CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE FOLLOWING ELECTRONIC RECORDS ARE TRUE AND ACCURATE REPRODUCTIONS OF THE ORIGINAL RECORDS OF JAMES CITY COUNTY GENERAL SERVICES DEPARTMENT- STORMWATER DIVISION; WERE SCANNED IN THE REGULAR COURSE OF BUSINESS PURSUANT TO GUIDELINES ESTABLISHED BY THE LIBRARY OF VIRGINIA AND ARCHIVES; AND HAVE BEEN VERIFIED IN THE CUSTODY OF THE INDIVIDUAL LISTED BELOW.

BMP NUMBER: **YC004**

DATE VERIFIED: **February 11, 2013**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

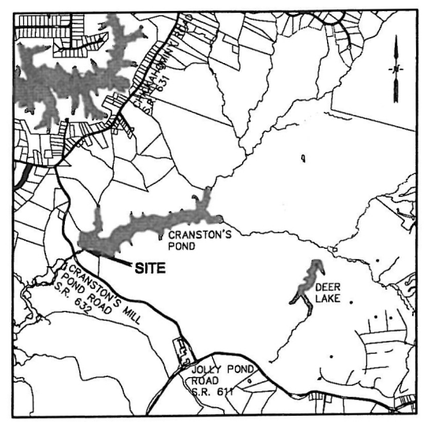
Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

SUP-0023-2010

CRANSTON MILL POND
SPECIAL USE PERMIT

POWHATAN DISTRICT **JAMES CITY COUNTY, VIRGINIA**



VICINITY MAP
SCALE: 1" = 2000'
0 2000 4000 6000

SITE DATA

OWNER/CONTRACT PURCHASER
CRANSTON MILL POND, LLC
C/O EARTHSOURCE SOLUTIONS INC.
5735 S. LABURNUM AVENUE
RICHMOND, VA 23231
CONTACT: BRENT FULTS – PRESIDENT
PHONE: (804) 222-5114
FAX: (804) 222-5220
EMAIL: BFULTS@ESSWETLANDS.COM

CIVIL ENGINEER
KOONTZ-BRYANT, P.C.
1703 NORTH PARHAM ROAD
SUITE 100
RICHMOND, VA 23229
CONTACT: PAUL HINSON, P.E., LEED AP
PHONE: (804) 740-9200
FAX: (804) 740-7338
EMAIL: PHINSON@KOONTZBRYANT.COM

SITE ADDRESS
6616 CRANSTON'S MILL POND ROAD
TOANO, VA 23168-9067

ZONING
A1

MAP REFERENCE
PARCEL ID: 2230100044

FIRM FLOOD MAP REFERENCE
FLOOD ZONE X
MAP NUMBERS: 51095C0105C
51095C0110C

UTILITIES
WATER: NONE
SEWER: NONE

AREA
153.48 AC. (WHOLE EXISTING PARCEL)
59.33 AC. (PROPOSED PARCEL)
3.56 AC. (DISTURBED AREA)

WATERSHED
THE ENTIRE PROJECT LIES WITHIN THE YARMOUTH CREEK WATERSHED.

TOPOGRAPHICAL INFORMATION
SURVEY PERFORMED BY TIMMONS GROUP IN FALL 2009.
SURVEY MERGED WITH JAMES CITY COUNTY GIS.

HORIZONTAL AND VERTICAL DATUM
NAD 83 & NGVD 29

RECEIVED AUG 2010 Planning Department

CONTENTS

C1.0 TITLE SHEET
C2.0 EXISTING CONDITIONS PLAN
C3.0 LAYOUT AND GRADING PLAN

ENVIRONMENTAL INVENTORY

1. TIDAL WETLANDS: NONE ON SITE
2. TIDAL SHORES: NONE ON SITE
3. NONTIDAL WETLANDS (RPA): PRESENT
4. 100' BUFFER (RPA): PRESENT – ENTIRE SITE IS IN RPA
5. NONTIDAL WETLANDS (RMA): NONE ON SITE (ALL WETLANDS WITHIN RPA)
6. 100-YR FLOODPLAIN: FEMA FLOODPLAIN SHOWN ON PLANS.
7. SLOPES 25% OR GREATER: PRESENT

REVISIONS:

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND
JAMES CITY COUNTY, VIRGINIA
POWHATAN DISTRICT
TITLE SHEET

DATE: AUGUST 20, 2010
JN: 09114-001

C1.0

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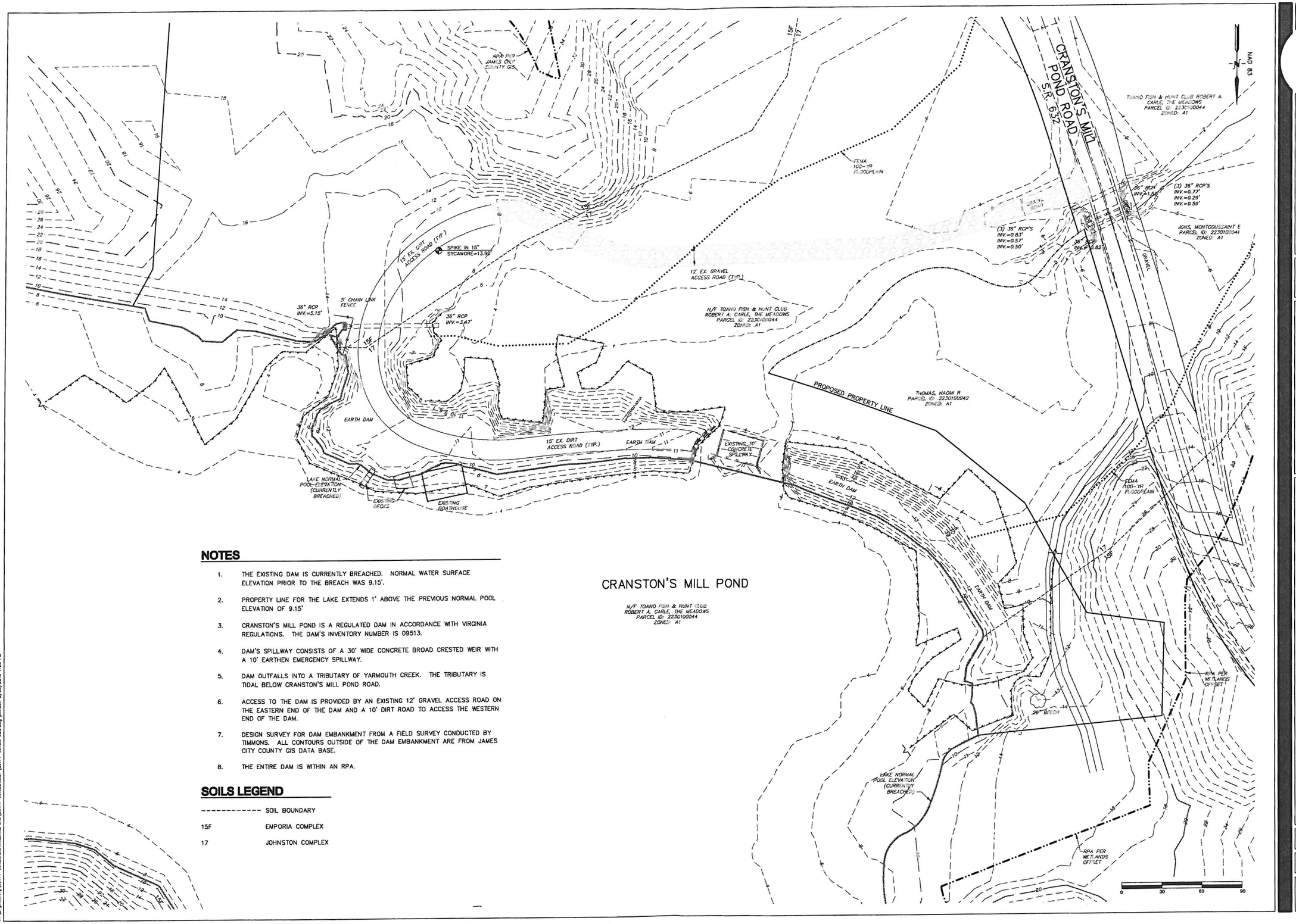

NOTES

1. THE EXISTING DAM IS CURRENTLY BREACHED. NORMAL WATER SURFACE ELEVATION PRIOR TO THE BREACH WAS 9.15'.
2. PROPERTY LINE FOR THE LAKE EXTENDS 1' ABOVE THE PREVIOUS NORMAL POOL ELEVATION OF 9.15'
3. CRANSTON'S MILL POND IS A REGULATED DAM IN ACCORDANCE WITH VIRGINIA REGULATIONS. THE DAM'S INVENTORY NUMBER IS 09513.
4. DAM'S SPILLWAY CONSISTS OF A 30' WIDE CONCRETE BROAD CRESTED WEIR WITH A 10' EARTHEN EMERGENCY SPILLWAY.
5. DAM OUTFALLS INTO A TRIBUTARY OF YARMOUTH CREEK. THE TRIBUTARY IS TIDAL BELOW CRANSTON'S MILL POND ROAD.
6. ACCESS TO THE DAM IS PROVIDED BY AN EXISTING 12' GRAVEL ACCESS ROAD ON THE EASTERN END OF THE DAM AND A 10' DIRT ROAD TO ACCESS THE WESTERN END OF THE DAM.
7. DESIGN SURVEY FOR DAM EMBANKMENT FROM A FIELD SURVEY CONDUCTED BY TIMMONS. ALL CONTOURS OUTSIDE OF THE DAM EMBANKMENT ARE FROM JAMES CITY COUNTY GIS DATA BASE.
8. THE ENTIRE DAM IS WITHIN AN RPA.

SOILS LEGEND

----------	SOIL BOUNDARY
15F	EMPORIA COMPLEX
17	JOHNSTON COMPLEX

REVISIONS:

DESIGNED: JSM/PFH
DRAWN: JSM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-8200 FAX (804) 740-7358
kbpc@koontzbryant.com

CRANSTON MILL POND

JAMES CITY COUNTY, VIRGINIA

POWHATAN DISTRICT

EXISTING CONDITIONS PLAN

DATE: AUGUST 20, 2010

JN: 09114-001

C2.0

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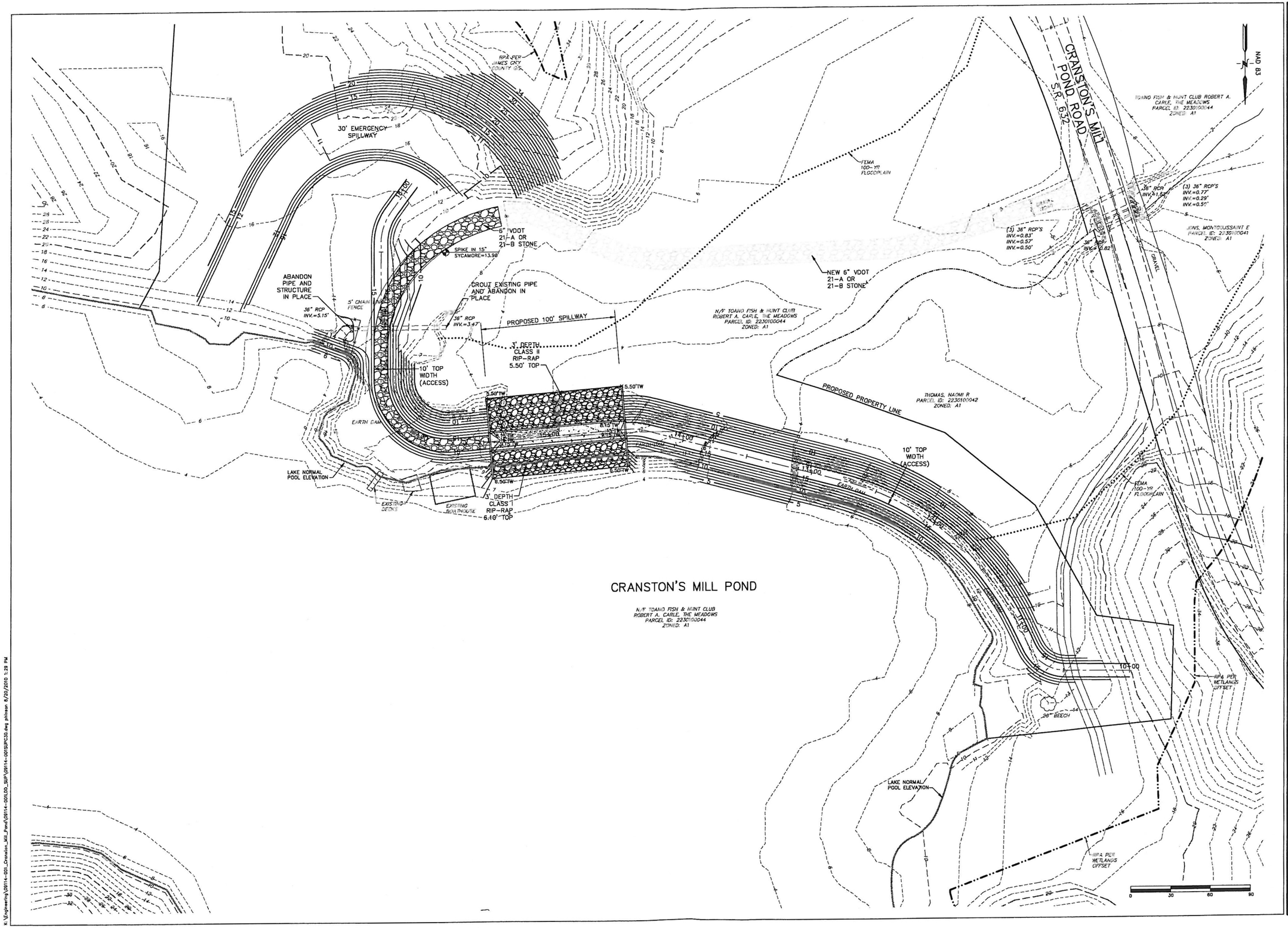

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REVISIONS:

DESIGNED: JSM/PPH
DRAWN: JBM
CHECKED: PPH

KOONTZ-BRYANT, P.C.
1706 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-6200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND

JAMES CITY COUNTY, VIRGINIA

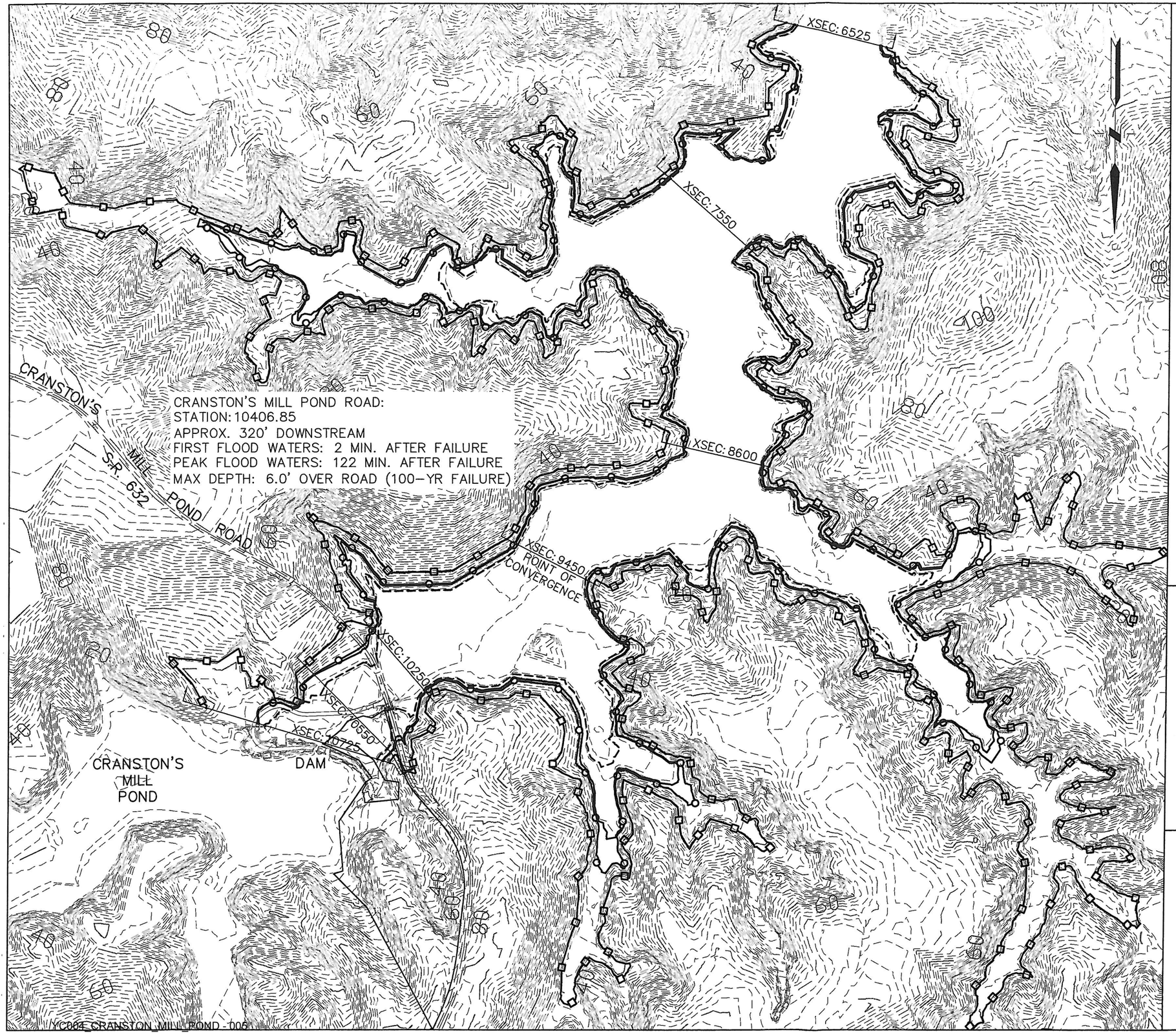
POWHATAN DISTRICT

LAYOUT AND GRADING PLAN

DATE: AUGUST 20, 2010

JN: 09114-001

C3.0



DAM BREAK INUNDATION MAP FOR CRANSTON'S MILL POND

SIGNIFICANT HAZARD CLASS

LEGEND

- SUNNY DAY FAILURE
- SPILLWAY DESIGN FLOOD WITH FAILURE
- SPILLWAY DESIGN FLOOD (NO FAILURE)
- PROBABLE MAXIMUM FLOOD WITH FAILURE

NOTES

1. THE INFORMATION CONTAINED IN THIS MAP IS PREPARED FOR USE IN NOTIFICATION OF DOWNSTREAM PROPERTY OWNERS BY EMERGENCY MANAGEMENT PERSONNEL.
2. MAPPING OF FLOODED AREAS AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE. TIMING AND EXTENT OF ACTUAL INUNDATION MAY DIFFER FROM THE INFORMATION PRESENTED ON THIS MAP.
3. ALL TOPOGRAPHICAL INFORMATION FROM JAMES CITY COUNTY GIS.
4. DATUM: HORIZONTAL=NAD 83, VERTICAL=NGVD 29

0 400 800 1200

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-20-10
PROFESSIONAL ENGINEER

DRAWN BY: JBM

CHECKED BY: PFH

DATE: 6/14/10
REV. 6/24/10
REV. 8/20/10

SCALE: 1"=400'

KOONTZ-BRYANT, P.C.
SITE DEVELOPMENT SOLUTIONS
1703 N. PARHAM ROAD, SUITE 100, RICHMOND, VIRGINIA 23229
(804)740-9200 kbpc@koontzbryant.com FAX (804)740-7338

Scott Thomas

From: Scott Thomas
Sent: Thursday, March 22, 2007 5:09 PM
To: Darryl Cook; Mike Woolson; William A. Cain; Barry Moses
Cc: John Horne
Subject: Colonial Heritage - Interesting Fact to Look At
Attachments: ColonialHeritage.overall.jpg

I've been reviewing revisions to the Colonial Heritage Master Stormwater Management plan for some time now. Part of this review process was them providing a HEC-RAS analyses of the stream network within the project area. Although they have BMPs scattered throughout the development, they would have some uncontrolled discharges. At uncontrolled discharge point MS-19 would apply directly at the receiving channel. Also, as uncontrolled runoff and controlled runoff is in combination, it was important to use HEC-RAS to show existing natural channels throughout the site, especially the larger streams in RPA/conservation areas, would meet MS-19 parameters, specifically that natural channels are adequate for velocity and capacity for the 2-year event.

The current master SW plan for Colonial Heritage has 24 structural BMPs, 667.5 acres of dedicated natural open space and an LID component to meet water quality requirements. An overall map is attached which shows all of the constructed BMPs to date, not all the master planned BMPs.

Early in the review of this analyses, the engineer inadvertently provided me a HEC-RAS analyses for a 100-year storm. This would be good for a floodplain analyses, not an MS-19 analyses of the two year storm. However, it did provide some very interesting information.

Colonial Heritage total land tract, with the Boy Scout property is 1508 acres. Roughly the drainage area to Cranstons Mill Pond (YC 004) is about 4300 acres. Therefore, Colonial Heritage is about 35 percent of the drainage area to Cranstons Mill Pond. At the lowest point in their stream network, just below Deer Lake, an analyses point was evaluated. This analyses point is about 2,500 feet upstream of Cranstons Mill Pon. Predevelopment 100-year flow at this location is **877** cfs. Postdevelopment, with all the structural BMPs in place is **1,894** cfs. This is an increase of **1,017** cfs to Cranstons Mill Pond at ultimate buildout. I would say the Colonial Heritage is at about ½ buildout now.

For the 2-year storm at the same analyses point, predevelopment is 311.07 cfs. Postdevelopment is 249.5 cfs, a reduction of 61.5 cfs. It is evident that our stormwater management requirements definitely have an effect on the 2-year storm but in this case no effect whatsoever on the 100-year.

Quite interesting huh?

Scott J. Thomas, P.E.
Chief Engineer - Stormwater
James City County
Environmental Division

Visit:
http://www.james-city.va.us/resources/devmgmt/div_devmgmt_environ.html
and
www.protectedwithpride.org

Scott Thomas

From: Scott Thomas
Sent: Thursday, April 12, 2007 6:05 PM
To: 'alexcom@vacoxmail.com'
Cc: Cheryl Waldren; Wayland Bass; William A. Cain
Subject: Cranstons Mill Pond Information
Attachments: CranstonsMillPond.1.jpg; CranstonsMillPond.2.jpg; CountySSCcriteria.121404.pdf; CountyDesignPlanChecklist.pdf

Joe – it was good talking to you again. Tell Roland and the crew I said hello.

Here is some information on Cranstons Mill Pond, if it becomes a project. You stated that the hunting club may have retained you to prepare a plan for submission to DCR Dam Safety.

Plan Submission

Normally all site plans need to come through the Planning Division. They are the clearinghouse for plans. But if it only involves minor repair/improvement to an existing dam and probably only involves erosion and sediment control, I think it can just come to our Division directly. However, if you think it is more than some minor work and involves the roadway and utilities (ie. VDOT, JCSA, etc.) it will need to come through our Planning Division and be assigned a County site plan number. I think there are hydrants along the road. The James City Service Authority (JCSA) is our utility arm. Wayland Bass is the County Engineer. We work closely with him. If it comes through Planning, he and us and VDOT, Planning and the JCSA will get a copy for review. If you submit if directly to us as an E&S control plan only, we would assign it a Division E&S plan number and I would make sure Wayland sees it also.

It just depends how extensive the work plan is but the rule of thumb is normally through Planning, only minor E&S plans get submitted directly to our Division.

General

The assigned County BMP Code number is YC 004, although this facility is deemed a "private facility" not an actual BMP. Based on County GIS, roughly the drainage area to Cranstons Mill Pond is 4300 acres. Colonial Heritage is about 35 percent of the drainage area to Cranstons Mill Pond. The current master stormwater management master plan for Colonial Heritage has 24 structural BMPs, 667.5 acres of dedicated natural open space and an LID component to meet water quality requirements. However, our requirements would not address the 100-year storm event. If you have any questions about what development has or is to occur in the watershed for your assumptions on design discharge for the spillway let us know.

As this is not a BMP for a land development project, it would not have to meet our stormwater management requirements per our County BMP manual.

FIRM maps 15B and 20B show SFHA Zone AE and Zone X in the vicinity of the dam (provide general notes on plan). The State Road is State Route 632 Cranstons Mill Pond Road.

Yarmouth Creek Watershed

The area is also within the Yarmouth Creek Watershed Management Plan area which was adopted by the Board of Supervisors. It is in the nontidal mainstem of Yarmouth Creek. Provide a general note on the plan stating that this project is situated in the nontidal mainstem of Yarmouth Creek. Special Stormwater Criteria, which applies to Yarmouth and Powhatan Creek Watersheds, would apply to the project. However, based on the nature of the project, and it is not a development plan or adding impervious cover or even subject to stormwater management,

we could probably work with you on that one. Perhaps use of EC-3 matting on slopes that you would probably not mat otherwise may be a good choice to show that you are complying with the SSC. I've attached the SSC criteria.

RPA/RPA Buffer

Unfortunately, dam repairs and improvement would fall under some of our Chesapeake Bay ordinance requirements because work activities will be conducted in an area shown as RPA/RPA buffer. Even if it is an existing dam. The nature of the project really has no bearing on this. If it was purely dam maintenance it probably would not be an issue, but as it is may be considered an improvement it needs to comply with our Chapter 23 requirements. I believe you will need to submit a letter with the plan, stating the reason for the project, work activities to occur and a request for waiver/exception from Chesapeake Bay ordinance requirements. For this type of case (existing dam), usually this is an administrative review and approval and does not go to the Chesapeake Bay Board. I've included a map which shows RPA/RPA buffer area. The red is historic (pre-2004), the purple is projected and the green confirmed. Environmental inventory requirements of Section 23-10(2) of the Ches Bay ordinance would also apply; however, you may be under the 5,000 sf disturbance threshold. Probably for this case you would list the components and state either not present or no impact, except for RPA/RPA buffer. This can be done on a table on the cover or plan view sheet.

If you are disturbing slope 25 percent or steeper, even if man-made, you need a waiver from our Division. Submit a letter which states the amount of impact, measures you are providing to limit impact or control erosion. This is an administrative waiver and pretty simple. Section 23-5 of the Ches Bay ordinance governs this.

Here's a link to the Ches Bay ordinance: http://www.jccegov.com/pdf/county_code/chp23.pdf

Land-Disturbing

Our threshold for land-disturbing is 2,500 square feet of disturbance. As discussed, I believe at a minimum we would have to review the plan for Land-Disturbing permit purposes which would include our Division reviewing and approving an erosion and sediment control plan for proposed dam maintenance/improvement activities. I assume that it is more an improvement activity than routine or non-routine maintenance. We would require evidence of a permit from the DCR prior to issuing land-disturbing permit. If there are any wetland impacts, we would need evidence of that also before we issue the LD permit also. Sometimes this happens if there are impacts to perimeter shoreline wetlands.

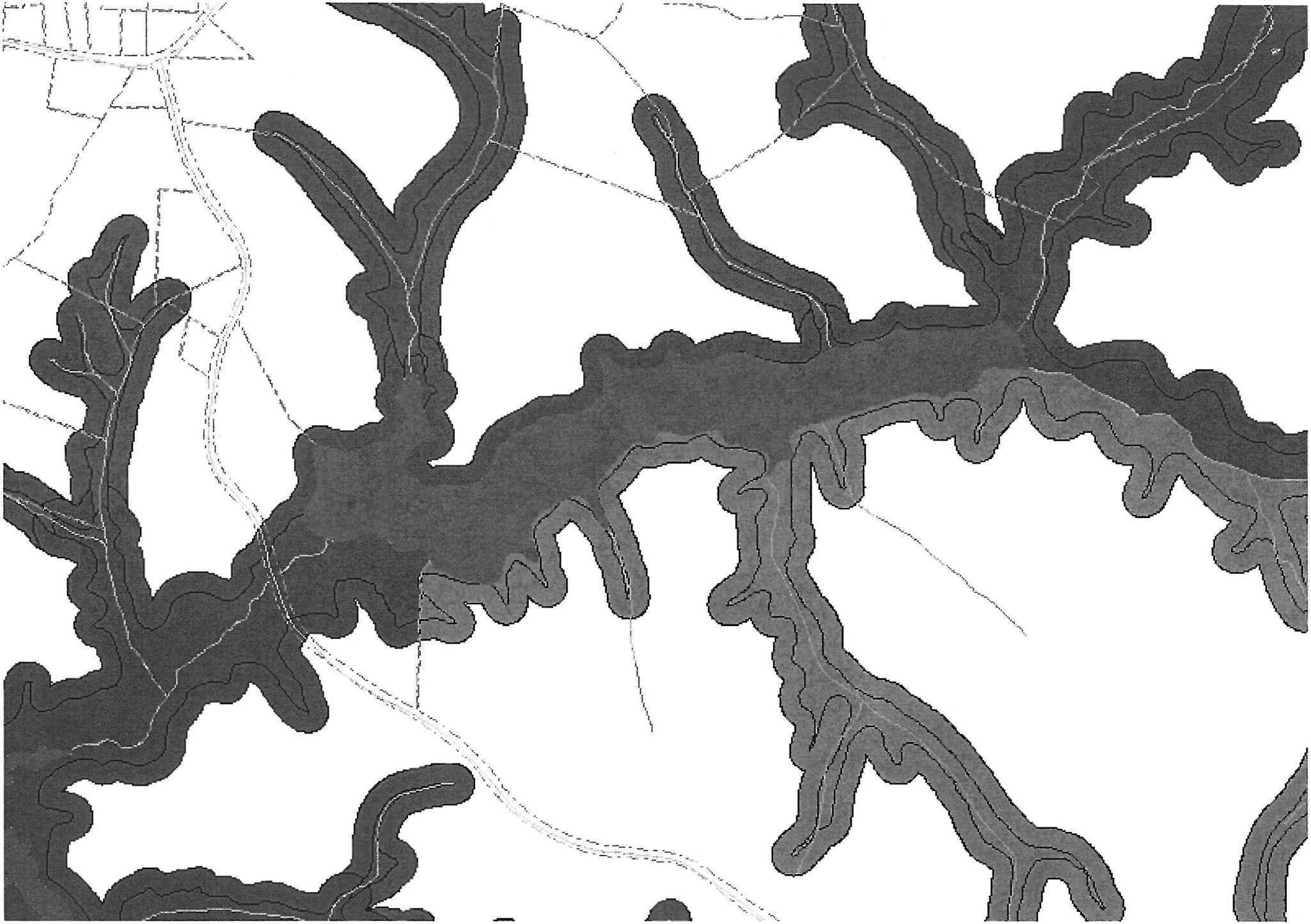
Part of our land-disturbing permit process is to post a surety for siltation. This would probably be a pretty low amount for this project. Our land-disturbing application and information is on our website at http://www.jccegov.com/government/forms/environmental.html . Some of the forms won't apply. I've also attached our erosion and sediment control plan checklist to guide you in preparing the E&S plan.

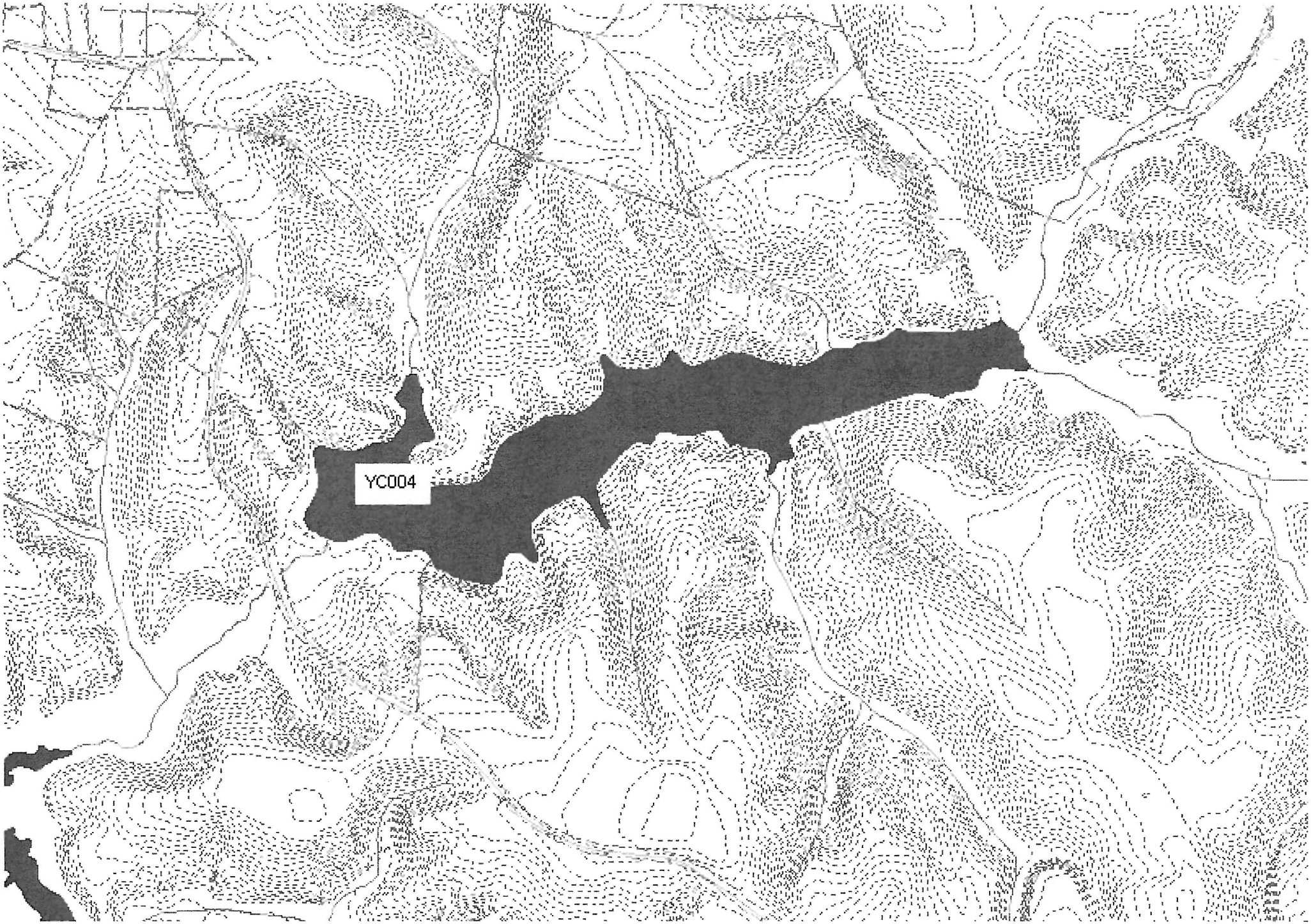
Hints: On the E&S plan, clearly show the limit of work, e&s control measures, a sequence of construction and address environmental inventory requirements.

Scott J. Thomas, P.E.
Chief Engineer - Stormwater
James City County
Environmental Division

Visit:
http://www.james-city.va.us/resources/devmgmt/div_devmgmt_environ.html
and
www.protectedwithpride.org

YC004_CRANSTON_MILL_POND - 009





YC004_CRANSTON_MILL_POND - 011

Cranston Mill Pond
Project Narrative

Cranston Mill Pond is an existing pond located at 6616 Cranston Mill Pond Road. The pond's dam was breached during a tropical storm in 2006. Prior to the breach the pond had an area of 50.2 acres at the permanent normal pool elevation of 9.15'.

The applicant (Cranston Mill Pond, LLC) proposes to repair the breach in accordance with the requirements of the Commonwealth's Dam Safety Act and associated Regulations. The facility is considered a regulated facility in accordance with state regulations as the dam creates an impoundment capacity in excess of 50 acre feet. The existing dam does not meet current state requirements. The dam improvements will bring the dam into compliance with the Dam Safety Act and Regulations.

