ATTACHMENT 4

Field and Laboratory Test Results

Falling Head Permeability Test #1

Boring B-4 (19 ft.)

Time (min)	Drop (ft.)	Drop (cm.)
1	0	0
2	0	0
3	0.05	1.524
4	0.05	1.524
5	0.05	1.524
6	0.05	1.524
7	0.05	1.524
8	0.05	1.524
9	0.05	1.524
10	0.05	1.524
15	0.07	2.1336
20	0.08	2.4384
25	0.08	2.4384
30	0.1	3.048

$$k_m = \frac{3.1416 \times D}{11(t_2 - t_1)} \ln \frac{H_1}{H_2}$$

$$= \frac{3.1416 \times 7.62\ \text{cm}}{11\ (1800\ \text{sec} - 60\ \text{sec})} \ln \frac{579\ \text{cm}}{576\ \text{cm}}$$

$$= \frac{23.99\ \text{cm}}{19{,}140\ \text{sec}} \times 0.0053$$

$$= 0.0013\ \text{cm/sec} \times 0.0053$$

$$= 6.8 \times 10^{-6}\ \text{cm/sec}$$

k_m = permeability (cm)
D = intake diameter (cm)
t_2 = 30 min = 1800 sec
t_1 = 1 min = 60 sec
H_1 = piezometer head for $t = t_1$ (cm)
H_2 = piezometer head for $t = t_2$ (cm)

Falling Head Permeability Test #2

Boring B-4 (34 ft.)

Time (min)	Drop (ft.)	Drop (cm.)
1	0.01	0.3048
2	0.02	0.6096
3	0.02	0.6096
4	0.02	0.6096
5	0.03	0.9144
6	0.03	0.9144
7	0.03	0.9144
8	0.04	1.2192
9	0.04	1.2192
10	0.04	1.2192
15	0.04	1.2192
20	0.04	1.2192
25	0.05	1.524
30	0.05	1.524

$$k_m = \frac{3.1416 \times D}{11(t_2 - t_1)} \ln \frac{H_1}{H_2}$$

$$= \frac{3.1416 \times 7.62 \text{ cm}}{11\ (1800 \text{ sec} - 60 \text{ sec})} \ln \frac{1036.0 \text{ cm}}{1034.8 \text{ cm}}$$

$$= \frac{23.99 \text{ cm}}{19{,}140 \text{ sec}} \times 0.0012$$

$$= 0.0013 \text{ cm/sec} \times 0.0012$$

$$= 1.5 \times 10^{-6} \text{ cm/sec}$$

k_m = permeability (cm)
D = intake diameter (cm)
t_2 = 30 min = 1800 sec
t_1 = 1 min = 60 sec
H_1 = piezometer head for $t = t_1$ (cm)
H_2 = piezometer head for $t = t_2$ (cm)

Falling Head Permeability Test #3

Boring B-7 (12.5 ft.)

Time (min)	Drop (ft.)	Drop (cm.)
1	0.03	0.9144
2	0.03	0.9144
3	0.04	1.2192
4	0.05	1.524
5	0.06	1.8288
6	0.07	2.1336
7	0.07	2.1336
8	0.08	2.4384
9	0.08	2.4384
10	0.09	2.7432
15	0.12	3.6576
20	0.14	4.2672
25	0.19	5.7912
30	0.21	6.4008

$$k_m = \frac{3.1416 \times D}{11(t_2 - t_1)} \ln \frac{H_1}{H_2}$$

$$= \frac{3.1416 \times 7.62\ \text{cm}}{11\ (1800\ \text{sec} - 60\ \text{sec})} \ln \frac{380.1\ \text{cm}}{374.6\ \text{cm}}$$

$$= \frac{23.99\ \text{cm}}{19{,}140\ \text{sec}} \times 0.0146$$

$$= 0.0013\ \text{cm/sec} \times 0.0146$$

$$= 1.9 \times 10^{-5}\ \text{cm/sec}$$

k_m = permeability (cm)
D = intake diameter (cm)
t_2 = 30 min = 1800 sec
t_1 = 1 min = 60 sec
H_1 = piezometer head for $t = t_1$ (cm)
H_2 = piezometer head for $t = t_2$ (cm)

Contract Drilling and Testing
SJB SERVICES, INC.

Eastern New York Office
PO Box 2199
Ballston Spa, NY 12020
Phone: (518) 899-7491
FAX: (518) 899-7496

REPORT OF TESTING

Natural Water Content
ASTM D 2216

Project: Subsurface Investigation
Belleayre UMP

Date: September 18, 2008

Client: NYS Dept. of Environmental Conservation

SJB No: AD-08-051

Test Pit/Boring No.	Sample No	Depth (ft)	Natural Water Content (%)
TP-1	S-1	6-7'	7.6
	S-2	11-12'	4.6
TP-2	S-1	6-7'	7.6
	S-2	9.5-10.5'	6.4
TP-3	S-1	6-7'	6.6
	S-2	11-12'	7.2

SJB SERVICES, INC.
Contract Drilling and Testing

FAL FFICE
5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

Laboratory Test Report

PROJECT: **Belleayre Mountain – Proposed Pond**

CLIENT: **NYS Department of Environmental Conservation**

DATE: **October 28, 2008**

PROJECT NO.: AD-08-051
REPORT NO.: LTR-1
Page 1 of 2

SAMPLE INFORMATION:
Sample No. BT-08-977 was collected from the project site, and received at SJB Services, Inc Buffalo Office on September 22, 2008. Sample is described as a composite sample of material from TP-1 to TP-3.

ASTM D-422: Particle Size Analysis of Soils

Sieve Size	*Percent Passing*
4"	100.0
3"	96.5
2"	90.3
1"	89.6
¾"	75.3
½"	71.8
3/8"	68.4
¼"	62.9
#4	59.5
#10	54.5
#20	46.7
#40	41.2
#100	23.7
#200	17.0

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
37.0 %	42.5 %	12.3 %	4.7 %

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Laboratory Test Report

PROJECT: **Belleayre Mountain – Proposed Pond**

CLIENT: **NYS Department of Environmental Conservation**

DATE: **October 28, 2008**

PROJECT NO.: AD-08-051
REPORT NO.: LTR-1

ASTM D-698-02: Laboratory Compaction Characteristics of Soil Using Method C Standard Effort

Maximum Dry Density: 129.0 pcf
Optimum Moisture: 9.2 %

ASTM D-5084: Measurement of Hydraulic Conductivity of Saturated Porous Material Using a Flexible Wall Permeameter

Coefficient of Permeability: 7.25×10^{-5} cm/sec (95% compaction at 9.2 % moisture)

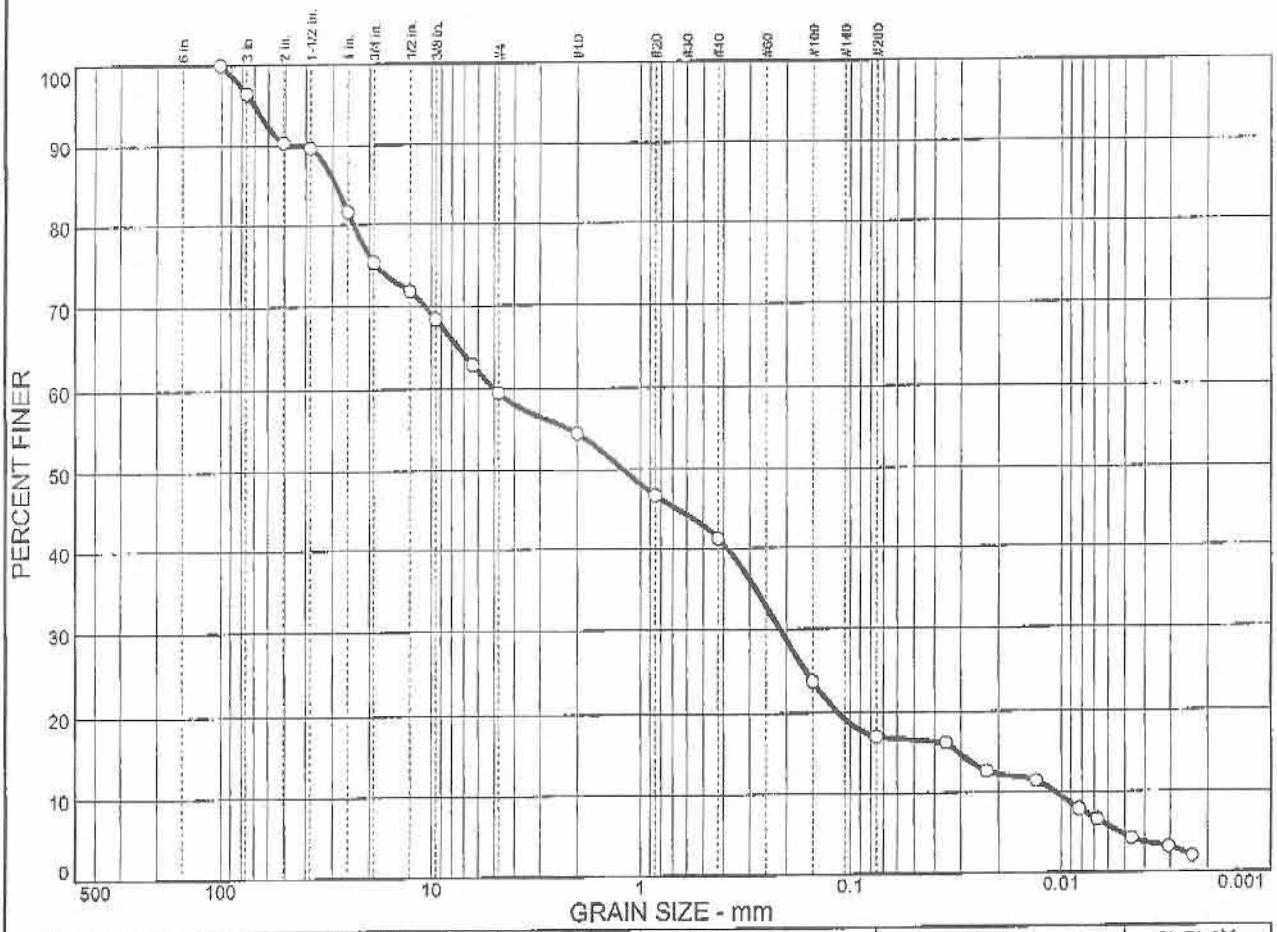
ASTM D-3080: Direct Shear test of Soils Under Consolidated Drained Conditions

Results Pending

SJB Services, Inc.

