeff., n	0.24				
Depth of Flow, d	1 ft				

OPEN CHANNEL FLOW #8

H-I

Flow Length, L	1974 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	0.15	fps	Tt= 212.71 Min.
Land Slope, s	0.2 %				
Channel Bottom	20 ft				
Side Slopes	10				
Area of Flow, A	12.5 s.f.				
Wetted Perimeter, WP	30.05 ft				
Manning's roughness coeff., n	0.24				
Depth of Flow, d	0.5 ft				

OPEN CHANNEL FLOW #9

I-DP#3

Flow Length, L	1308 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	0.17	fps	Tt= 125.43 Min.
Land Slope, s	0.2 %				
Channel Bottom	6 ft				
Side Slopes	6				
Area of Flow, A	9 s.f.				
Wetted Perimeter, WP	18.17 ft				
Manning's roughness coeff., n	0.24				
Depth of Flow, d	1 ft				

Tc= 430.22 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3B

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.63	Impervious	C	98
1.10	Brush/Weeds/Grass	C	70
1.07	Residential	C	79
	Total Acreage =		**2.80**
	Weighted CN =		**79.7**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	ASPHALT		
Manning's roughness coeff., n	0.01		
Flow length, L	85 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 1.06 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	1.5 %		

PIPE FLOW #2 **B-C**

Flow Length, L	378 ft	V = 1.49 r^2/3 s^1/2 / n	13.19 fps	Tt= 0.48 Min.
Land Slope, s	2.9 %			
Pipe Diameter	18 in			
Area of Flow, A	1.77 s.f.			
Wetted Perimeter, WP	4.71 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3B TO DP#3 **POND-DP#3** Tt= 0.00 Min.

Tc= 1.54 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3C

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.33	Impervious	C	98
1.00	Brush/Weeds/Grass	C	70
1.75	Residential	C	79

Total Acreage = 3.08
Weighted CN = 78.1

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 10.34 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	4.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-C**

Flow Length, L	79 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 2.45 fps	Tt= 0.54 Min.
Paved Land Slope, s	2.3 %		

PIPE FLOW #3 **C-D**

Flow Length, L	400 ft	V = 1.49 r^2/3 s^1/2 / n = 15.70 fps	Tt= 0.42 Min.
Land Slope, s	2.8 %		
Pipe Diameter	24 in		
Area of Flow, A	3.14 s.f.		
Wetted Perimeter, WP	6.28 ft		
Manning's roughness coeff., n	0.01		

FLOW THROUGH POND#3C TO DP#3 **POND-DP#3** Tt= 0.00 Min.

Tc= 11.30 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3D

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.38	Impervious	C	98
1.27	Brush/Weeds/Grass	C	70
4.57	Residential	C	79
	Total Acreage =		**6.22**
	Weighted CN =		**78.3**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 10.34 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	4.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	220 ft	Vunpaved= 5.14 fps	Tt= 0.71 Min.
Unpaved Land Slope, s	6.4 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

SHALLOW CONCENTRATED FLOW #3 — **C-D**

Flow Length, L	94 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 1.61 fps	Tt= 0.97 Min.
Paved Land Slope, s	1.0 %		

PIPE FLOW #4 — **D-E**

Flow Length, L	171 ft	V = 1.49 r^2/3 s^1/2 / n = 31.12 fps	Tt= 0.09 Min.
Land Slope, s	11.0 %		
Pipe Diameter	24 in		
Area of Flow, A	3.14 s.f.		
Wetted Perimeter, WP	6.28 ft		
Manning's roughness coeff., n	0.01		

FLOW THROUGH POND#3D TO DP#3 — **POND-DP#3** — Tt= 0.00 Min.

Tc= 12.12 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3E

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.02	Impervious	B	98
0.07	Brush/Weeds/Grass	B	56
1.45	Impervious	C	98
1.89	Brush/Weeds/Grass	C	70
6.24	Residential	C	79
	Total Acreage =		**9.67**
	Weighted CN =		**80.0**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 9.46 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	5.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	163 ft	Vunpaved= 5.26 fps	Tt= 0.52 Min.
Unpaved Land Slope, s	6.7 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

SHALLOW CONCENTRATED FLOW #3 — **C-D**

Flow Length, L	203 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 2.39 fps	Tt= 1.41 Min.
Paved Land Slope, s	2.2 %		

PIPE FLOW #4 — **D-E**

Flow Length, L	527 ft	V = 1.49 r^2/3 s^1/2 / n	16.52 fps	Tt= 0.53 Min.
Land Slope, s	3.1 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3E TO DP#3 — **POND-DP#3** — Tt= 0.00 Min.

Tc= 11.92 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3F

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.44	Impervious	C	98
1.24	Brush/Weeds/Grass	C	70
	Total Acreage =		**1.68**
	Weighted CN =		**77.3**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	ASPHALT		
Manning's roughness coeff., n	0.01		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 1.42 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	1.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	153 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 2.10 fps	Tt= 1.21 Min.
Paved Land Slope, s	1.7 %		

PIPE FLOW #3 — **C-D**

Flow Length, L	232 ft	V = 1.49 r^2/3 s^1/2 / n	13.92 fps	Tt= 0.28 Min.
Land Slope, s	2.2 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3F TO DP#3 — **POND-DP#3** — Tt= 0.00 Min.

Tc= 2.91 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3G

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.32	Impervious	B	98
1.03	Residential	B	68
0.28	Brush/Weeds/Grass	B	56
1.01	Impervious	C	98
1.26	Brush/Weeds/Grass	C	70
2.98	Residential	C	79
	Total Acreage =		**6.88**
	Weighted CN =		**78.4**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 8.79 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	6.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	66 ft	Vunpaved= 2.03 fps	Tt= 0.54 Min.
Unpaved Land Slope, s	1.0 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

SHALLOW CONCENTRATED FLOW #3 — **C-D**

Flow Length, L	160 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 2.28 fps	Tt= 1.17 Min.
Paved Land Slope, s	2.0 %		

PIPE FLOW #4 — **D-E**

Flow Length, L	1746 ft	V = 1.49 r^2/3 s^1/2 / n	17.05 fps	Tt= 1.71 Min.
Land Slope, s	3.3 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3G TO DP#3 — **POND-DP#3** — Tt= 0.00 Min.

Tc= 12.21 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3H

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.16	Impervious	B	98
0.36	Residential	B	68
0.44	Brush/Weeds/Grass	B	56

Total Acreage = 0.96
Weighted CN = 67.5

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	ASPHALT		
Manning's roughness coeff., n	0.01		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 1.07 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	2.0 %		

PIPE FLOW #2 **B-C**

Flow Length, L	354 ft	V = 1.49 r^2/3 s^1/2 / n	18.05 fps	Tt= 0.33 Min.
Land Slope, s	3.7 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3H TO DP#3 **POND-DP#3** Tt= 0.00 Min.

Tc= 1.40 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3I

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.20	Impervious	B	98
3.04	Residential	B	68
0.23	Brush/Weeds/Grass	B	56
1.54	Woods	C	73
0.47	Brush/Weeds/Grass	C	70
0.61	Residential	C	79
	Total Acreage =		**6.09**
	Weighted CN =		**71.1**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	WOODS					
Manning's roughness coeff., n	0.60					
Flow length, L	100 ft	Tt= $\frac{.007\ (nL)^{0.8}}{(P2)^{0.5}\ s^{0.4}}$			Tt=	8.10 Min.
2-yr. 24-hr rainfall, P2	3.50 in					
Land slope, s	46.0 %					

OPEN CHANNEL FLOW #2 **B-C**

Flow Length, L	343 ft	V = $\frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	1.80	fps	Tt=	3.17 Min.
Land Slope, s	12.2 %					
Channel Bottom	10 ft					
Side Slopes	6					
Area of Flow, A	26 s.f.					
Wetted Perimeter, WP	34.33 ft					
Manning's roughness coeff., n	0.24					
Depth of Flow, d	2 ft					

OPEN CHANNEL FLOW #3 **C-D**

Flow Length, L	409 ft	V = $\frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	1.03	fps	Tt=	6.60 Min.
Land Slope, s	17.6 %					
Channel Bottom	20 ft					
Side Slopes	10					
Area of Flow, A	6.25 s.f.					
Wetted Perimeter, WP	25.02 ft					
Manning's roughness coeff., n	0.24					
Depth of Flow, d	0.25 ft					

OPEN CHANNEL FLOW #4 **D-E**

Flow Length, L	70 ft	V = $\frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	0.25	fps	Tt=	4.73 Min.
Land Slope, s	0.5 %					
Channel Bottom	6 ft					
Side Slopes	10					
Area of Flow, A	11 s.f.					
Wetted Perimeter, WP	26.10 ft					
Manning's roughness coeff., n	0.24					
Depth of Flow, d	1 ft					

PIPE FLOW #5	**E-F**					
Flow Length, L	404 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	21.81	fps	Tt= 0.31	Min.
Land Slope, s	5.4 %					
Pipe Diameter	24 in					
Area of Flow, A	3.14 s.f.					
Wetted Perimeter, WP	6.28 ft					
Manning's roughness coeff., n	0.01					
FLOW THROUGH POND#3I	**POND3I**				Tt= 0.00	Min.
					Tc= 22.92	**Min.**
OPEN CHANNEL FLOW #6	**POND#3I-POND#3J**					
Flow Length, L	503 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	0.98	fps	Tt= 8.57	Min.
Land Slope, s	4.4 %					
Channel Bottom	12 ft					
Side Slopes	10					
Area of Flow, A	34 s.f.					
Wetted Perimeter, WP	52.20 ft					
Manning's roughness coeff., n	0.24					
Depth of Flow, d	2 ft					
COMBINE WITH FLOW FROM AREA#3J	**+**					
FLOW THROUGH POND#3J	**POND3J**				Tt= 0.00	Min.

Summit Woods

POST CN & Tc Calculations

AREA#3J

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.32	Impervious	B	98
3.40	Residential	B	68
0.48	Brush/Weeds/Grass	B	56
0.32	Impervious	C	98
0.16	Woods	C	73
1.25	Brush/Weeds/Grass	C	70
7.50	Residential	C	79
	Total Acreage =		**13.43**
	Weighted CN =		**75.4**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 10.34 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	4.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-C**

Flow Length, L	616 ft	Vunpaved= 4.31 fps	Tt= 2.38 Min.
Unpaved Land Slope, s	4.5 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

SHALLOW CONCENTRATED FLOW #3 **C-D**

Flow Length, L	70 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 1.14 fps	Tt= 1.02 Min.
Paved Land Slope, s	0.5 %		

PIPE FLOW #4 **D-E**

Flow Length, L	230 ft	V = 1.49 r^2/3 s^1/2 / n = 14.49 fps	Tt= 0.26 Min.
Land Slope, s	3.5 %		
Pipe Diameter	18 in		
Area of Flow, A	1.77 s.f.		
Wetted Perimeter, WP	4.71 ft		
Manning's roughness coeff., n	0.01		

COMBINE WITH FLOW FROM AREA#3I

FLOW THROUGH POND#3J TO DP#3 **POND-DP#3** Tt= 0.00 Min.

Tc= 14.01 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3K

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.08	Brush/Weeds/Grass	A	35
0.35	Impervious	B	98
0.09	Gravel	B	85
2.01	Residential	B	68
0.30	Woods	B	60
1.64	Brush/Weeds/Grass	B	56
0.10	Brush/Weeds/Grass	C	70
2.89	Woods	C	73
1.13	Residential	C	79

Total Acreage = 8.59
Weighted CN = 69.7

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	WOODS		
Manning's roughness coeff., n	0.60		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 10.88 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	22.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	720 ft	Vunpaved= 9.09 fps	Tt= 1.32 Min.
Unpaved Land Slope, s	20.0 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

PIPE FLOW #3 — **C-D**

Flow Length, L	305 ft	V = 1.49 r^2/3 s^1/2 / n	33.97 fps	Tt= 0.15 Min.
Land Slope, s	13.1 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3K TO DP#3 — **POND-DP#3** — Tt= 0.00 Min.

Tc= 12.35 Min.

Summit Woods

POST CN & Tc Calculations

AREA#3L

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.80	Impervious	B	98
7.26	Residential	B	68
4.29	Woods	B	60
1.15	Brush/Weeds/Grass	B	56
	Total Acreage =		**13.50**
	Weighted CN =		**66.2**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 4.75 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	28.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-C**

Flow Length, L	645 ft	Vunpaved= 9.29 fps	Tt= 1.16 Min.
Unpaved Land Slope, s	20.9 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

SHALLOW CONCENTRATED FLOW #3 **C-D**

Flow Length, L	88 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 3.42 fps	Tt= 0.43 Min.
Paved Land Slope, s	4.5 %		

PIPE FLOW #4 **D-E**

Flow Length, L	550 ft	V = 1.49 r^2/3 s^1/2 / n	14.84 fps	Tt= 0.62 Min.
Land Slope, s	2.5 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#3M TO DP#3 **POND-DP#3** Tt= 0.00 Min.

Tc= 6.95 Min.

Summit Woods

POST CN & Tc Calculations

AREA#4

Runoff Curve Number Calculations:

Area	Description	Soils	CN
1.03	Woods	C	73
0.27	Brush/Weeds/Grass	C	70
2.01	Residential	C	79
	Total Acreage =		**3.31**
	Weighted CN =		**76.4**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 18.00 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	1.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#4**

Flow Length, L	371 ft	Vunpaved= 3.34 fps	Tt= 1.85 Min.
Unpaved Land Slope, s	2.7 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 19.86 Min.

Summit Woods

POST CN & Tc Calculations

AREA#5

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.36	Woods	C	73
0.66	Brush/Weeds/Grass	C	70
0.60	Residential	C	79
	Total Acreage =		**1.62**
	Weighted CN =		**74.0**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS			
Manning's roughness coeff., n	0.24			
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt=	9.87 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4		
Land slope, s	4.5 %			

SHALLOW CONCENTRATED FLOW #2 **B-DP#5**

Flow Length, L	116 ft	Vunpaved= 4.31 fps	Tt=	0.45 Min.
Unpaved Land Slope, s	4.5 %	Vpaved= 0.00 fps	Tt=	0.00 Min.
Paved Land Slope, s	0.0 %			

Tc= 10.31 Min.

Summit Woods

POST CN & Tc Calculations

AREA#6A

Runoff Curve Number Calculations:

Area	Description	Soils	CN
4.00	Residential	B	68
1.55	Woods	B	60
1.06	Brush/Weeds/Grass	B	56
11.69	Brush/Weeds/Grass	C	70
5.18	Wetland	C	78
4.43	Residential	C	79
	Total Acreage =		**27.91**
	Weighted CN =		**71.5**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	$Tt = \frac{.007\ (nL)^{0.8}}{(P2)^{0.5}\ s^{0.4}}$	Tt= 7.84 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	8.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-C**

Flow Length, L	271 ft	Vunpaved= 5.53 fps	Tt= 0.82 Min.
Unpaved Land Slope, s	7.4 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

OPEN CHANNEL FLOW #3 **C-DP#6**

Flow Length, L	2040 ft	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ 0.17 fps	Tt= 195.55 Min.
Land Slope, s	0.5 %		
Channel Bottom	6 ft		
Side Slopes	10		
Area of Flow, A	2.75 s.f.		
Wetted Perimeter, WP	11.02 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	0.25 ft		

Tc= 204.20 Min.

Summit Woods

POST CN & Tc Calculations

AREA#6B

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.62	Impervious	C	98
1.18	Brush/Weeds/Grass	C	70
4.40	Residential	C	79
	Total Acreage =		**6.20**
	Weighted CN =		**79.2**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= $\frac{.007\ (nL)^{0.8}}{(P2)^{0.5}\ s^{0.4}}$	Tt= 13.64 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	2.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	660 ft	Vunpaved= 4.12 fps	Tt= 2.67 Min.
Unpaved Land Slope, s	4.1 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

PIPE FLOW #3 — **C-D**

Flow Length, L	64 ft	V = $\frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	18.97 fps	Tt= 0.06 Min.
Land Slope, s	6.0 %			
Pipe Diameter	18 in			
Area of Flow, A	1.77 s.f.			
Wetted Perimeter, WP	4.71 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#6B TO DP#6 — **POND-DP#6** — Tt= 0.00 Min.

Tc= 16.37 Min.

Summit Woods

POST CN & Tc Calculations

AREA#6C

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.73	Impervious	B	98
0.95	Brush/Weeds/Grass	B	56
	Total Acreage =		**1.68**
	Weighted CN =		**74.3**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	ASPHALT		
Manning's roughness coeff., n	0.01		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 1.42 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	1.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	45 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 1.61 fps	Tt= 0.46 Min.
Paved Land Slope, s	1.0 %		

PIPE FLOW #3 — **C-D**

Flow Length, L	1254 ft	V = 1.49 r^2/3 s^1/2 / n	11.87 fps	Tt= 1.76 Min.
Land Slope, s	1.6 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#6C TO DP#6 — **POND-DP#6** — Tt= 0.00 Min.

Tc= 3.64 Min.

Summit Woods

POST CN & Tc Calculations

AREA#6D

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.62	Impervious	C	98
1.20	Brush/Weeds/Grass	C	70
0.07	Wetland	C	78
2.09	Residential	C	79
	Total Acreage =		**3.98**
	Weighted CN =		**79.2**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= $\frac{.007\ (nL)^{0.8}}{(P2)^{0.5}\ s^{0.4}}$	Tt= 8.27 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	7.0 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	50 ft	Vunpaved= 0.00 fps	Tt= 0.00 Min.
Unpaved Land Slope, s	0.0 %	Vpaved= 1.14 fps	Tt= 0.73 Min.
Paved Land Slope, s	0.5 %		

PIPE FLOW #3 — **C-D**

Flow Length, L	375 ft	V = $\frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	17.30 fps	Tt= 0.36 Min.
Land Slope, s	3.4 %			
Pipe Diameter	24 in			
Area of Flow, A	3.14 s.f.			
Wetted Perimeter, WP	6.28 ft			
Manning's roughness coeff., n	0.01			

FLOW THROUGH POND#6D TO DP#6 — **POND-DP#6** — Tt= 0.00 Min.

Tc= 9.36 Min.

Summit Woods

POST CN & Tc Calculations

AREA#7

Runoff Curve Number Calculations:

Area	Description	Soils	CN
2.62	Residential	B	68
0.37	Woods	B	60
	Total Acreage =		**2.99**
	Weighted CN =		**67.0**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 8.79 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	6.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#7**

Flow Length, L	260 ft	Vunpaved= 2.23 fps	Tt= 1.95 Min.
Unpaved Land Slope, s	1.2 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

Tc= 10.74 Min.

Summit Woods

POST CN & Tc Calculations

AREA#8

Runoff Curve Number Calculations:

Area	Description	Soils	CN
3.41	Brush/Weeds/Grass	C	70
1.78	Wetland	C	78
1.60	Woods	C	73
	Total Acreage =		**6.79**
	Weighted CN =		**72.8**

Time of Concentration Calculations:

SHEET FLOW #1 **A-B**

Surface decription	GRASS		
Manning's roughness coeff., n	0.24		
Flow length, L	100 ft	Tt= .007 (nL)^0.8	Tt= 13.64 Min.
2-yr. 24-hr rainfall, P2	3.50 in	(P2)^0.5 s^0.4	
Land slope, s	2.0 %		

SHALLOW CONCENTRATED FLOW #2 **B-DP#8**

Flow Length, L	703 ft	Vunpaved=	1.57	fps	Tt= 7.44 Min.
Unpaved Land Slope, s	0.6 %	Vpaved=	0.00	fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %				

Tc= 21.09 Min.

Summit Woods

POST CN & Tc Calculations

AREA#9

Runoff Curve Number Calculations:

Area	Description	Soils	CN
0.39	Impervious	C	98
1.72	Brush/Weeds/Grass	C	70
1.60	Woods	C	73
3.73	Residential	C	79
	Total Acreage =		**7.44**
	Weighted CN =		**76.6**

Time of Concentration Calculations:

SHEET FLOW #1 — **A-B**

Surface decription	WOODS		
Manning's roughness coeff., n	0.60		
Flow length, L	100 ft	Tt= .007 (nL)^0.8 / (P2)^0.5 s^0.4	Tt= 49.45 Min.
2-yr. 24-hr rainfall, P2	3.50 in		
Land slope, s	0.5 %		

SHALLOW CONCENTRATED FLOW #2 — **B-C**

Flow Length, L	152 ft	Vunpaved= 2.87 fps	Tt= 0.88 Min.
Unpaved Land Slope, s	2.0 %	Vpaved= 0.00 fps	Tt= 0.00 Min.
Paved Land Slope, s	0.0 %		

OPEN CHANNEL FLOW #3 — **C-D**

Flow Length, L	236 ft	V = 1.49 r^2/3 s^1/2 / n = 0.57 fps	Tt= 6.88 Min.
Land Slope, s	3.4 %		
Channel Bottom	2 ft		
Side Slopes	6		
Area of Flow, A	5 s.f.		
Wetted Perimeter, WP	14.17 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	1 ft		

PIPE FLOW #4 — **D-E**

Flow Length, L	85 ft	V = 1.49 r^2/3 s^1/2 / n = 17.56 fps	Tt= 0.08 Min.
Land Slope, s	3.5 %		
Pipe Diameter	24 in		
Area of Flow, A	3.14 s.f.		
Wetted Perimeter, WP	6.28 ft		
Manning's roughness coeff., n	0.01		

OPEN CHANNEL FLOW #5 — **E-DP#9**

Flow Length, L	293 ft	V = 1.49 r^2/3 s^1/2 / n = 0.90 fps	Tt= 5.40 Min.
Land Slope, s	8.5 %		
Channel Bottom	2 ft		
Side Slopes	6		
Area of Flow, A	5 s.f.		
Wetted Perimeter, WP	14.17 ft		
Manning's roughness coeff., n	0.24		
Depth of Flow, d	1 ft		

Tc= 62.70 Min.

Appendix C

Pre-Development Hydrograph Summaries

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.98	1	721	6,289	----	------	------	AREA#1
2	SCS Runoff	2.68	1	722	9,607	----	------	------	AREA#2
3	SCS Runoff	22.87	1	1008	632,425	----	------	------	AREA#3
4	SCS Runoff	4.65	1	723	13,546	----	------	------	AREA#4
5	SCS Runoff	2.26	1	722	6,073	----	------	------	AREA#5
6	SCS Runoff	4.77	1	857	88,948	----	------	------	AREA#6
7	SCS Runoff	2.28	1	721	7,310	----	------	------	AREA#7
8	SCS Runoff	7.92	1	722	20,993	----	------	------	AREA#8
9	SCS Runoff	4.95	1	757	37,866	----	------	------	AREA#9

Proj. file: Summit Woods-PRE.gpw Return Period: 1 yr

Run date: 06-27-2005

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	3.88	1	720	10,031	----	------	------	AREA#1
2	SCS Runoff	5.36	1	721	15,352	----	------	------	AREA#2
3	SCS Runoff	33.58	1	996	910,213	----	------	------	AREA#3
4	SCS Runoff	6.76	1	723	18,941	----	------	------	AREA#4
5	SCS Runoff	3.25	1	722	8,447	----	------	------	AREA#5
6	SCS Runoff	7.21	1	851	127,989	----	------	------	AREA#6
7	SCS Runoff	4.20	1	721	11,385	----	------	------	AREA#7
8	SCS Runoff	11.20	1	722	28,939	----	------	------	AREA#8
9	SCS Runoff	6.87	1	757	50,962	----	------	------	AREA#9

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	11.26	1	719	24,575	----	------	------	AREA#1
2	SCS Runoff	15.92	1	720	37,708	----	------	------	AREA#2
3	SCS Runoff	72.63	1	978	1,900,281	----	------	------	AREA#3
4	SCS Runoff	13.95	1	722	37,653	----	------	------	AREA#4
5	SCS Runoff	6.59	1	721	16,644	----	------	------	AREA#5
6	SCS Runoff	16.28	1	841	267,082	----	------	------	AREA#6
7	SCS Runoff	11.53	1	720	26,925	----	------	------	AREA#7
8	SCS Runoff	22.25	1	721	56,129	----	------	------	AREA#8
9	SCS Runoff	13.22	1	756	94,733	----	------	------	AREA#9

Proj. file: Summit Woods-PRE.gpw Return Period: 10 yr

Run date: 06-27-2005

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	17.07	1	719	36,303	----	------	------	AREA#1
2	SCS Runoff	24.29	1	720	55,753	----	------	------	AREA#2
3	SCS Runoff	102.58	1	973	2,650,868	----	------	------	AREA#3
4	SCS Runoff	19.23	1	722	51,553	----	------	------	AREA#4
5	SCS Runoff	9.02	1	721	22,710	----	------	------	AREA#5
6	SCS Runoff	23.29	1	839	372,499	----	------	------	AREA#6
7	SCS Runoff	17.23	1	720	39,294	----	------	------	AREA#7
8	SCS Runoff	30.23	1	721	76,118	----	------	------	AREA#8
9	SCS Runoff	17.76	1	756	126,339	----	------	------	AREA#9

Proj. file: Summit Woods-PRE.gpw Return Period: 25 yr

Run date: 06-27-2005

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	29.95	1	719	62,991	----	------	------	AREA#1
2	SCS Runoff	42.90	1	720	96,844	----	------	------	AREA#2
3	SCS Runoff	168.03	1	965	4,286,374	----	------	------	AREA#3
4	SCS Runoff	30.32	1	722	81,405	----	------	------	AREA#4
5	SCS Runoff	14.12	1	721	35,704	----	------	------	AREA#5
6	SCS Runoff	38.52	1	838	602,146	----	------	------	AREA#6
7	SCS Runoff	29.78	1	720	67,187	----	------	------	AREA#7
8	SCS Runoff	46.86	1	721	118,735	----	------	------	AREA#8
9	SCS Runoff	27.16	1	756	192,884	----	------	------	AREA#9

Appendix D

Post –Development Hydrograph Summaries

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.98	1	721	6,289	----	------	------	AREA#1 TO DP#1
2	SCS Runoff	2.68	1	722	9,607	----	------	------	AREA#2 TO DP#2
3	SCS Runoff	18.90	1	1015	527,767	----	------	------	AREA#3A TO DP#3
4	SCS Runoff	6.74	1	716	11,724	----	------	------	AREA#3B TO POND#3B
5	SCS Runoff	5.29	1	721	12,874	----	------	------	AREA#3C TO POND#3C
6	SCS Runoff	9.95	1	722	25,397	----	------	------	AREA#3D TO POND#3D
7	SCS Runoff	16.99	1	721	43,054	----	------	------	AREA#3E TO POND#3E
8	SCS Runoff	3.58	1	716	6,216	----	------	------	AREA#3F TO POND#3F
9	SCS Runoff	11.07	1	721	28,238	----	------	------	AREA#3G TO POND#3G
10	SCS Runoff	1.08	1	716	1,976	----	------	------	AREA#3H TO POND#3H
11	SCS Runoff	4.38	1	728	16,644	----	------	------	AREA#3I TO POND#3I
12	SCS Runoff	17.21	1	723	47,691	----	------	------	AREA#3J
13	SCS Runoff	7.73	1	722	21,419	----	------	------	AREA#3K TO POND#3K
14	SCS Runoff	11.03	1	719	26,333	----	------	------	AREA#3L TO POND#3L
	SCS Runoff	3.84	1	726	12,396	----	------	------	AREA#4 TO DP#4
16	SCS Runoff	2.17	1	721	5,418	----	------	------	AREA#5 TO DP#5
17	SCS Runoff	4.19	1	851	74,418	----	------	------	AREA#6A TO DP#6
18	SCS Runoff	9.45	1	724	27,245	----	------	------	AREA#6B TO POND#6B
19	SCS Runoff	2.99	1	717	5,626	----	------	------	AREA#6C TO POND#6C
20	SCS Runoff	7.66	1	720	17,303	----	------	------	AREA#6D TO POND#6D
21	SCS Runoff	2.30	1	721	6,436	----	------	------	AREA#7 TO DP#7
22	SCS Runoff	5.89	1	727	20,952	----	------	------	AREA#8 TO DP#8
23	SCS Runoff	4.02	1	752	27,939	----	------	------	AREA#9 TO DP#9
24	Reservoir	0.00	1	0	0	4	321.69	11,724	POND#3B TO DP#3
25	Reservoir	0.00	1	0	0	5	327.09	12,874	POND#3C TO DP#3
26	Reservoir	0.00	1	0	0	6	322.49	25,397	POND#3D TO DP#3
27	Reservoir	0.00	1	0	0	7	319.38	43,054	POND#3E TO DP#3
28	Reservoir	0.00	1	0	0	8	324.59	6,216	POND#3F TO DP#3
29	Reservoir	0.00	1	0	0	9	321.53	28,238	POND#3G TO DP#3
30	Reservoir	0.00	1	0	0	10	378.73	1,976	POND#3H TO DP#3

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reservoir	0.00	1	0	0	11	403.84	16,644	POND#3I TO DP#3
32	Combine	17.21	1	723	47,691	12, 31	------	------	AREA#3J+POND#3I
33	Reservoir	0.00	1	0	0	32	376.10	47,691	POND#3J TO DP#3
34	Reservoir	0.00	1	0	0	13	390.44	21,419	POND#3K TO DP#3
35	Reservoir	0.00	1	0	0	14	387.18	26,333	POND#3L TO DP#3
36	Reservoir	0.00	1	0	0	18	322.88	27,245	POND#6B TO DP#6
37	Reservoir	0.00	1	0	0	19	326.31	5,626	POND#6C TO DP#6
38	Reservoir	0.00	1	0	0	20	318.21	17,303	POND#6D TO DP#6

Hydrograph Summary Report

[illegible]	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	3.88	1	720	10,031	----	------	------	AREA#1 TO DP#1
2	SCS Runoff	5.36	1	721	15,352	----	------	------	AREA#2 TO DP#2
3	SCS Runoff	27.31	1	1003	749,718	----	------	------	AREA#3A TO DP#3
4	SCS Runoff	8.78	1	716	15,378	----	------	------	AREA#3B TO POND#3B
5	SCS Runoff	7.06	1	721	17,069	----	------	------	AREA#3C TO POND#3C
6	SCS Runoff	13.30	1	721	33,628	----	------	------	AREA#3D TO POND#3D
7	SCS Runoff	22.37	1	721	56,372	----	------	------	AREA#3E TO POND#3E
8	SCS Runoff	4.76	1	716	8,286	----	------	------	AREA#3F TO POND#3F
9	SCS Runoff	14.79	1	721	37,364	----	------	------	AREA#3G TO POND#3G
10	SCS Runoff	1.61	1	716	2,857	----	------	------	AREA#3H TO POND#3H
11	SCS Runoff	6.44	1	728	23,276	----	------	------	AREA#3I TO POND#3I
12	SCS Runoff	23.64	1	723	64,446	----	------	------	AREA#3J
13	SCS Runoff	11.45	1	722	30,323	----	------	------	AREA#3K TO POND#3K
14	SCS Runoff	17.29	1	719	38,608	----	------	------	AREA#3L TO POND#3L
	SCS Runoff	5.24	1	726	16,632	----	------	------	AREA#4 TO DP#4
16	SCS Runoff	3.02	1	721	7,399	----	------	------	AREA#5 TO DP#5
17	SCS Runoff	6.11	1	845	104,195	----	------	------	AREA#6A TO DP#6
18	SCS Runoff	12.56	1	723	35,861	----	------	------	AREA#6B TO POND#6B
19	SCS Runoff	4.10	1	717	7,664	----	------	------	AREA#6C TO POND#6C
20	SCS Runoff	10.09	1	720	22,772	----	------	------	AREA#6D TO POND#6D
21	SCS Runoff	3.59	1	721	9,357	----	------	------	AREA#7 TO DP#7
22	SCS Runoff	8.42	1	727	28,888	----	------	------	AREA#8 TO DP#8
23	SCS Runoff	5.54	1	752	37,462	----	------	------	AREA#9 TO DP#9
24	Reservoir	0.00	1	0	0	4	322.14	15,378	POND#3B TO DP#3
25	Reservoir	0.00	1	0	0	5	327.39	17,069	POND#3C TO DP#3
26	Reservoir	0.00	1	0	0	6	323.10	33,628	POND#3D TO DP#3
27	Reservoir	0.00	1	0	0	7	319.79	56,372	POND#3E TO DP#3
28	Reservoir	0.00	1	0	0	8	324.79	8,286	POND#3F TO DP#3
29	Reservoir	0.00	1	0	0	9	322.33	37,364	POND#3G TO DP#3
30	Reservoir	0.00	1	0	0	10	379.04	2,857	POND#3H TO DP#3

Proj. file: Summit Woods-POST.gpw | Return Period: 2 yr | Run date: 06-29-2005

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reservoir	0.00	1	0	0	11	404.46	23,276	POND#3I TO DP#3
32	Combine	23.64	1	723	64,446	12, 31	------	------	AREA#3J+POND#3I
33	Reservoir	0.00	1	0	0	32	376.77	64,446	POND#3J TO DP#3
34	Reservoir	0.00	1	0	0	13	391.29	30,323	POND#3K TO DP#3
35	Reservoir	0.00	1	0	0	14	387.69	38,608	POND#3L TO DP#3
36	Reservoir	0.00	1	0	0	18	323.45	35,861	POND#6B TO DP#6
37	Reservoir	0.00	1	0	0	19	326.92	7,664	POND#6C TO DP#6
38	Reservoir	0.00	1	0	0	20	318.72	22,772	POND#6D TO DP#6

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	11.26	1	719	24,575	----	------	------	AREA#1 TO DP#1
2	SCS Runoff	15.92	1	720	37,708	----	------	------	AREA#2 TO DP#2
3	SCS Runoff	57.48	1	987	1,531,325	----	------	------	AREA#3A TO DP#3
4	SCS Runoff	15.22	1	715	27,286	----	------	------	AREA#3B TO POND#3B
5	SCS Runoff	12.79	1	720	30,884	----	------	------	AREA#3C TO POND#3C
6	SCS Runoff	24.08	1	721	60,698	----	------	------	AREA#3D TO POND#3D
7	SCS Runoff	39.44	1	721	99,691	----	------	------	AREA#3E TO POND#3E
8	SCS Runoff	8.52	1	716	15,137	----	------	------	AREA#3F TO POND#3F
9	SCS Runoff	26.71	1	721	67,359	----	------	------	AREA#3G TO POND#3G
10	SCS Runoff	3.46	1	716	6,010	----	------	------	AREA#3H TO POND#3H
11	SCS Runoff	13.49	1	727	46,288	----	------	------	AREA#3I TO POND#3I
12	SCS Runoff	45.03	1	722	120,676	----	------	------	AREA#3J
13	SCS Runoff	24.24	1	721	61,571	----	------	------	AREA#3K TO POND#3K
14	SCS Runoff	39.29	1	719	83,083	----	------	------	AREA#3L TO POND#3L
	SCS Runoff	9.88	1	725	30,749	----	------	------	AREA#4 TO DP#4
16	SCS Runoff	5.85	1	720	14,113	----	------	------	AREA#5 TO DP#5
17	SCS Runoff	12.97	1	839	207,619	----	------	------	AREA#6A TO DP#6
18	SCS Runoff	22.53	1	723	64,032	----	------	------	AREA#6B TO POND#6B
19	SCS Runoff	7.73	1	717	14,557	----	------	------	AREA#6C TO POND#6C
20	SCS Runoff	17.93	1	719	40,655	----	------	------	AREA#6D TO POND#6D
21	SCS Runoff	8.13	1	721	19,858	----	------	------	AREA#7 TO DP#7
22	SCS Runoff	16.99	1	726	56,048	----	------	------	AREA#8 TO DP#8
23	SCS Runoff	10.57	1	751	69,172	----	------	------	AREA#9 TO DP#9
24	Reservoir	0.00	1	0	0	4	323.41	27,286	POND#3B TO DP#3
25	Reservoir	0.00	1	0	0	5	328.34	30,884	POND#3C TO DP#3
26	Reservoir	0.00	1	0	0	6	324.69	60,698	POND#3D TO DP#3
27	Reservoir	0.00	1	0	0	7	321.02	99,690	POND#3E TO DP#3
28	Reservoir	0.00	1	0	0	8	325.37	15,137	POND#3F TO DP#3
29	Reservoir	0.00	1	0	0	9	324.44	67,359	POND#3G TO DP#3
30	Reservoir	0.00	1	0	0	10	379.98	6,010	POND#3H TO DP#3

Proj. file: Summit Woods-POST.gpw | Return Period: 10 yr | Run date: 06-29-2005

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reservoir	0.78	1	860	16,633	11	405.11	30,535	POND#3I TO DP#3
32	Combine	45.03	1	722	137,309	12, 31	------	------	AREA#3J+POND#3I
33	Reservoir	0.00	1	0	0	32	379.34	137,309	POND#3J TO DP#3
34	Reservoir	0.00	1	0	0	13	393.75	61,571	POND#3K TO DP#3
35	Reservoir	0.00	1	0	0	14	389.40	83,083	POND#3L TO DP#3
36	Reservoir	0.08	1	1440	101	18	325.03	63,934	POND#6B TO DP#6
37	Reservoir	0.00	1	0	0	19	328.48	14,556	POND#6C TO DP#6
38	Reservoir	0.00	1	0	0	20	320.15	40,655	POND#6D TO DP#6