The dam has been operating under a Conditional Operation and Maintenance Certificate from the Department of Conservation and Recreation's (DCR) Soil and Water Conservation Board due to the dam's non-conformance with state requirements. An Alteration Permit application was prepared and submitted by the applicant to the DCR Dam Safety Division for the required modifications to the existing dam. On January 14, 2010, DCR's Soil and Water Conservation Board issued a Dam Alteration Permit, which is valid thru January 31, 2011, to the applicant. The applicant has discussed modifications to the Alteration Permit based on refined design specifications and expects the revisions to be approved at the Board's September 16, 2010, meeting.

The proposed improvements to the dam (which will bring it into compliance with current dam safety regulations) include the construction of 100' of new concrete broad crested weir spillway. The new spillway would be constructed to maintain the same water surface elevation as the existing spillway. The existing 30' wide concrete broad crested weir spillway would be removed as part of the proposed alterations. A new 30' earthen emergency spillway would also be constructed. Woody vegetation on the dam embankment and within 25' of the up and down stream toes would also be removed in accordance with state regulations. The existing dam embankment would be raised approximately 3' and the existing embankment slopes would be re-graded as required to provide a stable slope. Wetland impacts will be less than 1/10 acre and the United States Army Corps of Engineers Nationwide Permit #3 will be used.

In conjunction with the preparation of the Alteration Permit package for the DCR Dam Safety Division, a dam break inundation zone map has been prepared. The map and research of down stream properties revealed that there are no existing structures or houses within the limits of the dam break inundation zone. Cranston's Mill Pond Road is located below the dam and has an average daily traffic count (ADT) of 470 vehicles per day in accordance with VDOT's 2008 traffic data base. The property below the dam is shown to be within an RPA in accordance with James City County's GIS data base.

Studies of the Yarmouth Creek drainage basin have been performed by the Center for Watershed Protection. The studies indicate that the pond provided environmental benefits for the Yarmouth Creek drainage basin. Once repaired, the dam will provide environmental and safety benefits.

From this point forward the file is not certified. The list below details the documents that have been added to the file, the person that added the documents and the date they were added.

Name	Content	Date
Jo Anna Ripley	Deeds, deed receipt, business cards, declarations, maps and misc. documents	12/5/2014

RESTORATION SYSTEMS | LLC

Natural Resource
Restoration & Conservation

www.restorationsystems.com

Worth Creech

worth@restorationsystems.com

Phone: 919-755-9490
Direct: 919-334-9114
Mobile: 919-389-3888
Fax: 919-755-9492

Pilot Mill
1101 Haynes St., Suite 211
Raleigh, North Carolina 27604

Baldwin Contracting and Development

Physical Address: 2207 Tazewell Street Richmond, Va 23222
Mailing Address: P. O. Box 26404 Richmond, Virginia 23260-6404

Chris Smith

Superintendent

Office: (804) 355-0071 Fax: (804) 355-0509 Cell: (804) 652-5747

e-Mail: ChrisS@baldwincontracting.net

KOONTZ-BRYANT, P.C.
Site Development Solutions

Paul F. Hinson, PE, LEED AP
Director of Engineering

(804) 200-1914

1703 N Parham Road, Suite 100
Richmond, VA 23229
(804) 740-9200 Office
(804) 740-[redacted]
(804) 874-[redacted]
phinson[redacted]

Baldwin Contracting and Development

Physical Address: 2207 Tazewell Street Richmond, VA 23222
Mailing Address: P. O. Box 26404 Richmond, Virginia 23260-6404

Todd Baldwin

Project Manager

Office: (804) 355-0071 Fax: (804) 355-0509 Cell: (804) 651-9681

e-Mail: Todd@toddbaldwincontracting.net

Prepared by JCC & Troutman/Sanders

110001428

DECLARATION OF COVENANTS

PROPERTY OF
Cranston Mill Pond, LLC
(Owner)
James City County, VIRGINIA

THIS DECLARATION OF COVENANTS (the "Declaration"), is made this 13th day of JANUARY, 2011, by and between **CRANSTON MILL POND, LLC**, a Virginia limited liability company ("CMP"), Owner, and the **COUNTY OF JAMES CITY, VIRGINIA**, a political subdivision of the Commonwealth of Virginia (the "County").

WHEREAS, CMP is the owner of the certain property consisting of approximately 59.33 acres (the "Property"), which is more particularly shown on that certain plat entitled "Subdivision Plat of Cranston's Mill Pond and Adjacent Property" number JCC-S-0049-2010 (the "Subdivision Plat") which is duly recorded in the Clerk's Office of the County of James City, Virginia as Instrument No. 100027353.

WHEREAS, CMP desires to comply with the respective conditions and terms of the Cranston's Mill Pond Nutrient Reduction Implementation Plan dated April 20, 2010 among: CMP, the Virginia Department of Environmental Quality ("DEQ") and the Virginia Department of Conservation and Recreation ("DCR") by imposing this DECLARATION OF COVENANTS upon said Property for the purpose of generating and transferring nutrient offsets pursuant to DEQ's point source nutrient trading program (§§ 62.1-44.19:12 et seq. of the *Code of Virginia*, 1950, as amended (the "Virginia Code") and 9 VAC 25-820-10 et seq.) and DCR's stormwater offset program (Virginia Code § 10.1-603.8:1).

WHEREAS, CMP desires to comply with the respective conditions and terms of the Nutrient Reduction Implementation Plan by imposing this Declaration of Covenants on the Property.

WHEREAS, the County has adopted the Chesapeake Bay Preservation Ordinance, Chapter 23 of the James City County Code, as required by Chapter 21 of Title 10.1 of the Virginia Code to protect the Chesapeake Bay and its tributaries from nonpoint source pollution within the Chesapeake Bay drainage area.

WHEREAS, CMP desires to comply with the respective conditions and terms of the Chesapeake Bay Preservation Ordinance, the James City County Code, and the Virginia Code and desires to preserve land in its natural condition as part of CMP's efforts to improve the quality of stormwater runoff from the Property.

WHEREAS, This Declaration of Covenants is imposed by CMP freely and voluntarily.

NOW THEREFORE WITNESSETH: CMP does hereby declare, covenant and agree, for itself and its successors and assigns, that the Property shall be hereafter held, leased, transferred, and sold

Returned to Chesapeake Bay Nutrient
5735 South Laburnum 1/12/2011
Richmond, VA 23231

subject to the following covenants and restrictions which shall run with the land and be binding on all parties and persons claiming under them.

CMP hereby grants operational and nutrient offset transfer rights for the Property under the terms of the Nutrient Reduction Implementation Plan to Chesapeake Bay Nutrient Land Trust, LLC ("CBNLT"). CBNLT agrees to manage said Property according to the terms of this Declaration of Covenants and the Cranston Mill Pond Nutrient Reduction Implementation Plan.

Covenants and Restrictions:

The Property shall be preserved in perpetuity by prohibiting the following activities:

1. A. Destruction or alteration of the Property except the following:

(a) Alterations in accordance with plans approved by the Soil and Water Conservation Board in issuing an Alteration Permit effective September 16, 2010, for Cranston Mill Pond Dam (Inventory Number 09513) pursuant to the terms of the Dam Safety Act (Virginia Code §§ 10.1-604 et seq.) and Dam Safety Regulations (4 VAC 50-20-10 et seq.) (collectively, the "Virginia Dam Safety Program");

(b) Alterations necessary to maintain the Property and Cranston Mill Pond Dam in accordance with the Dam Safety Program including removal of vegetation as required by Virginia Code § 10.1-609.2 and associated regulations;

(c) Alterations to Cranston Mill Pond Dam authorized by the Virginia Department of Conservation and Recreation and the Virginia Department of Environmental Quality as necessary to implement the terms of the Nutrient Reduction Implementation Plan and ensure the success of the planned nutrient reductions and associated nutrient offsets and in conjunction with the construction, reconstruction, enhancement or maintenance of the dam and spillway;

(d) Alterations as reasonably necessary to comply with local, state, or federal law or permit or appropriate court order;

(e) Alterations depicted on the Subdivision Plat and the Site Plan (JCC-SP0093-2010);

(f) Outdoor recreational activities including, but not limited to, canoeing, boating, hiking, camping, wildlife and botanical observation and studies, hunting, trapping and fishing;

(g) Non-commercial removal of trees for personal use (not to exceed 12 trees per year) on those portions of the Property outside the RPA (as shown on the Subdivision Plat) for obtaining firewood for private use on the Property only; and

(h) Alterations to construct structures such as walkways, boardwalks, foot trails, wildlife observation or management structures, benches, picnic tables, fence posts and, ecological, biological, hydrological or chemical monitoring, observation or management equipment including, without limitation, monitoring wells, water control weirs or interpretive stations, or other structures provided that such facilities are constructed and maintained in accordance with all applicable local, federal, and state laws and are located outside the RPA.

1. B. Destruction or alteration of the Property except the following, provided each exception is approved in writing by the County Watershed Planner, which approval shall not be unreasonably withheld:

(i) Alterations to construct a dam observation deck and an equipment storage and work building outside the RPA provided that such facilities are constructed and maintained in accordance with all applicable local, federal, and state laws;

(j) Addition of signs constructed in public right of ways by or on behalf of the Virginia Department of Transportation, the County, or other governmental agencies;

(k) Removal of vegetation (where not precluded by local, federal, or state law) when conducted for

(i) removal of noxious or invasive plants, or
(ii) limited aesthetic modifications not involving clearing or removal of trees or limbs greater than three (3) inches in caliper unless dead, dying or diseased; and

(l) Planting of native species of plants by hand for aesthetic landscaping or screening purposes.

2. Construction, maintenance, placement or relocation of any structures or fills including but not limited to buildings, and mobile homes, other than those which currently exist, except as authorized upon the written consent of the County Watershed Planner which approval shall not be unreasonably withheld. On the portion of the Property outside the RPA, construction and maintenance of an observation deck and an equipment storage and work building shall be permitted upon the written consent of the County Watershed Planner which approval shall not be unreasonably withheld.

3. Ditching, draining, diking, damming, filling, excavating, grading, plowing, flooding/ponding, mining, drilling, placing of trash and yard debris or removing/adding topsoil, sand, or other materials other than that approved upon the written consent of the County Watershed Planner which approval shall not be unreasonably withheld; however no additional approval by the County Watershed Planner is needed for those activities authorized by the Alteration Permit or depicted on the Subdivision Plat or Site Plan.

4. Permitting livestock to graze, inhabit or otherwise enter the Property;

5. Harvesting, cutting, logging, and pruning of trees and plants (except as may otherwise be authorized in this Declaration), or using fertilizers and/or biocides other than what is approved upon the written consent of the County Watershed Planner. Harvesting, cutting and logging trees on the Property shall be permitted as necessary to implement the improvements approved by the Alteration Permit or depicted on the Subdivision Plat or Site Plan. Harvesting, cutting, and logging trees on those portions of the Property outside the RPA shall be permitted upon the written consent of the County Watershed Planner for the location of dam observation deck and an equipment storage and work building.

Amendment:

The covenants contained herein shall not hereafter be altered in any respect without the express written approval and consent of CMP or its successor in interest and the County. After recording, CMP or its successor may vacate or modify this declaration by providing a document signed by CMP or its successor in interest and the County. For portions of the Property outside of the RPA for which nutrient offsets are not then currently being generated and transferred: CMP or its successor in interest may amend or vacate this declaration by providing a document signed by the CMP or its successor and the County, provided the amendment or vacation of this declaration does not negatively affect the RPA or the areas within the Property that continue to generate and transfer nutrient offsets.

Compliance Inspections and Enforcement:

The County, DEQ and DCR and their authorized agents shall have the right to enter and go on the Property to inspect and take actions necessary to verify and enforce compliance with this Declaration. For safety reasons, the County, DEQ, and DCR shall, when possible, give CMP advance notification of on-site inspections. Each request for access by non-County, DEQ or DCR parties will be evaluated on a case-by-case basis by CMP. The restrictive covenants herein shall be enforceable by any proceeding at law or in equity or administrative proceeding by the County, DEQ and DCR. Failure by the County, DEQ, DCR, CMP or any future owner to enforce any covenant or restriction contained herein shall in no event be deemed a waiver of the right to do so thereafter.

In the event of a violation of this Declaration, the County shall have the right to seek all appropriate legal and equitable relief, including but not limited to: reasonable attorney's fees and costs, the right to restore the Property to its pre-violation condition, and to assess the cost of such restoration as a lien against the Property.

Separability Provision:

The provisions hereof shall be deemed individual and severable and the invalidity or partial invalidity or unenforceability of any one provision or any portion thereof shall not affect the validity or enforceability of any other provision thereof.

Consent of Lender and Trustee: (Not Applicable)

No Lien Held

Referenced Document:

Terms and Conditions of the Cranston Mill Pond Nutrient Reduction Implementation Plan dated April 20, 2010 among: Cranston Mill Pond, LLC, the Virginia Department of Environmental Quality and the Virginia Department of Conservation and Recreation are available upon written request.

Document copies may be obtained with permission from:

Chesapeake Bay Nutrient Land Trust, LLC.
5735 South Laburnum Avenue
Richmond, Virginia 23231

(SIGNATURE ON NEXT PAGE)

WITNESS the following signature the day and year first above written.

BY: John P Preyer
Officer \ General Partner

BY: John P Preyer

TITLE: Manager Cranston Mill Pond LLC

North Carolina
~~Commonwealth of Virginia~~, County of Wake, to wit:

I, Tiffani Bylow, a notary public for the state and city aforesaid, do certify that John P Preyer, whose name was signed on January 12, 2011 in his capacity on that date to the foregoing document has acknowledged said document and signature before me in the city aforesaid.

Given under my hand and notarial seal this 12th day of January, 2011.

Tiffani Bylow Tiffani Bylow
Notary Public

My commission expires 5.04.2013.

TIFFANI BYLOW NOTARY PUBLIC WAKE COUNTY, N.C.

VIRGINIA: CITY OF WILLIAMSBURG & COUNTY OF JAMES CITY
This document was admitted to record on Jan 13, 2011
at 2:14 AM/PM. The taxes imposed by Virginia Code Section 58.1-801, 58.1-802 & 58.1-814 have been paid.

STATE TAX	LOCAL TAX	ADDITIONAL TAX
$ —	$ —	$ —

TESTE: BETSY B. WOOLRIDGE, CLERK

BY: Betsy B. Woolridge Clerk

OFFICIAL RECEIPT
WILLIAMSBURG/JAMES CITY COUNTY CIRCUIT
DEED RECEIPT

DATE: 01/13/11 TIME: 14:14:41 ACCOUNT: 830CLR110001428 RECEIPT: 11000002004
CASHIER: LAB REG: WD45 TYPE: DEC PAYMENT: FULL PAYMENT
INSTRUMENT : 110001428 BOOK: PAGE: RECORDED: 01/13/11 AT 14:14
GRANTOR: CRANSTON MILL POND LLC EX: N LOC: CO
GRANTEE: JAMES CITY COUNTY OF VIRGINIA EX: N PCT: 100%
AND ADDRESS : , .
RECEIVED OF : CHESAPEAKE BAY NUTRIENT DATE OF DEED: 01/13/11
CHECK: $21.44
DESCRIPTION 1: 59.33 ACRES CRANSTON MILL POND AND ADJACENT PAGES: 6 OP 0
2: PROPERTY NAMES: 0
CONSIDERATION: .00 A/VAL: .00 MAP:
PIN:

301	DEEDS	14.50	145	VSLF	1.50
106	TECHNOLOGY TRST FND	5.00	350	POSTAGE	.44

TENDERED : 21.44
AMOUNT PAID: 21.44
CHANGE AMT : .00

CLERK OF COURT: BETSY B. WOOLRIDGE

PAYOR'S COPY
RECEIPT COPY 1 OF 2

RESOLUTION

GRANTING AN EXCEPTION ON JCC RE TAX PARCEL NO. 2230100044

WHEREAS, Mr. Paul F. Hinson, PE of Koontz-Bryant PC on behalf of Mr. Brent Fults, Cranston's Mill Pond LLC (the "Applicant"), has appeared before the Chesapeake Bay Board of James City County (the "Board") on December 8, 2010 to request an exception to the use of the Resource Protection Area (the "RPA") on a parcel of property identified as JCC RE Tax Parcel No. 2230100044 and further identified as the Toano Hunt and Fish Club property at 6616 Cranston's Mill Pond Road (the "Property") as set forth in the application CBE-11-050 for encroachment into the RPA buffer for the rehabilitation of Cranston's Mill Pond and;

WHEREAS, the Board has listened to the arguments presented and has carefully considered all evidence entered into the record.

NOW, THEREFORE, following a public hearing, the Chesapeake Bay Board of James City County by a majority vote of its members FINDS that:

1. The exception request is the minimum necessary to afford relief.

2. Granting the exception will not confer upon the Applicant any special privileges denied by Chapter 23, Chesapeake Bay Preservation, of the James City County Code, to other property owners similarly situated in the vicinity.

3. The exception request will be in harmony with the purpose and intent of Chapter 23 of the James City County Code, and is not of substantial detriment to water quality.

4. The exception request is not based on conditions or circumstances that are self-created or self-imposed, nor does the request arise from conditions or circumstances either permitted or non-conforming that are related to adjacent parcels.

5. Reasonable and appropriate conditions are hereby imposed, as set forth below, which will prevent the exception request from causing a degradation of water quality.

6. In granting this exception, the following conditions are hereby imposed to prevent this exception request from causing degradation of water quality:

   1) The applicant must obtain all other necessary federal, state, and local permits as required for the project.

   2) The recordation of a Natural Open Space (NOS) easement or a Deed of Covenants over the entire proposed parcel, in a form suitable to the County Attorney.

Rec'd 1/13/11

Both Recd 1/13/11

3) The NOS easement or Deed of Covenants shall be guaranteed through the provisions of the Ordinance ~~contained in~~ Sections 23-10(3) (d) and 23-17(c), which is providing a form of surety satisfactory to the County Attorney. The surety for the NOS easement or Deed of Covenants shall be $5,000.

4) This exception request approval shall become null and void if construction has not begun by **December 8, 2011** or all improvements including the required easement are not completed by that expiration date.

5) Written requests for an extension to an exception shall be submitted to the Environmental Division no later than 2 weeks prior to the expiration date.

David Gussman
Chair, Chesapeake Bay Board

ATTEST:

Scott J. Thomas
Secretary to the Board

Adopted by the Chesapeake Bay Board of James City County, Virginia, this **8th** day of **December 2010**.

Environmental Division

OCT 20 2010

RECEIVED

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST

I. *GENERAL:*

Yes	No	N/A	
☒	☐	☐	*FAMILIARITY* with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).
☒	☐	☐	*WAIVER OR EXCEPTION* if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to this review case only.
☒	☐	☐	*VARIANCE REQUEST* if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.
☒	☐	☐	*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved stormwater management plans, drawings, technical reports and specifications.
☐	☐	☒	*WORKSHEET FOR BMP POINT SYSTEM* to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only).
☐	☐	☒	*PROPOSED CONSERVATION EASEMENT AREAS* for any natural open space points claimed in the BMP worksheet.
☐	☐	☒	*INSPECTION/MAINTENANCE AGREEMENT* is required to be prepared and executed with the County for the project.
☒	☐	☐	*FEMA FIRM PANEL* reference with designated special flood hazard areas or zone designations associated with the site, as applicable.
☐	☐	☒	*DRAINAGE AREA MAP* at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map.

Yes	No	N/A	
☒	☐	☐	*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.
☐	☐	☒	*STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.
☐	☐	☒	*TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.
☐	☐	☒	*MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.
☐	☐	☒	*STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and muti-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.
☒	☐	☐	*PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)
☒	☐	☐	North arrow and plan legend.
☒	☐	☐	Property lines.
☒	☐	☐	Adjacent property information.
☒	☐	☐	Existing site features and existing impervious cover areas.
☒	☐	☐	Impervious cover tabulations.
☒	☐	☐	Existing drainage facilities (natural or manmade).
☒	☐	☐	Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.).
☒	☐	☐	Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.
☒	☐	☐	Existing and proposed easement locations.

Yes	No	N/A	
☒	☐	☐	Proposed site improvements and proposed impervious cover areas.
☐	☐	☒	Proposed stormwater conveyance, drainage and management facilities with appropriate labeled construction data and information.
☐	☐	☒	Proposed landscaping and seeding plans (disturbed areas, pond interior, etc.).
☒	☐	☐	Proposed slope stabilization areas (riprap, blankets, mattings, walls, etc.).
☐	☐	☒	Delineation of permanent pools and the 1-, 2-, 10- and 100-year Design Water Surface Elevations.
☐	☐	☒	Delineation of ponding, headwater, surcharge or backwater areas which may affect adjacent existing or proposed buildings, structures or upstream adjacent properties.
☐	☐	☒	Test boring locations with reference surface elevations (if known).
☐	☐	☒	Risers, barrels, underdrains, overflows and outlet protections.
☐	☐	☒	Emergency spillway level section and outlet channel.
☐	☐	☒	Existing and proposed site utilities and protection measures.
☒	☐	☐	Erosion and sediment control measures (for site or BMP).
☐	☐	☒	Maintenance or access corridors to permanent stormwater management, BMP or drainage facilities.

II. *STORMWATER CONVEYANCE SYSTEMS:*

Yes	No	N/A	
☐	☐	☒	*PLAN VIEWS*
	☐	☐	☐ Storm drain lengths, sizes, types, classes and slopes for all segments. Label directly on plan or use structure/pipe schedule.
	☐	☐	☐ Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.
	☐	☐	☐ All structure numbers labeled.
	☐	☐	☐ Adequate horizontal clearance from other site utilities or structures.
☐	☐	☒	*PROFILES* generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas.
☐	☐	☒	*DETAILS*
	☐	☐	☐ Typical storm drain bedding details or reference note.
	☐	☐	☐ Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).
	☐	☐	☐ Inlet shaping detail or applicable reference note.
	☐	☐	☐ Step detail or applicable reference note (if depth 4 ft. or more).
	☐	☐	☐ Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.
	☐	☐	☐ Outlet protections at all pipe outfalls.

Yes No N/A

☐ ☐ ☒ *STORMWATER CONVEYANCE SYSTEM COMPUTATIONS*

- ☐ ☐ ☐ Storm Sewer Design computations based on 10-year design event.
- ☐ ☐ ☐ Hydraulic Grade Line computations based on 10-year design event.
- ☐ ☐ ☐ Inlet computations based on current VDOT procedure for spread, ponding depth and grate size required.
- ☐ ☐ ☐ Culvert Headwater computations. Design based on 10-year design storm event and check only for 100-year storm event.
- ☐ ☐ ☐ Open Channel computations based on 2-year design event for velocity and 10-year design event for capacity.
- ☐ ☐ ☐ Standard outlet protection or special energy dissipators.
- ☐ ☐ ☐ Pipe thickness design computations, as required, for selected pipe type (live load, minimum cover, maximum height of cover, etc.).
- ☐ ☐ ☐ Adequate channel computations for receiving channels (based on field measured channel section data).

III. *STORMWATER MANAGEMENT / BMP FACILITIES:*

Yes No N/A

☐ ☐ ☒ *HYDROLOGY* - An SCS based methodology is required for the design of stormwater management/BMP facilities with watersheds exceeding 20 acres. Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. Refer to Chapter 5 of the VESCH or Chapter 5 of the VSMH.

- ☐ ☐ ☐ Runoff Curve Number or Coefficient determinations: predeveloped and ultimate development land use scenarios.
- ☐ ☐ ☐ Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components (200 ft. maximum length for overland flow).
- ☐ ☐ ☐ Hydrograph generation (tabular or graphical): pre- and postdevelopment conditions for the 1-, 2-, 10-, and 100-year design storm events.

☐ ☐ ☒ *FACILITY CONFIGURATION and MINIMUM SEPARATIONS*

- ☐ ☐ ☐ Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).
- ☐ ☐ ☐ Basic considerations for safety and unauthorized entry.
- ☐ ☐ ☐ Proper length to width ratio (Typically 2H:1V).
- ☐ ☐ ☐ Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis.
- ☐ ☐ ☐ Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.
- ☐ ☐ ☐ No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.

Yes No N/A

☐ ☐ ☒ Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.

Yes No N/A

☐ ☐ ☒ *HYDRAULIC COMPUTATIONS*

- ☐ ☐ ☐ Elevation- or Stage- Storage curve and/or tabular data.
- ☐ ☐ ☐ Weir / Orifice Control - Extended Detention.
- ☐ ☐ ☐ Weir / Orifice Control - riser 1-year control for channel protection.
- ☐ ☐ ☐ Weir / Orifice Control - riser 2-year control for quantity (if required).
- ☐ ☐ ☐ Weir / Orifice Control - riser 10-year control for quantity (if required).
- ☐ ☐ ☐ Inlet / Outlet (barrel) control - (All Storms).
- ☐ ☐ ☐ Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.
- ☐ ☐ ☐ Emergency spillway capacity and depth of flow.
- ☐ ☐ ☐ Elevation - Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.
- ☐ ☐ ☐ Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria.

☐ ☐ ☒ *POND or RESERVOIR ROUTING*

- ☐ ☐ ☐ Storage-Indication Routing of postdeveloped inflow hydrographs for the 1-, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation.
- ☐ ☐ ☐ Downstream hydrographs at established study points, if conditions warrant (ie. facility discharge combined with uncontrolled bypass).

☐ ☐ ☒ *MISCELLANEOUS COMPUTATIONS*

- ☐ ☐ ☐ Water quality volume for permanent pool based on selected BMP treatment volume (WQv).
- ☐ ☐ ☐ Water quality volume for extended detention based on selected BMP treatment volume (WQv) with drawdown computations.
- ☐ ☐ ☐ Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.
- ☐ ☐ ☐ Pond drain computations (within 24 hours).
- ☐ ☐ ☐ Anti-seep collar design (concrete preferred) or match material type.
- ☐ ☐ ☐ Filter diaphragm design (or alternative method of controlling seepage).

Yes	No	N/A	
☐	☐	☐	Riser / base structure flotation analyses. FS = 1.25 minimum.
☐	☐	☐	Downstream danger reach study and/or emergency action plan (if conditions warrant).
☐	☐	☐	Upstream backwater analyses onto offsite adjacent property (if conditions warrant).
☐	☐	☐	100 year floodplain impacts (if conditions warrant).

Yes	No	N/A	
☐	☐	☒	*GEOTECHNICAL REQUIREMENTS*
☐	☐	☐	Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.
☐	☐	☐	Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
☐	☐	☐	Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
☐	☐	☐	Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.
☐	☐	☐	Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.
☐	☐	☐	Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*

☒	☐	☒	*PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS*
☒	☐	☐	*EXISTING GROUND AND PROPOSED GRADE*
☒	☐	☐	Embankment or excavation side slopes labeled (3H:1V maximum).
☒	☐	☐	Minimum top width labeled (per VESCH or VSMH requirements).
☒	☐	☐	Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

Yes No N/A

☐ ☐ ☒ *CORE TRENCH*

- ☐ ☐ ☐ Material (per plan or Geotechnical Report).
- ☐ ☐ ☐ Bottom width (4' minimum or greater as dictated by Geotechnical Report recommendations).
- ☐ ☐ ☐ Side slopes (1:1 maximum steepness)
- ☐ ☐ ☐ Depth (4' minimum or greater as dictated by Geotechnical Report).

☒ ☐ ☒ *PRINCIPAL CONTROL STRUCTURE. RISER OR SIMILAR STRUCTURE (DETAILS REQUIRED FOR ALL ITEMS)*

- ☒ ☐ ☐ Durable, watertight, resistant material (concrete preferred).
- ☐ ☐ ☒ Riser diameter is at least 1.25 times larger than barrel diameter.
- ☒ ☐ ☐ All pertinent dimensions and elevations shown.
- ☒ ☐ ☐ Control orifice or weir dimensions and elevations shown.
- ☐ ☐ ☒ Trash rack - removable - for each release.
- ☐ ☐ ☒ Anti-vortex device, baffle or plate.
- ☐ ☐ ☒ Riser base structure with dimensions and embedment specifications (concrete preferred).
- ☒ ☐ ☐ Interior access (steps, ladders, etc.) for maintenance for structures over 4 feet in height. Excessively high risers may need some form of exterior access on top portion.
- ☐ ☐ ☒ Low flow orifice with trash rack device.

☐ ☐ ☒ *PRINCIPAL CONTROL STRUCTURE OUTLET BARREL*

- ☐ ☐ ☐ Material (ASTM C-361 reinforced concrete pipe) with watertight joints. Prior approval required for all other pipe material (other RCP types, CMP, CPP, PVC, etc.).
- ☐ ☐ ☐ Support and bedding requirements for barrel - concrete cradles, etc. or as recommended by the Geotechnical Report.
- ☐ ☐ ☐ Pipe inverts, length, size, class and slope shown.
- ☐ ☐ ☐ Flared end section or endwall provided on barrel outlet.

☐ ☐ ☒ *SEEPAGE CONTROL*

- ☐ ☐ ☐ Phreatic line shown (4:1 slope measured from the intersection of the embankment and the principal spillway design high water).

- ☐ ☐ ☐ *ANTI-SEEP COLLARS*
  - ☐ ☐ ☐ Anti-seep collar, concrete preferred.
  - ☐ ☐ ☐ Size - 15 percent increase in length of saturation using outside pipe diameter.
  - ☐ ☐ ☐ Spacing and location on barrel (located at least 2 feet from a pipe joint).
  - ☐ ☐ ☐ *FILTER DIAPHRAGMS*
  - ☐ ☐ ☐ Design based on latest NRCS design methods and certified by a professional engineer.

Yes	No	N/A	
☒	☐	☐	*ELEVATION AND DIMENSIONAL DESIGN DATA*
☒	☐	☐	Top of facility - construction height and settled height (10 percent settlement).
☒	☐	☐	Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.
☒	☐	☐	Minimum freeboard of one (1) foot above the 100-year design high water elevation for facilities <u>with</u> an emergency spillway.
☒	☐	☐	Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities <u>without</u> an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).
☐	☐	☒	Basin Sediment Clean-Out elevation (permanent mode). Typically 10 to 25 percent of water quality volume.
☒	☐	☐	*CROSS SECTION THROUGH FACILITY*
☒	☐	☐	Existing Ground.
☒	☐	☐	Proposed grade.
☒	☐	☐	Top of facility - constructed and settled.
☒	☐	☐	Location of emergency spillway with side slopes labeled (emergency spillway in cut).
☒	☐	☐	Bottom of core trench (4' minimum).
☒	☐	☐	Location of each soil boring.
☐	☐	☒	Barrel location.
☐	☐	☒	Existing and proposed utility location/protection.
☒	☐	☐	*EMERGENCY SPILLWAY PROFILE*
☒	☐	☐	Existing ground.
☒	☐	☐	Inlet, level (control) and outlet sections per SCS.
☒	☐	☐	Spillway and crest elevations.
☐	☐	☒	*PRETREATMENT DEVICES* of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

Yes	No	N/A	
☒	☐	☐	*CONSTRUCTION SPECIFICATIONS and NOTES*
☒	☐	☐	Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan).
☒	☐	☐	Provisions to control base stream or storm flow conditions encountered during construction.
☒	☐	☐	Site and subgrade preparation requirements.
☒	☐	☐	Embankment, fill and backfill material soil and placement (lift) thickness requirements.
☒	☐	☐	Compaction and soil moisture content requirements.
☒	☐	☐	Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes.
☐	☐	☒	Clay or synthetic (PVC or HDPE) pond liners.
☐	☐	☒	Storm drain, underdrain and pipe conduit requirements.
☐	☐	☒	Minimum depth of pipe cover for temporary (construction) and final cover conditions.
☒	☐	☐	Permanent shutoff valve and pond drain.
☒	☐	☐	Concrete requirements for structural components.
☒	☐	☐	Riprap and slope protection.
☒	☐	☐	Access or maintenance road surface, base, subbase.
☒	☐	☐	Temporary and permanent stabilization measures.
☒	☐	☐	Temporary or permanent safety fencing.
☐	☐	☒	BMP Landscaping (deep, shallow, fringe, perimeter,etc.)
☐	☐	☒	Dust and traffic control (if warranted).
☒	☐	☐	Construction monitoring and certification by professional.
☐	☐	☐	Other: _____
☐	☐	☐	Other: _____.
☒	☐	☐	*MAINTENANCE PROVISIONS*
☒	☐	☐	Entity responsible for maintenance identified..
☒	☐	☐	Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays
☒	☐	☐	Maintenance access from public right-of-way or publicly traveled road.
☐	☐	☒	Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas.
☐	☐	☒	Minimum 6 foot wide public safety shelf (landing) or alternative fencing.

IV. *OUTLET PROTECTIONS:*

Yes	No	N/A	
☒	☐	☐	Sized for maximum design release (generally 10-year storm).
☐	☐	☒	Flared end section or endwall.
☒	☐	☐	Dimensions.
☒	☐	☐	Rock or riprap size, quantity and placement thickness.
☒	☐	☐	Slope at 0 percent (Level Grade).
☒	☐	☐	Geotextiles (nonwoven).
☐	☐	☒	Special energy dissipators are required for design discharge velocities that exceed eighteen (18) feet per second; or if use of standard outlet protection would result in velocities exceeding permissible channel velocities; or if space restricts or limits their use.

V. *ADDITIONAL COMMENTS OR INFORMATION SPECIFIC TO THE PLAN:*

Design has been approved by DCR Dam Safety Division

Plan Preparer: Paul F. Hinson P.E.

Date: 10-14-10

SWMProg/BMP/Checklist/ChkList

Environmental Division

OCT 20 2010

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James City County, Virginia
Environmental Division

Erosion and Sediment Control and Stormwater Management Design Plan Checklists

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GENERAL INFORMATION

Project Name: CRANSTON MILL POND
Owner / Applicant: CRANSTON MILL POND, LLC / C/O EARTHSOURCE SOLUTIONS INC.
Plan Preparer: KOONTZ-BRYANT, P.C. Email: PHINSON@KOONTZBRYANT.COM
Project Location: 6616 CRANSTON'S MILL POND ROAD / TOANO, VA
Tax Map / Parcel: 2230100044
County Plan No. (if known): _____
County BMP Type: _____ (-)
Other information submitted in addition to this checklist (Check all that apply):

- ☑ Design or Construction Drawings (Plans, Profiles, Details, etc.).
- ☑ Erosion & Sediment Control Plan (Plans, Details, etc.).
- ☐ Erosion & Sediment Control Plan Design Report.
- ☐ Stormwater Management Design Plan (Plans, Profiles, Details, etc.).
- ☐ Stormwater Management Design Report.
- ☐ Other, List: _____

Issue Date
March 1, 2001

Environmental Division

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JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

EROSION AND SEDIMENT CONTROL PLAN CHECKLIST

I. *GENERAL:*

Yes	No	N/A	
☑	☐	☐	*FAMILIARITY* with current versions of Chapter 8, Erosion and Sedimentation Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia and the Virginia Erosion and Sediment Control Handbook (VESCH).
☑	☐	☐	*LAND DISTURBING PERMIT AND SILTATION AGREEMENT* with surety are required for the project.
☑	☐	☐	*VARIANCE* if necessary, requested in writing, for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.

II. *SITE PLAN:*

Yes	No	N/A	
☑	☐	☐	*VICINITY MAP* locating the site in relation to the surrounding area. Include any major landmarks which might assist in physically locating the site.
☑	☐	☐	*INDICATE NORTH* direction in relation to the site.
☑	☐	☐	*LIMITS OF CLEARING AND GRADING* for the site including that required for implementation of erosion and sediment controls, stockpile areas and utilities.
☑	☐	☐	*DISTURBED AREA ESTIMATES* in acres or square feet for the project.
☑	☐	☐	*EXISTING TOPOGRAPHY* or contours for the site at no more than 5 foot contour interval.
☑	☐	☐	*FINAL TOPOGRAPHY*, contours or proposed site grading in accordance with the design plan which indicates changes to existing topography and drainage patterns at no more than 2 foot contour interval (or 1 foot contours where required).
☑	☐	☐	*EXISTING AND PROPOSED SPOT ELEVATIONS* to supplement existing and proposed contours, topography or site grading information. Spot elevations may replace final contours in some instances, especially if terrain is in a low lying area or relatively flat.
☑	☐	☐	*EXISTING VEGETATION* including existing tree lines, grassed or unique vegetation areas.