Paul Gregorczyk
Laboratory Manager

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
3.5	37.0	42.5	12.3	4.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4 in.	100.0		
3 in.	96.5		
2 in.	90.3		
1.5 in.	89.6		
1 in.	81.6		
.75 in.	75.3		
.5 in.	71.8		
.375 in.	68.4		
.25 in.	62.9		
#4	59.5		
#10	54.5		
#20	46.7		
#40	41.2		
#100	23.7		
#200	17.0		

* (no specification provided)

Soil Description

COMPOSITE SAMPLE
TP-1 TO TP-3

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 29.1 D_{60}= 4.99 D_{50}= 1.21
D_{30}= 0.215 D_{15}= 0.0312 D_{10}= 0.0107
C_u= 467.65 C_c= 0.87

Classification

USCS= AASHTO=

Remarks

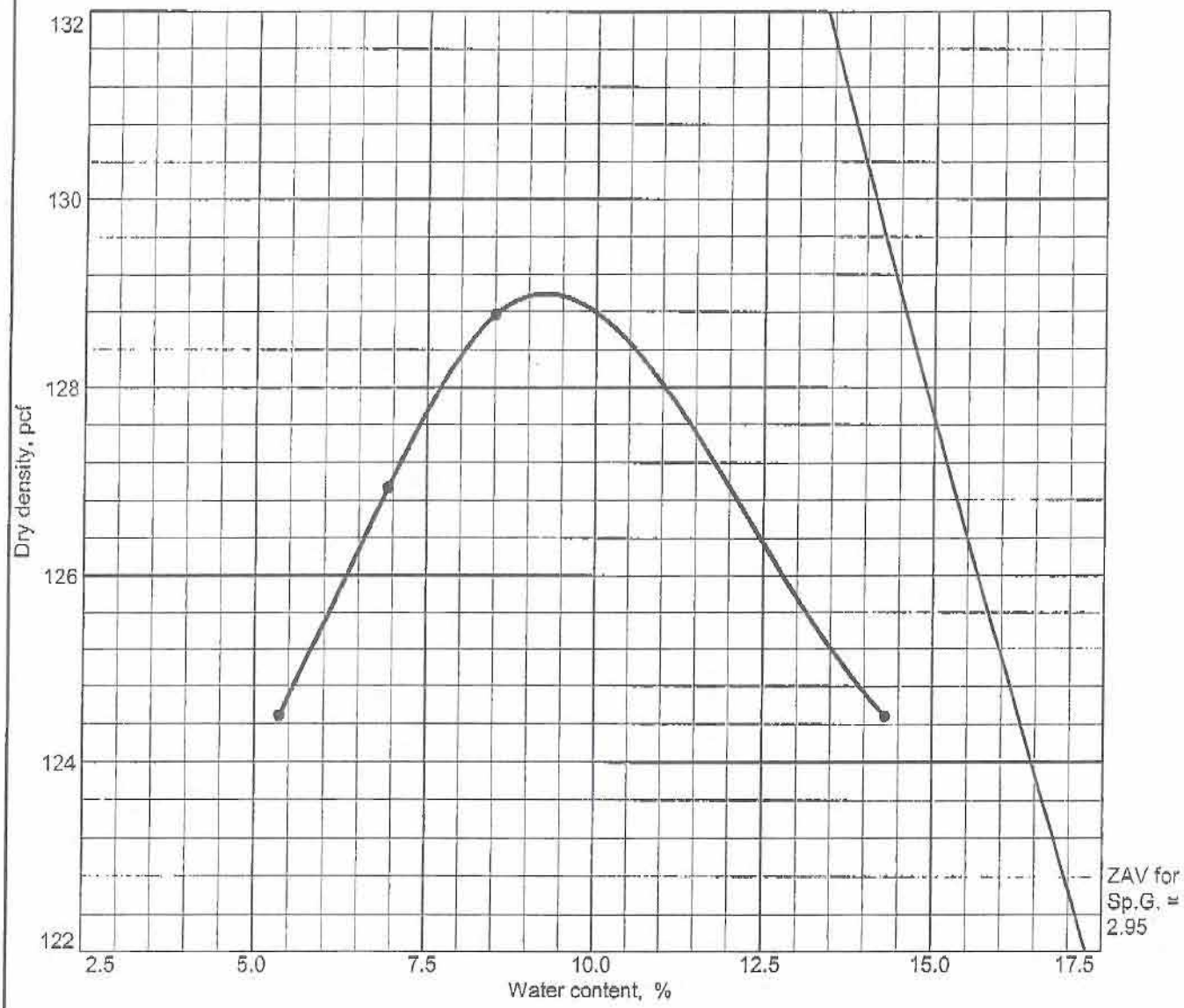
SAMPLE NUMBER: BT-08-977

Sample No.: 08-977 **Source of Sample:** TP-1 TO TP-3 **Date:** 10/24/08
Location: COMPOSITE SAMPLE **Elev./Depth:**

SJB SERVICES, INC.

Client: NYS DEPT OF ENV. CONSERVATION
Project: BELLEAYRE MOUNTAIN - PROPOSED POND
Project No: AD-08-051 **Plate**

COMPACTION TEST REPORT



Test specification: ASTM D 698-02 Procedure C Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
				2.75			24.7	17.0

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 129.0 pcf Optimum moisture = 9.2 %	COMPOSITE SAMPLE TP-1 TO TP-3

Project No. AD-08-051 **Client:** NYS DEPT OF ENV. CONSERVATION
Project: BELLEAYRE MOUNTAIN - PROPOSED POND
● **Location:** COMPOSITE SAMPLE

Remarks:
SAMPLE NUMBER: BT-08-977

COMPACTION TEST REPORT

SJB SERVICES, INC.

Plate

PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.61
Specimen Diameter (cm): 10.15
Dry Unit Weight (pcf): 122.4
Moisture Before Test (%): 9.1
Moisture After Test (%): 9.7
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 95.0

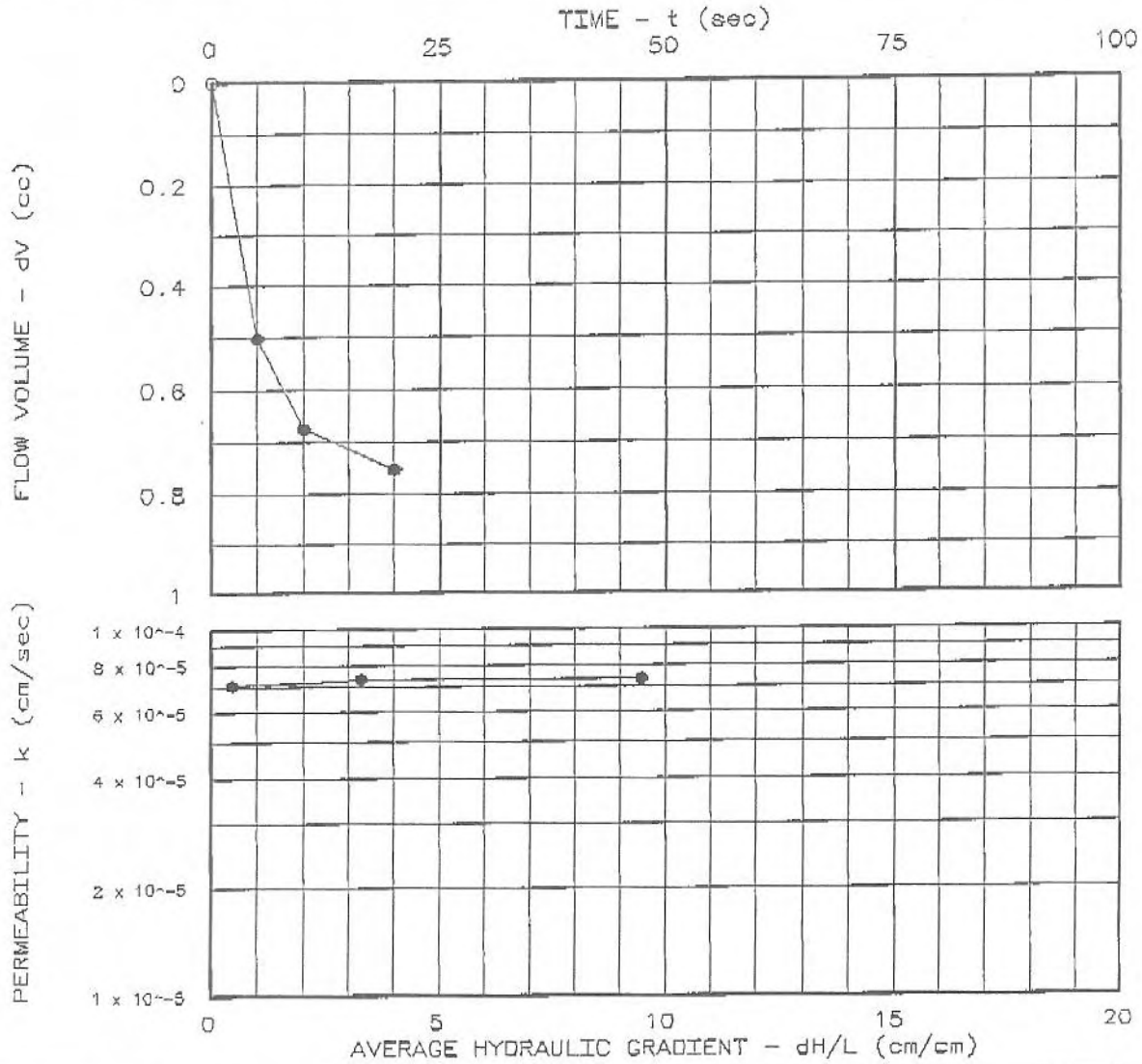
Sat. Pressure (psi): 80.0
Diff. Head (psi): 2.3

Perm. (cm/sec): 7.25 x 10^-5

SAMPLE DATA:

Sample Identification: COMPOSITE SAMPLE TP-1 TO TP-3
Visual Description: COMPOSITE SAMPLE TP-1 TO TP-3
Remarks: ASTM D2434

Maximum Dry Density (pcf): 129.0
Optimum Moisture Content (%): 9.2
ASTM(D698)
Percent Compaction: 94.9%
Permeameter type:
Sample type: re-molded



Project: BELLEAYRE MOUNTAIN - PROPOSED POND
Location:
Date: 10/24/08

PERMEABILITY TEST REPORT

SJB SERVICES, INC.

Project No.: AD-08-051
File No.: BT-08-977
Lab No.: BT-08-977
Tested by: pg
Checked by: pg
Test: CV - Constant volume

GeoTesting express

a subsidiary of Geocomp Corporation

Client:	SJB Services, Inc.		
Project Name:	Belleayre Mountain - Proposed Pond		
Project Location:	Highmount, NY		
GTX #:	8627		
Start Date:	10/31/08	Tested By:	bfs
End Date:	11/04/08	Checked By:	rmt
Soil ID:	BT-08-977 (TP-1 to TP-3)		
Soil Description:	Moist, olive gray silt with gravel		

Direct Shear Test Series by ASTM D 3080

Soil Preparation:	Target Compaction: 122.6 pcf at 9.2% moisture content (values provided by client).		
Compaction Characteristics:	Maximum Dry Density	--- pcf	
	Optimum Moisture Content	--- %	
	Compaction Test Method	---	
Test Equipment:	Top box = 12 in x 12 in; Bottom box = 16 in x 12 in; Load cells and LVDTs connected to data acquisition system for shear force, normal load and horizontal displacement readings; surface area = 144 in^2		
Maximum Particle Size Used, in:	1.5	Horizontal Displacement, in/min:	0.02
Soil Height, in:	3	Test Condition:	inundated
Gap Between Boxes, in:	1		

Parameter	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6
Initial Moisture Content, %	9.3	9.3	9.3	---	---	---
Initial Dry Density, pcf	122	122	122	---	---	---
Percent Compaction, %	---	---	---	---	---	---
Normal Compressive Stress, psi	10	20	40	---	---	---
Peak Shear Stress, psi	7.1	14	28	---	---	---
Post Peak Shear Stress, psi	---	---	---	---	---	---
Final Moisture Content, %	11.9	11.4	10.6	---	---	---

Notes:

Peak Friction Angle:	**35**	**degrees**
Peak Cohesion:	**0.1**	**psi**
Post Peak Friction Angle:	**---**	**degrees**
Post Peak Cohesion:	**---**	**psi**

Figure a. Shear Force vs. Horizontal Displacement

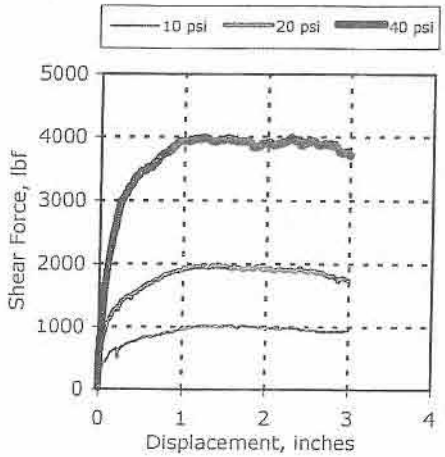
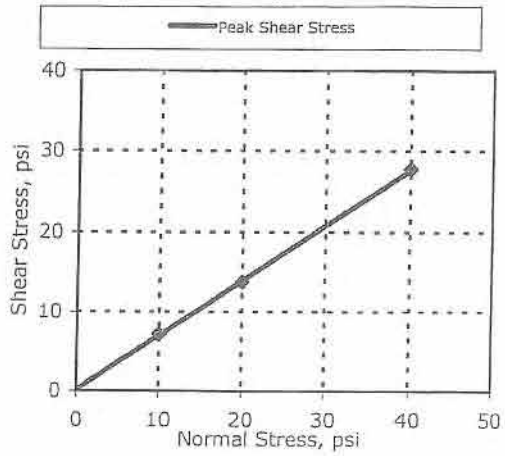


Figure b. Shear Stress vs. Normal Stress



Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material. Values for cohesion and friction angle determined from best-fit straight line to the data for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site-specific conditions.