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	17.07	1	719	36,303	----	------	------	AREA#1 TO DP#1
2	SCS Runoff	24.29	1	720	55,753	----	------	------	AREA#2 TO DP#2
3	SCS Runoff	80.34	1	982	2,118,573	----	------	------	AREA#3A TO DP#3
4	SCS Runoff	19.68	1	715	35,717	----	------	------	AREA#3B TO POND#3B
5	SCS Runoff	16.78	1	720	40,746	----	------	------	AREA#3C TO POND#3C
6	SCS Runoff	31.56	1	721	80,004	----	------	------	AREA#3D TO POND#3D
7	SCS Runoff	51.19	1	721	130,323	----	------	------	AREA#3E TO POND#3E
8	SCS Runoff	11.16	1	715	20,049	----	------	------	AREA#3F TO POND#3F
9	SCS Runoff	35.00	1	721	88,740	----	------	------	AREA#3G TO POND#3G
10	SCS Runoff	4.82	1	716	8,407	----	------	------	AREA#3H TO POND#3H
11	SCS Runoff	18.68	1	727	63,383	----	------	------	AREA#3I TO POND#3I
12	SCS Runoff	60.20	1	722	161,403	----	------	------	AREA#3J
13	SCS Runoff	33.72	1	721	84,989	----	------	------	AREA#3K TO POND#3K
14	SCS Runoff	55.72	1	719	117,213	----	------	------	AREA#3L TO POND#3L
	SCS Runoff	13.16	1	725	40,918	----	------	------	AREA#4 TO DP#4
16	SCS Runoff	7.88	1	720	19,015	----	------	------	AREA#5 TO DP#5
17	SCS Runoff	18.10	1	838	284,520	----	------	------	AREA#6A TO DP#6
18	SCS Runoff	29.44	1	723	84,032	----	------	------	AREA#6B TO POND#6B
19	SCS Runoff	10.30	1	717	19,579	----	------	------	AREA#6C TO POND#6C
20	SCS Runoff	23.35	1	719	53,349	----	------	------	AREA#6D TO POND#6D
21	SCS Runoff	11.51	1	721	27,871	----	------	------	AREA#7 TO DP#7
22	SCS Runoff	23.21	1	726	76,018	----	------	------	AREA#8 TO DP#8
23	SCS Runoff	14.14	1	751	92,005	----	------	------	AREA#9 TO DP#9
24	Reservoir	0.00	1	0	0	4	324.20	35,717	POND#3B TO DP#3
25	Reservoir	0.00	1	0	0	5	328.95	40,746	POND#3C TO DP#3
26	Reservoir	0.15	1	1440	600	6	325.59	79,409	POND#3D TO DP#3
27	Reservoir	0.00	1	0	0	7	321.82	130,323	POND#3E TO DP#3
28	Reservoir	0.00	1	0	0	8	325.76	20,049	POND#3F TO DP#3
29	Reservoir	0.23	1	1439	913	9	325.62	87,835	POND#3G TO DP#3
30	Reservoir	0.00	1	0	0	10	380.57	8,407	POND#3H TO DP#3

Hydrograph Summary Report

No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reservoir	3.33	1	756	33,596	11	405.29	32,791	POND#3I TO DP#3
32	Combine	60.20	1	722	194,999	12, 31	------	------	AREA#3J+POND#3I
33	Reservoir	0.00	1	0	0	32	381.12	194,999	POND#3J TO DP#3
34	Reservoir	0.00	1	0	0	13	395.28	84,989	POND#3K TO DP#3
35	Reservoir	0.00	1	0	0	14	390.59	117,213	POND#3L TO DP#3
36	Reservoir	0.72	1	1006	18,248	18	325.16	66,985	POND#6B TO DP#6
37	Reservoir	0.00	1	0	0	19	329.39	19,579	POND#6C TO DP#6
38	Reservoir	0.00	1	0	0	20	321.01	53,349	POND#6D TO DP#6

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	29.95	1	719	62,991	----	------	------	AREA#1 TO DP#1
2	SCS Runoff	42.90	1	720	96,844	----	------	------	AREA#2 TO DP#2
3	SCS Runoff	129.88	1	975	3,390,045	----	------	------	AREA#3A TO DP#3
4	SCS Runoff	28.68	1	715	53,234	----	------	------	AREA#3B TO POND#3B
5	SCS Runoff	24.91	1	720	61,349	----	------	------	AREA#3C TO POND#3C
6	SCS Runoff	46.79	1	721	120,306	----	------	------	AREA#3D TO POND#3D
7	SCS Runoff	74.95	1	721	193,903	----	------	------	AREA#3E TO POND#3E
8	SCS Runoff	16.54	1	715	30,337	----	------	------	AREA#3F TO POND#3F
9	SCS Runoff	51.85	1	721	133,358	----	------	------	AREA#3G TO POND#3G
10	SCS Runoff	7.69	1	716	13,641	----	------	------	AREA#3H TO POND#3H
11	SCS Runoff	29.64	1	727	100,101	----	------	------	AREA#3I TO POND#3I
12	SCS Runoff	91.45	1	722	247,335	----	------	------	AREA#3J
13	SCS Runoff	53.76	1	721	135,598	----	------	------	AREA#3K TO POND#3K
14	SCS Runoff	91.00	1	718	192,220	----	------	------	AREA#3L TO POND#3L
	SCS Runoff	19.89	1	725	62,295	----	------	------	AREA#4 TO DP#4
16	SCS Runoff	12.08	1	720	29,415	----	------	------	AREA#5 TO DP#5
17	SCS Runoff	29.06	1	837	449,793	----	------	------	AREA#6A TO DP#6
18	SCS Runoff	43.48	1	723	125,657	----	------	------	AREA#6B TO POND#6B
19	SCS Runoff	15.59	1	716	30,221	----	------	------	AREA#6C TO POND#6C
20	SCS Runoff	34.33	1	719	79,768	----	------	------	AREA#6D TO POND#6D
21	SCS Runoff	18.83	1	720	45,413	----	------	------	AREA#7 TO DP#7
22	SCS Runoff	36.24	1	726	118,598	----	------	------	AREA#8 TO DP#8
23	SCS Runoff	21.52	1	751	139,983	----	------	------	AREA#9 TO DP#9
24	Reservoir	0.36	1	1072	7,654	4	325.06	45,870	POND#3B TO DP#3
25	Reservoir	0.91	1	839	19,127	5	329.12	43,701	POND#3C TO DP#3
26	Reservoir	1.47	1	884	38,107	6	325.93	86,768	POND#3D TO DP#3
27	Reservoir	0.00	1	0	0	7	323.35	193,903	POND#3E TO DP#3
28	Reservoir	0.00	1	0	0	8	326.51	30,337	POND#3F TO DP#3
29	Reservoir	1.81	1	853	43,510	9	325.99	94,648	POND#3G TO DP#3
30	Reservoir	0.00	1	0	0	10	381.71	13,641	POND#3H TO DP#3

Hydrograph Summary Report

NO.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reservoir	17.74	1	739	70,050	11	405.90	40,202	POND#3I TO DP#3
32	Combine	91.45	1	722	317,386	12, 31	------	------	AREA#3J+POND#3I
33	Reservoir	4.07	1	919	103,308	32	381.95	224,326	POND#3J TO DP#3
34	Reservoir	1.99	1	860	44,296	13	395.83	94,252	POND#3K TO DP#3
35	Reservoir	2.38	1	917	57,726	14	391.28	138,617	POND#3L TO DP#3
36	Reservoir	4.35	1	761	59,319	18	325.56	75,615	POND#6B TO DP#6
37	Reservoir	0.36	1	897	8,275	19	329.87	22,442	POND#6C TO DP#6
38	Reservoir	0.58	1	1046	15,281	20	321.73	65,628	POND#6D TO DP#6

Appendix E

Unified Sizing Criteria Calculations

5.0 Mitigation Measures:

The previous table in section 4.0 demonstrates that increases in flow will be experienced at design points #3 & #6 in the post-development condition. Stormwater ponds are necessary in these areas to adequately mitigate the increases in runoff, provide attenuation benefits and to provide water quality control. The following summaries demonstrate the minimum standards as required by the EPA Phase II regulations for the stormwater ponds.

5.1 DP#1/Area#1

No mitigation required.

5.2 DP#2/Area#2

No mitigation required.

5.3 DP#3/Area#3A

No mitigation required.

5.4 DP#3 / Area#3B / Pond#3B

5.4.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 30% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(30) = 0.32$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.32)(2.80\text{acres})(1/12) = 0.08$ ac-ft.

5.4.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/79.7)-2) = 0.51

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.51/2.75 = 0.19

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3B Post-development condition.

Tc = 1.54 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 900 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.028$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.028)+1.64(0.028)^2-0.804(0.028)^3 = 0.643$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#1a = 11,724 cu.ft. / 121,968 sq.ft.
Q_d = 0.10 ft = **1.20"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.643(1.20")(2.80)(1/12) = 0.18$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.18(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.09$

5.4.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3B/Pond#3B, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.4.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.36 cfs (Area#3B/Pond#3B, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.4.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.08
Cp_v	Stream Protection	0.18

Determine Pretreatment Volume:
Size the forebay to treat 10% of the Wq_v = (10%)(0.08) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:
Size the permanent pool to contain 50% of the Wq_v = (50%)(0.08) = 0.04 ac-ft (includes 0.01 ac-ft of forebay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.08) = 0.04 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3B shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 8' broad crested weir at elevation 325.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.08 acre-ft. This is greater than the 0.01 acre-ft required. The

pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 1.03 acre-ft (45,144 cu.ft.) has been provided. This is greater than the 0.18 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 58,366 cubic feet (1.34 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.5 DP#3 / Area#3C / Pond#3C

5.5.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 22% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(22) = 0.25$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.25)(3.08acres)(1/12) = 0.07$ ac-ft.

5.5.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/78.1)-2) = 0.56

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.56/2.75 = 0.20

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3C Post-development condition.

Tc = 11.30 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 780 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.029$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.029)+1.64(0.029)^2-0.804(0.029)^3 = 0.642$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3C = 12,874 cu.ft. / 134,165 sq.ft.
Q_d = 0.10 ft = **1.20"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.642(1.20")(3.08)(1/12) = 0.20$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.20(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.10$

5.5.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3C/Pond#3C, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.5.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.91 cfs (Area#3C/Pond#3C, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.5.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.07
Cp_v	Stream Protection	0.20

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.07) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.07) = 0.04 ac-ft (includes 0.01 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.07) = 0.04 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3C shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 8' broad crested weir at elevation 329.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.04 acre-ft. This is greater than the 0.01 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 0.95 acre-ft (41,494 cu.ft.) has been provided. This is greater than the 0.18 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 59,747 cubic feet (1.37 acre-feet). All conditions have been met as outlined in the "*New York State Storm water Management Design Manual*".

5.6 DP#3 / Area#3D / Pond#3D

5.6.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:

Assume I = 21% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(21) = 0.24$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.24)(6.22acres)(1/12) = 0.14$ ac-ft.

5.6.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/78.3)-2) = 0.55

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.55/2.75 = 0.20

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3D Post-development condition.

Tc = 12.12 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 750 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.030$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.030)+1.64(0.030)^2-0.804(0.030)^3 = 0.641$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3D = 25,397 cu.ft. / 270,943 sq.ft.
Q_d = 0.093 ft = **1.12"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.641(1.12")(6.22)(1/12) = 0.37$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.37(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.19$

5.6.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3D/Pond#3D, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.6.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 1.47 cfs (Area#3D/Pond#3D, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.6.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.14
Cp_v	Stream Protection	0.37

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.14) = 0.02 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.14) = 0.07 ac-ft (includes 0.02 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.14) = 0.07 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3D shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 2' broad crested weir at elevation 325.50'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.04 acre-ft. This is greater than the 0.02 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 1.53 acre-ft (66,438 cu.ft.) has been provided. This is greater than the 0.37 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 88,301 cubic feet (2.03 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.7 DP#3 / Area#3E / Pond#3E

5.7.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 28% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(28) = 0.30$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.30)(9.67\text{acres})(1/12) = 0.27$ ac-ft.

5.7.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/80)-2) = 0.50

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.50/2.75 = 0.18

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3E Post-development condition.

Tc = 11.92 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 745 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.031$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.031)+1.64(0.031)^2-0.804(0.031)^3 = 0.639$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3E = 43,054 cu.ft. / 421,225 sq.ft.
Q_d = 0.102 ft = **1.22"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.639(1.22")(9.67)(1/12) = 0.63$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.63(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.32$

5.7.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3E/Pond#3E, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.7.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.00 cfs (Area#3E/Pond#3E, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.7.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.27
Cp_v	Stream Protection	0.63

Determine Pretreatment Volume:
Size the fore bay to treat 10% of the Wq_v = (10%)(0.27) = 0.03 ac-ft.

Determine Permanent Pool Volume and ED Volume:
Size the permanent pool to contain 50% of the Wq_v = (50%)(0.27) = 0.14 ac-ft (includes 0.03 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.27) = 0.14 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3E shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 8' broad crested weir at elevation 325.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.05 acre-ft. This is greater than the 0.03 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 6.17 acre-ft (268,829 cu.ft.) has been provided. This is greater than the 0.63 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 318,369 cubic feet (7.31 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.8 DP#3 / Area#3F / Pond#3F

5.8.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 26% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(26) = 0.28$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.28)(1.68\text{acres})(1/12) = 0.04$ ac-ft.

5.8.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/77.3)-2) = 0.59

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.59/2.75 = 0.21

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3F Post-development condition.

Tc = 2.91 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 1,200 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.019$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.019)+1.64(0.019)^2-0.804(0.019)^3 = 0.655$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3F = 6,216 cu.ft. / 73,181 sq.ft.
Q_d = 0.085 ft = **1.02"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.655(1.02")(1.68)(1/12) = 0.09$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.09(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.05$

5.8.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3F/Pond#3F, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.8.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.00 cfs (Area#3F/Pond#3F, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.8.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.04
Cp_v	Stream Protection	0.09

Determine Pretreatment Volume:
Size the fore bay to treat 10% of the Wq_v = (10%)(0.04) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:
Size the permanent pool to contain 50% of the Wq_v = (50%)(0.04) = 0.02 ac-ft (includes 0.01 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.04) = 0.02 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3F shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 8' broad crested weir at elevation 327.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.03 acre-ft. This is greater than the 0.01 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 0.86 acre-ft (37,411 cu.ft.) has been provided. This is greater than the 0.09 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 53,901 cubic feet (1.24 acre-feet). All

conditions have been met as outlined in the "*New York State Storm water Management Design Manual*".

5.9 DP#3 / Area#3G / Pond#3G

5.9.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 31% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(31) = 0.33$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.33)(6.88\text{acres})(1/12) = 0.21$ ac-ft.

5.9.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/78.4)-2) = 0.55

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.55/2.75 = 0.20

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3G Post-development condition.

Tc = 12.21 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 750 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.030$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.030)+1.64(0.030)^2-0.804(0.030)^3 = 0.641$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3G = 28,238 cu.ft. / 299,693 sq.ft.
Q_d = 0.094 ft = **1.13"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.641(1.13")(6.88)(1/12) = 0.42$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.42(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.21$

5.9.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3G/Pond#3G, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.9.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 1.81 cfs (Area#3G/Pond#3G, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.9.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.21
Cp_v	Stream Protection	0.42

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.21) = 0.02 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.21) = 0.11 ac-ft (includes 0.02 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.21) = 0.11 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3G shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 2' broad crested weir at elevation 325.50'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.04 acre-ft. This is greater than the 0.02 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 1.76 acre-ft (76,431 cu.ft.) has been provided. This is greater than the 0.42 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 94,750 cubic feet (2.18 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.10 DP#3 / Area#3H / Pond#3H

5.10.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:

Assume I = 24% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(24) = 0.27$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.27)(0.96\text{acres})(1/12) = 0.24$ ac-ft.

5.10.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
$Ia = (200/CN-2) = ((200/67.5)-2) = 0.96$

Compute Initial Abstraction Ratio, Ia/P:
$Ia/P = 0.96/2.75 = 0.35$

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3H Post-development condition.

Tc = 1.40 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

$q_u = 1{,}000$ csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.018$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.018)+1.64(0.018)^2-0.804(0.018)^3 = 0.682$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3H = 1,976 cu.ft. / 41,818 sq.ft.
$Q_d = 0.047$ ft = **0.56"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.682(0.56")(0.96)(1/12) = 0.03$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.03(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.02$

5.10.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3H/Pond#3H, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.10.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.00 cfs (Area#3H/Pond#3H, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.10.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.24
Cp_v	Stream Protection	0.03

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.24) = 0.03 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.24) = 0.12 ac-ft (includes 0.03 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.24) = 0.12 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3H shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 8' broad crested weir at elevation 383.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.05 acre-ft. This is greater than the 0.03 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 0.48 acre-ft (20,732 cu.ft.) has been provided. This is greater than the 0.03 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 27,318 cubic feet (0.63 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.11 DP#3 / Area#3I / Pond#3I

5.11.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 15% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(15) = 0.19$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.19)(6.09\text{acres})(1/12) = 0.11$ ac-ft.

Section 4.2: "A minimum of 0.2 inch-acres per acre shall be met at residential sites that have less than 17% impervious cover."
$WQv_{min} = 0.2_{\text{inch-acres/acre}} \times 6.09_{\text{acres}} \times 0.0833_{\text{ft/inch}} = 0.10$acre-ft < **0.11 acre-ft**

5.11.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/71.1)-2) = 0.81

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.81/2.75 = 0.29

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3I Post-development condition.

Tc = 22.92 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 525 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.035$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.035)+1.64(0.035)^2-0.804(0.035)^3 = 0.634$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3I = 16,644 cu.ft. / 265,280 sq.ft.
Q_d = 0.063 ft = **0.76"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.634(0.76")(6.09)(1/12) = 0.24$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.24(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.12$

5.11.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.78 cfs (Area#3I/Pond#3I, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.11.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 17.74 cfs (Area#3I/Pond#3I, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.11.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.11
Cp_v	Stream Protection	0.24

Determine Pretreatment Volume:
Size the fore bay to treat 10% of the Wq_v = (10%)(0.11) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:
Size the permanent pool to contain 50% of the Wq_v = (50%)(0.11) = 0.06 ac-ft (includes 0.01 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.11) = 0.06 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3I shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 8' broad crested weir at elevation 405.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.03 acre-ft. This is greater than the 0.01 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 0.67 acre-ft (29,182 cu.ft.) has been provided. This is greater than the 0.24 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 41,438 cubic feet (0.95 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.12 DP#3 / Area#3J / Pond#3J

5.12.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 21% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(21) = 0.24$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.24)(13.43\text{acres})(1/12) = 0.30$ ac-ft.

5.12.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/75.4)-2) = 0.65

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.65/2.75 = 0.24

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3J Post-development condition.

Tc = 14.01 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 700 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.031$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.031)+1.64(0.031)^2-0.804(0.031)^3 = 0.639$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3J = 47,691 cu.ft. / 585,011 sq.ft.
Q_d = 0.082 ft = **0.98"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.639(0.98")(13.43)(1/12) = 0.70$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.70(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.35$

5.12.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3J/Pond#3J, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.12.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 4.07 cfs (Area#3J/Pond#3J, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.12.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.30
Cp_v	Stream Protection	0.70

Determine Pretreatment Volume:
Size the fore bay to treat 10% of the Wq_v = (10%)(0.30) = 0.03 ac-ft.

Determine Permanent Pool Volume and ED Volume:
Size the permanent pool to contain 50% of the Wq_v = (50%)(0.30) = 0.15 ac-ft (includes 0.03 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.30) = 0.15 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3J shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 3' broad crested weir at elevation 381.30'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.05 acre-ft. This is greater than the 0.03 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 4.38 acre-ft (190,918 cu.ft.) has been provided. This is greater than the 0.70 acre-ft minimum required by the Cpv calculation. The

composite storage volume of the pond is 226,204 cubic feet (5.19 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.13 DP#3 / Area#3K / Pond#3K

5.13.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 11% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(11) = 0.15$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.15)(8.59\text{acres})(1/12) = 0.12$ ac-ft.

Section 4.2: "A minimum of 0.2 inch-acres per acre shall be met at residential sites that have less than 17% impervious cover."
$WQv_{min} = 0.2_{\text{inch-acres/acre}} \times 8.59_{\text{acres}} \times 0.0833_{\text{ft/inch}} =$ **0.14acre-ft** > 0.12 acre-ft

5.13.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/69.7)-2) = 0.87

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.87/2.75 = 0.32

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3K Post-development condition.

Tc = 12.35 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 650 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.035$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.035)+1.64(0.035)^2-0.804(0.035)^3 = 0.634$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3K = 21,419 cu.ft. / 374,180 sq.ft.
Q_d = 0.057 ft = **0.68"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.634(0.68")(8.59)(1/12) = 0.31$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.31(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.16$

5.13.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3K/Pond#3K, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.13.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 1.99 cfs (Area#3K/Pond#3K, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.13.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.14
Cp_v	Stream Protection	0.31

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.14) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.14) = 0.07 ac-ft (includes 0.01 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.14) = 0.07 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3K shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 4' broad crested weir at elevation 395.50'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.03 acre-ft. This is greater than the 0.01 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 1.84 acre-ft (80,340 cu.ft.) has been provided. This is greater than the 0.31 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 97,100 cubic feet (2.23 acre-feet). All conditions have been met as outlined in the "*New York State Storm water Management Design Manual*".

5.14 DP#3 / Area#3L / Pond#3L

5.14.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:

Assume I = 17% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(17) = 0.20$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.20)(13.50acres)(1/12) = 0.25$ ac-ft.

5.14.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/66.2)-2) = 1.02

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 1.02/2.75 = 0.37

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#3/Area#3L Post-development condition.

Tc = 6.95 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 850 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.025$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.025)+1.64(0.025)^2-0.804(0.025)^3 = 0.647$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#3L = 26,333 cu.ft. / 588,060 sq.ft.
Q_d = 0.045 ft = **0.54"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.647(0.54")(13.50)(1/12) = 0.39$ ac-ft.

Define the Average Release Rate, Q_r:

The V_s shall be released over a 24-hour period.

$Q_r = V_s(43{,}560)/(24 \text{ hrs. x } 3{,}600 \text{ sec/hr.})$

$Q_r = 0.39(43{,}560)/(24 \text{ hrs. x } 3{,}600 \text{ sec/hr.}) = 0.20$

5.14.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 72.63 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#3L/Pond#3L, see appendices of this report).
Qpeak = 58.26 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.14.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 168.03 cfs (DP#3, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 2.38 cfs (Area#3L/Pond#3L, see appendices of this report).
Qpeak = 160.61 cfs (Summation of all discharges to DP#3 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.14.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.25
Cp_v	Stream Protection	0.39

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.25) = 0.03 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.25) = 0.13 ac-ft (includes 0.03 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.25) = 0.13 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#3L shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 6' broad crested weir at elevation 391.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.05 acre-ft. This is greater than the 0.03 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 2.97 acre-ft (129,554 cu.ft.) has been provided. This is greater than the 0.39 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 161,453 cubic feet (3.71 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.15 DP#4 / Area#4

No mitigation required.

5.16 DP#5 / Area#5

No mitigation required.

5.17 DP#6 / Area#6A

No mitigation required.

5.18 DP#6 / Area#6B / Pond#6B

5.18.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 24% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(24) = 0.27$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.27)(6.20\text{acres})(1/12) = 0.15$ ac-ft.

5.18.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/79.2)-2) = 0.53

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.53/2.75 = 0.19

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#6/Area#6B Post-development condition.

Tc = 16.37 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 725 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.027$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.027)+1.64(0.027)^2-0.804(0.027)^3 = 0.645$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#6B = 27,245 cu.ft. / 270,072 sq.ft.
Q_d = 0.101 ft = **1.21"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.645(1.21")(6.20)(1/12) = 0.40$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.40(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.20$

5.18.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 16.28 cfs (DP#6, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.08 cfs (Area#6B/Pond#6B, see appendices of this report).
Qpeak = 13.05 cfs (Summation of all discharges to DP#6 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.18.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 38.52 cfs (DP#6, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 4.35 cfs (Area#6B/Pond#6B, see appendices of this report).
Qpeak = 34.35 cfs (Summation of all discharges to DP#6 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.18.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.15
Cp_v	Stream Protection	0.40

Determine Pretreatment Volume:
Size the fore bay to treat 10% of the Wq_v = (10%)(0.15) = 0.02 ac-ft.

Determine Permanent Pool Volume and ED Volume:
Size the permanent pool to contain 50% of the Wq_v = (50%)(0.15) = 0.08 ac-ft (includes 0.02 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.15) = 0.08 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#6B shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 4' broad crested weir at elevation 325.00'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.04 acre-ft. This is greater than the 0.02 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 1.45 acre-ft (63,373 cu.ft.) has been provided. This is greater than the 0.40 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 85,308 cubic feet (1.96 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.19 DP#6 / Area#6C / Pond#6C

5.19.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 43% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(43) = 0.44$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.44)(1.68acres)(1/12) = 0.07$ ac-ft.

5.19.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/74.3)-2) = 0.69

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.69/2.75 = 0.25

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#6/Area#6C Post-development condition.

Tc = 3.64 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 1,100 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

q_u/q_i = 0.018

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.018)+1.64(0.018)^2-0.804(0.018)^3 = 0.657$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#6C = 5,626 cu.ft. / 73,181 sq.ft.
Q_d = 0.077 ft = **0.92"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.657(0.92")(1.68)(1/12) = 0.08$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.08(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.04$

5.19.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 16.28 cfs (DP#6, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#6C/Pond#6C, see appendices of this report).
Qpeak = 13.05 cfs (Summation of all discharges to DP#6 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.19.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 38.52 cfs (DP#6, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.36 cfs (Area#6C/Pond#6C, see appendices of this report).

Qpeak = 34.35 cfs (Summation of all discharges to DP#6 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.19.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.07
Cp_v	Stream Protection	0.08

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.07) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.07) = 0.4 ac-ft (includes 0.01 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.07) = 0.04 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#6C shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 2' broad crested weir at elevation 329.70'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.03 acre-ft. This is greater than the 0.01 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 0.39 acre-ft (17,203 cu.ft.) has been provided. This is greater than the 0.08 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 23,256 cubic feet (0.53 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.20 DP#6 / Area#6D / Pond#6D

5.20.1 Water Quality Volume, WQ_v:

Compute Impervious Cover, I:
Assume I = 26% (From AutoCAD Calculation)

Compute Runoff Coefficient, R_v:
$R_v = 0.05+(0.009)(I) = 0.05+(0.009)(26) = 0.28$

Compute Water Quality Volume, WQ_v:
Use the 90% capture rule (From Figure 4.1 of the Design Manual)

$WQ_v = (1.1)(R_v)(A)=(1.1)(0.28)(3.98\text{acres})(1/12) = 0.10$ ac-ft.

5.20.2 Stream Channel Protection Volume, Cp_v:

Compute Initial Abstraction, Ia:
Ia = (200/CN-2) = ((200/79.2)-2) = 0.53

Compute Initial Abstraction Ratio, Ia/P:
Ia/P = 0.53/2.75 = 0.19

Time of Concentration, Tc:
See the appendices of the report for the Tc calculations for the DP#6/Area#6D Post-development condition.

Tc = 9.36 minutes

Unit Peak Discharge, q_u:
From Exhibit 4-II from TR-55 for Type II Storm event.

q_u = 850 csm/in

Ratio of Inflow to Outflow, q_o/q_i:
From Figure 8.5 of the Design Manual

$q_u/q_i = 0.026$

Ratio of Storage to Runoff Volume, V_s/V_r:

$V_s/V_r = 0.682 - 1.43(q_u/q_u) + 1.64(q_u/q_u)^2 - 0.804(q_u/q_u)^3$

$V_s/V_r = 0.682-1.43(0.026)+1.64(0.026)^2-0.804(0.026)^3 = 0.646$

Compute Storage Volume, V_s:
Q_d = 1-year volume/Drainage Area#6D = 17,303 cu.ft. / 173,369 sq.ft.
Q_d = 0.100 ft = **1.20"**

$V_s = (V_s/V_r)(Qd)(A)(1/12) = 0.646(1.20")(3.98)(1/12) = 0.26$ ac-ft.

Define the Average Release Rate, Q_r:
The V_s shall be released over a 24-hour period.

$Q_r = V_s(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.})$

$Q_r = 0.26(43,560)/(24 \text{ hrs. x } 3,600 \text{ sec/hr.}) = 0.13$

5.20.3 Overbank Flood Protection Volume, Qp_{10}:

Pre-development Peak Rate of Runoff for 10-year Storm:
Qpeak = 16.28 cfs (DP#6, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 10-year Storm:
Qpeak = 0.00 cfs (Area#6D/Pond#6D, see appendices of this report).
Qpeak = 13.05 cfs (Summation of all discharges to DP#6 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 10-year storm.

5.20.4 Extreme Flood Protection Volume, Q_f:

Pre-development Peak Rate of Runoff for 100-year Storm:
Qpeak = 38.52 cfs (DP#6, see Table 4.0 above).

Post-development Mitigated Peak Rate of Runoff for 100-year Storm:
Qpeak = 0.58 cfs (Area#6D/Pond#6D, see appendices of this report).
Qpeak = 34.35 cfs (Summation of all discharges to DP#6 post-development mitigated, See Table 4.0 above).

The pond has been designed to attenuate the 100-year storm.

5.20.5 Summary of Storage Requirements:

Symbol	Category	Volume Required (acre-feet)
Wq_v	Water Quality Volume	0.10
Cp_v	Stream Protection	0.26

Determine Pretreatment Volume:

Size the fore bay to treat 10% of the Wq_v = (10%)(0.10) = 0.01 ac-ft.

Determine Permanent Pool Volume and ED Volume:

Size the permanent pool to contain 50% of the Wq_v = (50%)(0.10) = 0.05 ac-ft (includes 0.01 ac-ft of fore bay volume)

Size the ED volume to contain 50% of the Wq_v = (50%)(0.10) = 0.05 ac-ft.

The proposed pond shall be designed so that the storm water passes through a rip-rap spillway when flowing from the forebay to the permanent pool.

Pond#6D shall be designed to be an extended detention stormwater pond (P-3). It shall contain one main outlet structure consisting of a 2' broad crested weir at elevation 321.50'. The pond shall also contain a stone trench drain at its bottom to slowly empty the pond over time. This pond has been sized to attenuate the 2-year, 10-year, 25-year and 100-year storms to below the pre-development conditions of peak development runoff for all four storm frequencies. The forebay has been sized to contain 0.03 acre-ft. This is greater than the 0.01 acre-ft required. The pond has also been sized to completely contain the 1-year storm event. A Cpv volume of 1.22 acre-ft (53,189 cu.ft.) has been provided. This is greater than the 0.26 acre-ft minimum required by the Cpv calculation. The composite storage volume of the pond is 70,222 cubic feet (1.61 acre-feet). All conditions have been met as outlined in the *"New York State Storm water Management Design Manual"*.

5.21 DP#7 / Area#7

No mitigation required.

5.22 DP#8 / Area#8

No mitigation required.

5.23 DP#9 / Area#9

No mitigation required.

6.0 Conclusions:

It can be seen from the information provided herein that the proposed development shall provide adequate mitigation to reduce all post-development drainage impacts to pre-development levels or less. As demonstrated in the calculations above, the multiple stormwater ponds proposed shall provide

Appendix F

Pond Reports & Elevations

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - POND#3B

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	320.00	5,862	0	0
1.00	321.00	7,067	6,465	6,465
2.00	322.00	8,272	7,670	14,134
3.00	323.00	9,635	8,954	23,088
4.00	324.00	10,998	10,317	33,404
5.00	325.00	12,481	11,740	45,144
6.00	326.00	13,963	13,222	58,366

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 8.00	0.00	0.00	0.00
Crest El. ft	= 325.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	320.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	6,465	321.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	14,134	322.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	23,088	323.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	33,404	324.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	45,144	325.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	58,366	326.00	---	---	---	---	20.80	---	---	---	---	20.80

Hydrograph Plot

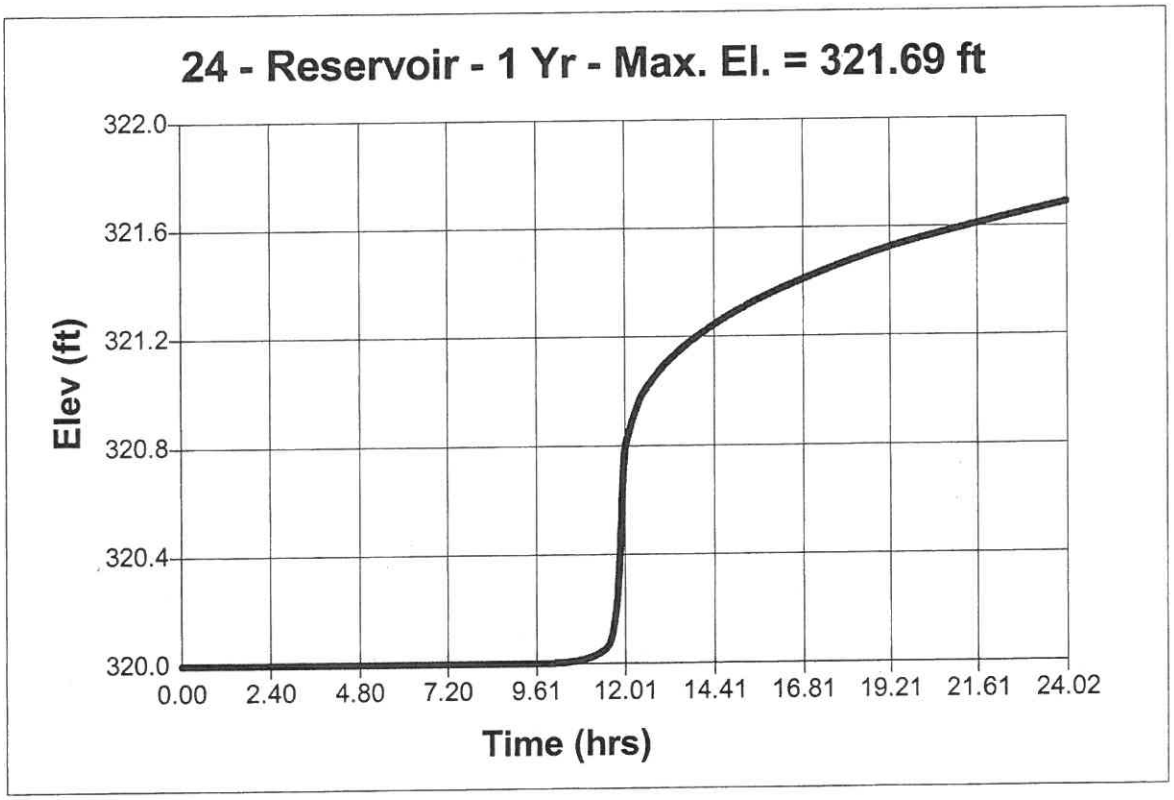
Hyd. No. 24

POND#3B TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 4	Reservoir name	= POND#3B
Max. Elevation	= 321.69 ft	Max. Storage	= 11,724 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

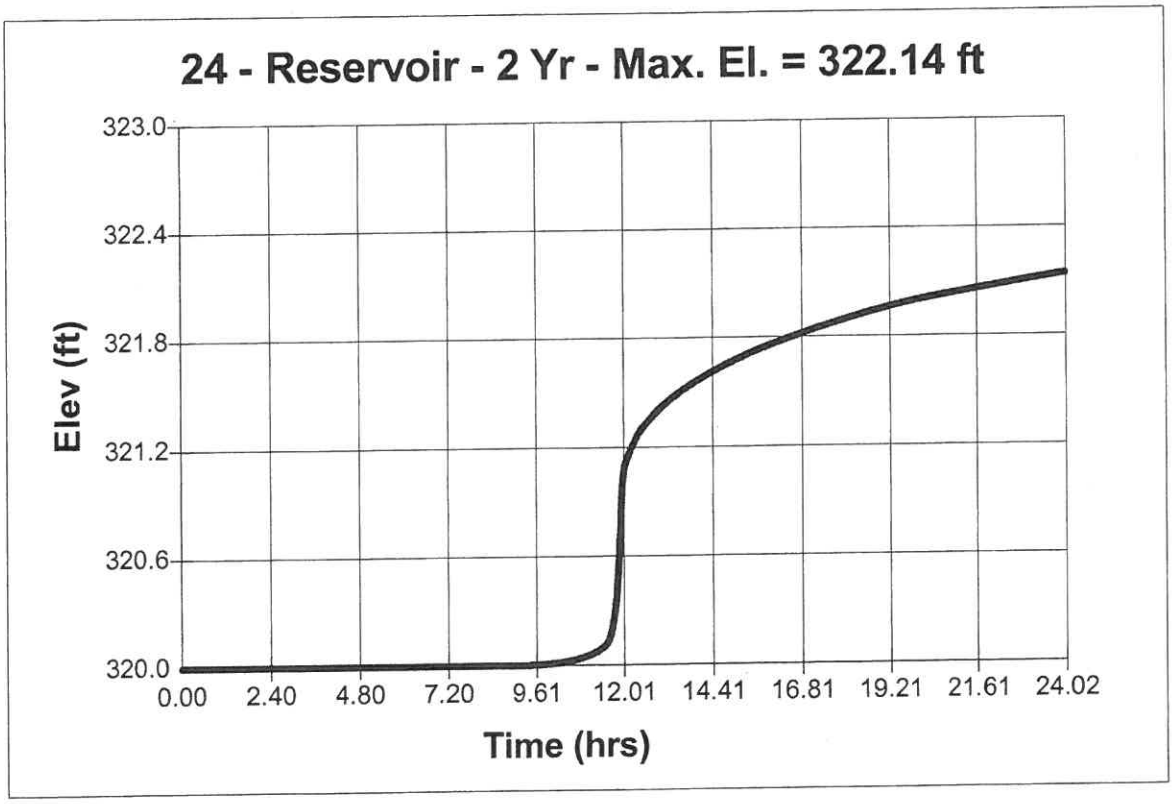
Hyd. No. 24

POND#3B TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 4	Reservoir name	= POND#3B
Max. Elevation	= 322.14 ft	Max. Storage	= 15,378 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

