STORMWATER MANAGEMENT REPORT

Proposed 12 Lot Single Family Residential Subdivision
Picard Road and New Salem Road
Town of New Scotland
Albany County, New York

Prepared For

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Project No. 3471A

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PROJECT LOCATION

The 12 lot residential subdivision is located off Picard Road (County Route 307) and New Salem Road (N.Y.S. Route 85A) immediately east of the intersection of Picard Road in the Town of New Scotland (see Exhibit 1).

GENERAL SITE DEVELOPMENT

The applicant, Biernacki Builders, LLC, is proposing a 12 lot residential subdivision in two phases, located on 31.52± acres of land previously Owned and already subdivided by Jeanne Picard-Fish. Seven lots will front on Picard Road and each will have a private well and a private septic system, the remaining five lots will front on New Salem Road and will be connected to the existing Village of Voorheesville water main and also have individual private septic systems. 10 lots will be on the north side of New Salem Road and west side of Picard Road and 2 lots will be on the south side of New Salem Road.

SOIL TYPES, GROUNDWATER AND TOPOGRAPHY

The existing site contains a cornfield and woods. There are 2.33± acres of Federal Wetlands and 5.09± acres of NYSDEC Wetlands on the property. Neither of the wetlands or the buffer area will be disturbed. Test pits and percolation tests were performed by ABD Engineers and Surveyors and witnessed by the Albany County Department of Health. The results were highly permeable sandy material, very suitable for conventional septic systems and stormwater infiltration. The depth to groundwater varies across the site and is expected to be about 0 to 2 feet near the Federal Wetlands to over 30 feet near Picard Road. The depth to bedrock is greater than 8 feet.

EXISTING SITE DRAINAGE CHARACTERISTICS

In the predevelopment condition, there are four main drainage areas, as shown in Exhibit 2. Each area drains towards either a Class C stream on the north end of the property, or federal wetlands in the center of the property or NYSDEC wetlands on the south end of the property, all are tributary to the Vly Creek and then the Normans Kill to the Hudson River.

STORMWATER MANAGEMENT & PLANNING

The stormwater management planning meets the requirements of Chapter 3 of the NYSDEC Stormwater Management Design Manual August 2010. Specifically,

a. Site planning to preserve natural features and reduce impervious cover;

The development is mainly limited to the open non vegetated corn field area of the site except for three (3) of the 12 lots (10, 11 & 12) and parts of Lot 8 & 9. Previous plans included more residential lots and associated site disturbances. The scale of the project has been reduced from 15 lots to 12 lots. No wetland disturbance is proposed.

b. Calculation of the Water Quality Volume for the site;

The water quality volume calculation has been provided in Appendix A and meets NYSDEC stormwater regulations. The water quality volume is being provided based on the minimum runoff reduction volume (RRV) due to the soils on the site. The upper soils of the site are mostly Class B soils with Class A sub soils, the sub soils will be used for infiltration practices.

c. Incorporation of Green Infrastructure techniques (GI) and standard stormwater management practices (SMP's) with runoff reduction volume (RRv) capacity; the standard SMP is infiltration where 100% of the impervious area. Runoff will be retained onsite and allowed to infiltrate to groundwater to meet runoff reduction requirements. The infiltration areas meet GI techniques by providing storage for the water quality volume while retaining the pre-development hydrologic and water quality characteristics of undisturbed natural areas, such as the federal wetlands and NYSDEC wetlands and 100-foot buffers.

d. Design of volume and peak rate control practices; the standard SMP is infiltration where 100% of the impervious areas will be retained onsite and allowed to infiltrate to groundwater by providing storage for the water quality volume and retaining the pre-

development hydrologic and water quality characteristics. Since the pre-developed existing soil conditions for a corn field has a higher CN value than the post development condition of grassed lawn, the post development CN will be lower and the post development peak discharge rates will be less and therefore no stormwater detention is required. Calculations are in Appendix A attached

GREEN INFRASTRUCTURE PLAN

Green Infrastructure Techniques will include rooftop disconnection, vegetated grass swales and soil restoration to allow infiltration, filtration and water quality treatment. Green Infrastructure (GI) techniques include the rooftop areas that will drain onto and across vegetated areas before infiltrating into the ground. The infiltration basins are utilize groundwater recharge to mimic water quality characteristics of the pre-developed conditions. The infiltration basins were sized to provide enough storage and infiltration volume for the water quality volume requirements and to meet the runoff reduction requirements. The grass swales will provide pretreatment and the Infiltration Basins (I-2) will provide the water quality volume required per NYSDEC Phase 2 Stormwater Regulations. The required water quality volume for all impervious areas of the subdivision requires 12,732± cubic feet and has been provided. A minimum Runoff Reduction volume (RRv) of 3,035± cubic feet is required (see attached worksheets) and a total of 17,587± cubic feet is provided (90% credit from infiltration practices and 100% credit from rooftop disconnection). Therefore the minimum RRv has been met.

STORMWATER MANAGEMENT PLAN

The stormwater management plan is to utilize surface sheet flow from pavement and rooftops to flow across lawn areas to grass swales prior to entering the Infiltration Basins (I-2) as shown on the site plans and in conformance with the NYSDEC Phase II requirements for water quality and water quantity. Hydrological soil group "A" is used for design calculations. The infiltration rates of the sandy sub-soils resulted in 1" in 2 minutes and the infiltration basins are designed conservatively to provide a measure of safety in frozen conditions if the storm event exceeds the basins capacity. Each infiltration basin will recharge to groundwater but if the basin is exceeded of the full storage volume, then flow will be across swales and towards the stream, federal wetlands

and/or the NYSDEC wetlands. Both stormwater infiltration basins are designed conservatively and exceeds the capacity required by the calculations.

ANALYSIS

The TR-55 method was used for stormwater runoff calculations where:

- *Qp = qu * Am * Q * Fp*
- *qu = limit peak discharge in csm/inch*
- *Am = drainage area in square miles*
- *Q = runoff in inches*
- *Fp = a pond and swamp adjustment factor*

Calculations are presented for the pre and post-developed stormwater runoff conditions in Appendix A. Note the existing roadway impervious has not been included in the analysis since it is the same from pre to post.

PRE DEVELOPMENT CONDITIONS (SEE EXHIBIT 2)

In the predevelopment condition there are four main drainage areas (see Exhibit 2). In the predevelopment condition, **Area 1** consists of 4.33± acres, which drains from the southwest to the northeast into an existing Class C stream along the north property line, which is tributary to the Vly Creek, then the Normans Kill to the Hudson River. The majority of this drainage area is wooded. The peak discharge rates for the 1, 10 and 100-year storm events are 0.55±cfs, 6.04±cfs and 12.35±cfs respectively with a time of concentration of 6 minutes and a curve number of 60.

In the predevelopment condition, **Area 2** has consists of 10± acres, which drains from the west to the east and into a federal wetland area, which then flows to a tributary to Vly Creek and the Normans Kill. The majority of this drainage area is open cornfields and the rear portion is woods and federal wetlands. The peak discharge rates for the 1, 10 and 100-year storm events are 6.82±cfs, 27.27±cfs and 45.94±cfs respectively with a time of concentration of 6 minutes and a curve number of 72.

In the predevelopment condition, **Area 3** consists of 11.3± acres, which drains from the east and west to the south central to an existing 24" culvert under New Salem Road, which then flows to the NYSDEC wetlands, which wetlands are a tributary to Vly Creek and then the Normans Kill to the Hudson River. The majority of this drainage area is an open cornfield. The peak discharge rates for the 1, 10 and 100-year storm events are 12.94±cfs, 40.91±cfs and 64.97±cfs respectively with a time of concentration of 6 minutes and a curve number of 79. See Appendix B for supplement analysis.

In the predevelopment condition, **Area 4** consists of 5± acres, which drains from the north to the south to NYSDEC wetlands, which are tributary to the Vly Creek, then the Normans Kill to the Hudson River. The majority of this drainage area is wooded. The peak discharge rates for the 1, 10 and 100-year storm events are 0.63±cfs, 7.17±cfs and 14.64±cfs respectively with a time of concentration of 8 minutes and a curve number of 60.

POST DEVELOPMENT CONDITIONS (SEE EXHIBIT 3)

In the post development condition, there are four drainage areas, similar to the predevelopment condition (see Exhibit 3). In the post development condition, **Area 1** consists of 4.3± acres of proposed Lots 9 and 10 that includes residential rooftops, driveways and lawn areas. The peak discharge rates without attenuation for the 1, 10 and 100 year storm events are 0.79±cfs, 7.13±cfs and 14.01±cfs respectively with a time of concentration of 6 minutes and a curve number of 63. A stone gravel diaphragm will be used to capture the stormwater runoff and will be allowed to infiltrate to the sandy sub soils to provide the water quality volume. The stone gravel diaphragm will decrease the stormwater runoff rates and distribute flows to reduce peak discharge velocities. The stone gravel diaphragm will provide the water quality volume required by infiltration. The water quality volume requires 650 cubic feet and is exceeded by use of a stone gravel diaphragm.

In the post development condition, **Area 2** consists of 12.2± acres, which drains easterly to westerly towards federal wetlands as in the predevelopment condition. The drainage area includes proposed Lots 6, 7 and 8 and portion of 5 and 9, which includes residential rooftops, driveways and lawn areas. These impervious surfaces will sheet flow to lawn areas then to grass swales between property lines prior to entering the infiltration basin. The peak discharge rates without attenuation for the 1, 10 and 100 year storm events are 2.29±cfs, 20.92±cfs and 39.84±cfs respectively with a time of concentration of 6 minutes and a curve number of 63. A grass swale will be used to pre treat the stormwater runoff and the infiltration basin will allow the stormwater runoff to infiltrate

to the sandy sub soils to provide the water quality volume. The infiltration basin will decrease the stormwater runoff rates and distribute flows to reduce peak discharge velocities. The infiltration basins will provide the water quality volume required by infiltration. The water quality volume requires 2,755 cubic feet and the two infiltration basins provide 2,760 cubic feet.

In the post development condition, **Area 3** consists of 9.2± acres (which area has been reduced from the predevelopment condition see Appendix B for supplement analysis) and drains from the west to the southeast to an existing 24" culvert under New Salem Road, as in the predevelopment condition. The drainage area includes proposed Lots 1, 2, 3, 4 and portion of 5, which includes residential rooftops and driveways. These impervious surfaces will sheet flow to lawns and grass swales between property lines prior to entering the infiltration basin. The peak discharge rates without attenuation for the 1, 10 and 100 year storm events are 1.56±cfs, 14.72±cfs and 28.71±cfs respectively with a time of concentration of 8 minutes and a curve number of 64. A grass swale will be used to pre treat the stormwater runoff and the infiltration basin will allow the stormwater runoff to infiltrate to the sandy sub soils to provide the water quality volume. The infiltration basin will decrease the stormwater runoff rates and distribute flows to reduce peak discharge velocities. The infiltration basins will provide the water quality volume required by infiltration. The water quality volume requires 4,423 cubic feet and the infiltration basin provides 4,450 cubic feet.

In the post development condition, **Area 4** consists of 5.0± acres and drains from the north to the south towards NYSDEC wetlands, as in the predevelopment condition. The drainage area includes proposed Lots 11 and 12, which includes residential rooftops and driveways. The peak discharge rates without attenuation for the 1, 10 and 100 year storm events are 0.77±cfs, 7.83±cfs and 15.64±cfs respectively with a time of concentration of 6 minutes and a curve number of 62. A stone gravel diaphragm will be used to capture the stormwater runoff and will be allowed to infiltrate to the sandy sub soils to provide the water quality volume. The stone gravel diaphragm will decrease the stormwater runoff rates and distribute flows to reduce peak discharge velocities. The stone gravel diaphragm will provide the water quality volume required by infiltration. The water quality volume requires 1,267 cubic feet and is exceeded by use of a stone gravel diaphragms for both Lots 11 and 12.

From the analysis (see summary below), the post development peak discharge rates for the 1, 10 and 100-year storm events are below the peak discharge rates for the predevelopment condition and therefore no stormwater detention for water quantity is needed. The vegetated grass swales and the infiltration basins will provide the pretreatment volume and water quality volumes required per the NYSDEC Phase II Stormwater Regulations.

AREA 1 - Pre and Post Development Peak Runoff Comparison

Pre Development	**1 year**	**10 year**	**100 year**
Area = 4.33± acres RCN = 60 TC = 6 minutes	0.55± cfs	6.04± cfs	12.35± cfs

Post Development Increase			
Area = 4.33± acres RCN = 63 TC = 6 minutes	0.79± cfs *0.00± cfs**	7.13± cfs *4.93± cfs**	14.01± cfs *11.04± cfs**

** Post development peak discharge rates with infiltration trench practice*

AREA 2 - Pre and Post Development Peak Runoff Comparison

Pre Development	**1 year**	**10 year**	**100 year**
Area = 10± acres RCN = 72 TC = 5 minutes	6.82± cfs	27.27± cfs	45.94± cfs

Post Development			
Area = 12.2± acres RCN = 63 TC = 6 minutes	2.29± cfs	20.92± cfs	39.84± cfs

AREA 3 - Pre and Post Development Peak Runoff Comparison

Pre Development	**1 year**	**10 year**	**100 year**
Area = 11.3± acres RCN = 79 TC = 6 minutes	12.94± cfs	40.91± cfs	64.97± cfs
Post Development Area = 9.20± acres RCN = 64 TC = 8 minutes	1.56± cfs*	14.72± cfs*	28.71± cfs*

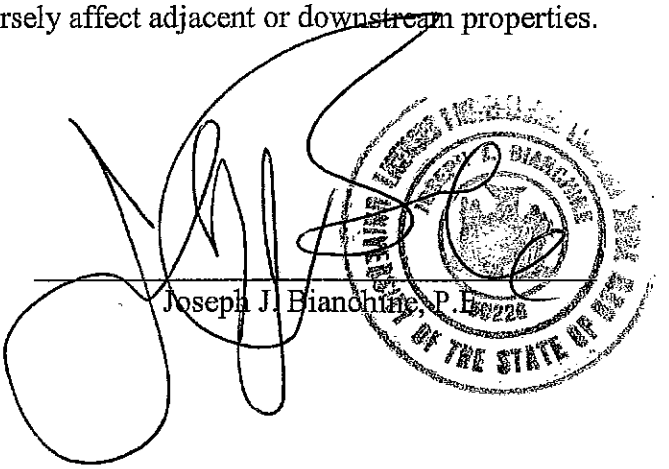
AREA 4 - Pre and Post Development Peak Runoff Comparison

Pre Development	**1 year**	**10 year**	**100 year**
Area = 5± acres RCN = 60 TC = 6 minutes	0.63± cfs	7.17± cfs	14.64± cfs
Post Development Area = 5± acres RCN = 62 TC = 6 minutes	0.77± cfs*	7.83± cfs*	15.64± cfs*

* The peak discharge rates for Area 4 appear to have increased. However, the peak discharge rates from post developed Area 3 have been significantly reduced compared to the pre developed Area 3 and therefore the post developed Area 3 over compensates for Area 4 and the total post development peak discharge rates ff site are ultimately less than the predevelopment condition for the 1, 10 and 100 year storm events. See Appendix B for supplement analysis on ponding within a proposed 50' drainage easement and the existing 24" CPP under New Salem Road.