Yes	No	N/A	
☑	☐	☐	*EXISTING SITE FEATURES* including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.
☑	☐	☐	*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.
☑	☐	☐	*ENVIRONMENTAL INVENTORY* in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.
☑	☐	☐	*100-YEAR FLOODPLAIN LIMITS* or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.
☐	☐	☑	*DRAINAGE AREAS* for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.
☑	☐	☐	*CRITICAL EROSION AREAS* which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.
☑	☐	☐	*DEVELOPMENT PLAN* for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.
☑	☐	☐	*LOCATION OF PRACTICES* proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.
☑	☐	☐	*TEMPORARY STOCKPILE AREAS* or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.
☐	☐	☑	*OFFSITE LAND DISTURBING AREAS* including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.
☑	☐	☐	*DETAILS* or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.

Yes	No	N/A	
☑	☐	☐	*MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.
☐	☐	☑	*TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.
☑	☐	☐	*CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.
☐	☐	☑	*PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.
☑	☐	☐	*STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes, latest version.
☑	☐	☐	*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

III. *NARRATIVE:*

Yes	No	N/A	
☑	☐	☐	*PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.
☑	☐	☐	*EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.
☑	☐	☐	*ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.
☐	☐	☑	*OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.
☑	☐	☐	*SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.
☑	☐	☐	*CRITICAL AREAS* on the site which many have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes	No	N/A	
☑	☐	☐	*PROPOSED EROSION & SEDIMENT CONTROL MEASURES* inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.
☑	☐	☐	*STABILIZATION MEASURES* required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.
☑	☐	☐	*STORMWATER MANAGEMENT CONSIDERATIONS* for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

IV. *CALCULATIONS:*

Yes	No	N/A	
☑	☐	☐	*CALCULATIONS AND COMPUTATIONS* associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.
☐	☐	☑	*TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET* submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

Public Notice

U.S. Army Corps of Engineers, Norfolk District

June 26, 2007

CENAO-REG
NAO-2006-8301-prk

FEDERAL PUBLIC NOTICE

The District Commander has received a joint application for Federal and State permits as described below:

APPLICANT
Toano Fishing & Hunting Club
c/o L. Clark Jones Jr., President

WATERWAY AND LOCATION OF THE PROPOSED WORK: The project is located in Yarmouth Creek, a tributary to the Chickahominy River, in James City County, Virginia.

PROPOSED WORK AND PURPOSE: The applicant proposes to rebuild the combined principal and emergency spillway of Cranston's Pond dam that was washed out due to high water flows in the fall of 2006. The pond water has drained through the breach in the dam and emergent vegetation is re-establishing on the formerly flooded areas.

Cranston's Pond was created by damming off Yarmouth Creek approximately 70 years ago. The purpose of the original dam was to provide water for a grist mill. The mill has long disappeared and the pond was being used by the Toano Fishing and Hunting Club, which has a membership of 10 people. The pond was approximately 30 acres in size. Yarmouth Creek below Cranston's Pond dam is a confirmed anadromous fish use area, with striped bass, blueback herring, and yellow perch being collected. In addition, American eels have been collected downstream and upstream of the former pond.

Issues such as possible anadromous fish runs in the area, the possibility of establishing a wetland, braided stream complex in the area formerly flooded, effects on endangered species in the area and measures to mitigate adverse impacts by providing fish passage are being examined.

In addition to the required Department of the Army permit, the applicant must obtain a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ) assuring that applicable laws and regulations pertaining to water quality are not violated and a permit from the James City County Wetlands Board. Project drawings are attached.

AUTHORITY: Permits are required pursuant to Sections 401 and 404 of the Clean Water Act (Public Law 95-217) and Title 62.1 of the Code of Virginia.

FEDERAL EVALUATION OF APPLICATION: The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. The decision will reflect the national concern for both protection and utilization of important resources. The benefits which reasonably may be expected from the proposal must be balanced against its reasonably foreseeable detriments. All of the proposal's

relevant factors will be considered, including conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use classification, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, consideration of property ownership and, in general, the needs and welfare of the people. The Environmental Protection Agency's "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" will also be applied (Section 404(b)(1) of the Clean Water Act).

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity. Anyone may request a public hearing to consider this permit application by writing to the District Commander within 30 days of the date of this notice, stating specific reasons for holding the public hearing. The District Commander will then decide if a hearing should be held.

Preliminary review indicates that: (l) no environmental impact statement will be required; (2) no species of fish, wildlife, or plant (or their critical habitat) listed as endangered or threatened under the Endangered Species Act of 1973 (PL 93-205) will be affected; and (3) no known properties eligible for inclusion or included in the National Register of Historic Places are in or near the permit area, or would likely be affected by the proposal. Additional information might change any of these findings. For compliance with the Coastal Zone Management Act of 1972, as amended, the applicant must certify that federally licensed or permitted activities affecting Virginia's coastal zone (Tidewater) will be conducted in a manner consistent with the Virginia Coastal Resources Management Program (VCP). For more information or to obtain a list of the enforceable programs of the VCP, contact the Department of Environmental Quality, Office of Environmental Impact Review at (804) 698-4330 or e-mail: elirons@deq.virginia.gov.

COMMENT PERIOD: Comments on this project should be made in writing, addressed to the Norfolk District, Corps of Engineers (ATTN: CENAO-REG), 803 Front Street, Norfolk, Virginia 23510-1096, and should be received by the close of business on July 26, 2007.

If you have any questions about this project or the permit process, please call Peter Kube at (757) 201-7504.

FOR THE DISTRICT COMMANDER:

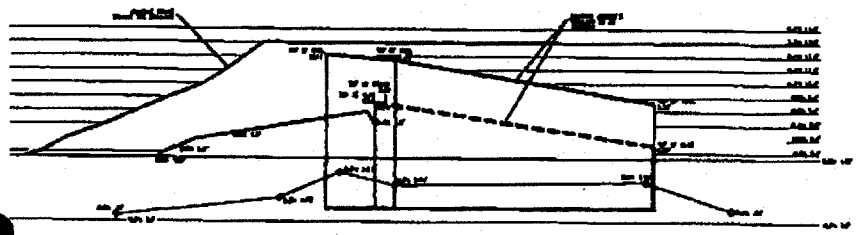
Michael A. Schwinn
Chief, Western Virginia
Regulatory Section

Attachment: Drawings

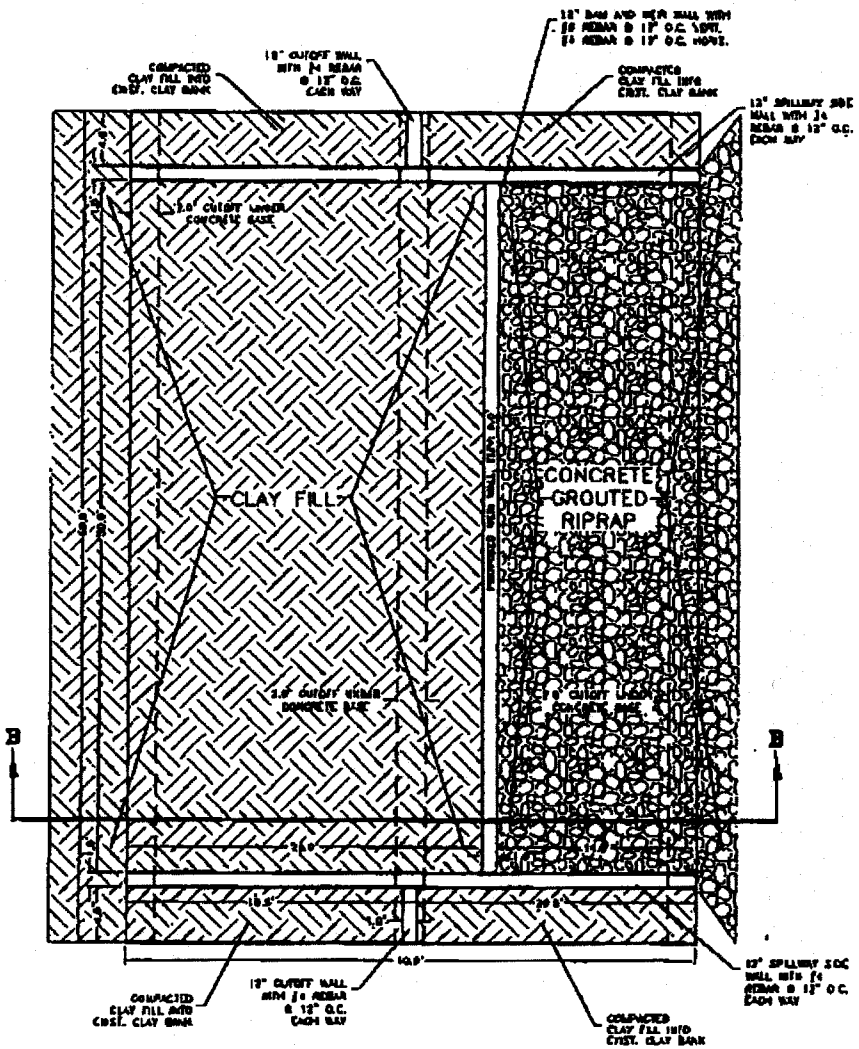
Copyright (C) 1997, Maptech, Inc.

Received
Jun 8 2007 03:10pm
Jun. 8. 2007 2:04PM No.1940 P. 2

Received Jun. 8. 2007 2:05PM No. 1940 P. 3
Jun 8 2007 03:10pm



SECTION A–A
EXISTING CONDITIONS



PROPOSED SPILLWAY
TOP VIEW

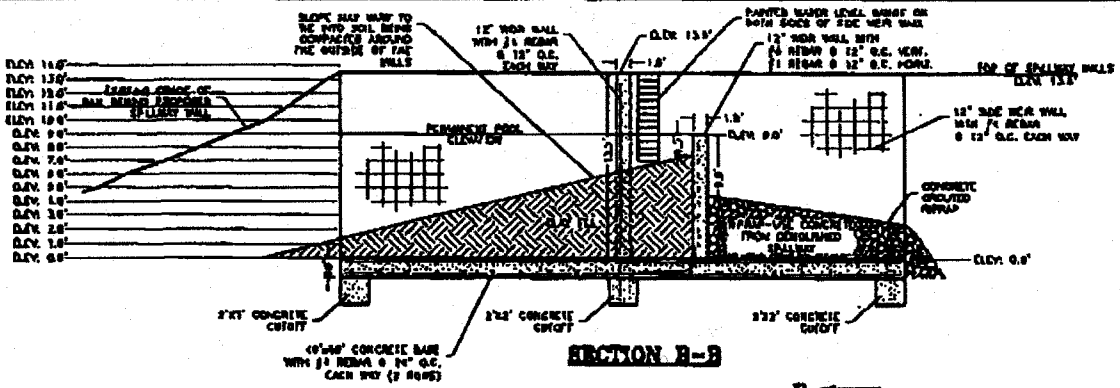
NOTES:
- *CONCRETE 3,000 PSI WITH 7% AIR ENTRAINMENT
- *STEEL = GRADE 60
- *COMPACT BACKFILL TO 95% OF STANDARD PROCTOR DRY DENSITY AT MOISTURE CONTENTS WITHIN ± 3 PERCENTAGE POINTS OF OPTIMUM
- *SEED, LIME, FERTILIZER, AND MULCH ALL DENUDED AREAS

ALEXCOM & ASSOCIATES, INC.

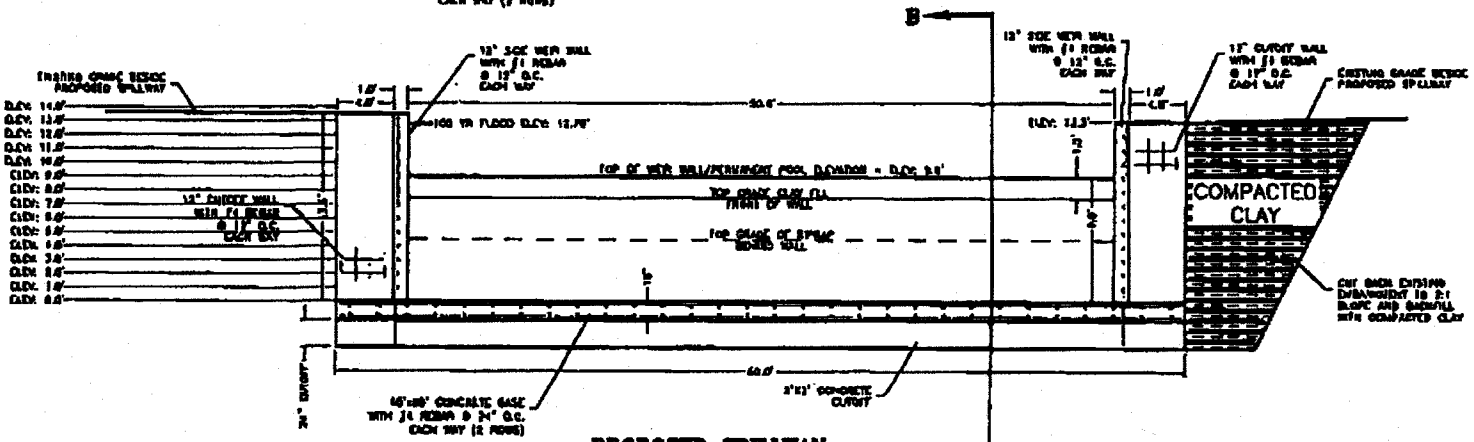
DETAILS
TOANA HUNTING AND FISHING CLUB
CRANSTONS POND DAM
JAMES CITY COUNTY MAGISTERIAL DISTRICT
James City County, VA

1/4" = 1'

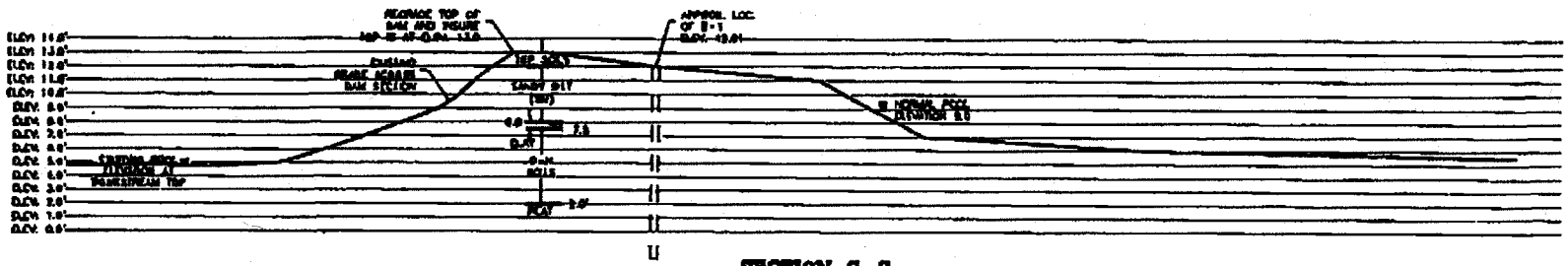
03070196



SECTION B-B



PROPOSED SPILLWAY
FRONT VIEW
(LOOKING DOWN STREAM)



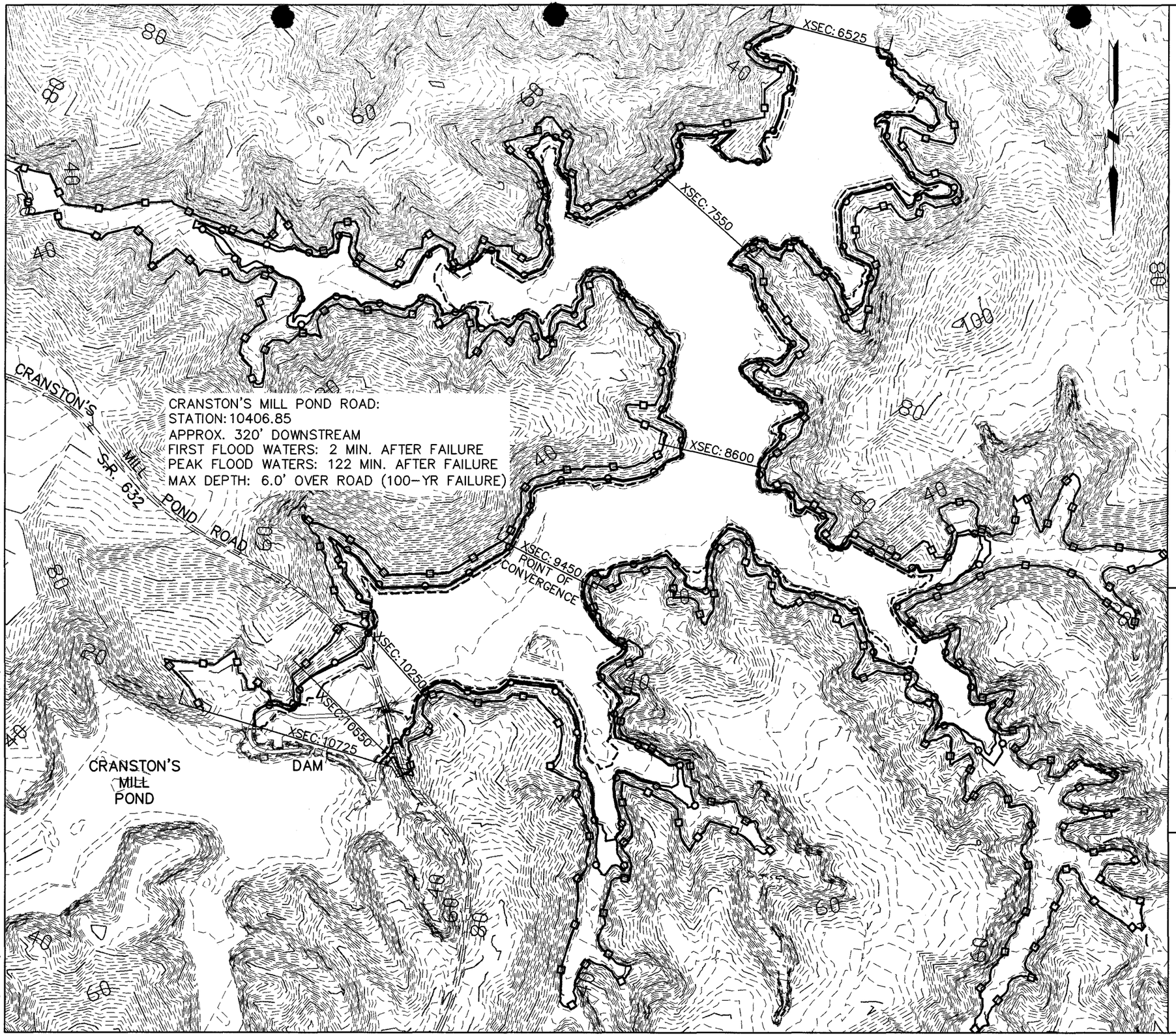
SECTION C-C
EXISTING GRADE

ALDICOM & ASSOCIATES, INC.

DETAILS
TOANA HUNTING AND FISHING CLUB
CRANSTONS POND DAM
JAMES CITY COUNTY MAGISTERIAL DISTRICT
James City County, VA

1/4" = 1'

03070186



DAM BREAK INUNDATION MAP FOR CRANSTON'S MILL POND

SIGNIFICANT HAZARD CLASS

LEGEND

- SUNNY DAY FAILURE
- SPILLWAY DESIGN FLOOD WITH FAILURE
- SPILLWAY DESIGN FLOOD (NO FAILURE)
- PROBABLE MAXIMUM FLOOD WITH FAILURE

NOTES

1. THE INFORMATION CONTAINED IN THIS MAP IS PREPARED FOR USE IN NOTIFICATION OF DOWNSTREAM PROPERTY OWNERS BY EMERGENCY MANAGEMENT PERSONNEL.
2. MAPPING OF FLOODED AREAS AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE. TIMING AND EXTENT OF ACTUAL INUNDATION MAY DIFFER FROM THE INFORMATION PRESENTED ON THIS MAP.
3. ALL TOPOGRAPHICAL INFORMATION FROM JAMES CITY COUNTY GIS.
4. DATUM: HORIZONTAL=NAD 83, VERTICAL=NGVD 29

0 400 800 1200

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-3-10
PROFESSIONAL ENGINEER

DRAWN BY: JBM

CHECKED BY: PFH

DATE: 6/14/10
REV. 6/24/10

SCALE: 1"=400'

KOONTZ-BRYANT, P.C.
SITE DEVELOPMENT SOLUTIONS
1703 N. PARHAM ROAD, SUITE 100, RICHMOND, VIRGINIA 23229
(804)740-9200 kbpc@koontzbryant.com FAX (804)740-7338

Major Water Quality Impact Assessment

CRANSTON'S MILL POND DAM ALTERATION

PREPARED FOR:

James City County
Environmental Division
101-E Mounts Bay Road
Williamsburg, VA 23185

PREPARED BY:

Jonathan Murray, EIT
Koontz-Bryant, P.C.
1703 N. Parham Road
Suite 100
Richmond, Virginia 23229

July 29, 2010

JN: 09114-002-00

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A. Minor WQIA Requirements:

1. The proposed construction at Cranston's Mill Pond Dam will disturb approximately 3.65 acres of land, all of which is inherently within the RPA. Construction includes the alteration of an existing earthen embankment dam, excavation of an emergency spillway, modifications to an existing spillway, and construction of a new principal spillway. All alterations are being performed in order to bring the dam into compliance with current DCR regulations. The location of the RPA is shown on the Cranston Mill Pond construction plans which are being issued separately.

2. All construction for this project will be within the area of the existing dam and access roads. No disturbance is planned outside of what is necessary for the dam alterations and construction of the new emergency spillway. There are no paved or impervious surfaces planned outside of the new concrete principal spillway. New gravel is to be placed on the existing gravel access road and it is also to be extended onto the top of the altered embankment. The limits of clearing, location of structures, roadways, and erosion control measures can be seen on the Cranston Mill Pond construction plans.

   The existing topography in the area of the dam is steep with many of the surrounding slopes 2:1 or greater. All existing and proposed contours may be seen on the construction plans.

   There are no sewage disposal systems or reserve drainfield sites within the project area.

3. With the improvements to the existing dam, Cranston's Mill Pond will be used as a regional BMP nutrient bank. Any required mitigation can be treated by the restored pond.

4. Clearing shall be limited to the areas required for construction and by DCR regulations. Much of the area to be disturbed is already clear of trees. In accordance with current DCR regulations, all woody vegetation must be removed from the dam faces and within 25' of the up and downstream toes of the embankment.

5. Upon completion of construction, all disturbed areas are to be permanently seeded with certified seed and mulched immediately in order to stabilize slopes and prevent erosion. EC-2, soil stabilization blankets are to be used as necessary on steep slopes. No woody vegetation is allowed within the area of the dam per DCR regulations.

B. Major WQIA Requirements:

1. Elements of the Minor Water Quality Impact Assessment are described in section "A" above.

2. Hydrogeological Element:

   a. The existing site in the area of the dam is floodplain, much of which is wetlands, which is surrounded by steep slopes often 2:1 or greater. Soils in the area include Emporia Complex and Johnston Complex. A soils map can be seen on sheet C2.0 of the construction plans and detailed soils data can be found in the geotechnical engineering study performed by McKinney & Company dated May 27, 2010.

      The existing dam was constructed in the Yarmouth Creek drainage basin to create a recreational lake for a hunting and fishing club and has been in place since at least the 1930's. The dam was breached in a storm in 2006 that caused damage to the existing principal spillway. The lake is still holding water, but at a reduced permanent pool level due to the breach.

      The dam has a drainage area of approximately 4,500 acres or 7.00 square miles. The drainage basin has been studied extensively by the County and in a report prepared by the Center for Watershed Protection.

   b. Repairs to the dam will return the lake to its original normal pool elevation of 9.15' which creates a 50.3 acre lake. This should not have any significant impacts on the surrounding topography, soils, hydrology, or geology as it is only returning the dam and lake to its original conditions prior to the 2006 breach. Alterations are also being made to the dam to prevent future breaches to the maximum extent practicable.

   c.

      1) Wetlands will be impacted as a result of reconstructing the existing embankments. Any impacts associated with this construction will be done in accordance with the USCOE Nationwide #3 permit. Impacts will be less than 0.10 acres and will be documented as required by the Nationwide #3 permit.

         Wetland areas within the required DCR vegetative clear zone are covered by a blanket DEQ permit for dam maintenance.

2) No change is proposed to the permanent pool level from the pre-breach conditions and normal flow is expected to remain as it was previously.

3) No change is proposed to the permanent pool level from the pre-breach conditions and circulation patterns are expected to remain as they were previously.

4) Proposed fill material will come from the cut generated in creation of the new emergency spillway. Fill material is to be prepared as specified in the geotechnical engineering study performed by McKinney & Company dated May 27, 2010.

5) No dredging is proposed.

6) The increase of impervious area due to the proposed concrete spillway is insignificant in the 153 acre parcel. No other impervious surface is proposed.

7) Approximately 2% of the site will be cleared for the project, much of which is already clear of trees.

8) A two phase sequence of construction is specified on sheets C2.1 and C2.2 of the construction plans.

d. Mitigation Measures:

1) Erosion and Sediment control measures for the construction are specified as part of the erosion control plan on sheets C2.1 and C2.2 of the construction plans.

a) Turbidity curtains are being installed up and downstream of the proposed construction in conjunction with silt fence to minimize sediment transport to the maximum extent practicable. Silt fence has been shown along the main access road to minimize sediment as well as traffic flow into areas outside the planned limits of disturbance.

b) 3' depth Class II rip-rap is proposed below each spillway to dissipate energy and reduce runoff velocities.

c) Disturbed areas are proposed to be stabilized via permanent seeding with the use of EC-2 soil stabilization blankets as necessary.

d) Specialized seed mixtures are provided on sheet C2.4 of the construction plans.

e) The dam will be maintained in accordance with requirements of the dam safety regulations. An operations and maintenance plan will be submitted to the county as part of the requirements which will at a minimum include regular mowing and annual inspections of the vicinity.

2) With the improvements to the existing dam, Cranston's Mill Pond will be used as a regional BMP nutrient bank. Any required water quality treatment can be performed by the restored pond.

3) Vegetative Element:

a) The majority of the area to be impacted is free of trees.

b) The clearing limits are clearly shown on sheets C2.1 and C2.2 of the construction plans. All woody vegetation must be removed from the dam faces and within 25' of the up and downstream toes of the embankment in accordance with current DCR regulations.

c) Upon completion of construction, all disturbed areas are to be permanently seeded with certified seed. No woody vegetation is allowed within the area of the dam per DCR regulations.

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F: 757-253-6822
devman@james-city.va.us

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Code Compliance
(757) 253-6620
codecomp@james-city.va.us

Environmental Division
(757) 253-6670
environ@james-city.va.us

Planning and Zoning
(757) 253-6685
planning@james-city.va.us

November 8, 2010

Mr. Jonathan Murray, EIT
Koontz-Bryant, P.C.
1703 North Parham, Suite 100
Richmond, Virginia 23229

RE: Chesapeake Bay Preservation Ordinance Exception for Cranston's Mill Pond Dam Alteration
SUP-023-10; SP-093-10; S-049-10; CBE-11-050

Dear Mr. Murray:

Staff has reviewed your request date stamped October 20, 2010 for an exception to the County's Chesapeake Bay Preservation Ordinance to rehabilitate the existing dam structure at the Toano Hunt and Fish Club property, otherwise known as Cranston's Mill Pond. In section B (2) (b), it states that the normal pool elevation of 8.15 feet will create an approximate 50-acre lake. According to County GIS, this appears to be optimistic. Please verify the extents of the normal pool.

After careful consideration of both the Chesapeake Bay Preservation Ordinance and the Zoning Ordinance, it has been determined that this application cannot be process administratively, therefore an additional $100.00 processing fee will be required for public notification. The basis of this determination is as follows:

Sec. 23-12. Waivers for noncomplying structures.

The manager through an administrative process may permit the continued use, alteration, or the expansion of any structure in existence on August 6, 1990, which is not in conformity with the provisions of this chapter. The process requires that:
(1) The manager grant a waiver for noncomplying structures on legal nonconforming lots or parcels to provide for alterations or expansions to such nonconforming structures provided that:

a. There will be no increase in nonpoint source pollution load;

b. Any development or land disturbance exceeding an area of 2,500 square feet complies with all erosion and sediment control requirements of this chapter; and

c. For expansion of a principal noncomplying structure, the manager makes the following findings:

1. The request for the waiver is the minimum necessary to afford relief;

2. Granting the waiver will not confer upon the applicant any specific privileges that are denied by this chapter to other property owners in similar situations;

3. The waiver is in harmony with the purpose and intent of this chapter and does not result in water quality degradation;

4. The waiver is not based on conditions or circumstances that are self-created or self-imposed;

5. Reasonable and appropriate conditions are imposed, as warranted, that will prevent the waiver from causing a degradation of water quality;

6. Other findings, as appropriate and required by the manager are met; and

7. In no case shall this provision apply to accessory structures as defined in chapter 24 of the County Code.

d. The waiver does not conflict with the comprehensive plan or any applicable approved watershed management plan.

and

Sec. 24-634. Restoration/replacement of a nonconforming use.

(a) A nonconforming use damaged by casualty may be restored in accordance with the provisions of this section, provided such restoration has started within 12 months of the date of the casualty and is complete within 24 months of the date of the casualty. By casualty shall mean as a result of a fire or other cause beyond the control of the owner or by an act of God. By casualty shall not include damage caused by age or ordinary wear and tear or damage intentionally caused by the owner or an agent thereof.

The Special Use Permit process that has been ongoing is a land use decision that allows for the proposed use on the property. The dam lost legal nonconforming status one year after the September 2006 storm that damaged the structure because no permits had been acquired for the reconstruction and the reconstruction had not been completed within two years after the September 2006 storm. Because the dam lost the nonconforming status, it no longer falls under the administrative waiver for noncomplying structures. Therefore it must go before the Chesapeake Bay Board for review and approval.

If there are any questions regarding this matter, please contact us at 757-253-6670.

Sincerely,

Scott J. Thomas, P.E.
Environmental Division Director

Michael D. Woolson, L.A.
Senior Watershed Planner

KOONTZ-BRYANT, P.C.
Site Development Solutions

October 14, 2010

Mike Woolson
James City County, Environmental Division
101-E Mounts Bay Road
Williamsburg, VA 23185

Reference: Cranston Mill Pond
Project No: 09114.002.00

Dear Mr. Woolson:

In accordance with the provisions of Chapter 27 of the County Ordinance, we are requesting approval to allow disturbance within an RPA for the redevelopment of the Cranston Mill Pond dam. The proposed alterations to the dam are being performed to bring the facility into compliance with the requirements of the Dam Safety Act regulations. Our activities limit disturbance within the RPA to the minimum amount necessary to perform the proposed alterations to the dam. Access has been limited to existing roadways.

We are submitting a Major Water Quality Impact Assessment, site plan with erosion and sedimentation control plan and the required $25 fee with this request.

This request is made on behalf of:

Brent Fults – President
Cranston Mill Pond, LLC.
c/o Earthsource Solutions INC.
5735 S. Laburnum Avenue
Richmond, VA 23231

Regarding the property at:

6616 Cranston's Mill Pond Road
Toano, VA 23168-9067
Parcel ID: 2230100044

Please contact me if you need anything else.

Sincerely yours,
Koontz-Bryant, P.C.

Paul F. Hinson, P.E., LEED AP
Director of Engineering

Enclosures

cc: Brent Fults

1703 North Parham Road ■ Suite 100 ■ Richmond, VA 23229 ■ (804) 740-9200 ■ Fax (804) 740-7338

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

November 18, 2010

REPLY TO
ATTENTION OF:

Environmental Division

NOV 30 2010

RECEIVED

Western Virginia Regulatory Section
NAO-2006-8301 (Yarmouth Creek)

Shannon Varner
Troutman Sanders LLP
1001 Haxall Point
Richmond, VA 23219

Dear Mr. Varner:

This is in regard to the Cranston Mill Pond LLC's Department of the Army permit application number NAO-2006-8301 to repair the breach in the Cranston Mill Pond Dam according to the plans entitled, "Cranston Mill Pond" in 3 sheets dated August 20, 2010 and the plan entitled, "CMP – Wetland Impact Map" in one sheet dated October 14, 2010. The work will occur at 6616 Cranston Mill Pond Road in James City County, Virginia.

The proposed work as outlined above satisfies the criteria contained in the Corps Nationwide Permit(s) (3), attached. The Corps Nationwide Permits were published in the March 12, 2007, Federal Register notice (72 FR 47) and the regulations governing their use can be found in 33 CFR 330 published in Volume 56, Number 226 of the Federal Register dated November 22, 1991.

This nationwide permit verification is contingent upon the following project specific conditions:

1. The new spillway height shall be no higher than 8.15 feet.

2. The applicant will allow construction of a fishway that maximizes passage efficiency at Cranston's Pond Dam to provide upstream and downstream fish passage primarily for alosine species such as blueback herring (Alosa aestivalis) and alewife (A. psuedoherengus) and resident species occupying Yarmouth Creek. Fishway design should be coordinated with the Virginia Department of Game and Inland Fisheries and the U.S. Fish and Wildlife Service to determine the appropriate type of fishway to be installed. The fish passage design shall be approved by the Corps, with input from the applicant. The fish passage design should have no more than minimal adverse effect upon the nutrient capture efficiency, fishing, hunting, or other natural resource benefits of the pond. The design should not impact compliance with Virginia Dam Safety Act or other statutory or regulatory requirements or impede ingress and egress from the property or dam for maintenance or other activities. The fishway shall be installed within one year of the resource agencies making the determination that fish passage is needed at Cranston's Millpond Pond Dam.

Provided the project specific conditions (above) and the Nationwide Permit General Conditions (enclosed) are met, an individual Department of the Army Permit will not be required. In addition, the Virginia Department of Environmental Quality has provided §401 Water Quality Certification for Nationwide Permit Number 3. However, a permit may be required from the Virginia Marine Resources Commission and/or your local wetlands board, and this verification is not valid until you obtain their approval, if necessary. This authorization does not relieve your responsibility to comply with local requirements pursuant to the Chesapeake Bay Preservation Act (CBPA), nor does it supersede local government authority and responsibilities pursuant to the Act. You should contact your local government before you begin work to find out how the CBPA applies to your project.

Enclosed is a "compliance certification" form, which must be signed and returned within 30 days of completion of the project, including any required mitigation. Your signature on this form certifies that you have completed the work in accordance with the nationwide permit terms and conditions.

This verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2012. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 330.4(e) and 33 CFR 330.5 (c) or (d). Project specific conditions listed in this letter continue to remain in effect after the NWP verification expires, unless the district engineer removes those conditions. Activities completed under the authorization of an NWP which was in effect at the time the activity was completed continue to be authorized by that NWP.

If you have any questions, please contact Peter Kube at (757) 201-7504 or peter.r.kube@usace.army.mil.

Sincerely,

Richard E. Henderson
Acting Chief, Regulatory Branch

Environmental Division

NOV 30 2010

RECEIVED

Environmental Division
NOV 30 2010
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U.S. Army Corps
Of Engineers
Norfolk District

CERTIFICATE OF COMPLIANCE WITH ARMY CORPS OF ENGINEERS PERMIT

Permit Number: NAO-2006-8301-prk

Name of Permittee: Cranston Mill Pond LLC

Date of Issuance: 11/18/10

Permit Type: NWP #3

Within 30 days of completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Peter Kube
c/o Regulatory Branch
Norfolk District Corps of Engineers
803 Front Street
Norfolk, Va. 23510-1096

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation has been completed in accordance with the permit conditions.