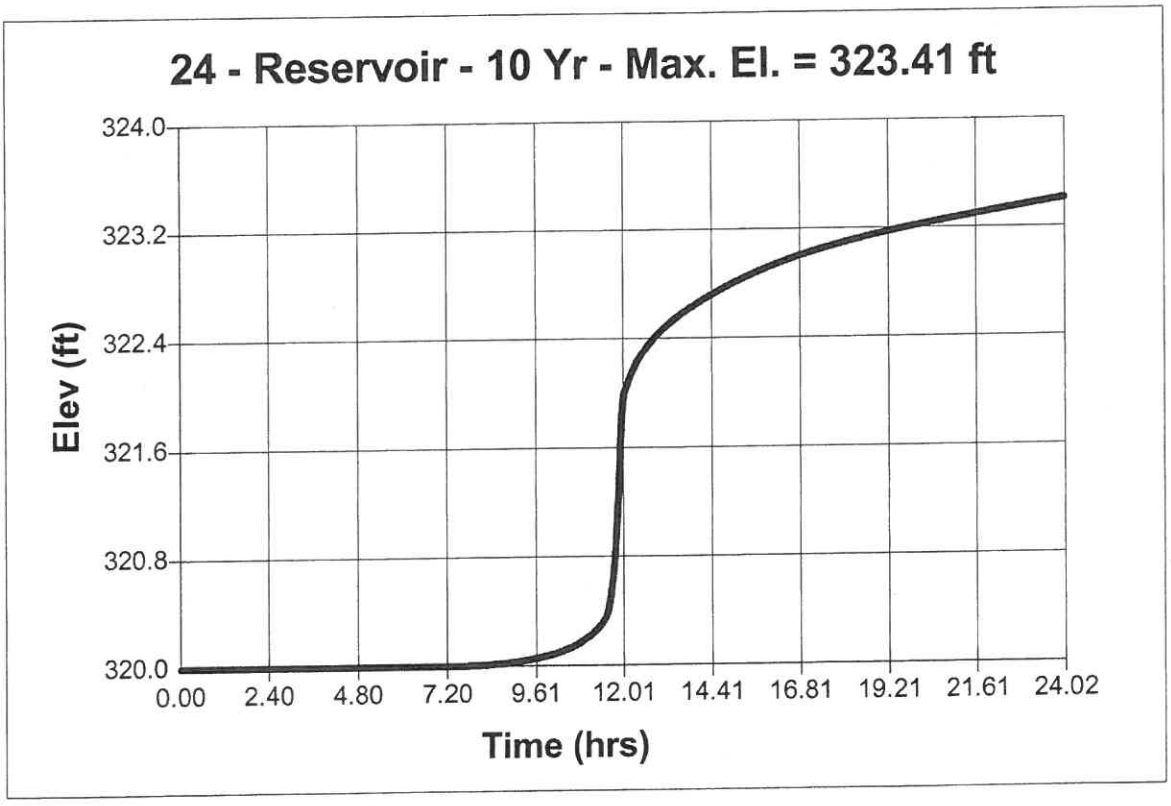
Hyd. No. 24

POND#3B TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 4	Reservoir name	= POND#3B
Max. Elevation	= 323.41 ft	Max. Storage	= 27,286 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

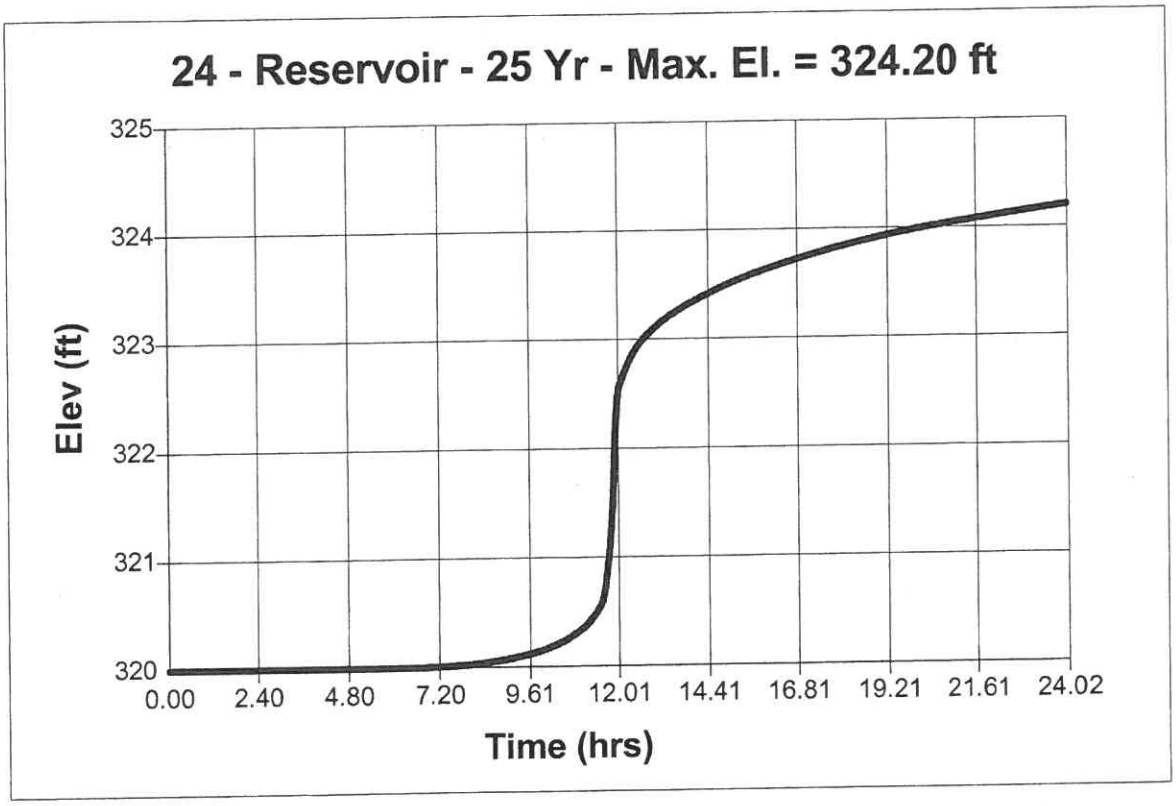
Hyd. No. 24

POND#3B TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 4	Reservoir name	= POND#3B
Max. Elevation	= 324.20 ft	Max. Storage	= 35,717 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

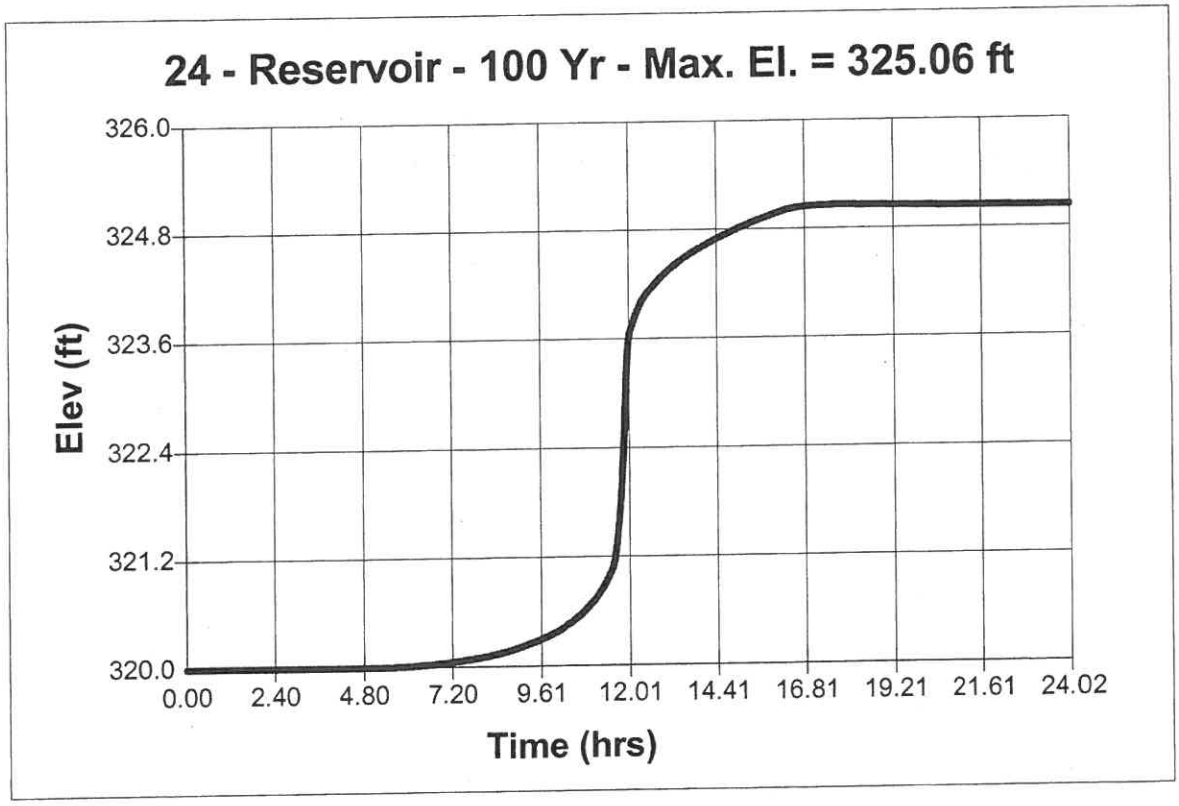
Hyd. No. 24

POND#3B TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.36 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 4	Reservoir name	= POND#3B
Max. Elevation	= 325.06 ft	Max. Storage	= 45,870 cuft

Storage Indication method used.

Hydrograph Volume = 7,654 cuft



POND REPORT & ELEVATIONS
POND#3C

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 2 - POND#3C

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	326.00	10,609	0	0
1.00	327.00	12,745	11,677	11,677
2.00	328.00	14,880	13,813	25,490
3.00	329.00	17,129	16,005	41,494
4.00	330.00	19,377	18,253	59,747

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 8.00	0.00	0.00	0.00
Crest El. ft	= 329.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	326.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	11,677	327.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	25,490	328.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	41,494	329.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	59,747	330.00	---	---	---	---	20.80	---	---	---	---	20.80

Hydrograph Plot

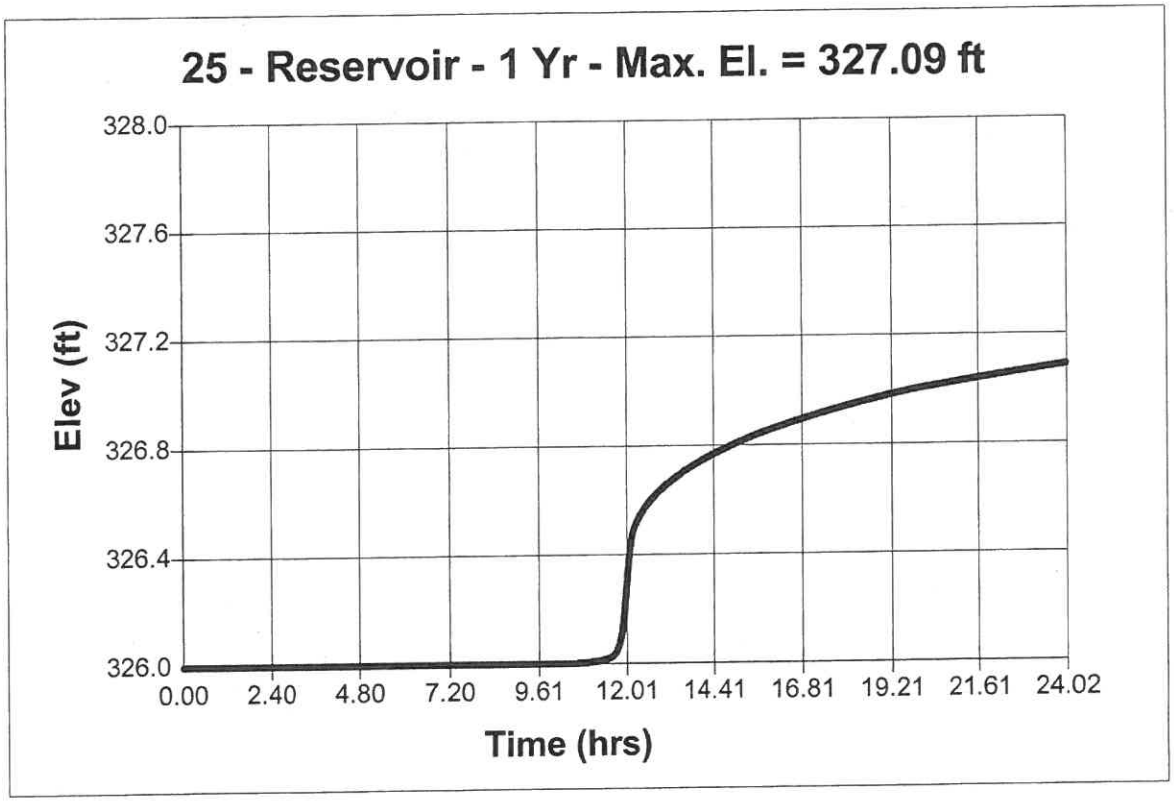
Hyd. No. 25

POND#3C TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 5	Reservoir name	= POND#3C
Max. Elevation	= 327.09 ft	Max. Storage	= 12,874 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

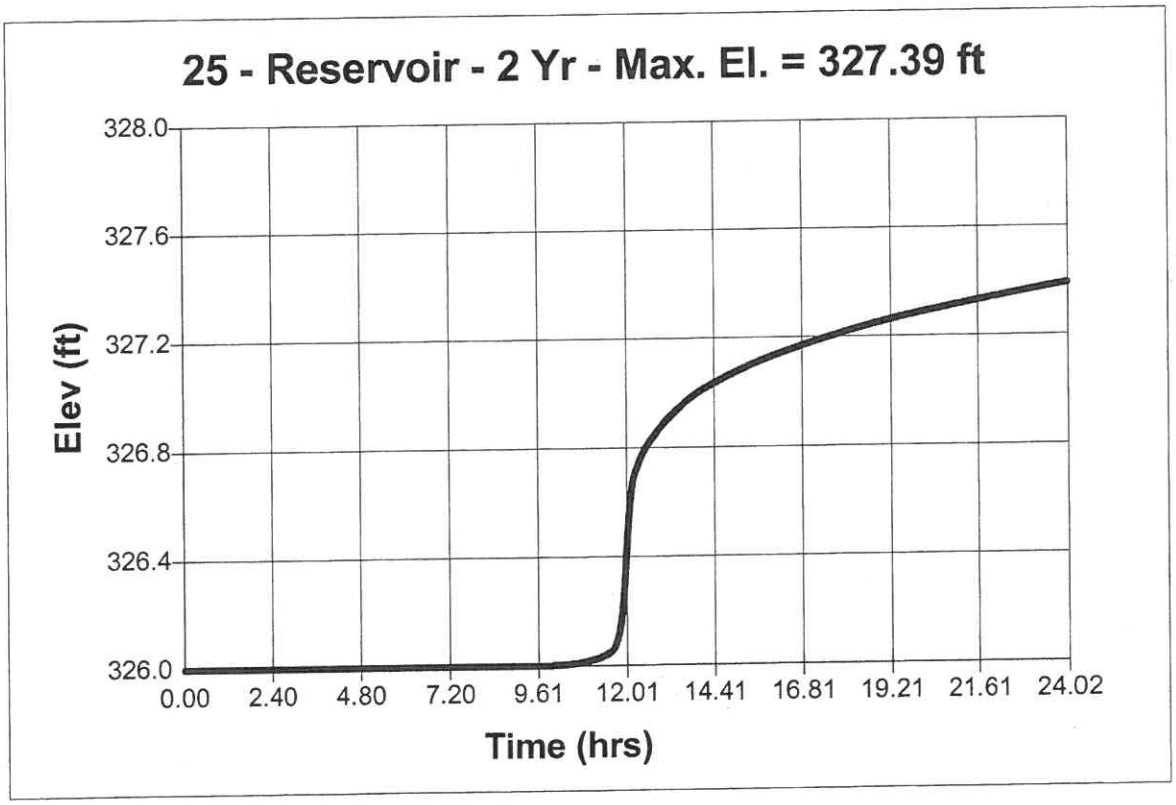
Hyd. No. 25

POND#3C TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 5	Reservoir name	= POND#3C
Max. Elevation	= 327.39 ft	Max. Storage	= 17,069 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

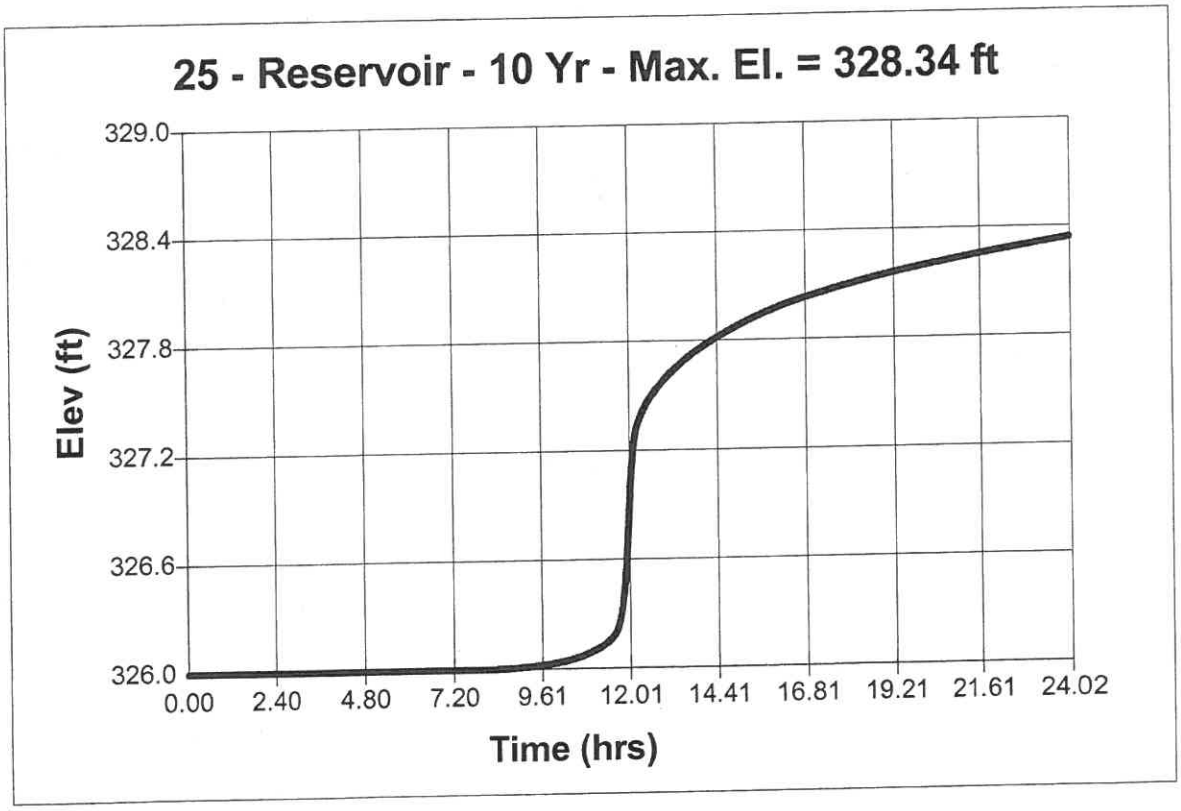
Hyd. No. 25

POND#3C TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 5	Reservoir name	= POND#3C
Max. Elevation	= 328.34 ft	Max. Storage	= 30,884 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

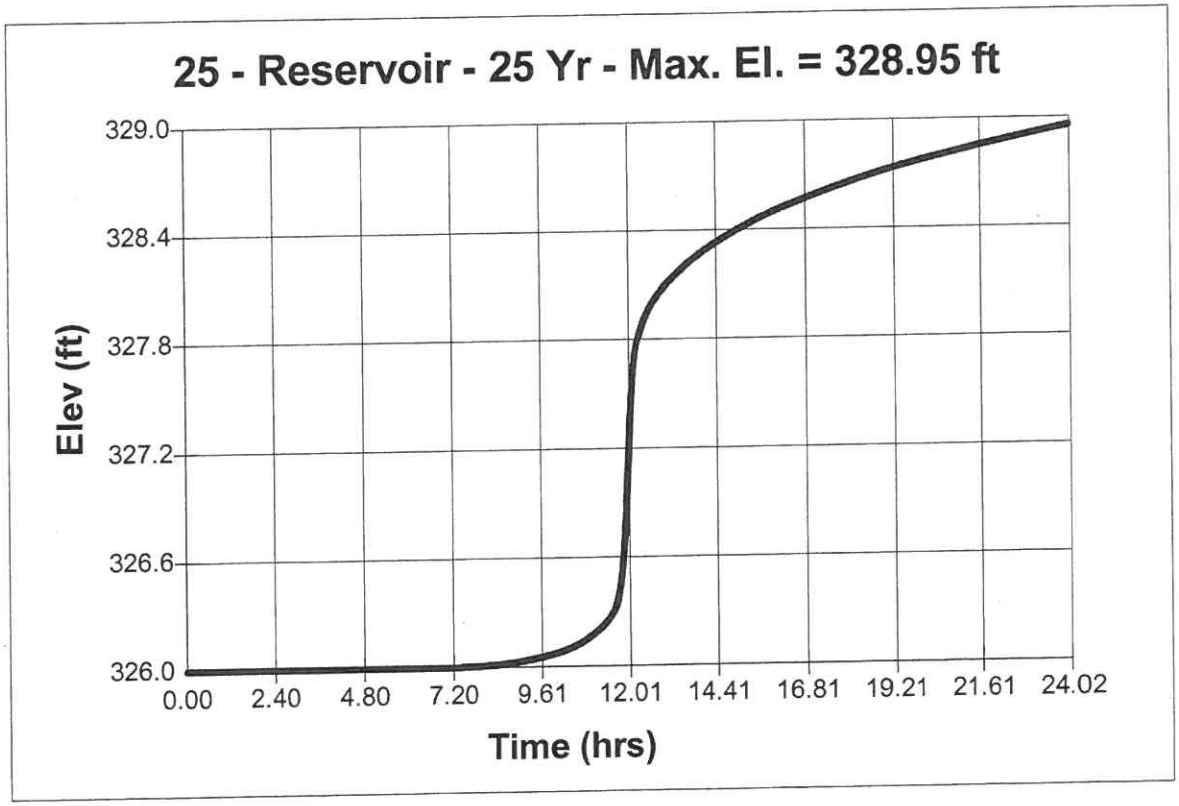
Hyd. No. 25

POND#3C TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 5	Reservoir name	= POND#3C
Max. Elevation	= 328.95 ft	Max. Storage	= 40,746 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

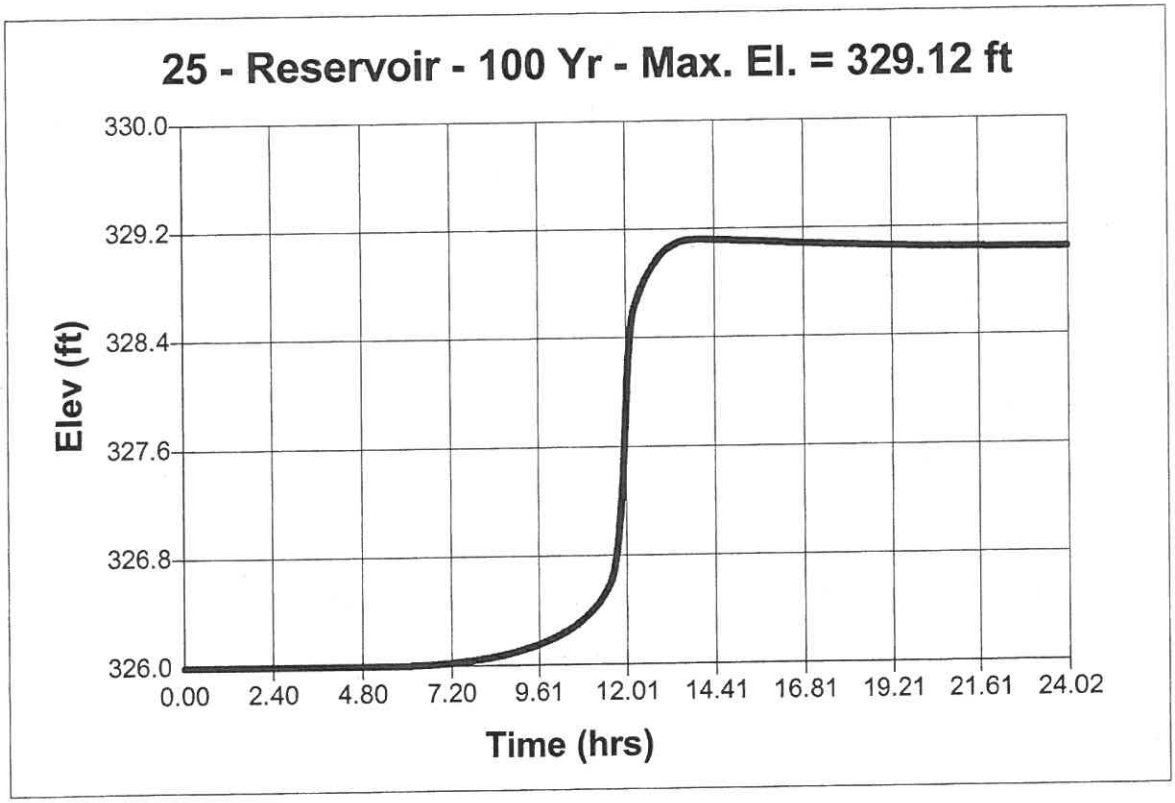
Hyd. No. 25

POND#3C TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.91 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 5	Reservoir name	= POND#3C
Max. Elevation	= 329.12 ft	Max. Storage	= 43,701 cuft

Storage Indication method used.

Hydrograph Volume = 19,127 cuft



POND REPORT & ELEVATIONS
POND#3D

Reservoir Report

Reservoir No. 3 - POND#3D

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	320.00	7,685	0	0
1.00	321.00	9,575	8,630	8,630
2.00	322.00	11,464	10,520	19,150
3.00	323.00	14,293	12,879	32,028
4.00	324.00	17,122	15,708	47,736
5.00	325.00	20,283	18,703	66,438
6.00	326.00	23,443	21,863	88,301

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 2.00	0.00	0.00	0.00
Crest El. ft	= 325.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	320.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	8,630	321.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	19,150	322.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	32,028	323.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	47,736	324.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	66,438	325.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	88,301	326.00	---	---	---	---	1.84	---	---	---	---	1.84

Hydrograph Plot

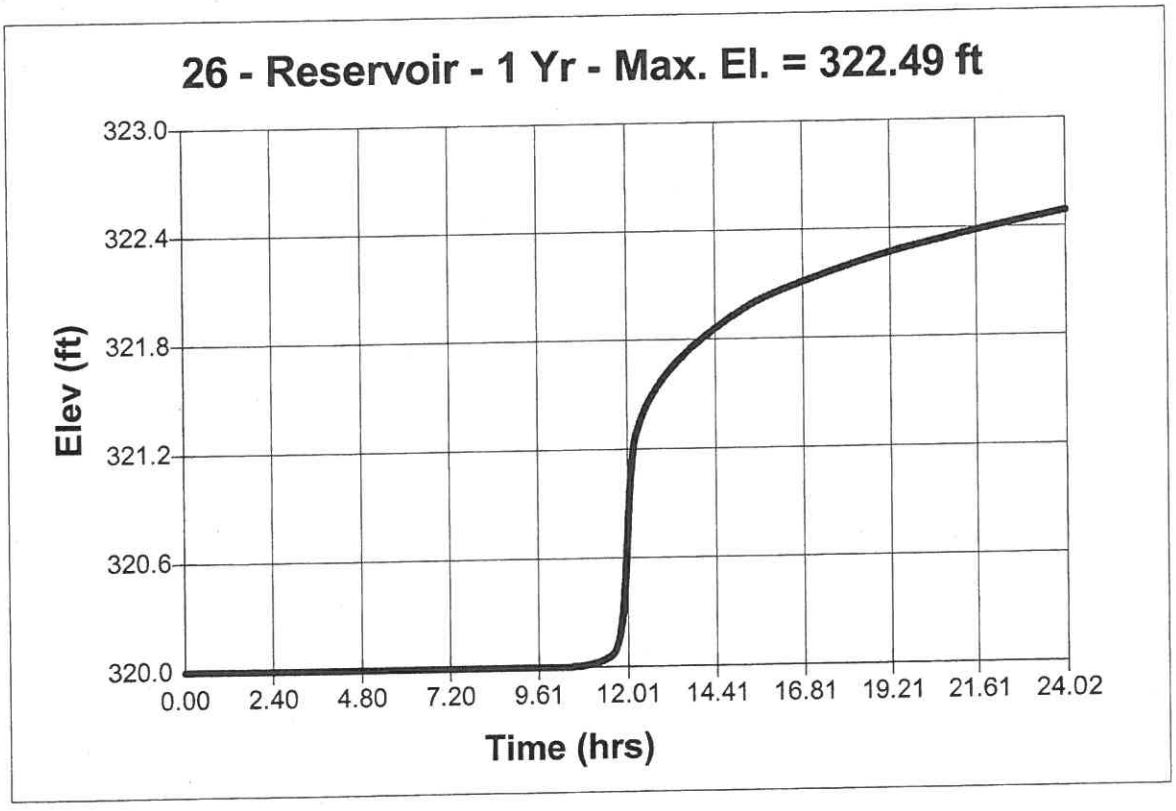
Hyd. No. 26

POND#3D TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 6	Reservoir name	= POND#3D
Max. Elevation	= 322.49 ft	Max. Storage	= 25,397 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

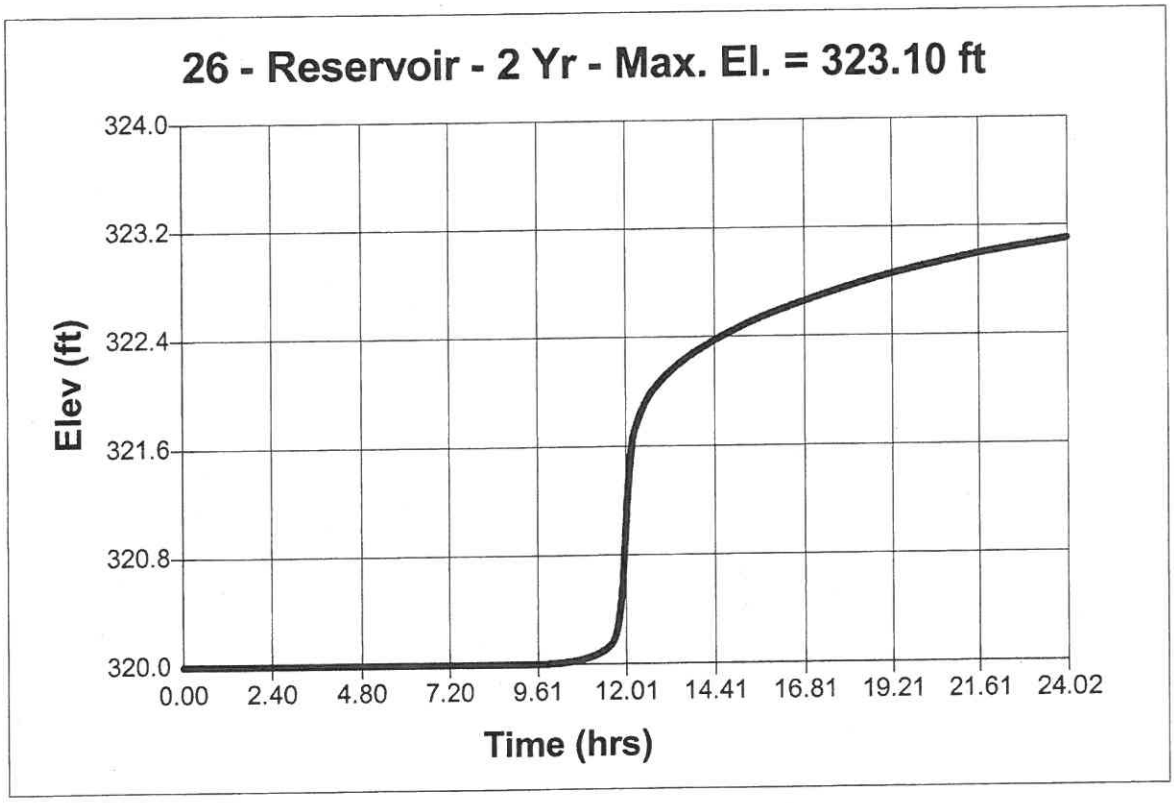
Hyd. No. 26

POND#3D TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 6	Reservoir name	= POND#3D
Max. Elevation	= 323.10 ft	Max. Storage	= 33,628 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

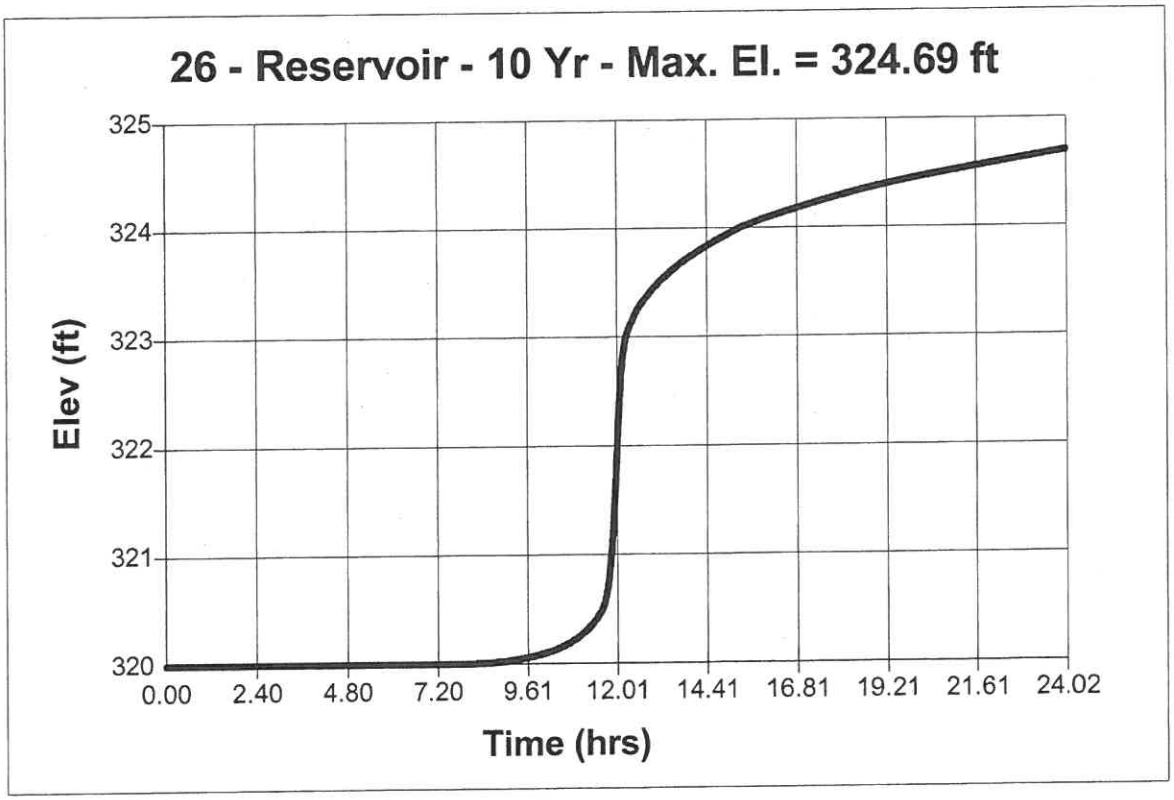
Hyd. No. 26

POND#3D TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 6	Reservoir name	= POND#3D
Max. Elevation	= 324.69 ft	Max. Storage	= 60,698 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

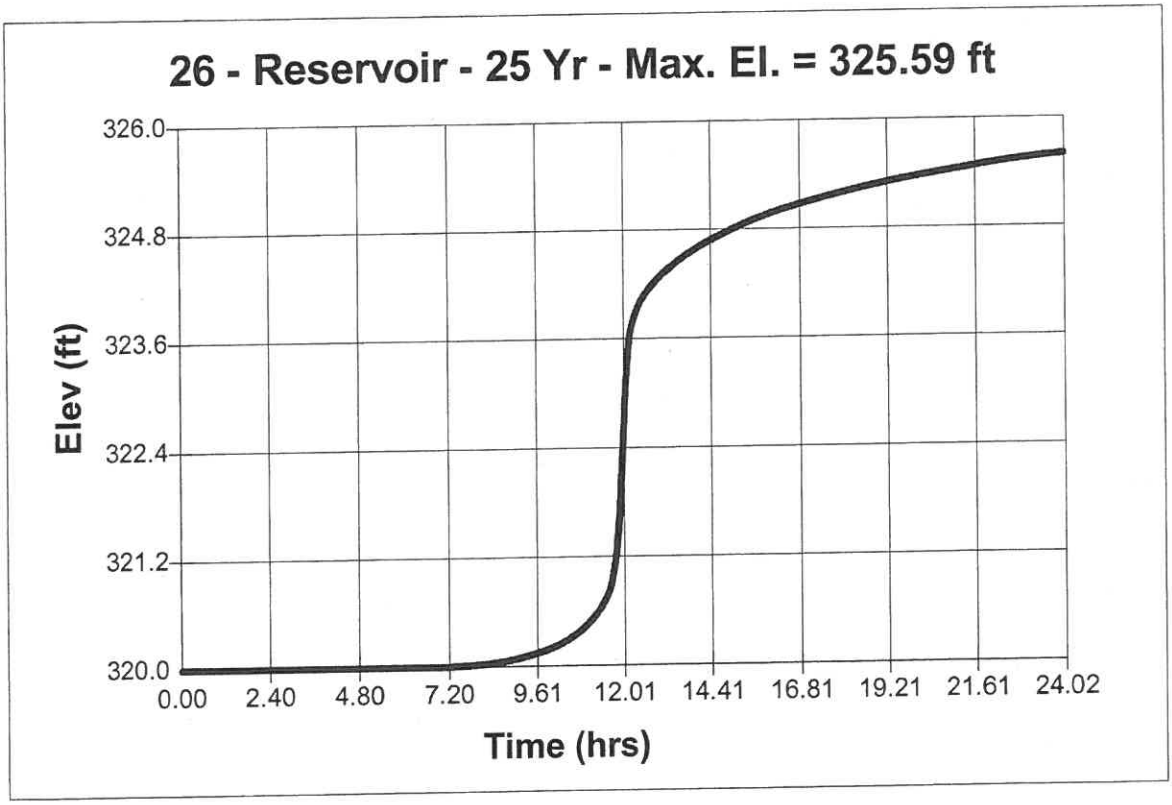
Hyd. No. 26

POND#3D TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.15 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 6	Reservoir name	= POND#3D
Max. Elevation	= 325.59 ft	Max. Storage	= 79,409 cuft

Storage Indication method used.