ATTACHMENT 5

Information Regarding Soils Report

GEOTECHNICAL REPORT LIMITATIONS

Empire Geo-Services, Inc. (Empire) has endeavored to meet the generally accepted standard of care for the services completed, and in doing so is obliged to advise the geotechnical report user of our report limitations. Empire believes that providing information about the report preparation and limitations is essential to help the user reduce geotechnical-related delays, cost over-runs, and other problems that can develop during the design and construction process. Empire would be pleased to answer any questions regarding the following limitations and use of our report to assist the user in assessing risks and planning for site development and construction.

PROJECT SPECIFIC FACTORS: The conclusions and recommendations provided in our geotechnical report were prepared based on project specific factors described in the report, such as size, loading, and intended use of structures; general configuration of structures, roadways, and parking lots; existing and proposed site grading; and any other pertinent project information. Changes to the project details may alter the factors considered in development of the report conclusions and recommendations. *Accordingly, Empire cannot accept responsibility for problems which may develop if we are not consulted regarding any changes to the project specific factors that were assumed during the report preparation.*

SUBSURFACE CONDITIONS: The site exploration investigated subsurface conditions only at discrete test locations. Empire has used judgement to infer subsurface conditions between the discrete test locations, and on this basis the conclusions and recommendations in our geotechnical report were developed. It should be understood that the overall subsurface conditions inferred by Empire may vary from those revealed during construction, and these variations may impact on the assumptions made in developing the report conclusions and recommendations. *For this reason, Empire should be retained during construction to confirm that conditions are as expected, and to refine our conclusions and recommendations in the event that conditions are encountered that were not disclosed during the site exploration program.*

USE OF GEOTECHNICAL REPORT: Unless indicated otherwise, our geotechnical report has been prepared for the use of our client for specific application to the site and project conditions described in the report. *Without consulting with Empire, our geotechnical report should not be applied by any party to other sites or for any uses other than those originally intended.*

CHANGES IN SITE CONDITIONS: Surface and subsurface conditions are subject to change at a project site subsequent to preparation of the geotechnical report. Changes may include, but are not limited to, floods, earthquakes, groundwater fluctuations, and construction activities at the site and/or adjoining properties. *Empire should be informed of any such changes to determine if additional investigative and/or evaluation work is warranted.*

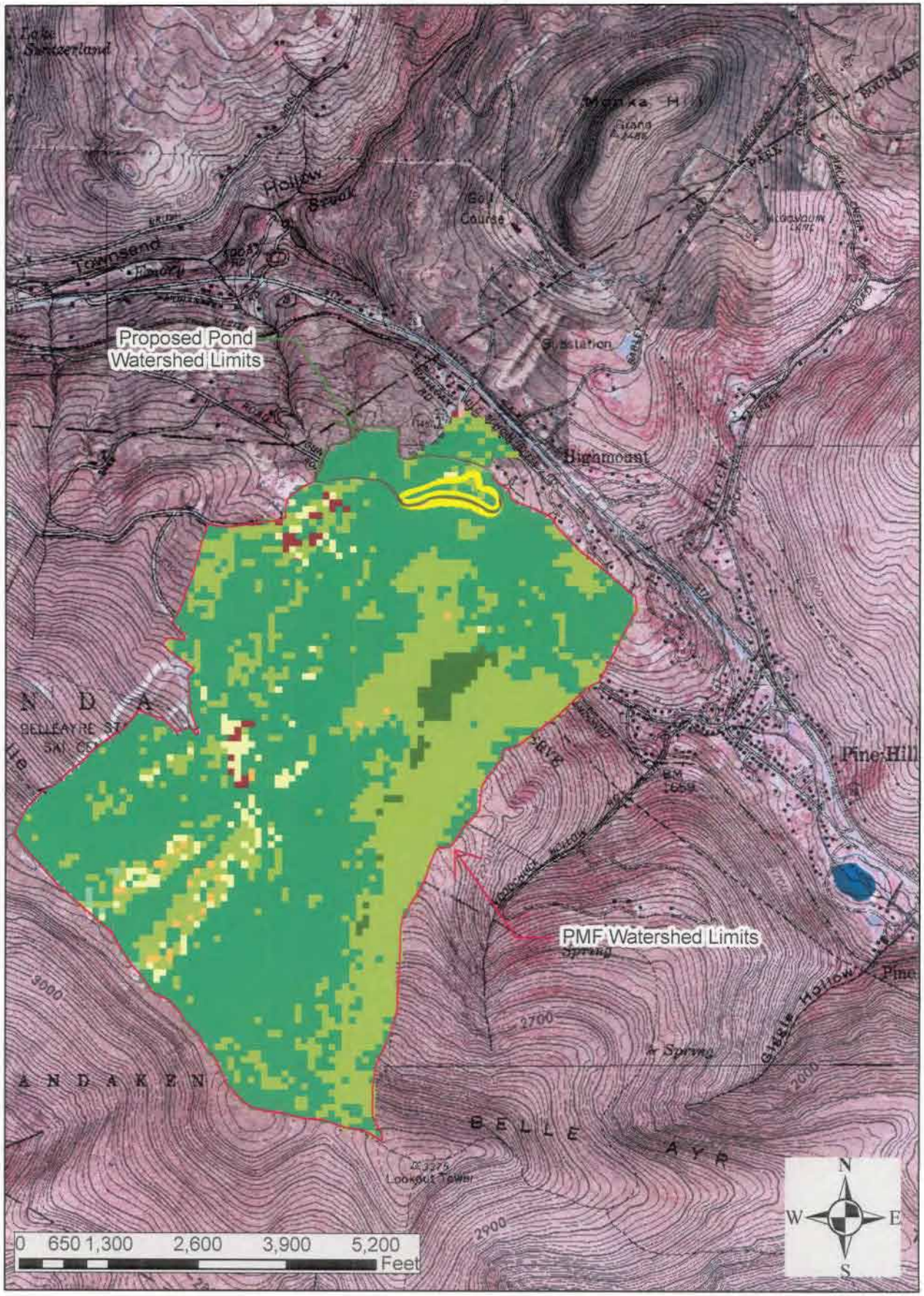
MISINTERPRETATION OF REPORT: The conclusions and recommendations contained in our geotechnical report are subject to misinterpretation. *To limit this possibility, Empire should review project plans and specifications relative to geotechnical issues to confirm that the recommendations contained in our report have been properly interpreted and applied.*

Subsurface exploration logs and other report data are also subject to misinterpretation by others if they are separated from the geotechnical report. This often occurs when copies of logs are given to contractors during the bid preparation process. *To minimize the potential for misinterpretation, the subsurface logs should not be separated from our geotechnical report and the use of excerpted or incomplete portions of the report should be avoided.*

OTHER LIMITATIONS: Geotechnical engineering is less exact than other design disciplines, as it is based partly on judgement and opinion. For this reason, our geotechnical report may include clauses that identify the limits of Empire's responsibility, or that may describe other limitations specific to a project. These clauses are intended to help all parties recognize their responsibilities and to assist them in assessing risks and decision making. Empire would be pleased to discuss these clauses and to answer any questions that may arise.

APPENDIX C

Appendix C Belleayre Watershed MRLC Data



Belleayre PMF Watershed MRLC Curve Number Conversion

	acres	CN	x CN / total A
1 Water	0.00	100.00	0.00
2 Low Intensity Residential	0.44	80.00	0.03
3 High Intensity Residential	0.00	90.00	0.00
4 High Intensity Commercial/ Industrial	6.23	94.00	0.54
5 Pasture/Hay	1.56	79.00	0.11
6 Row Crops	26.91	85.00	2.09
7 Other Grasses	5.12	79.00	0.37
8 Evergreen Forest	18.46	73.00	1.23
9 Mixed Forest	331.15	71.50	21.68
10 Deciduous Forest	702.32	70.00	45.01
11 Woody Wetlands	0.00	77.00	0.00
12 Emergent Wetlands	0.00	74.00	0.00
13 Barren, Quarry, Strip/Gravel Mines	0.00	87.00	0.00
14 Barren, Rock, Sand	0.00	89.00	0.00
15 Barren, Transitional, Clearcut	0.00	81.00	0.00
Unaccounted	0.00	na	
Total Acres	1092.18		71.07 Average CN

Drainage area for the PMF watershed used in incremental design flood calculations

MRLC Analysis

30 sq. meters per pixel

MRLC values in the (_) associated NRCS Cover	pixels in a area	pixels in b area	total sq meters	in %	acres	CN
1 Water	0	0	0	0%	0.0	100.0
2 Low Intensity Residential	2	0	2	0%	0.4	80.0
3 High Intensity Residential	0	0	0	0%	0.0	90.0
4 High Intensity Commercial/ Industrial	28	0	28	1%	6.2	94.0
5 Pasture/Hay	7	0	7	0%	1.6	79.0
6 Row Crops	121	0	121	2%	26.9	85.0
7 Other Grasses	23	0	23	0%	5.1	79.0
8 Evergreen Forest	83	0	83	2%	18.5	73.0
9 Mixed Forest	1489	0	1489	30%	331.1	71.5
10 Deciduous Forest	3158	0	3158	64%	702.3	70.0
11 Woody Wetlands	0	0	0	0%	0.0	77.0
12 Emergent Wetlands	0	0	0	0%	0.0	74.0
13 Barren, Quarry, Strip/Gravel Mines	0	0	0	0%	0.0	87.0
14 Barren, Rock, Sand	0	0	0	0%	0.0	89.0
15 Barren, Transitional, Clearcut	0	0	0	0%	0.0	81.0
Unaccounted to adjust for analysis	0	na	na	0%	0.0	na
Total pixel Count			4911.0	100%	1092.2	
				sq. meters	4421072	
				Sq miles	1.71	

Weighted Curve Number (CN) Analysis

	% of soils in each hydric group				NRCS Curve #'s (CN) in each Hydric group			
	A	B	C	D	A	B	C	D
(1) Water	0%	0%	100%	0%	100	100	100	100
(2) 1/2 acre 25%impervious	0%	0%	100%	0%	54	70	80	85
(3) 1/8 acre 65%impervious	0%	0%	100%	0%	77	85	90	92
(3) 85%impervious	0%	0%	100%	0%	89	92	94	95
Fair	0%	0%	100%	0%	49	69	79	84
str. Row good	0%	0%	100%	0%	67	78	85	89
Fair Parks lawns golf	0%	0%	100%	0%	49	69	79	84
woods Fair w/litter&brush	0%	0%	100%	0%	36	60	73	79
between 8 and 10	0%	0%	100%	0%	33	57.5	71.5	78
woods Good w/litter&brush	0%	0%	100%	0%	30	55	70	77
woods poor	0%	0%	100%	0%	45	66	77	83
*open space lawn good	0%	0%	100%	0%	39	61	74	80
Impervious Dirt	0%	0%	100%	0%	72	82	87	89
Impervious gravel	0%	0%	100%	0%	76	85	89	91
** Fair Herbaceous mix	0%	0%	100%	0%	30	71	81	89

Belleayre Snowmaking Pond Watershed MRLC Curve Number Conversion

Cover Type	acres	CN	x CN / total A
1 Water	0.00	100.00	0.00
2 Low Intensity Residential	0.00	80.00	0.00
3 High Intensity Residential	0.00	90.00	0.00
4 High Intensity Commercial/ Industrial	0.00	94.00	0.00
5 Pasture/Hay	0.00	79.00	0.00
6 Row Crops	0.44	85.00	1.31
7 Other Grasses	0.00	79.00	0.00
8 Evergreen Forest	0.00	73.00	0.00
9 Mixed Forest	2.00	71.50	4.95
10 Deciduous Forest	26.47	70.00	64.07
11 Woody Wetlands	0.00	77.00	0.00
12 Emergent Wetlands	0.00	74.00	0.00
13 Barren, Quarry, Strip/Gravel Mines	0.00	87.00	0.00
14 Barren, Rock, Sand	0.00	89.00	0.00
15 Barren, Transitional, Clearcut	0.00	81.00	0.00
Unaccounted	0.00	na	
Total Acres	28.91		70.34 Average CN