SUMMARY

The proposed Stormwater Management Plan adequately serves the drainage needs of the proposed project and the Town of New Scotland. The drainage system as proposed will function adequately and will not adversely affect adjacent or downstream properties.



Joseph J. Biancchine, P.E.

EXHIBIT 1

SITE LOCATION MAP

AND

SOILS INFORMATION

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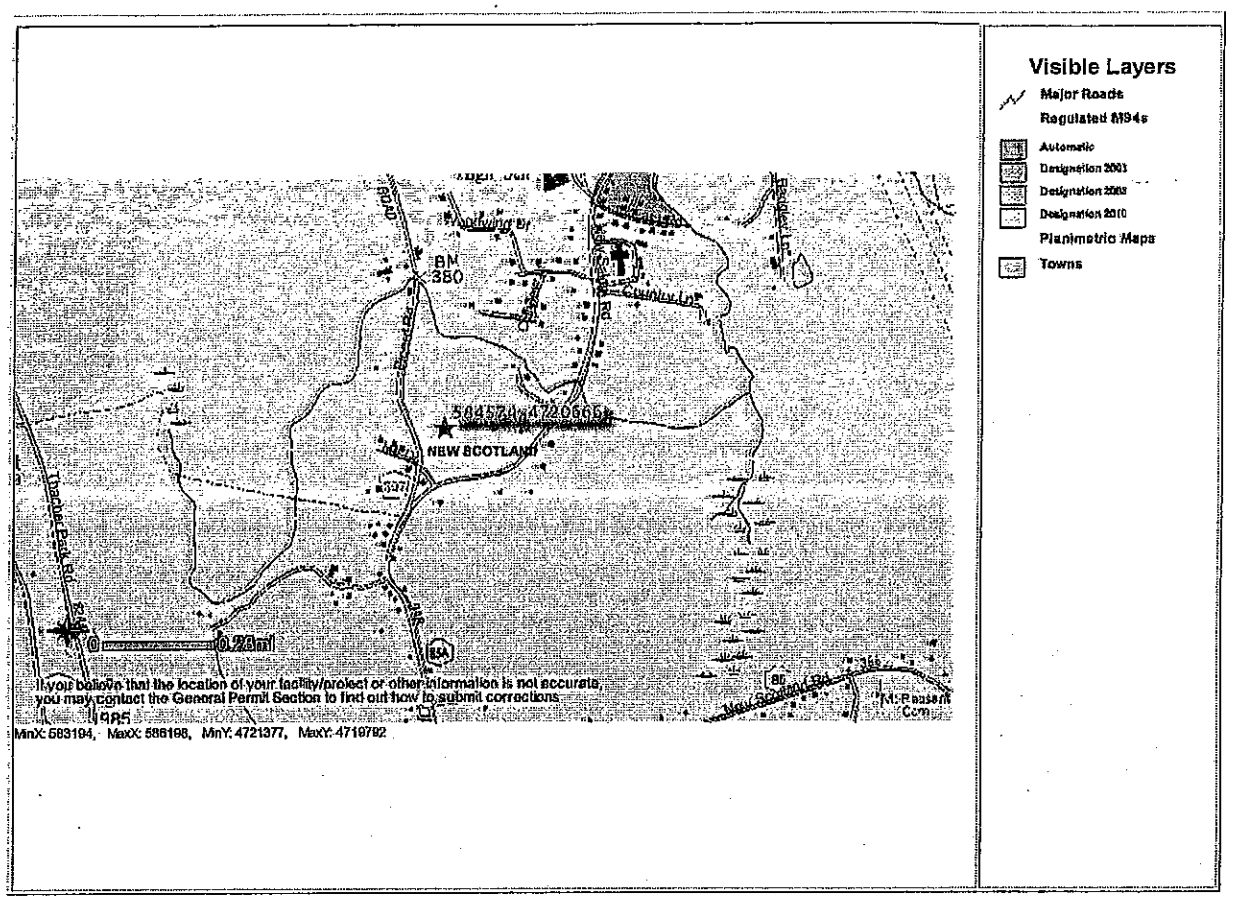
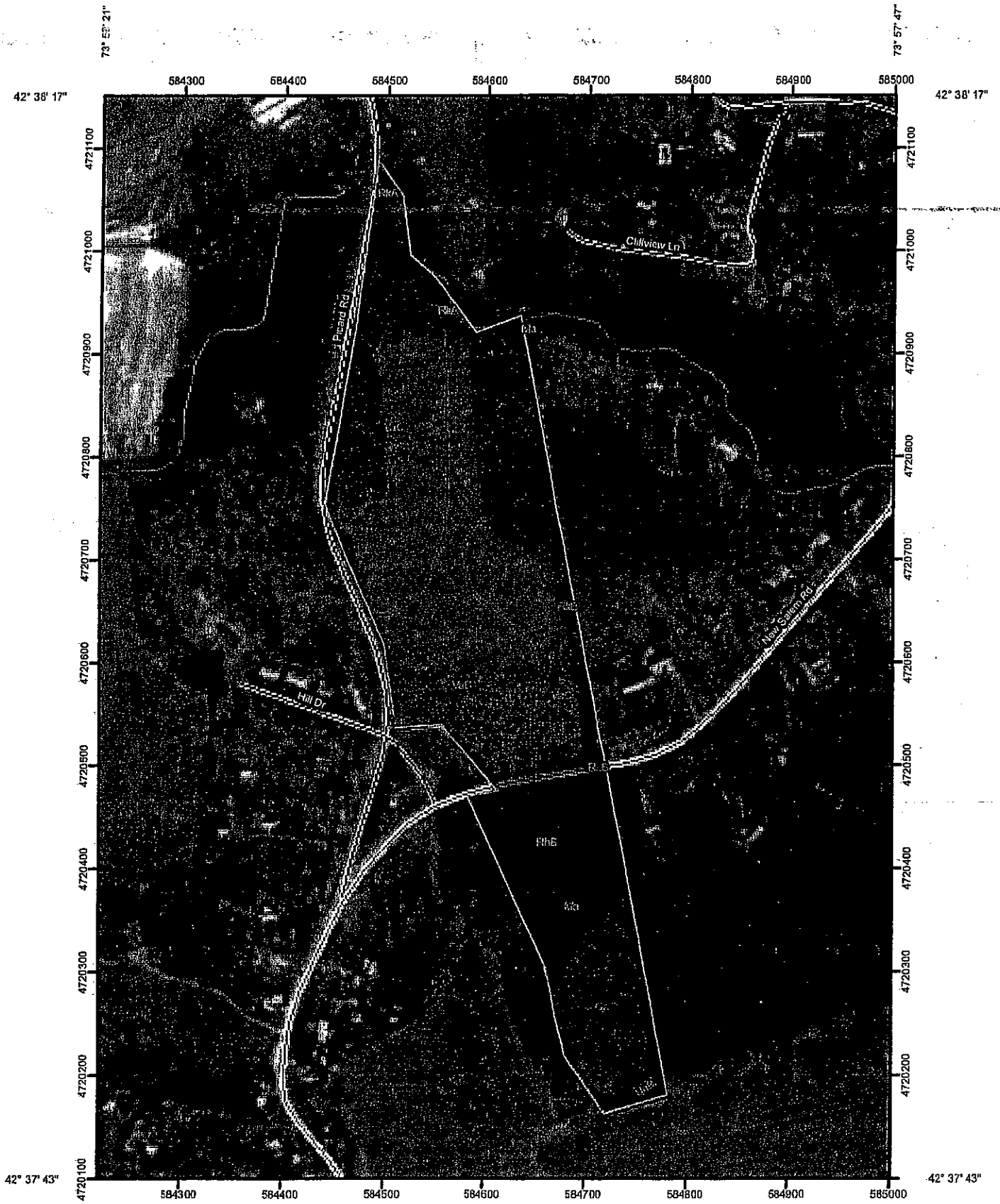
Please set your printer orientation to "Landscape".




73° 58' 21"
73° 57' 47"
42° 38' 17"
584300
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42° 37' 43"
Chilview Ln
Read Rd
Hill Dr
New Salem Rd
RhB
RhE
Ud
Ua
Map Scale: 1:5,020 if printed on A size (8.5" x 11") sheet.
N
Meters
0 45 90 180 270
Feet
0 150 300 600 900
73° 58' 22"
73° 57' 48"

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

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

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:5,020 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: Albany County, New York
Survey Area Data: Version 10, Dec 19, 2011

Date(s) aerial images were photographed: 11/6/2006

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

Hydrologic Soil Group

Hydrologic Soil Group—Summary by Map Unit — Albany County, New York (NY001)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ca	Carlisle muck	A/D	3.3	10.4%
Ma	Madalin silt loam	C/D	1.7	5.3%
RhB	Rhinebeck silty clay loam, 3 to 8 percent slopes	C/D	2.2	7.1%
RkA	Riverhead fine sandy loam, 0 to 3 percent slopes	A	0.4	1.4%
RkB	Riverhead fine sandy loam, 3 to 8 percent slopes	A	0.5	1.5%
UnB	Unadilla silt loam, 3 to 8 percent slopes	B	0.4	1.3%
VaB	Valois gravelly loam, 3 to 8 percent slopes	B	10.8	34.2%
VaC	Valois gravelly loam, 8 to 15 percent slopes	B	12.3	38.8%
Totals for Area of Interest			**31.7**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Albany County, New York

VaB—Valois gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 600 to 1,750 feet
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days

Map Unit Composition

Valois and similar soils: 80 percent
Minor components: 20 percent

Description of Valois

Setting

Landform: End moraines, lateral moraines, valley sides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from sandstone, siltstone, and shale

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Gravelly loam
8 to 30 inches: Gravelly loam
30 to 46 inches: Gravelly loam
46 to 60 inches: Very gravelly loam

Minor Components

Chenango

Percent of map unit: 10 percent

Unnamed soils

Percent of map unit: 5 percent

Nunda

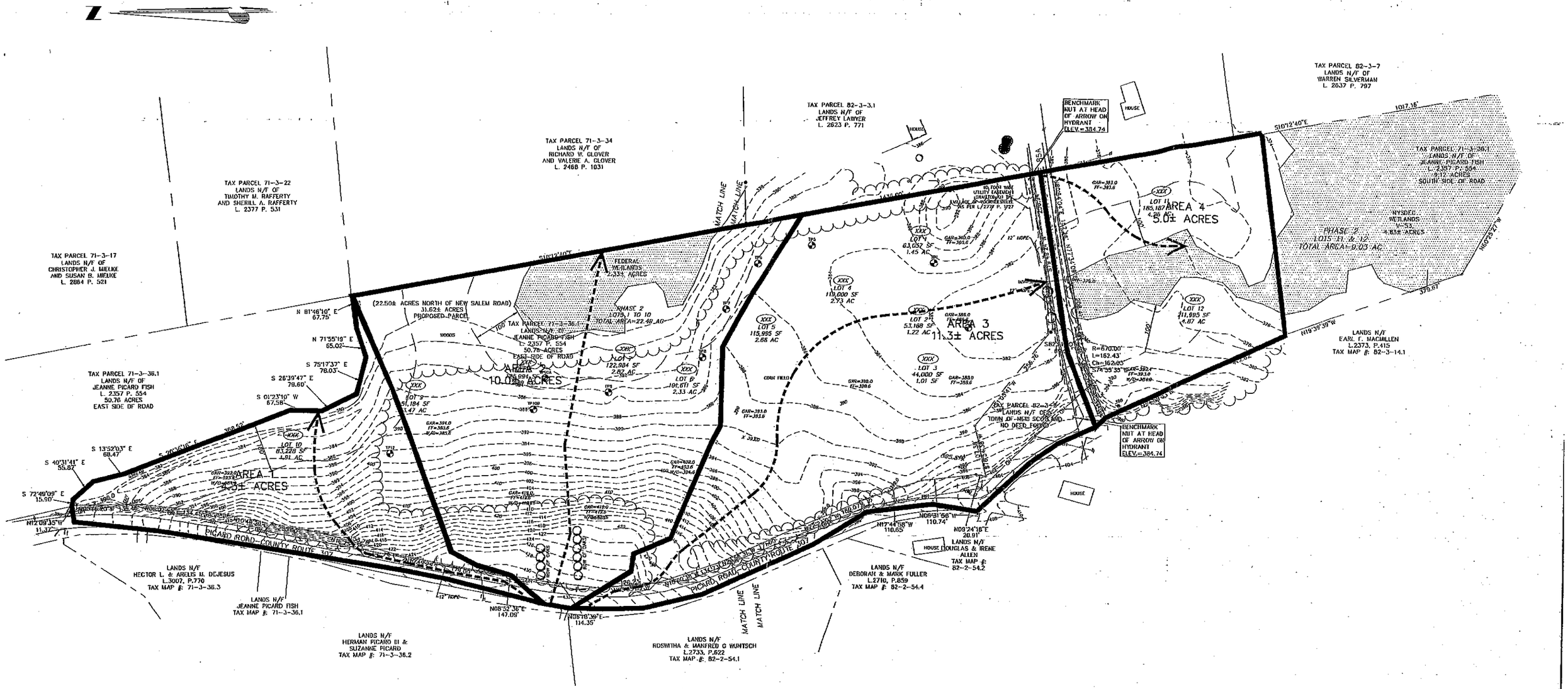
Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: Albany County, New York
Survey Area Data: Version 10, Dec 19, 2011