Hydrograph Volume = 600 cuft



Hydrograph Plot

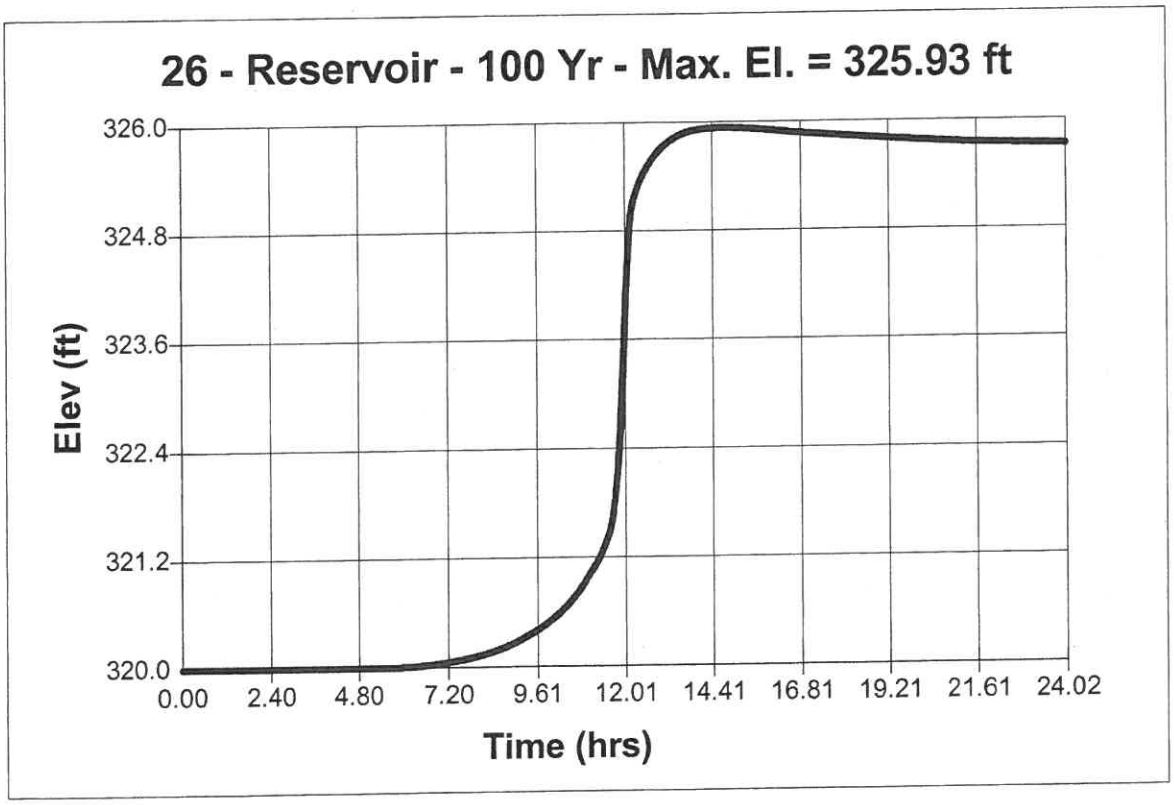
Hyd. No. 26

POND#3D TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 1.47 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 6	Reservoir name	= POND#3D
Max. Elevation	= 325.93 ft	Max. Storage	= 86,768 cuft

Storage Indication method used.

Hydrograph Volume = 38,107 cuft



POND REPORT & ELEVATIONS
POND#3E

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 4 - POND#3E

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	318.00	29,184	0	0
1.00	319.00	31,734	30,459	30,459
2.00	320.00	34,283	33,009	63,468
3.00	321.00	36,953	35,618	99,086
4.00	322.00	39,622	38,288	137,373
5.00	323.00	42,407	41,015	178,388
6.00	324.00	45,192	43,800	222,187
7.00	325.00	48,091	46,642	268,829
8.00	326.00	50,989	49,540	318,369

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 8.00	0.00	0.00	0.00
Crest El. ft	= 325.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	318.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	30,459	319.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	63,468	320.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	99,086	321.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	137,373	322.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	178,388	323.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	222,187	324.00	---	---	---	---	0.00	---	---	---	---	0.00
7.00	268,829	325.00	---	---	---	---	0.00	---	---	---	---	0.00
8.00	318,369	326.00	---	---	---	---	20.80	---	---	---	---	20.80

Hydrograph Plot

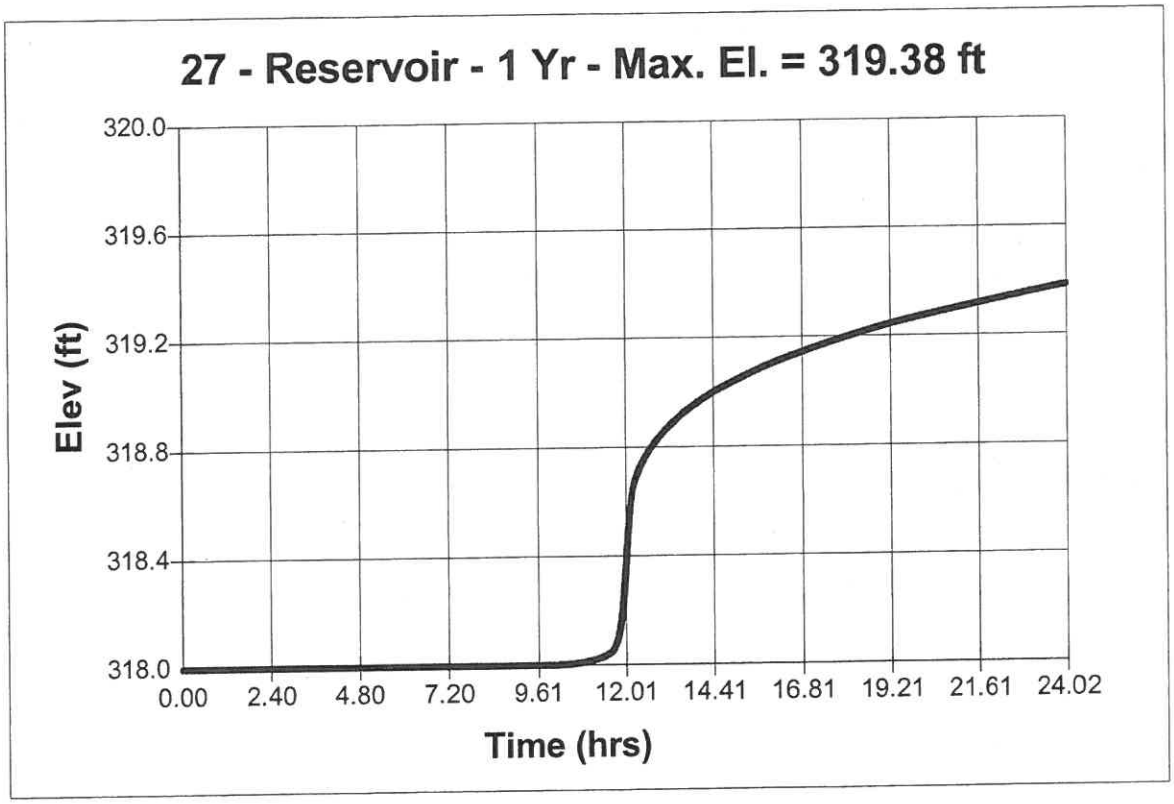
Hyd. No. 27

POND#3E TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 7	Reservoir name	= POND#3E
Max. Elevation	= 319.38 ft	Max. Storage	= 43,054 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

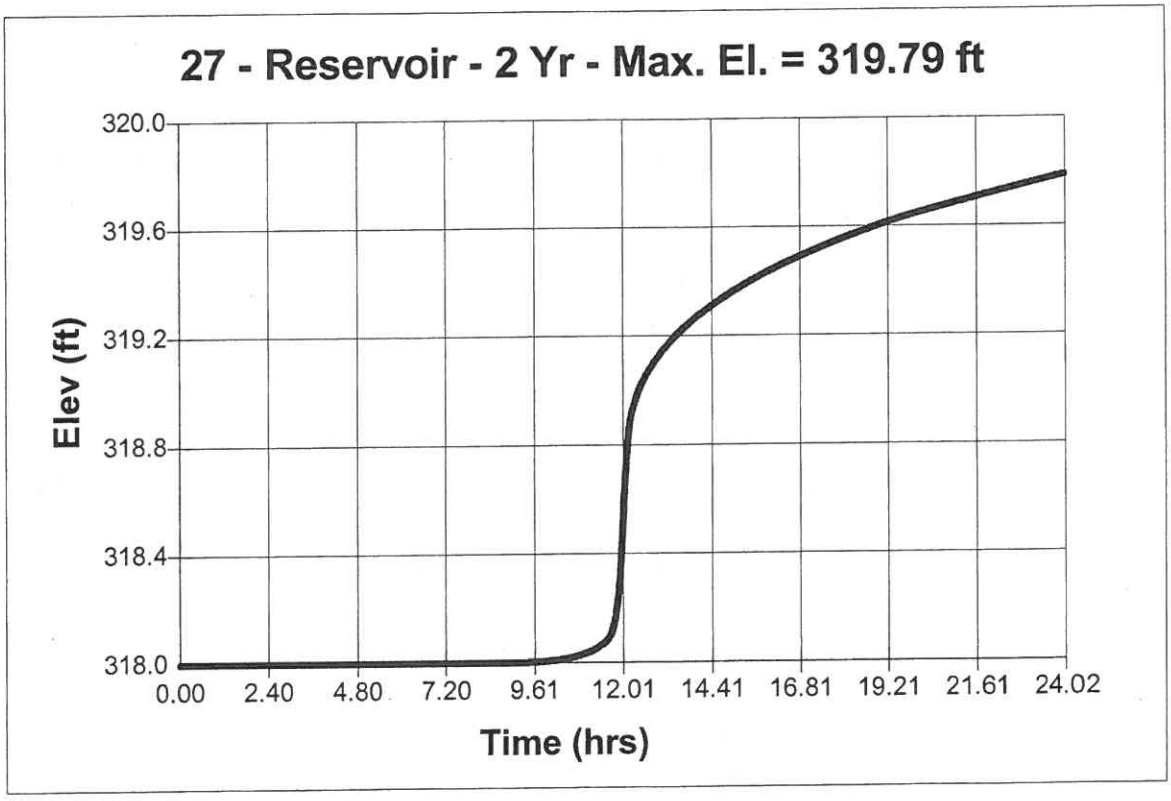
Hyd. No. 27

POND#3E TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 7	Reservoir name	= POND#3E
Max. Elevation	= 319.79 ft	Max. Storage	= 56,372 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

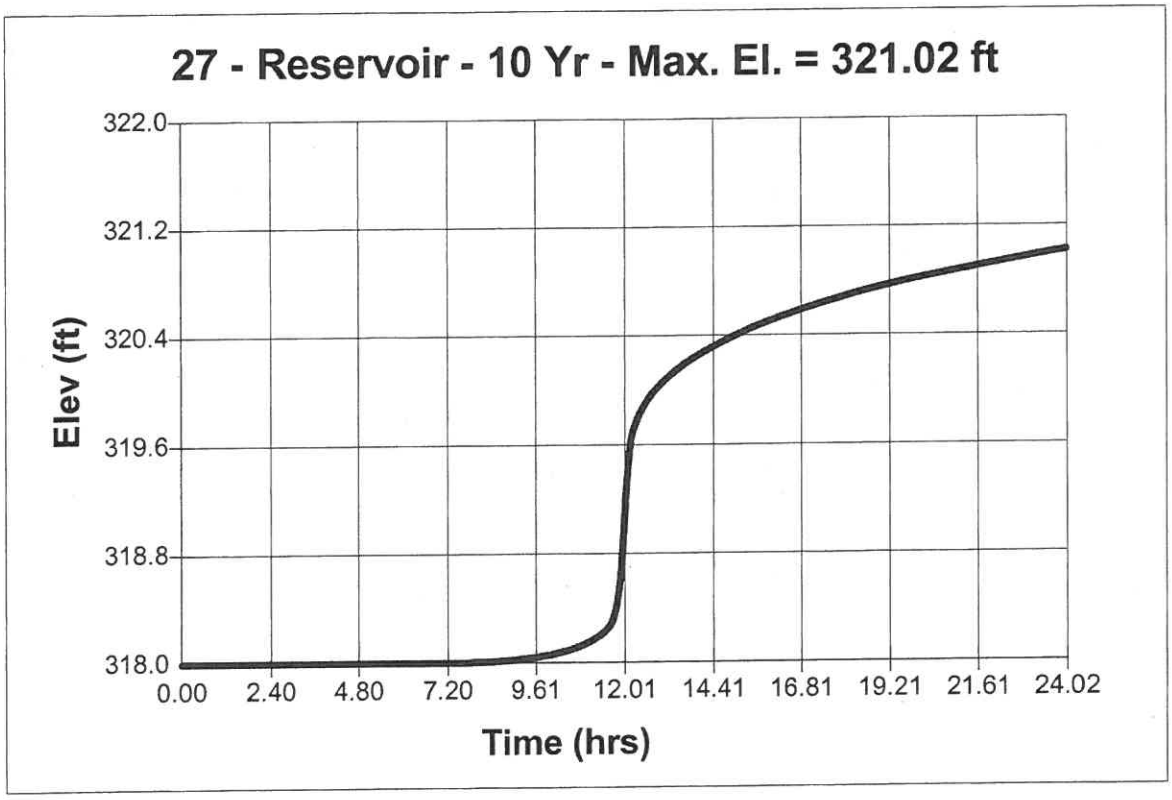
Hyd. No. 27

POND#3E TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 7	Reservoir name	= POND#3E
Max. Elevation	= 321.02 ft	Max. Storage	= 99,690 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

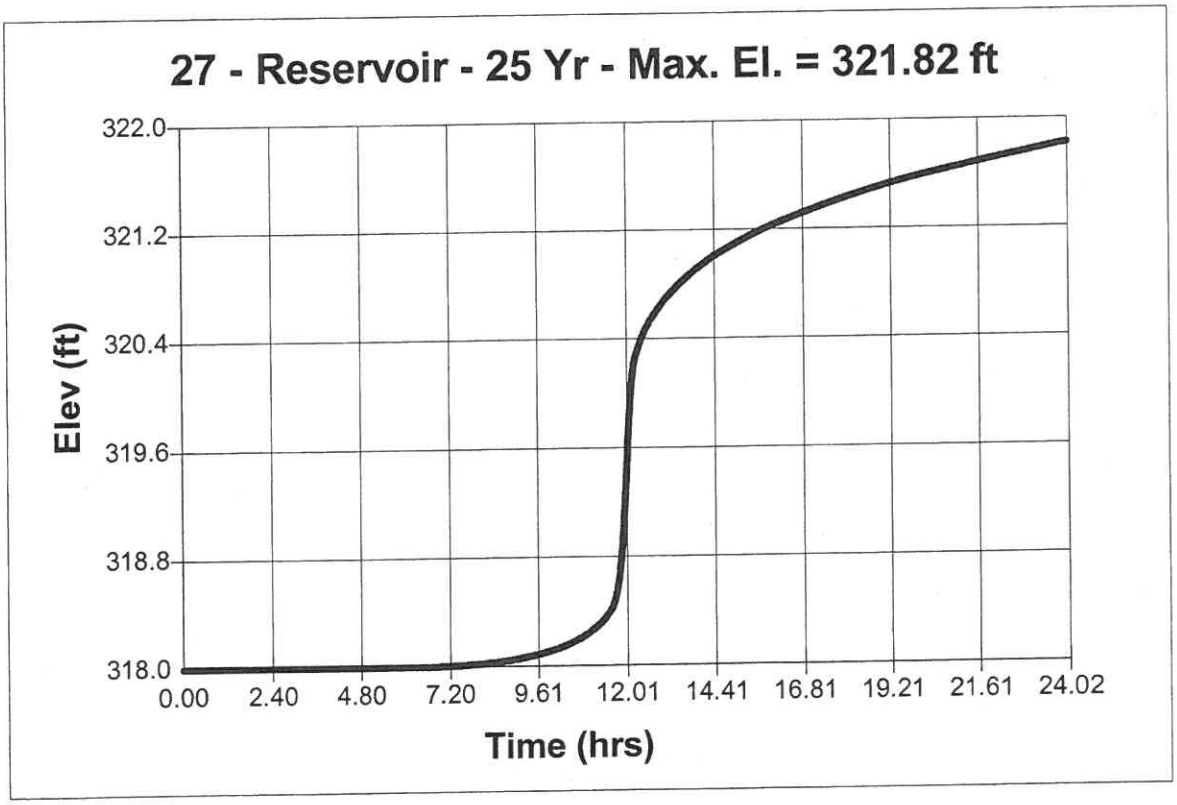
Hyd. No. 27

POND#3E TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 7	Reservoir name	= POND#3E
Max. Elevation	= 321.82 ft	Max. Storage	= 130,323 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

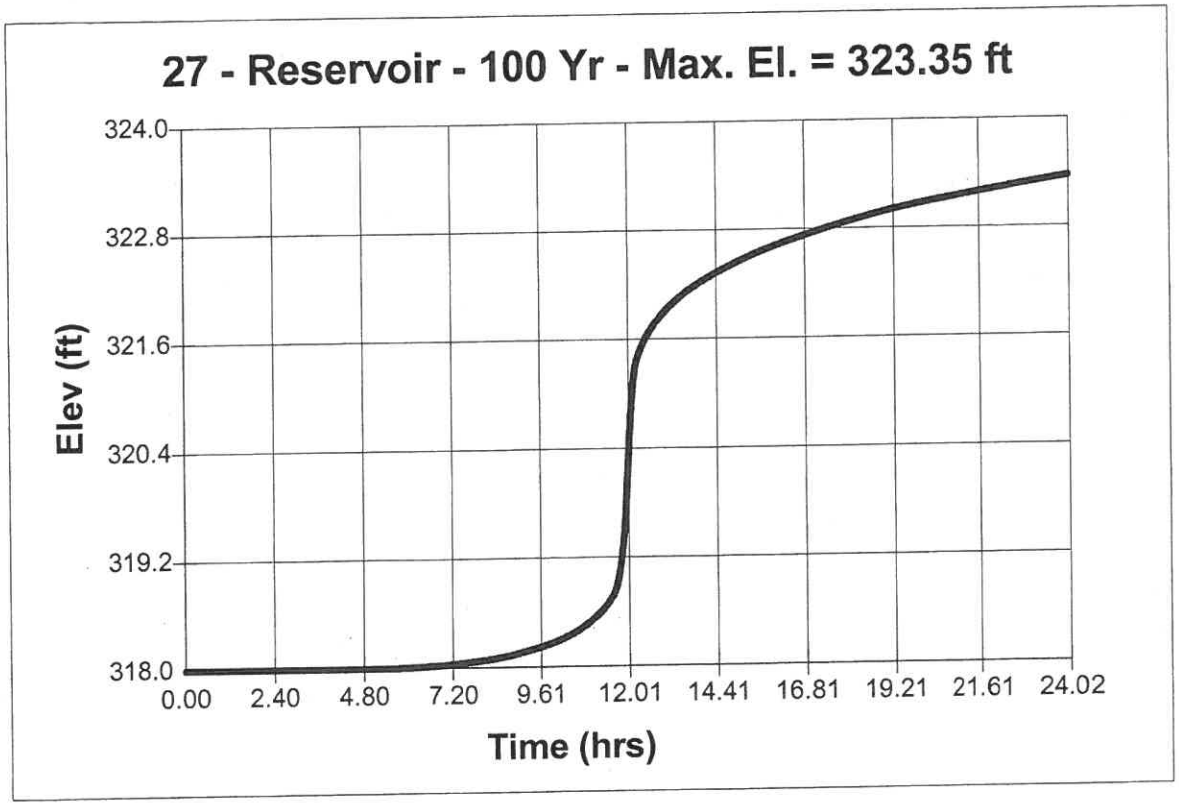
Hyd. No. 27

POND#3E TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 7	Reservoir name	= POND#3E
Max. Elevation	= 323.35 ft	Max. Storage	= 193,903 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



POND REPORT & ELEVATIONS
POND#3F

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 5 - POND#3F

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	324.00	9,602	0	0
1.00	325.00	11,495	10,549	10,549
2.00	326.00	13,387	12,441	22,990
3.00	327.00	15,456	14,422	37,411
4.00	328.00	17,524	16,490	53,901

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 8.00	0.00	0.00	0.00
Crest El. ft	= 327.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	324.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	10,549	325.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	22,990	326.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	37,411	327.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	53,901	328.00	---	---	---	---	20.80	---	---	---	---	20.80

Hydrograph Plot

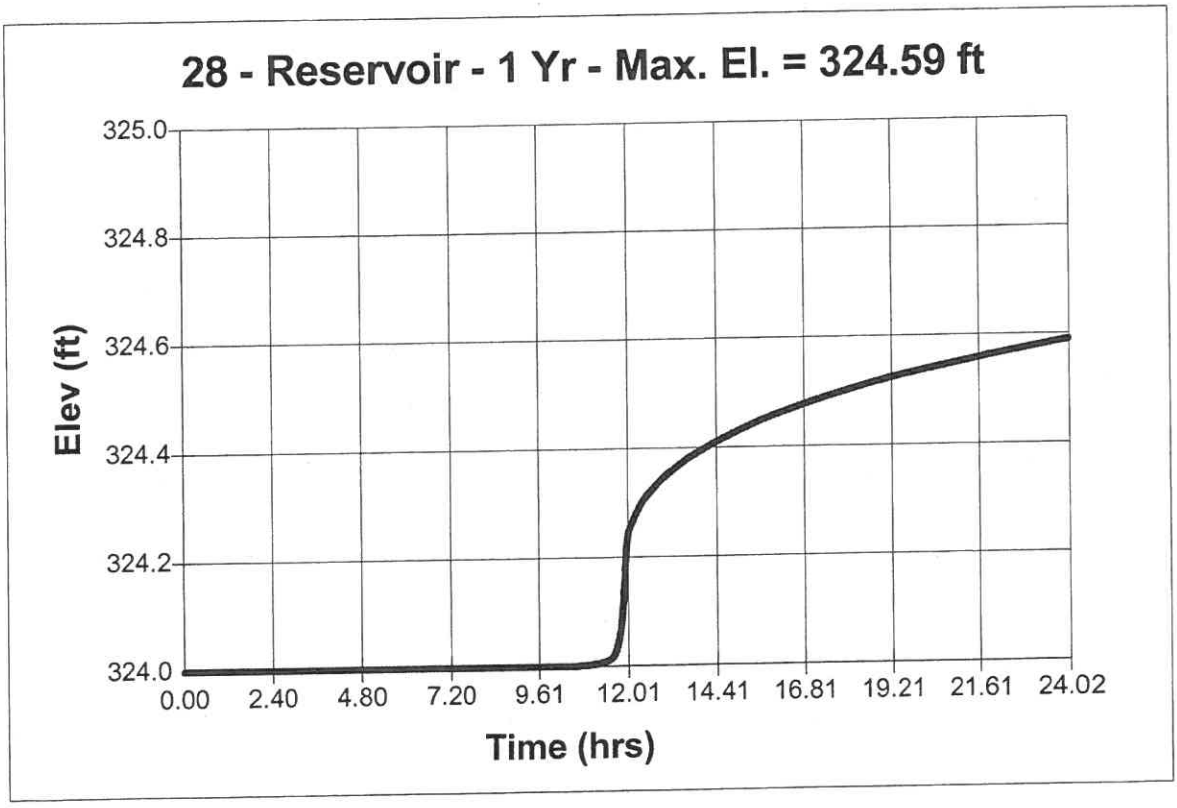
Hyd. No. 28

POND#3F TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 8	Reservoir name	= POND#3F
Max. Elevation	= 324.59 ft	Max. Storage	= 6,216 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

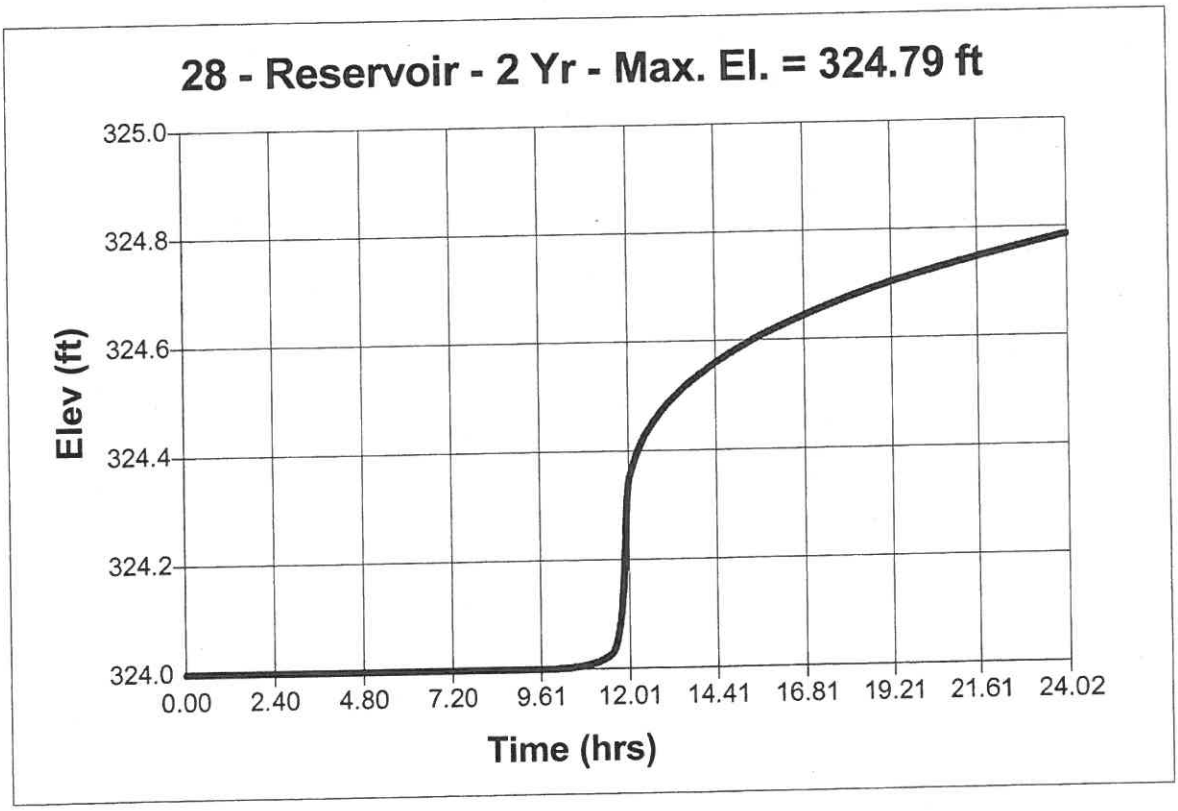
Hyd. No. 28

POND#3F TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 8	Reservoir name	= POND#3F
Max. Elevation	= 324.79 ft	Max. Storage	= 8,286 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

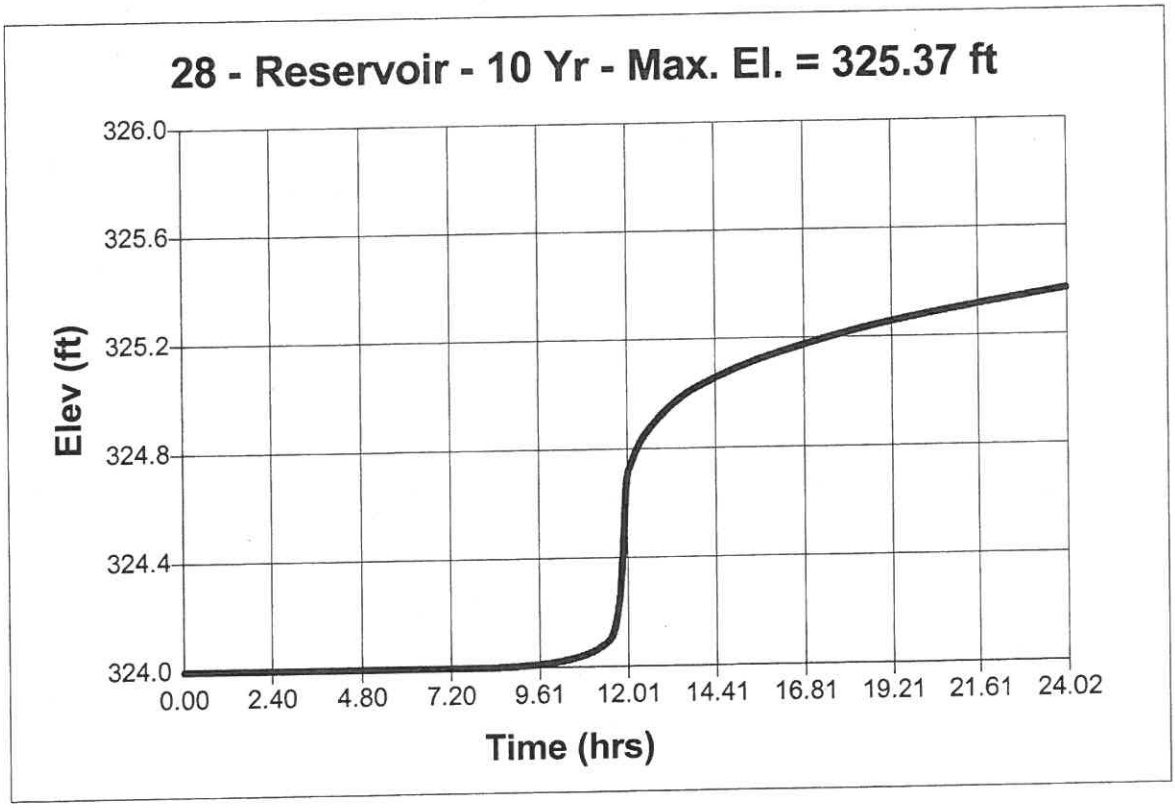
Hyd. No. 28

POND#3F TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 8	Reservoir name	= POND#3F
Max. Elevation	= 325.37 ft	Max. Storage	= 15,137 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

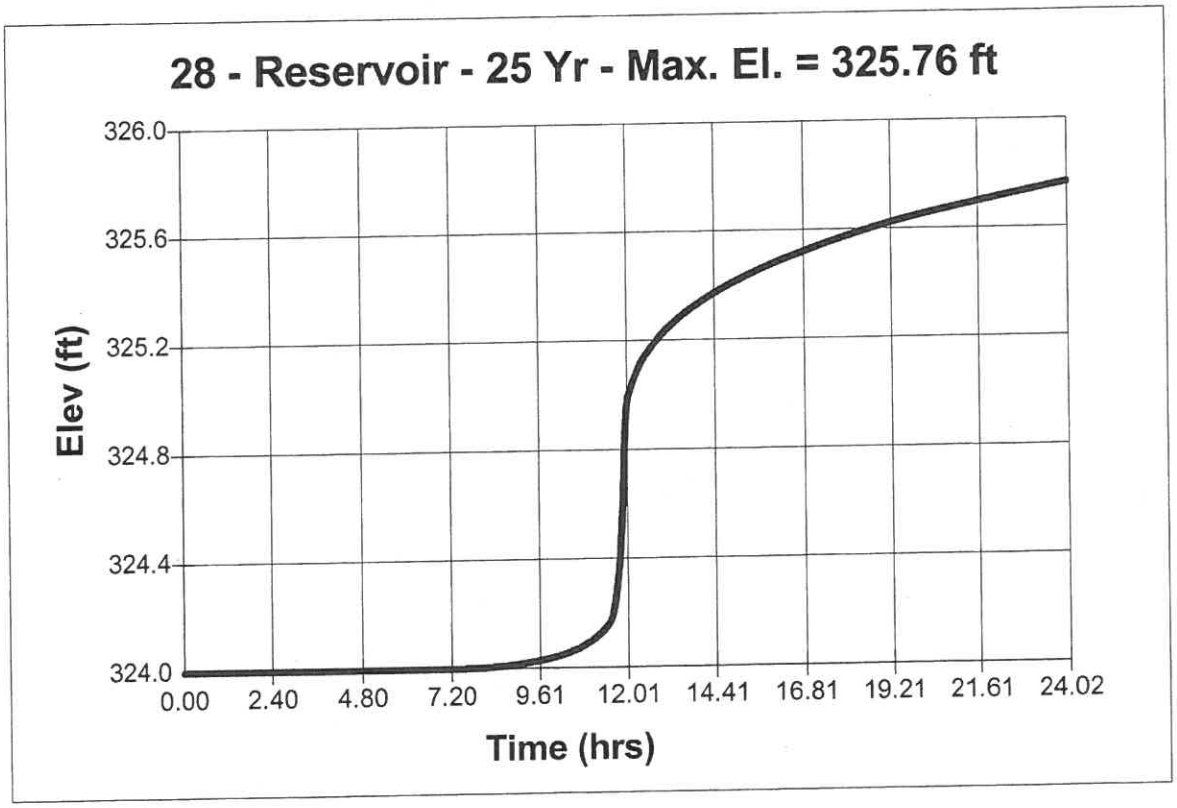
Hyd. No. 28

POND#3F TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 8	Reservoir name	= POND#3F
Max. Elevation	= 325.76 ft	Max. Storage	= 20,049 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