Drainage area for the snowmaking pond
Excluding the area of the pond itself

MRLC Analysis

30 sq. meters per pixel

MRLC values in the (_) associated NRCS Cover	pixels in a area	pixels in b area	total sq meters	in %	acres	CN
1 Water	0	0	0	0%	0.0	100.0
2 Low Intensity Residential	0	0	0	0%	0.0	80.0
3 High Intensity Residential	0	0	0	0%	0.0	90.0
4 High Intensity Commercial/ Industrial	0	0	0	0%	0.0	94.0
5 Pasture/Hay	0	0	0	0%	0.0	79.0
6 Row Crops	2	0	2	2%	0.4	85.0
7 Other Grasses	0	0	0	0%	0.0	79.0
8 Evergreen Forest	0	0	0	0%	0.0	73.0
9 Mixed Forest	9	0	9	7%	2.0	71.5
10 Deciduous Forest	119	0	119	92%	26.5	70.0
11 Woody Wetlands	0	0	0	0%	0.0	77.0
12 Emergent Wetlands	0	0	0	0%	0.0	74.0
13 Barren, Quarry, Strip/Gravel Mines	0	0	0	0%	0.0	87.0
14 Barren, Rock, Sand	0	0	0	0%	0.0	89.0
15 Barren, Transitional, Clearcut	0	0	0	0%	0.0	81.0
Unaccounted to adjust for analysis	0	na	na	0%	0.0	na
Total pixel Count			130.0	100%	28.9	
				sq. meters	117038	
				Sq miles	0.045	

Weighted Curve Number (CN) Analysis

	% of soils in each hydric group				NRCS Curve #'s (CN) in each Hydric group			
	A	B	C	D	A	B	C	D
(1) Water	0%	0%	100%	0%	100	100	100	100
(2) 1/2 acre 25%impervious	0%	0%	100%	0%	54	70	80	85
(3) 1/8 acre 65%impervious	0%	0%	100%	0%	77	85	90	92
(3) 85%impervious	0%	0%	100%	0%	89	92	94	95
Fair	0%	0%	100%	0%	49	69	79	84
str. Row good	0%	0%	100%	0%	67	78	85	89
Fair Parks lawns golf	0%	0%	100%	0%	49	69	79	84
woods Fair w/litter&brush	0%	0%	100%	0%	36	60	73	79
between 8 and 10	0%	0%	100%	0%	33	57.5	71.5	78
woods Good w/litter&brush	0%	0%	100%	0%	30	55	70	77
woods poor	0%	0%	100%	0%	45	66	77	83
*open space lawn good	0%	0%	100%	0%	39	61	74	80
Impervious Dirt	0%	0%	100%	0%	72	82	87	89
Impervious gravel	0%	0%	100%	0%	76	85	89	91
** Fair Herbaceous mix	0%	0%	100%	0%	30	71	81	89

Belleayre Snowmaking Pond Watershed MRLC Curve Number Conversion

Cover Type	acres	CN	x CN / total A	
1 Water	10.23	100.00	99.98	
2 Low Intensity Residential	0.00	80.00	0.00	
3 High Intensity Residential	0.00	90.00	0.00	
4 High Intensity Commercial/ Industrial	0.00	94.00	0.00	
5 Pasture/Hay	0.00	79.00	0.00	
6 Row Crops	0.00	85.00	0.00	
7 Other Grasses	0.00	79.00	0.00	
8 Evergreen Forest	0.00	73.00	0.00	
9 Mixed Forest	0.00	71.50	0.00	
10 Deciduous Forest	0.00	70.00	0.00	
11 Woody Wetlands	0.00	77.00	0.00	
12 Emergent Wetlands	0.00	74.00	0.00	
13 Barren, Quarry, Strip/Gravel Mines	0.00	87.00	0.00	
14 Barren, Rock, Sand	0.00	89.00	0.00	
15 Barren Transitional, Clearcut	0.00	81.00	0.00	
Unaccounted	0.00	na		
Total Acres	10.23		100.00	Average CN

Pond area as a curve number of 100
Excluding land drainage area for HMS model

MRLC Analysis

30 sq. meters per pixel

MRLC values in the (_) associated NRCS Cover	pixels in a area	pixels in b area	total sq meters	in %	acres	CN
1 Water	46	0	46	100%	10.2	100.0
2 Low Intensity Residential	0	0	0	0%	0.0	80.0
3 High Intensity Residential	0	0	0	0%	0.0	90.0
4 High Intensity Commercial/ Industrial	0	0	0	0%	0.0	94.0
5 Pasture/Hay	0	0	0	0%	0.0	79.0
6 Row Crops	0	0	0	0%	0.0	85.0
7 Other Grasses	0	0	0	0%	0.0	79.0
8 Evergreen Forest	0	0	0	0%	0.0	73.0
9 Mixed Forest	0	0	0	0%	0.0	71.5
10 Deciduous Forest	0	0	0	0%	0.0	70.0
11 Woody Wetlands	0	0	0	0%	0.0	77.0
12 Emergent Wetlands	0	0	0	0%	0.0	74.0
13 Barren, Quarry, Strip/Gravel Mines	0	0	0	0%	0.0	87.0
14 Barren, Rock, Sand	0	0	0	0%	0.0	89.0
15 Barren Transitional, Clearcut	0	0	0	0%	0.0	81.0
Unaccounted to adjust for analysis	0	na	na	0%	0.0	na
Total pixel Count			46.0	100%	10.2	
				sq. meters	41418	
				Sq miles	0.016	

Weighted Curve Number (CN) Analysis

	% of soils in each hydric group				NRCS Curve #'s (CN) in each Hydric group			
	A	B	C	D	A	B	C	D
(1) Water	0%	0%	100%	0%	100	100	100	100
(2) 1/2 acre 25%impervious	0%	0%	100%	0%	54	70	80	85
(3) 1/8 acre 65%impervious	0%	0%	100%	0%	77	85	90	92
(3) 85%impervious	0%	0%	100%	0%	89	92	94	95
Fair	0%	0%	100%	0%	49	69	79	84
str. Row good	0%	0%	100%	0%	67	78	85	89
Fair Parks lawns golf	0%	0%	100%	0%	49	69	79	84
woods Fair w/litter&brush	0%	0%	100%	0%	36	60	73	79
between 8 and 10	0%	0%	100%	0%	33	57.5	71.5	78
woods Good w/litter&brush	0%	0%	100%	0%	30	55	70	77
woods poor	0%	0%	100%	0%	45	66	77	83
*open space lawn good	0%	0%	100%	0%	39	61	74	80
Impervious Dirt	0%	0%	100%	0%	72	82	87	89
Impervious gravel	0%	0%	100%	0%	76	85	89	91
** Fair Herbaceous mix	0%	0%	100%	0%	30	71	81	89

Belleayre Snowmaking Pond Watershed Time of Concentration

Sheet Flow		
Surface Description		woods w/brush
Manning's n (Table 3-1)		0.4
Flow Length (ft)		100
Two Year Rainfall (in)		3.5
Land Slope		0.1
Tt	***0.180***	
Shallow Concentrated Flow		
Paved/Unpaved		U
Length		1780
Start Elevation		2028
End Elevation		1920
Watercourse Slope		0.061
Average Velocity (Fig 3-1)		4
Tt	***0.124***	0.124
Channel Flow		
Cross- Sectional Flow Area		none
Wetted Perimeter		
Hydraulic Radius		
Channel Slope		
Manning's Roughness		
Channel Velocity		
Flow Length		
Tt	***0.000***	
Tc Total Time of Concentration, hr	**0.30**	
SCS Lag Time, hr	**0.18**	

Belleayre PMF Drainage Area Time of Concentration

Sheet Flow				
Surface Description				
Manning's n (Table 3-1)		0.4		
Flow Length (ft)		150		
Two Year Rainfall (in)		3.3		
Land Slope		0.093		
Tt	***0.263***	***0.263***		
Shallow Concentrated Flow				
Paved/Unpaved		U		
Length		4855		
Start Elevation		3401		
End Elevation		2275		
Watercourse Slope		0.232		
Average Velocity (Fig 3-1)		7.8		
Tt	***0.173***	0.173		
Channel Flow				
		Reach 1	Reach 2	Reach 3
Cross- Sectional Flow Area		10	10	10
Wetted Perimeter		9	9	9
Hydraulic Radius		1.11	1.11	1.11
Start Elevation		2275	2105	1865
End Elevation		2105	1865	1610
Flow Length		1400	2465	3910
Channel Slope		0.12	0.10	0.07
Manning's Roughness		0.035	0.035	0.035
Channel Velocity		15.9	14.3	11.7
Tt	***0.166***	0.024	0.048	0.093
Tc Total Time of Concentration, hr	**0.602**			
SCS Lag Time, hr	**0.361**			

APPENDIX D

Reservoir | Dam Break | Options

Basin Name: Sunny Day Breach Basin
Element Name: 15ft weir outlet@1926.5

Method:	Piping Breach
Direction:	Main
Top Elevation (FT)	1929
Bottom Elevation (FT)	1905
Bottom Width (FT)	25
Left Slope (xH:1V)	1.5
Right Slope (xH:1V)	1.5
Piping Elevation (FT)	1926
Piping Coefficient:	0.8
Development Time (HR)	0.75
Trigger Method:	Specific Time
Trigger Date (ddMMMYYYY)	01Jan3000
Trigger Time (HH:mm)	00:05
Progression Method:	Sine Wave

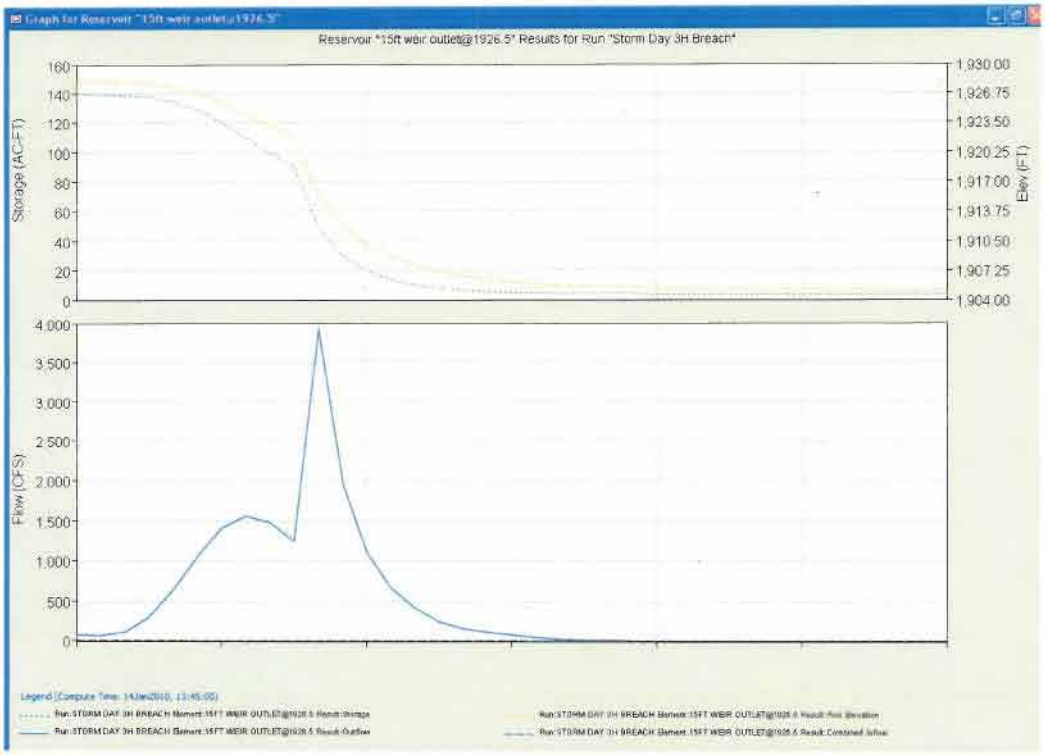
HEC-HMS Sunny Day Dam Breach Impoundment @ 1926.5