_____ _____

Signature of Permittee Date

Development Management
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P: 757-253-6671
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devman@james-city.va.us

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Code Compliance
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codecomp@james-city.va.us

Environmental Division
757-253-6670
environ@james-city.va.us

Planning and Zoning
757-253-6685
planning@james-city.va.us

November 22, 2010

Mr. Paul F. Hinson
Koontz-Bryant, P.C.
1703 North Parham Road, Suite 100
Richmond, VA 23229

Re: Exception for Disturbance of Steep Slopes
Cranstons Mill Pond Repair
County Plan No.: SP-93-10

Dear Mr. Hinson:

The Environmental Division is in receipt of your written request dated October 14th 2010 to obtain exception from Section 23-5 of the County's Chesapeake Bay Preservation ordinance for disturbance of slopes 25 percent or greater associated with the above referenced project. Pursuant to the provisions of 23-14(e) of the County's Chesapeake Bay Preservation ordinance, an exception is hereby granted. Applicable conditions include:

1. Steep slope disturbances are only authorized within the defined limits of work for the project.
2. Steep slope disturbances are limited to a total of 0.64 acres as defined on the environmental inventory.
3. Approved erosion and sediment control plan measures must be fully implemented downstream of applicable steep slope impact areas prior to their disturbance.

Please note that approval of this exception, with the conditions stated, in no way implies final approval of a site or subdivision plan as required by the Chapter 24 Zoning or Chapter 19 Subdivisions of the County Code; nor does it constitute final approval of an erosion and sediment control or stormwater management plan as required by Chapter 8 Erosion and Sediment Control and Chapter 23 Chesapeake Bay Preservation of the County Code. Approval of this exception is also contingent upon no major (substantial) changes in the development plan, or if site conditions change, become apparent or alter significantly following the date of this approval.

Thank you for your efforts to protect the Chesapeake Bay and its tributaries from the effects of non-point source pollution associated with land use activities. Please contact me at 253-6639 if you have any questions about this exception or any of its associated conditions.

Sincerely,

Scott J. Thomas, P.E.
Director
Environmental Division

SJT/sjt
ChesBay\SteepSlope\SP9310.approval

KOONTZ-BRYANT, P.C.
Site Development Solutions

October 14, 2010

Mr. Mike Woolson
James City County, Environmental Division
101-E Mounts Bay Road
Williamsburg, VA 23185

Reference: Cranston Mill Pond
Project No: 09114.001

To Whom It May Concern:

We would like to request a variance from the requirements of section 23-7 of the James City County Ordinance due to the nature of the proposed construction. The alterations to the Dam at Cranston's Mill Pond are required by DCR to be made to the water-dependent facility which is located entirely within the RPA. In accordance with current DCR regulations, all woody vegetation must be removed from the dam faces and within 25' of the up and downstream toes of the embankment. Much of the existing topography in the area of the dam includes slopes greater than 25% which must be impacted to make the required alterations to the embankment and spillways. An environmental inventory has been provided as part of the site plans (see sheets C1.0 and C2.0). A water quality impact assessment for the project is attached.

This request is made on behalf of:

Brent Fults – President
Cranston Mill Pond, LLC.
c/o Earthsource Solutions INC.
5735 S. Laburnum Avenue
Richmond, VA 23231

Regarding the property at:

6616 Cranston's Mill Pond Road
Toano, VA 23168-9067
Parcel ID: 2230100044

Sincerely yours,
Koontz-Bryant, P.C.

Paul F. Hinson, P.E., LEED AP
Director of Engineering

Enclosures: Water quality impact assessment, Processing fee

cc: (Brent Fults – Cranston Mill Pond, LLC)

1703 North Parham Road ■ Suite 100 ■ Richmond, VA 23229 ■ (804) 740-9200 ■ Fax (804) 740-7338

Scott Thomas

From: Scott Thomas
Sent: Wednesday, November 17, 2010 12:23 PM
To: 'bfults@esswetlands.com'
Cc: William Cain; Mike Woolson; Jose Ribeiro
Subject: Misc. Data for Cranston's Mill Pond

In 2006 a HEC-1 analyses was done for Colonial Heritage. This was done in conjunction with the Master Stormwater Management Plan SWM-01-05. This HEC-1 analyses provided data on peak flows, both at predevelopment and at postdevelopment levels. Also it had scenario at postdevelopment with stormwater management control incorporated. Keep in mind, the SWM facilities were plugged into the model with best available information as most of the land bays were not at final design. Postdevelopment being a look into the future development plan of Colonial Heritage. Our Division required the HEC-1 analyses to get a sense of compliance with MS-19/quantity control early into the project.

Of course the development plan overall includes a very complex system of stormwater management BMPs to address water quality and quantity control. It includes 24 stormwater BMPs (wet and dry ponds), 660 acres of dedicated natural open space (conservation easement) and a Low Impact Development (LID) component.

As discussed, I wanted to provide you a summary of this data, for your information only, and to use at your discretion to compare to your specific design for the Cranstons Mill Pond rehabilitation project.

The information provided below is a HEC-RAS analyses at Node 3. Node 3 is on the nontidal mainstem of Yarmouth Creek just to the north of the outfall of Deer Lake and which is approximately 1.5 upstream of the Cranstons Mill Pond dam.

<u>Node 3</u>
Drainage Area = 1800 acres
2-year flow estimates
- Predev 910 cfs
- Postdev 1047 cfs
- Postdev with SWM 809 cfs

100-year flow estimates
- Predev 877
- Postdev 1894 cfs

We do not have design data submitted for DCR dam safety design. Again, I am providing this information to you for reference purposes only and as it is historical background information in our files that you may not be aware of.

Scott J. Thomas
Director
Environmental Division
101-E Mounts Bay Road
Williamsburg, VA 23187
P: 757-253-6639
F: 757-259-4032
jccEgov.com

Nationwide Permit (3) Maintenance (3/19/2007)

(a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This NWP authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

(b) This NWP also authorizes the removal of accumulated sediments and debris in the vicinity of and within existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) and the placement of new or additional riprap to protect the structure. The removal of sediment is limited to the minimum necessary to restore the waterway in the immediate vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend further than 200 feet in any direction from the structure. This 200 foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an upland area unless otherwise specifically approved by the district engineer under separate authorization. The placement of riprap must be the minimum necessary to protect the structure or to ensure the safety of the structure. Any bank stabilization measures not directly associated with the structure will require a separate authorization from the district engineer.

(c) This NWP also authorizes temporary structures, fills, and work necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

(d) This NWP does not authorize maintenance dredging for the primary purpose of navigation or beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 27). Where maintenance dredging is proposed, the pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (Sections 10 and 404)

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act Section 404(f) exemption for maintenance.

REGIONAL CONDITIONS:

1. Waters Containing Submerged Aquatic Vegetation (SAV) Beds: Notification is required if work will occur in areas that contain submerged aquatic vegetation (SAVs). Information about SAVs can be found at the Virginia Institute of Marine Science's website http://www.vims.edu/bio/sav . Additional avoidance and minimization measures, such as relocating a structure or time of year restrictions may be required to reduce impacts to SAVs.

2. Designated Critical Resource Waters, which include National Estuarine Research Reserves: Notification is required for work under NWP 3 in the Chesapeake Bay National Estuarine Research Reserve in Virginia. This multi-site system along a salinity gradient of the York River includes Sweet Hall Marsh, Taskinas Creek, Catlett Island, and Goodwin Islands. More information can be found at: http://www.vims.edu/cbnerr/reservesites/index.htm .

3. Waters with federally listed endangered or threatened species, waters federally designated as Critical Habitat, and one mile upstream (including tributaries) of any such waters, notification is required for work in the areas listed below for NWP 3.

The Counties of Lee, Russell, Scott, Tazewell, Wise, and Washington in Southwestern Virginia within the following specific waters and reaches:

1) Powell River - from the Tennessee-Virginia state line upstream to the Route 58 bridge in Big Stone Gap and one mile upstream of the mouth of any tributary adjacent to this portion of the River.
2) Clinch River - from the Tennessee-Virginia state line upstream to Route 632 at Pisgah in Tazewell County and one mile upstream of the mouth of any tributary adjacent to this portion of the River, the Little River to its confluence with Maiden Spring Creek, and one mile upstream of the mouth of any tributary adjacent to this portion of Little River.
3) North Fork Holston River - from the Tennessee-Virginia state line upstream to the Smyth County/Bland County line and one mile upstream of any tributary adjacent to this portion of the River.
4) Copper Creek - from its junction with the Clinch River upstream to the Route 58 bridge at Dickensonville in Russell County and one mile upstream of any tributary adjacent to this portion of the Creek.
5) Indian Creek - from its junction with the Clinch River upstream to the fourth Norfolk and Western Railroad bridge at Van Dyke in Tazewell County and one mile upstream of the mouth of any tributary adjacent to this portion of the Creek.
6) Middle Fork Holston River - from the Tennessee-Virginia state line to its junction with Walker Creek in Smyth County near Marion, Virginia.
7) South Fork Holston River - from its junction with Middle Fork Holston River upstream to its junction with Beech Creek in Washington County.

This NWP requires notification to work in Lee, Russell, Scott, Smyth, Tazewell, Washington or Wise Counties. For any work in Lee, Russell, Scott, or Wise Counties, please submit the notification to the Norfolk District Corps of Engineers, Clinch Valley Field Office, PO Box 338, Abingdon, Virginia 24212. For any work in Smyth, Tazewell, or Washington Counties please submit the notification to the Norfolk District Corps of Engineers, Virginia Highlands Field Office, PO Box 1295, Abingdon, Virginia 24212-1295. Written verification from these offices would be

required prior to performing the proposed work. It is recommended that the prospective permittees first contact the field offices by telephone at (276) 623-5259 (Clinch Valley) or (276) 676-4807 (Virginia Highlands) to determine if the notification procedures would apply. The notification must be in writing and include the following information (the Joint Permit Application may also be used - be sure to mark it with the letters PCN at the top of the first page):

- Name, address, and telephone number of the prospective permittee.
- Location of the proposed project.
- Vicinity map and project drawings on 8.5-inch by 11-inch paper (plan view, profile, & cross section).
- Brief description of the proposed project and the project purpose.
- Where required by the terms of the nationwide permit, a delineation of affected special aquatic sites, including wetlands.

When all required information is received by the appropriate field office, the Corps will notify the prospective permittee within 45 days whether the project may proceed under the nationwide permit or whether an individual permit is required. If, after reviewing the notification, the District Engineer determines that the proposed activity would have more than a minimal individual or cumulative adverse impact on the aquatic environment or otherwise may be contrary to the public interest, then he will either condition the nationwide permit authorization to reduce or eliminate the adverse impacts, or notify the prospective permittee that the activity is not authorized by the nationwide permit and provide the permittee with instructions on how to seek authorization under an individual permit.

Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

4. Designated Trout Waters: Notification is required for work in the areas listed below for NWPs 3.

This condition applies to activities occurring in two categories of waters; Class V (Put and Take Trout Waters) and Class VI (Natural Trout Waters), as defined by the Virginia State Water Control Board Regulations, Water Quality Standards (VR-680 21-00), dated January 1, 1991, or the most recently updated publication. The Virginia Department of Game and Inland Fisheries (VDGIF) designated these same trout streams into six classes. Classes I-IV are considered wild trout streams. Classes V and VI are considered stockable trout streams. Information on designated trout streams can be obtained via their Virginia Fish and Wildlife Information Service's (VAFWIS's) Cold Water Stream Survey database. Basic access to the VAFWIS is available via http://vafwis.org/wis/asp/default.asp.

The waters, occurring specifically within the mountains of Virginia, are within the following river basins:

1) Potomac-Shenandoah
2) James
3) Roanoke
4) New
5) Tennessee and Big Sandy
6) Rappahannock

This condition applies to the following counties and cities: Albemarle, Allegheny, Amherst, Augusta, Bath, Bedford, Bland, Botetourt, Bristol, Buchanan, Buena Vista, Carroll, Clarke, Covington, Craig, Dickenson, Floyd, Franklin, Frederick, Giles, Grayson, Greene, Henry, Highland, Lee, Loudoun, Madison, Montgomery, Nelson, Page, Patrick, Pulaski, Rappahannock, Roanoke City, Roanoke Co., Rockbridge, Rockingham, Russell, Scott, Shenandoah, Smyth, Staunton, Tazewell, Warren, Washington, Waynesboro, Wise, and Wythe.

Any discharge of dredged and/or fill material authorized by the nationwide permits listed above, which would occur in the designated waterways or adjacent wetlands of the specified counties, requires notification to the appropriate Corps of Engineers field office, and written approval from that office prior to performing the work. We recommend that prospective permittees first contact the appropriate field office by telephone to determine if the notification procedures would apply. The notification must be in writing and include the following information (the standard Joint Permit Application may also be used):

- Name, address, and telephone number of the prospective permittee.
- Location of the proposed project.
- Vicinity map and project drawings on 8.5-inch by 11-inch paper (plan view, profile, & cross section).
- Brief description of the proposed project and the project purpose.
- Where required by the terms of the nationwide permit, a delineation of affected special aquatic sites, including wetlands.

When all required information is received by the appropriate field office, the Corps will notify the prospective permittee within 45 days whether the project can proceed under the NWP or whether an individual permit is required. If, after reviewing the notification, the District Engineer determines that the proposed activity would have more than minimal individual or cumulative adverse impacts on the aquatic environment or otherwise may be contrary to the public interest, then he will either condition the nationwide permit authorization to reduce or eliminate the adverse impacts, or notify the prospective permittee that the activity is not authorized by the nationwide permit and provide with instructions on how to seek authorization under an individual permit. If the permittee is not notified otherwise within the 45-day period the permittee may begin the activity.

4. Conditions Pertaining to Countersinking of Pipes and Culverts in Nontidal Waters: This condition applies to NWP 3.

NOTE: THE COUNTERSINKING REQUIREMENT DOES NOT APPLY IN TIDAL WATERS.

a. Following consultation with the Virginia Department of Game and Inland Fisheries (DGIF), the Norfolk District has determined that fish and other aquatic

organisms are most likely present in any stream being crossed, in the absence of site-specific evidence to the contrary. Although permittees have the option of providing such evidence, extensive efforts to collect such information is not encouraged, since countersinking will in most cases be required except as outlined in the conditions below.

b. All pipes: All pipes and culverts placed in streams will be countersunk at both the inlet and outlet ends, unless indicated otherwise by the Norfolk District on a case-by-case basis (see below). Pipes that are 24" or less in diameter shall be countersunk 3" below the natural stream bottom. Pipes that are greater than 24" in diameter shall be countersunk 6" below the natural stream bottom. The countersinking requirement does not apply to bottomless pipes/culverts or pipe arches. All single pipes or culverts (with bottoms) shall be depressed (countersunk) below the natural streambed at both the inlet and outlet of the structure. In sets of multiple pipes or culverts (with bottoms) at least one pipe or culvert shall be depressed (countersunk) at both the inlet and outlet to convey low flows.

c. Exemption for extensions and certain maintenance: The requirement to countersink does not apply to extensions of existing pipes or culverts that are not countersunk, or to maintenance to pipes/culverts that does not involve replacing the pipe/culvert (such as repairing cracks, adding material to prevent/correct scour, etc.).

d. Floodplain pipes: The requirement to countersink does not apply to pipes or culverts that are being placed above ordinary high water, such as those placed to allow for floodplain flows. The placement of pipes above ordinary high water is not jurisdictional (provided no fill is discharged into wetlands).

e. Hydraulic opening: Pipes should be adequately sized to allow for the passage of ordinary high water *with the countersinking and invert restrictions taken into account.*

f. Pipes on bedrock: Different procedures will be followed for pipes or culverts to be placed on bedrock, depending on whether the work is for replacement of an existing pipe/culvert or a new pipe/culvert:

i. Replacement of an existing pipe/culvert: Countersinking is not required provided the elevations of the inlet and outlet ends of the replacement pipe/culvert are no higher above the stream bottom than those of the existing pipe/culvert. Documentation (photographic or other evidence) must be maintained in the permittee's records showing the bedrock condition and the existing inlet and outlet elevations. That documentation will be available to the Norfolk District upon request, but notification or coordination with the Norfolk District is not otherwise required.

ii. A pipe/culvert is being placed in a new location: If the prospective permittee determines that the bedrock prevents countersinking, they should evaluate the use of a bottomless pipe/culvert, bottomless utility vault, span (bridge) or other bottomless structure to cross the waterway, and also evaluate alternative locations for the new pipe/culvert that will allow for countersinking. If the prospective permittee determines that neither a bottomless structure nor an alternative location is practicable, then they must submit a Pre-Construction Notification to the Norfolk District in accordance with General Condition #27 of the Nationwide Permits. In addition to the information required by General Condition #27, the prospective permittee must provide documentation of measures evaluated to minimize disruption of the movement of aquatic life as well as documentation of the cost, engineering factors, and site conditions that prohibit countersinking the pipe/culvert. Options that must be considered include partial countersinking (such as less than 3" of countersinking, or countersinking of one end of the pipe), and constructing stone step pools, low rock weirs downstream, or other measures to provide for the movement of aquatic organisms. The PCN must also include photographs documenting site conditions. The prospective permittee may find it helpful to contact their regional fishery biologist for the Virginia Department of Game and Inland Fisheries (DGIF), for recommendations about the measures to be taken to allow for fish movements. When seeking advice from DGIF, the prospective permittee should provide the DGIF biologist with all available information such as location, flow rates, stream bottom features, description of proposed pipe(s), slopes, etc. Any recommendations from DGIF should be included in the PCN. The Norfolk District will notify the prospective permittee whether the proposed work qualifies for the nationwide permit within 45 days of receipt of a complete PCN. NOTE: Blasting of stream bottoms through the use of explosives is not acceptable as a means of providing for countersinking of pipes on bedrock.

g. Pipes on steep terrain: Pipes being placed on steep terrain (slope of 5% or greater) must be countersunk in accordance with the conditions above and will in most cases be non-reporting. It is recommended that on slopes greater than 5% the permittee install larger pipe than required for passage of ordinary high water in order to increase the likelihood that natural velocities can be maintained. There may be situations where countersinking both the inlet and outlet may result in a slope in the pipe that results in flow velocities that cause excessive scour at the outlet and/or prohibit some fish movement. This type of situation could occur on the side of a mountain where falls and drop pools occur along a stream. Should this be the case, or should the prospective permittee not want to countersink the pipe/culvert for other reasons, they must submit a Pre-Construction Notification to the Norfolk District in accordance with General Condition #27 of the Nationwide Permits. In addition to the information required by General Condition #27, the prospective permittee must provide documentation of measures evaluated to minimize disruption of the movement of aquatic life as well as documentation of the cost, engineering factors, and site conditions that prohibit countersinking the pipe/culvert. The prospective permittee should design the pipe to be placed at a slope as steep as stream characteristics allow, countersink the inlet 3-6", and implement measures to minimize any disruption of fish movement. These measures can include constructing a stone step/pool structure, preferably using river rock/native stone rather than riprap, constructing low rock weirs to create a pool or pools, or other structures to allow for fish movements in both directions. Stone structures should be designed with sufficient-sized stone to prevent erosion or washout and should include keying-in as appropriate. These structures should be designed both to allow for fish passage and to minimize scour at the outlet. The quantities of fill discharged below ordinary high water necessary to comply with these requirements (i.e., the cubic yards of stone, riprap or other fill placed below the plane of ordinary high water) must be included in project totals. The prospective permittee may find it helpful to contact their regional fishery biologist for the Virginia Department of Game and Inland Fisheries (DGIF), for recommendations about the measures to be taken to allow for fish movements. When seeking advice from DGIF, the prospective permittee should provide the DGIF biologist with all available information such as location, flow rates, stream

bottom features, description of proposed pipe(s), slopes, etc. Any recommendations from DGIF should be included in the PCN. The Norfolk District will notify the prospective permittee whether the proposed work qualifies for the nationwide permit within 45 days of receipt of a complete PCN.

h. Problems encountered during construction: When a pipe/culvert is being replaced, and the design calls for countersinking at both ends of the pipe/culvert, and during construction it is found that the streambed/banks are on bedrock, then the permittee must stop work and contact the Norfolk District (contact by telephone and/or email is acceptable). The permittee must provide the Norfolk District with specific information concerning site conditions and limitations on countersinking. The Norfolk District will work with the permittee to determine an acceptable plan, taking into consideration the information provided by the permittee, but the permittee should recognize that the Norfolk District could determine that the work will not qualify for a nationwide permit.

i. Emergency pipe replacements: In the case of an emergency situation, such as when a pipe/culvert washes out during a flood, a permittee is encouraged to countersink the replacement pipe at the time of replacement, in accordance with the conditions above. However, if conditions or timeframes do not allow for countersinking, then the pipe can be replaced as it was before the washout, but the permittee will have to come back and replace the pipe/culvert and countersink it in accordance with the guidance above. In other words, the replacement of the washed out pipe is viewed as a temporary repair, and a countersunk replacement should be made at the earliest possible date. The Norfolk District must be notified of all pipes/culverts that are replaced without countersinking at the time that it occurs, even if it is an otherwise non-reporting activity, and must provide the permittee's planned schedule for installing a countersunk replacement (it is acceptable to submit such notification by email). The permittee should anticipate whether bedrock or steep terrain will limit countersinking, and if so, should follow the procedures outlined in (f) and/or (g) above.

GENERAL CONDITIONS:

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

1. Navigation.
   (a) No activity may cause more than a minimal adverse effect on navigation.
   (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
   (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.
3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.
4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.
6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).
7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.
8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.
9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).
10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.
11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.
12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.
13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.
14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.
15. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).
16. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.
17. Endangered Species.
   (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.
(c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.
(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.
(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

18. Historic Properties.
(a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.
(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.
(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.
(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

19. Designated Critical Resource Waters. Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.
(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.
(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

20. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:
(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).
(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.
(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.
(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.
(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.
(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally,

the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

21. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

22. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

23. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

24. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

25. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

26. Compliance Certification. Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

27. Pre-Construction Notification.

(a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity:

(1) Until notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) If 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

(4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the

proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination:

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring pre-construction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

(5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

(e) District Engineer's Decision: In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP.

If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

28. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

D. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

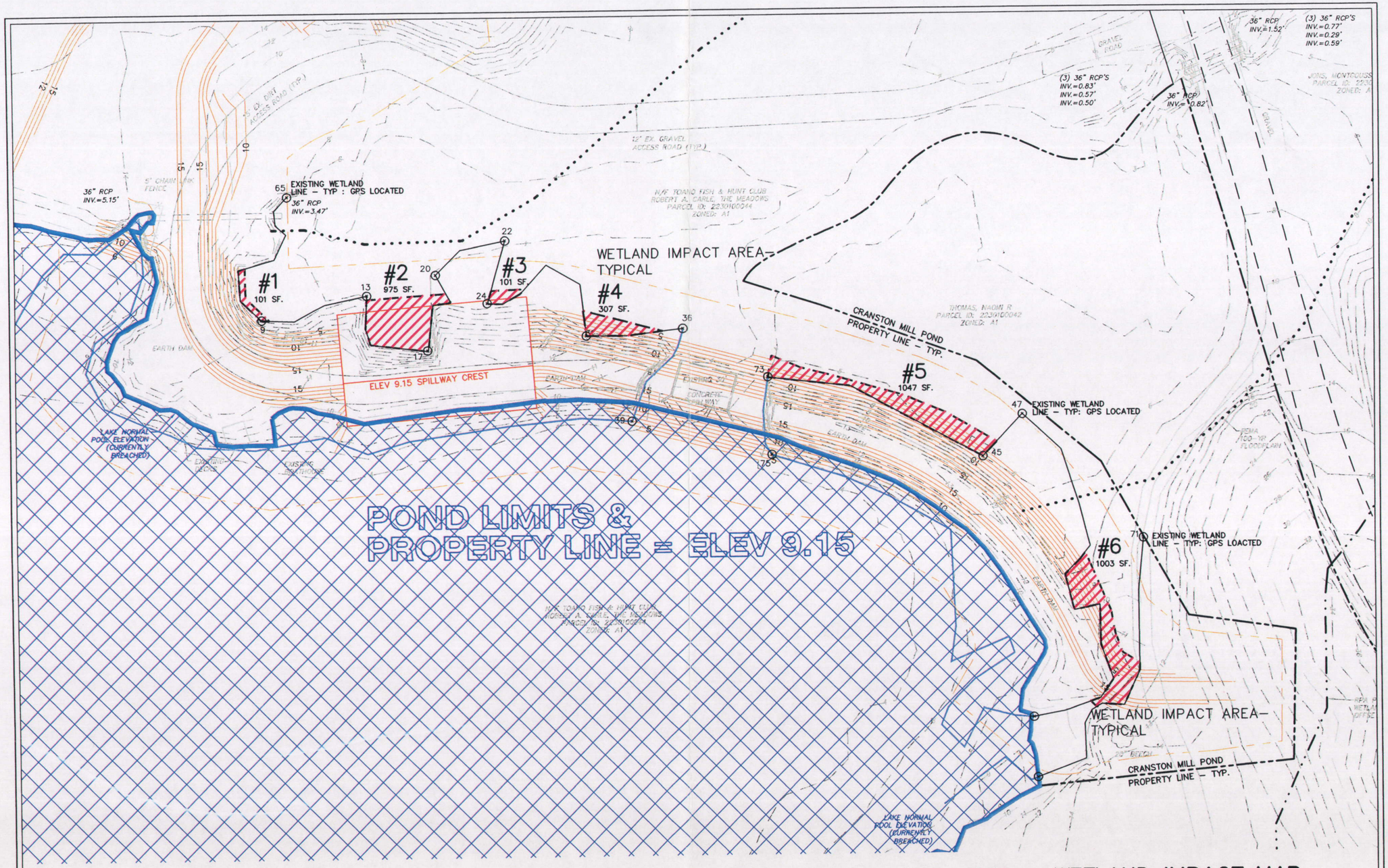
Section 401 Water Quality Certification (4/20/07):

The State Water Control Board provided unconditional §401 Water Quality Certification for the following Nationwide Permits, as meeting the requirements of the Virginia Water Protection Permit Regulation, which serves as the Commonwealth's §401 Water Quality Certification: Nationwide Permits 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 15, 20, 21, 22, 23, 28, 30, 31, 33, 34, 35, 36, 37, 38, 41, 45, 46, 47, 49, and 50.

Coastal Zone Management Consistency Determination (5/7/07):

The Commonwealth of Virginia's Department of Environmental Quality (DEQ) has determined that the 2007 Nationwide Permits are consistent with the Virginia Coastal Resources Management Program, provided that the Corps and NWP holders comply with all applicable requirements and with the recommendations found in their letter of May 7, 2007. The applicable requirements include, but are not limited to, the following:

- The Section 401 (Clean Water Act) certification provided by DEQ's Division of Water Quality, Office of Wetlands and Water Protection on behalf of the State Water Control Board on April 20, 2007. (Excludes NWPs 16 and 17)
- The permitting requirements for encroachments on subaqueous lands and tidal wetlands administered by the Marine Resources Commission pursuant to *Virginia Code* sections 28.2-1200 et seq. and 28.2-1300 et seq.
- The land use and development performance criteria in the Chesapeake Bay Designation and Management Regulations (9 VAC 10-20-110 through 150) administered by the Department of Conservation and Recreation's Division of Chesapeake Bay Local Assistance pursuant to the Chesapeake Bay Preservation Act (*Virginia Code* sections 10.2-2100 et seq.).



WETLAND IMPACT AREA TABLE

#1 – 101 SF
#2 – 975 SF
#3 – 101 SF
#4 – 307 SF
#5 – 1047 SF
#6 – 1003 SF

TOTAL WETLAND IMPACT = 3534 SF OR 0.081 ACRES
IMPACT AREA HAS BEEN CALCULATED AT A POINT 5 FEET BEYOND GRADING LIMITS.

NOTE:
LIMITS OF WETLAND DELINIATION & DATA SHEETS PREPARED ON MAY 10, 2010 BY DB SOIL & WETLAND WETLAND SERVICE, LLC. WETLAND IMPACTS WILL USE A NATIONWIDE #3. IMPACTS THRESHHOLD BELOW 1/10TH AN ACRE AND USES A NON REPORTING PROCESS GPS LOCATED & REVIEWED BY KYLE SPRINGS – TIMMONS

NORTH

09\21\2010

CMP – WETLAND IMPACT MAP

CRANSTON MILL POND LLC:
CRANSTON'S MILL POND NUTRIENT BANK
James City County, VA.

MANAGED BY:

EarthSource Solutions, Inc.
"Tomorrow's Natural Resources Today"
5735 S. LABURNUM AVENUE • RICHMOND, VIRGINIA 23231
PH) 804-222-5114, FAX) 804-222-5220 • BFULTS@ESSWETLANDS.COM

Tina Creech

From: Tina Creech
Sent: Thursday, January 20, 2011 9:20 AM
To: 'ChrisS@baldwincontracting.net'; 'ToddB@baldwincontracting.net'; 'sreed@esswetlands.com'; 'phinson@koontzbryant.com'; 'worth@restorationsystems.com'; 'cheryl.chance@VDOT.Virginia.gov'
Cc: Joe Buchite
Subject: SP-093-10 Cranston's Mill Pond Repair - Site Request Information

Your request to change the location of silt fence installation in Phase I of construction is approved. The addition of a concrete washout area was also deemed necessary and approved. Both of these changes need to be shown on the approved plan once it is received by our division. I will contact Chris or Todd when I have the plan so that they document the changes.

Cheryl – The addition of "Construction Entrance Ahead" signs on Cranston's Mill Pond Road were discussed at our preconstruction meeting yesterday. Please let us know what, if anything, needs to be submitted to be able to install these signs. They are starting the project today and hoped to get then installed ASAP. * May be added to CE-7 - but its not on file. Emailed VDOT info to developer 1/24/11

Tina Creech
Senior Environmental Inspector

James City County

Environmental
101-E Mounts Bay Road
Williamsburg, VA 23185
P: 757-253-6743
F: 757-259-4032
jccegov.com

TRANSMITTAL

Environmental Division

NOV 30 2010

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DATE: **November 30, 2010**

TO: Environmental Division (1)
JCSA (2)
Proffer Administrator (3)

FROM: Jose Ribeiro, Senior Planner

SUBJECT: SP-0093-2010, Cranston's Mill Pond Dam Repair

ITEMS ATTACHED:
Revised Site Plan (1, 2, 3)
Comment Response Letter (1, 2, 3)
Copy of DRC Alteration Permit (1)
Copy of letter from USACOE authorizing use of Nationwide 3 Permit (1)
Copy of Geotechnical Report by McKinney and Company (1)
Copy of Hydrology and Hydraulics Report approved by DCR (1)
Copy of draft Operation and Maintenance Plan (1)

Please review and return comments by December 13, 2010

NOTE: This site plan is also associated with S-0049-2010 and SUP-0023-2010

Thank you for your review,
José-Ricardo Linhares Ribeiro
JCC Planner

3.56 AC. Disturbed
YC watershed
HVC Code JL28

PLEASE UPLOAD YOUR COMMENTS ON CASE TRAK

Plan is approved by the Environmental Division. A Land Disturbing Permit and Siltation Agreement, with surety, is required for this project. The project is subject to the provision of approved Chesapeake Bay Exception CBE-11-050. Stormwater facility inspection fees and DOC-I/M agreement do not apply as this is a state dam safety project and not a BMP. The project is subject to the provisions of state dam safety alterations permit and O+M certificate (09513). Jeff Thomas 12-20-10

MDW/WAC

ENVIRONMENTAL DIVISION REVIEW COMMENTS
Cranston's Mill Pond
County Plan C-018-10
June 4, 2010

General:

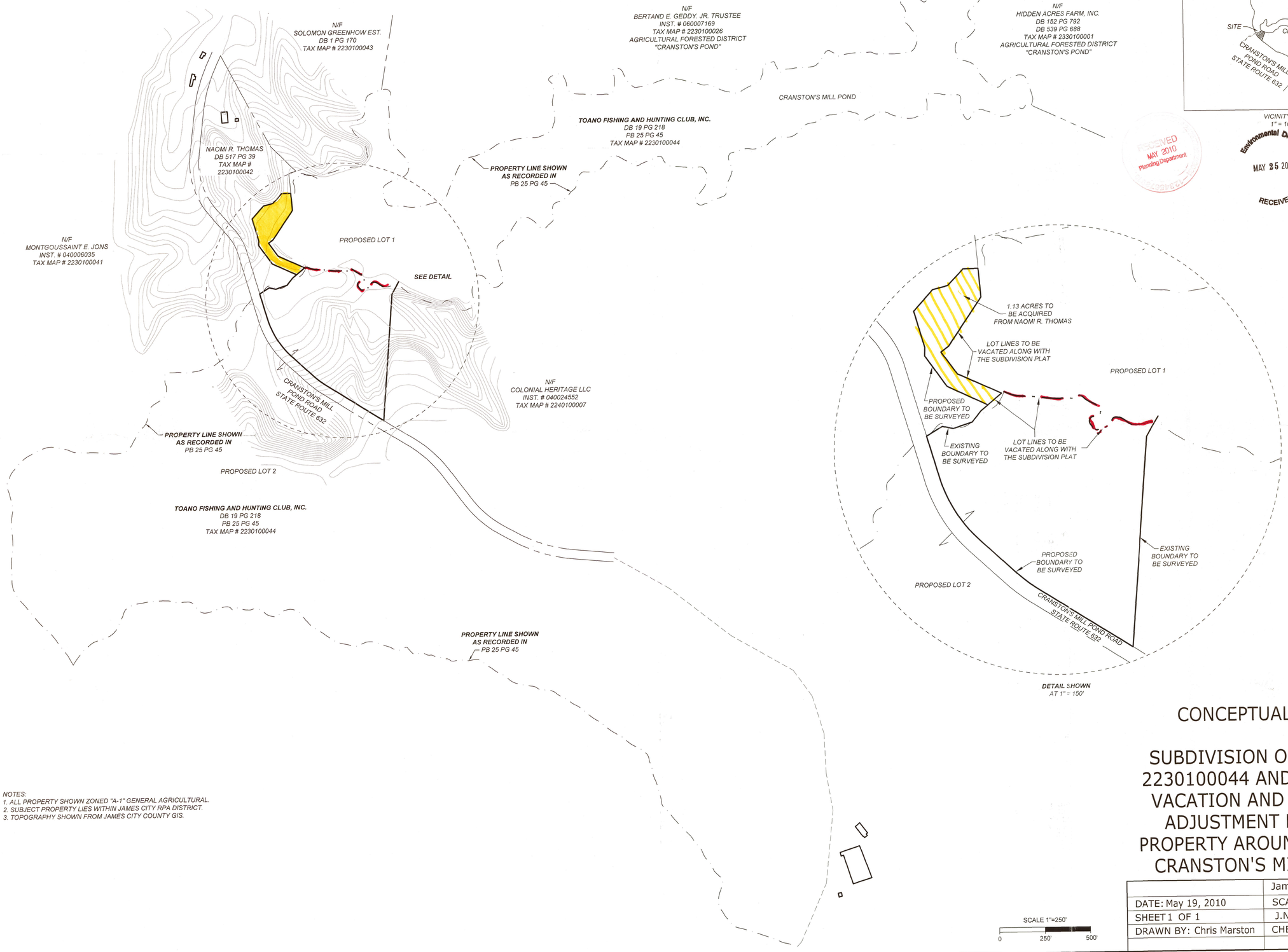
1. The Environmental Division offers no formal comments on the conceptual plan at this time and for the above referenced project; however, be advised that if the applicant wished to proceed with a subdivision plat, the following items will be required for address at that time:

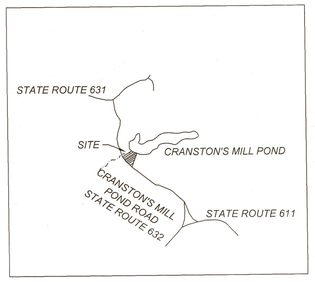
    a. Field delineation of wetlands and RPA, along with a Jurisdictional Determination by the US Army Corps of Engineers for all three lots (Naomi R. Thomas, proposed lot 1 and proposed lot 2).

    b. Proposed well and septic field locations (primary and reserve) for all three lots or a note stating that the lot is unbuildable for a single family residence.

    c. Though the current conceptual application indicates a delineated parcel around what appears to have been the original normal pool of the now relic pond, a more formal delineation of this parcel boundary must be provided.