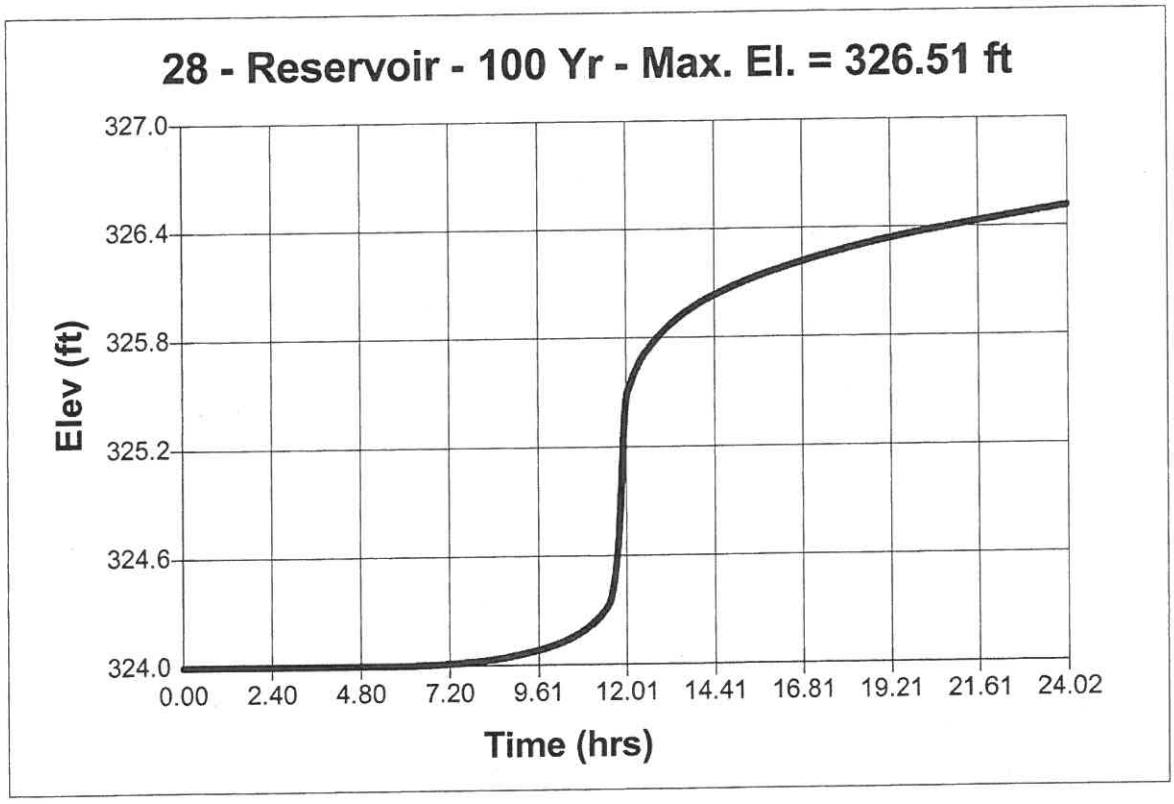
Hyd. No. 28

POND#3F TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 8	Reservoir name	= POND#3F
Max. Elevation	= 326.51 ft	Max. Storage	= 30,337 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



POND REPORT & ELEVATIONS
POND#3G

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 6 - POND#3G

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	318.00	5,348	0	0
1.00	319.00	6,762	6,055	6,055
2.00	320.00	8,176	7,469	13,524
3.00	321.00	9,861	9,019	22,543
4.00	322.00	11,546	10,704	33,246
5.00	323.00	13,436	12,491	45,737
6.00	324.00	15,317	14,377	60,114
7.00	325.00	17,318	16,318	76,431
8.00	326.00	19,319	18,319	94,750

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 2.00	0.00	0.00	0.00
Crest El. ft	= 325.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	318.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	6,055	319.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	13,524	320.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	22,543	321.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	33,246	322.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	45,737	323.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	60,114	324.00	---	---	---	---	0.00	---	---	---	---	0.00
7.00	76,431	325.00	---	---	---	---	0.00	---	---	---	---	0.00
8.00	94,750	326.00	---	---	---	---	1.84	---	---	---	---	1.84

Hydrograph Plot

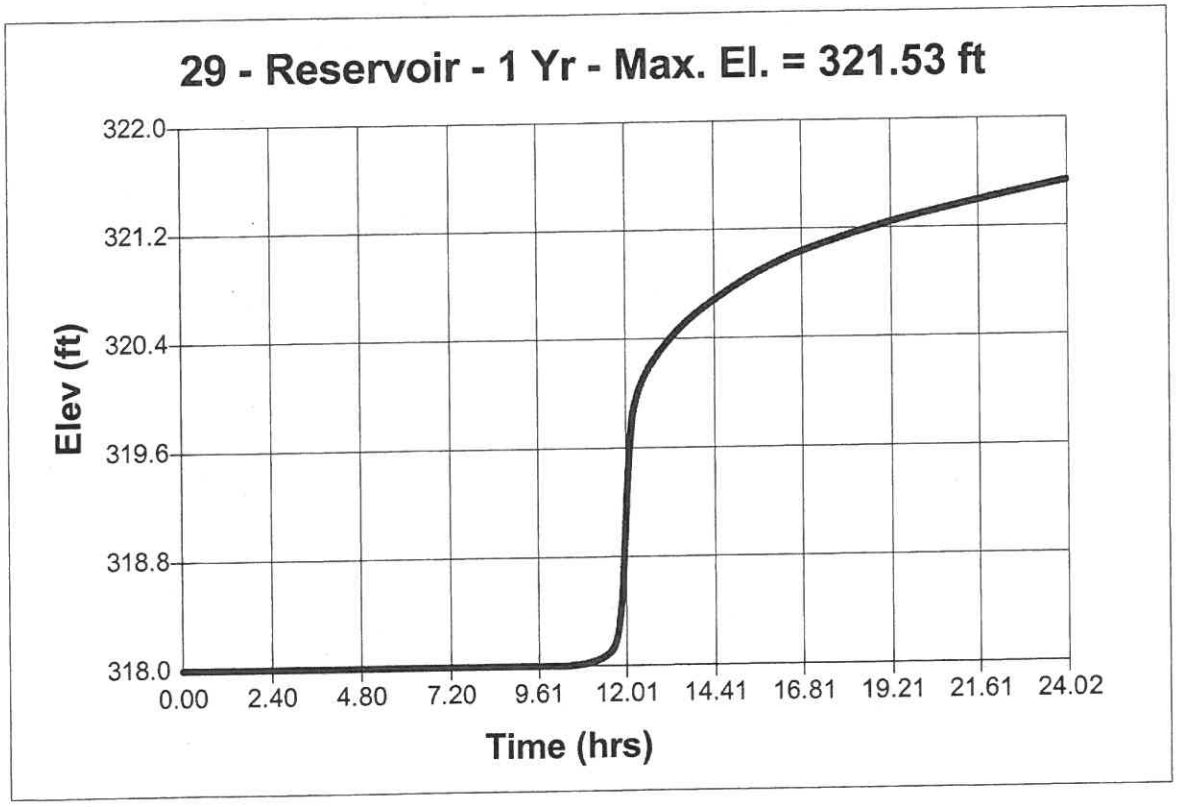
Hyd. No. 29

POND#3G TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 9	Reservoir name	= POND#3G
Max. Elevation	= 321.53 ft	Max. Storage	= 28,238 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

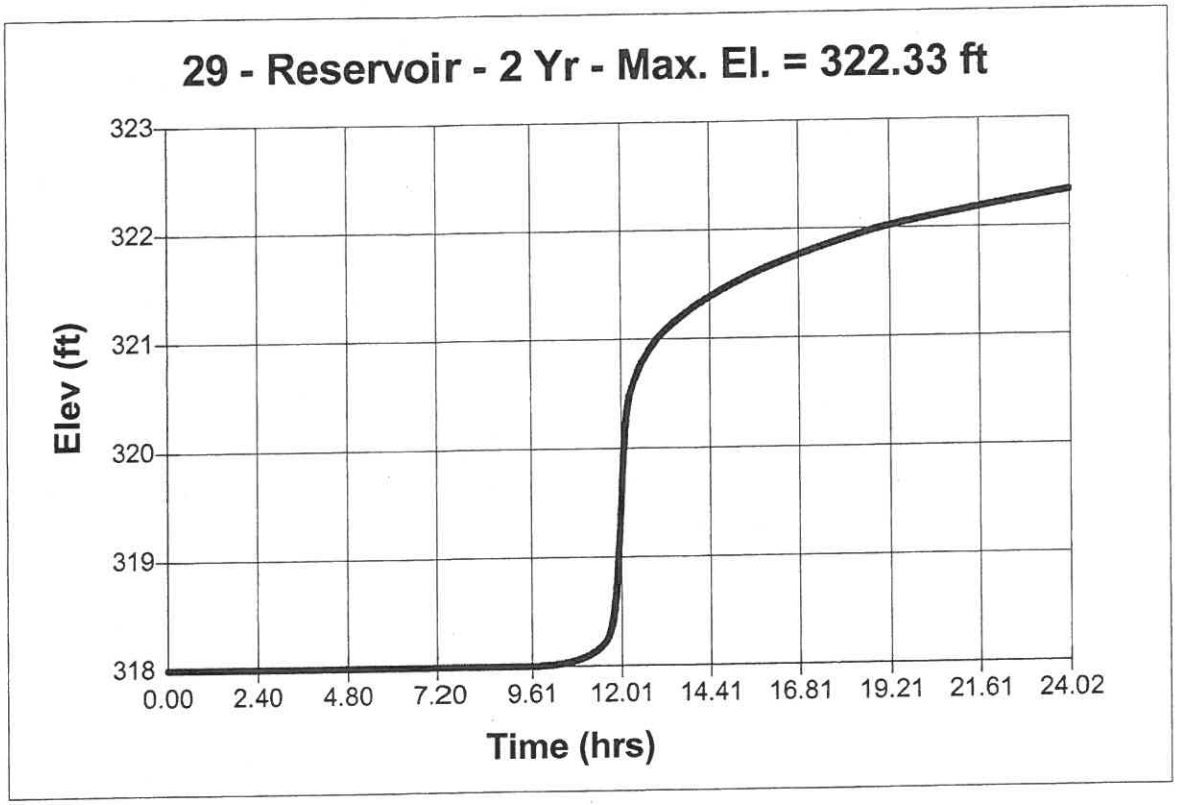
Hyd. No. 29

POND#3G TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 9	Reservoir name	= POND#3G
Max. Elevation	= 322.33 ft	Max. Storage	= 37,364 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

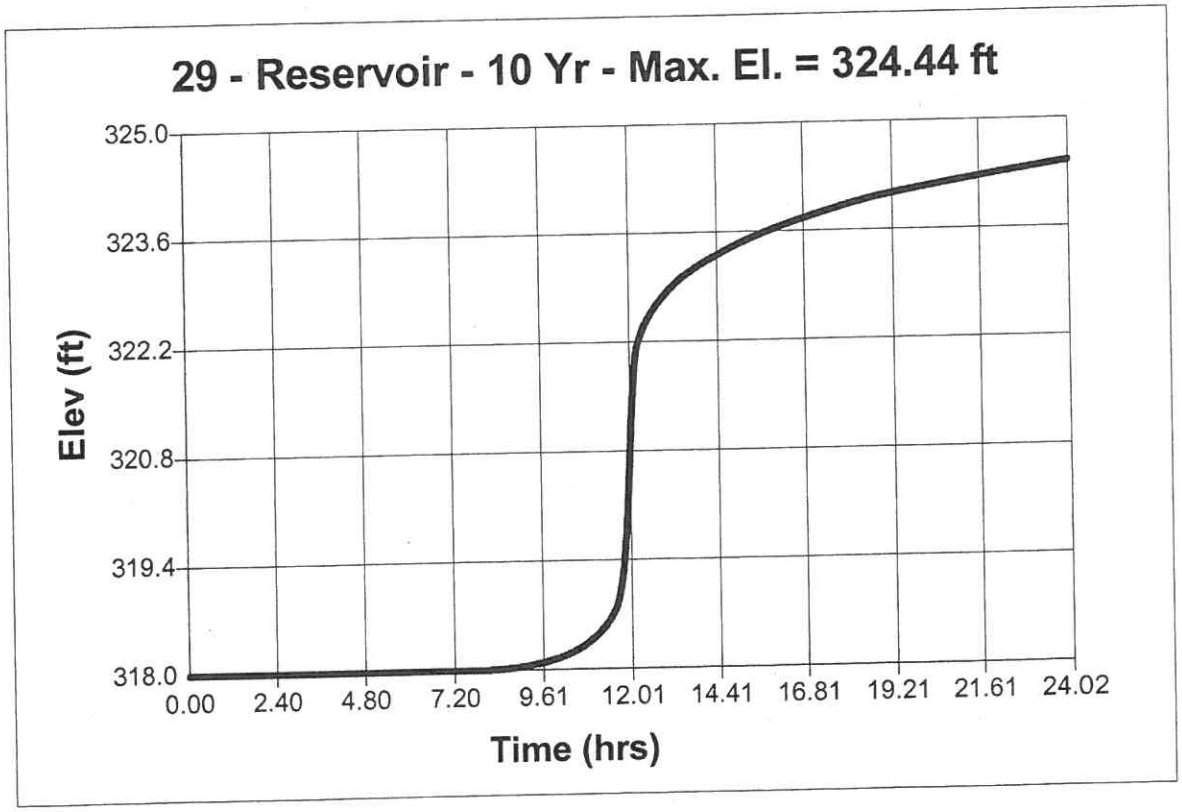
Hyd. No. 29

POND#3G TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 9	Reservoir name	= POND#3G
Max. Elevation	= 324.44 ft	Max. Storage	= 67,359 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

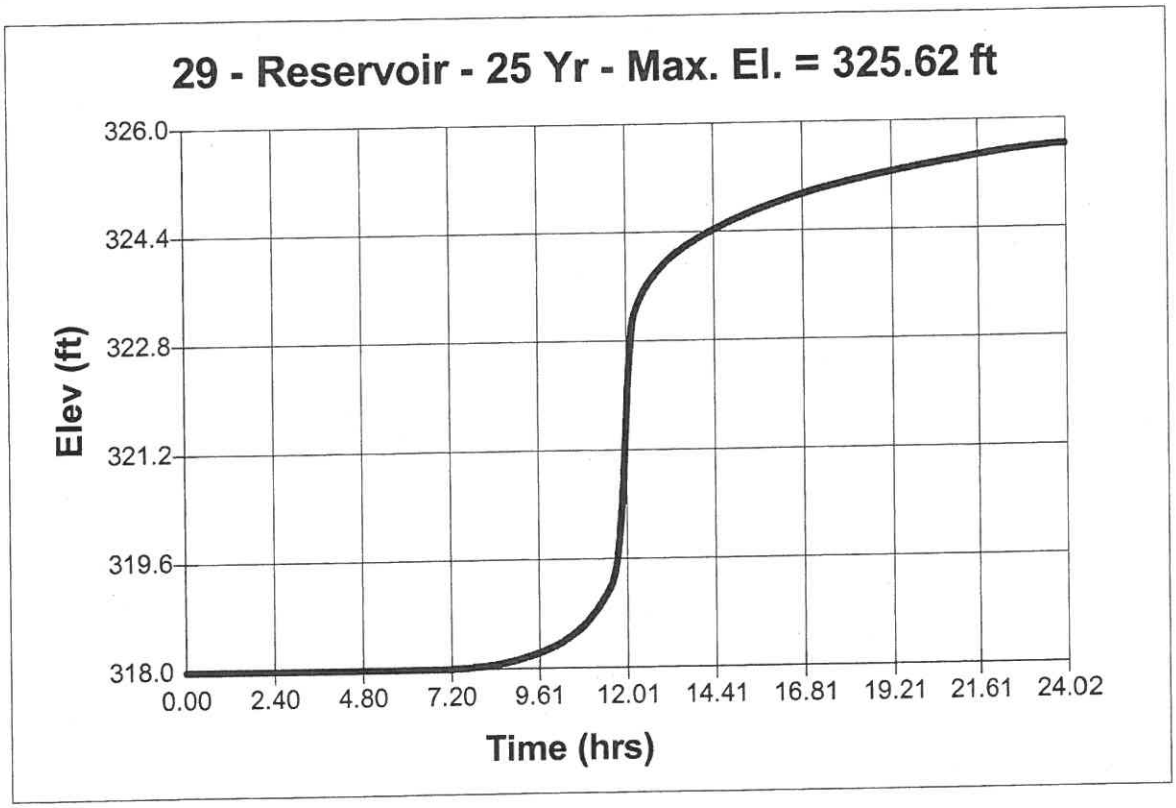
Hyd. No. 29

POND#3G TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.23 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 9	Reservoir name	= POND#3G
Max. Elevation	= 325.62 ft	Max. Storage	= 87,835 cuft

Storage Indication method used.

Hydrograph Volume = 913 cuft



Hydrograph Plot

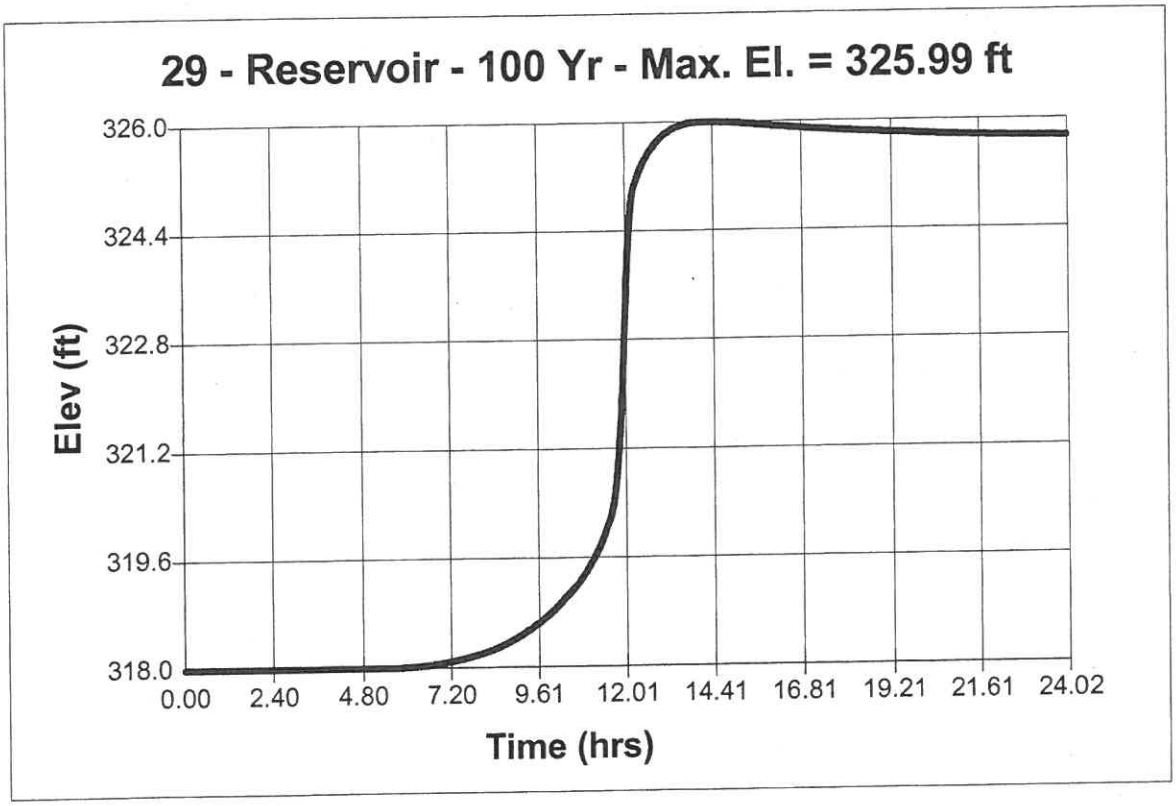
Hyd. No. 29

POND#3G TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 1.81 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 9	Reservoir name	= POND#3G
Max. Elevation	= 325.99 ft	Max. Storage	= 94,648 cuft

Storage Indication method used.

Hydrograph Volume = 43,510 cuft



POND REPORT & ELEVATIONS
POND#3H

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 7 - POND#3H

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	378.00	2,379	0	0
1.00	379.00	3,040	2,710	2,710
2.00	380.00	3,701	3,371	6,080
3.00	381.00	4,477	4,089	10,169
4.00	382.00	5,253	4,865	15,034
5.00	383.00	6,142	5,698	20,732
6.00	384.00	7,031	6,587	27,318

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 8.00	0.00	0.00	0.00
Crest El. ft	= 383.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	378.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	2,710	379.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	6,080	380.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	10,169	381.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	15,034	382.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	20,732	383.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	27,318	384.00	---	---	---	---	20.80	---	---	---	---	20.80

Hydrograph Plot

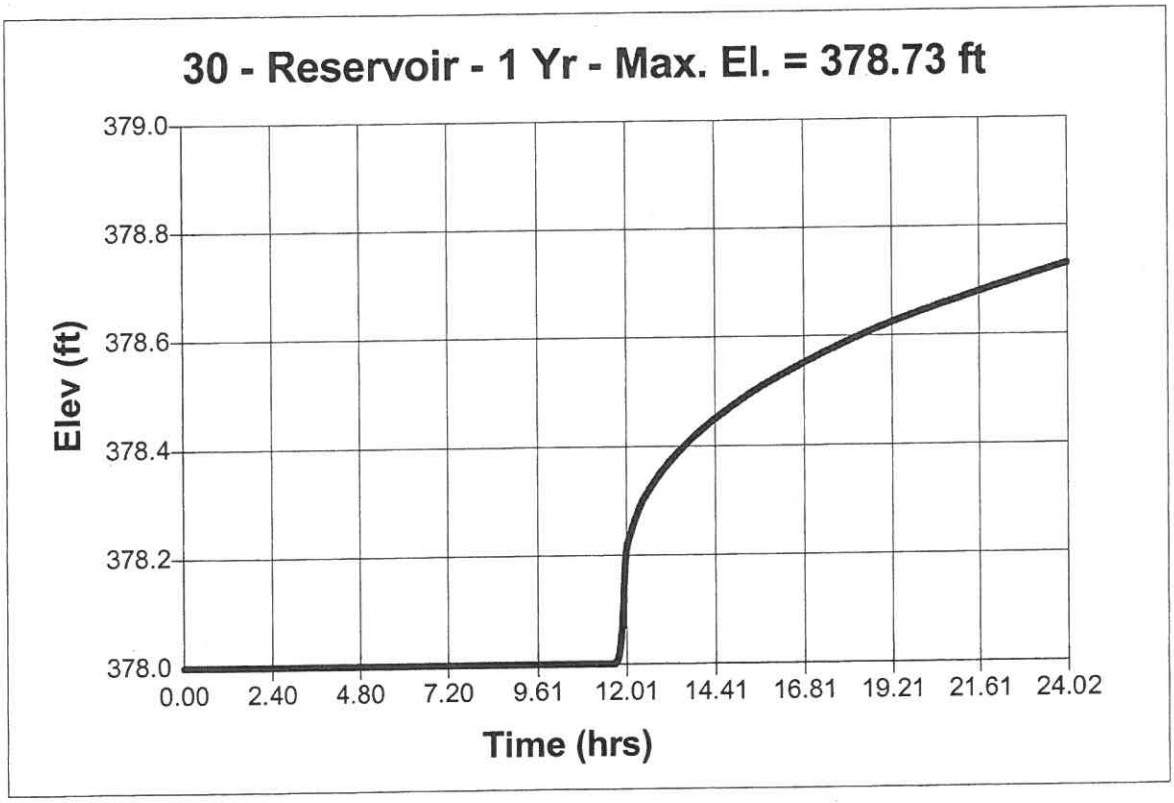
Hyd. No. 30

POND#3H TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 10	Reservoir name	= POND#3H
Max. Elevation	= 378.73 ft	Max. Storage	= 1,976 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

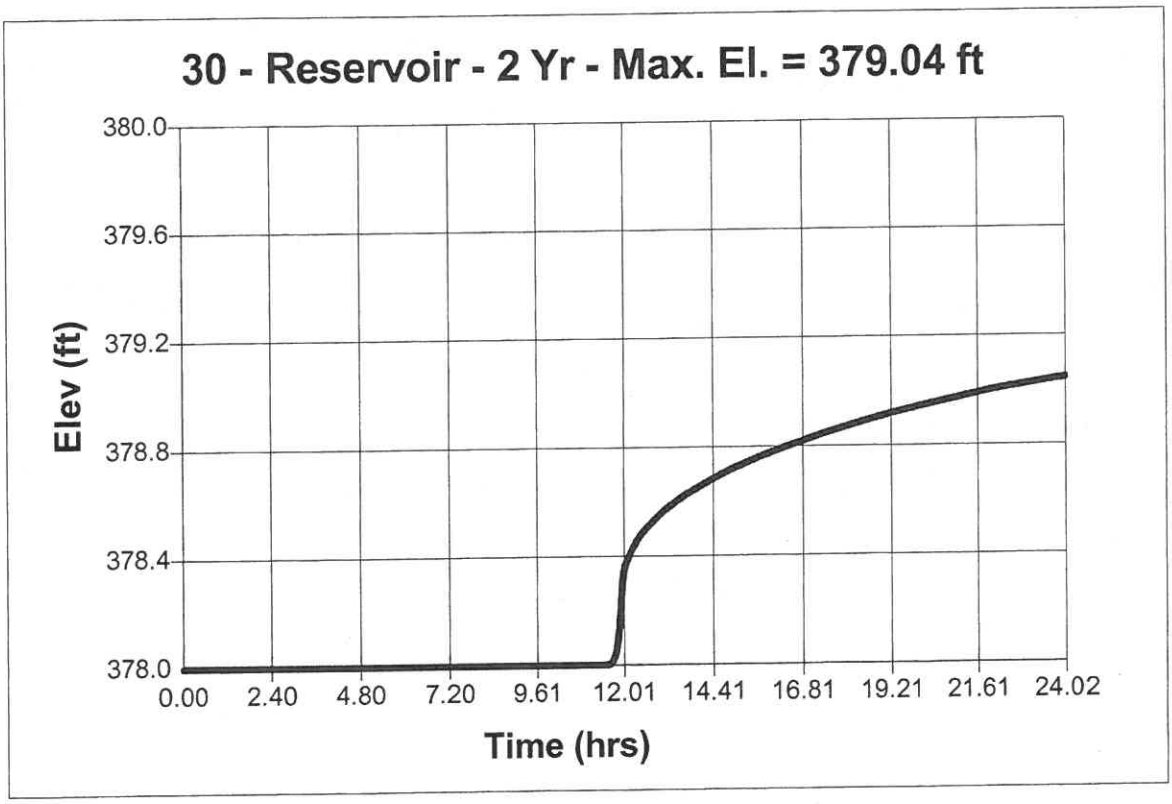
Hyd. No. 30

POND#3H TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 10	Reservoir name	= POND#3H
Max. Elevation	= 379.04 ft	Max. Storage	= 2,857 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

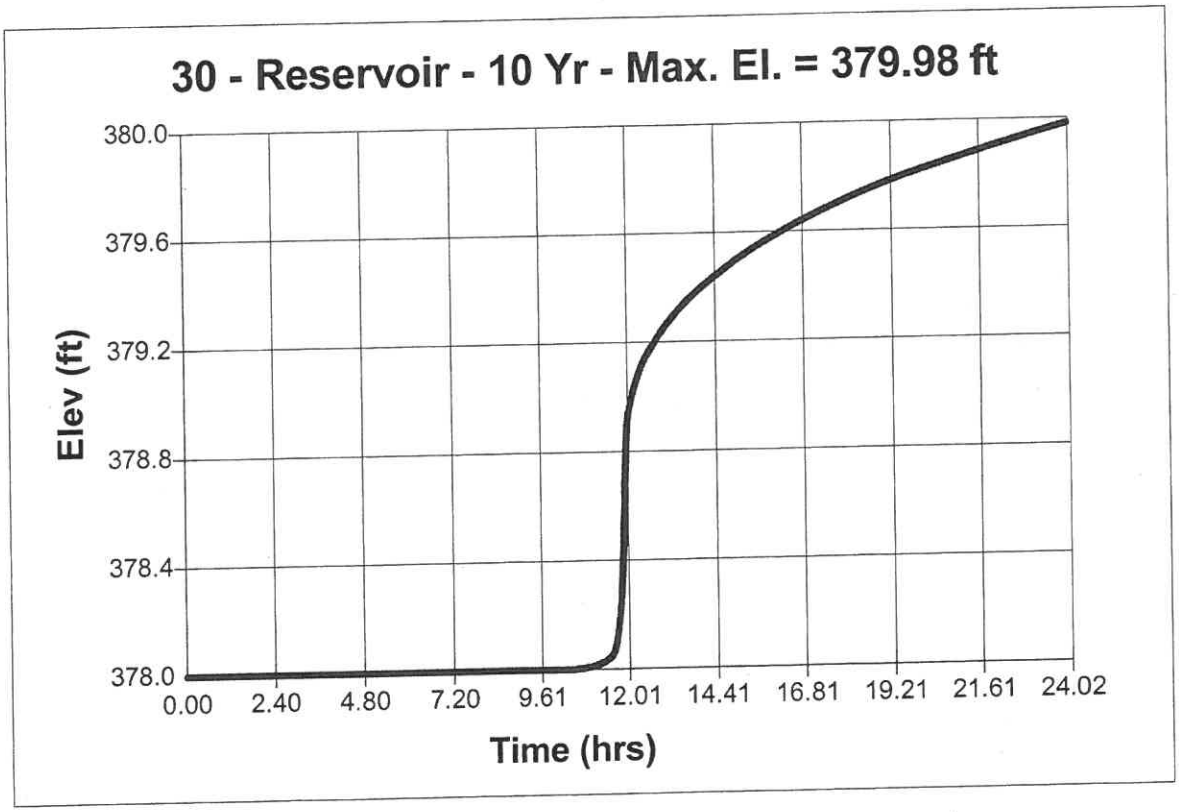
Hyd. No. 30

POND#3H TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 10	Reservoir name	= POND#3H
Max. Elevation	= 379.98 ft	Max. Storage	= 6,010 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

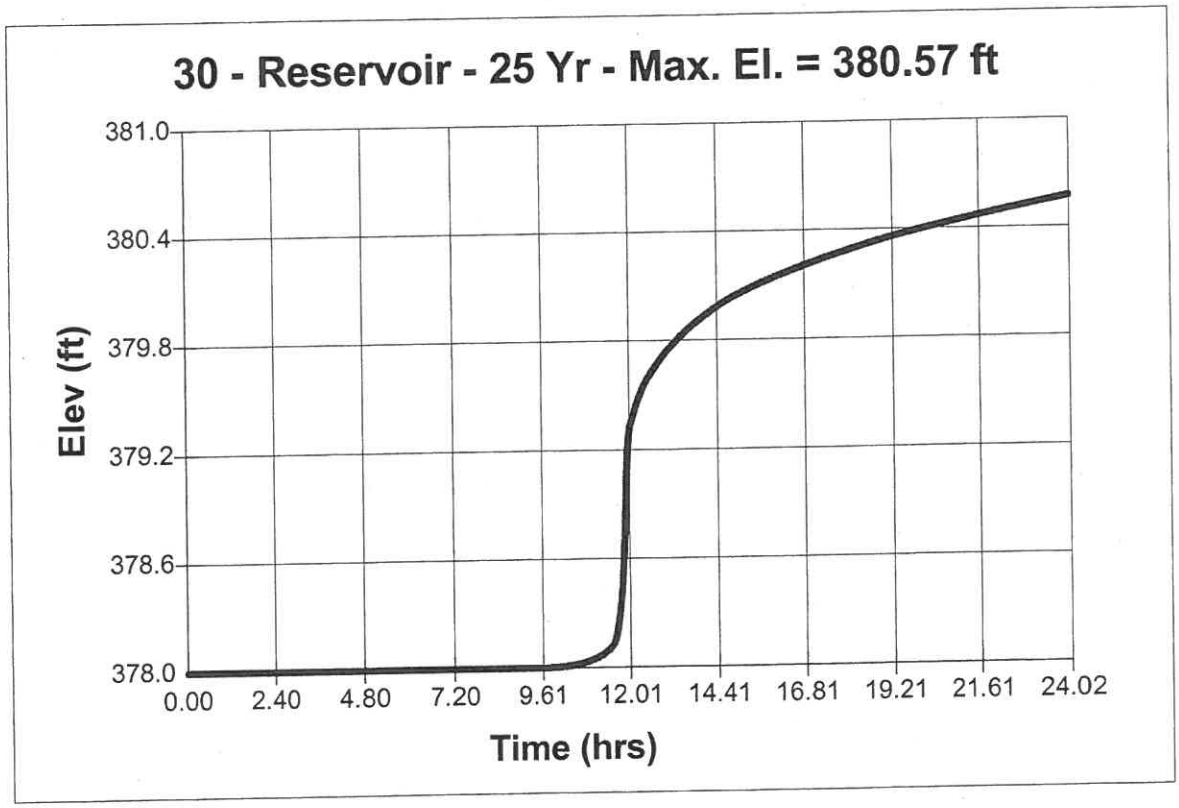
Hyd. No. 30

POND#3H TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 10	Reservoir name	= POND#3H
Max. Elevation	= 380.57 ft	Max. Storage	= 8,407 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

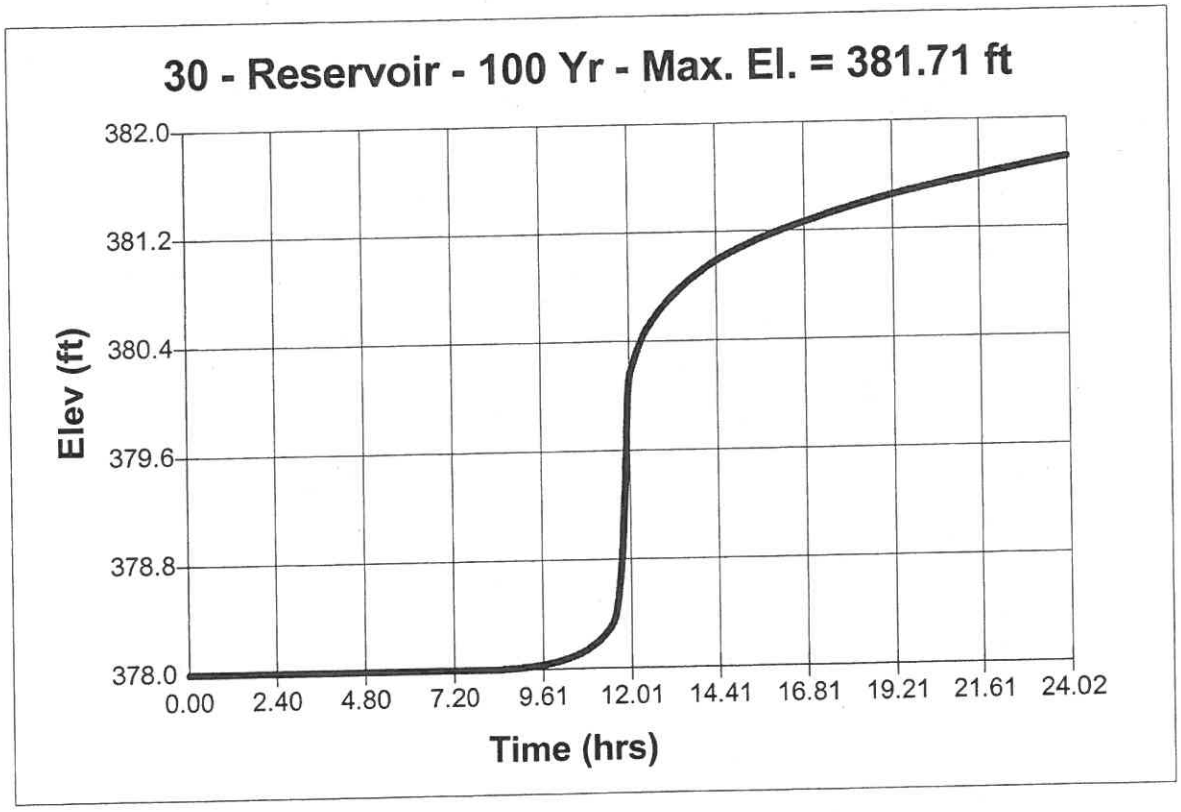
Hyd. No. 30

POND#3H TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 10	Reservoir name	= POND#3H
Max. Elevation	= 381.71 ft	Max. Storage	= 13,641 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



POND REPORT & ELEVATIONS
POND#3I

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 8 - POND#3I

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	402.00	7,925	0	0
1.00	403.00	9,114	8,520	8,520
2.00	404.00	10,303	9,709	18,228
3.00	405.00	11,605	10,954	29,182
4.00	406.00	12,907	12,256	41,438

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 8.00	0.00	0.00	0.00
Crest El. ft	= 405.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	402.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	8,520	403.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	18,228	404.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	29,182	405.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	41,438	406.00	---	---	---	---	20.80	---	---	---	---	20.80