EXHIBIT 2

PRE-DEVELOPMENT DRAINAGE



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518-377-0315 Fax.518-377-0379

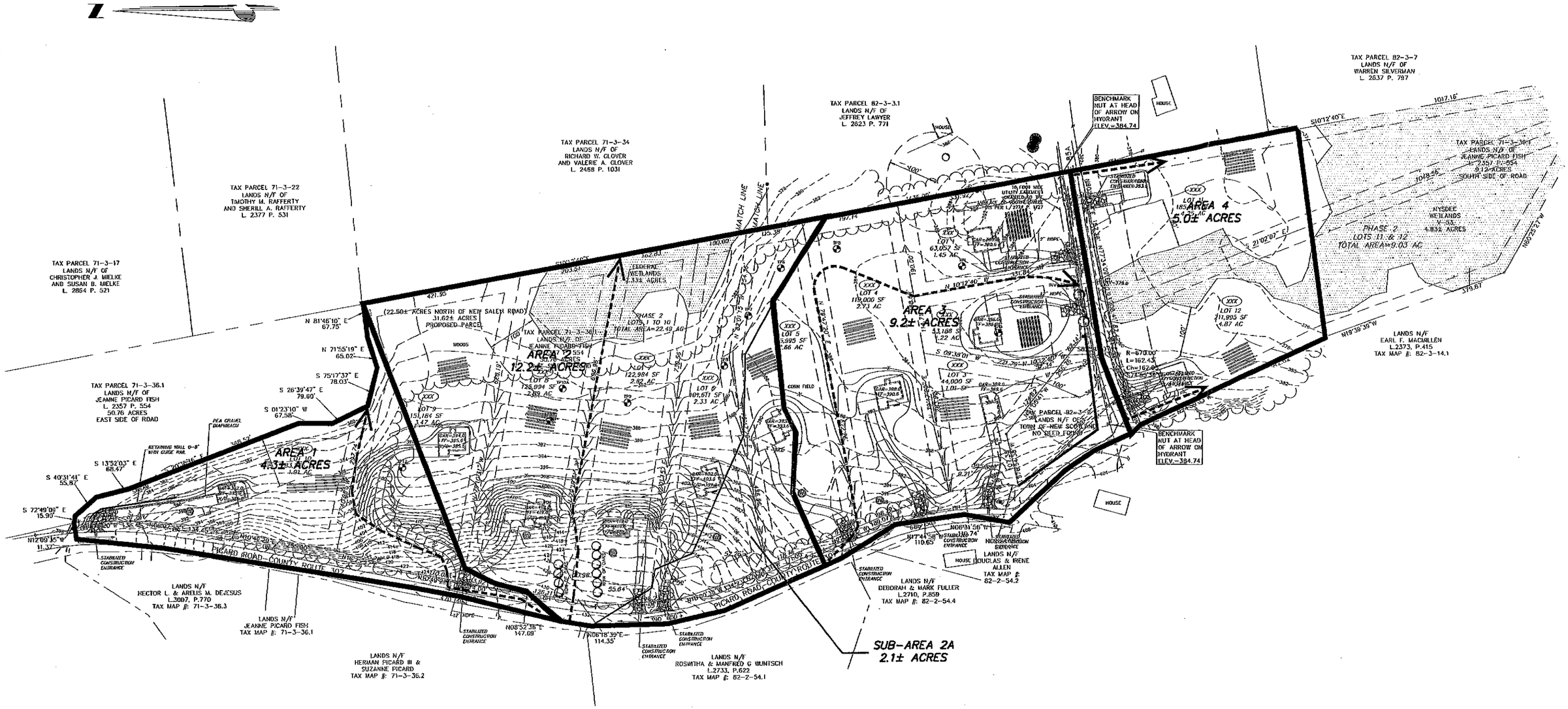
SCALE: 1"=200'

EXHIBIT 2

PRE DEVELOPMENT MAP
SUBDIVISION
LANDS OF BIERNACKI
103 PICARD ROAD
NEW SCOTLAND, NY

EXHIBIT 3

POST-DEVELOPMENT DRAINAGE



ABD ENGINEERS SURVEYORS
411 Union Street Schenectady, N.Y. 12305
518-377-0315 Fax.518-377-0379

SCALE: 1"=200'

EXHIBIT 3

POST DEVELOPMENT MAP
SUBDIVISION
LANDS OF BIERNACKI
103 PICARD ROAD
NEW SCOTLAND, NY

APPENDIX A

STORMWATER CALCULATIONS

Job# 3471A
PICARD ROAD SUBDIVISION
Total Drainage Area
RRv

Total Water Quality Volume

Water Quality Volume Required		
$WQ_v = \frac{[(P)(R_v)(A)]}{12}$		0.292 ac/ft
100% WQv=	12,732 C.F.	
$R_v = 0.05 + 0.009(I) =$		0.11
I =	7.2	
A=	30.600	
P =	1.00	

Water Quality Volume Credit by Portion of Rooftop		
$WQ_v = \frac{[(P)(R_v)(A)]}{12}$		0.212 ac/ft
100% WQv=	9,253 C.F.	
$R_v = 0.05 + 0.009(I) =$		0.08
I =	3.700	
A=	30.600	
P =	1.00	

RRv MINIMUM REQUIRED: = [P(1.0) x 0.95 x S(0.40) x AI(2.2)] x 43,560 / 12 =	3,035 ± CF
RRv PROVIDED BY INFILTRATION PRACTICE#1: 650±CF x 90% =	585 ± CF
RRv PROVIDED BY INFILTRATION PRACTICE#2A: 1,430±CF x 90% =	1,287 ± CF
RRv PROVIDED BY INFILTRATION PRACTICE#2B: 1,430±CF x 90% =	1,287 ± CF
RRv PROVIDED BY INFILTRATION PRACTICE#3: 4,450±CF x 90% =	4,005 ± CF
RRv PROVIDED BY INFILTRATION PRACTICE#4A: 650±CF x 90% =	585 ± CF
RRv PROVIDED BY INFILTRATION PRACTICE#4B: 650±CF x 90% =	585 ± CF
RRv PROVIDED BY ROOFTOP DISCONNECT: 9,253±CF x 100% =	9,253 ± CF
TOTAL RRv PROVIDED 17,587± CF IS GREATER THAN 3,035± CF...RRv MINIMUM HAS BEEN MET	

Water Quality Volume for Drainage Area 1
LOT #10

Water Quality Volume Required		
WQ_v = $\frac{[(P)(R_v)(A)]}{12}$ =	**0.015 ac/ft**	
WQv=	**633 C.F.**	
R_v = 0.05 + 0.009(I) =	0.95	
I =	100	
A=	0.18	acres (use 8,000 s.f.)
P =	1.00	

Surface Area Required (*6.3.4 Treatment*)		
A = V_w/d_b =	**633 S.F.**	
Vw =	633	c.f.
d_b =	1.00	ft.

Surface Area Provided
Provided per site plan **650 s.f.** > 633 s.f. required

Water Quality Volume for Drainage Area 2A
LOT #8 & #9

Water Quality Volume Required		
WQ_v = $\frac{[(P)(R_v)(A)]}{12}$ =	**0.033 ac/ft**	
WQv=	**1,425 C.F.**	
$R_v = 0.05 + 0.009(I)$ =	0.30	
I =	28	
A=	1.30	acres
P =	1.00	

Surface Area Required *(6.3.4 Treatment)*		
A = V_w/d_b =	**1,425 S.F.**	
Vw =	1,425	c.f.
d_b =	1.00	ft.

Surface Area Provided
Provided per site plan **1,430 s.f.** > 1,425 s.f. required

Water Quality Volume for Drainage Area 2B
LOT #6 & #7

Water Quality Volume Required		
WQ_v = $\frac{[(P)(R_v)(A)]}{12}$ =	**0.031 ac/ft**	
WQv=	**1,330 C.F.**	
$R_v = 0.05 + 0.009(I)$ =	0.48	
I =	48	
A=	0.76	acres
P =	1.00	

Surface Area Required *(6.3.4 Treatment)*		
A = V_w/d_b =	**1,330 S.F.**	
Vw =	1,330	c.f.
d_b =	1.00	ft.

Surface Area Provided
Provided per site plan **1,330 s.f.** > 1,330 s.f. required

Water Quality Volume for Drainage Area 3
LOT #1 - #5

Water Quality Volume Required		
WQ_v = $\frac{[(P)(R_v)(A)]}{12}$ =	**0.102 ac/ft**	
WQv=	**4,423 C.F.**	
$R_v = 0.05 + 0.009(I)$ =	0.16	
I =	12	
A=	7.80	acres
P =	1.00	

Surface Area Required *(6.3.4 Treatment)*		
A = V_w/d_b =	**4,423 S.F.**	
Vw =	4,423	c.f.
d_b =	1.00	ft.

Surface Area Provided
Provided per site plan **4,450 s.f.** > 4,423 s.f. required

Water Quality Volume for Drainage Area 4A
LOT #11

Water Quality Volume Required		
WQ_v = $\frac{[(P)(R_v)(A)]}{12}$ =	**0.015 ac/ft**	
WQv=	**633 C.F.**	
R_v = 0.05 + 0.009(I) =	0.95	
I =	100	
A=	0.18	acres (use 8,000 s.f.)
P =	1.00	

Surface Area Required *(6.3.4 Treatment)*		
A = V_w/d_b =	**633 S.F.**	
Vw =	633	c.f.
d_b =	1.00	ft.

Surface Area Provided
Provided per site plan **650 s.f.** > 633 s.f. required

Water Quality Volume for Drainage Area 4B
LOT #12

Water Quality Volume Required		
WQ_v = $\frac{[(P)(R_v)(A)]}{12}$ =	**0.015 ac/ft**	
WQv=	**633 C.F.**	
R_v = 0.05 + 0.009(I) =	0.95	
I =	100	
A=	0.18	acres (use 8,000 s.f.)
P =	1.00	

Surface Area Required *(6.3.4 Treatment)*		
A = V_w/d_b =	**633 S.F.**	
Vw =	633	c.f.
d_b =	1.00	ft.

Surface Area Provided
Provided per site plan **650 s.f.** > 633 s.f. required

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres / mi^2 / %	Product of CN x area
				0.0
B	WOODS/FAIR	60	4.33	259.8
				0.0
				0.0
		Totals	4.33	259.8

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{259.8}{4.33}$ **Use CN** 60

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.1471	1.0198	1.9216

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... ln		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6. Compute T_t ..... hr		0.01	

6. $T_t = \dfrac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	unpaved
8. Flow length, L .....ft		280.0	320.0
9. Watercourse slope, s ..... ft/ft		0.021	0.130
10. Average velocity, V (figure 3-1) ..... ft/sec		2.40	5.00
Compute T_t ..... hr		0.032	0.018

11. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.05

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec				
18. Flow length, L^n .....ft				
19. Compute T_t ..... hr				

19. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #:	Picard Road 12 Lot Su	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Data

Drainage area ..... A_m = 0.007 **mi^2 (acres/640)**
Runoff curve number..... CN = 60 **(from worksheet 2)**
Time of concentration ..... T_c = 0.10 **hr (from worksheet 3)**
Rainfall distribution..... = II **(I, IA, II III)**
Pond and swamp areas spred throughout watershed ..... = **% of A_m (** **acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.5	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.330	1.330	1.330
5. Compute I_a/P	0.55	0.30	0.22
6. Unit peak discharge, q_u ..... csm/in	550.0	875.0	950.0
Use T_c and I_a/P with exibit 4- II			
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.147	1.020	1.922
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	0.55	6.04	12.35

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres / mi^2 / %	Product of CN x area
				0.0
	proposed house & dway	98	0.33	32.3
B	grass	61	0.60	36.6
B	remianing woods/brush	60	3.40	204.0
		Totals	4.33	272.9

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{272.9}{4.33}$ **Use CN** 63

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.2124	1.2044	2.1794

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... ln		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6. Compute T_t ..... hr		0.01	

6. $T_t = \dfrac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	unpaved
8. Flow length, L .....ft		480.0	120.0
9. Watercourse slope, s ..... ft/ft		0.100	0.050
10. Average velocity, V (figure 3-1) ..... ft/sec		5.00	3.00
Compute T_t ..... hr		0.027	0.011

11.