C-0018-2010





VICINITY MAP
1" = 1000'

RECEIVED
MAY 2010
Planning Department

Environmental Division
MAY 25 2010
RECEIVED

NOTES:
1. ALL PROPERTY SHOWN ZONED "A-1" GENERAL AGRICULTURAL.
2. SUBJECT PROPERTY LIES WITHIN JAMES CITY RPA DISTRICT.
3. TOPOGRAPHY SHOWN FROM JAMES CITY COUNTY GIS.

CONCEPTUAL PLAN

SUBDIVISION OF PARCEL 2230100044 AND LOT LINE VACATION AND LOT LINE ADJUSTMENT PLAT OF PROPERTY AROUND DAM AT CRANSTON'S MILL POND

	James City County, VA.
DATE: May 19, 2010	SCALE: 1" = 250'
SHEET 1 OF 1	J.N.: 27750
DRAWN BY: Chris Marston	CHECK BY: John Webb

THIS DRAWING PREPARED AT THE
CORPORATE OFFICE
1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL 804.200.6500 FAX 804.560.1016 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

Site Development | Residential | Infrastructure | Technology

TIMMONS GROUP

Y:\906\27750 Conceptual Plan\DWG\27750-Conceptual.dwg | Plotted on 5/20/2010 12:35 PM | by Chris Marston

6/1/10

Bill

comments on C-018-10.0

Mike.

TRANSMITTAL

Environmental Division

MAY 25 2010

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DATE: **May 24, 2010**

TO: JCSA
Environmental Division
VDOT
Health Department

FROM: Jose Ribeiro, Senior Planner

SUBJECT: **C-0018-2010, Cranston's Mill Pond**

ITEMS ATTACHED:

- Conceptual Plan

ACTION: Please review and return comments by **June 04, 2010**

Note: The 1.13 acre-area which is highlighted in yellow is land which will be acquired from Ms. Naomi R. Thomas' parcel to benefit proposed Lot 1 through a boundary line extinguishment. The area shown in red will also be incorporated by the proposed Lot 1 via a boundary line adjustment.

Please upload any comments issued for this application to CaseTrak.

SP-93-10
CBE-11-050
09513
YC004

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-1712

Reply to: Division of Dam Safety & Floodplain Management
203 Governor Street Suite 206
Richmond, VA 23219
(804) 786-3914 Fax (804) 371-2630
E-mail: robert.bennett@dcr.virginia.gov

Environmental Division
NOV 30 2010
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October 15, 2010

Re: Alteration Permit

Dear Dam Owner:

Attached are the **Alteration Permit and Alteration Permit Datasheet** approved by the Virginia Soil and Water Conservation Board. The alteration project must conform to the approved plans and specifications referenced in the Datasheet. Any proposed changes to the approved plans and specifications must be submitted in advance and approved in writing by the Regional Dam Safety Engineer.

Work specified in the Alteration Permit must commence within the time frame identified in the Alteration Permit. If work does not commence within the prescribed time frame, the permit shall expire. The applicant may petition the Board for a time extension for good cause and with updated construction sequence and milestones. For general responsibilities regarding inspections, reporting requirements, maintenance, emergency action plan and exercises, please check the latest Dam Safety Act, Impounding Structure Regulations, and Guidance Documents available at www.dcr.virginia.gov .

If you have any questions, please contact your Regional Dam Safety Engineer, noted on your Datasheet, or me at my address above.

Sincerely,

Robert T. Bennett

Robert T. Bennett, P.E., R.A.
Division Director
Division of Dam Safety & Floodplain Management

Enclosures: Alteration Permit
Alteration Permit Datasheet

COMMONWEALTH *of* VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

DIVISION OF DAM SAFETY

VIRGINIA SOIL AND WATER CONSERVATION

Dam Safety Conditional Operation and Maintenance Certificate
Significant Hazard Dam, Inventory Number [redacted]
Alteration Permit

This permit entitles Toano Fishing and Hunting Club to alter Cranston Millpond Dam in James City County pursuant to the provisions of the Dam Safety Act (Section 10.1-604 et seq., Code of Virginia) and the Virginia Soil and Water Conservation Board (Board) Regulations promulgated thereunder and other requirements of the Board.

This permit is issued to perform the alteration as noted on the two-year Alteration Permit Data Sheet dated September 14, 2010, and is effective September 16, 2010 and expires September 30, 2012.

David A. Johnson

David A. Johnson
Director, Department of Conservation and Recreation

DATA SHEET – ALTERATION PERMIT

Department of Conservation & Recreation
Division of Dam Safety & Floodplain Management
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Name of Dam: **Cranstons Mill Pond Dam**	Inventory Number: **09513**
Location: **Yarmouth Creek**	City/County: **James City County**
Owner: **Cranston Mill Pond, LLC** **Attn: Brent L. Fults** Address: **5735 S. Laburnum Avenue** City/Town/Zip: **Richmond, VA 23231**	Designed by: **Unknown** Constructed by: **Unknown** Year Constructed (Modified): **1964**
Type of Dam: **Earthfill**	Purpose: **Recreation**
Drainage Area (Sq. Mi.): **7.2**	Type of Watershed: **Wooded / Rural**
Total Height (Ft.): **13.0**	Elevation: **13.0**
Normal Pool Height (Ft.): **9.0**	Elevation: **9.0**
Maximum Capacity (Acre Ft.): **935**	Maximum Area (Acres): **148**
Normal Capacity (Acre Ft.): **234**	Normal Area (Acres): **50**
Size Classification: **Small**	Hazard Classification: **Low**
Required Spillway Design Flood: **100-YR**	Available Spillway Design Flood: **> 100-YR**
Type of Spillway: **Concrete Channel**	*(Note if Section 130):*

(X) Design Report by: **Paul F. Henson, P.E. VA #023860**

Temporary Emergency Action Plan filed with:
(X) Virginia Dept. of Emergency Management
(X) Local Coordinator of Emergency Services City/County: **James City County**

Application Reviewed and Recommended for: **24-month Alteration Permit (09/16/10 – 09/30/12) for upgrades and repairs per plans and specifications by Paul F. Henson, P.E. VA #023860, dated 8/18/2010.**

By: **Steven M. Snell, P.E. Va. # 044523** Date: **September 14, 2010**

Concurrence with the Recommendation:

By: **Robert Bennett, P.E., R.A., Director** Date: **September 15, 2010**

Virginia Department of Conservation & Recreation

State Parks • Soil & Water Conservation • Natural Heritage
Chesapeake Bay Local Assistance • Land Conservation
Outdoor Recreation Planning • Dam Safety & Floodplains

Date Prepared: November 24, 2010
Prepared By: Paul F. Hinson, P.E.
Koontz-Bryant, P.C.
1703 N. Parham Rd,
Richmond, VA 23229

OPERATION AND MAINTENANCE CERTIFICATE APPLICATION FOR VIRGINIA REGULATED IMPOUNDING STRUCTURES

Note: Any executed Application for an Operation and Maintenance Certificate must be mailed to the appropriate Regional Engineer. In addition, a completed Certificate and Permit Application Fee Form (DCR199-192) and the required fee must be mailed under separate cover to: Virginia Department of Conservation and Recreation, Division of Finance, Accounts Payable, 203 Governor Street, 4th Floor, Richmond, Virginia 23219.

Reference: Impounding Structures Regulations, 4VAC 50-20-10 et seq., including 4VAC 50-20-105 and 4VAC 50-20-150, Virginia Soil and Water Conservation Board

1. **Name of Dam:** Cranstons Mill Pond Dam Inventory Number: 09513
   Other Name (if any): _____

2. **Hazard Potential Classification** (See 4VAC 50-20-40 Hazard Classifications of the Virginia Impounding Structure Regulations):
   (Check one) ☐ HIGH ☒ SIGNIFICANT ☐ LOW

3. **Name of Owner(s):** Cranston Mill Pond, LLC
   If a corporation, name of representative: Brent L. Fults, LA
   Mailing address: 5735 S. Laburnum Avenue, Richmond, VA 23231
   Telephone: (Business) 804-222-5114 (Residential) _____
   Other means of communication: 804-357-1251 (M)

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4 Operating Plan and Schedule:

Provide a narrative for each item:

a. Operation of control gates and spillways: Annually

b. Operation of Impoundment Drain: None

5. Maintenance Plan and Schedule:

Provide a narrative explaining the Maintenance Plan and Schedule.

a. Earthen Embankment Impounding Structures:

(1) embankment: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Mow a minimum of 3 times a year. Repair any erosion within 30 days of detection. Permanently seed any denuded areas.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(2) principal spillway: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Items to be inspected will include the primary weir, wing walls, rip rap armoring, maintenance walkway and level gauge painted on wing walls. If any siginificant cracks or imperfections are detected, perform a follow-up inspection within 30 days by a professional engineer. Repair any deficiences within 30 days of detection.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(3) emergency spillway: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Mow a minimum of 3 times a year. Repair any erosion within 30 days of detection. Permanently seed any denuded areas.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(4) low level outlet: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Gates should be operated to ensure they are functioning properly.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(5) impoundment area: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Inspection will be from the water surface by boat. Inspection for evidence of erosion, sloughing, accumulation of sediment or other debris within the inflow channels or the impoundment area.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(6) downstream channel: Annual inspection by Owner or Owner's representative. Inspect for debris within the channel or other impediments to the flows. Repair or remove as allowed by regulations for wetlands and waters of the U.S.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(7) staff gages: Annual inspection by Owner or Owner's representative. Examine level gauges painted on wing walls of principal spillway walls and depth gauge within emergency spillway is still in place and legible. Repair or replace as needed.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(8) other maintenance actions: Annual inspection by Owner or Owner's representative of maintenace walkway. Check for loose boards, railing, supports. Ensure steel beams are properly supported on the foundations and still sound.

Inspection report prepared by a professional engineer a minimum of every 3 years.

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b. Concrete Impounding Structures (including masonry and others): **Not Applicable**

(1) upstream face: _____

(2) downstream face: _____

(3) crest of dam: _____

(4) galleries (tunnels): _____

(5) abutments: _____

(6) spillways: _____

(7) gates and outlets: _____

(8) staff gages: _____

(9) other maintenance actions: _____

---

6. Inspection schedule (provide appropriate response):

a. Operator inspection (daily, weekly, etc.): Facility is not manned. Annual inspections by Owner or Owner's Representative and after every Stage 2 and 3 condition as outlined in the EAP.

b. Maintenance inspection (monthly, quarterly, semi-annual, annual): Annual inspections by Owner or Owner's Representative and after every Stage 2 and 3 condition as outlined in the EAP.

c. Technical safety inspection by a professional engineer. (Required for certification update: High Hazard Dams – every two years, Significant Hazard Dams – every three years and Low Hazard Dams – every six years: Every 3 years or as required based upon deficiences discovered during annual inspections.

d. Inspection by dam owner or designee (years in which a Professional Engineer does not inspect): Annually

e. Note: All dams must be inspected by a professional engineer each time a dam is overtopped or significant flows through the emergency spillway are experienced.

---

7. Emergency Action Plan Schedule:

Provide the events that initiate the Emergency Action Plan.

a. Rainfall amounts, emergency spillway flow levels or storm event: Stage I Condition – Flood Watch
Stage II Condition – 1' of flow in emergency spillway or 4.9' of flow over primary spillway.
Stage III Condition – 2' of flow in emergency spillway or 5.9' of flow over primary spillway.

b. Frequency of observation: Stage I condition: 6 hours Stage II condition: 2 hours Stage III condition: Continuous

---

8. State whether or not the current hazard classification for the impounding structure is appropriate and whether or not additional work is needed to make an appropriate hazard designation:

Dam is currently classified as a Significant Hazard. An Alteraion Permit has been granted and construction is scheduled to begin in December of 2010.

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9. **For newly constructed or recently altered impounding structures, provide certification from a Professional Engineer who has inspected the impounding structure during construction or alteration that, to the best of the engineer's judgment, knowledge and belief, the impounding structure and its appurtenances have been constructed or altered in conformance with the plans, specifications, drawings and other requirements approved by the Virginia Soil and Water Conservation Board.**

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OPERATION AND MAINTENANCE PLAN AND SCHEDULE CERTIFICATION BY OWNER

I hereby certify that the operation and maintenance plan and schedule provided herewith will be adhered to during the certification period except in cases of unanticipated emergency requiring departure therefrom in order to mitigate hazards to life and property, at which time my engineer and the Department of Conservation and Recreation will be notified.

Signed: _____

Owner's Signature Print Name

This _____ day of _____ , 20 _____ .

CERTIFICATION BY OWNER'S ENGINEER

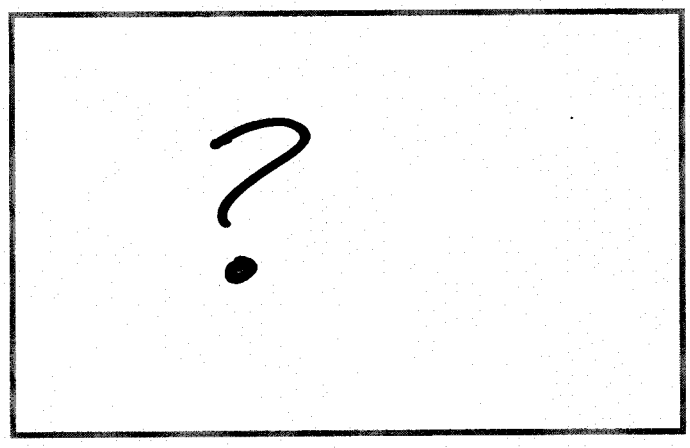
I hereby certify that the information provided in this form has been examined by me and found in my professional judgment to be true and correct.

Signed: _____ Virginia Number: _____

Professional Engineer's Signature Print Name

This _____ day of _____ , 20 _____ .

Engineer's Virginia Seal:



Remarks: _____

Mail the executed form to the appropriate
Department of Conservation and Recreation
Division of Dam Safety and Floodplain Management
Regional Engineer

Environmental Division

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McKINNEY & COMPANY

Planning | Design | Construction

May 27, 2010

Attn: Brent Fults
Cranston's Mill Pond, L.L.C.
c/o EarthSource Solutions, Inc.
5735 South Laburnum Ave.
Richmond, Virginia 23231

Environmental Division
NOV 30 2010
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Re: Geotechnical Engineering Study
Proposed Reconstruction of Cranston's Mill Pond
James City County, Virginia
McKinney Project 14752A09

Dear Mr. Fults:

This letter transmits our geotechnical engineering test data and recommendations for the above referenced project.

INTRODUCTION

To provide geotechnical engineering recommendations for the proposed reconstruction of Cranston's Mill Pond, we contracted on your behalf four engineering test borings at the locations shown in Figure 1. Each boring extended to the depth of 35 ft and typically included continuous sampling from the depth of 0 to 10 ft, and sampling at 5-ft intervals to the maximum depth of the boring. (The drilling company included supplemental sampling in Boring B-2 to better define the thickness of a peat layer.) Boring logs are presented in Attachment 1 of this report.

Soil samples were delivered to our laboratory for classification and analyses. Laboratory testing included Atterberg limits, moisture content, percent sand determination and mechanical analysis of grain size. Our testing also included Standard Proctor moisture-density relations for one bulk sample. During the field exploration, the drilling company obtained undisturbed samples of the natural peat layer. Attachment 2 presents our laboratory test data. One undisturbed sample was submitted to S&ME's soil laboratory for one-dimensional consolidation testing. Attachment 3 presents S&ME's laboratory test data. The laboratory data were used in our engineering evaluations for reconstructed embankment stability.

Cranston's Mill Pond includes an embankment dam with an existing crest elevation at El 12 to El 13. A concrete principal spillway is located in the central portion of the embankment and maintains a normal pool elevation at El 9.15, based on survey data by Timmons. During a prominent storm (Hurricane Ernesto, September 2006), we understand that flood waters overtopped the embankment with the greatest flow velocities located immediately adjacent to the principal spillway. This overtopping resulted in a fully penetrating breach to either side of the existing concrete embankment and also resulted in over steepening of the downstream embankment slope.

Recent field observations show that large-diameter trees are commonly located on the downstream slope of the embankment and within 25 ft of the downstream toe of slope. To a lesser extent woody vegetation is located on the upstream embankment slope.

Restoration of the Cranston's Mill Pond will require several discrete tasks, as follows:

- Removal of woody vegetation from and within 25 ft of the upstream and downstream embankment slope.
- Development of an on-site soil borrow pit.
- Slope restoration of the embankment.
- Removal or reconstruction of the existing spillway.
- The addition of supplemental spillway capacity (i.e., the existing principal spillway is not adequate).
- Raising the embankment crest elevation.
- Reconstruction/restoration of an emergency spillway

ESTIMATED SUBSURFACE CONDITIONS

The test borings disclosed 5½ to 9 ft of silty and/or clayey sand embankment fill. Below the embankment fill, we observed natural soils primarily consisting of silty and poorly-graded sand. At the locations of B-2, we observed a layer of fibrous peat from the depth of 14 to 17 ft. In both borings B-2 and B-3, we observed organic-rich silty sand from 17 to 23 ft and 16½ to 21 ft, respectively. In Boring B-2, this organic-rich silty sand was immediately located below the peat layer. Refer to Attachment 1 for our specific observations at each boring location.

Attachment 2 presents the laboratory test data, with supplemental moisture contents presented on the boring logs. Within the embankment fill, we recorded Liquid Limits ranging from non-plastic to 52 (typical values from 23 to 24), Plasticity Indices from non-plastic to 35 (typical values from 6 to 10) and sand contents from 52.6 to 76.3 percent. For the underlying organic-rich silty sand, we recorded a Liquid Limit of 31, a Plasticity Index of 6 and 70 percent sand

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content.

Our laboratory program included two full sieves – one for the embankment soil and the other for an underlying sample of poorly-graded sand. Attachment 2 presents the grain-size distribution curve showing an extrapolated D_{20} value of 0.04 mm for the embankment soil and a D_{10} value of 0.13 mm for the poorly-graded sand soil. We used these values to correlate saturated permeability values of $2x10^{-4}$ cm/sec and $1.7x10^{-2}$ cm/sec, respectively. Standard Proctor moisture-density relations for the embankment soil show a maximum dry density of 119.2 with an optimum moisture content for compaction of 13.0 percent. We recorded a natural moisture content of 16.0 percent for this bulk sample, which shows that the moisture content of the natural soil (at the time of exploration) was greater than the most favorable moisture content for compaction.

S&ME's soil laboratory test data show that the underlying peat layer displays a pre-consolidation pressure of 0.81 tsf (1,620 psf). We calculated an overburden pressure of 0.62 tsf (1,240 psf) in the peat layer for the embankment height at El 12. The data show values of C_α from 0.0025 to 0.0058 when the loading in the peat is controlled to less than 1.0 tsf. These values of C_α reflect very low to low compressibility.

Our subsurface exploration did not include water observation wells. During drilling, we encountered ground water at some of the boring locations. The boring logs present our ground water observations. Typically, we observed the ground water at depths ranging from 6½ to 7½ ft. Ground water observations in the embankment dam are influenced by the pond elevation, which is well below the design pool elevation owing to the breached condition.

ENGINEERING RECOMMENDATIONS

Using the data from our field exploration program, we have developed the following recommendations for site preparation, earthwork and reinforced concrete spillway construction. Successful implementation of our recommendations will require field testing, and engineering observations during construction.

Site Preparation and Earthwork Recommendations

We recommend the complete removal of all woody vegetation from all embankment slopes. This recommendation includes the complete removal of all root bulbs. The removal of root bulbs will result in a crater-shaped depression. Earth fill in this depression must conform to the requirements of compacted structural fill as described below.

Subgrades to receive compacted structural fill shall be cleared of all topsoil and organic, wet or otherwise disturbed soils. The owner should engage a geotechnical engineer or qualified engineering technician to document favorable subgrade preparation.

There is a likelihood that new earth fill placement may be required to extend the toe of the embankment downstream. This may occur in areas of standing water or in areas where saturated subgrade conditions are within the near surface. Figure 2 depicts site preparation measures required to prepare a subgrade to receive compacted structural embankment fill. This subgrade preparation method may result in encroachment into jurisdictional waters and wetlands.

Compacted structural embankment fill will be required to repair the existing breach, restore minimum embankment slopes and to raise the embankment crest elevation. Compacted structural fill shall consist of non-organic soils classifying as CL, ML, SM, SC providing that the soils contain at least 30 percent sand or 30 percent fines and have a Plasticity Index of less than 35. Maximum grain size for suitable fill material should not exceed 3 inches. This classification allows for the reuse of on-site soils, with the exception of the underlying peat layer, which is not likely to be exposed by the anticipated grading activities.

Compacted structural fill shall be placed in horizontal loose lifts not exceeding 8-in thick, which are compacted to at least 95 percent of the maximum dry density as determined in the laboratory using ASTM D-698, Standard Proctor. Compaction moisture contents should be controlled to within 3 percent of the optimum moisture content for compaction, providing that this range of moisture allows for the required level of compaction.

There will be areas of the site where the placement of compacted structural fill will abut existing slopes. Horizontal lifts of compacted structural fill may be placed adjacent to existing grades that are 5H:1V, or flatter (i.e., 20 percent). If the existing grades are steeper than 5H:1V, the horizontal lift of compacted structural fill should be keyed into the existing slopes.

Engineered Slopes

Finished embankment slopes should be designed at 2H:1V, or flatter. We understand that MSE (mechanically stabilized embankment) fill may be needed to raise the crest of the embankment and maintain a 10-ft wide crest width (owner's requirement). The use of MSE will require the contractor to submit a shop drawing that properly depicts the height of the MSE and the position of the geotextile reinforcement within the embankment. This shop drawing shall be prepared by a licensed engineer registered in the Commonwealth of Virginia.

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Attachment 4 presents slope stability calculations used to document that a renovated embankment dam raised to El 15 using MSE fill provides suitable safety factors against slope failure.

Cast in Place Concrete Construction/Spillway Reconstruction

This project does not include conventional foundation elements. The interaction between the vertical spillway end walls and the horizontal spillway slab may result in stress concentrations to be mitigated by the structural design and the soil support of the embankment. We recommend a net allowable bearing pressure of 1,500 psf for loads applied below elevation El 9.0. We recommend a subgrade modulus of 150 pci for cast-in-place concrete placed on a prepared subgrade of compacted structural embankment fill.

We recommend the spillway be designed for at-rest earth pressures. We recommend a coefficient of at rest earth pressure $K_o = 0.45$. Considering a moist unit weight of 135 pcf (i.e., 100 percent compaction at the optimum moisture content), this would result in an equivalent fluid pressure of 60 pcf. We recommend a coefficient of passive earth pressure Kp = 3.5. Considering a potential for earth fill desiccation, we recommend an equivalent fluid density of 375 pcf. We also recommend the upper 2 ft of burial be excluded from passive pressure computations.

The presence of a concrete spillway located on the embankment can lead to preferential flow paths along the concrete-to-embankment-soil interface. Seepage forces along this preferential flow path can lead to damaging internal erosion and piping failure. To minimize the potential for internal erosion, we recommend the following:

- The up-stream 2/3^{rds} of all slab-on -grade concrete shall be cast directly on the embankment fill (i.e., no subbase aggregate).
- The downstream 1/3rd of all slab-on-grade concrete shall be cast directly on a 12-in thick engineered subbase of VDOT No. 57 open-graded aggregate.
- Backfill for the upstream 2/3^{rds} of the spillway end walls shall consist of compacted structural fill (i.e., as described above).
- Backfill for the downstream 1/3rd of the spillway end walls shall consist of VDOT No. 57 open-graded aggregate.
- Mirafi 140N (or equal) shall be used to separate all VDOT No. 57 aggregate from existing embankment soil, abutting compacted structural embankment fill or overlying topsoil.

ON THE MATTER OF SETTLEMENT

As shown on the boring logs the center of the embankment (i.e., in proximity to the existing spillway) includes an underlying layer of peat. This layer of peat is about 3 ft thick. Proposed construction at Cranston's Mill Pond will result in stress increase in the peat layer of about 400 psf (i.e., in those areas where the crest height is raised by 3 ft). This amount of stress increase is within the pre-consolidation pressure that the peat has experienced in the past. As such, there is a trivial likelihood of noticeable settlement resulting from the application of this new embankment load.

Reconstruction/renovation of Cranston's Mill Pond will require a supplemental spillway. Our subsurface exploration data show that there is limited likelihood that the area for the proposed supplemental spillway (i.e., the vicinity of Boring B-1) will be underlain by peat. However, if peat does underlie the new spillway location, it's important to realize the net loading on the peat will decrease by the construction of the new spillway.
The construction of a new spillway results in the removal of earth fill (i.e., from the current crest height of El 12, in order to prepare a subgrade for slab-on-grade construction at about El 8 or El 8½. Following this excavation, the placement of 8-in (±) of concrete results in a net load decrease. Our field data and engineering analysis, in conjunction with the S&ME laboratory data show that the presence of peat will not likely affect the engineering design or the long term performance of Cranston's Mill Pond.

CLOSURE

The recommendations in this letter should be incorporated into the civil and structural design and translated to the contractor in the general notes of the design drawings. The boring logs and laboratory test data can be included in the contract documents. However, this geotechnical engineering study should not be included into the contract documents.

This report is prepared for the project as referenced and described herein. If the project is revised, we should be notified to evaluate whether our recommendations remain valid.

We have prepared this letter report in accordance with generally accepted geotechnical engineering practice. And, we make no warrantees, either express or implied, as to the professional advice provided under the terms of our agreement.

We appreciate our involvement in this project. If there are any questions, please call.

Sincerely yours,

McKINNEY AND COMPANY

COMMONWEALTH OF VIRGINIA
CARL P. BENSON
Lic. No. 021962
5/27/10
PROFESSIONAL ENGINEER

Carl P. Benson, C.P.G., P.E.
Manager - Geotechnical & Environmental Services

CPB/cgs

Attachments: Figure 1 - Site and Location Plan
Figure 2 – Subgrade Preparation in Areas of Standing Water
1) Exploration Data
2) Soil Laboratory Test Data
3) S&ME Laboratory Test Data
4) Stability Calculations

c: Paul Hinson, P.E. – Koontz-Bryant

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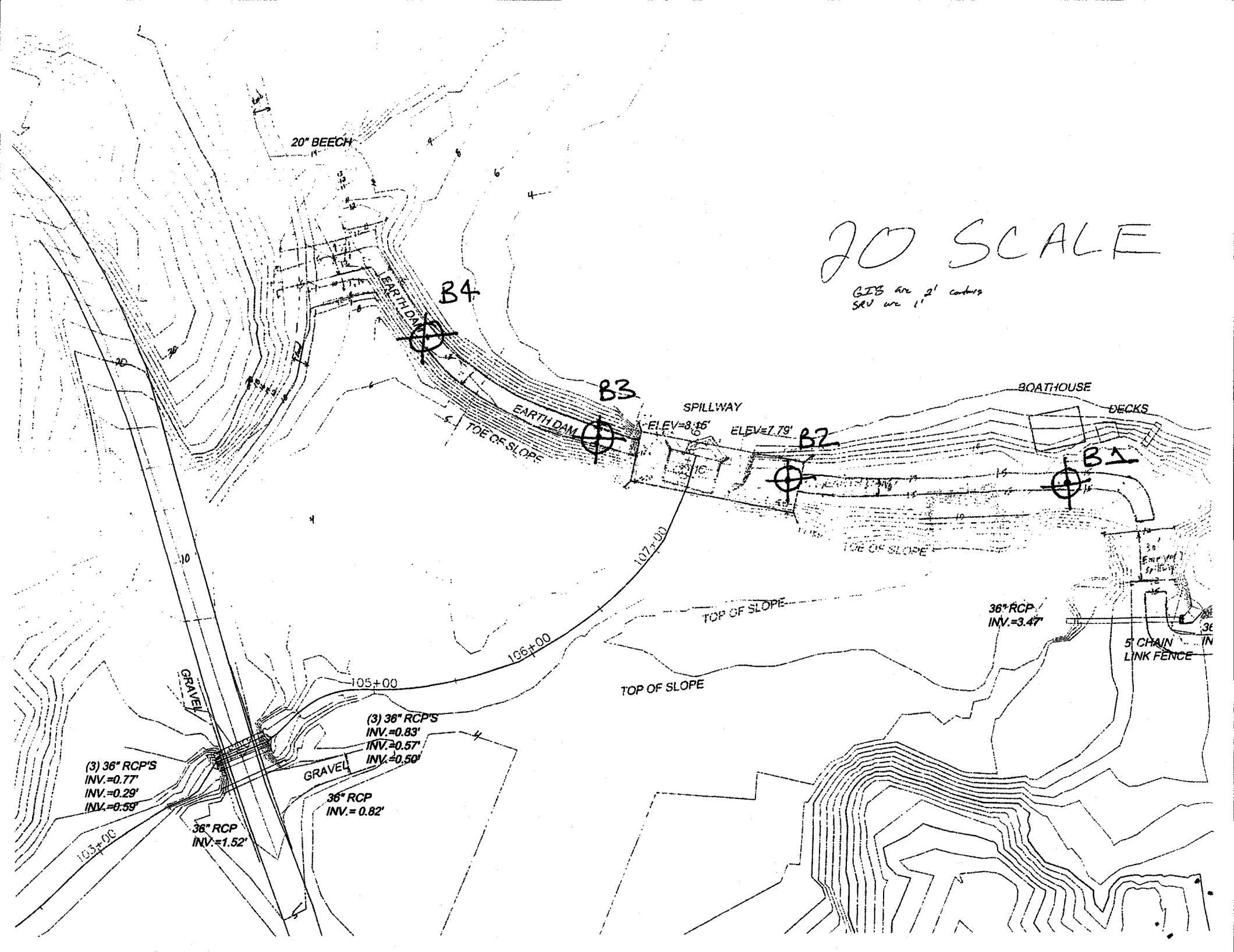
20 SCALE
GIS are 2' contours
SRV are 1'
20" BEECH
B4
EARTH DAM
B3
EARTH DAM
TOE OF SLOPE
SPILLWAY
ELEV=8.15'
ELEV=7.79'
B2
B1
BOATHOUSE
DECKS
TOE OF SLOPE
107+00
106+00
105+00
103+00
TOP OF SLOPE
TOP OF SLOPE
36" RCP
INV.=3.47'
5' CHAIN
LINK FENCE
GRAVEL
GRAVEL
(3) 36" RCP'S
INV.=0.83'
INV.=0.57'
INV.=0.50'
36" RCP
INV.= 0.82'
(3) 36" RCP'S
INV.=0.77'
INV.=0.29'
INV.=0.59'
36" RCP
INV.=1.52'

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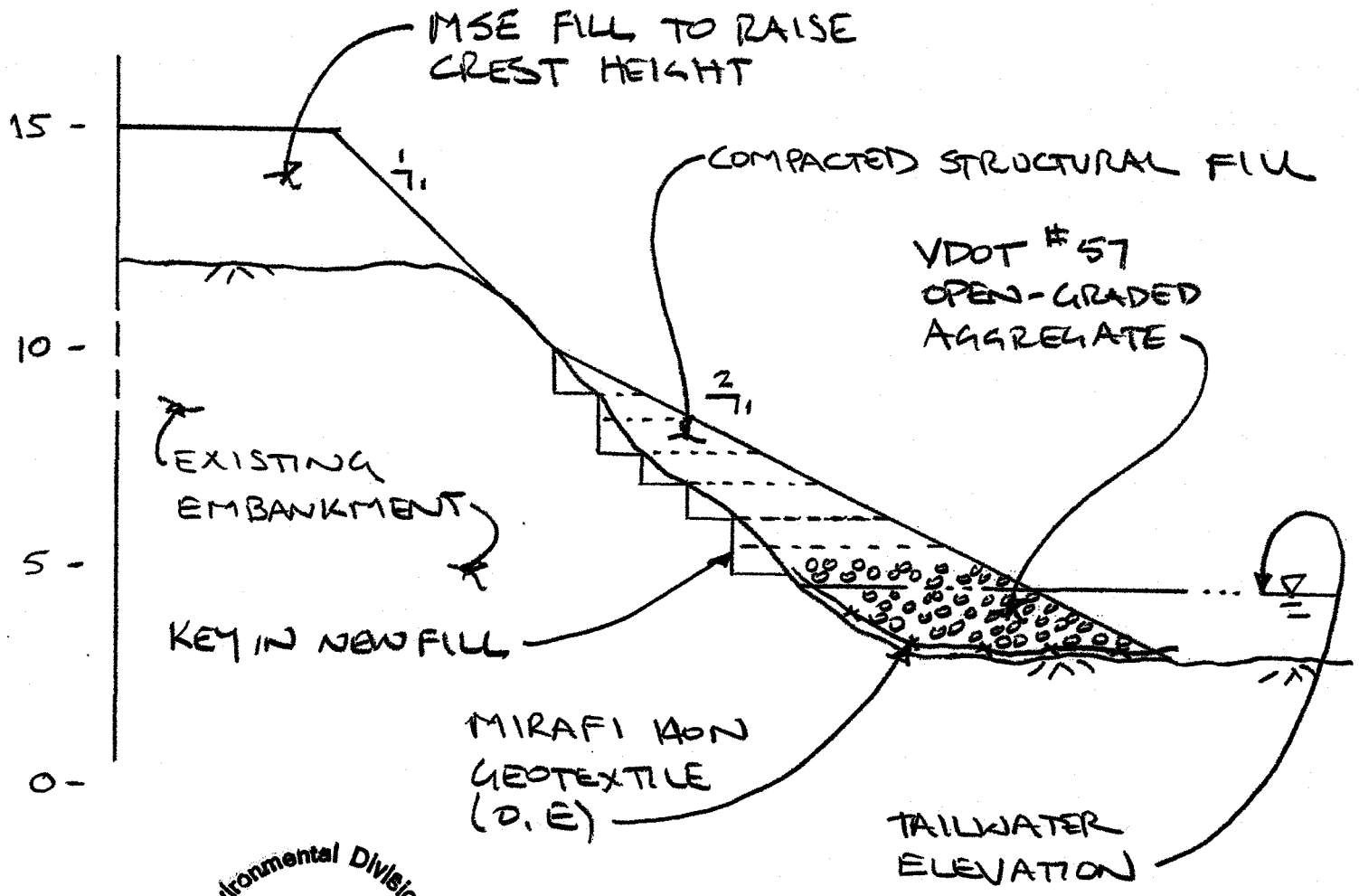
PROJECT 14752A09

SHEET NO. 1 OF 1

CALCULATED BY GVS DATE 5/27/

CHECKED BY — DATE —

FIGURE 2



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ATTACHMENT 1

Subsurface Exploration Data

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LOG OF: B1

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
12.0	7.5	7.50	7.5	9.5

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS1	11 8 9 7	17		Rootmat	11.9				Dam Fill
			2	Dark yellow brown, brown and gray, fine to medium, SILTY SAND FILL, contains occasional root fragments and wood fragments; moist (FILL).	10.0				
SS2	3 7 7 6	14		Strong brown and gray, fine to medium, CLAYEY SAND FILL; moist (FILL).					
			4						
SS3	3 2 3 2	5							
			6						
SS4	1 1 2 2	3			5.0				
			8	Blue gray and olive, fine to medium, POORLY GRADED SAND WITH SILT; wet (SP-SM).				▽	Coastal Plain Sediments
SS5	1 2 3 4	5							
			10						
			12						
SS6	WOH 2 6 7	8		Contains occasional clay lenses					Low recovery
			14						
			16						
			18						Running sands encountered at 17 to 23 ft.
SS7	1 1 1 1	2		Gray, fine to coarse					
			20						
			22						

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LOG OF: B1

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
12.0	7.5	7.50	7.5	9.5

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS8	WOH 2 2 3	4	24, 26	Gray, fine to coarse, POORLY GRADED SAND WITH SILT [continued]	-14.5				
SS9	2 4 3 7	7	28, 30, 32	Dark green gray, fine to medium, SILTY SAND, contains occasional fluvial mica; wet (SM).	-23.0				
SS10	WOH 2 3 4	5	34						
			36, 38, 40, 42, 44	Boring terminated at 35 ft. Borehole backfilled with soil cuttings upon completion.					