Reservoir | Dam Break | Options

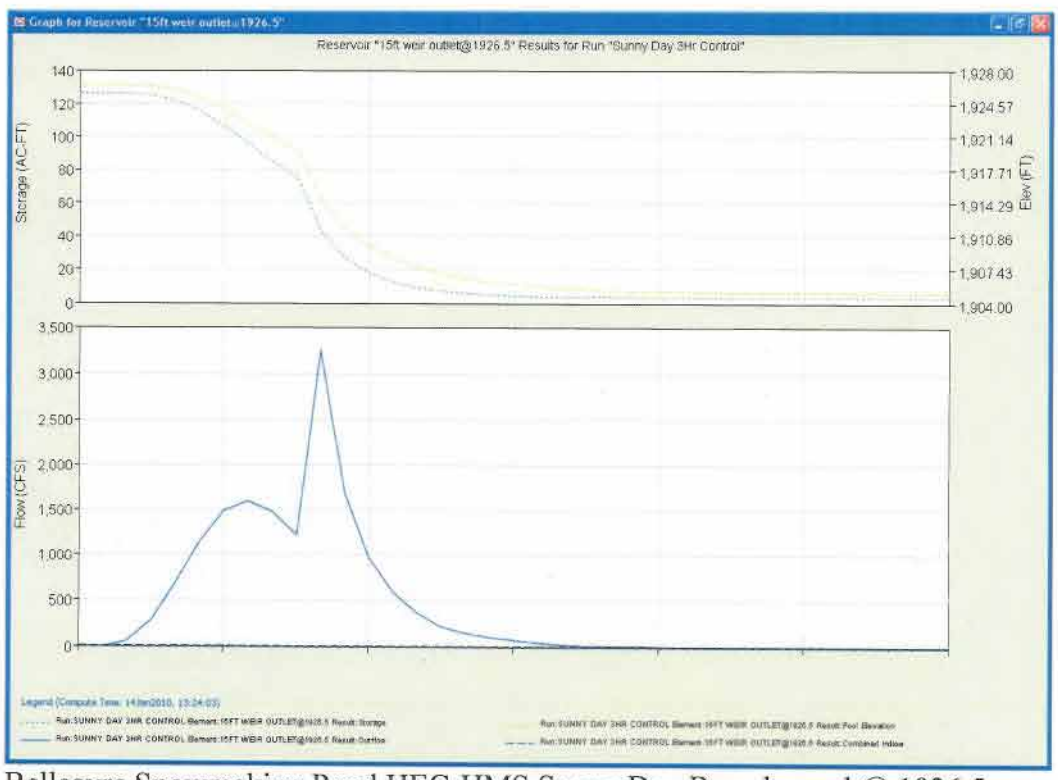
Basin Name: Storm Breach Basin Model
Element Name: 15ft weir outlet@1926.5

Method:	Piping Breach
Direction:	Main
Top Elevation (FT)	1929
Bottom Elevation (FT)	1905
Bottom Width (FT)	25
Left Slope (xH:1V)	1.5
Right Slope (xH:1V)	1.5
Piping Elevation (FT)	1928
Piping Coefficient:	0.8
Development Time (HR)	0.75
Trigger Method:	Specific Time
Trigger Date (ddMMMYYYY)	01Jan3000
Trigger Time (HH:mm)	00:05
Progression Method:	Sine Wave

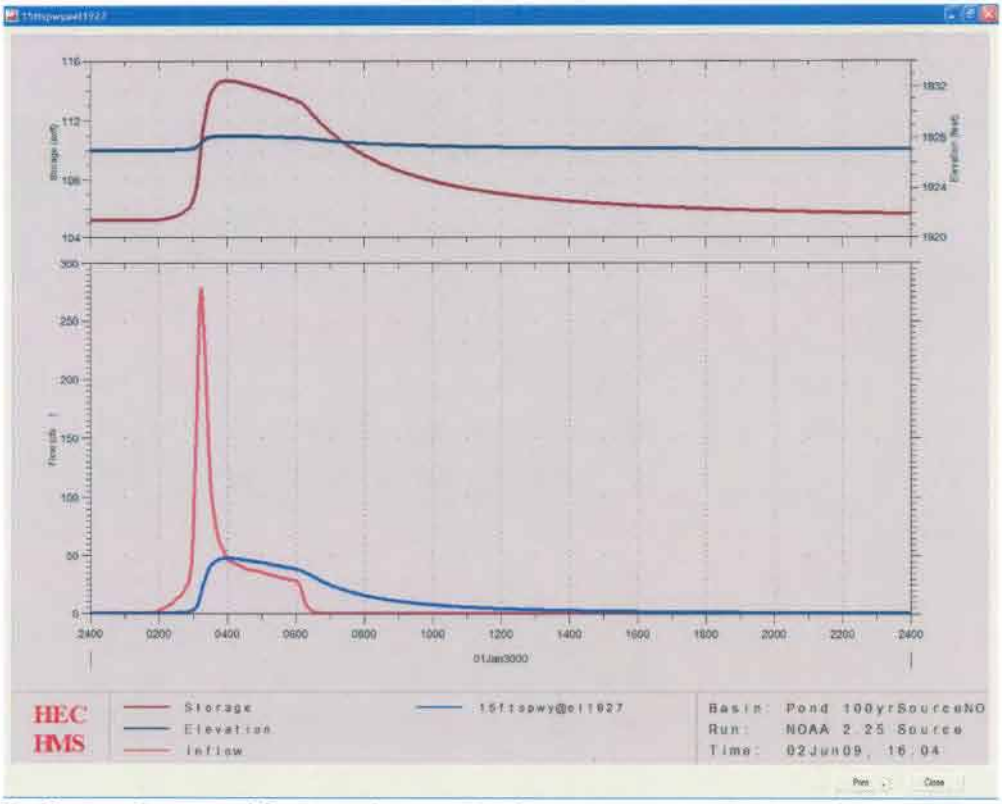
HEC-HMS Storm Day Dam Breach Piping @ 1928.0



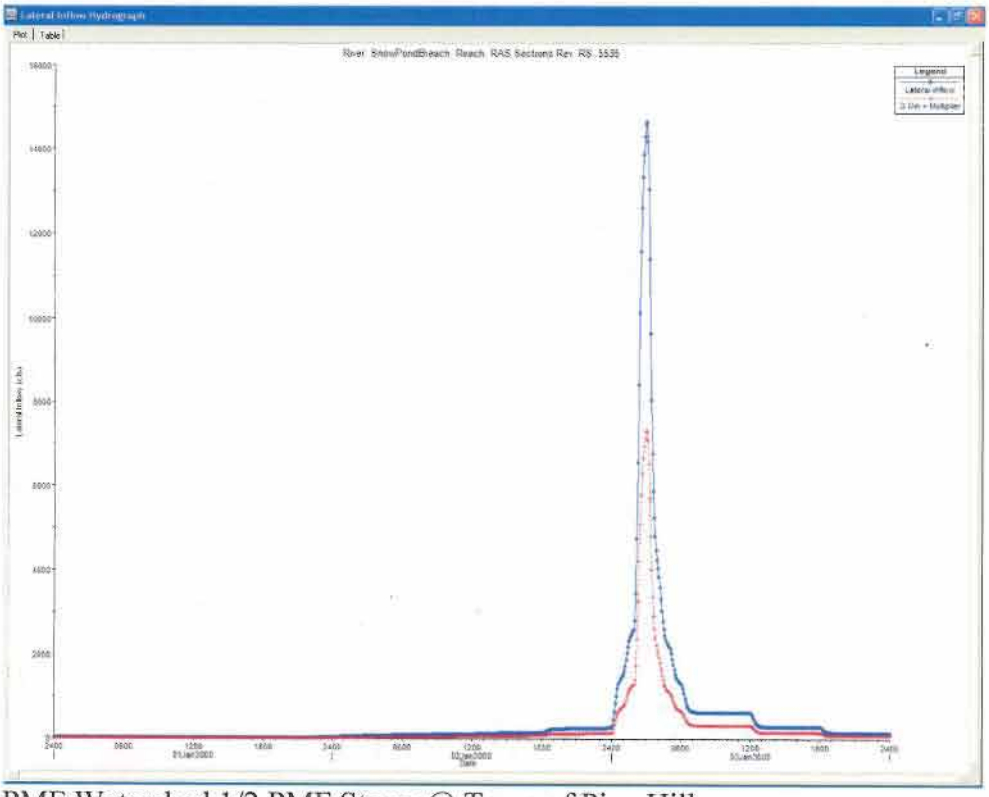
Belleayre Snowmaking Pond HEC-HMS Storm Day Breach, piping @ 1928.0



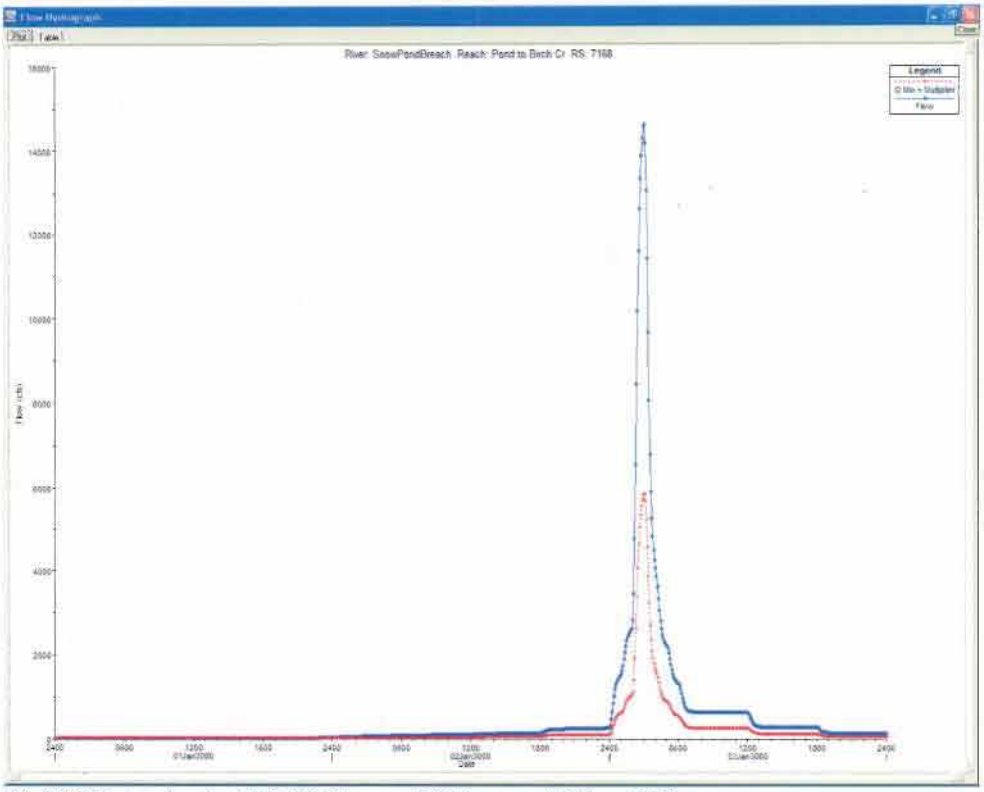
Belleayre Snowmaking Pond HEC-HMS Sunny Day Breach, pool @ 1926.5



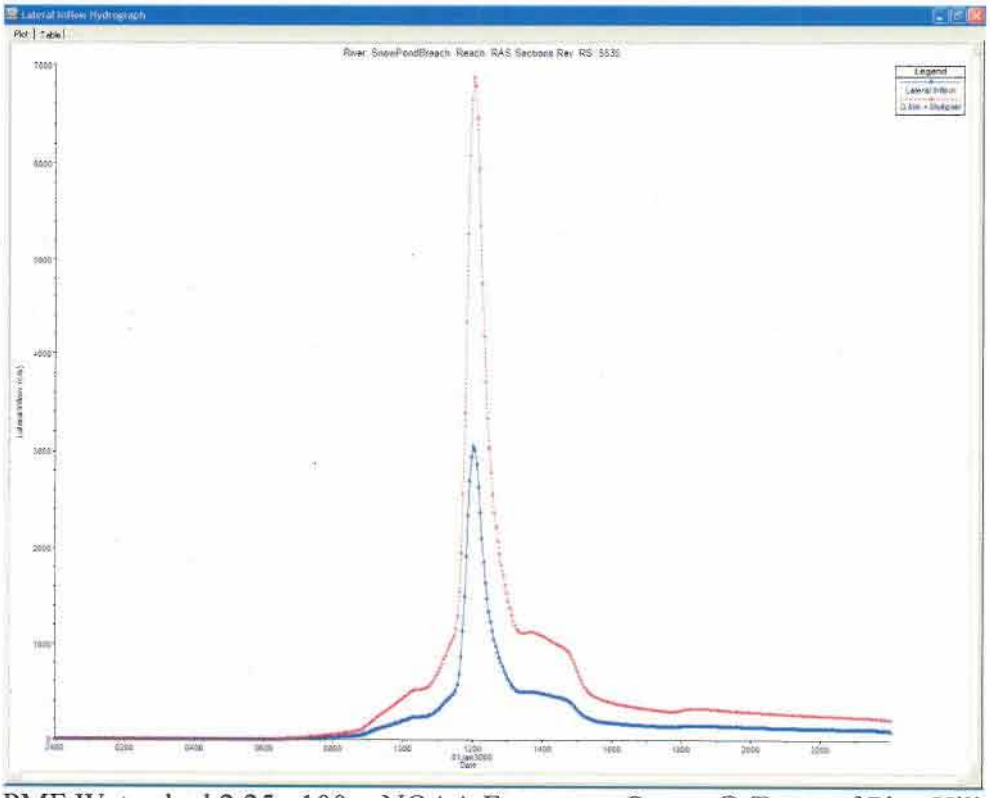
Belleayre Snowmaking Pond Watershed 2.25x 100 year NOAA frequency storm