Hydrograph Plot

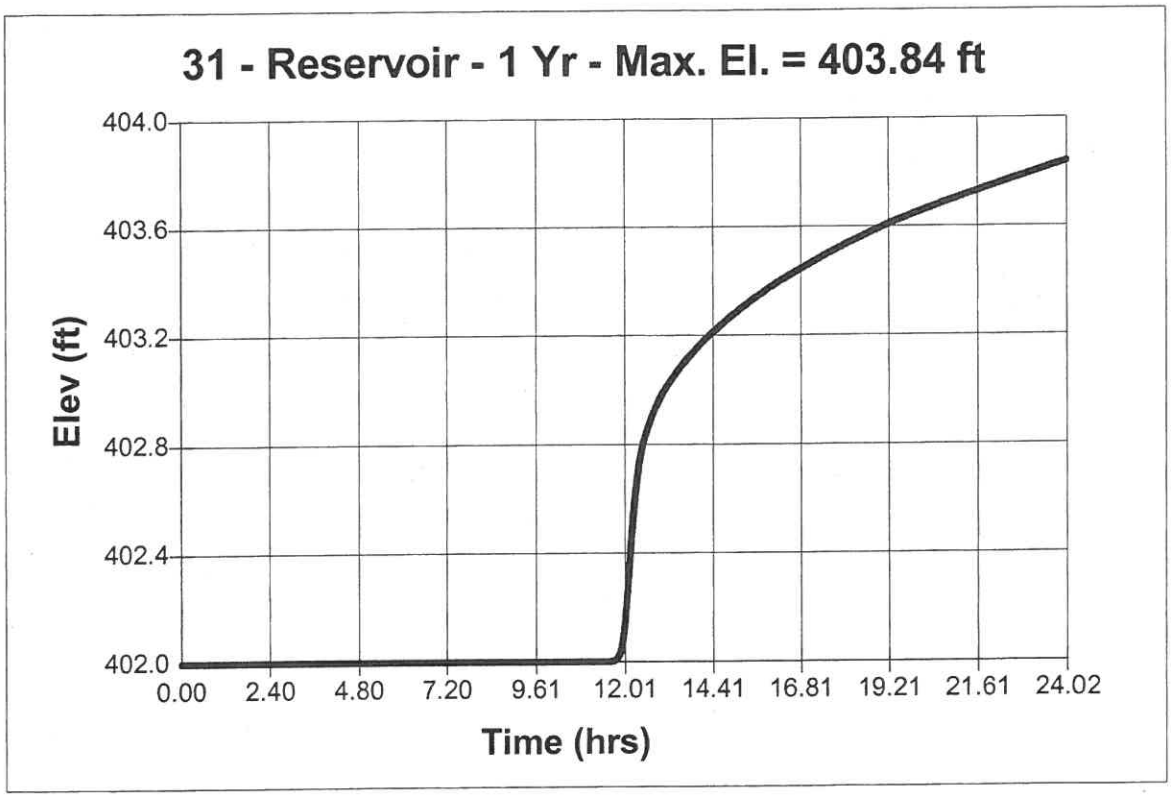
Hyd. No. 31

POND#3I TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 11	Reservoir name	= POND#3I
Max. Elevation	= 403.84 ft	Max. Storage	= 16,644 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

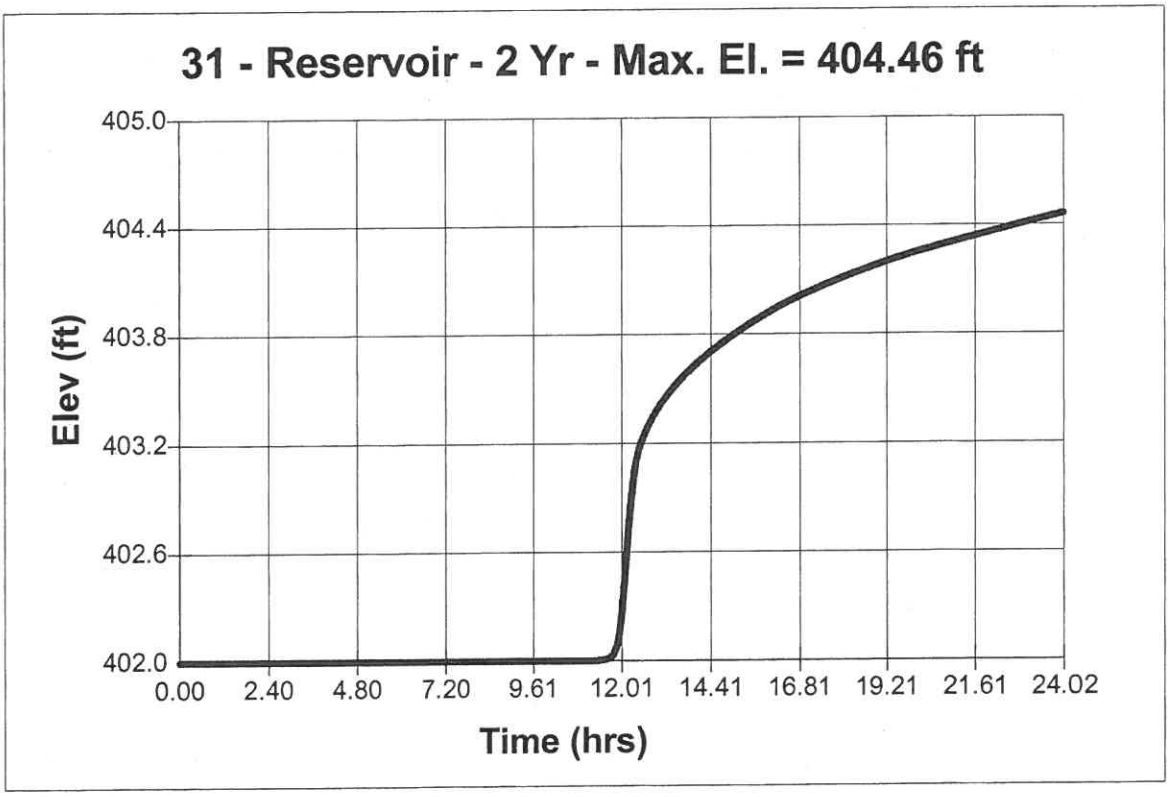
Hyd. No. 31

POND#3I TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 11	Reservoir name	= POND#3I
Max. Elevation	= 404.46 ft	Max. Storage	= 23,276 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

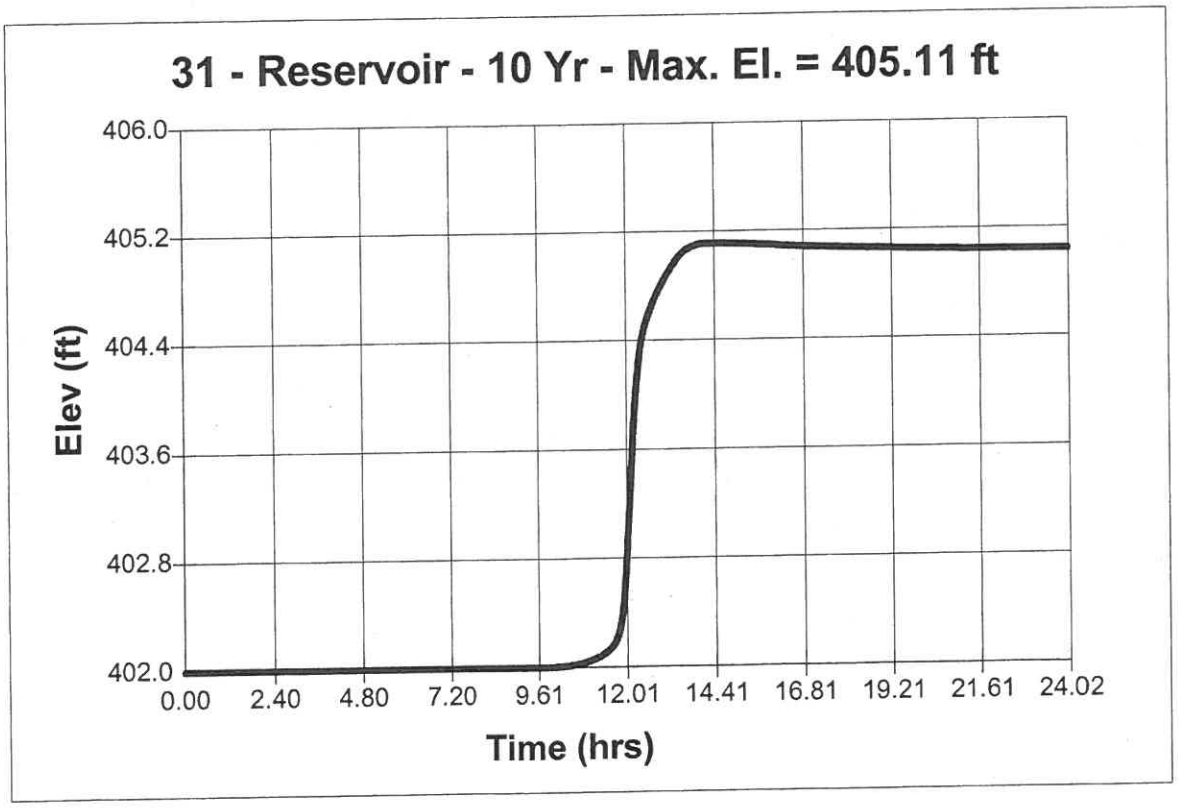
Hyd. No. 31

POND#3I TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.78 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 11	Reservoir name	= POND#3I
Max. Elevation	= 405.11 ft	Max. Storage	= 30,535 cuft

Storage Indication method used.

Hydrograph Volume = 16,633 cuft



Hydrograph Plot

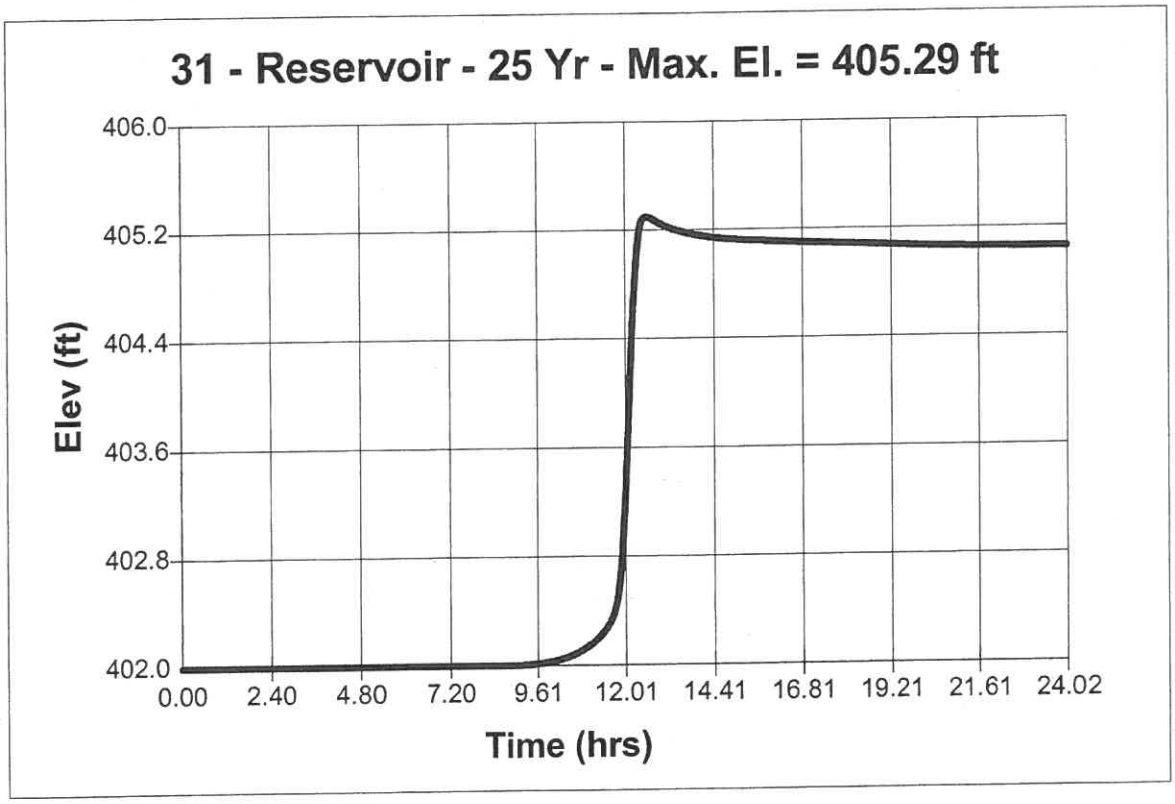
Hyd. No. 31

POND#3I TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 3.33 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 11	Reservoir name	= POND#3I
Max. Elevation	= 405.29 ft	Max. Storage	= 32,791 cuft

Storage Indication method used.

Hydrograph Volume = 33,596 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

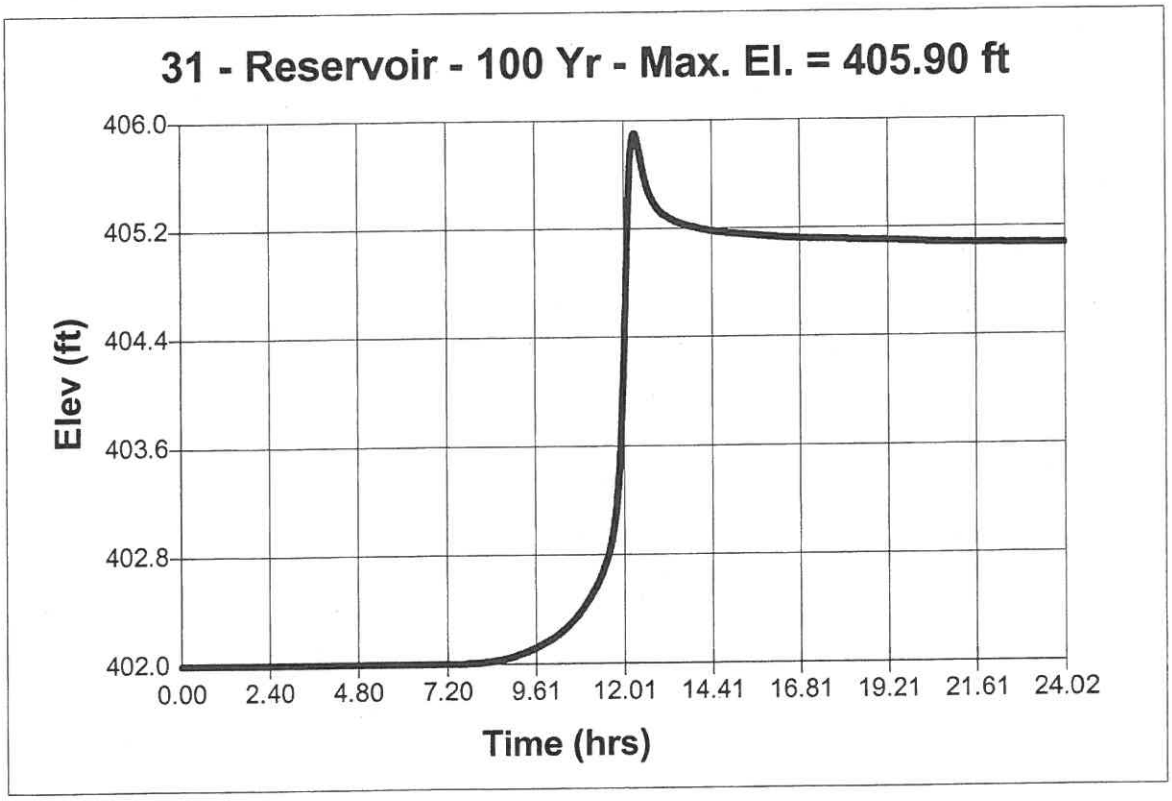
Hyd. No. 31

POND#3I TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 17.74 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 11	Reservoir name	= POND#3I
Max. Elevation	= 405.90 ft	Max. Storage	= 40,202 cuft

Storage Indication method used.

Hydrograph Volume = 70,050 cuft



POND REPORT & ELEVATIONS
POND#3J

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 9 - POND#3J

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	374.00	20,778	0	0
1.00	375.00	22,549	21,664	21,664
2.00	376.00	24,320	23,435	45,098
3.00	377.00	26,212	25,266	70,364
4.00	378.00	28,104	27,158	97,522
5.00	379.00	30,110	29,107	126,629
6.00	380.00	32,116	31,113	157,742
7.00	381.00	34,236	33,176	190,918
8.00	382.00	36,335	35,286	226,204

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 3.00	0.00	0.00	0.00
Crest El. ft	= 381.30	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	374.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	21,664	375.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	45,098	376.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	70,364	377.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	97,522	378.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	126,629	379.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	157,742	380.00	---	---	---	---	0.00	---	---	---	---	0.00
7.00	190,918	381.00	---	---	---	---	0.00	---	---	---	---	0.00
8.00	226,204	382.00	---	---	---	---	4.57	---	---	---	---	4.57

Hydrograph Plot

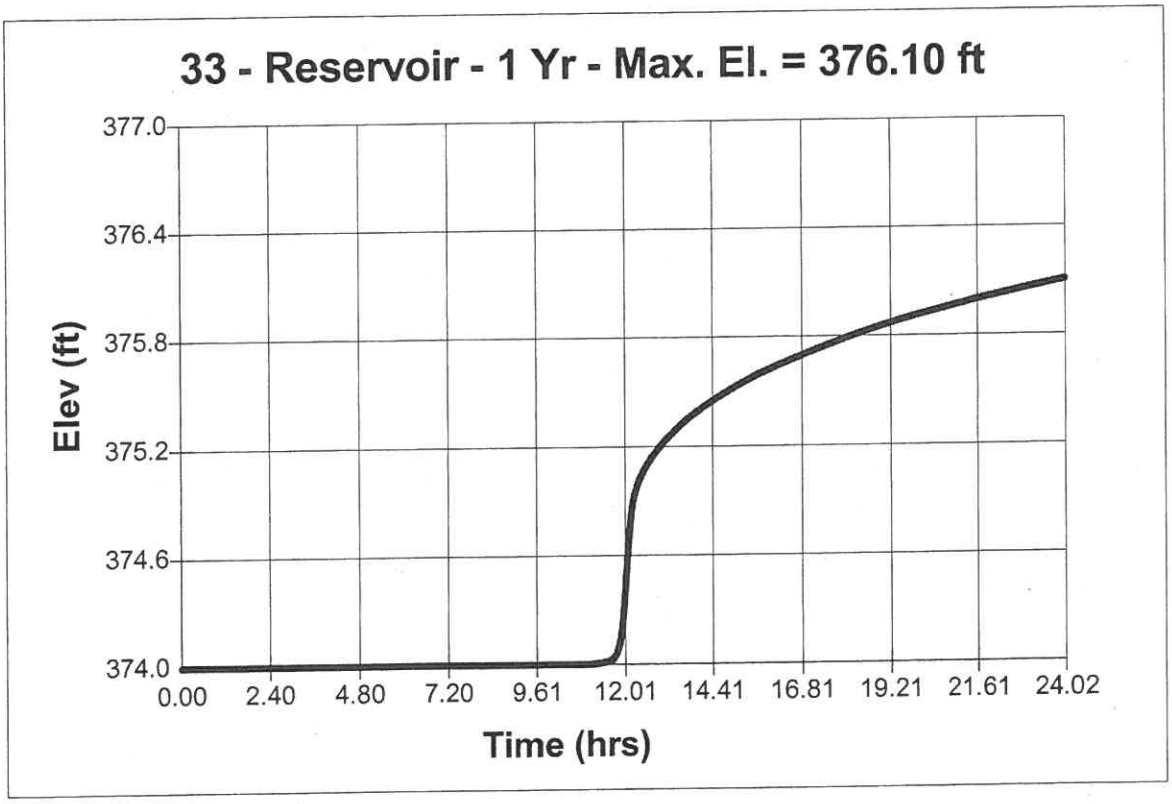
Hyd. No. 33

POND#3J TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 32	Reservoir name	= POND#3J
Max. Elevation	= 376.10 ft	Max. Storage	= 47,691 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

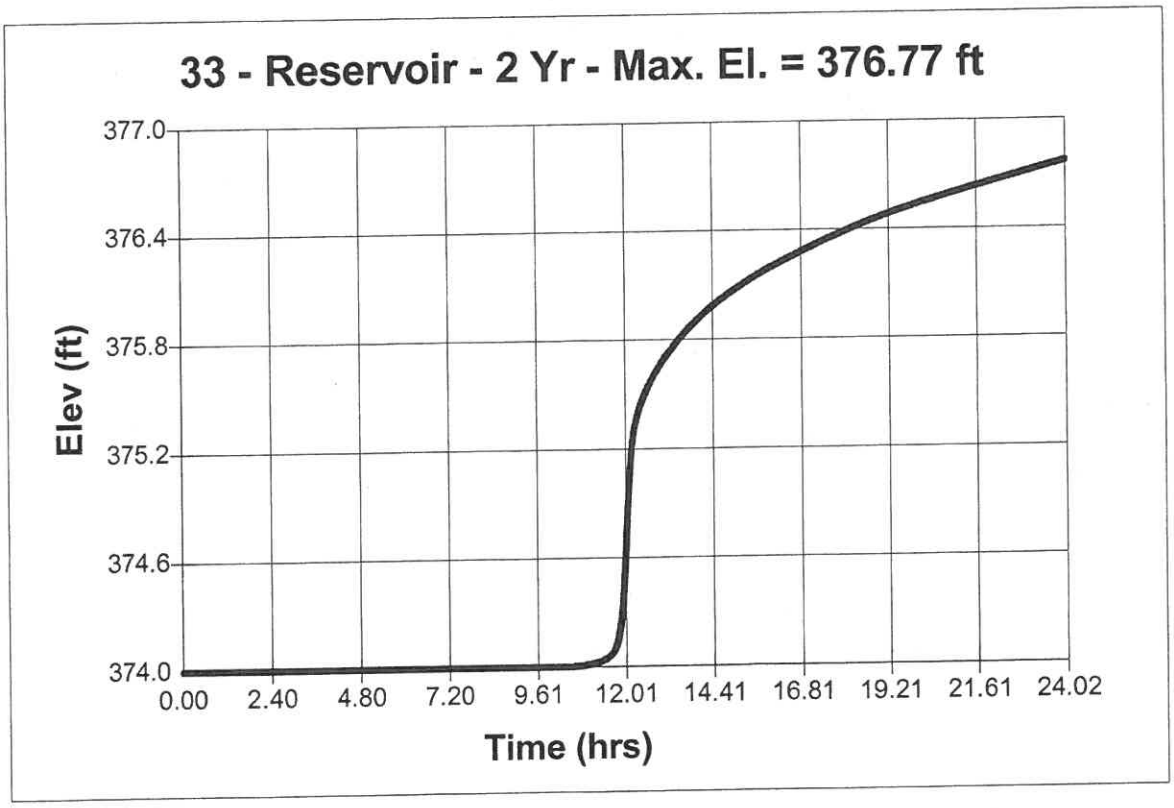
Hyd. No. 33

POND#3J TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 32	Reservoir name	= POND#3J
Max. Elevation	= 376.77 ft	Max. Storage	= 64,446 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

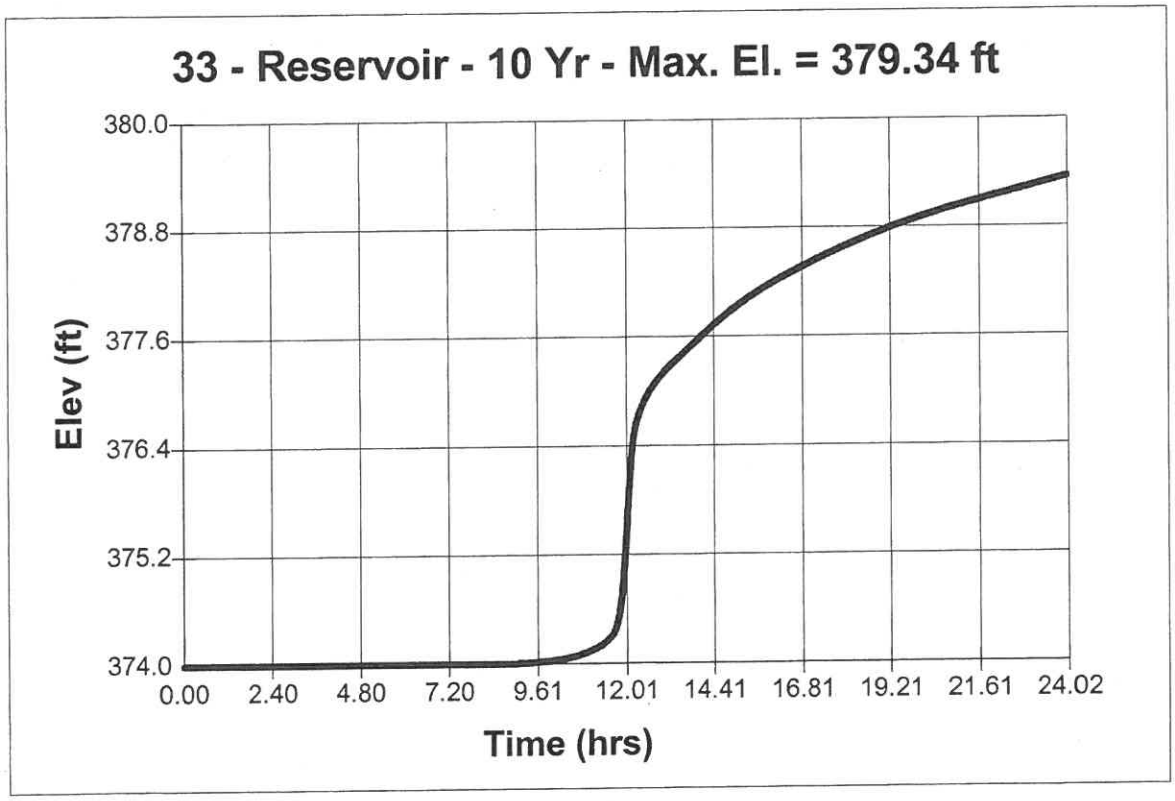
Hyd. No. 33

POND#3J TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 32	Reservoir name	= POND#3J
Max. Elevation	= 379.34 ft	Max. Storage	= 137,309 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

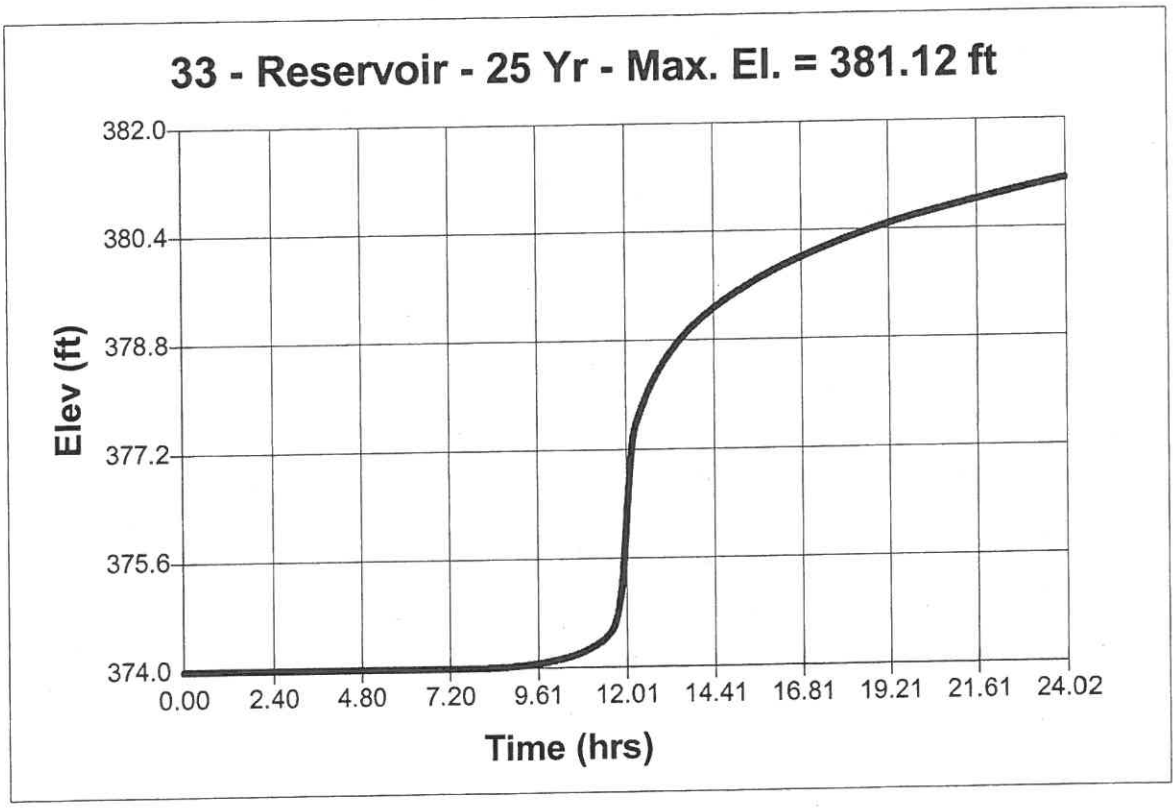
Hyd. No. 33

POND#3J TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 32	Reservoir name	= POND#3J
Max. Elevation	= 381.12 ft	Max. Storage	= 194,999 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

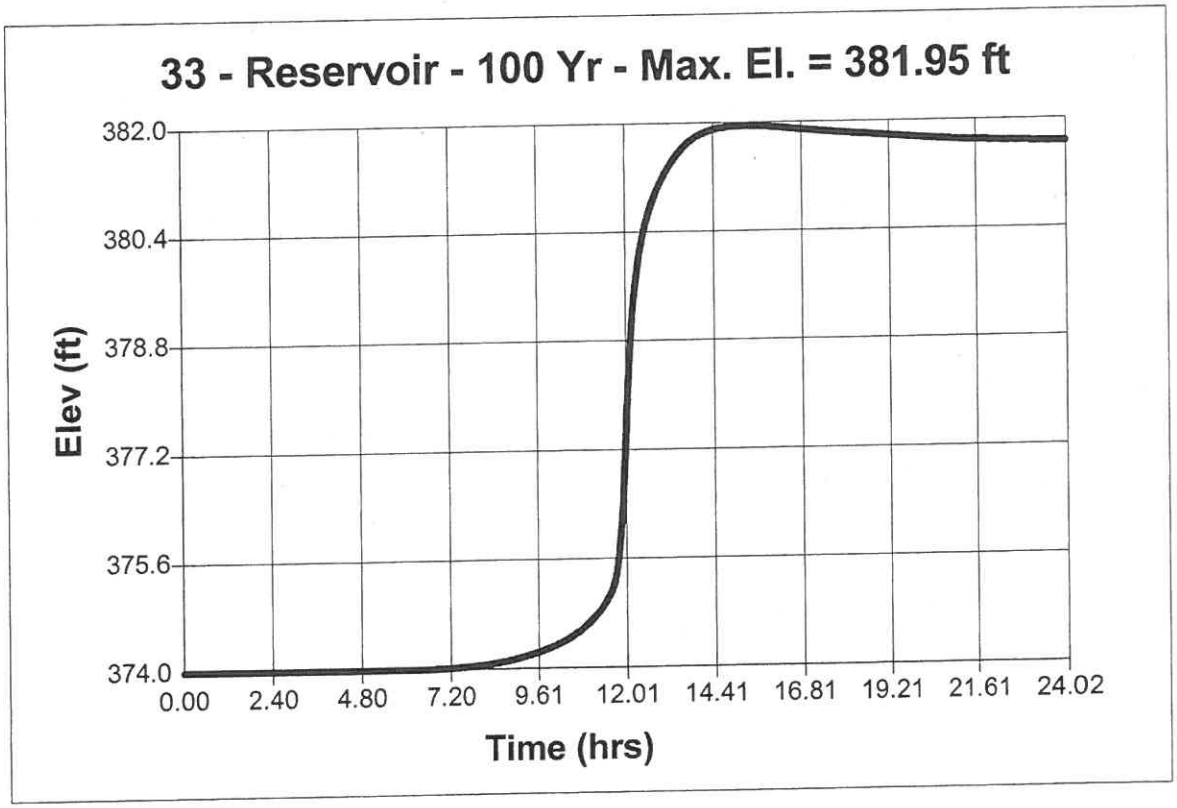
Hyd. No. 33

POND#3J TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 4.07 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 32	Reservoir name	= POND#3J
Max. Elevation	= 381.95 ft	Max. Storage	= 224,326 cuft

Storage Indication method used.

Hydrograph Volume = 103,308 cuft



POND REPORT & ELEVATIONS
POND#3K

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 10 - POND#3K

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	388.00	7,366	0	0
1.00	389.00	8,460	7,913	7,913
2.00	390.00	9,552	9,006	16,919
3.00	391.00	10,760	10,156	27,075
4.00	392.00	11,967	11,364	38,439
5.00	393.00	13,288	12,628	51,066
6.00	394.00	14,608	13,948	65,014
7.00	395.00	16,043	15,326	80,340
8.00	396.00	17,477	16,760	97,100

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 4.00	0.00	0.00	0.00
Crest El. ft	= 395.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	388.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	7,913	389.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	16,919	390.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	27,075	391.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	38,439	392.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	51,066	393.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	65,014	394.00	---	---	---	---	0.00	---	---	---	---	0.00
7.00	80,340	395.00	---	---	---	---	0.00	---	---	---	---	0.00
8.00	97,100	396.00	---	---	---	---	3.68	---	---	---	---	3.68

Hydrograph Plot

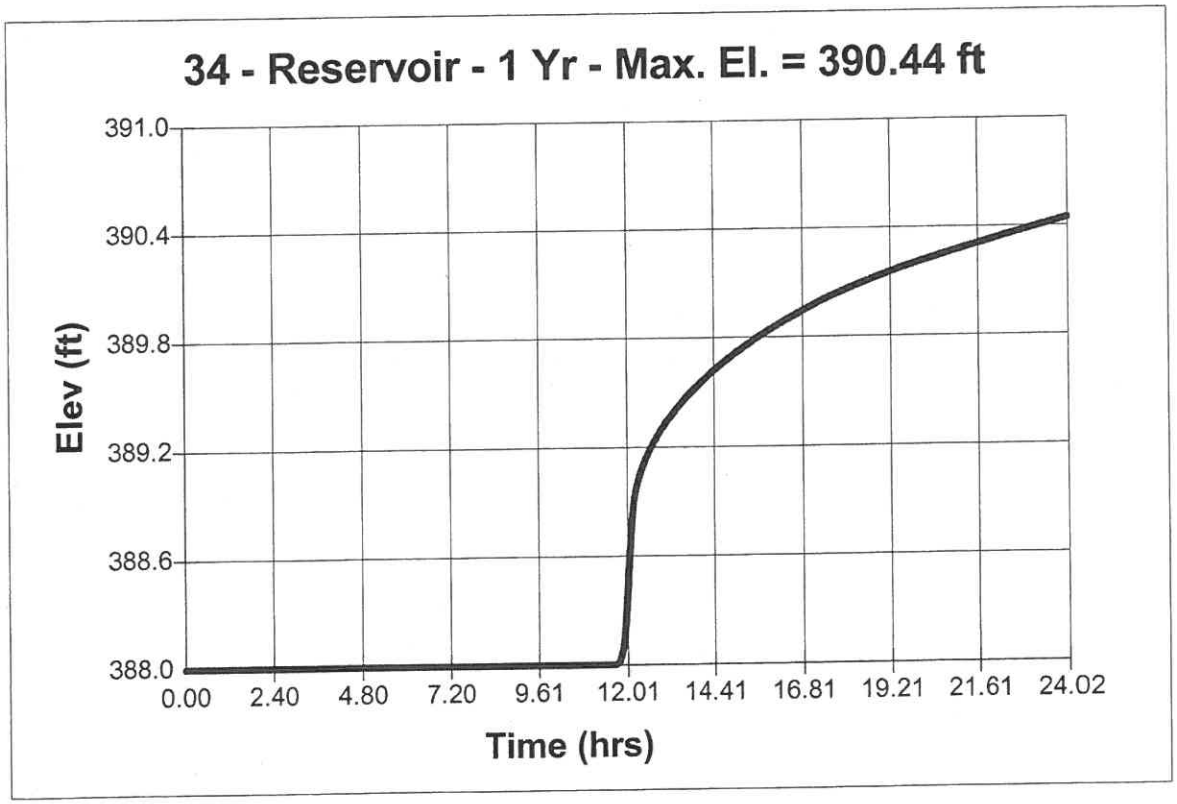
Hyd. No. 34

POND#3K TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 13	Reservoir name	= POND#3K
Max. Elevation	= 390.44 ft	Max. Storage	= 21,419 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

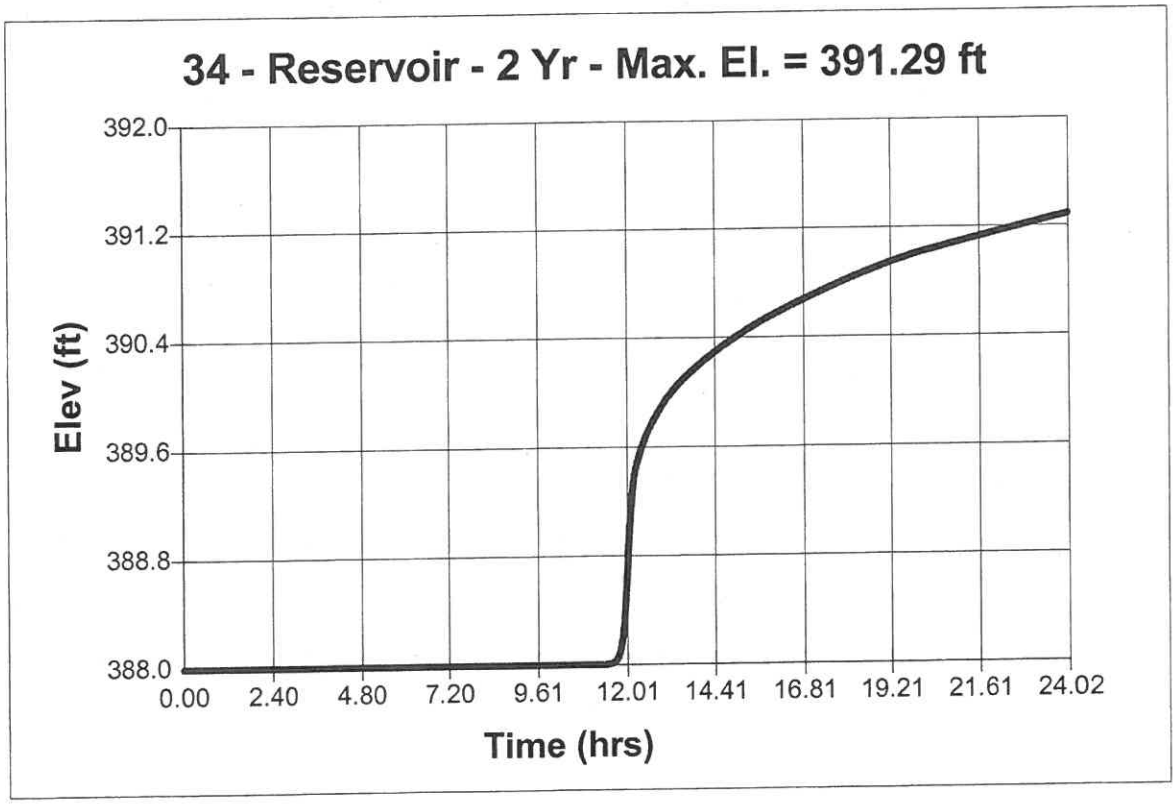
Hyd. No. 34

POND#3K TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 13	Reservoir name	= POND#3K
Max. Elevation	= 391.29 ft	Max. Storage	= 30,323 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