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LOG OF: B2

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
12.0	6.5	6.50	6.5	11.0

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS1	4 3 3 2	6		Rootmat	11.9				Dam Fill
				Yellow brown and gray, fine to medium, SILTY SAND FILL, contains occasional wood fragments; moist (FILL).			16.0		
SS2	2 3 2 2	5	2						
SS3	3 1 2 1	3	4		7.0				
				Yellow brown, gray and dark yellow brown, fine, CLAYEY SAND FILL, contains occasional root fragments; moist (FILL).					Borderline Clayey Sand Fill/ Sandy Lean Clay Fill
SS4	2 2 2 1	4	6	Gray and yellow brown, wet			23.3	▽	
SS5	1 1 2 1	3	8		3.0				Low recovery
				Blue gray, fine to medium, SILTY SAND; wet (SM).					Coastal Plain Sediments
			10						
			12						
SS6	1 1 1 1	2	14	Pale yellow	-2.0				Low recovery
				Very dark brown, PEAT; fibrous, hemic, contains abundant partially decomposed organic matter; wet (PEAT).					
SS7	1 2 2 2	4	16				276.0		
SS8	2 3 3 2	6	18		-5.0		30.3		
				Very dark brown, fine, SILTY SAND; strong organic content, sapric, contains abundant decomposed organic matter and occasional wood fragments; wet (SM).					
SS9	2 2 3 3	5	20	Observe variable moisture content			69.4		
SS10	2 4 4 3	8	22		-11.0		46.6		

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LOG OF: B2

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
12.0	6.5	6.50	6.5	11.0

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS11	2 3 3 3	6	24	Gray, fine to medium, POORLY GRADED SAND; wet (SP).					Running sands encountered from 22 to 26 ft.
			26						
SS12	WOH/ 12" 1 1	1	28						
			30						
			32						
SS13	2 2 5 6	7	34		-23.0				
			36	Boring terminated at 35 ft. Borehole backfilled with soil cuttings upon completion.					
			38						
			40						
			42						
			44						

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LOG OF: B3

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
13.0	7.5	7.50	7.5	6.0

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS1	5 5 3 3	8		Rootmat Dark yellow brown and yellow brown, fine to medium, SILTY SAND FILL, contains occasional wood fragments; moist (FILL).	12.9				Dam Fill
SS2	1 1 1 2	2	2	Gray and yellow brown					Low recovery
SS3	5 4 2 3	6	4						
SS4	1 2 1 2	3	6	Dark yellow brown and pale yellow, contains occasional clay lenses				▽	Low recovery
SS5	4 3 1 1	4	8		4.5				
				Blue gray, fine to medium, SILTY SAND; wet (SM).					Coastal Plain Sediments
			10						
			12						
SS6	1 1 1 2	2		Blue gray and gray					Borderline SP-SM/SM
			14						
			16						
SS7	1 2 1 2	3			-3.5		128.5		
				Very dark brown, fine, SILTY SAND; strong organic content, sapric, contains occasional fibrous organic matter, abundant decomposed organic matter and occasional wood fragments; wet (SM).					
SS8	1 1 1 2	2	18				70.9		
TUBE			20						
					-8.0				
			22	Gray, fine to medium, POORLY GRADED SAND, trace silt, contains occasional organic matter; wet (SP).					

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LOG OF: B3

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
13.0	7.5	7.50	7.5	6.0

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS9	1 2 3 4	5	24 26	Gray, fine to medium, POORLY GRADED SAND, trace silt, contains occasional organic matter; wet [continued]					Running sands encountered from 25 to 28 ft.
SS10	1 2 3 3	5	28 30	Fine to coarse, contains occasional organic matter	-18.5				
SS11	2 6 7 8	13	32 34	Dark green gray, fine to medium, CLAYEY SAND; wet (SC).	-22.0				Composed mainly of fine sand
			36 38 40 42 44	Boring terminated at 35 ft. Borehole backfilled with soil cuttings upon completion.					

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LOG OF: B4

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
12.5	6.5	6.50	6.5	5.0

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS1	4 4 4 3	8		Rootmat Yellow brown, gray and strong brown, SILTY SAND FILL, contains occasional root fragments; moist (FILL).	12.4				Dam Fill
SS2	4 5 6 4	11	2						
SS3	3 2 1 2	3	4		7.0				
SS4	1 1 1 2	2	6	Gray, fine to medium, CLAYEY SAND; moist (SC). Gray and olive, contains lenses of clay, wet				▽	Coastal Plain Sediments
SS5	1 2 1 2	3	8		3.5				
			10	Gray green, fine to medium, CLAYEY SAND, contains fluvial mica; wet (SC).					
			12						
SS6	1 2 3 2	5	14	Gray green and olive					
			16						
SS7	1 2 3 2	5	18						
			20						
			22						

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LOG OF: B4

Project No.: 14752A09

Client:	Cranston Mill Pond, LLC	Logged By:	P. Londeree
Project:	Cranston Mill Pond	Drilling Company:	Fishburne Drilling Inc.
Location:	James City Co., Virginia; North: ; East:	Driller:	S. Sequist
Start Date:	May 12, 2010; Completion Date: May 12, 2010	Boring Method:	3.25-in ID HSA

Surface Elevation (ft):	Ground Water Encountered (ft):	Ground Water Augers in-place (ft):	Ground Water Augers removed (ft):	Cave-in (ft):
12.5	6.5	6.50	6.5	5.0

Samp ID	Blow Counts	N Value	Depth Scale	SOIL DESCRIPTION (USCS)	Stratum Elev	PP (tsf)	Moisture Content %	H_2O	Remarks
SS8	2 2 3 3	5	24	Gray green and olive, fine to medium, CLAYEY SAND, contains fluvial mica; wet [continued]					
			26						
SS9	2 4 4 4	8	28	Dark gray green					
			30						
			32						
SS10	1 3 4 4	7	34		-22.5				
			36	Boring terminated at 35 ft. Borehole backfilled with soil cuttings upon completion.					
			38						
			40						
			42						
			44						

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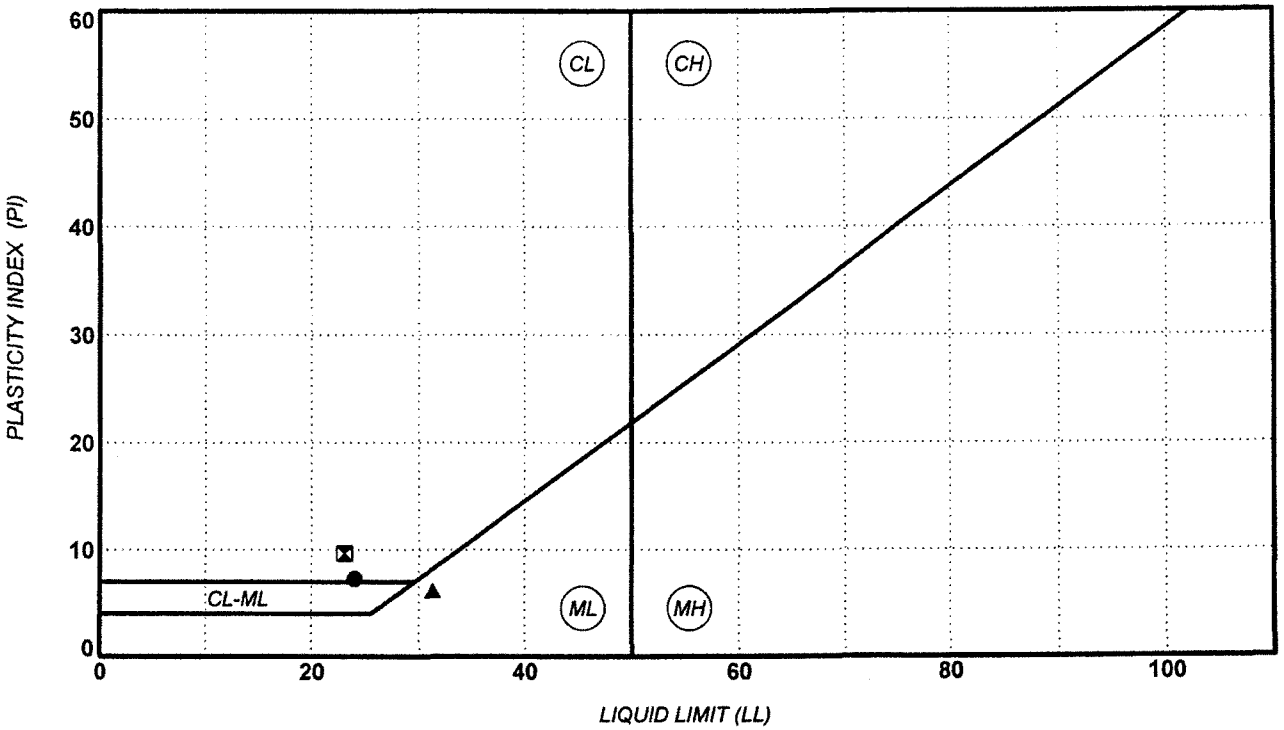
ATTACHMENT 2

Soil Laboratory Test Data

ATTERBERG LIMIT RESULTS



	Specimen ID/Depth (ft)		LL	PL	PI	Fines	MC%	Classification (USCS)
●	B2	0.5	24	17	7	40.9	16.0	SILTY, CLAYEY SAND SC-SM
⊠	B2	6.0	23	13	10	45.5	23.3	CLAYEY SAND SC
▲	B2	17.0	31	25	6	30.1	30.3	SILTY SAND SM

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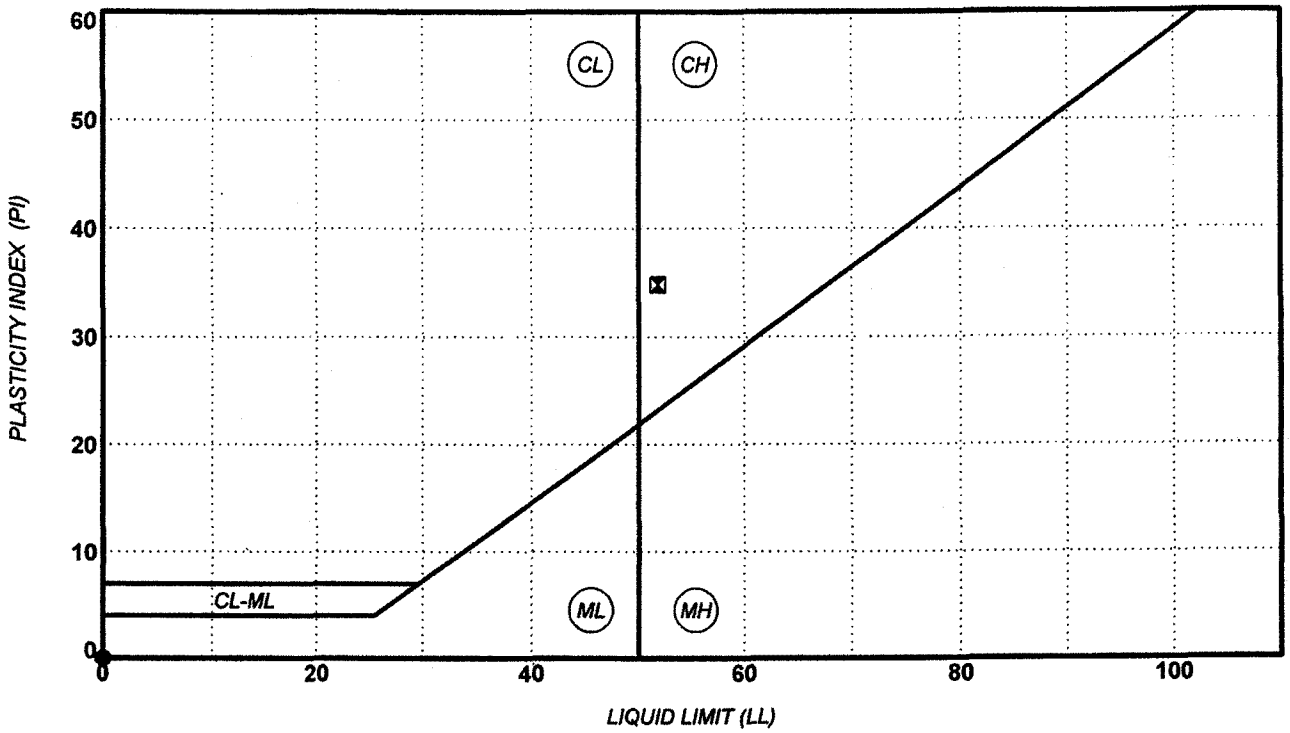
PROJECT: Cranston Mill Pond

LOCATION: James City Co., Virginia

PROJECT NO.: 14752A09

DATE: May 2010

ATTERBERG LIMIT RESULTS



	Specimen ID/Depth (ft)		LL	PL	PI	Fines	MC%	Classification (USCS)
●	2355	0.5	NP	NP	NP	23.7	13.6	SILTY SAND SM
⊠	2356	0.5	52	17	35	47.4	20.6	CLAYEY SAND SC

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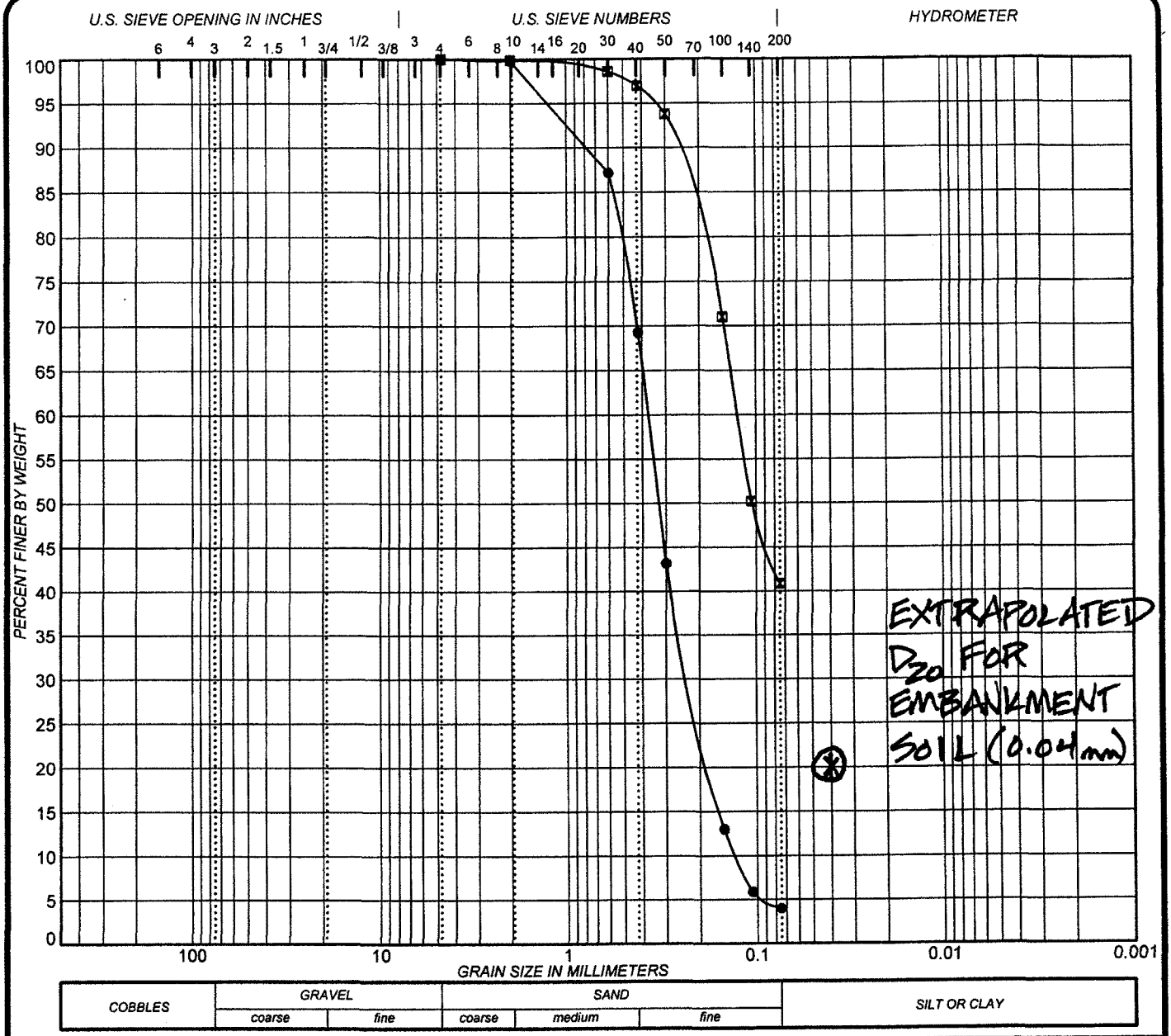
PROJECT: Cranston Mill Pond

LOCATION: James City County., Virginia

PROJECT NO.: 14752-09

DATE: May 2010



	Specimen ID / Depth		Classification	MC%	LL	PL	PI	Cc	Cu
●	B1	18.0	POORLY GRADED SAND (SP)					1.02	2.9
⊠	B2	0.5	SILTY, CLAYEY SAND (SC-SM)	16.0	24	17	7		

	Specimen ID / Depth		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B1	18.0	4.75	0.37	0.222	0.1295	0.0	96.0	4.0	
⊠	B2	0.5	4.75	0.12			0.0	59.1	40.9	

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GRADATION CURVES

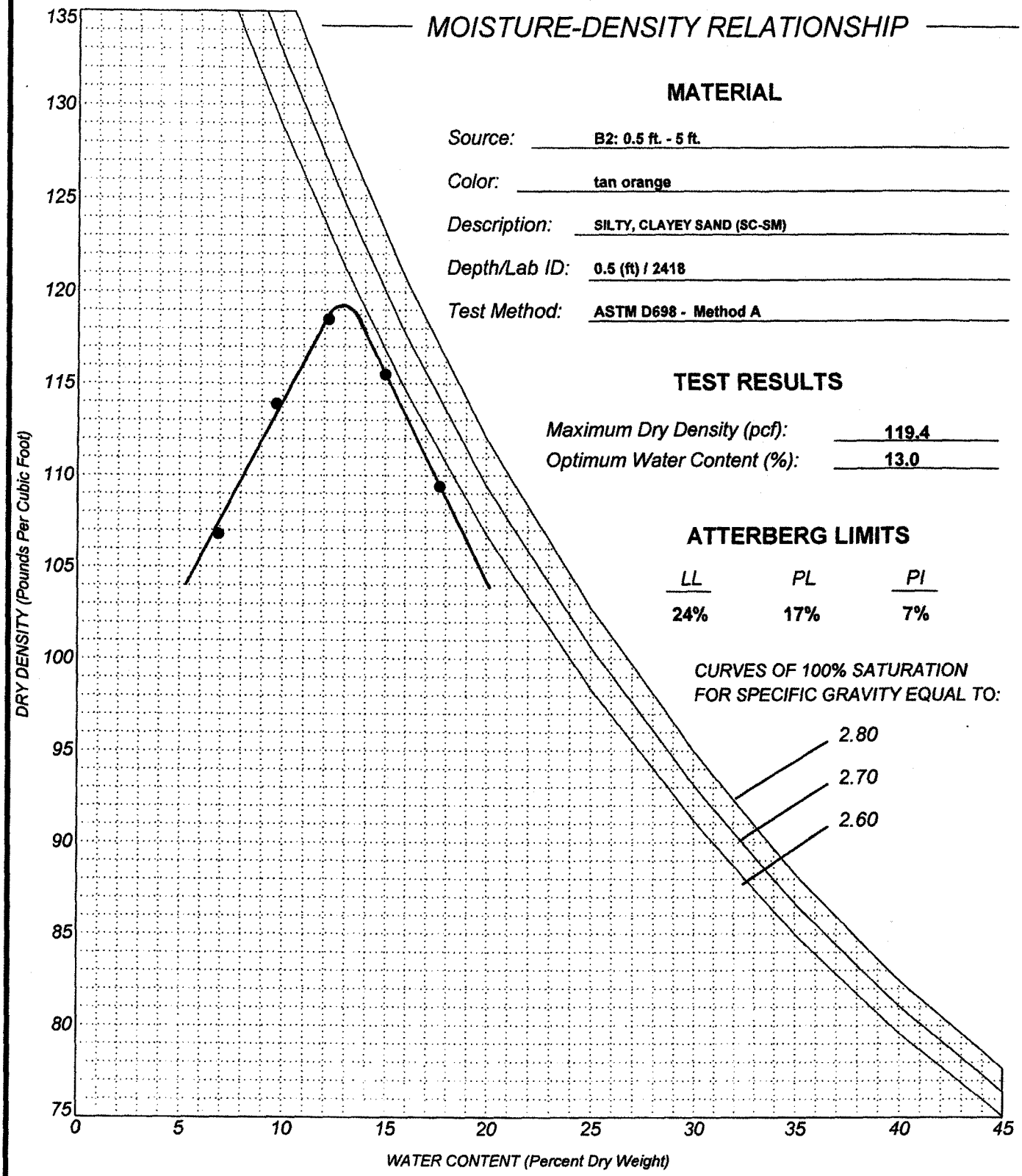
PROJECT: Cranston Mill Pond

LOCATION: James City Co., Virginia

JOB NO.: 14752A09

DATE: May 2010

MOISTURE-DENSITY RELATIONSHIP



MATERIAL

Source: B2: 0.5 ft. - 5 ft.

Color: tan orange

Description: SILTY, CLAYEY SAND (SC-SM)

Depth/Lab ID: 0.5 (ft) / 2418

Test Method: ASTM D698 - Method A

TEST RESULTS

Maximum Dry Density (pcf): 119.4

Optimum Water Content (%): 13.0

ATTERBERG LIMITS

LL	PL	PI
24%	17%	7%

McKINNEY AND COMPANY

PROJECT: Cranston Mill Pond

LOCATION: James City Co., Virginia

PROJECT NO.: 14752A09

DATE: May 2010

ATTACHMENT 3

S&ME Laboratory Test Data

Environmental Division

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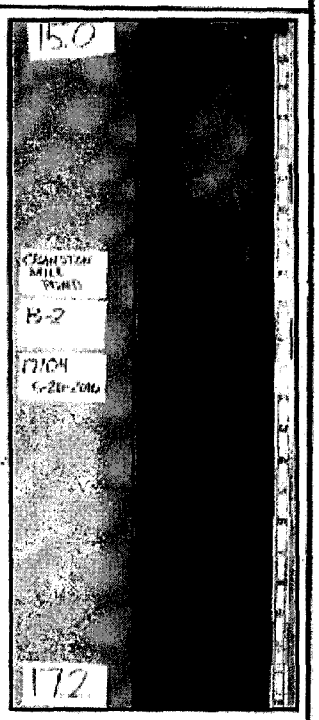
EXTRACTION LOG

Project: CRANSTON MILL POND
Job No.: 1081-10-2739
Inspector: MLT
Boring: B-2
Tube No.:
Rec. (ft.): 2.2

Location: JAMES CITY COUNTY, VA
Client: CRANSTON MILL POND, LLC
Date: 5-20-2010
Lab No.: 17104
Depth (ft.): 15-17
Date Collected: 5-12-10

Length (ft.)	Depth (ft.)	DESCRIPTION	REMARKS	PICTURE
0	15	Peat		
0.5	15.5	Orange-brown mottled with gray, fine to medium SAND, some silt, moist. (SM)	Moisture crack	
1.0	16	Peat	crack Pieces of wood crack Moisture consol (1st attempt)	
1.5	16.5	Peat	consol (2nd attempt) crack piece of wood	
2.0	17	Peat	piece of wood Moisture	
		END OF SAMPLE		

X:\LB\Job Files\1081-10\LB2739 - Cranston Mill Pond\[Tube Extraction Logs.xls]B-2 15 ft

Form No: TR-D2216-T265-1
Revision No. 0
Revision Date: 02/22/08

Laboratory Determination of Water Content

S&ME

ASTM D 2216 ☑ *AASHTO T 265* ☐ *Quality Assurance*

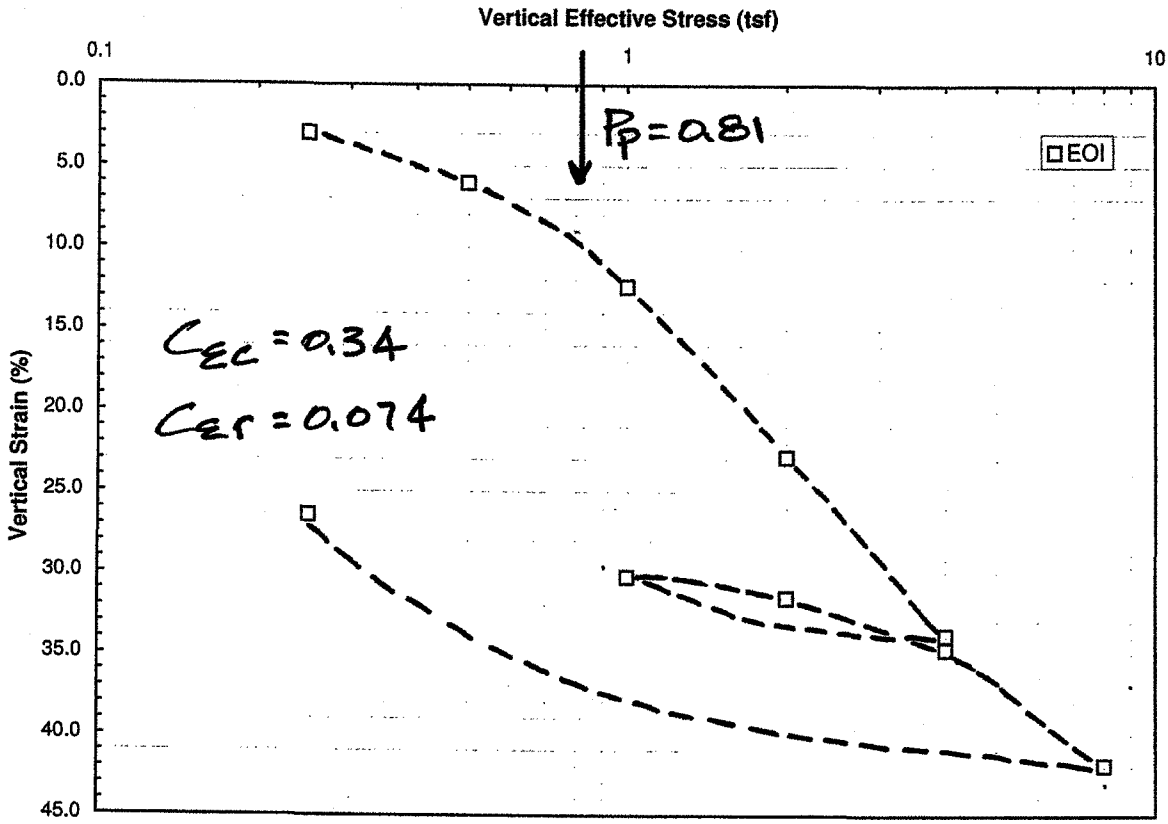
S&ME, Inc. Richmond, 8211 Hermitage Road Richmond, Virginia 23228

Project #:	**1081-10-2739**	Report Date:	5/26/2010
Project Name:	Cranston Mill Pond	Test Date(s):	5/20/2010
Client Name:	Cranston Mill Pond, LLC		
Client Address:	Richmond, Virginia		
Sample by:	McKinney & Co.	Sample Date(s):	5/12/2010
Sampling Method:	3-inch Tube		

Method: **A** (1%) ☐ **B** (0.1%) ☑ *Balance ID.* *20976* *Calibration Date:* *4/28/2010*

Boring No.	Lab Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
B-2	17104	15.3 ft	65	49.20	224.54	199.12	25.42	**17.0%**	
B-2	17104	16.2 ft	40	49.09	160.92	84.27	76.65	**217.9%**	
B-2	17104	17.1 ft	49	49.45	124.67	81.68	42.99	**133.4%**	

Notes / Deviations / References



CONSOLIDATION PARAMETERS	
Probable Preconsolidation Stress, P'_c (tsf):	-----
Approximate Overburden Stress, P'_o (tsf):	-----
Vertical Strain at P'_o (%):	-----
Sample Quality Designation (SQD):	-----
Compression Ratio (CR):	-----
Recompression Ratio (RR):	-----
Over Consolidation Ratio (OCR):	-----

TEST METHOD	
Test Method:	ASTM D-2435 B
Trimming Procedure:	2.5-inch Trimming Lathe
Pressure at Inundation:	0.049 tsf
Method to Compute C_v:	N/A

SAMPLE ID	
Test No.:	17104
Sample No.:	McKinney B-2 15 ft
Exploration No.:	B-2
Depth(ft):	15 to 17
Visual Description:	Black, PEAT

SAMPLE DATA		
Sample Diameter (cm):	6.35	
Sample Area (cm^2):	31.67	
Est. Specific Gravity:	0.80	
Trimmings Moisture (%):	140.8	
% Passing #200 Sieve:	-----	
Liquid Limit:	-----	
Plastic Limit:	-----	
Plasticity Index:	-----	
	Initial	Final
Water Content (%):	129.8	87.6
Est. % Saturation:	38.8	41.1
Sample Height (cm):	2.540	1.868
Wet Sample Weight (g):	97.83	79.86
Dry Sample Weight (g):	42.58	42.58
Dry Unit Weight (pcf):	33.0	44.9
Void Ratio, e:	2.67	1.70
Solids Height (cm):	0.691	0.691

S&ME
WWW.SMEINC.COM
8211 Hermitage Road
Richmond, Virginia 23228
Tel: 804.266.2199
Fax: 804.261.5569

ONE-DIMENSIONAL CONSOLIDATION TEST

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

Test No.:	17104
Sample No.:	McKinney B-2 15 ft
Exploration No.:	B-2
Depth (ft):	15 to 17

LOAD INC.	STRESS DURATION (Hr - min)	VERTICAL STRESS (tsf)	VERTICAL STRAIN (EOI*)	VERTICAL STRAIN (EOP*)	VOID RATIO e (EOI*)	VOID RATIO e (EOP*)	VERTICAL PERMEABILITY (CM/S)	STRESS RATIO (P'/P'c)	TAYLOR COEFFICIENT OF CONSOLIDATION (ft^2/year)	CASAGRANDE COEFFICIENT OF CONSOLIDATION (ft^2/year)
1	1 - 58	0.25	3.0	-----	2.56	-----	-----	-----	-----	-----
2	11 - 05	0.5	6.0	-----	2.45	-----	-----	-----	-----	-----
3	13 - 51	1	12.4	-----	2.22	-----	-----	-----	-----	-----
4	12 - 37	2	22.8	-----	1.84	-----	-----	-----	-----	-----
5	13 - 26	4	33.9	-----	1.43	-----	-----	-----	-----	-----
6	12 - 28	1	30.2	-----	1.56	-----	-----	-----	-----	-----
7	12 - 45	2	31.5	-----	1.52	-----	-----	-----	-----	-----
8	13 - 00	4	34.7	-----	1.40	-----	-----	-----	-----	-----
9	13 - 56	8	41.9	-----	1.14	-----	-----	-----	-----	-----
10	16 - 30	0.25	26.4	-----	1.70	-----	-----	-----	-----	-----

*EOI = End of Increment

Remarks:

Sample collection, handling methods, and other factors not disclosed to the laboratory testing firm could have affected the test results and the values reported. The test results are based upon interpretation of data collected through the test process. These interpretations do not consider the specifics of the project to which they will be applied. Therefore, all results must be confirmed by a qualified geotechnical engineer for consistency with their intended use. Load increment schedule provided by Carl Benson on May 17, 2010.