$T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.04

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec				
18. Flow length, L^n .....ft				
19. Compute T_t ..... hr				

19. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.007	mi^2	**(acres/640)**
Runoff curve number..... CN =	63		**(from worksheet 2)**
Time of concentration ..... T_c =	0.10	**hr**	**(from worksheet 3)**
Rainfall distribution..... =	II		**(I, IA, II III)**

Pond and swamp areas spred throughout watershed ..... = **% of A_m (** **acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.330	1.330	1.330
5. Compute I_a/P	0.55	0.30	0.22
6. Unit peak discharge, q_u ..... csm/in	550.0	875.0	950.0
Use T_c and I_a/P with exibit 4- II			
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.212	1.204	2.179
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	0.79	7.13	14.01

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres mi^2 %	Product of CN x area
				0.0
B	OPEN CORN FIELDS/POOR	79	6.42	507.2
B	WOODS/FAIR	60	3.60	216.0
				0.0
		Totals	10.02	723.2

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{723.2}{10.02}$ **Use CN** 72

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.4838	1.8333	3.0097

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... ln		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6. Compute T_t ..... hr		0.01	

6. $T_t = \dfrac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	unpaved
8. Flow length, L .....ft		130.0	570.0
9. Watercourse slope, s ..... ft/ft		0.060	0.100
10. Average velocity, V (figure 3-1) ..... ft/sec		3.20	4.00
Compute T_t ..... hr		0.011	0.040

11. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.05

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\dfrac{a}{P_w}$ **Compute r .....ft**				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\dfrac{1.49 r^{2/3} s^{1/2}}{n}$ **Compute V ..... ft/sec**				
18. Flow length, L^n .....ft				
19. Compute T_t ..... hr				

19. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m = 0.016 **mi^2 (acres/640)**
Runoff curve number..... CN = 72 **(from worksheet 2)**
Time of concentration ..... T_c = 0.10 **hr (from worksheet 3)**
Rainfall distribution..... = II **(I, IA, II III)**
Pond and swamp areas spred throughout watershed ..... = **% of A_m (** **acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	0.778	0.778	0.778
5. Compute I_a/P	0.32	0.17	0.13
6. Unit peak discharge, q_u ..... csm/in Use T_c and I_a/P with exibit 4- II	900.0	950.0	975.0
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.484	1.833	3.010
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	6.82	27.27	45.94

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres mi^2 %	Product of CN x area
				0.0
	proposed house & dway	98	0.75	73.5
B	grass	61	10.70	652.7
B	grass & decompacted soils	61	0.75	45.8
		Totals	12.20	772.0

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{772.0}{12.20}$ **Use CN** 63

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.2180	1.2195	2.2002

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... ln		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6. Compute T_t ..... hr		0.01	

6. $T_t = \dfrac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	unpaved
8. Flow length, L .....ft		130.0	570.0
9. Watercourse slope, s ..... ft/ft		0.060	0.100
10. Average velocity, V (figure 3-1) ..... ft/sec		3.20	4.00
Compute T_t ..... hr		0.011	0.040

11. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.05

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec				
18. Flow length, L^n .....ft				
19. Compute T_t ..... hr				

19. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.019	**mi^2 (acres/640)**
Runoff curve number..... CN =	63	**(from worksheet 2)**
Time of concentration ..... T_c =	0.10	**hr (from worksheet 3)**
Rainfall distribution..... =	II	**(I, IA, II III)**
Pond and swamp areas spred throughout watershed ..... =		**% of A_m (acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.279	1.279	1.279
5. Compute I_a/P	0.53	0.28	0.21
6. Unit peak discharge, q_u ..... csm/in Use T_c and I_a/P with exibit 4- II	550.0	900.0	950.0
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.218	1.219	2.200
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	2.29	20.92	39.84

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres / mi^2 / %	Product of CN x area
				0.0
	proposed house & dway	98	0.17	16.7
B	grass	61	1.93	117.7
B	grass & decompacted soils	61	0.00	0.0
		Totals	2.10	134.4

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}} = \frac{134.4}{2.10}$ **Use CN** 64

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.2355	1.2653	2.2630

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		unpaved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... ln		100	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.060	
6. Compute T_t ..... hr		0.01	

T_t = $\dfrac{0.007(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	
8. Flow length, L .....ft		325.0	
9. Watercourse slope, s ..... ft/ft		0.075	
10. Average velocity, V (figure 3-1) ..... ft/sec		4.00	
Compute T_t ..... hr		0.023	

11.

T_t = $\dfrac{L}{(3600)(V)}$

T_t = 0.02

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\dfrac{a}{P_w}$ **Compute r .....ft**				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\dfrac{1.49 r^{2/3} s^{1/2}}{n}$ **Compute V ..... ft/sec**				
18. Flow length, L^n .....ft				
19. Compute T_t ..... hr				

T_t = $\dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #:	Picard Road 12 Lot Su	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.003	**mi^2 (acres/640)**	
Runoff curve number..... CN =	64	**(from worksheet 2)**	
Time of concentration ..... T_c =	0.10	**hr (from worksheet 3)**	
Rainfall distribution..... =	II	**(I, IA, II III)**	
Pond and swamp areas spred throughout watershed ..... =		**% of A_m (**	**acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... in	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.125	1.125	1.125
5. Compute I_a/P	0.47	0.25	0.19
6. Unit peak discharge, q_u ..... csm/in	550.0	900.0	950.0
Use T_c and I_a/P with exibit 4- II			
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.235	1.265	2.263
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	0.42	3.74	7.05

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres / mi^2 / %	Product of CN x area
				0.0
B	OPEN CORN FIELDS/POOR	79	11.30	892.7
B	WOODS/FAIR	60	0.00	0.0
				0.0
		Totals	11.30	892.7

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{892.7}{11.30}$ **Use CN** 79

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.7712	2.3765	3.6796

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... ln		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6.	**Compute T_t ..... hr**	0.01	

$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	unpaved
8. Flow length, L .....ft		130.0	1030.0
9. Watercourse slope, s ..... ft/ft		0.080	0.060
10. Average velocity, V (figure 3-1) ..... ft/sec		4.20	3.80
	Compute T_t ..... hr	0.009	0.075

11.

$T_t = \frac{L}{(3600)(V)}$

T_t = 0.08

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec				
18. Flow length, L^n .....ft				
19.	**Compute T_t ..... hr**			

$T_t = \frac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.018	**mi^2 (acres/640)**	
Runoff curve number..... CN =	79	**(from worksheet 2)**	
Time of concentration ..... T_c =	0.10	**hr (from worksheet 3)**	
Rainfall distribution..... =	II	**(I, IA, II III)**	
Pond and swamp areas spred throughout watershed ..... =		**% of A_m (**	**acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	0.532	0.532	0.532
5. Compute I_a/P	0.22	0.12	0.09
6. Unit peak discharge, q_u ..... csm/in	950.0	975.0	1000.0
Use T_c and I_a/P with exibit 4-	II		
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.771	2.376	3.680
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	12.94	40.91	64.97

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres / mi^2 / %	Product of CN x area
				0.0
	proposed house & dway	98	0.80	78.4
B	grass	61	7.60	463.6
B	grass & decompacted soils	61	0.80	48.8
		Totals	9.20	590.8

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{590.8}{9.20}$ **Use CN** 64

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2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.2410	1.2796	2.2824

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow — **Segment ID**		
1. Surface description (table 3-1).....	paved	
2. Mannning's roughness coefficient, n (table 3-1).	0.01	
3. Flow length, L (total L † 300 ft) ..... In	24	
4. Two-year 24-hour rainfall, P_2 ..... in	2.80	
5. Land slope, s ..... ft/ft	0.030	
6. Compute T_t ..... hr	0.01	

6. $T_t = \dfrac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow — **Sgment ID**		
7. Surface description (paved or unpaved).....	unpaved	unpaved
8. Flow length, L .....ft	540.0	500.0
9. Watercourse slope, s ..... ft/ft	0.050	0.010
10. Average velocity, V (figure 3-1) ..... ft/sec	2.80	1.80
Compute T_t ..... hr	0.054	0.077

11. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.13

Channel flow — **Sgment ID**			
12. Cross sectional flow area, a ..... ft^2			
13. Wetted perimeter, P_w ..... ft			
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft			
15. Channel slope, s ..... ft/ft			
16. Manning's roughness coefficient, n			
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec			
18. Flow length, L^n .....ft			
19. Compute T_t ..... hr			

19. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.14

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.014	**mi^2 (acres/640)**
Runoff curve number..... CN =	64	**(from worksheet 2)**
Time of concentration ..... T_c =	0.14	**hr (from worksheet 3)**
Rainfall distribution..... =	II	**(I, IA, II III)**
Pond and swamp areas spred throughout watershed ..... =		**% of A_m (acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.226	1.226	1.226
5. Compute I_a/P	0.51	0.27	0.20
6. Unit peak discharge, q_u ..... csm/in	450.0	800.0	875.0
Use T_c and I_a/P with exibit 4-	II		
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.241	1.280	2.282
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	1.56	14.72	28.71

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres mi^2 %	Product of CN x area
				0.0
B	OPEN CORN FIELDS/POOR	79	0.00	0.0
B	WOODS/FAIR	60	5.00	300.0
				0.0
		Totals	5.00	300.0

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{300.0}{5.00}$ **Use CN** 60

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.1471	1.0198	1.9216

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... in		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6.	**Compute T_t ..... hr**	0.01	

$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	
8. Flow length, L .....ft		320.0	
9. Watercourse slope, s ..... ft/ft		0.013	
10. Average velocity, V (figure 3-1) ..... ft/sec		2.00	
	Compute T_t ..... hr	0.044	

11.

$T_t = \frac{L}{(3600)(V)}$

T_t = 0.04

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec				
18. Flow length, L^n .....ft				
19.	**Compute T_t ..... hr**			

$T_t = \frac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.008	**mi^2 (acres/640)**
Runoff curve number..... CN =	60	**(from worksheet 2)**
Time of concentration ..... T_c =	0.10	**hr (from worksheet 3)**
Rainfall distribution..... =	II	**(I, IA, II III)**
Pond and swamp areas spred throughout watershed ..... =		**% of A_m (acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.330	1.330	1.330
5. Compute I_a/P	0.55	0.30	0.22
6. Unit peak discharge, q_u ..... csm/in	550.0	900.0	975.0
Use T_c and I_a/P with exibit 4- II			
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.147	1.020	1.922
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	0.63	7.17	14.64

WORKSHEET 2: Runoff curve number and runoff

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-13***

1. Runoff curve number

Soil name and hydrolic group	Cover description	CN	Area acres / mi^2 / %	Product of CN x area
				0.0
	proposed house & dway	98	0.20	19.6
B	woods	60	4.60	276.0
B	grass & decompacted soils	61	0.20	12.2
		Totals	5.00	307.8

CN (weighted) = $\frac{\textit{total product}}{\textit{total area}}$ = $\frac{307.8}{5.00}$ **Use CN** 62

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr	1	10	100
Rainfall, P (24-hour) ...in	2.40	4.50	6.00
Runoff, Q ..... in	0.1792	1.1132	2.0530

WORKSHEET 3: Time of Concentration (T_c) or travel time (T_t)

Project #:	Picard Road 12 Lot Subdivision	**By:**	LAP
Location:	New Scotland	**Date:**	2/25/13 ***REV:4-1-1***

Sheet flow	**Segment ID**		
1. Surface description (table 3-1).....		paved	
2. Mannning's roughness coefficient, n (table 3-1).		0.01	
3. Flow length, L (total L † 300 ft) ..... in		24	
4. Two-year 24-hour rainfall, P_2 ..... in		2.80	
5. Land slope, s ..... ft/ft		0.030	
6. Compute T_t ..... hr		0.01	

6. $T_t = \dfrac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$

T_t = 0.01

Shallow concentrated flow	**Sgment ID**		
7. Surface description (paved or unpaved).....		unpaved	
8. Flow length, L .....ft		320.0	
9. Watercourse slope, s ..... ft/ft		0.013	
10. Average velocity, V (figure 3-1) ..... ft/sec		2.00	
Compute T_t ..... hr		0.044	

11. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.04

Channel flow	**Sgment ID**			
12. Cross sectional flow area, a ..... ft^2				
13. Wetted perimeter, P_w ..... ft				
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft				
15. Channel slope, s ..... ft/ft				
16. Manning's roughness coefficient, n				
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/sec				
18. Flow length, L^n .....ft				
19. Compute T_t ..... hr				

19. $T_t = \dfrac{L}{(3600)(V)}$

T_t = 0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) .....Hr 0.10

Worksheet 4: Graphical Peak Discharge method

Project #: Picard Road 12 Lot Su	**By:**	LAP	
Location: New Scotland	**Date:**	2/25/13	***REV:4-1-13***

1. Data

Drainage area ..... A_m =	0.008	**mi^2 (acres/640)**
Runoff curve number..... CN =	62	**(from worksheet 2)**
Time of concentration ..... T_c =	0.10	**hr (from worksheet 3)**
Rainfall distribution..... =	II	**(I, IA, II III)**
Pond and swamp areas spred throughout watershed ..... =		**% of A_m (acres or mi^2 covered)**

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	1	10	100
3. Rainfall, P (24-hour) ..... In	2.40	4.50	6.00
4. Initial abstraction, I_a ..... in (use CN with table 4-1)	1.279	1.279	1.279
5. Compute I_a/P	0.53	0.28	0.21
6. Unit peak discharge, q_u ..... csm/in	550.0	900.0	975.0
Use T_c and I_a/P with exibit 4-	II		
7. Runoff Q ..... in (From worksheet 2) Figure 2-6	0.179	1.113	2.053
8. Pond and swamp factor, F_p ..... (Use % pond and swamp area with table 4-2. Factor is 1.0 for zero % pond and swamp area.)	1.000	1.000	1.000
9. Peak discharge, q_p ..... ft^3/sec (Where $q_p = q_u\ a_m\ QF_p$)	0.77	7.83	15.64

APPENDIX B

SUPPLEMENT ANALYSIS FOR EXISTING 24" CPP

Supplement Analysis – Existing 24" CPP under New Salem Road

Proposed 12 Lot Single Family Residential Subdivision
Picard Road and New Salem Road
Town of New Scotland
Albany County, New York