PMF Watershed 1/2 PMF Storm @ Town of Pine Hill

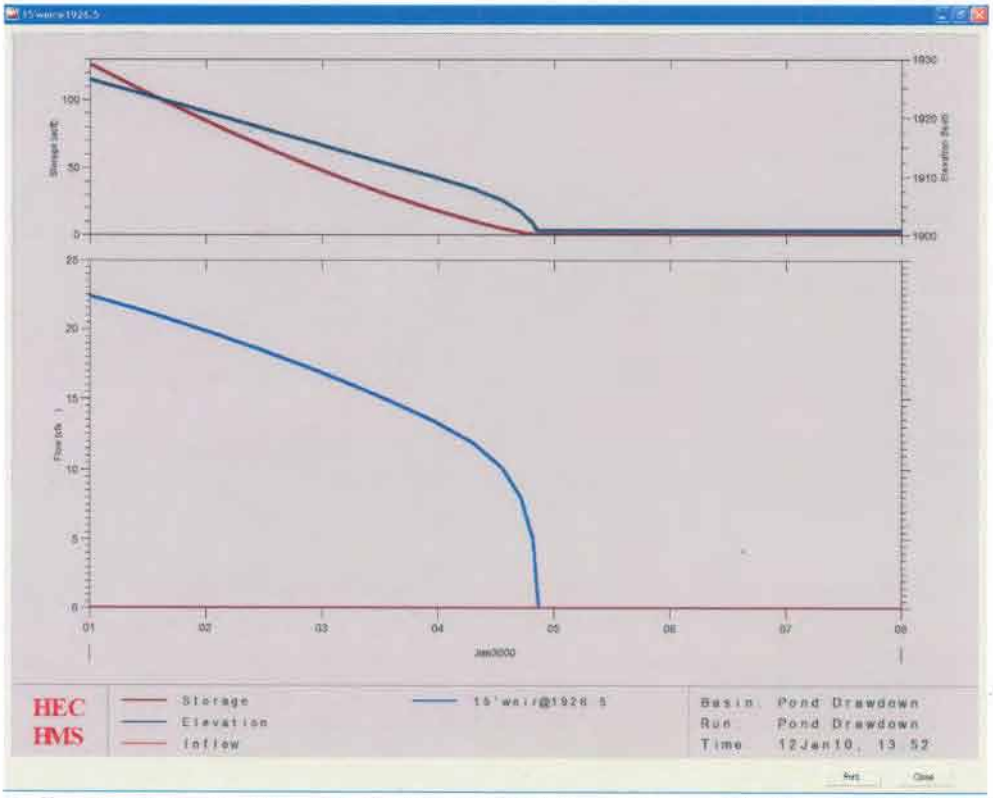


PMF Watershed .4 PMF Storm @ Town of Pine Hill



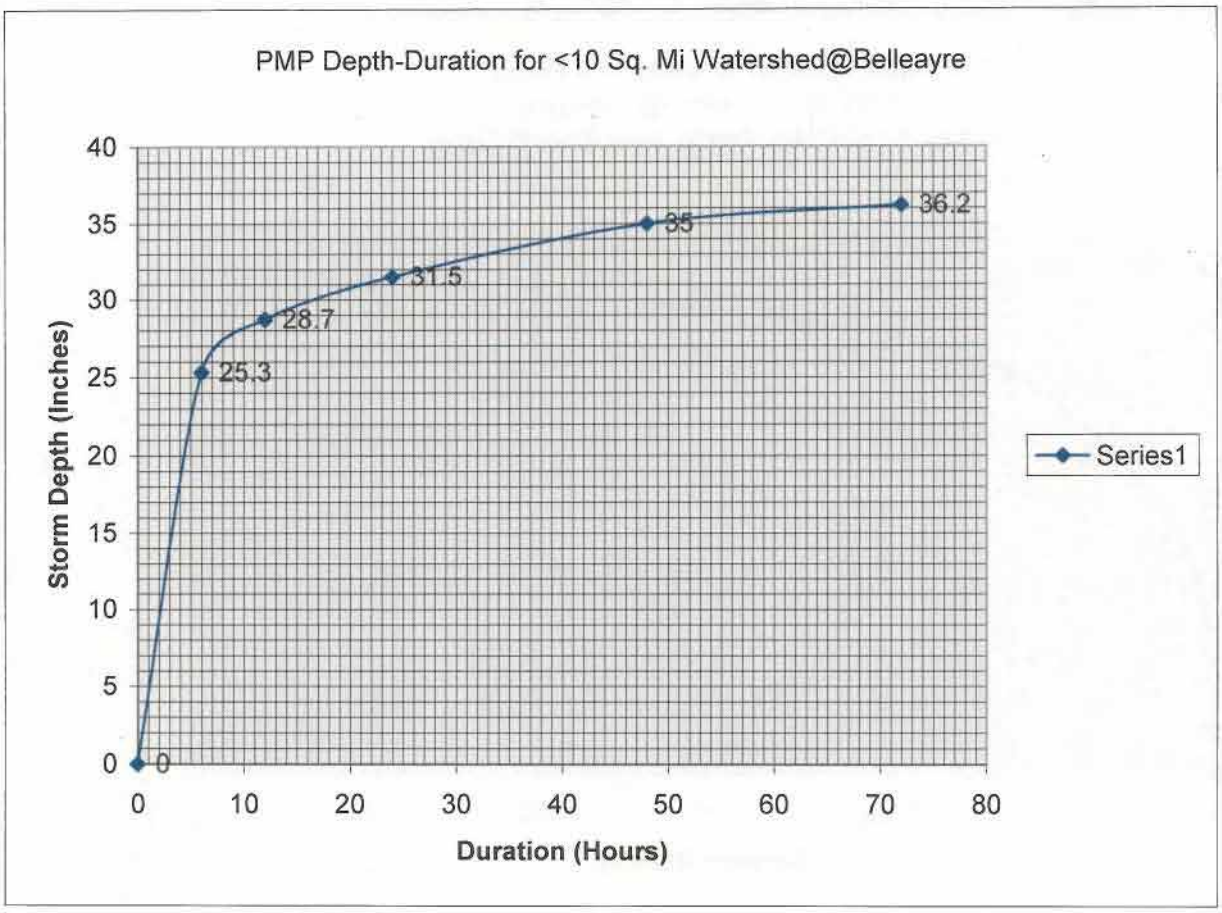
PMF Watershed 2.25x 100yr NOAA Frequency Storm @ Town of Pine Hill

Belleayre Snowmaking Pond Drawdown from Max. Impoundment to Spillway Crest



Belleayre Snowmaking Pond Normal Pool Drawdown, 12" Dia. Outlet Invert @ El. 1900.7 and Normal Pool El 1926.5

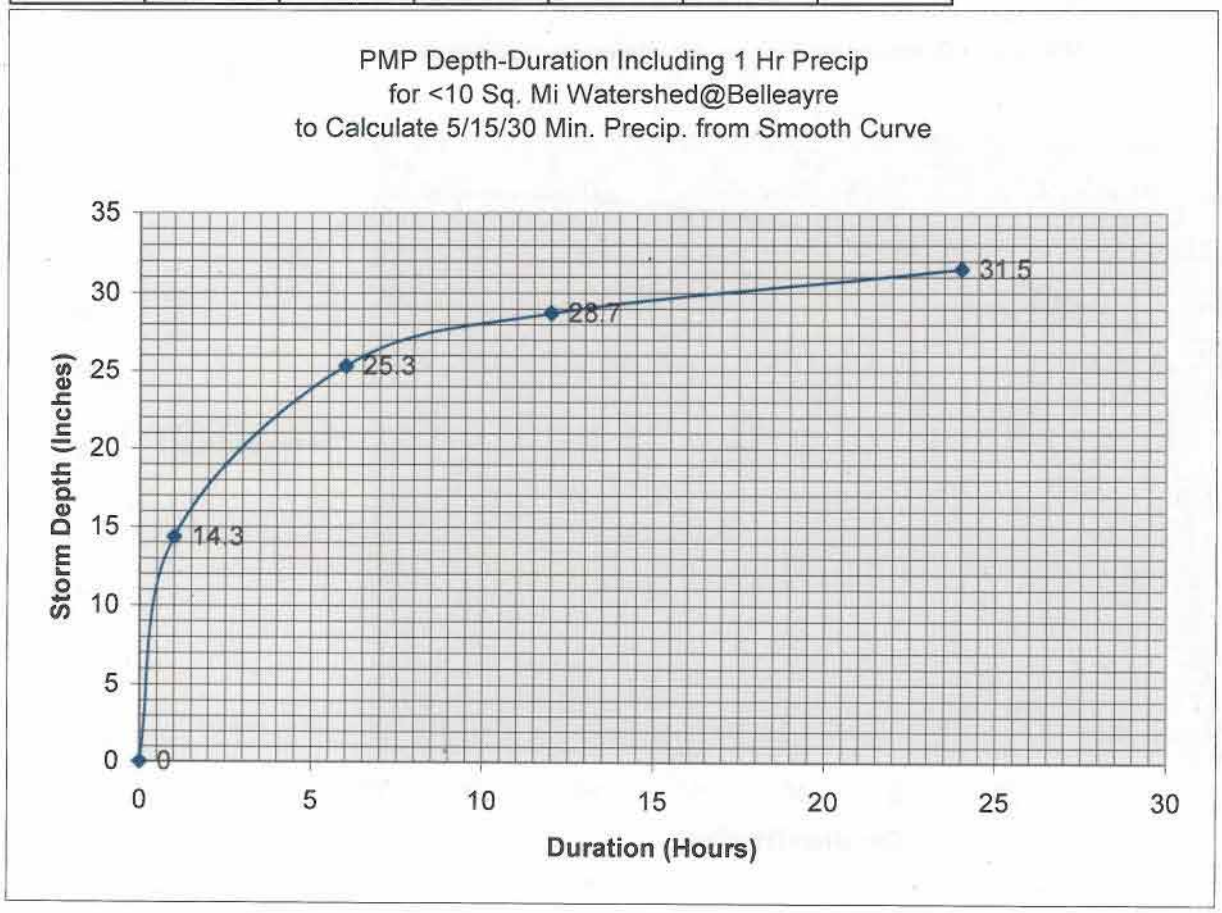
Area	Rainfall Duration, Hours						Location
sq mi	0	6	12	24	48	72	42 08' 74 31'
10	0	25.3	28.7	31.5	35	36.2	42.0 74.5