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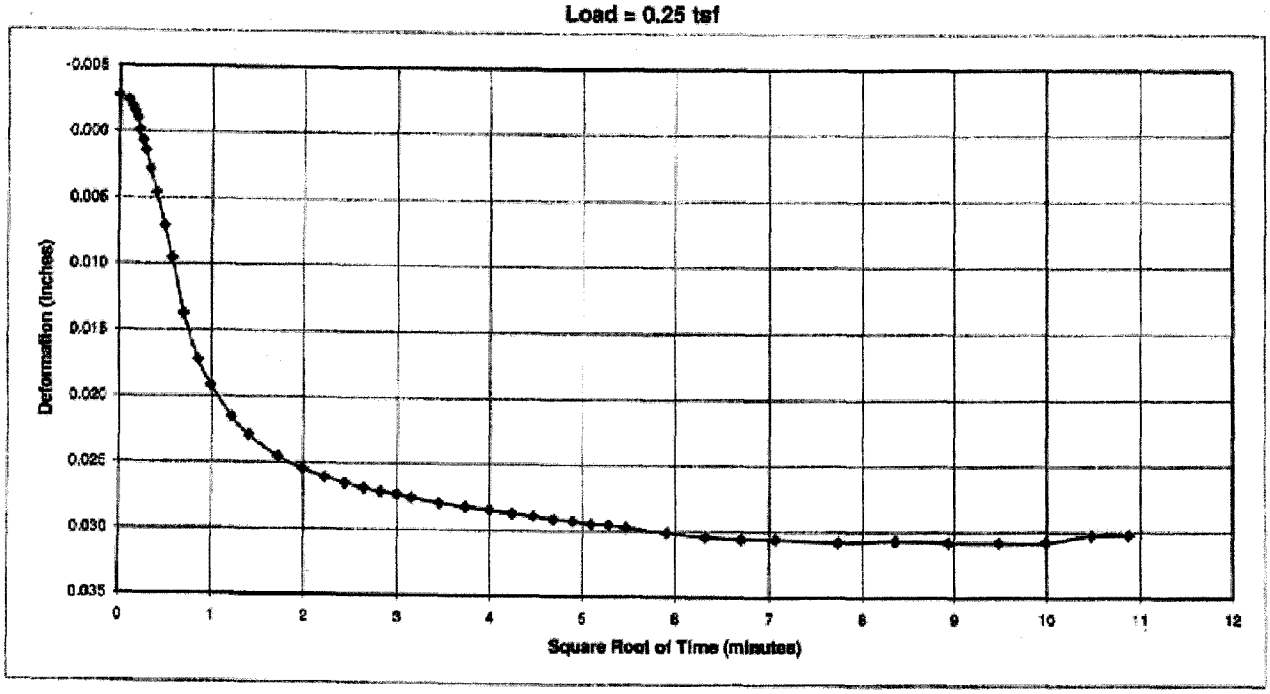
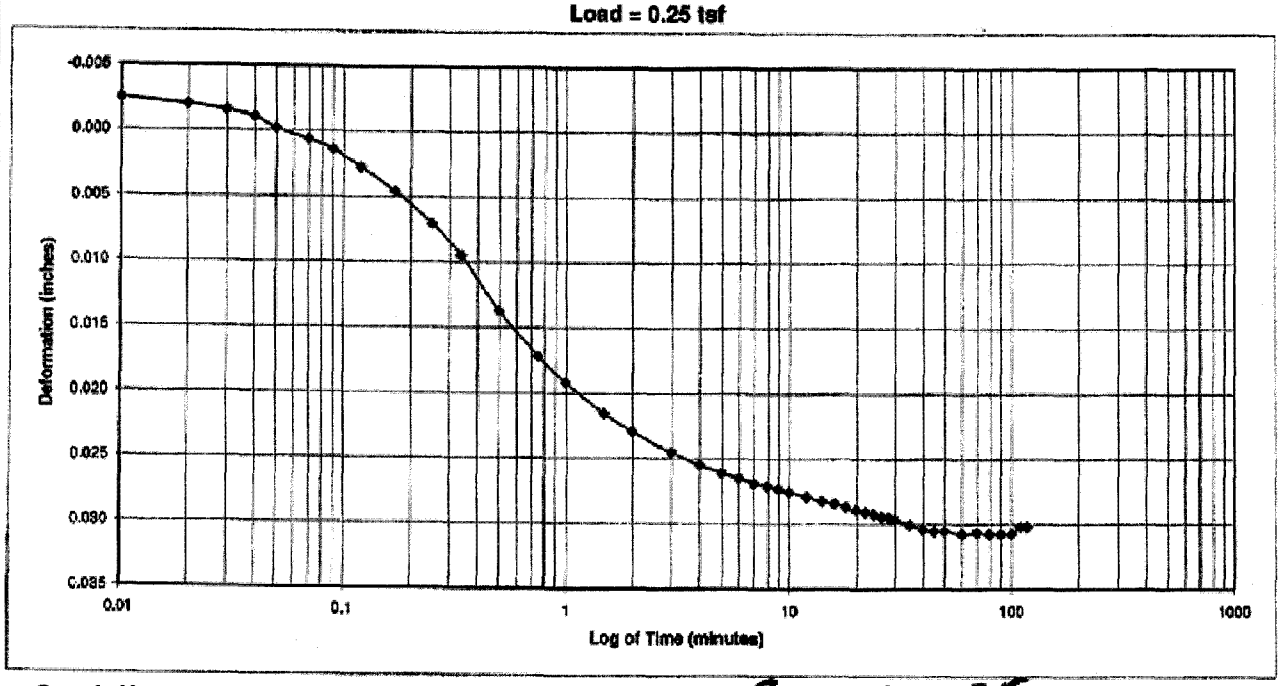
ONE-DIMENSIONAL CONSOLIDATION TEST

Project: Cranston Mill Pond
Client: Cranston Mill Pond, LLC
Location: James City County, Virginia
Project No. 1081-10-2739

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 0.25 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 0.25 tsf



Sample No.:	McKinney B-2 15 ft	Cx = 0.0025
Exploration No.:	B-2	
Depth:	15 to 17 feet	EOP = 36 min

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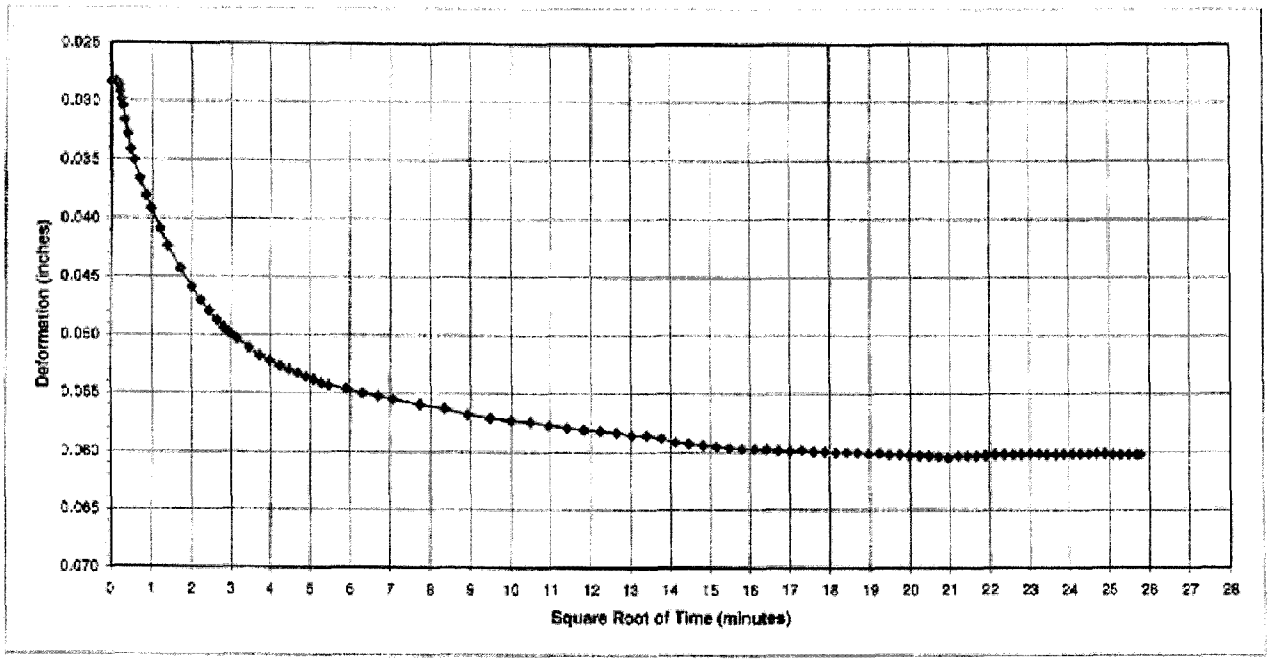
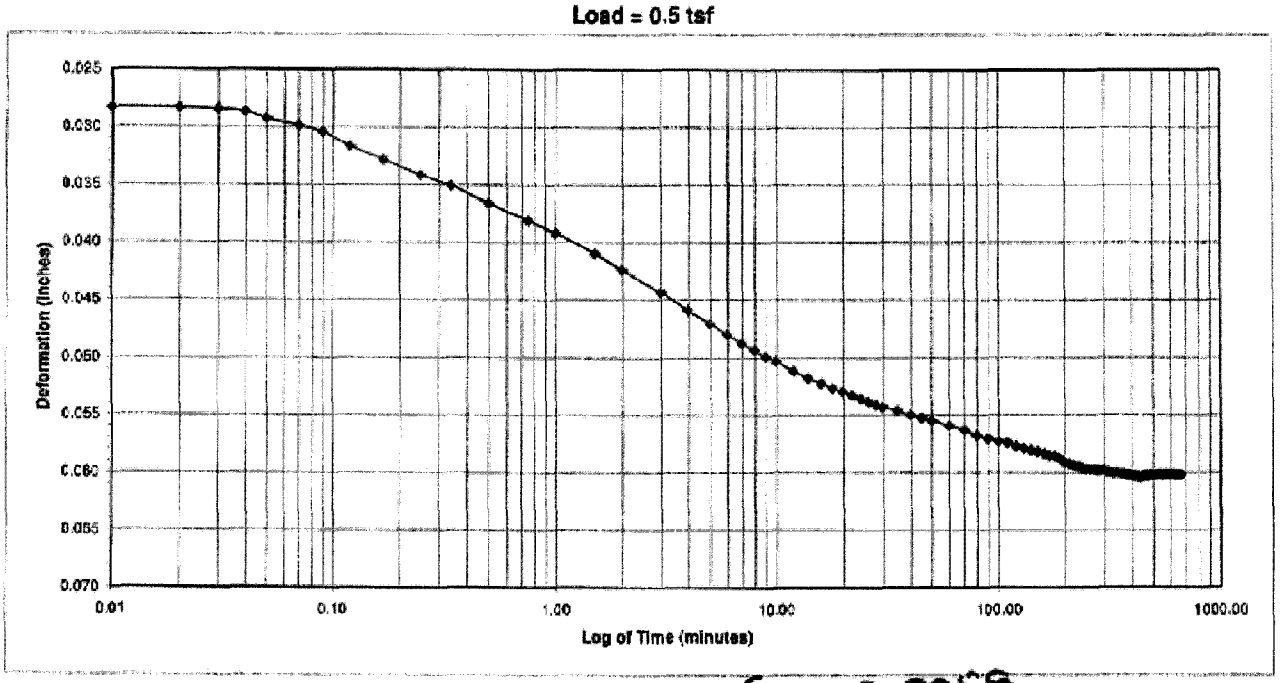
1-D CONSOLIDATION TIME-DEFORMATION CURVES

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1061-10-2739

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 0.5 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 0.5 tsf



Sample No.:	McKinney B-2 15 ft	C_α = 0.0058
Exploration No.:	B-2	EOP = 196 min
Depth:	15 to 17 feet	

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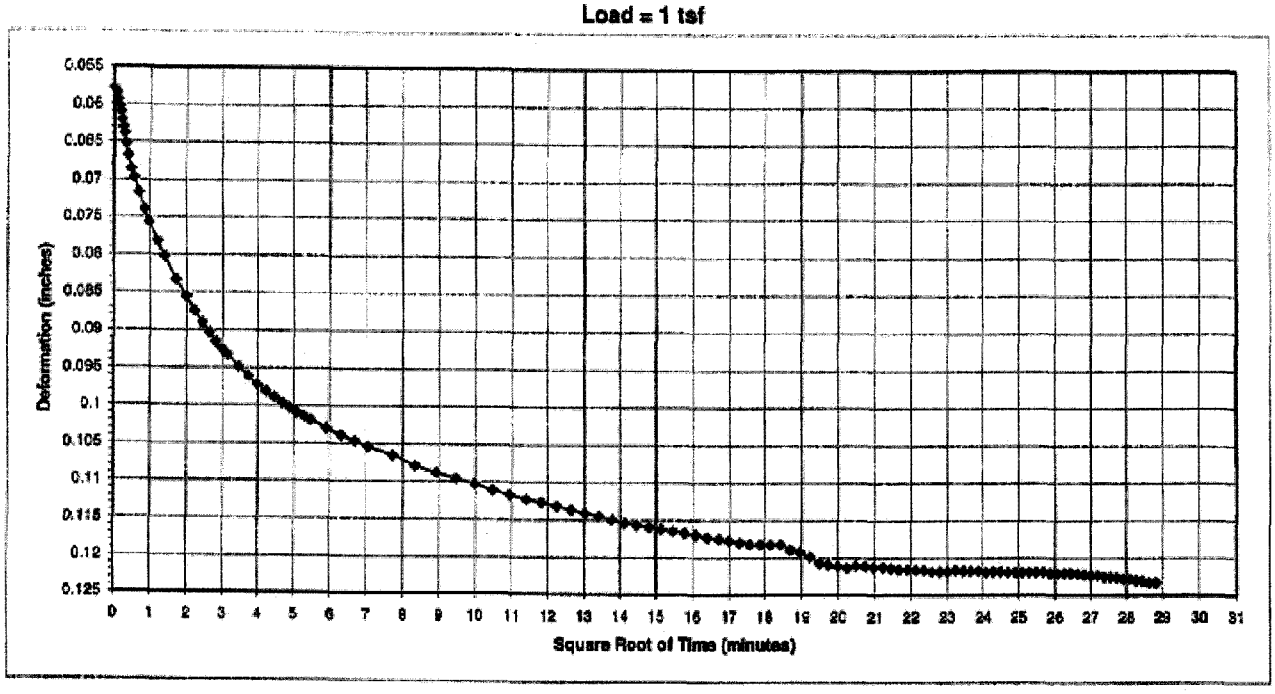
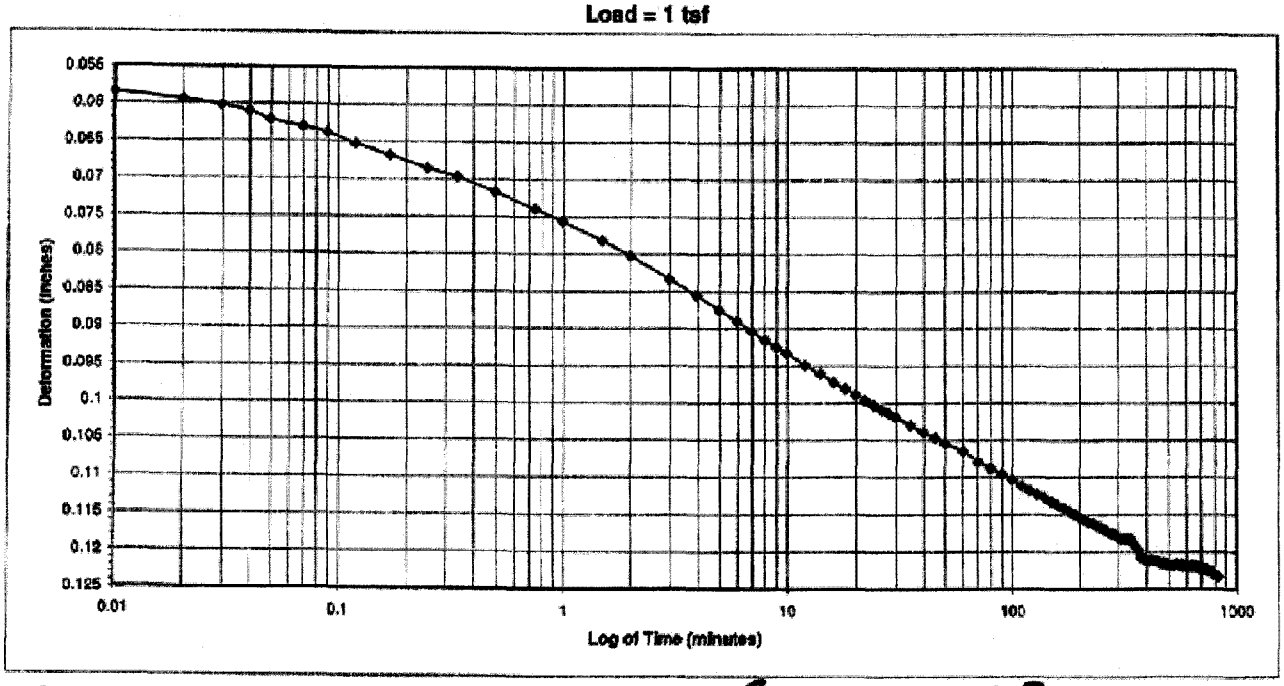
1-D CONSOLIDATION TIME-DEFORMATION CURVES

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 1 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 1 tsf



Sample No.:	McKinney B-2 15 ft	C_α = 0.0035
Exploration No.:	B-2	EOP = 380 min
Depth:	15 to 17 feet	

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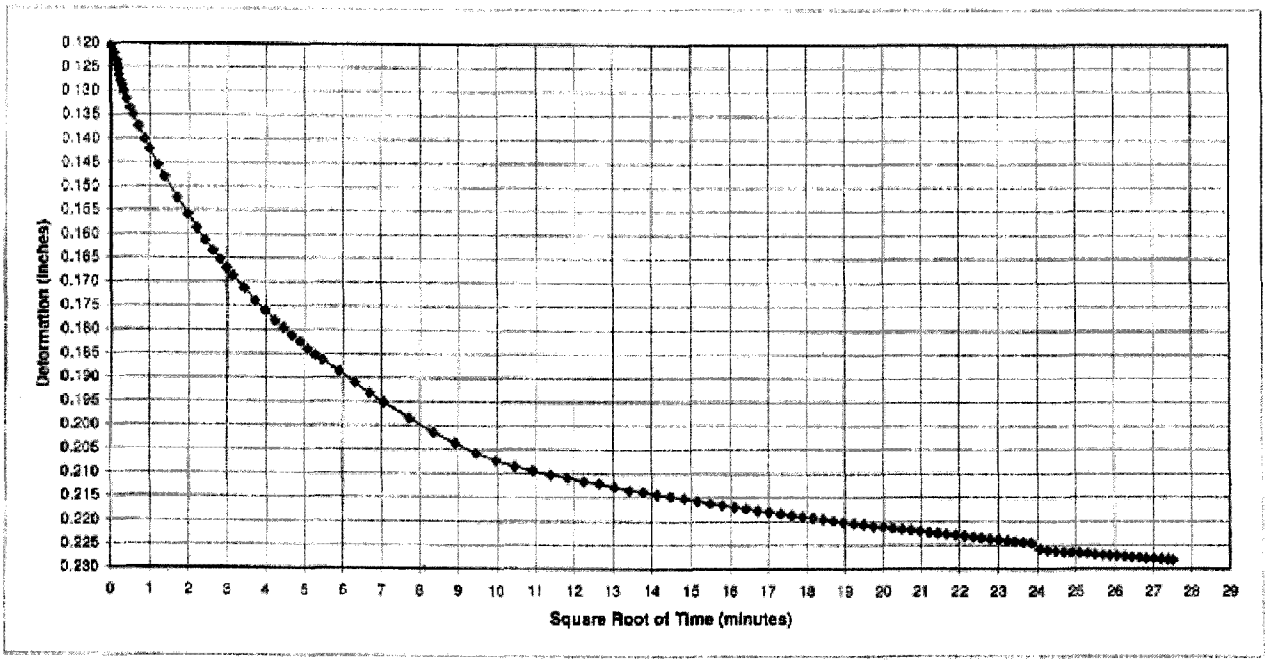
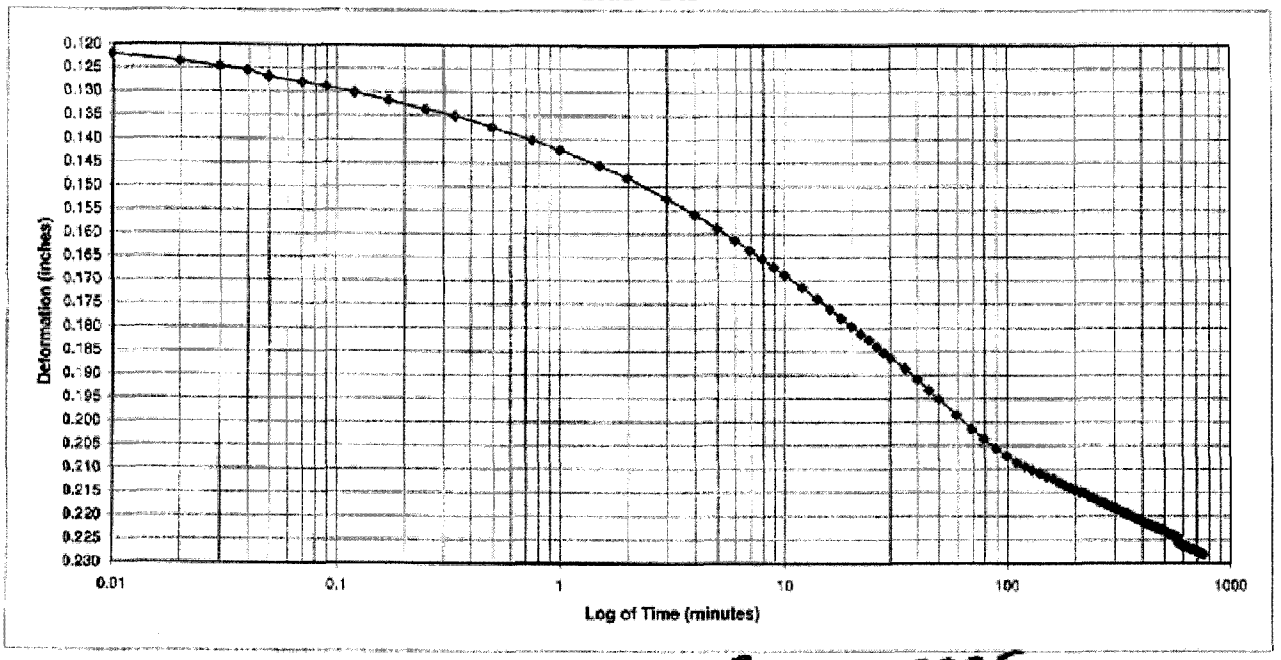
1-D CONSOLIDATION TIME-DEFORMATION CURVES

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 2 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 2 tsf



Sample No.:	McKinney B-2 15 ft	$C_\alpha = 0.0225$
Exploration No.:	B-2	EOP = 300 Min (±)
Depth:	15 to 17 feet	

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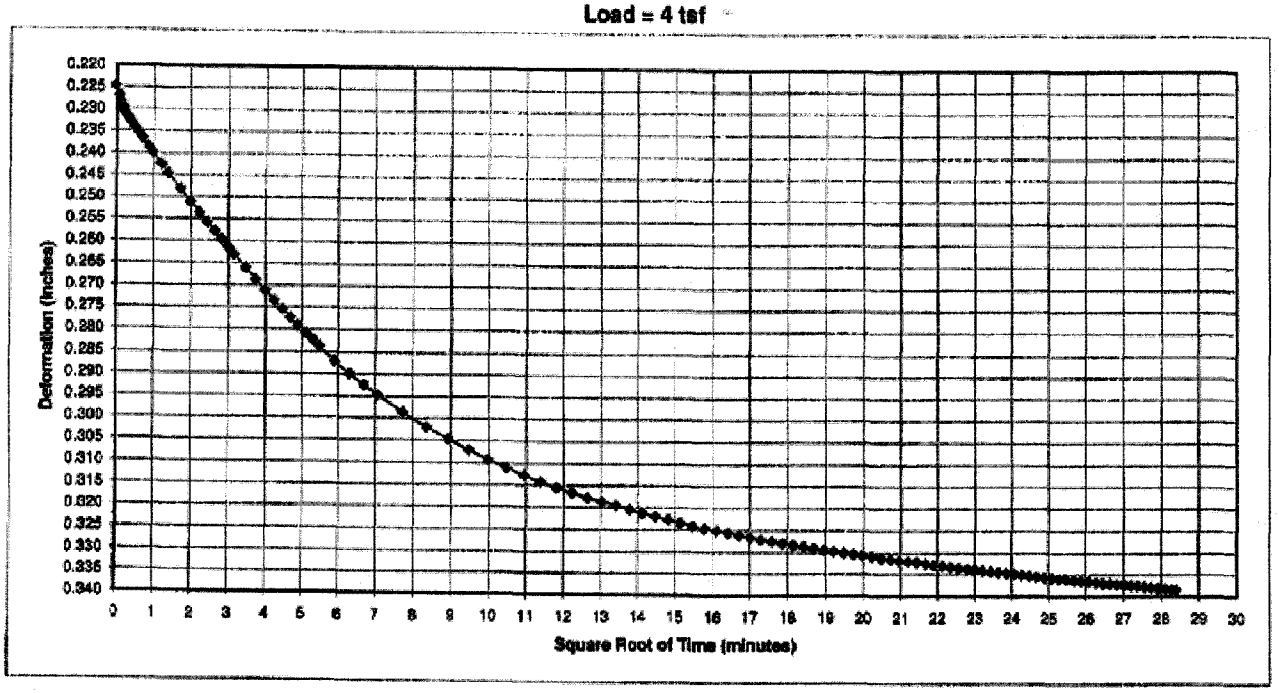
1-D CONSOLIDATION TIME-DEFORMATION CURVES

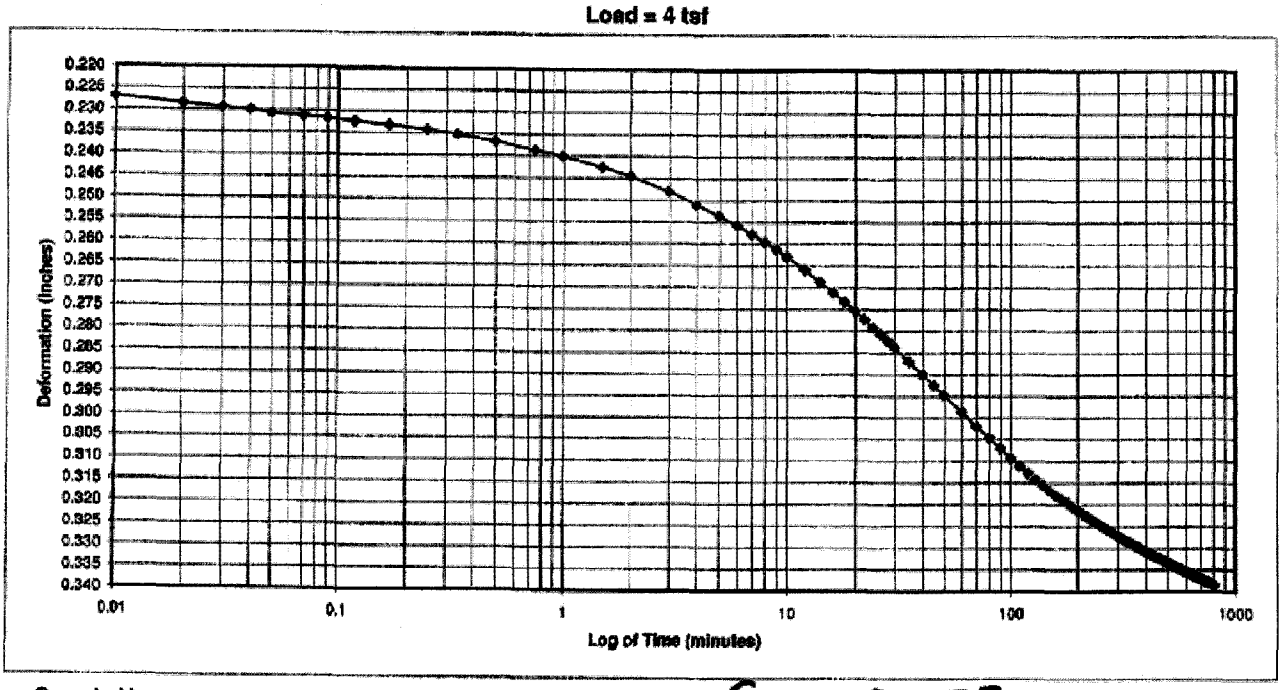
Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

X:\LB\Job Files\1081-10\L82739 - Cranston Mill Pond\B2 15 to 17 ft Consolidation Time Plots - 17104.xls]Load Increment 4

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 4 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 4 tsf



Sample No.: McKinney B-2 15 ft
Exploration No.: B-2
Depth: 15 to 17 feet

$C_\alpha = 0.027$
EOP = 330 min

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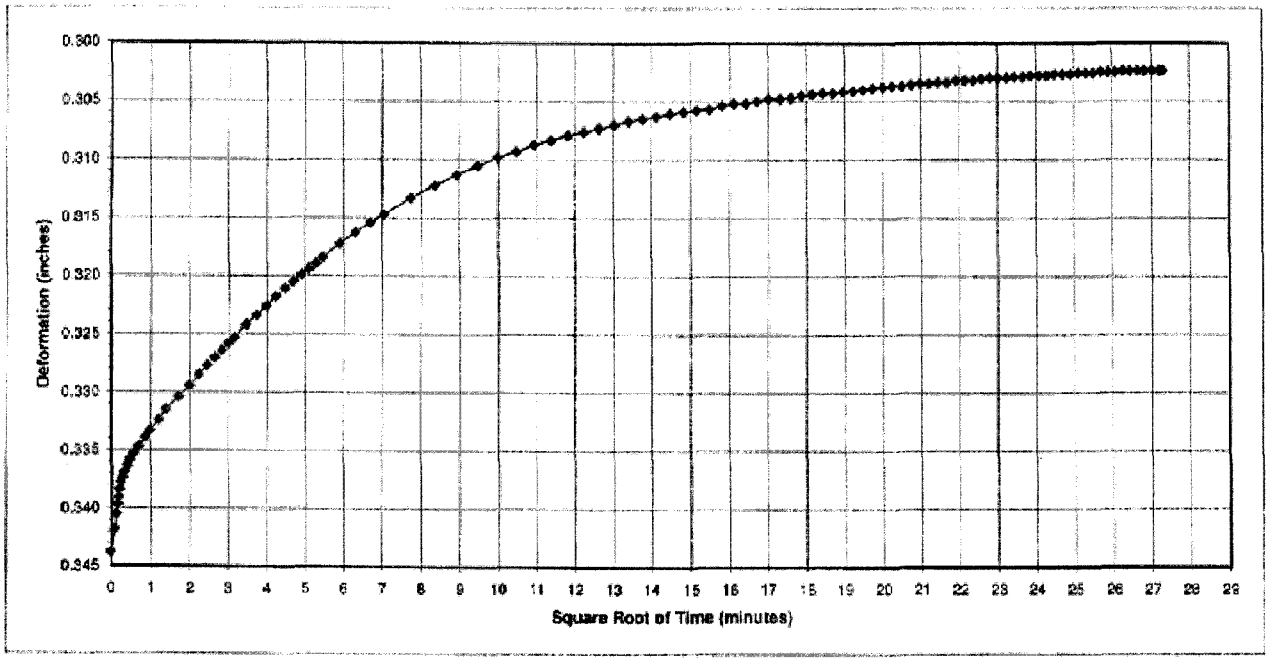
1-D CONSOLIDATION TIME-DEFORMATION CURVES

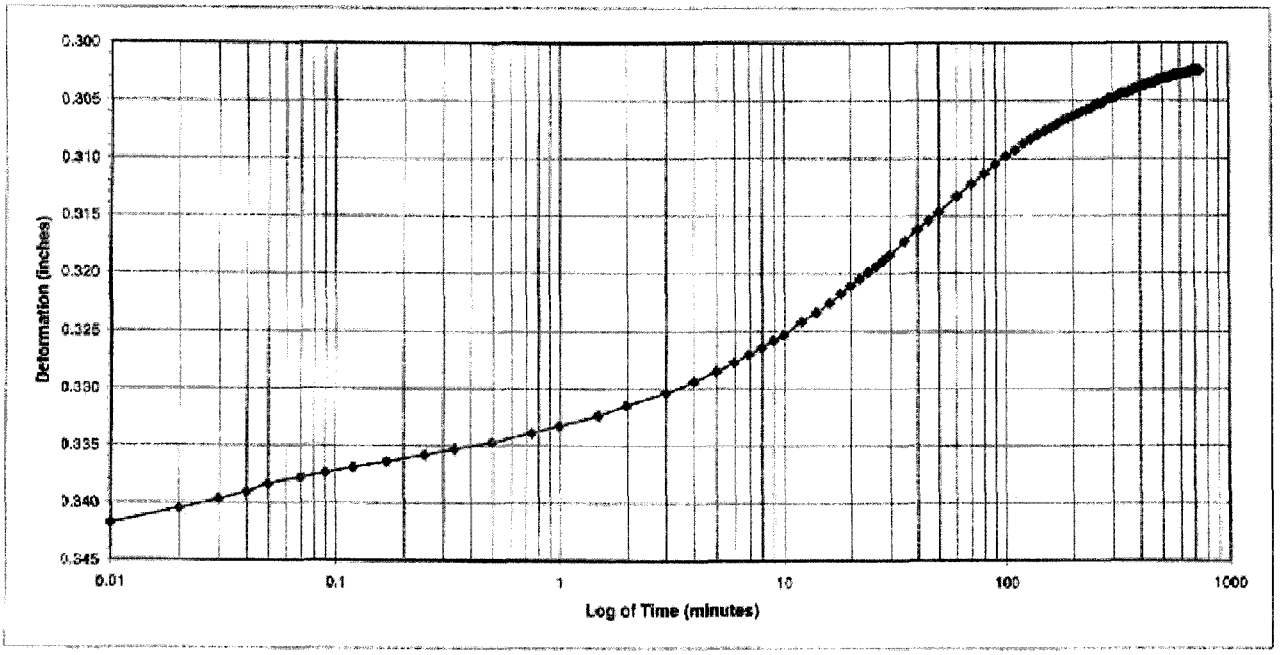
Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

X:\LB\Job Files\1081-10\LB2739 - Cranston Mill Pond\B2 15 to 17 ft Consolidation Time Plots - 17104.xls]Load Increment 5

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Unload = 1 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Unload = 1 tsf



Sample No.: McKinney B-2 15 ft
Exploration No.: B-2
Depth: 15 to 17 feet

UNLOAD

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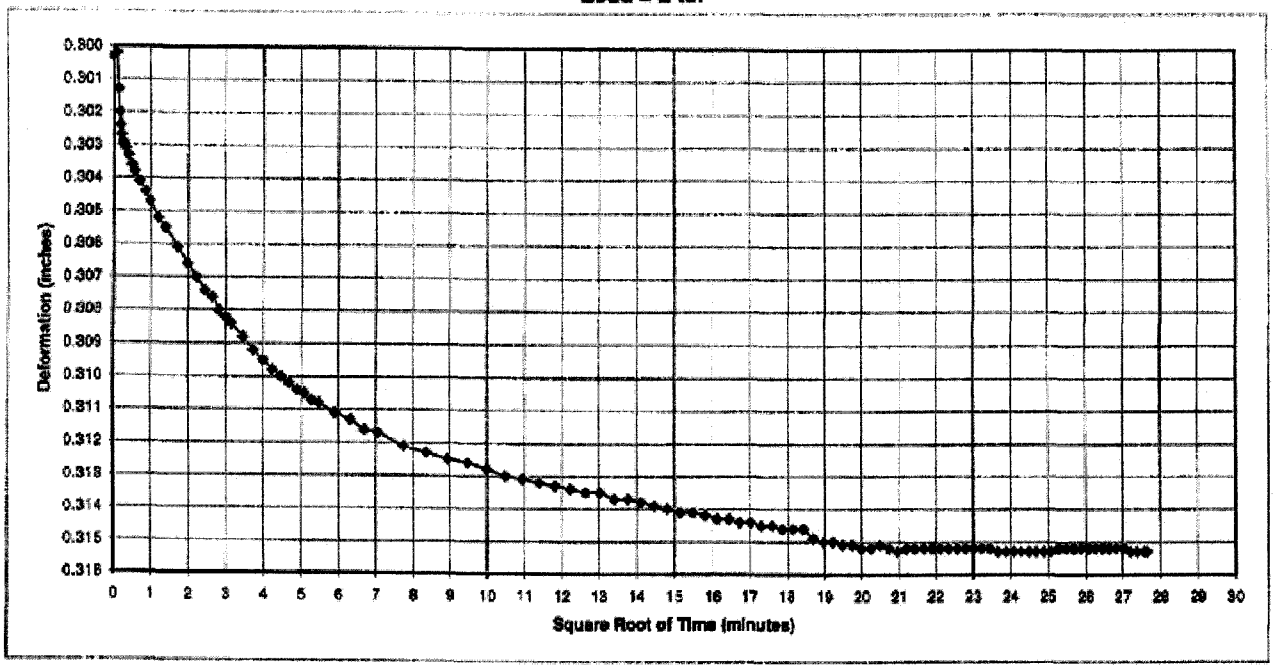
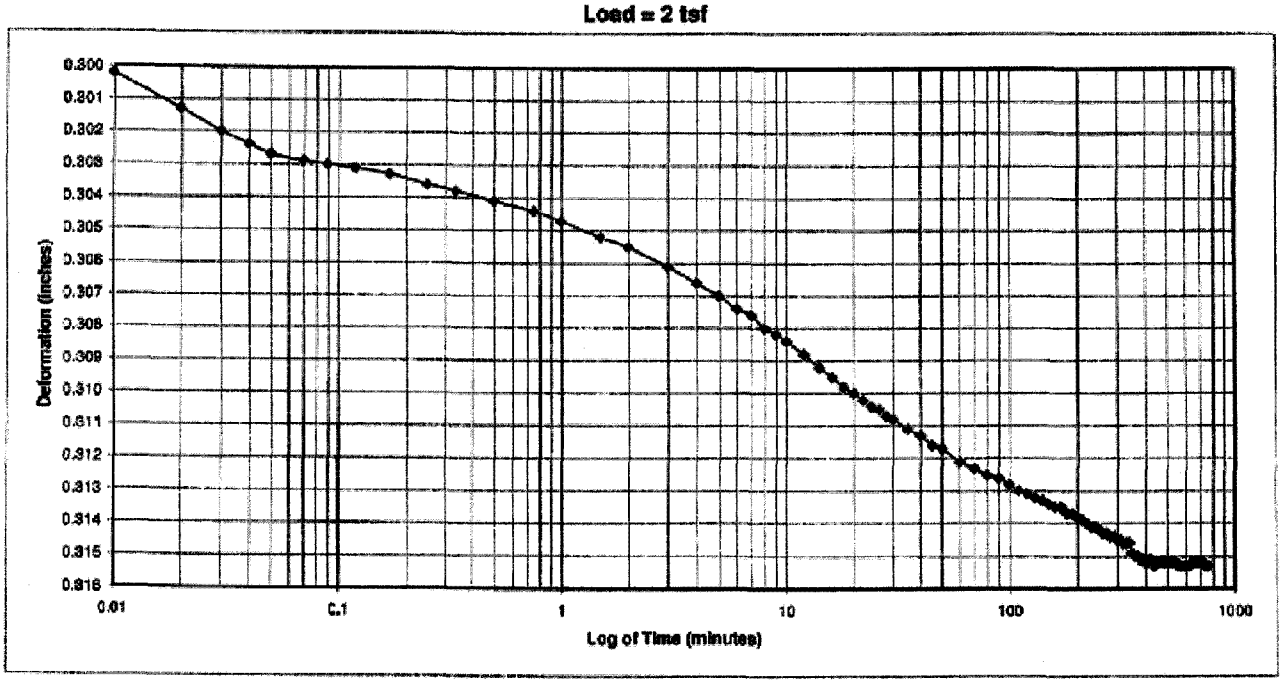
1-D CONSOLIDATION TIME-DEFORMATION CURVES