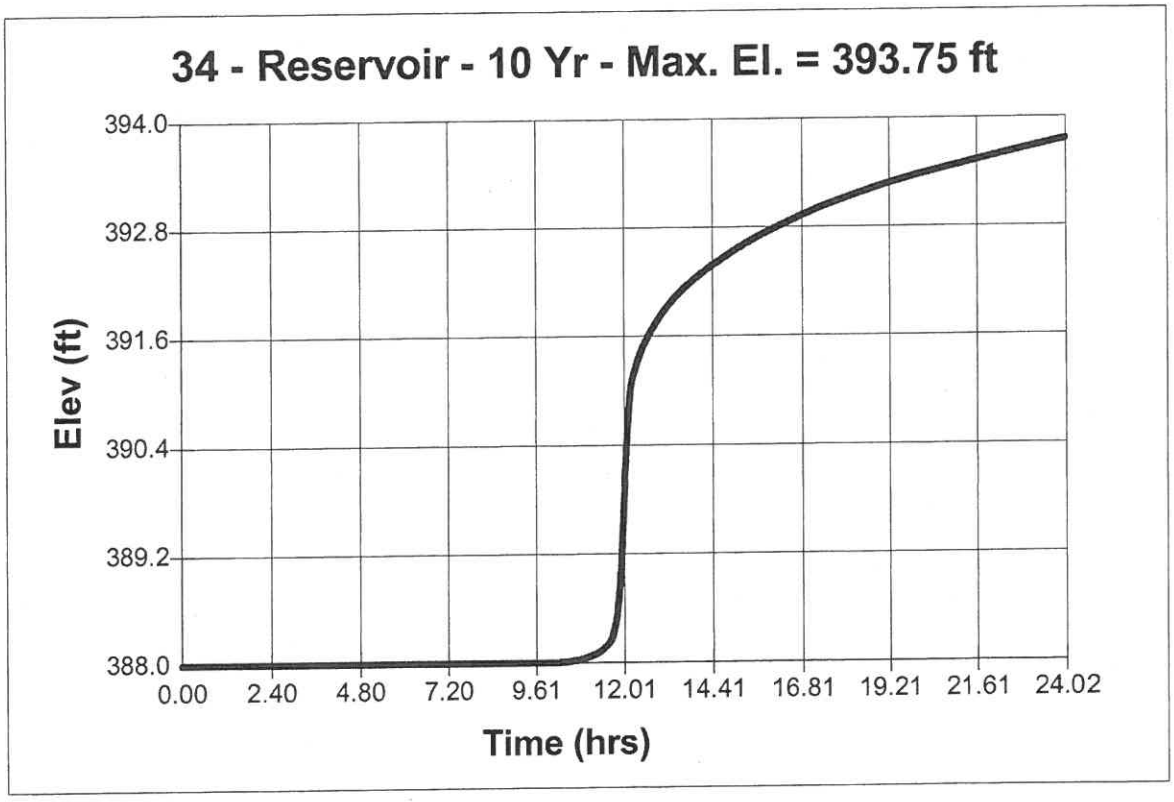
Hyd. No. 34

POND#3K TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 13	Reservoir name	= POND#3K
Max. Elevation	= 393.75 ft	Max. Storage	= 61,571 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

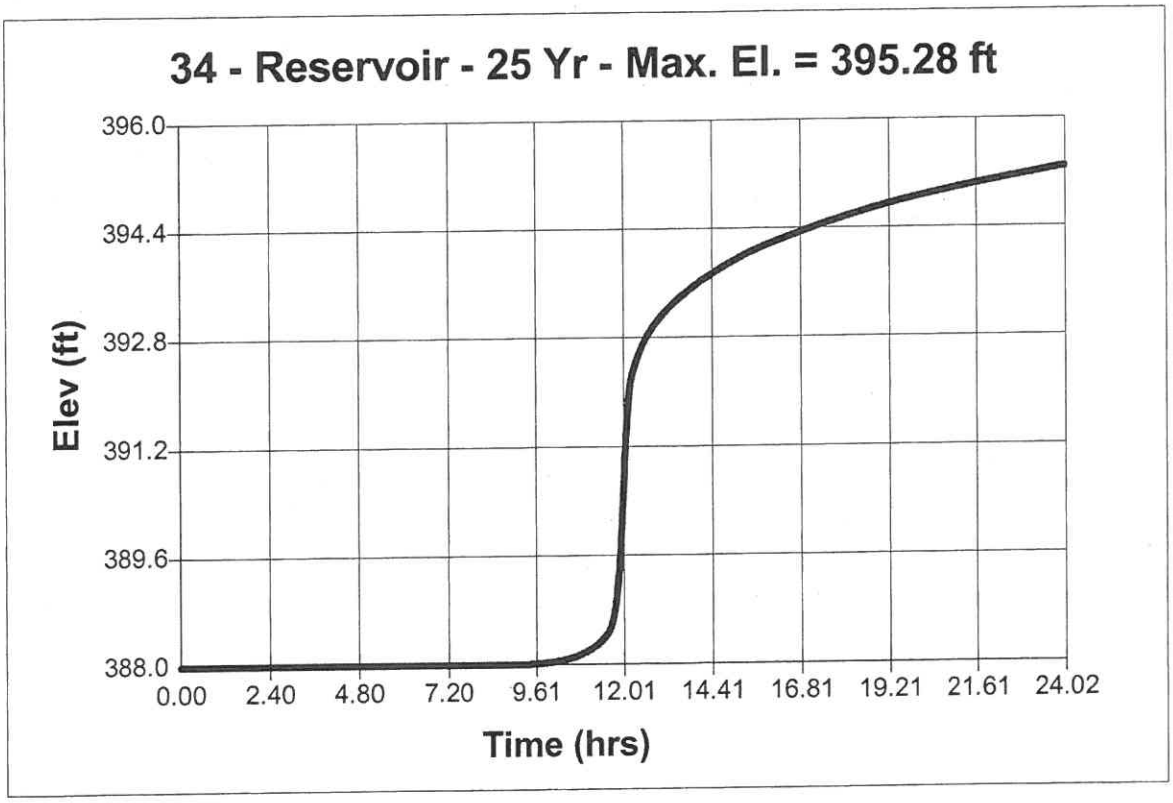
Hyd. No. 34

POND#3K TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 13	Reservoir name	= POND#3K
Max. Elevation	= 395.28 ft	Max. Storage	= 84,989 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

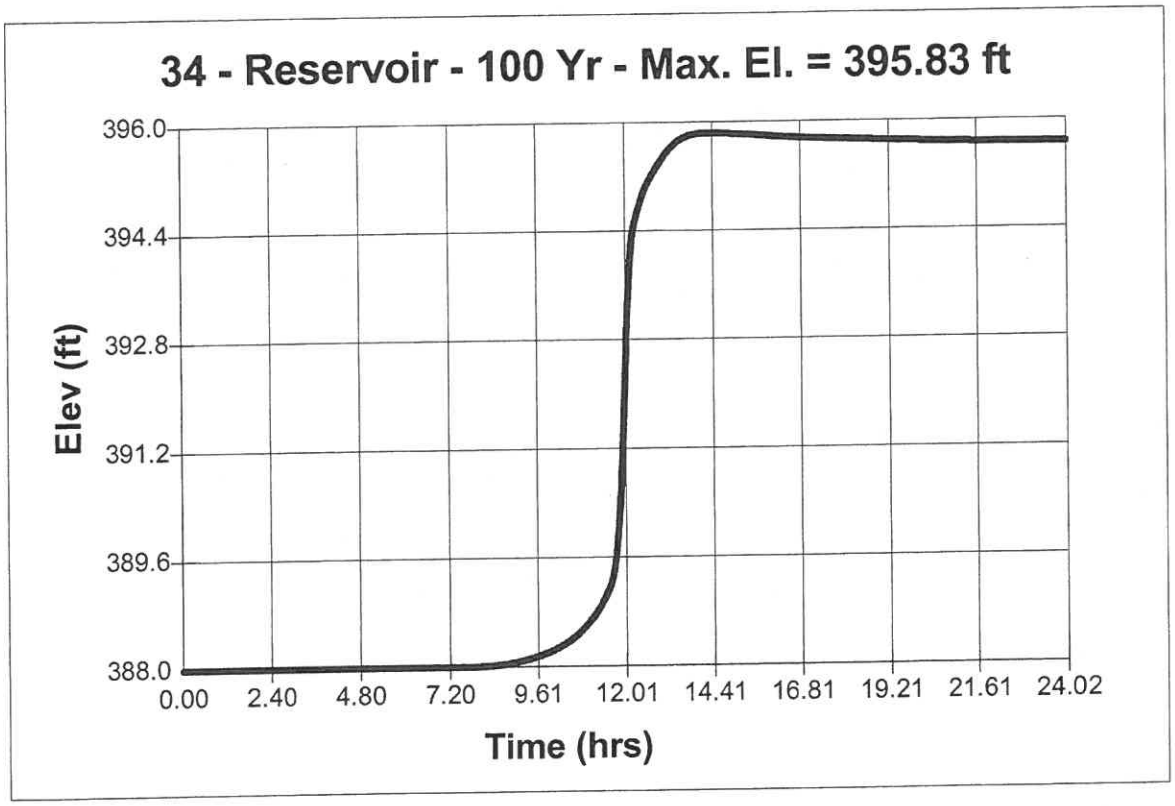
Hyd. No. 34

POND#3K TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 1.99 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 13	Reservoir name	= POND#3K
Max. Elevation	= 395.83 ft	Max. Storage	= 94,252 cuft

Storage Indication method used.

Hydrograph Volume = 44,296 cuft



POND REPORT & ELEVATIONS
POND#3L

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 12 - POND#3L

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	386.00	21,169	0	0
1.00	387.00	23,017	22,093	22,093
2.00	388.00	24,865	23,941	46,034
3.00	389.00	26,869	25,867	71,901
4.00	390.00	28,787	27,828	99,729
5.00	391.00	30,862	29,825	129,554
6.00	392.00	32,936	31,899	161,453

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 6.00	0.00	0.00	0.00
Crest El. ft	= 391.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	386.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	22,093	387.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	46,034	388.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	71,901	389.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	99,729	390.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	129,554	391.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	161,453	392.00	---	---	---	---	15.60	---	---	---	---	15.60

Hydrograph Plot

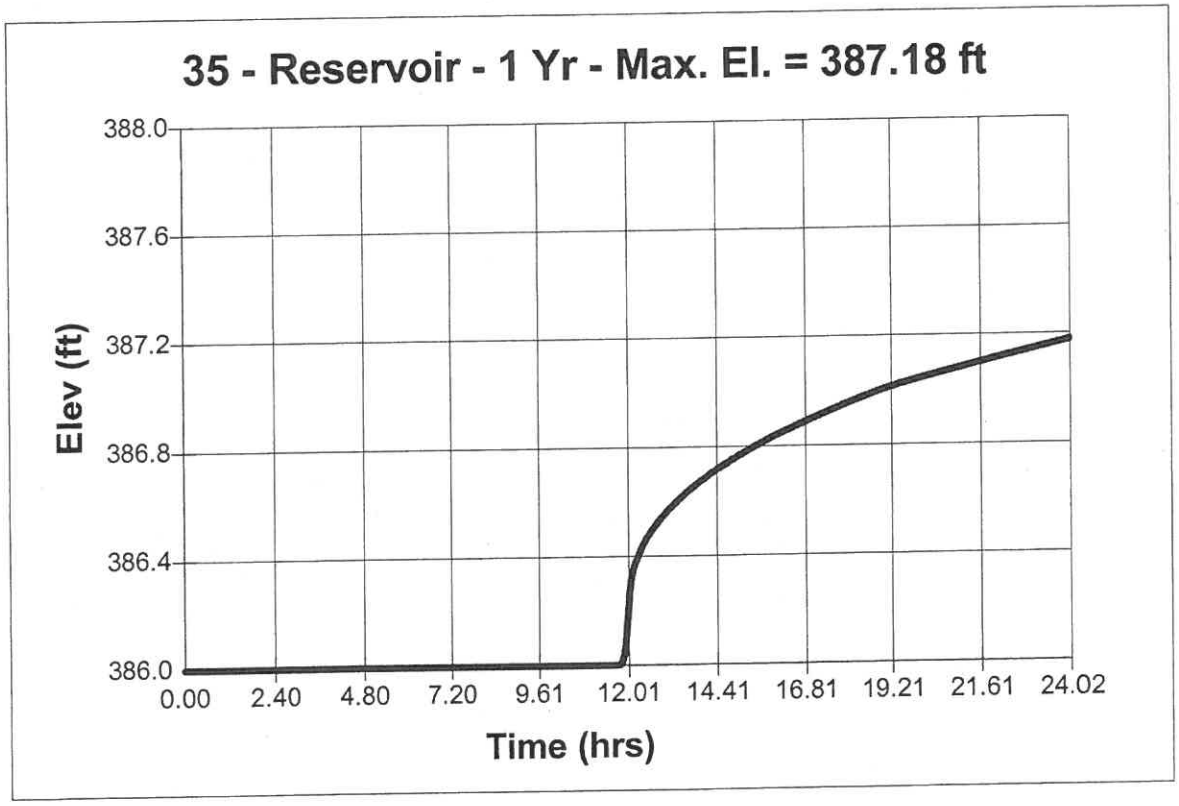
Hyd. No. 35

POND#3L TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 14	Reservoir name	= POND#3L
Max. Elevation	= 387.18 ft	Max. Storage	= 26,333 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

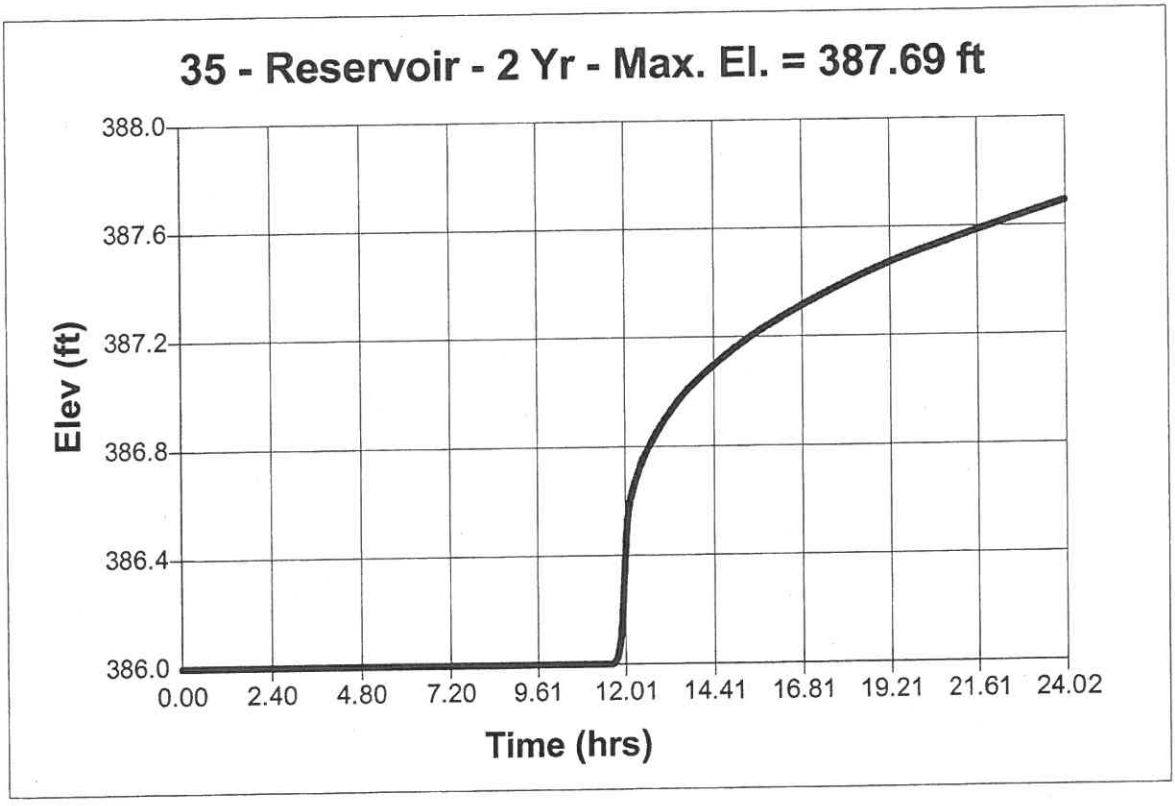
Hyd. No. 35

POND#3L TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 14	Reservoir name	= POND#3L
Max. Elevation	= 387.69 ft	Max. Storage	= 38,608 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

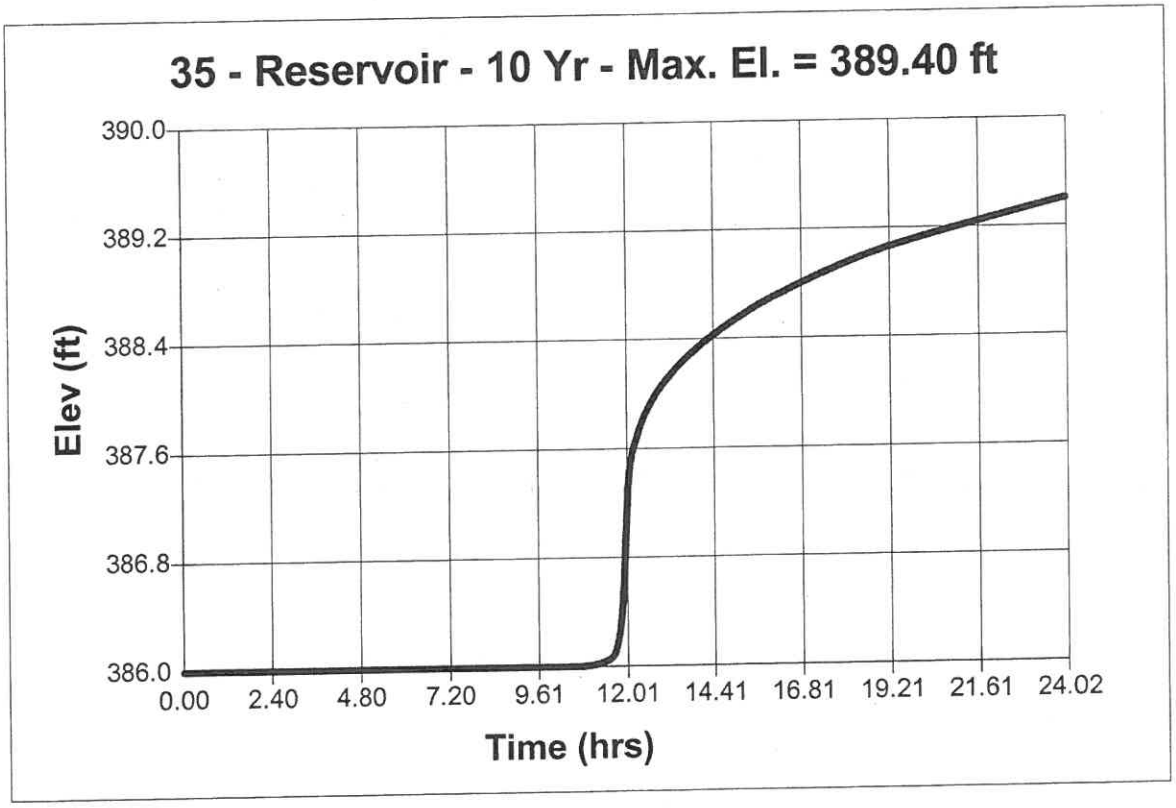
Hyd. No. 35

POND#3L TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 14	Reservoir name	= POND#3L
Max. Elevation	= 389.40 ft	Max. Storage	= 83,083 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

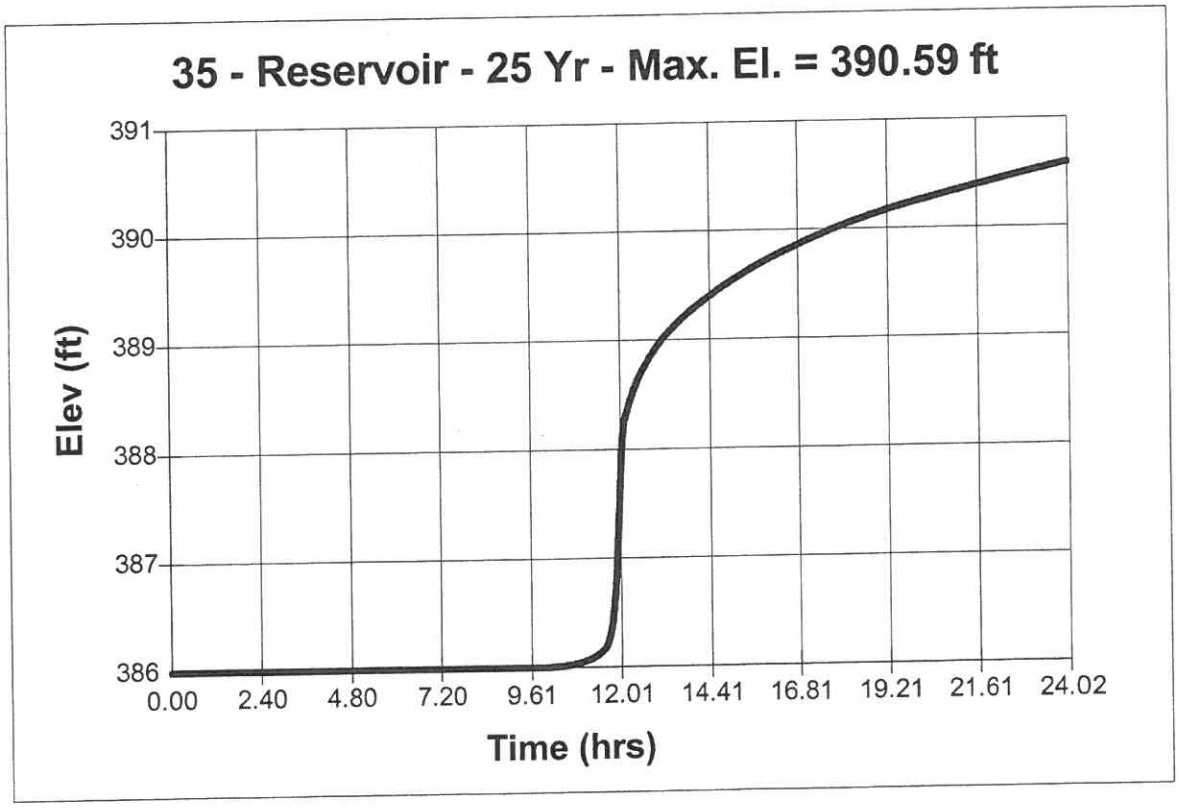
Hyd. No. 35

POND#3L TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 14	Reservoir name	= POND#3L
Max. Elevation	= 390.59 ft	Max. Storage	= 117,213 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

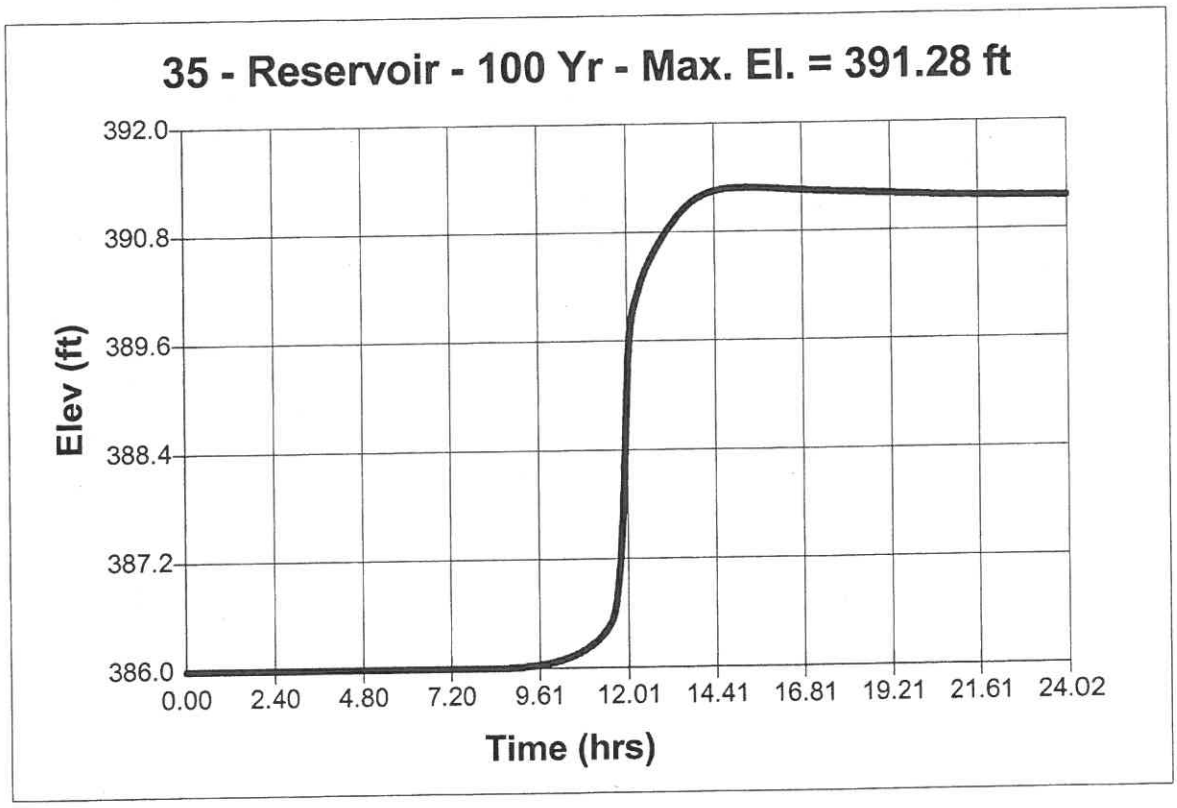
Hyd. No. 35

POND#3L TO DP#3

Hydrograph type	= Reservoir	Peak discharge	= 2.38 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 14	Reservoir name	= POND#3L
Max. Elevation	= 391.28 ft	Max. Storage	= 138,617 cuft

Storage Indication method used.

Hydrograph Volume = 57,726 cuft



POND REPORT & ELEVATIONS
POND#6B

Reservoir Report

Reservoir No. 13 - POND#6B

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	320.00	4,750	0	0
1.00	321.00	8,000	6,375	6,375
2.00	322.00	11,245	9,623	15,998
3.00	323.00	14,264	12,755	28,752
4.00	324.00	17,282	15,773	44,525
5.00	325.00	20,414	18,848	63,373
6.00	326.00	23,456	21,935	85,308

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 4.00	0.00	0.00	0.00
Crest El. ft	= 325.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	320.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	6,375	321.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	15,998	322.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	28,752	323.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	44,525	324.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	63,373	325.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	85,308	326.00	---	---	---	---	10.40	---	---	---	---	10.40

Hydrograph Plot

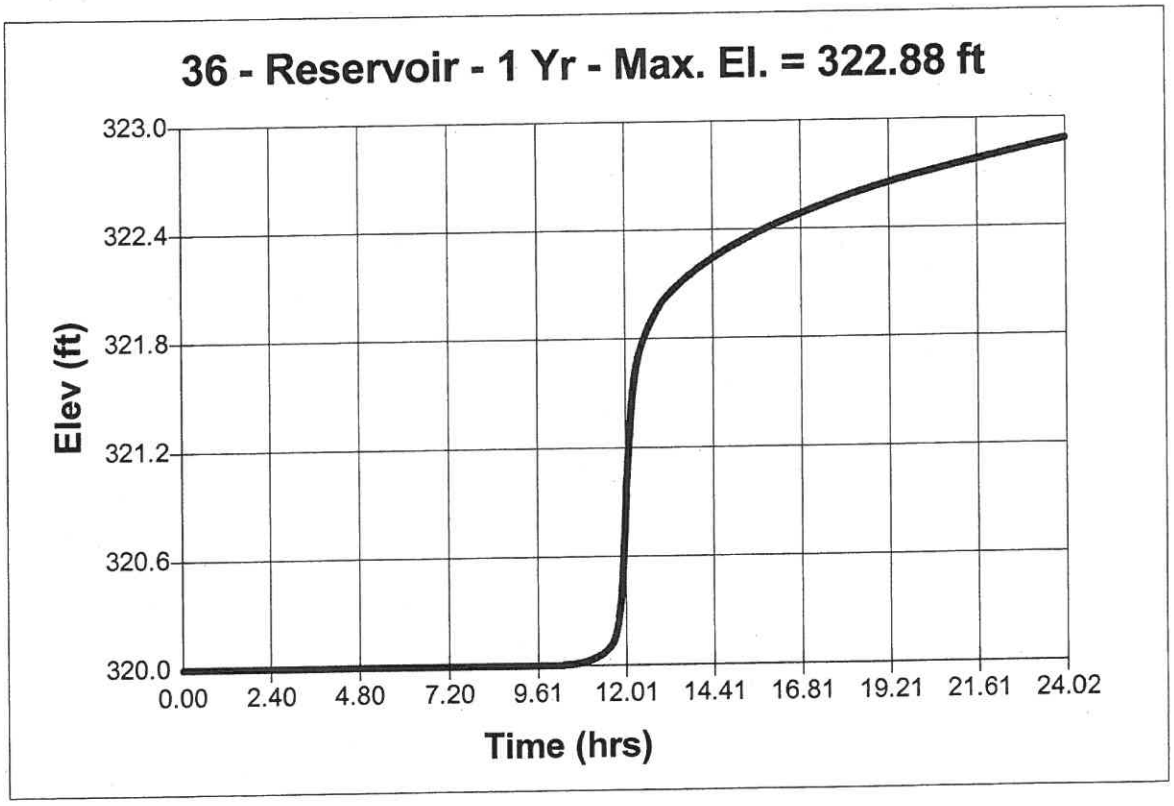
Hyd. No. 36

POND#6B TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 18	Reservoir name	= POND#6B
Max. Elevation	= 322.88 ft	Max. Storage	= 27,245 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

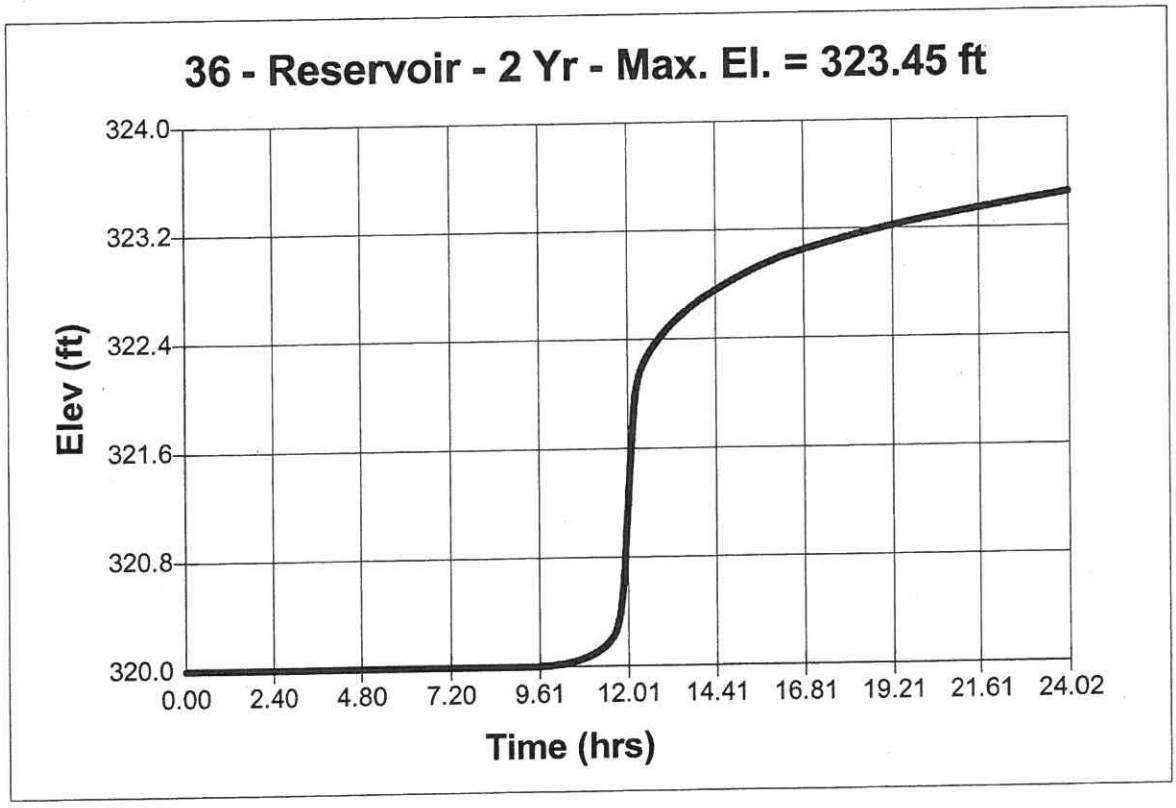
Hyd. No. 36

POND#6B TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 18	Reservoir name	= POND#6B
Max. Elevation	= 323.45 ft	Max. Storage	= 35,861 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

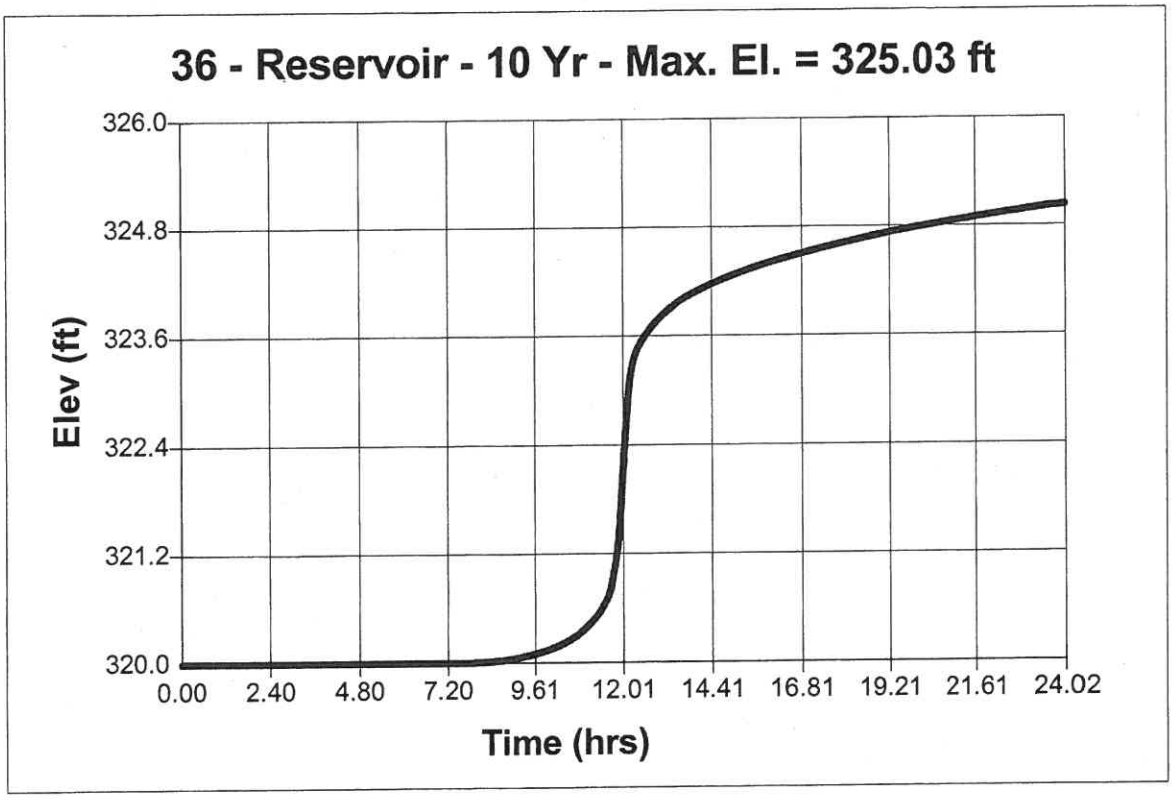
Hyd. No. 36

POND#6B TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.08 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 18	Reservoir name	= POND#6B
Max. Elevation	= 325.03 ft	Max. Storage	= 63,934 cuft

Storage Indication method used.