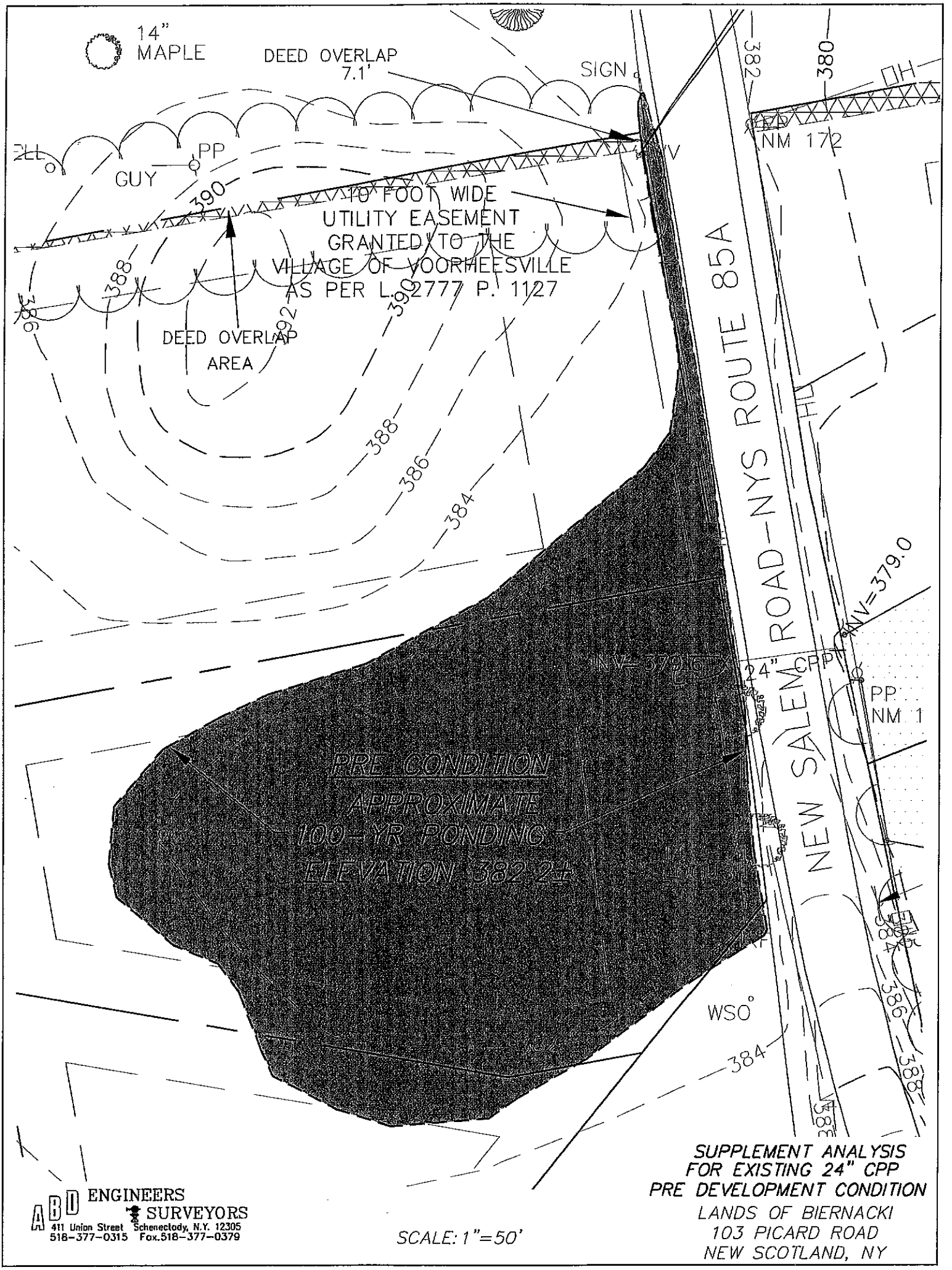
This analysis has been prepared to supplement the calculations for the existing 24" CPP under New Salem Road. The existing 24" CPP has a 1.28% slope and a flow capacity of approximately 28 cfs (see attached). In the predevelopment condition, the watershed that drains to the existing 24" pipe has been calculated. The 1, 10 and 100 year storm event has peak discharge rates of 13± cfs, 41± cfs and 65± cfs respectively. Under current conditions the10-year and greater storm events, ponding occurs at the inlet of the pipe creating a head condition before discharging to the south side of New Salem Road.

In the post development condition, the watershed that drains to the existing 24" pipe has been reduced and the calculated 1, 10 and 100 year storm event has peak discharge rates of 2± cfs, 15± cfs and 29± cfs respectively. The post development condition will reduce the required ponding elevation needed to pass the peak development discharge rates through the existing 24" CPP. An easement has been provided on Lots 1, 2, 3 & 4 to allow ponding within the easement for the 100-year event. Attached are the pre and post maps that show the approximate ponding areas.

The low point for this portion of New Salem Road is elevation 382.91 feet. The summary of ponding elevations is as follows:

Storm	Existing	Proposed
1-year	380.80	380.16
2-year	380.99	380.41
10-year	381.69	381.27
25-year	381.88	381.52
50-year	382.06	381.77
100-year	382.23	382.03

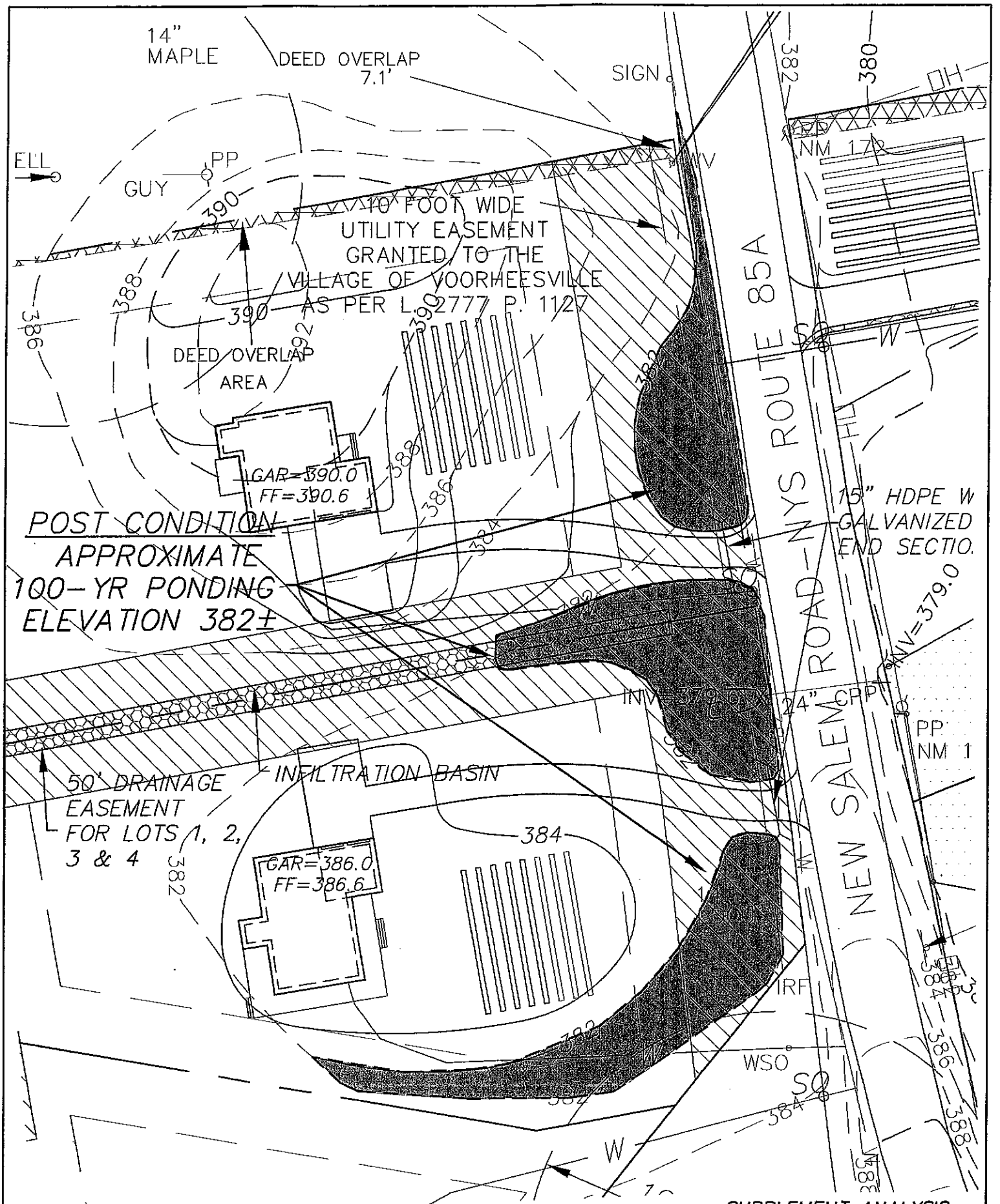
The analysis shows in the post development condition, the ponding elevation does not significantly change, however the ponding volume and areas have been reduced. The proposed subdivision and the existing 24" CPP as proposed will function adequately and will not adversely affect the capacity of the existing 24" CPP.



ABD ENGINEERS SURVEYORS
411 Union Street Schenectady, N.Y. 12305
518-377-0315 Fax.518-377-0379

SCALE: 1"=50'

SUPPLEMENT ANALYSIS
FOR EXISTING 24" CPP
PRE DEVELOPMENT CONDITION
LANDS OF BIERNACKI
103 PICARD ROAD
NEW SCOTLAND, NY



ABD ENGINEERS SURVEYORS
411 Union Street Schenectady, N.Y. 12305
518-377-0315 Fax.518-377-0379

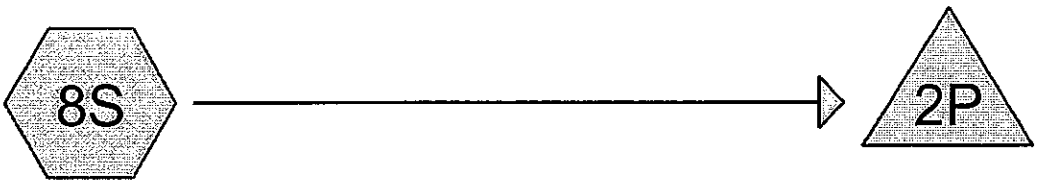
SCALE: 1"=50'

SUPPLEMENT ANALYSIS
FOR EXISTING 24" CPP
POST DEVELOPMENT CONDITION
LANDS OF BIERNACKI
103 PICARD ROAD
NEW SCOTLAND, NY

Pipe Calcs for Existing 24" CPP under New Salem Road New Scotland, NY

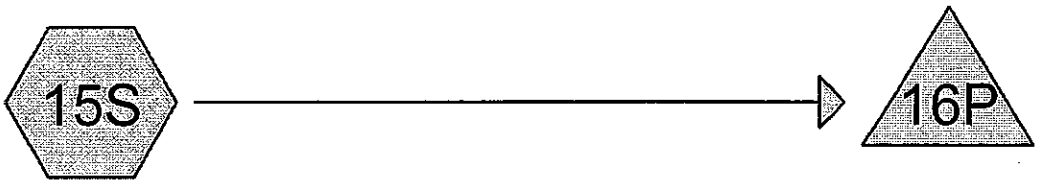
Channel flow	Sgment ID	24" CPP	
12. Cross sectional flow area, a ..... ft^2		3.142	
13. Wetted perimeter, P_w ..... ft		6.28	
14. Hydraulic radius, r= $\frac{a}{P_w}$ Compute r .....ft		0.50	
15. Channel slope, s ..... ft/ft		0.0128	
16. Manning's roughness coefficient, n		0.012	
17. V= $\frac{1.49 r^{2/3} s^{1/2}}{n}$	Compute V ..... ft/sec	8.85	
	Full Flow Capacity Q**=	28	±CFS

*** The flow would be greater if any head conditions were considered***



PRE DEVELOPMENT
AREA #3

EXISTING PONDING
AREA FOR 24"
CULVERT



POST DEVELOPMENT
AREA #3

PROPOSED PONDING
AREA FOR 24"
CULVERT

Subcat Reach Pond Link

Drainage Diagram for 3471_EXISTING 24-INCH CULVERT ANALYSIS
Prepared by ABD Engineers and Surveyors

Summary for Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT

Inflow Area = 11.300 ac, 0.00% Impervious, Inflow Depth = 0.77" for 1 YEAR event
Inflow = 13.51 cfs @ 12.02 hrs, Volume= 0.726 af
Outflow = 5.78 cfs @ 12.14 hrs, Volume= 0.726 af, Atten= 57%, Lag= 7.6 min
Primary = 5.78 cfs @ 12.14 hrs, Volume= 0.726 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 380.80' @ 12.14 hrs Surf.Area= 15,455 sf Storage= 6,278 cf

Plug-Flow detention time= 7.5 min calculated for 0.726 af (100% of inflow)
Center-of-Mass det. time= 7.5 min (869.8 - 862.3)

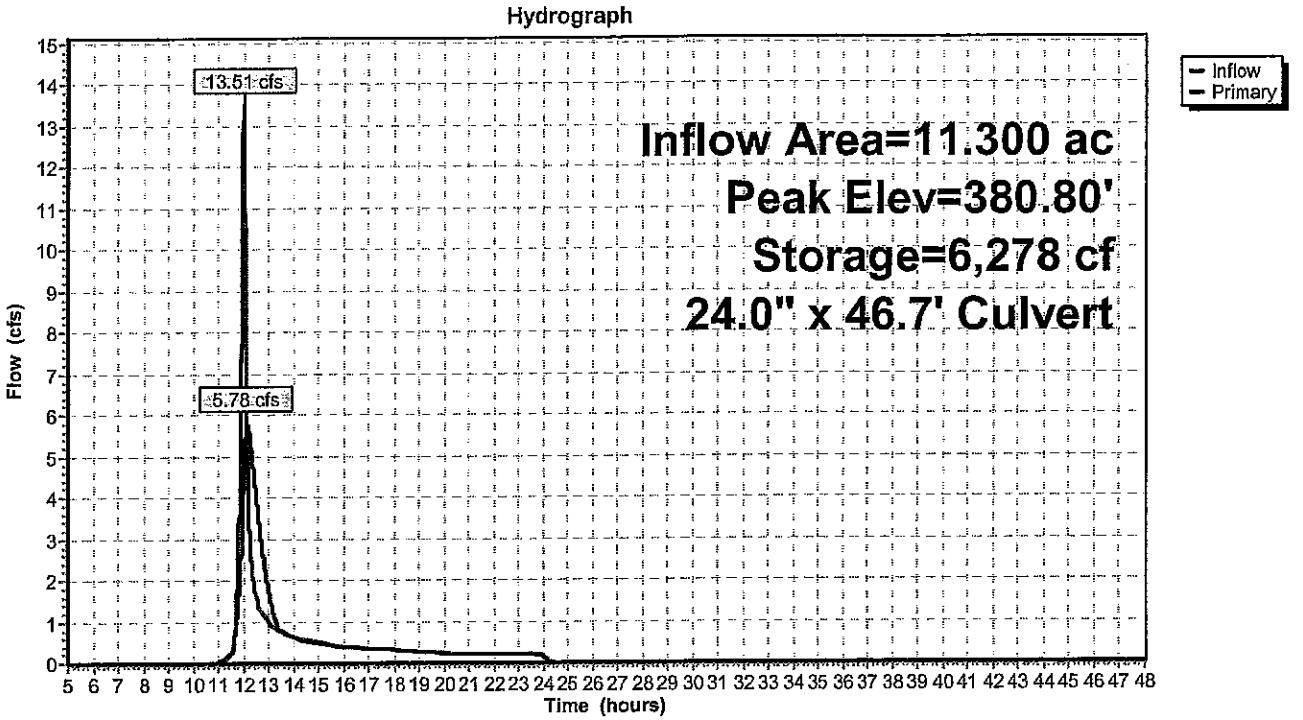
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	85,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	38,447	38,630	38,667
382.91	64,191	46,700	85,367