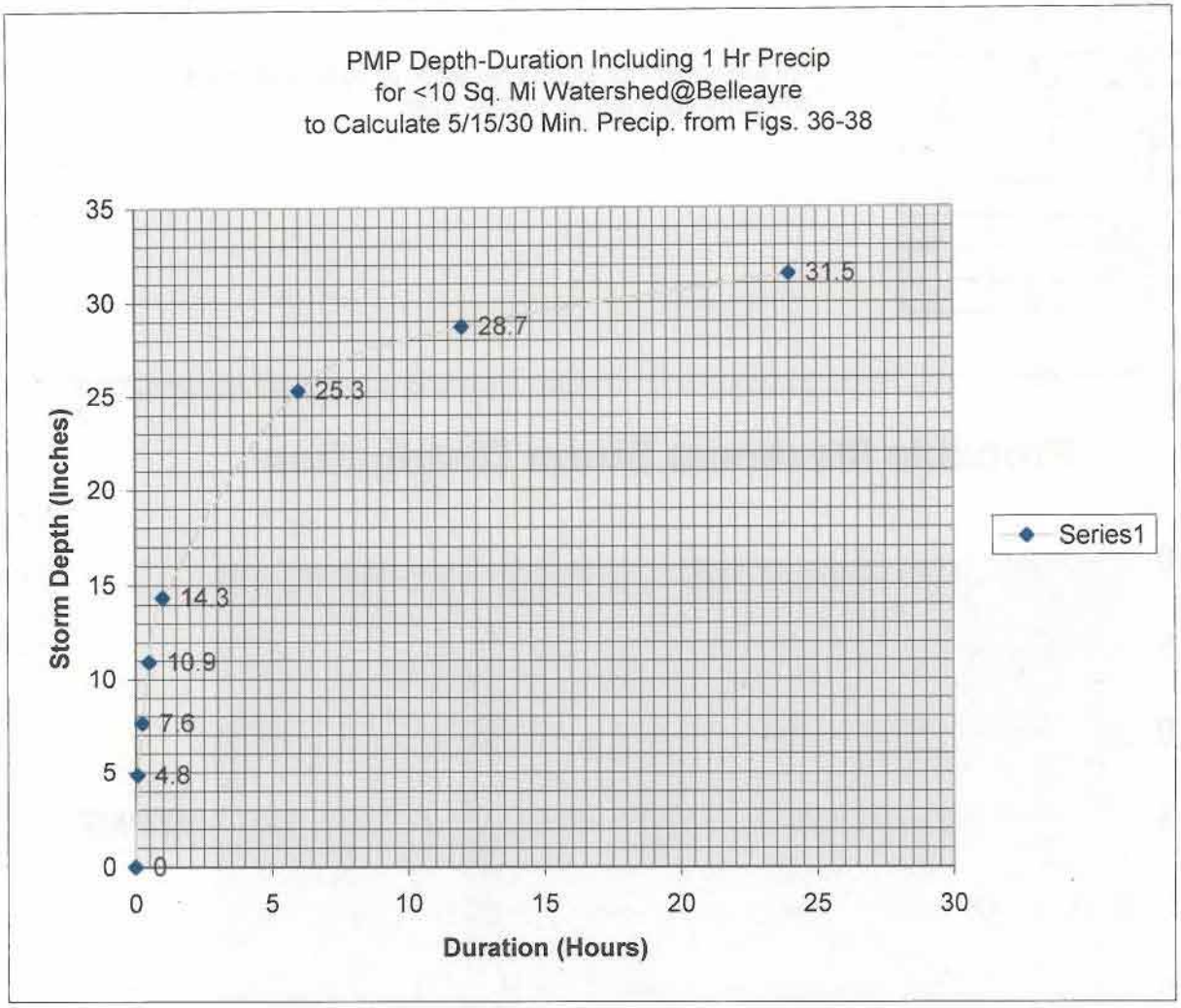
All precip falls within the A Isohyet

Ratio of 5 to 60 min, Fig 36	0.337
Ratio of 15 to 60 min, Fig 37	0.53
Ratio of 30 to 60 min, Fig 38	0.762
Ratio of 1hr to 6hr, Fig 40	0.567

Area	Rainfall Duration, Hours					
sq mi	0	1	6	12	24	
10	0	14.3	25.3	28.7	31.5	



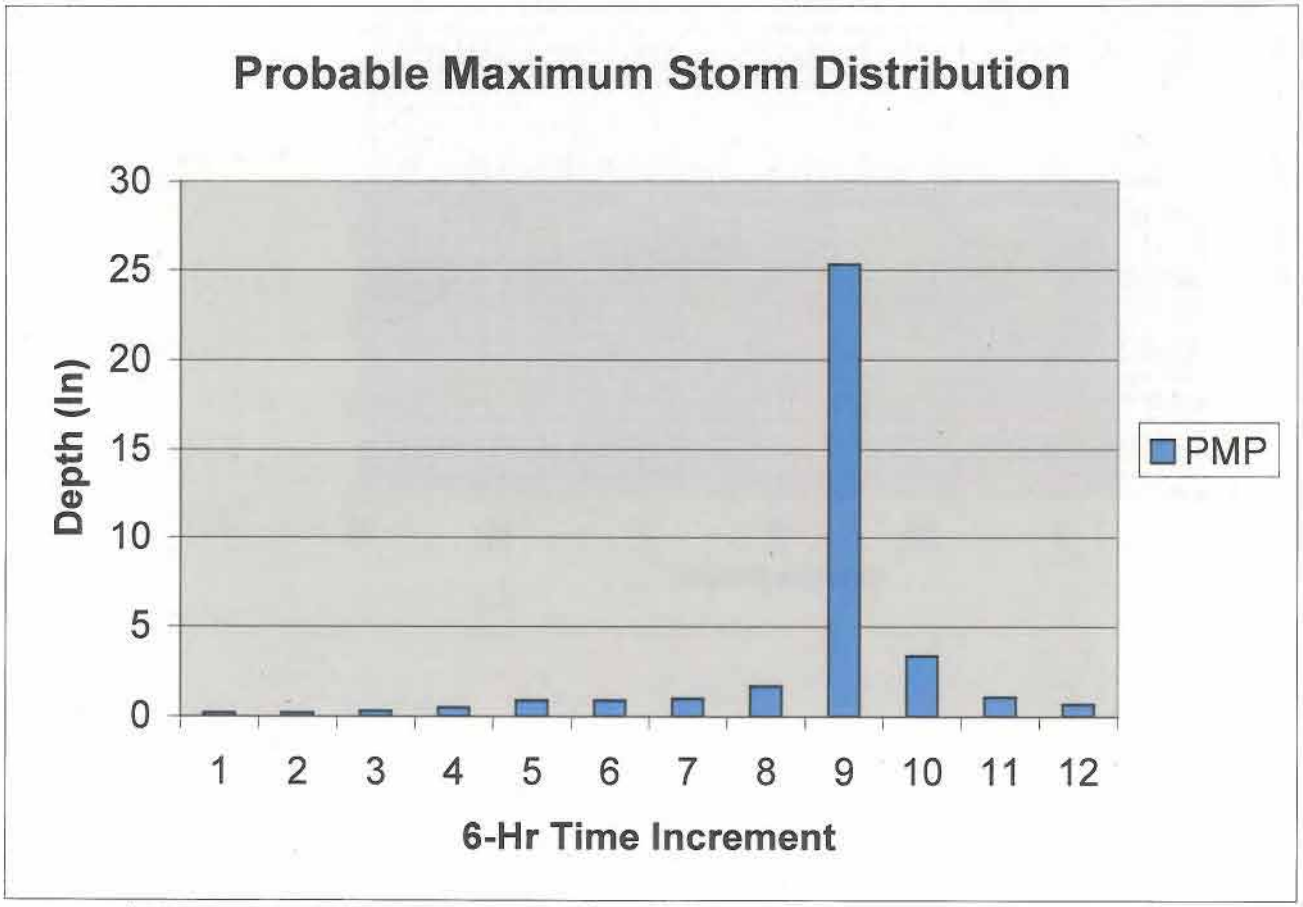
Area sq mi	Rainfall Duration, Hours							
	0	0.083	0.25	0.5	1	6	12	24
10	0	4.8	7.6	10.9	14.3	25.3	28.7	31.5



10 sq mi area PMS Calculation			
Time	PMP	Incrmnt. Precip	step #
6	25.3	25.3	1
12	28.7	3.4	2
18	30.4	1.7	3
24	31.5	1.1	4
30	32.5	1.0	5
36	33.4	0.9	6
42	34.3	0.9	7
48	35.0	0.7	8
54	35.5	0.5	9
60	35.8	0.3	10
66	36.0	0.2	11
72	36.2	0.2	12

Temporal Distribution of PMP - Fig 7 from HMR 52											
12	11	10	9	7	6	5	3	1	2	4	8
0.2	0.2	0.3	0.5	0.9	0.9	1	1.7	25.3	3.4	1.1	0.7

** No adjustment for storm orientation or basin-avg precip since drainage area is <10 sq. miles



1-6 hr Rainfall values from smoothed curve using Fig 36-38 data points					
1	2	3	4	5	6
14.3	17.7	20.4	22	24	25
Incremental 6-hr Precipitation					
14.3	3.4	2.7	2	1.7	1.2

Other precipitation values are determined by dividing the respective 6-hour increment by 6 to get an hourly precipitation value.

APPENDIX E

SNOWMAKING POND PROPOSED DAM AND BROAD CREST WEIR

Stage (ft)	Proposed Weir Crest El. 1926.5			
	Head @ Spillway (ft)	C for Broad Crest Weir	Effective L (ft)	Flow over Spillway (cfs)
1926.5	0.0			
1927.0	0.5	2.6	14.8	13.6
1927.5	1.0	2.6	14.6	38.0
1928.0	1.5	2.6	14.4	68.8
1928.5	2.0	2.6	14.2	104.4

Flow over spillway: Q=CL(H)^3/2, where L=L'-2(NKp+Ka)H
From "Design of Small Dams", US Dept of Interior, 3rd ed., pg 365
Ka = 0.2 (abutment contraction coefficient)
Kp = 0 (pier contraction coefficient)
from Lindeburg's Civil Eng. Reference Manual, 9th Ed.
L' = 15

SNOWMAKING POND STAGE AND STORAGE

Stage	Area	Area	Incremental Storage	Total Storage
(ft)	(sf)	(Ac)	(Ac)	(Ac)
1900	1	0.0	0	0
1902	19996	0.5	0.5	0.5
1904	43129	1.0	1.4	1.9
1906	86244	2.0	3.0	4.9
1908	155817	3.6	5.6	10.4
1910	215497	4.9	8.5	19.0
1912	231525	5.3	10.3	29.2
1914	247716	5.7	11.0	40.2
1916	264064	6.1	11.7	52.0
1918	280571	6.4	12.5	64.5
1920	297235	6.8	13.3	77.7
1922	314058	7.2	14.0	91.8
1924	331040	7.6	14.8	106.6
1926	348182	8.0	15.6	122.2
1928	365483	8.4	16.4	138.6
1929	375582	8.6	17.0	155.6

APPENDIX F

Spillway Channel for Belleayre Snowmaking Pond
trapezoidal channel with sides sloped at 2H:1V

Base Width L 15
Manning's n 0.035 (Lindeberg Appendix A37)
Channel Slope s 0.018 First half of the new outlet channel

Channel Flow depth (ft)	Side Slope Angle (deg)	a (ft2)	p (ft)	r (ft)	r^2/3 (ft)	C	Kd	s^1/2	Channel Q (cfs)	Channel v (ft/sec)	
0.25	26.57	3.87	16.1	0.240	0.387	42.45714	63.6	0.13	9	2.2	
0.5	26.57	8.00	17.2	0.464	0.599	42.45714	203.6	0.13	27	3.4	
1	26.57	17.00	19.5	0.873	0.913	42.45714	659.3	0.13	88	5.2	2.25*100yr NOAA storm = 86cfs
1.5	26.57	27.00	21.7	1.244	1.157	42.45714	1325.8	0.13	178	6.6	
2	26.57	38.00	23.9	1.587	1.361	42.45714	2195.0	0.13	294	7.8	
2.5	26.57	50.00	26.2	1.910	1.539	42.45714	3267.6	0.13	438	8.8	

88cfs @ 5.2 ft/sec

Base Width L 5
Manning's n 0.035 (Lindeberg Appendix A37)
Channel Slope s 0.018 Second half of the new outlet channel

Channel Flow depth (ft)	Side Slope Angle (deg)	a (ft2)	p (ft)	r (ft)	r^2/3 (ft)	C	Kd	s^1/2	Channel Q (cfs)	Channel v (ft/sec)	
0.25	26.57	1.37	6.1	0.225	0.370	42.45714	21.6	0.13	3	2.1	
0.5	26.57	3.00	7.2	0.415	0.556	42.45714	70.8	0.13	10	3.2	
1	26.57	7.00	9.5	0.739	0.817	42.45714	242.9	0.13	33	4.7	
1.5	26.57	12.00	11.7	1.025	1.017	42.45714	517.9	0.13	69	5.8	
1.7	26.57	14.28	12.6	1.133	1.087	42.45714	658.9	0.13	88	6.2	2.25*100yr NOAA storm = 86cfs
2	26.57	18.00	13.9	1.291	1.186	42.45714	905.9	0.13	122	6.8	

88cfs @ 6.2 ft/sec

Belleayre Snowmaking Pond
Drawdown Pipe Outlet Protection

Max outflow is 23 cfs based on HEC-HMS drawdown for a
12" dia pipe at EL 1900 and impoundment at EL 1926.5.