Hydrograph Volume = 101 cuft



Hydrograph Plot

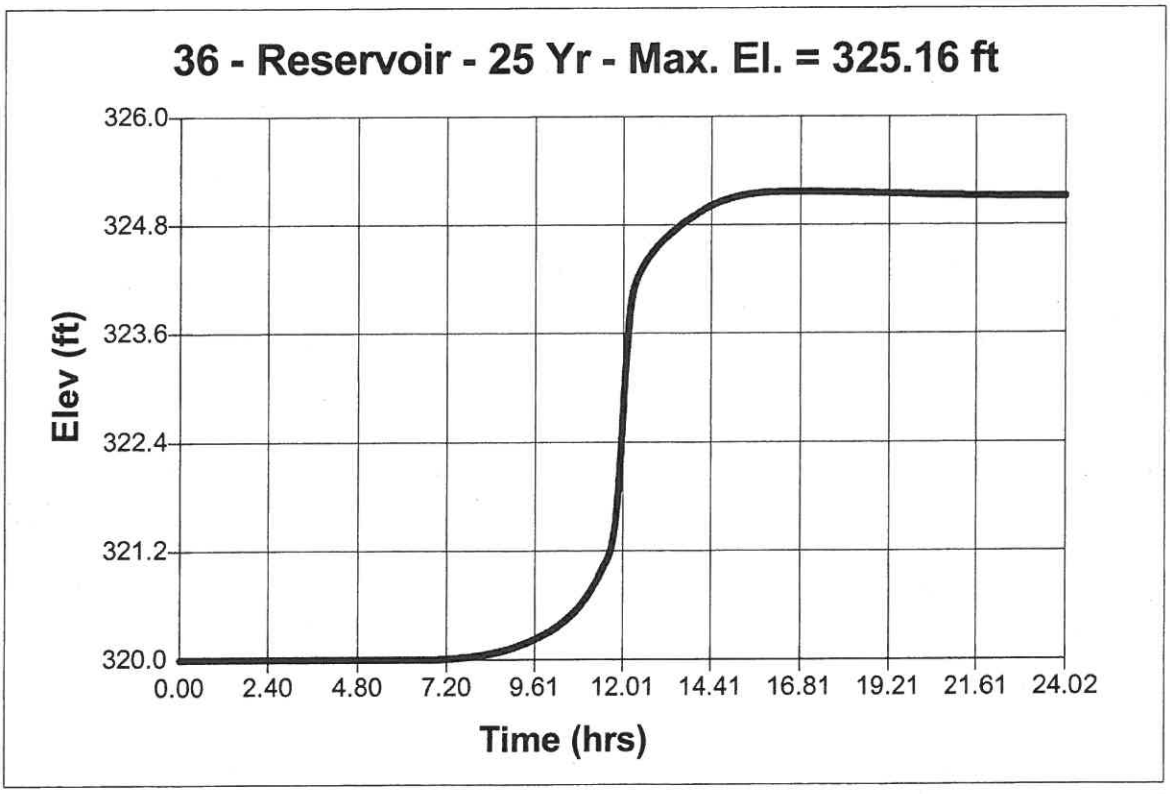
Hyd. No. 36

POND#6B TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.72 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 18	Reservoir name	= POND#6B
Max. Elevation	= 325.16 ft	Max. Storage	= 66,985 cuft

Storage Indication method used.

Hydrograph Volume = 18,248 cuft



Hydrograph Plot

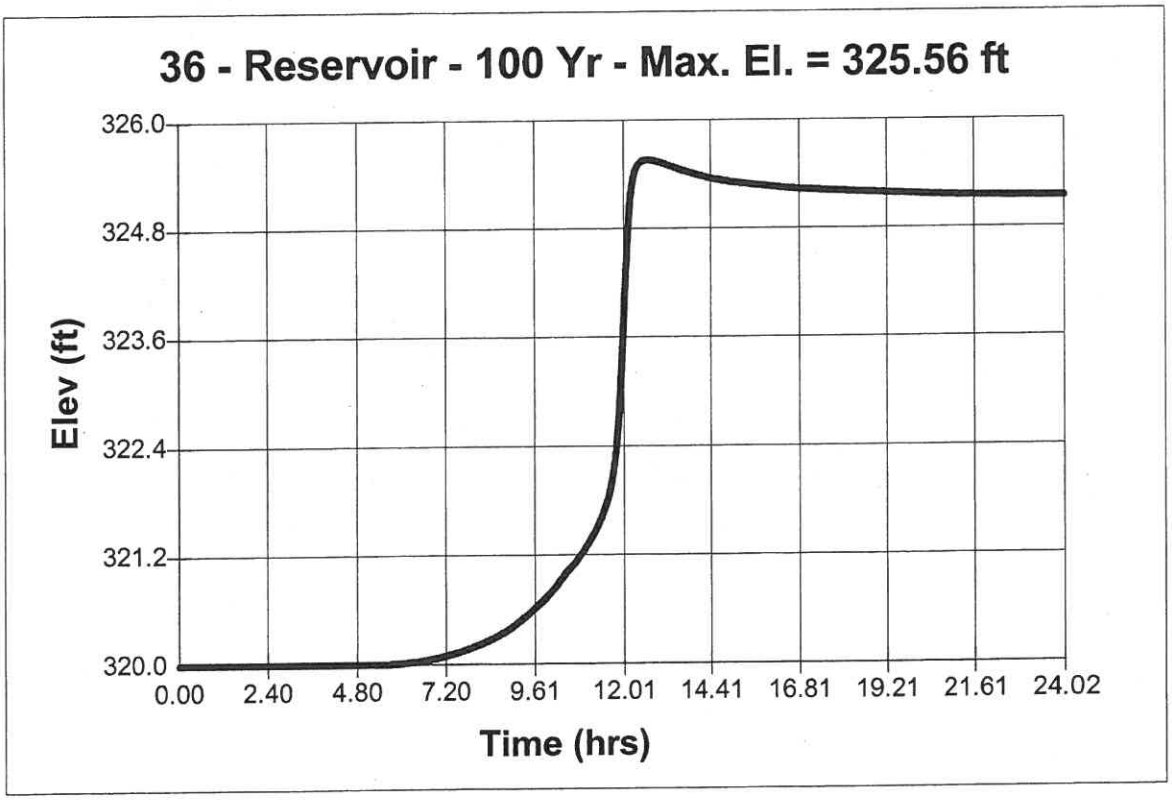
Hyd. No. 36

POND#6B TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 4.35 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 18	Reservoir name	= POND#6B
Max. Elevation	= 325.56 ft	Max. Storage	= 75,615 cuft

Storage Indication method used.

Hydrograph Volume = 59,319 cuft



POND REPORT & ELEVATIONS
POND#6C

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 14 - POND#6C

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	324.00	1,619	0	0
1.00	325.00	2,284	1,952	1,952
2.00	326.00	2,948	2,616	4,568
3.00	327.00	3,775	3,362	7,929
4.00	328.00	4,602	4,189	12,118
5.00	329.00	5,569	5,086	17,203
6.00	330.00	6,536	6,053	23,256

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 2.00	0.00	0.00	0.00
Crest El. ft	= 329.70	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	324.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	1,952	325.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	4,568	326.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	7,929	327.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	12,118	328.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	17,203	329.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	23,256	330.00	---	---	---	---	0.85	---	---	---	---	0.85

Hydrograph Plot

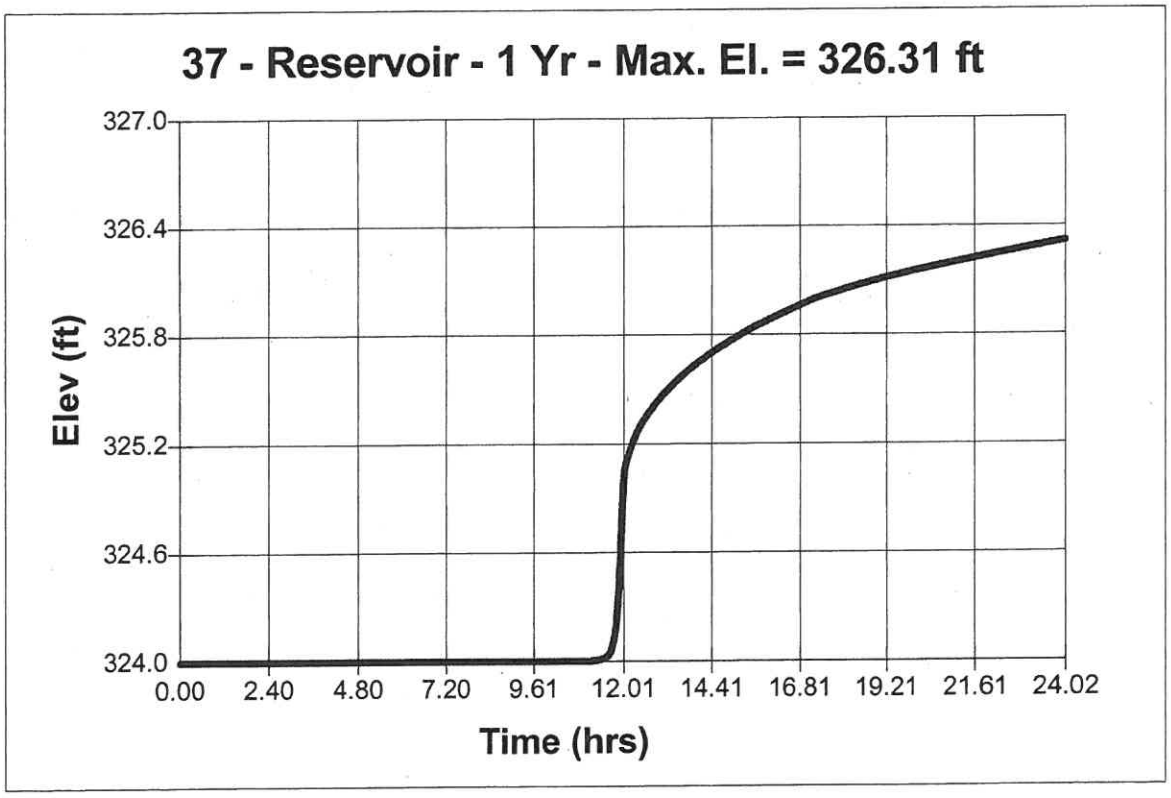
Hyd. No. 37

POND#6C TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 19	Reservoir name	= POND#6C
Max. Elevation	= 326.31 ft	Max. Storage	= 5,626 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

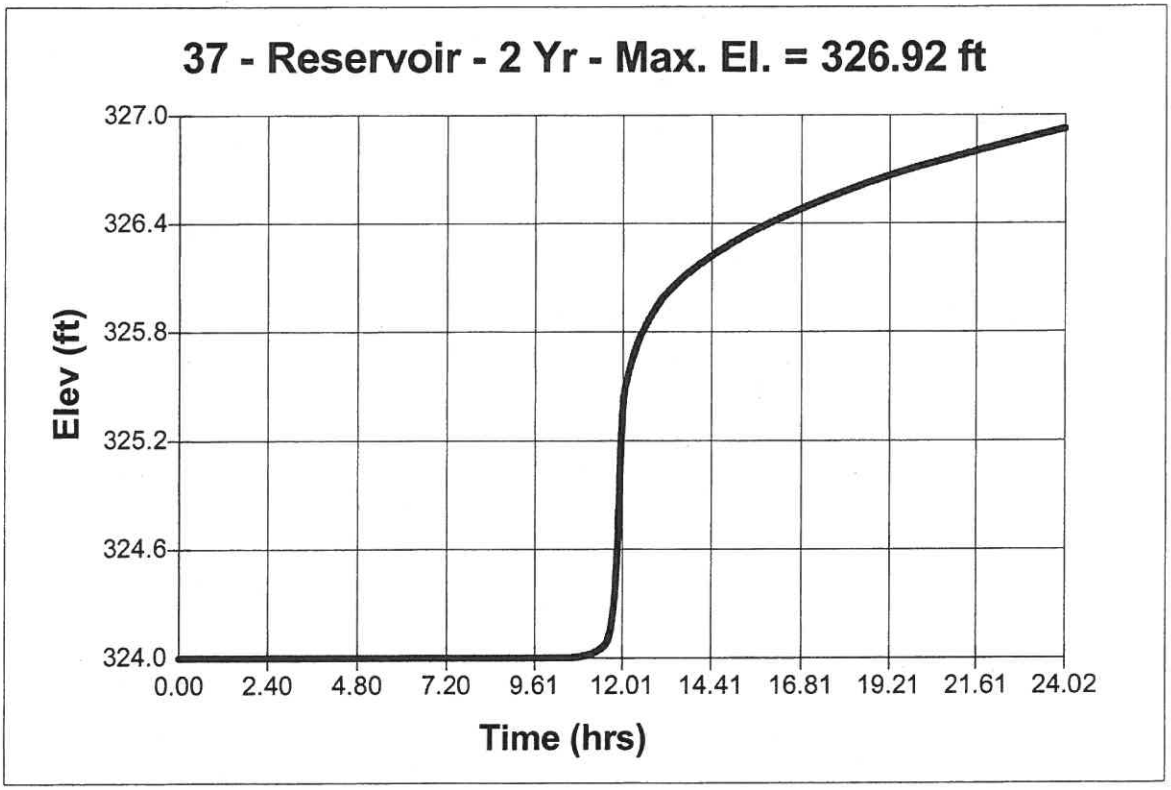
Hyd. No. 37

POND#6C TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 19	Reservoir name	= POND#6C
Max. Elevation	= 326.92 ft	Max. Storage	= 7,664 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

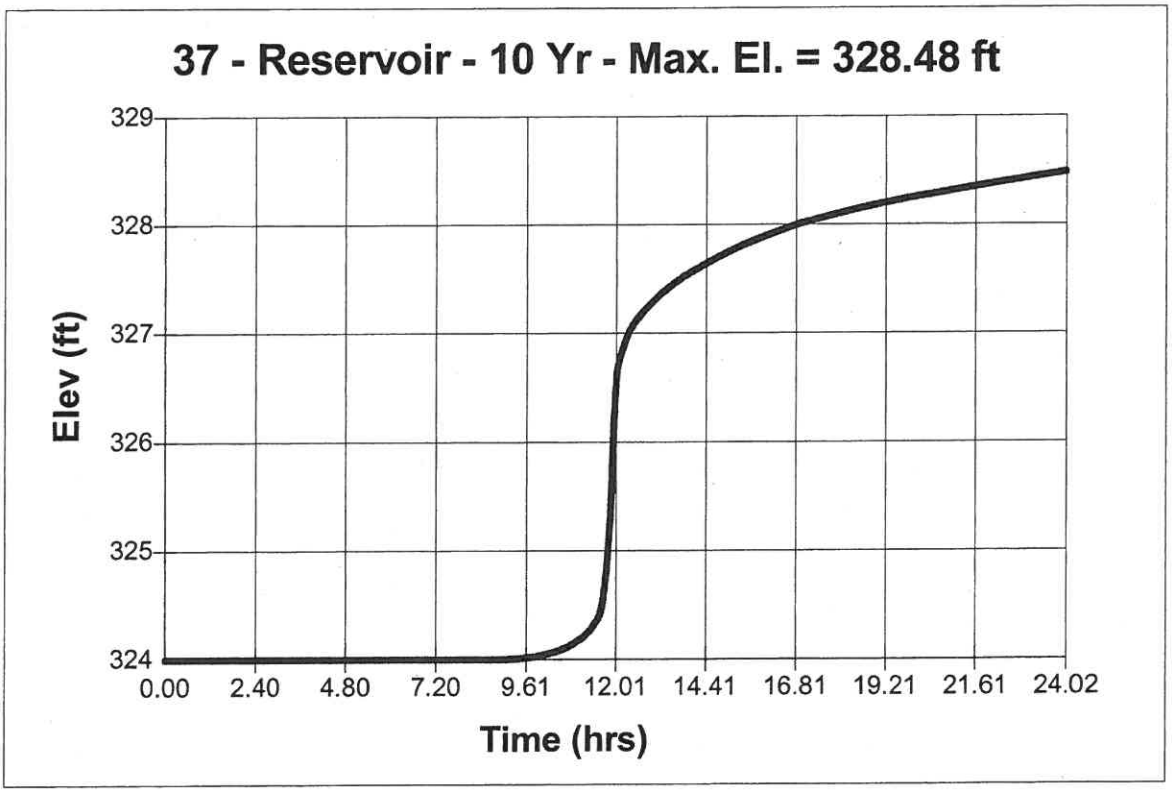
Hyd. No. 37

POND#6C TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 19	Reservoir name	= POND#6C
Max. Elevation	= 328.48 ft	Max. Storage	= 14,556 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

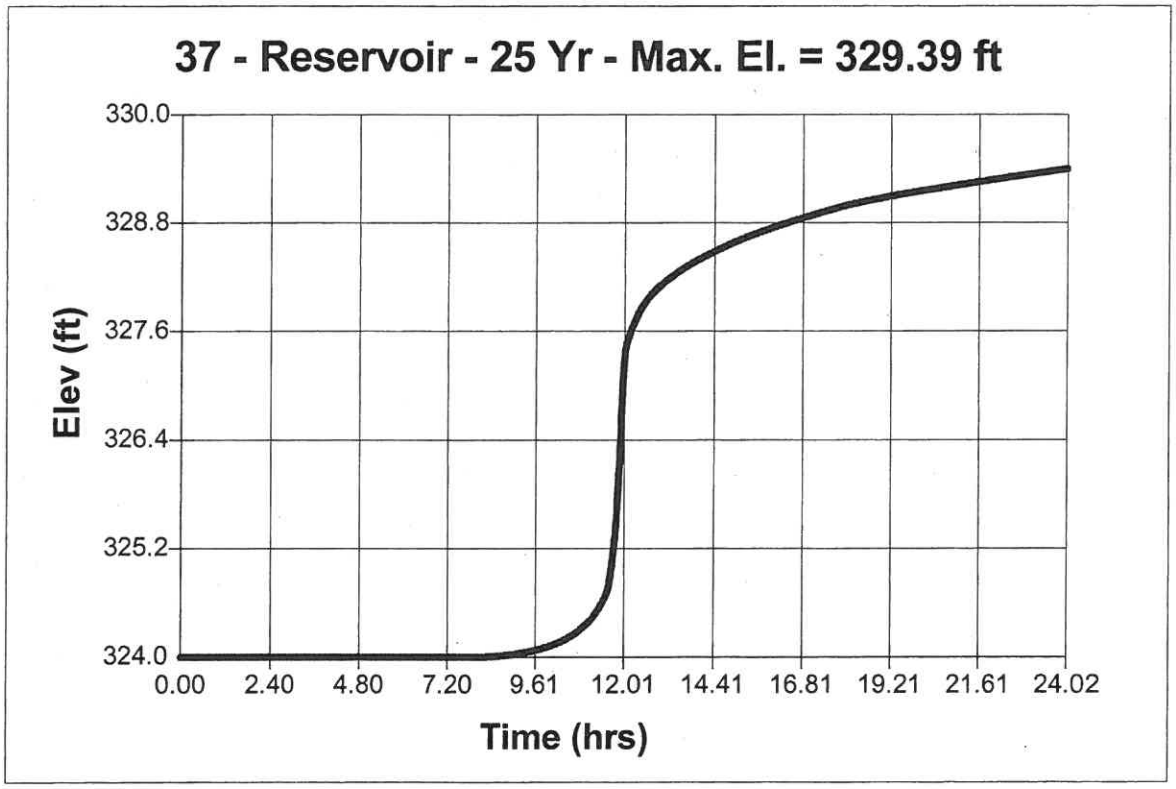
Hyd. No. 37

POND#6C TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 19	Reservoir name	= POND#6C
Max. Elevation	= 329.39 ft	Max. Storage	= 19,579 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

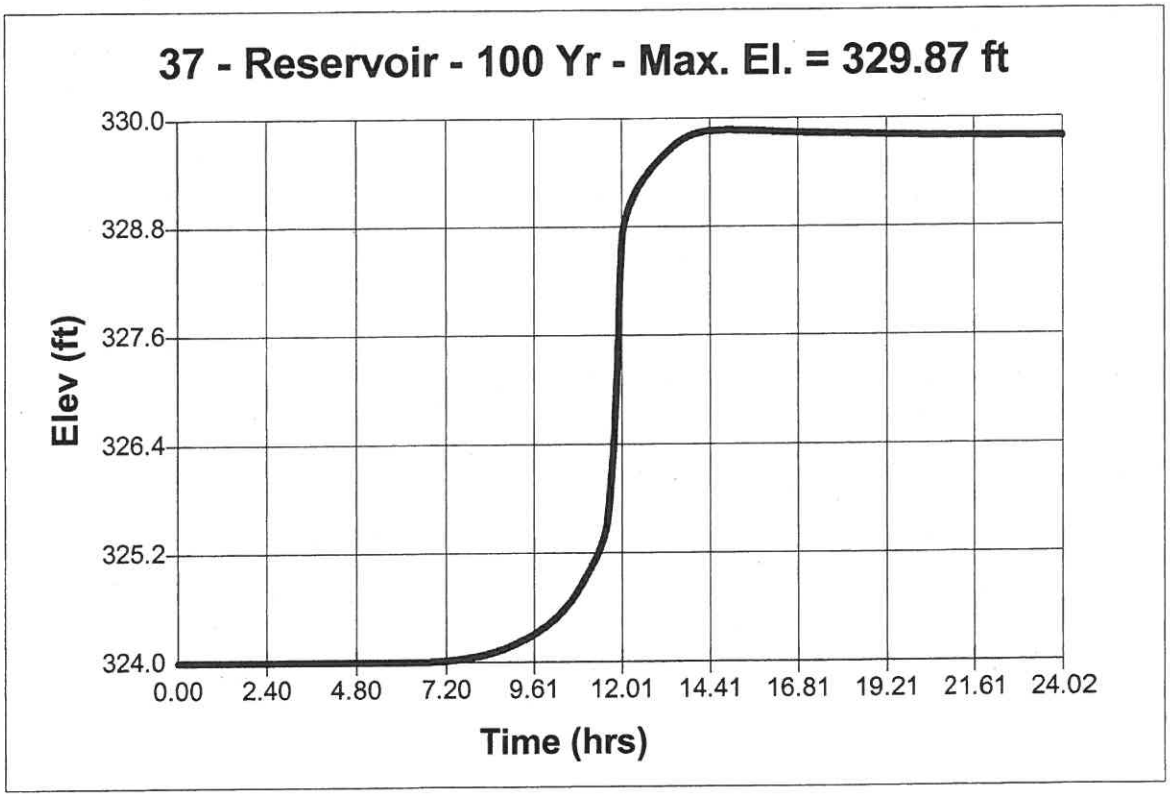
Hyd. No. 37

POND#6C TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.36 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 19	Reservoir name	= POND#6C
Max. Elevation	= 329.87 ft	Max. Storage	= 22,442 cuft

Storage Indication method used.

Hydrograph Volume = 8,275 cuft



POND REPORT & ELEVATIONS
POND#6D

Reservoir Report

Reservoir No. 15 - POND#6D

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	316.00	5,590	0	0
1.00	317.00	7,560	6,575	6,575
2.00	318.00	9,530	8,545	15,120
3.00	319.00	11,623	10,577	25,697
4.00	320.00	13,717	12,670	38,367
5.00	321.00	15,928	14,823	53,189
6.00	322.00	18,138	17,033	70,222

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 2.00	0.00	0.00	0.00
Crest El. ft	= 321.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	316.00	---	---	---	---	0.00	---	---	---	---	0.00
1.00	6,575	317.00	---	---	---	---	0.00	---	---	---	---	0.00
2.00	15,120	318.00	---	---	---	---	0.00	---	---	---	---	0.00
3.00	25,697	319.00	---	---	---	---	0.00	---	---	---	---	0.00
4.00	38,367	320.00	---	---	---	---	0.00	---	---	---	---	0.00
5.00	53,189	321.00	---	---	---	---	0.00	---	---	---	---	0.00
6.00	70,222	322.00	---	---	---	---	1.84	---	---	---	---	1.84

Hydrograph Plot

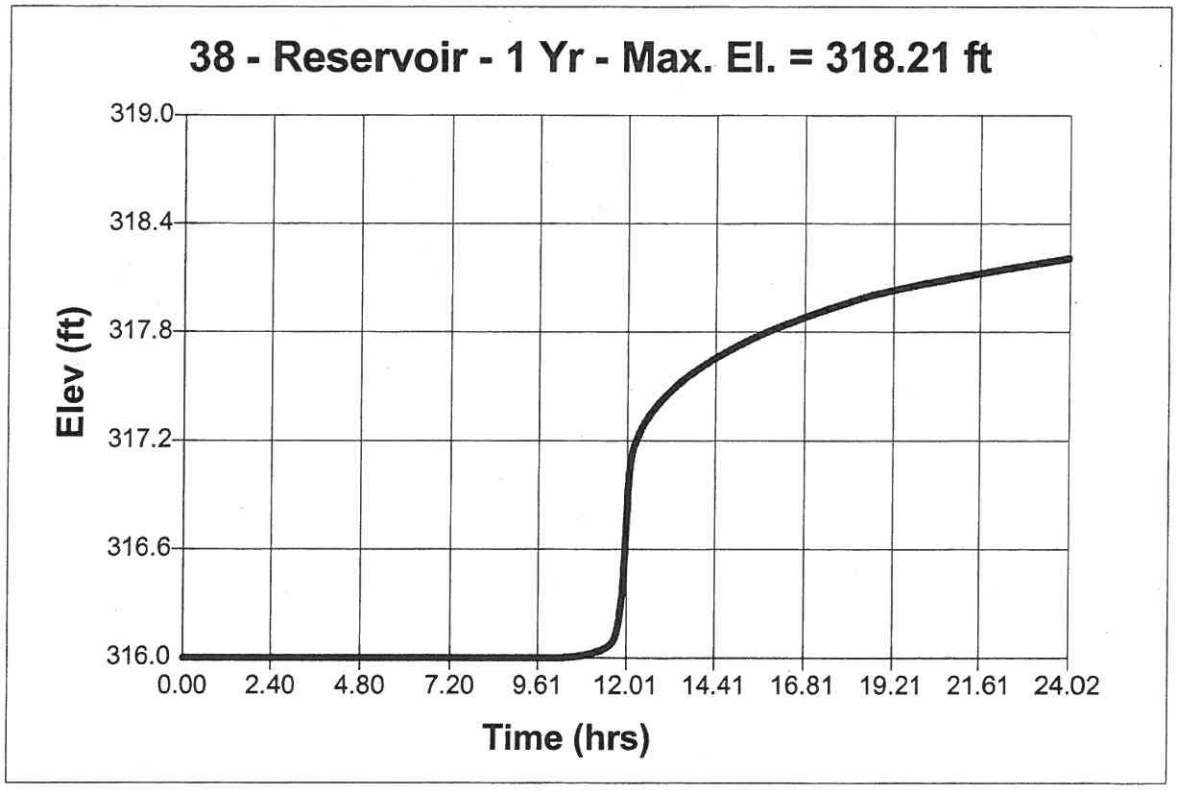
Hyd. No. 38

POND#6D TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Inflow hyd. No.	= 20	Reservoir name	= POND#6D
Max. Elevation	= 318.21 ft	Max. Storage	= 17,303 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

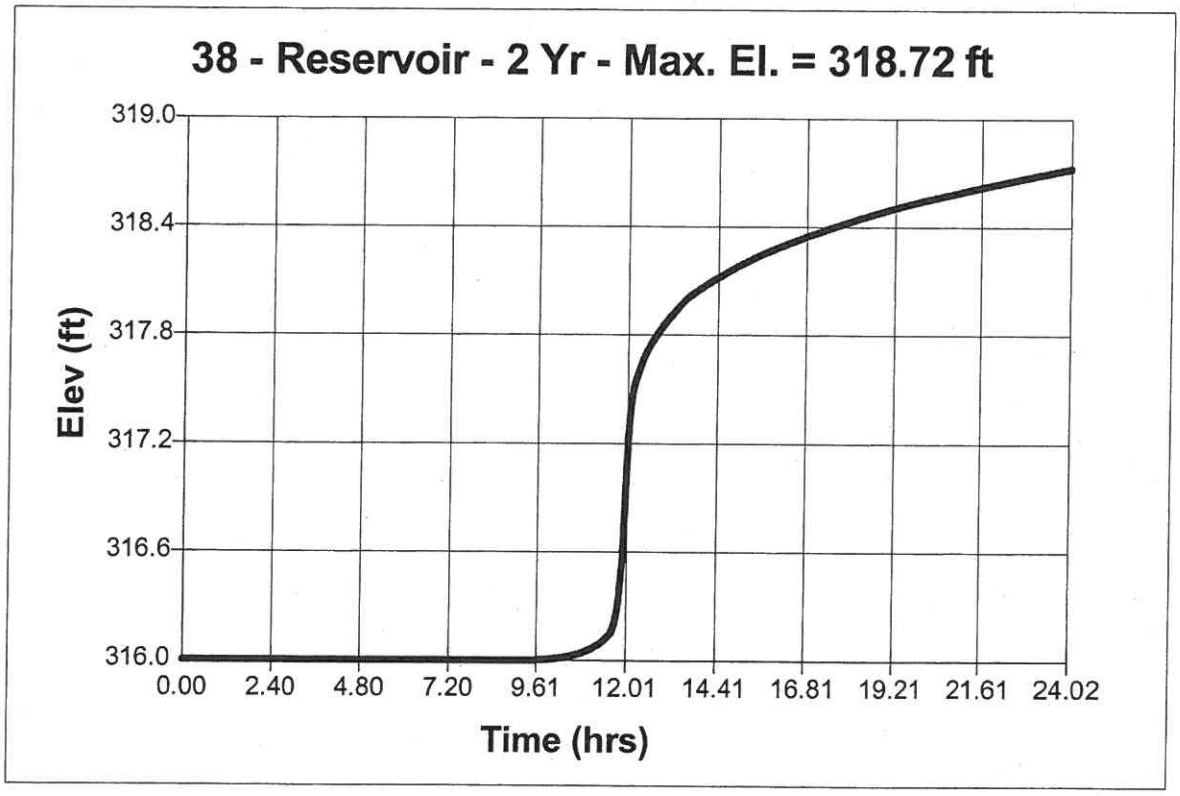
Hyd. No. 38

POND#6D TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 20	Reservoir name	= POND#6D
Max. Elevation	= 318.72 ft	Max. Storage	= 22,772 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

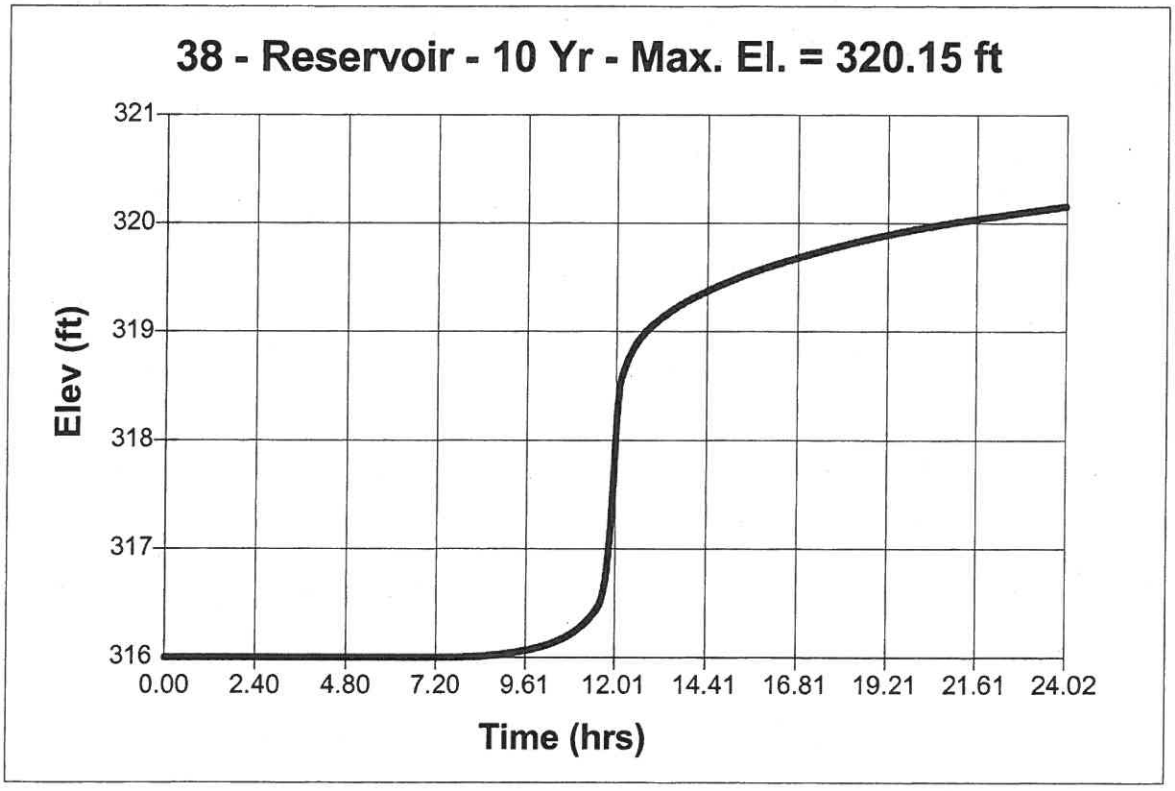
Hyd. No. 38

POND#6D TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 20	Reservoir name	= POND#6D
Max. Elevation	= 320.15 ft	Max. Storage	= 40,655 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

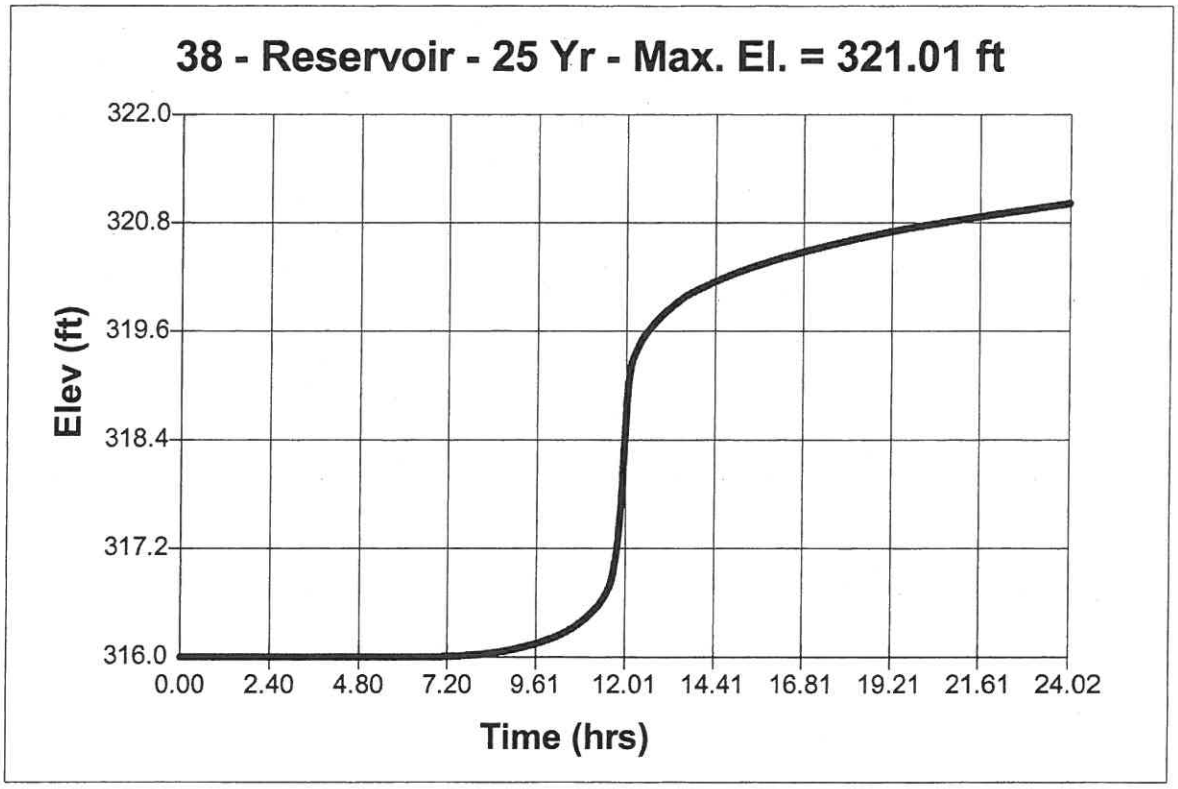
Hyd. No. 38

POND#6D TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 20	Reservoir name	= POND#6D
Max. Elevation	= 321.01 ft	Max. Storage	= 53,349 cuft

Storage Indication method used.

Hydrograph Volume = 0 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Hyd. No. 38

POND#6D TO DP#6

Hydrograph type	= Reservoir	Peak discharge	= 0.58 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 20	Reservoir name	= POND#6D
Max. Elevation	= 321.73 ft	Max. Storage	= 65,628 cuft

Storage Indication method used.

Hydrograph Volume = 15,281 cuft