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.78 cfs @ 12.14 hrs HW=380.80' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.78 cfs @ 2.94 fps)

Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT



Summary for Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT

Inflow Area = 9.200 ac, 0.00% Impervious, Inflow Depth = 0.24" for 1 YEAR event
Inflow = 1.61 cfs @ 12.09 hrs, Volume= 0.181 af
Outflow = 1.44 cfs @ 12.14 hrs, Volume= 0.181 af, Atten= 10%, Lag= 2.9 min
Primary = 1.44 cfs @ 12.14 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 380.16' @ 12.14 hrs Surf.Area= 1,191 sf Storage= 145 cf

Plug-Flow detention time= 0.9 min calculated for 0.181 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (945.8 - 944.9)

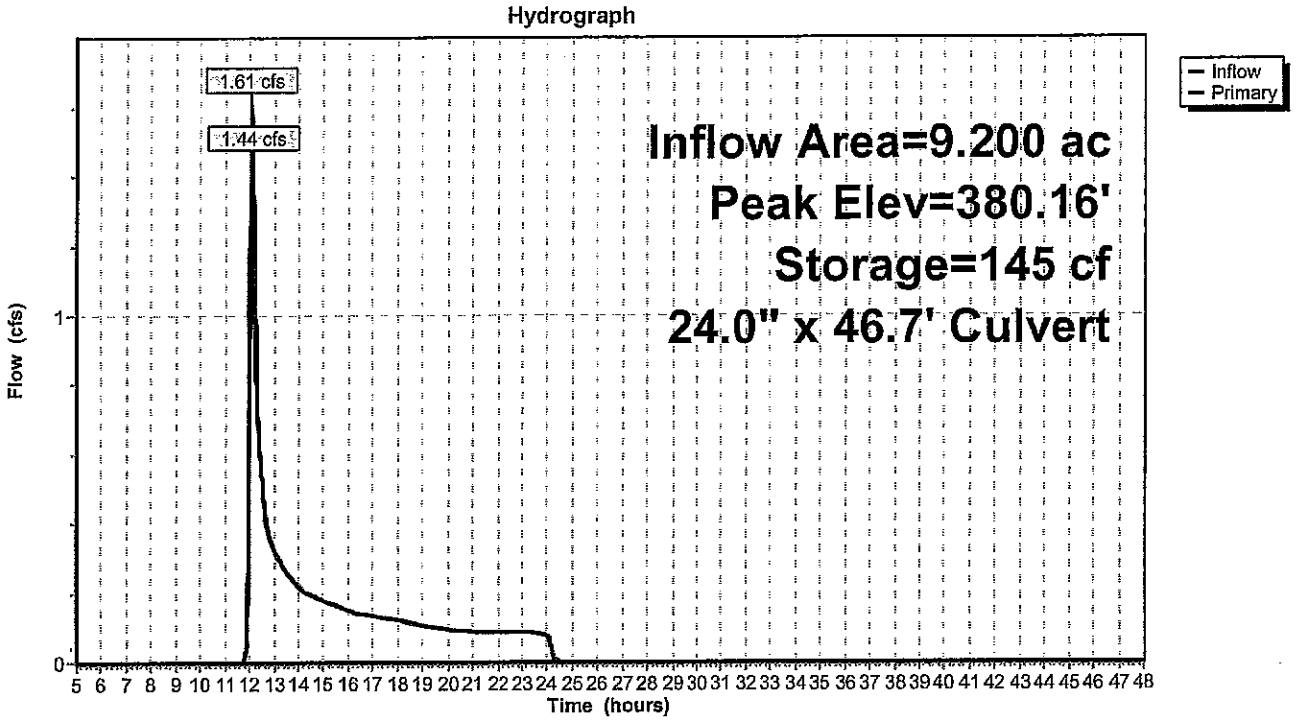
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	47,788 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	12,927	13,110	13,147
382.91	63,208	34,641	47,788

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.44 cfs @ 12.14 hrs HW=380.16' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1.44 cfs @ 2.01 fps)

Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT



Summary for Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT

Inflow Area = 11.300 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2 YEAR event
Inflow = 18.55 cfs @ 12.02 hrs, Volume= 0.983 af
Outflow = 7.37 cfs @ 12.15 hrs, Volume= 0.983 af, Atten= 60%, Lag= 8.1 min
Primary = 7.37 cfs @ 12.15 hrs, Volume= 0.983 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 380.99' @ 12.15 hrs Surf.Area= 19,078 sf Storage= 9,548 cf

Plug-Flow detention time= 9.5 min calculated for 0.983 af (100% of inflow)
Center-of-Mass det. time= 9.5 min (862.5 - 853.0)

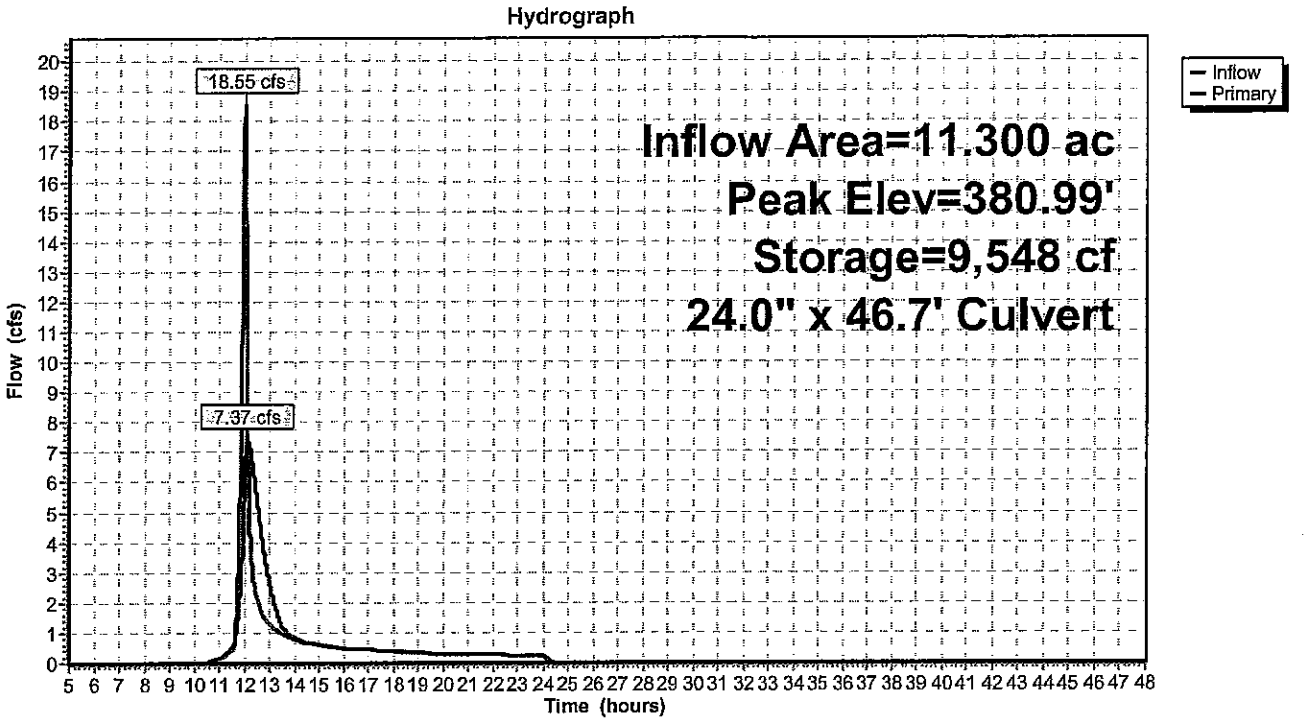
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	85,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	38,447	38,630	38,667
382.91	64,191	46,700	85,367

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=7.36 cfs @ 12.15 hrs HW=380.99' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.36 cfs @ 3.17 fps)

Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT



Summary for Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT

Inflow Area = 9.200 ac, 0.00% Impervious, Inflow Depth = 0.38" for 2 YEAR event
Inflow = 3.49 cfs @ 12.08 hrs, Volume= 0.295 af
Outflow = 2.77 cfs @ 12.15 hrs, Volume= 0.295 af, Atten= 21%, Lag= 4.2 min
Primary = 2.77 cfs @ 12.15 hrs, Volume= 0.295 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 380.39' @ 12.15 hrs Surf.Area= 2,682 sf Storage= 598 cf

Plug-Flow detention time= 1.3 min calculated for 0.295 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (921.6 - 920.3)

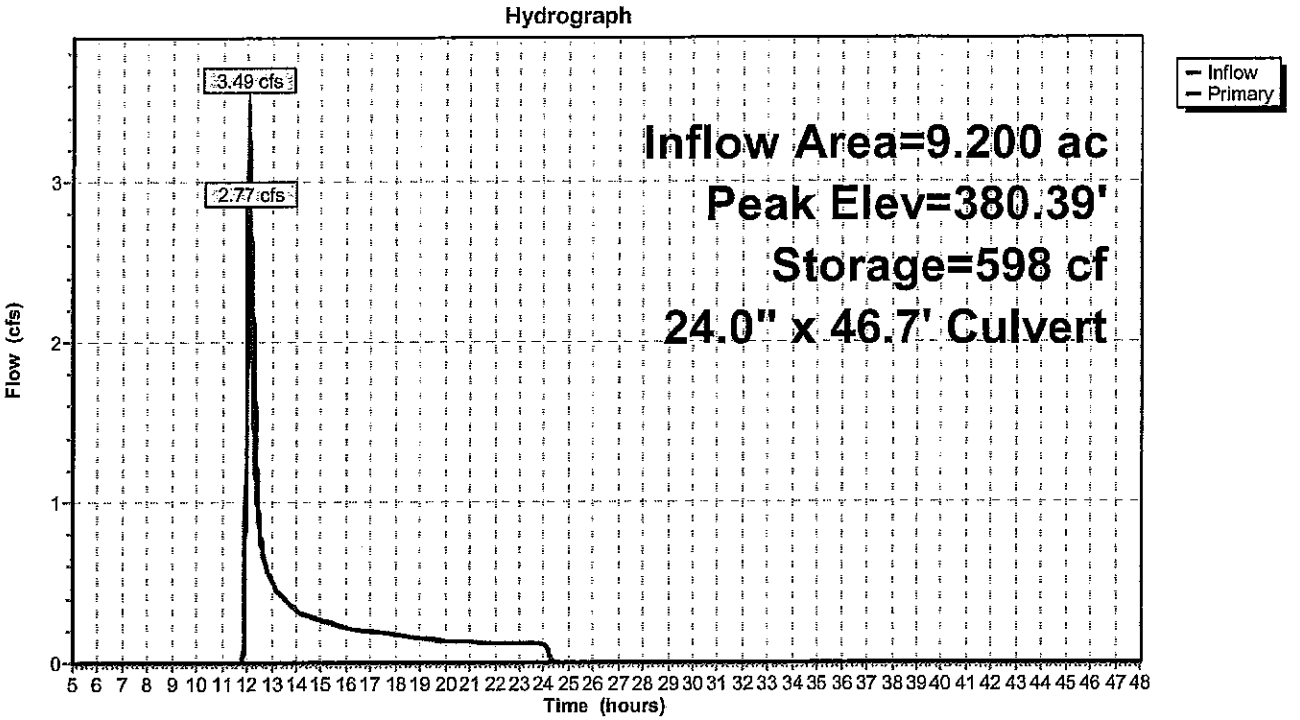
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	47,788 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	12,927	13,110	13,147
382.91	63,208	34,641	47,788

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.77 cfs @ 12.15 hrs HW=380.39' (Free Discharge)
↑**1=Culvert** (Inlet Controls 2.77 cfs @ 2.39 fps)

Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT



Summary for Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT

Inflow Area = 11.300 ac, 0.00% Impervious, Inflow Depth = 2.38" for 10 YEAR event
Inflow = 42.40 cfs @ 12.01 hrs, Volume= 2.238 af
Outflow = 12.49 cfs @ 12.18 hrs, Volume= 2.238 af, Atten= 71%, Lag= 10.3 min
Primary = 12.49 cfs @ 12.18 hrs, Volume= 2.238 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 381.69' @ 12.18 hrs Surf.Area= 32,595 sf Storage= 27,802 cf

Plug-Flow detention time= 17.4 min calculated for 2.237 af (100% of inflow)
Center-of-Mass det. time= 17.3 min (846.5 - 829.1)