Based on weir flow, Q = 2.6 * wier width * depth of water$^{1.5}$
From the rating table, 23 cfs is a depth of flow of 1.7'
Therefore the velocity = Q/A = 23cfs / 4' * 1.7' = 3.4 ft/sec

The required stone size downstream of the weir is given by
the USBR 1984 Publication 'Hydraulic Design of Stilling Basins and Energy Dissipators'

V = 3.4 ft/sec requires a minimum stone diameter of 2", which is d15 of the stone.
Light stone fill d15 is about 5", which is sufficient to resist erosion.
Bed stone with 6" of #2 stone fill over 6" of C-33 concrete sand

Belleayre Snowmaking Pond
Spillway Weir Channel Outlet Protection

Max outflow is 86 cfs based on HEC-HMS storm day model
Peak impoundment elevation is 1928.2

Based on channel flow, the 5 foot wide portion is the controlling condition with the highest velocity.
From the channel rating table, 86 cfs is a velocity of 6.2 ft/sec

The required stone size downstream of the weir is given by
the USBR 1984 Publication 'Hydraulic Design of Stilling Basins and Energy Dissipators'

V = 3.4 ft/sec requires a minimum stone diameter of just under 5", which is d15 of the stone.
Light stone fill d15 is about 5", which is sufficient to resist erosion.
Bed stone with 6" of #2 stone fill over 6" of C-33 concrete sand

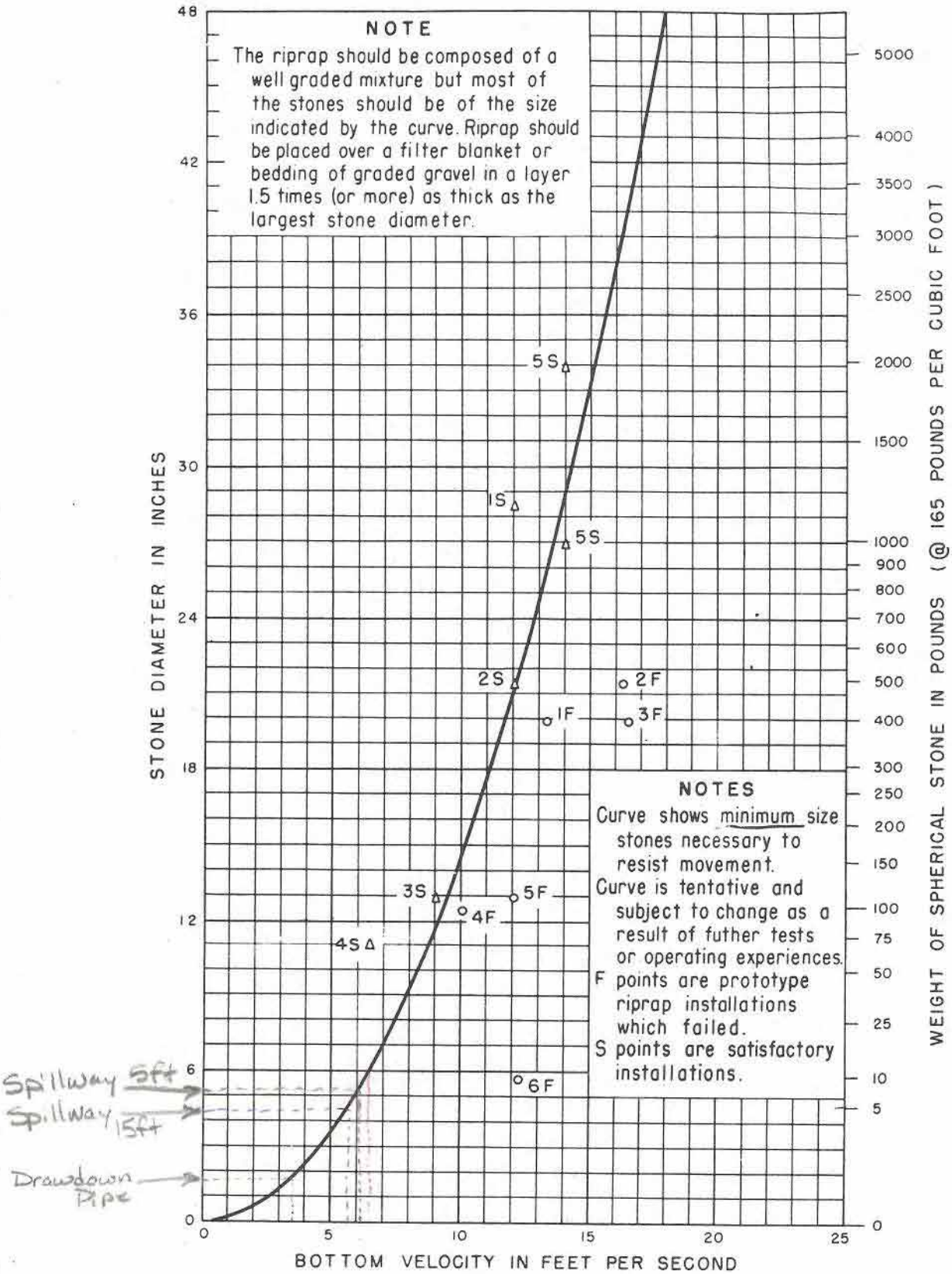


FIGURE 165.—*Curve to determine ~~maximum~~ minimum stone size in riprap mixture.*

NOTE: SEE BUREAU HYD REPORT 572 - G L BEICHLEY FIG 14 FOR RIPRAP DOWNSTREAM OF TYPE VI INDIAN BASIN

Belleayre Snowmaking Pond Filter Criteria

Use light stone fill downstream of the stilling basin based on the expected discharge velocity.
Layer thickness is 18", d85~12", d15~05"

For light stone bedding, the required d85 is no less than 1/5 of d15 of
light stone - use a stone bedding with d85 >= 1"

Use #2 Stone Fill as bedding for Fine Stone Fill
Layer thickness is 6", d85 ~1", d15~.5"

Use ASTM C-33 fine aggregate for bedding #2 Stone Fill
Layer thickness is 6", d85 ~.09", d15~.01"

SJB Sample TP1 and TP3 material - bedding material design between native soil & first filter layer:
Following the steps of example 26-3 from the National Engineering Handbook:

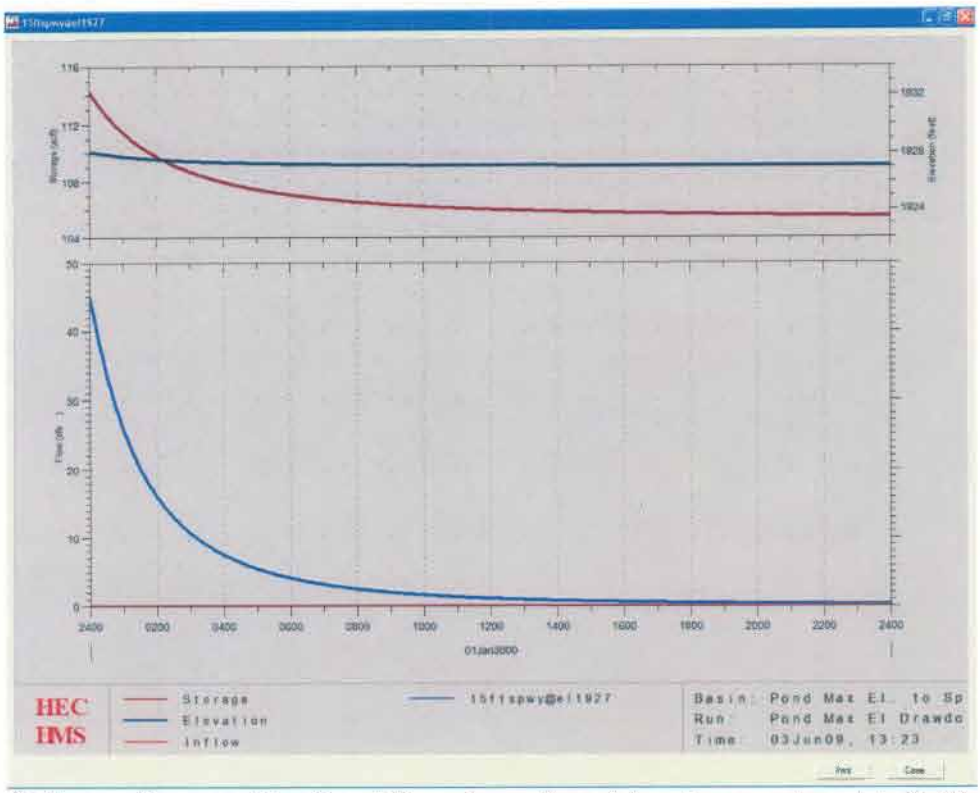
1)

Sieve Size	% Finer	Regraded Percent Passing
1	100	
3/4	100	
1/2		
3/8	68	
1/4	63	
#4	60	100
#10	55	92
#20	47	79
#40	41	69
#100	24	40
#200	17	29

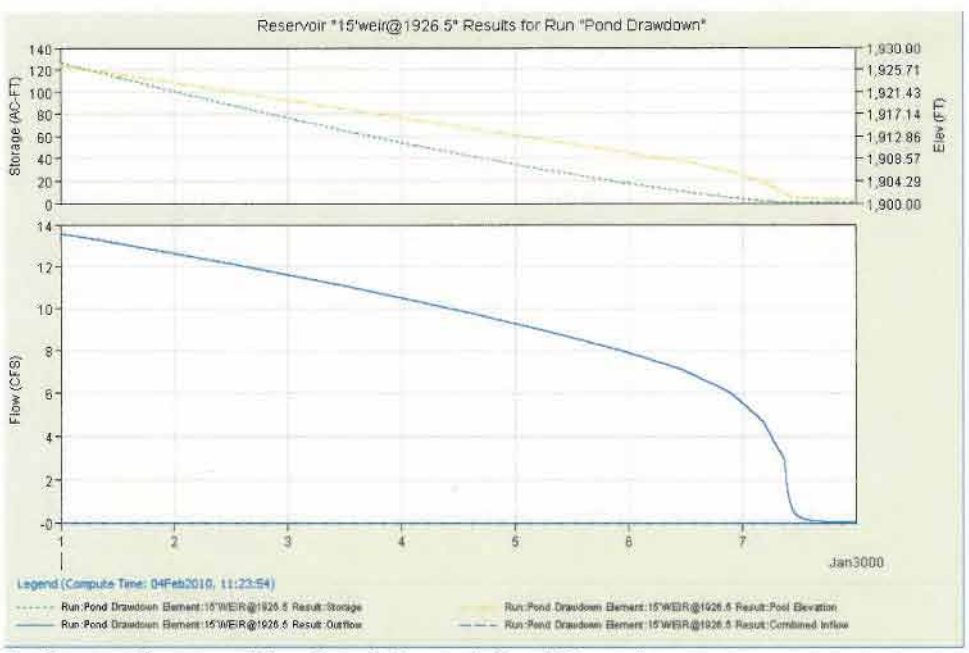
3) 59.5% passing #4 -> adjustment factor is 100/84 = 1.68
4) 29% passing #200 sieve, soil is category 3 from table 26-1
5) d15 max will be determined from table 26-2
= [(40-regraded % passing #200)/(40-15)]*[4*d85-.7mm]+.7mm = 0.075 inches
6) Based on permeability, d15 min = 4 * d15 base soil.
d15 min of 4*.003in. = .012 in. or .004 in (Table 26-3) -> use .012 inches
7) d15 min must be >= 1/5 d15 max = .075/5 = .015 in.
8) d10 max = d15max (step 7) /1.2 = .075/1.2 in. = .0625 in
d60 max = d10 * 6 = 6*.0625 = .375 in.
d60 min = d60 max/5 = .075 in.
9) d100 max = 3 in.
d5 min = .003 in.
10) d10 min = d15 min / 1.2 = .01 in.
d90 max from table 26-6 = 0.8 in.

ASTM C-33 concrete sand fits the range of permissible gradations for a filter over the existing soil.

APPENDIX G



Belleayre Snowmaking Pond Drawdown from Max. Impoundment to Spillway Crest



Belleayre Snowmaking Pond Normal Pool Drawdown:
12" Dia. Outlet, Invert @ El. 1900.7, 170' of Pipe and Normal Pool El 1926.5