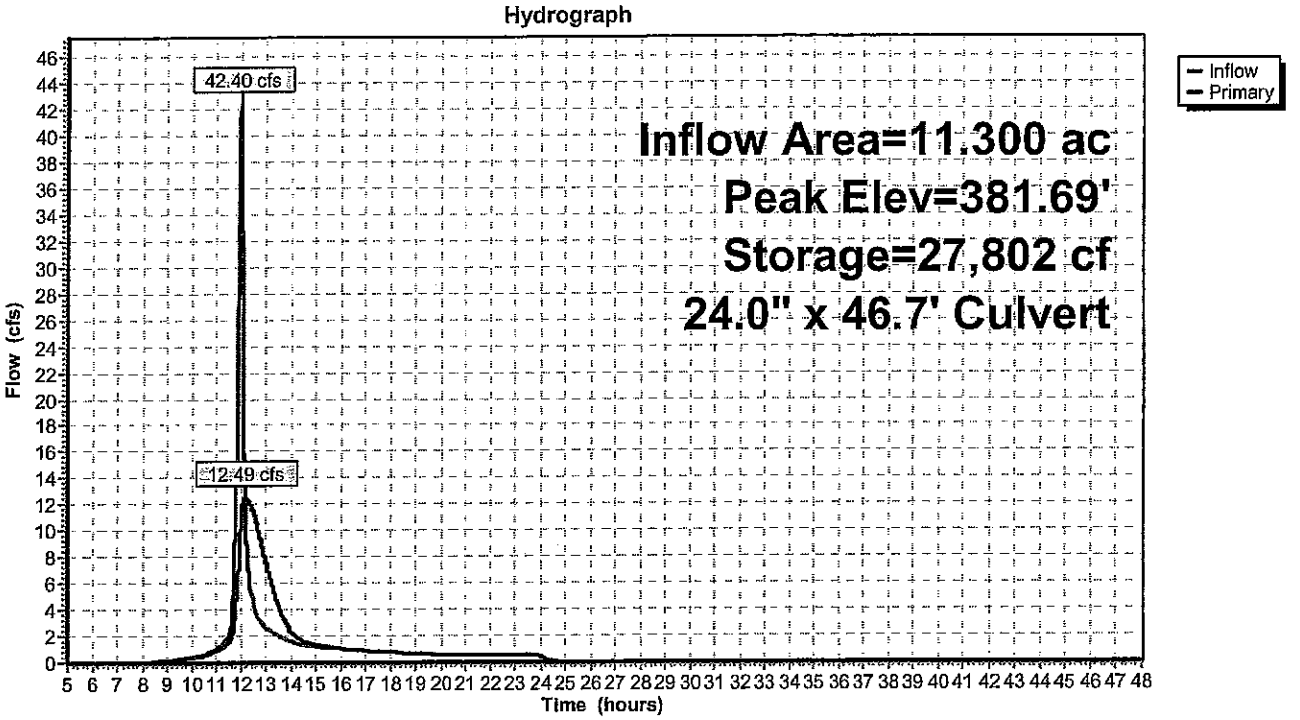
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	85,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	38,447	38,630	38,667
382.91	64,191	46,700	85,367

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=12.49 cfs @ 12.18 hrs HW=381.69' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 12.49 cfs @ 3.98 fps)

Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT



Summary for Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT

Inflow Area = 9.200 ac, 0.00% Impervious, Inflow Depth = 1.27" for 10 YEAR event
Inflow = 15.42 cfs @ 12.06 hrs, Volume= 0.970 af
Outflow = 9.72 cfs @ 12.17 hrs, Volume= 0.970 af, Atten= 37%, Lag= 6.4 min
Primary = 9.72 cfs @ 12.17 hrs, Volume= 0.970 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 381.27' @ 12.17 hrs Surf.Area= 8,266 sf Storage= 5,396 cf

Plug-Flow detention time= 3.9 min calculated for 0.970 af (100% of inflow)
Center-of-Mass det. time= 3.9 min (877.6 - 873.7)

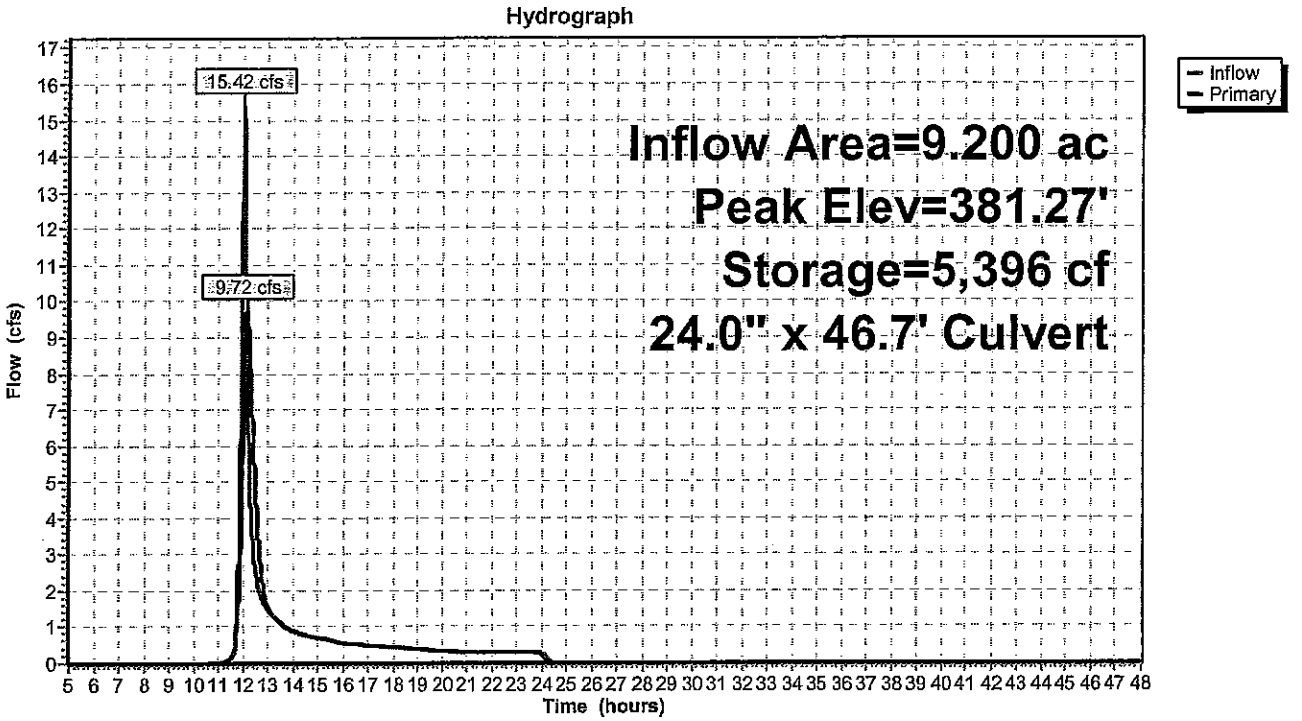
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	47,788 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	12,927	13,110	13,147
382.91	63,208	34,641	47,788

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=9.72 cfs @ 12.17 hrs HW=381.27' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 9.72 cfs @ 3.47 fps)

Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT



Summary for Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT

Inflow Area = 11.300 ac, 0.00% Impervious, Inflow Depth = 2.80" for 25 YEAR event
Inflow = 49.83 cfs @ 12.01 hrs, Volume= 2.638 af
Outflow = 13.52 cfs @ 12.19 hrs, Volume= 2.638 af, Atten= 73%, Lag= 10.9 min
Primary = 13.52 cfs @ 12.19 hrs, Volume= 2.638 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 381.88' @ 12.19 hrs Surf.Area= 36,200 sf Storage= 34,283 cf

Plug-Flow detention time= 19.8 min calculated for 2.638 af (100% of inflow)
Center-of-Mass det. time= 19.8 min (844.2 - 824.4)

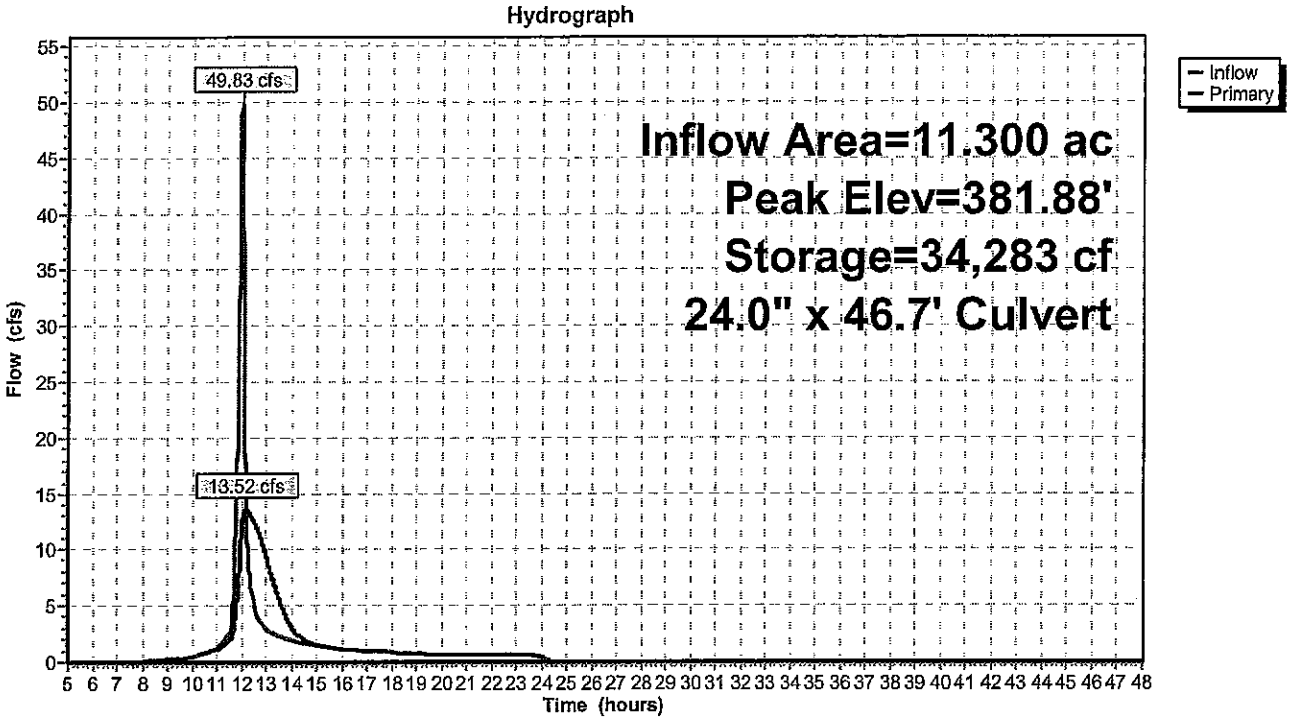
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	85,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	38,447	38,630	38,667
382.91	64,191	46,700	85,367

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=13.52 cfs @ 12.19 hrs HW=381.88' (Free Discharge)
↑**1=Culvert** (Inlet Controls 13.52 cfs @ 4.30 fps)

Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT



Summary for Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT

Inflow Area = 9.200 ac, 0.00% Impervious, Inflow Depth = 1.58" for 25 YEAR event
Inflow = 19.65 cfs @ 12.06 hrs, Volume= 1.212 af
Outflow = 11.53 cfs @ 12.17 hrs, Volume= 1.212 af, Atten= 41%, Lag= 7.0 min
Primary = 11.53 cfs @ 12.17 hrs, Volume= 1.212 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 381.52' @ 12.17 hrs Surf.Area= 9,850 sf Storage= 7,647 cf

Plug-Flow detention time= 4.7 min calculated for 1.212 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (871.2 - 866.5)

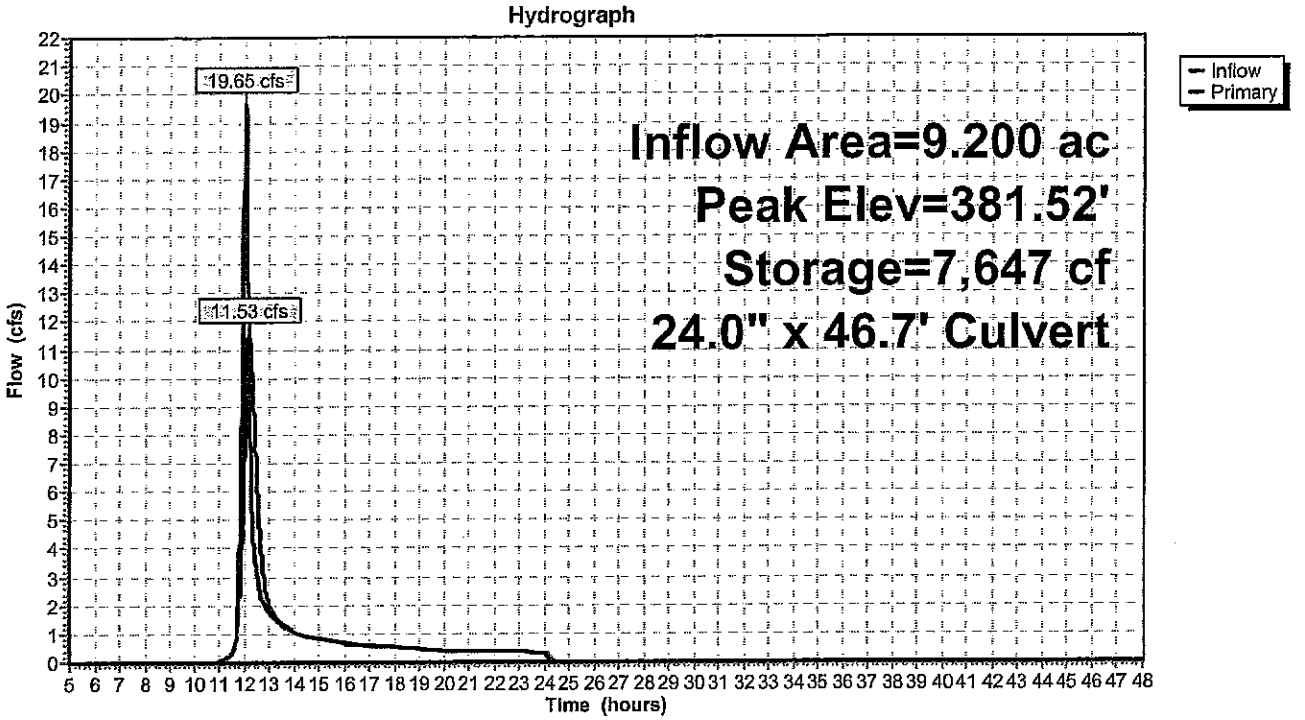
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	47,788 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	12,927	13,110	13,147
382.91	63,208	34,641	47,788

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=11.52 cfs @ 12.17 hrs HW=381.52' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 11.52 cfs @ 3.72 fps)

Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT



Summary for Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT

Inflow Area = 11.300 ac, 0.00% Impervious, Inflow Depth = 3.24" for 50 YEAR event
Inflow = 57.35 cfs @ 12.01 hrs, Volume= 3.048 af
Outflow = 14.44 cfs @ 12.20 hrs, Volume= 3.048 af, Atten= 75%, Lag= 11.6 min
Primary = 14.44 cfs @ 12.20 hrs, Volume= 3.048 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 382.06' @ 12.20 hrs Surf.Area= 40,208 sf Storage= 41,115 cf

Plug-Flow detention time= 22.4 min calculated for 3.047 af (100% of inflow)
Center-of-Mass det. time= 22.3 min (842.7 - 820.3)

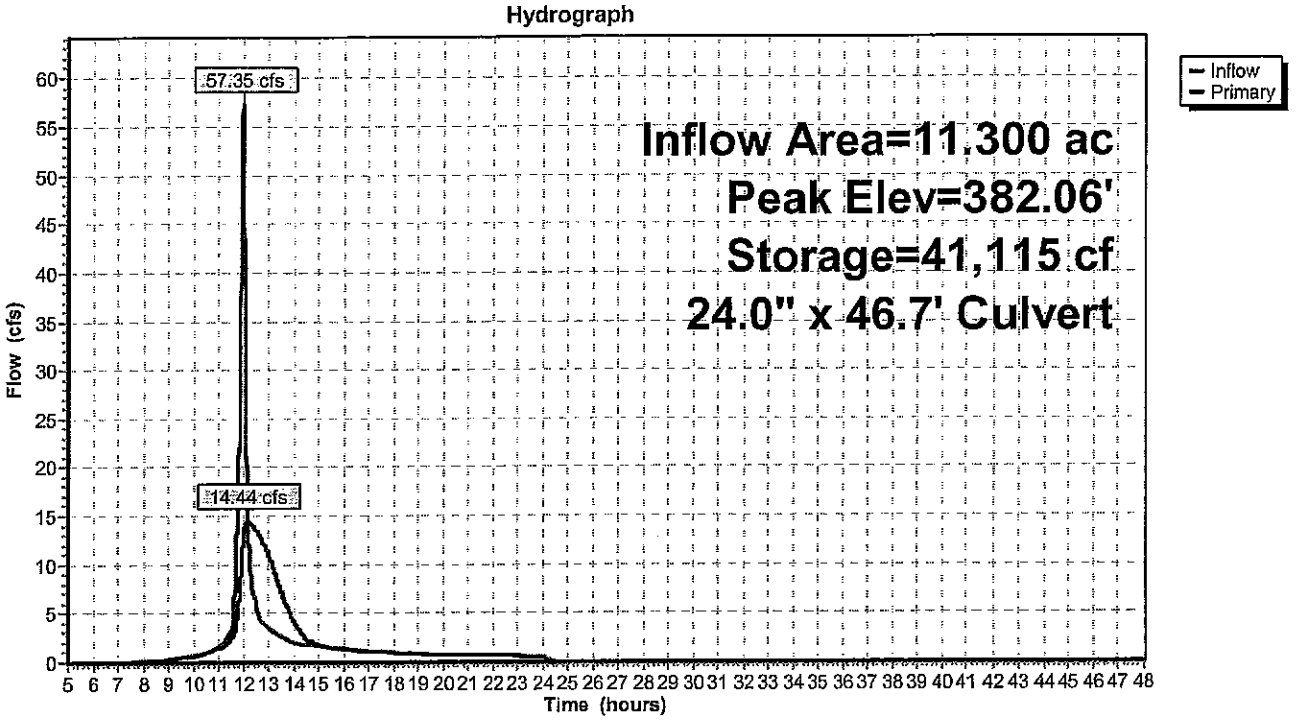
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	85,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	38,447	38,630	38,667
382.91	64,191	46,700	85,367

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=14.44 cfs @ 12.20 hrs HW=382.06' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 14.44 cfs @ 4.60 fps)

Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT



Summary for Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT

Inflow Area = 9.200 ac, 0.00% Impervious, Inflow Depth = 1.91" for 50 YEAR event
Inflow = 24.11 cfs @ 12.05 hrs, Volume= 1.467 af
Outflow = 12.94 cfs @ 12.18 hrs, Volume= 1.467 af, Atten= 46%, Lag= 7.8 min
Primary = 12.94 cfs @ 12.18 hrs, Volume= 1.467 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 381.77' @ 12.18 hrs Surf.Area= 11,484 sf Storage= 10,382 cf

Plug-Flow detention time= 5.6 min calculated for 1.467 af (100% of inflow)
Center-of-Mass det. time= 5.6 min (866.1 - 860.6)

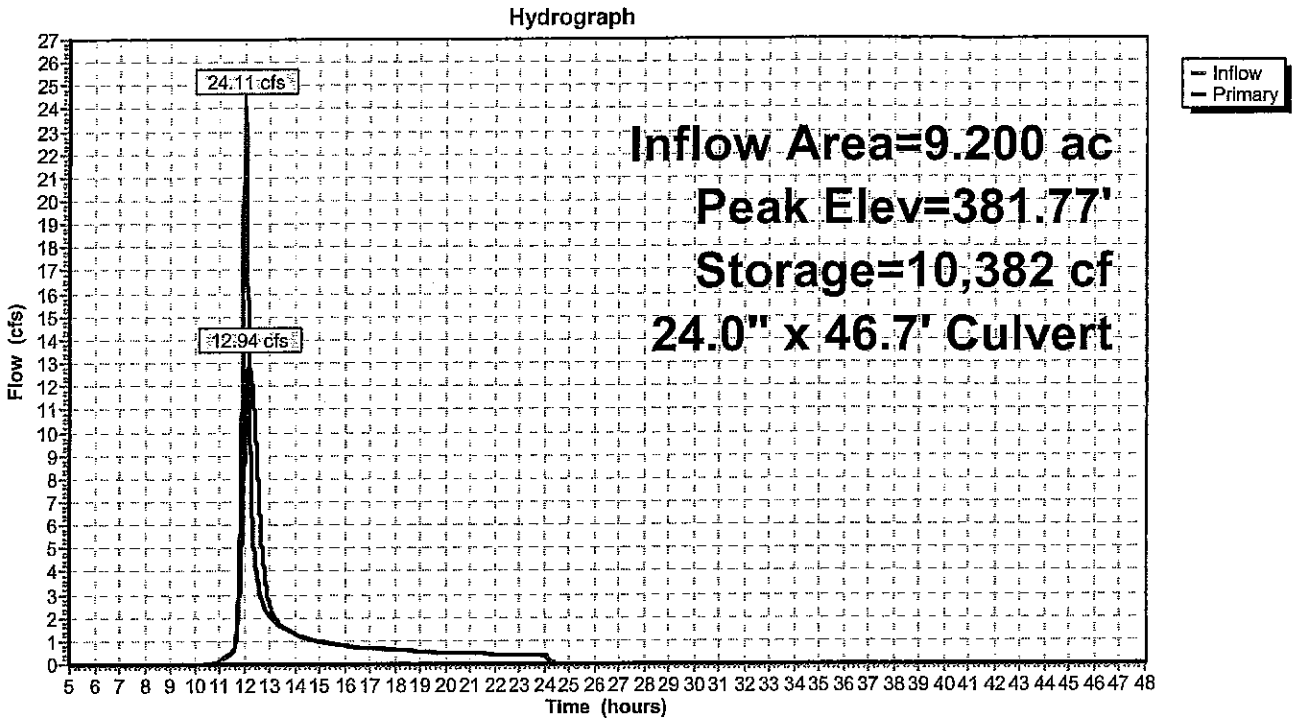
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	47,788 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	12,927	13,110	13,147
382.91	63,208	34,641	47,788

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=12.93 cfs @ 12.18 hrs HW=381.77' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 12.93 cfs @ 4.12 fps)

Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT



Summary for Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT

Inflow Area = 11.300 ac, 0.00% Impervious, Inflow Depth = 3.68" for 100 YEAR event
Inflow = 64.93 cfs @ 12.01 hrs, Volume= 3.465 af
Outflow = 15.25 cfs @ 12.21 hrs, Volume= 3.465 af, Atten= 77%, Lag= 12.3 min
Primary = 15.25 cfs @ 12.21 hrs, Volume= 3.465 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 382.23' @ 12.21 hrs Surf.Area= 44,955 sf Storage= 48,260 cf

Plug-Flow detention time= 24.9 min calculated for 3.464 af (100% of inflow)
Center-of-Mass det. time= 24.9 min (841.6 - 816.6)

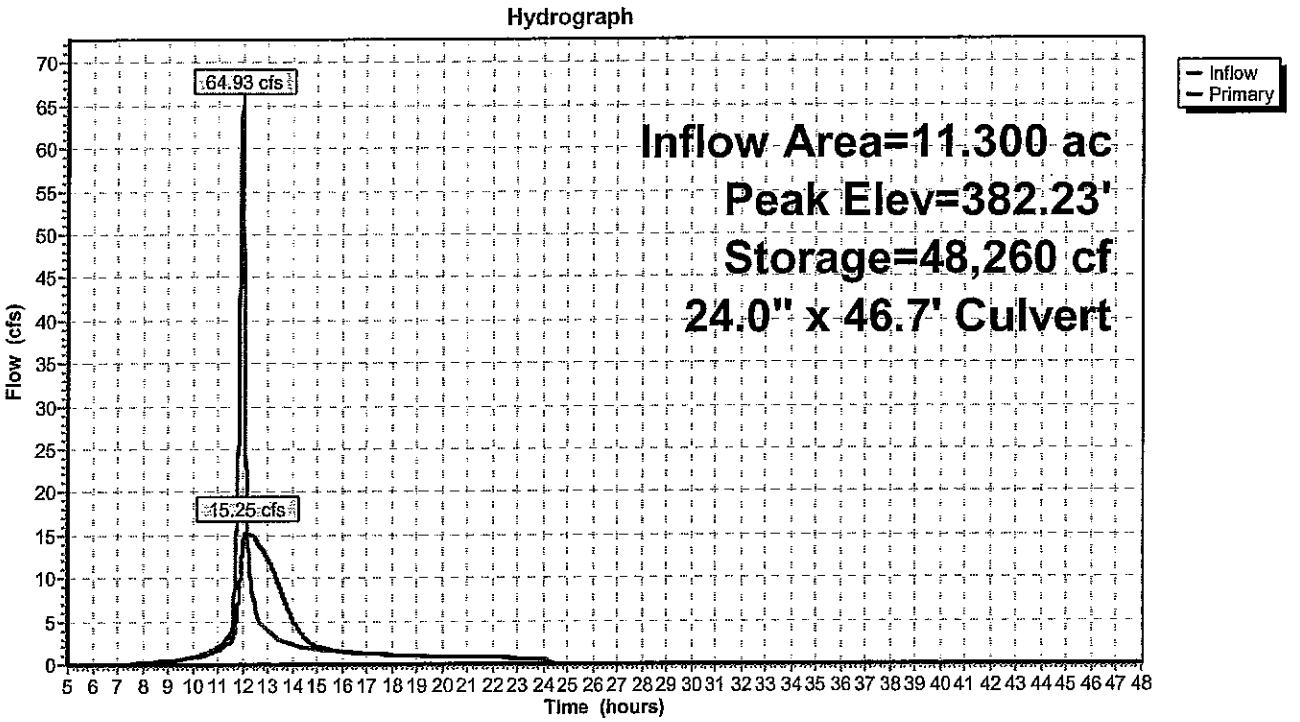
Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	85,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	38,447	38,630	38,667
382.91	64,191	46,700	85,367

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=15.25 cfs @ 12.21 hrs HW=382.23' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 15.25 cfs @ 4.85 fps)

Pond 2P: EXISTING PONDING AREA FOR 24" CULVERT



Summary for Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT

Inflow Area = 9.200 ac, 0.00% Impervious, Inflow Depth = 2.26" for 100 YEAR event
Inflow = 28.76 cfs @ 12.05 hrs, Volume= 1.735 af
Outflow = 14.26 cfs @ 12.19 hrs, Volume= 1.735 af, Atten= 50%, Lag= 8.5 min
Primary = 14.26 cfs @ 12.19 hrs, Volume= 1.735 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 382.03' @ 12.19 hrs Surf.Area= 14,339 sf Storage= 13,495 cf

Plug-Flow detention time= 6.6 min calculated for 1.735 af (100% of inflow)
Center-of-Mass det. time= 6.6 min (862.1 - 855.5)

Volume	Invert	Avail.Storage	Storage Description
#1	379.60'	47,788 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
379.60	0	0	0
380.00	183	37	37
382.00	12,927	13,110	13,147
382.91	63,208	34,641	47,788

Device	Routing	Invert	Outlet Devices
#1	Primary	379.60'	**24.0" x 46.7' long Culvert** CMP, projecting, no headwall, Ke= 0.900 Outlet Invert= 379.00' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=14.26 cfs @ 12.19 hrs HW=382.03' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 14.26 cfs @ 4.54 fps)

Pond 16P: PROPOSED PONDING AREA FOR 24" CULVERT