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 2 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 2 tsf



Sample No.: McKinney B-2 15 ft
Exploration No.: B-2
Depth: 15 to 17 feet

UNLOAD

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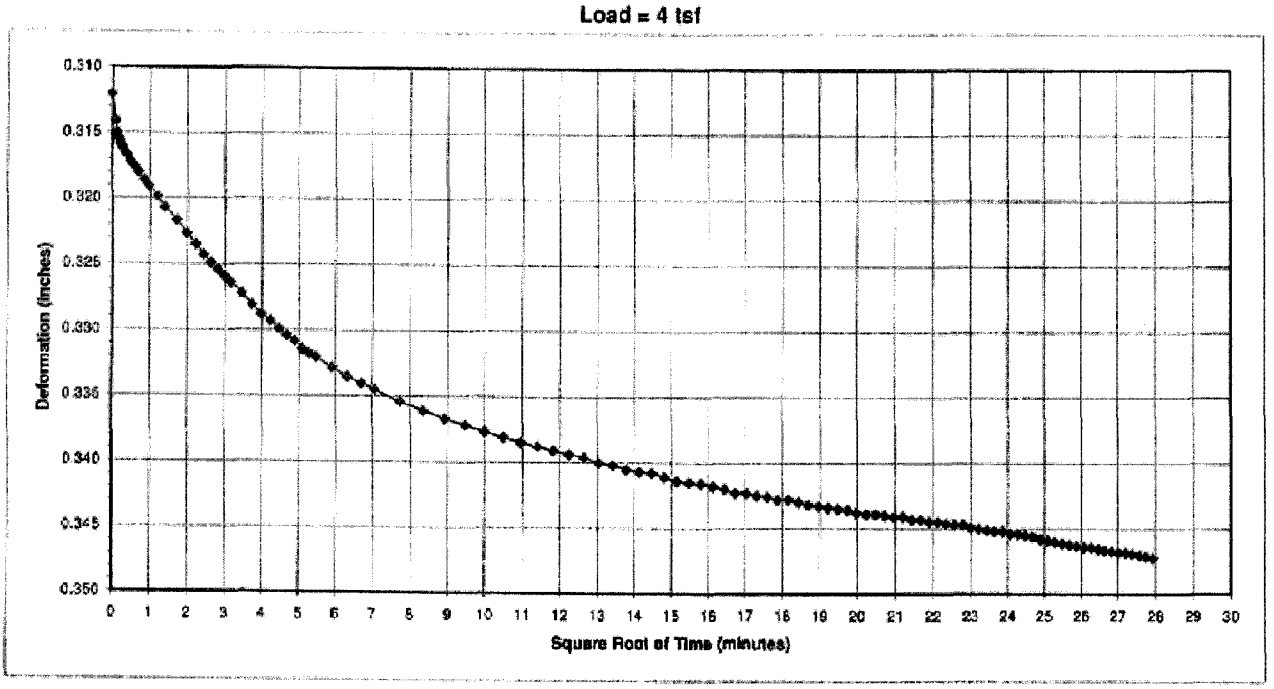
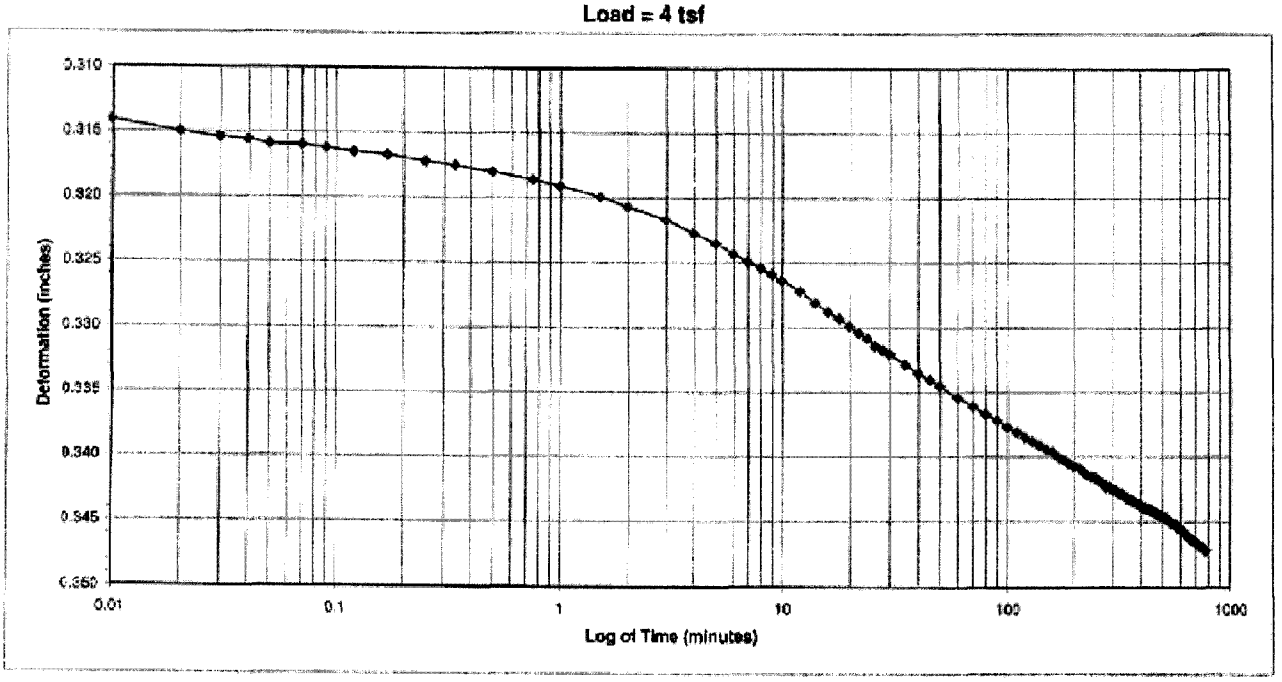
1-D CONSOLIDATION TIME-DEFORMATION CURVES

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 4 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 4 tsf



Sample No.: McKinney B-2 15 ft
Exploration No.: B-2
Depth: 15 to 17 feet

RELOAD

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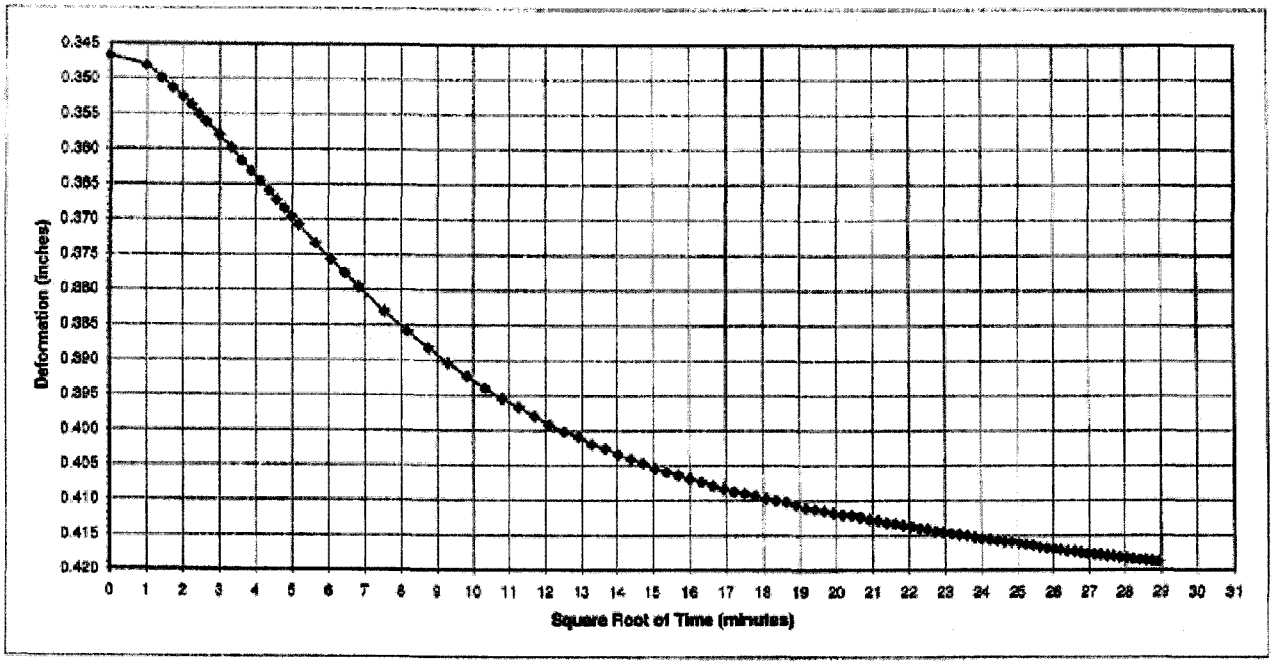
1-D CONSOLIDATION TIME-DEFORMATION CURVES

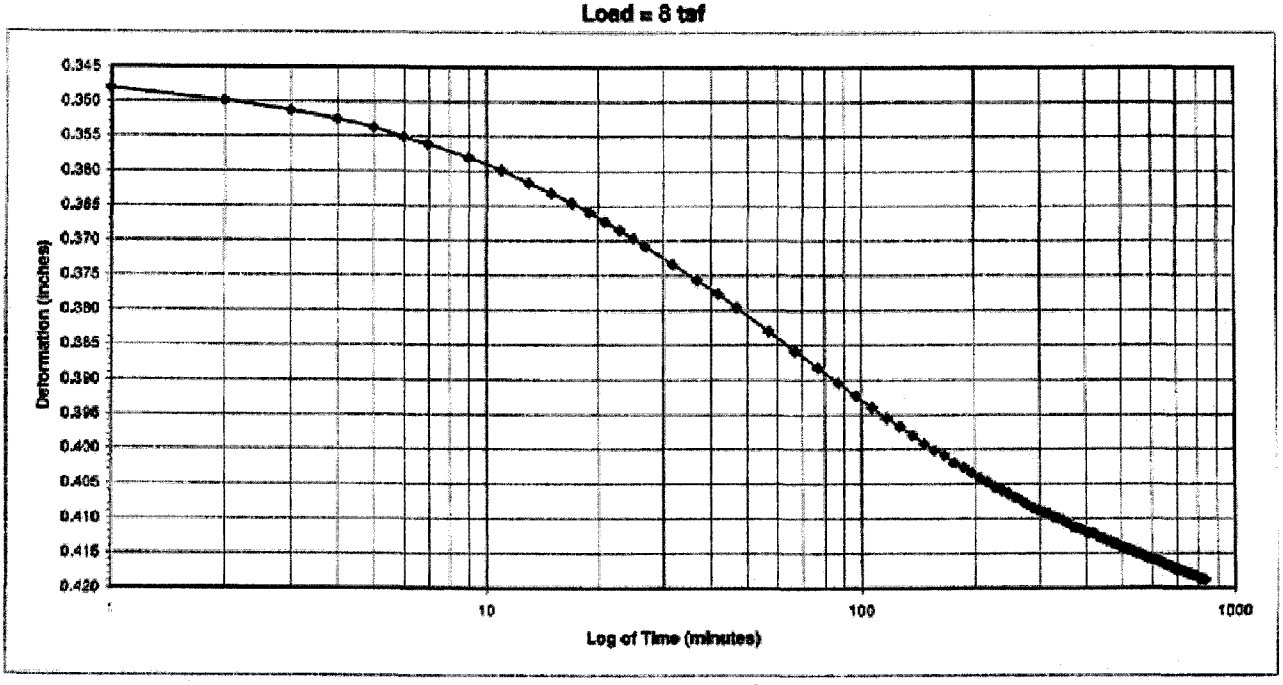
Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

X:\LB\Job Files\1081-10\LB2739 - Cranston Mill Pond\[B2 15 to 17 ft Consolidation Time Plots - 17104.xls]Load Increment 8

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Load = 8 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Load = 8 tsf



Sample No.:	McKinney B-2 15 ft	C_K = 0.022
Exploration No.:	B-2	EOP = 340 min
Depth:	15 to 17 feet	

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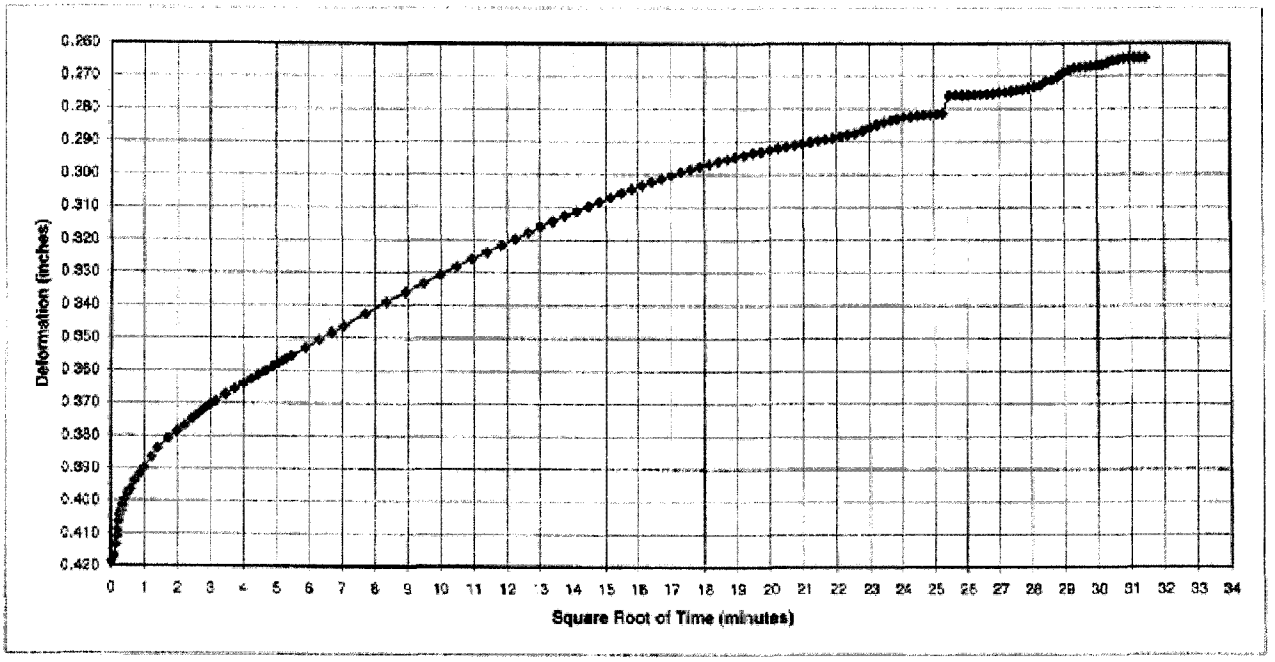
1-D CONSOLIDATION TIME-DEFORMATION CURVES

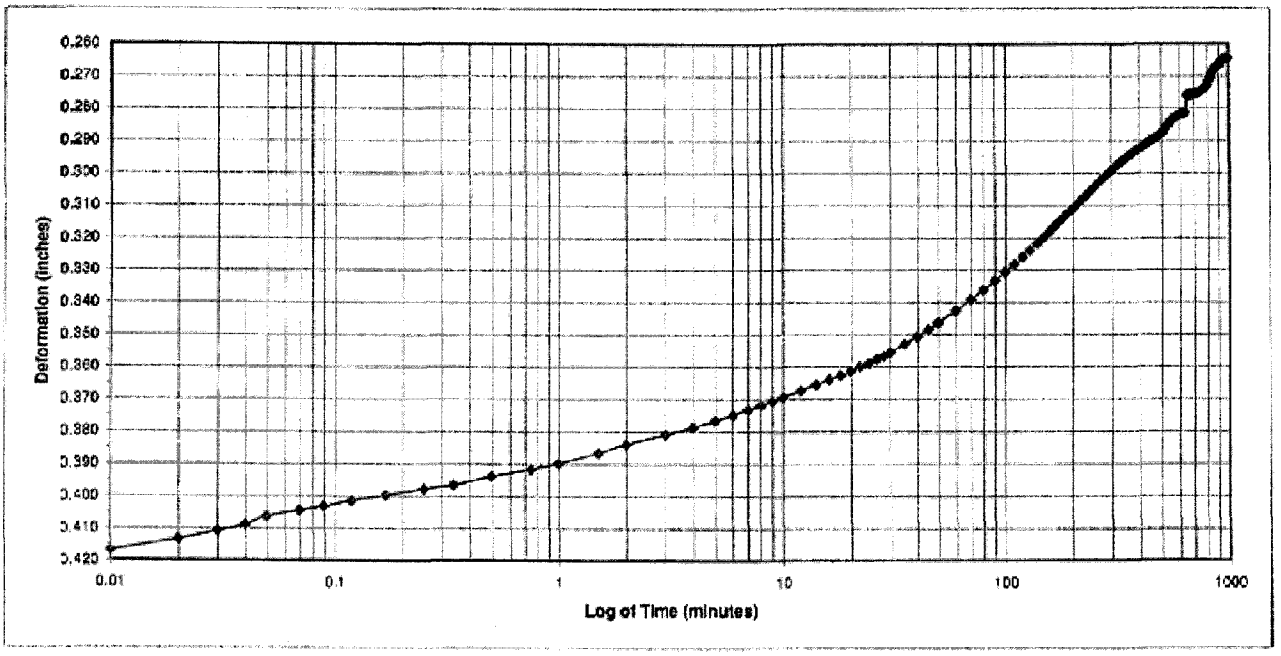
Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

X:\LB\Job Files\1081-10\LB2739 - Cranston Mill Pond\[B2 15 to 17 ft Consolidation Time Plots - 17104.xls]Load Increment 8

DEFORMATION VS. SQUARE ROOT OF TIME
B-2, 15 to 17 feet
Unload = 0.25 tsf



DEFORMATION VS. LOG OF TIME
B-2, 15 to 17 feet
Unload = 0.25 tsf



Sample No.: McKinney B-2 15 ft
Exploration No.: B-2
Depth: 15 to 17 feet

UNLOAD

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1-D CONSOLIDATION TIME-DEFORMATION CURVES

Project:	Cranston Mill Pond
Client:	Cranston Mill Pond, LLC
Location:	James City County, Virginia
Project No.:	1081-10-2739

Environmental Division
NOV 30 2010
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ATTACHMENT 4

Stability Calculations

McKINNEY & COMPANY

MAIN OFFICE
100 South Railroad Ave.
Ashland, Virginia 23005
(804) 798-1451
(804) 798-7072 facsimile

WILLIAMSBURG
460 McLaws Circle, Suite 150
Williamsburg, Va. 23185
(757) 220-5400
(757) 229-6301 facsimile

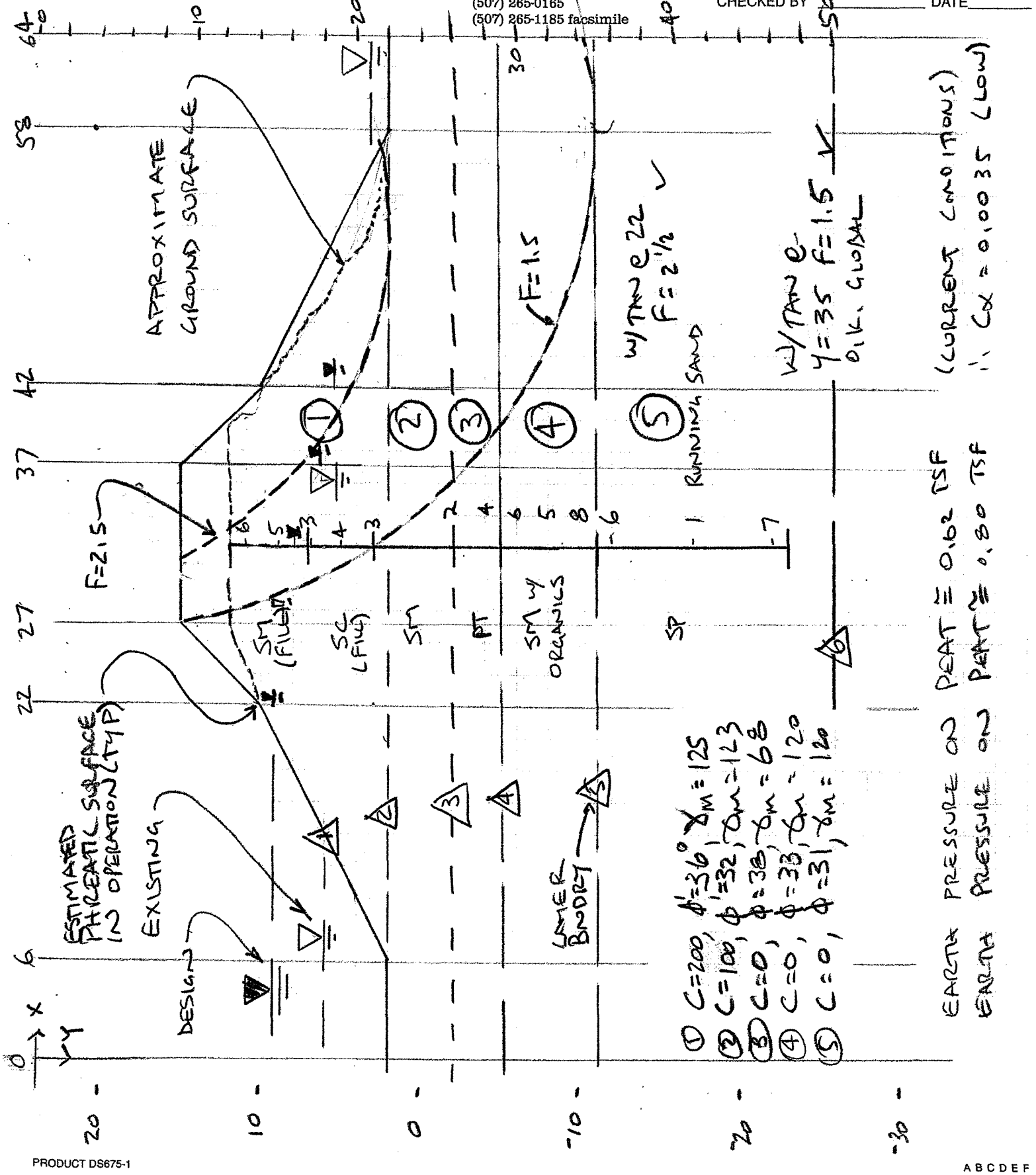
PANAMA
McKinney Internacional
Torre ADR
Ave. Samuel Lewis y calle 58
Piso 12, oficina 12-C
Panamá, Republica de Panamá
(507) 265-0165
(507) 265-1185 facsimile

PROJECT 14752A09

SHEET NO. 1 OF 1

CALCULATED BY GJ DATE 5/26/

CHECKED BY — DATE —



1Program STABR -- Version 2.84 (MS-DOS)

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0cranston's mill pond downstream slope stability
0CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	1
NUMBER OF VERTICAL SECTIONS	8
NUMBER OF SOIL LAYER BOUNDARIES	6
NUMBER OF PORE PRESSURE LINES	1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

0SEISMIC COEFFICIENT S1,S2 = .00, .00
0UNIT WEIGHT OF WATER = 62.40
0 SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (50.0, .0) WITH FINAL GRID OF 1.0
0ALL CIRCLES TANGENT TO DEPTH, 22.0,
0GEOMETRY

0 SECTIONS	.0	6.0	22.0	27.0	37.0	42.0	58.0	64.0
T. CRACKS	22.0	22.0	14.0	9.0	9.0	14.0	22.0	22.0
W IN CRACK	22.0	22.0	14.0	9.0	9.0	14.0	22.0	22.0
BOUNDARY 1	22.0	22.0	14.0	9.0	9.0	14.0	22.0	22.0
BOUNDARY 2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
BOUNDARY 3	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
BOUNDARY 4	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
BOUNDARY 5	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
BOUNDARY 6	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0

0SOIL PROPERTIES

0 LAYER	COHESION	FRICTION ANGLE	DENSITY
1	200.0	36.0	125.0
2	100.0	32.0	123.0
3	.0	38.0	68.0
4	.0	33.0	120.0
5	.0	31.0	120.0

0PORE PRESSURE DATA
COORDINATES OF EQUI-PRESSURE LINES

0 SECTIONS	.0	6.0	22.0	27.0	37.0	42.0	58.0	64.0
LINE 1	15.0	15.0	15.0	15.5	17.5	18.5	21.0	21.0

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0cranston's mill pond downstream slope stability

0NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	22.0	22.0	50.0	.0	2.518	2.348
2	22.0	22.0	48.0	.0	2.638	2.445
3	22.0	24.0	50.0	-2.0	2.541	2.387
4	22.0	22.0	52.0	.0	2.473	2.323
5	22.0	20.0	50.0	2.0	2.511	2.323
6	22.0	22.0	51.0	.0	2.484	2.325
7	22.0	23.0	52.0	-1.0	2.471	2.328
8	22.0	22.0	53.0	.0	2.490	2.348
9	22.0	21.0	52.0	1.0	2.482	2.324
10	22.0	23.0	51.0	-1.0	2.490	2.338
11	22.0	24.0	52.0	-2.0	2.474	2.338
12	22.0	23.0	53.0	-1.0	2.477	2.342
13	22.0	24.0	51.0	-2.0	2.499	2.354
14	22.0	24.0	53.0	-2.0	2.471	2.343
15	22.0	22.0	53.0	.0	2.490	2.348
16	22.0	22.0	51.0	.0	2.484	2.325

0F.S. MINIMUM= 2.471 FOR THE CIRCLE OF CENTER (52.0, -1.0)

```
1Program STABR -- Version 2.84 (MS-DOS)

0        BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0cranston's mill pond downstream slope stability
0CONTROL DATA
      NUMBER OF SPECIFIED CENTERS                    1
      NUMBER OF DEPTH LIMITING TANGENTS              1
      NUMBER OF VERTICAL SECTIONS                    8
      NUMBER OF SOIL LAYER BOUNDARIES                6
      NUMBER OF PORE PRESSURE LINES                  1
      NUMBER OF POINTS DEFINING COHESION PROFILE     0
0SEISMIC COEFFICIENT S1,S2    =    .00,  .00
0UNIT WEIGHT OF WATER         =       62.40
0SPECIFIED CENTER (X,Y)
0     (  58.0   3.6)   (
0ALL CIRCLES TANGENT TO DEPTH,  35.0,
0GEOMETRY
0    SECTIONS       .0   6.0  22.0  27.0  37.0  42.0  58.0  64.0

     T. CRACKS    22.0  22.0  14.0   9.0   9.0  14.0  22.0  22.0
     W IN CRACK   22.0  22.0  14.0   9.0   9.0  14.0  22.0  22.0
     BOUNDARY 1   22.0  22.0  14.0   9.0   9.0  14.0  22.0  22.0
     BOUNDARY 2   22.0  22.0  22.0  22.0  22.0  22.0  22.0  22.0
     BOUNDARY 3   26.0  26.0  26.0  26.0  26.0  26.0  26.0  26.0
     BOUNDARY 4   29.0  29.0  29.0  29.0  29.0  29.0  29.0  29.0
     BOUNDARY 5   35.0  35.0  35.0  35.0  35.0  35.0  35.0  35.0
     BOUNDARY 6   50.0  50.0  50.0  50.0  50.0  50.0  50.0  50.0
0SOIL PROPERTIES
0      LAYER          COHESION   FRICTION ANGLE     DENSITY
        1             200.0           36.0          125.0
        2             100.0           32.0          123.0
        3                .0           38.0           68.0
        4                .0           33.0          120.0
        5                .0           31.0          120.0
0PORE PRESSURE DATA
      COORDINATES OF EQUI-PRESSURE LINES
0     SECTIONS       .0   6.0  22.0  27.0  37.0  42.0  58.0  64.0
      LINE  1      15.0  15.0  15.0  15.5  17.5  18.5  21.0  21.0
0        BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0cranston's mill pond downstream slope stability
0NUMBER  TANGENT  RADIUS   (X) CENTER  (Y) CENTER   FS(BISHOP)  FS(OMS)

    1     35.0     31.4        58.0         3.6       1.543      1.114

□0           31.0          120.0
0PORE PRESSURE DATA
      COORDINATES OF EQUI-PRESSURE LINES
0     SECTIONS       .0   6.0  22.0  27.0  37.0  42.0  58.0  64.0
      LINE  1      15.0  15.0  15.0  15.5  17.5  18.5  21.0  21.0
0        BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0cranston's mill pond downstream slope stability
0NUMBER  TANGENT  RADIUS   (X) CENTER  (Y) CENT
```

McKINNEY & COMPANY

Planning | Design | Construction

June 8, 2010

Attn: Brent Fults
Cranston's Mill Pond, L.L.C.
c/o EarthSource Solutions, Inc.
5735 South Laburnum Ave.
Richmond, Virginia 23231

Environmental Division

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Re: Geotechnical Engineering Supplement
Proposed Reconstruction of Cranston's Mill Pond
James City County, Virginia
McKinney Project 14752A09

Dear Mr. Fults:

This letter transmits supplemental information on the proposed reconstruction of Cranston's Mill Pond. Please refer to our geotechnical engineering study dated May 27, 2010 for our original project description, scope of work, exploration program and recommendations.

EMBANKMENT DAM SEEPAGE EVALUATION

Figure 1 (attached) presents the design embankment case and our flow net evaluation for seepage through Cranston's Mill Pond. By constructing a flow net, we were able to show that the anticipated seepage through the embankment, under normal pool design would result in about 1.4 cubic feet of water per day per linear foot of embankment. We also used the flow net to show a discharge gradient of 0.76, which provides a safety factor of 1.5 against the critical gradient for piping failure.

Our geotechnical engineering study dated May 27, 2010, the supplemental evaluation presented in this letter and the history of the embankment's performance over the last 100 years shows that once the threat of overtopping is addressed via increased crest elevation and greater spillway capacity, the embankment dam is well suited for long-term performance.

We appreciate our involvement in this project. If there are any questions, please call.

Sincerely yours,

McKINNEY AND COMPANY

Carl P. Benson, C.P.G., P.E.
Manager - Geotechnical & Environmental Services

COMMONWEALTH OF VIRGINIA
CARL P. BENSON
Lic. No. 021962
6/8/10
PROFESSIONAL ENGINEER

CPB/cgs

Attachments: Figure 1 – Seepage Analysis

c: Paul Hinson, P.E. – Koontz-Bryant

$S = \frac{N_f}{N_e} = \frac{3}{6.6} = 0.45$

$q = k H S$

$H = 9\frac{1}{2} - 4 = 5\frac{1}{2}$

$k = 2 \times 10^{-4} \frac{cm}{sec} = 0.57 \frac{ft}{day}$

$q = 0.57(5\frac{1}{2})(0.45)$

$q = 1.41 \frac{ft^3}{d}/lf$

FOR "L" = 1,000 lf

$Q = 1,410 \frac{ft^3}{d}$

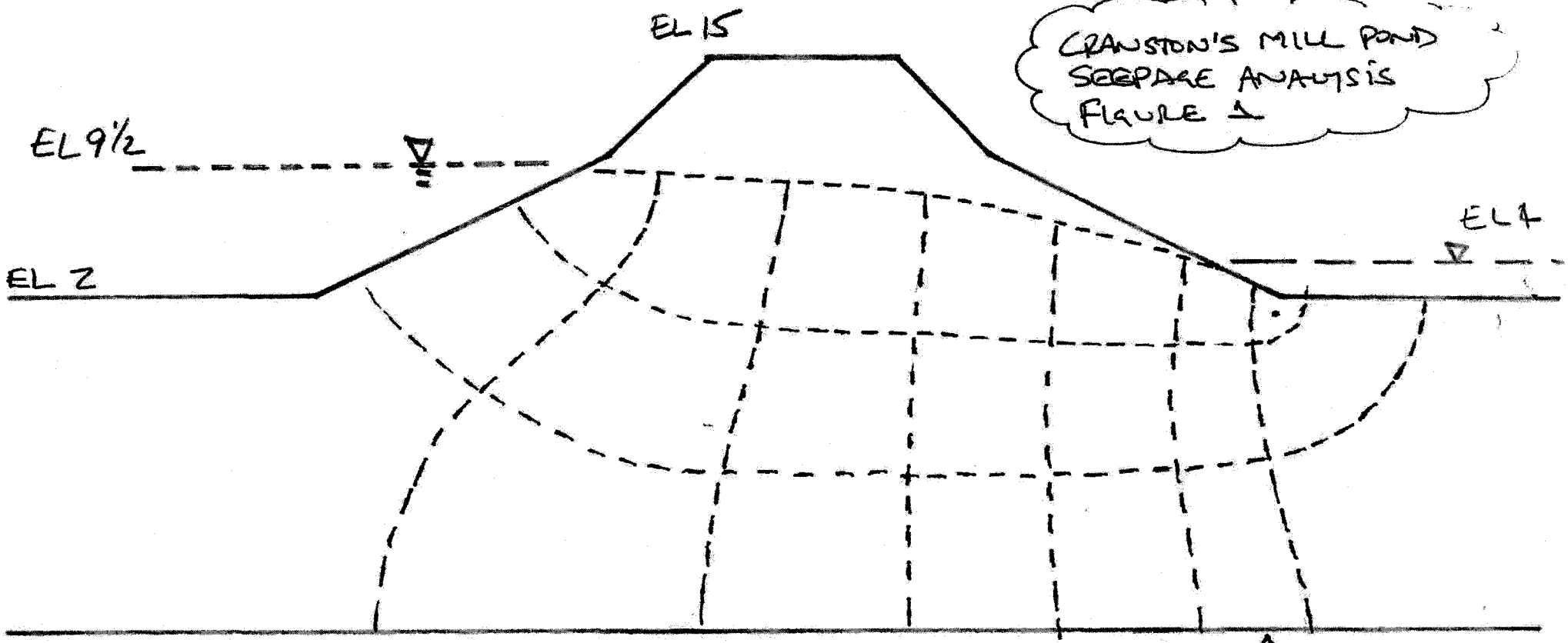
$i = \frac{H/n_e}{L}$

$i = \frac{5.5/6.6}{1.1} = 0.76$

$i_c = \frac{\gamma_b}{\gamma_w} = \frac{\gamma_s - \gamma_w}{\gamma_w} = \frac{134 - 62.4}{62.4} = 1.15$

$F = \frac{1.15}{0.76} = 1.5$

CRANSTON'S MILL POND
SEEPAGE ANALYSIS
FIGURE 1



1" = 8' 14752-09
CJS
6/8/10

FLOW NET SHOWING GRAPHIC SOLUTION TO LAPLACE TRANSFORMATION OF 2ND ORDER NON-HOMOGENEOUS DIFF. EQN.

PARTIAL DROP (0.6)

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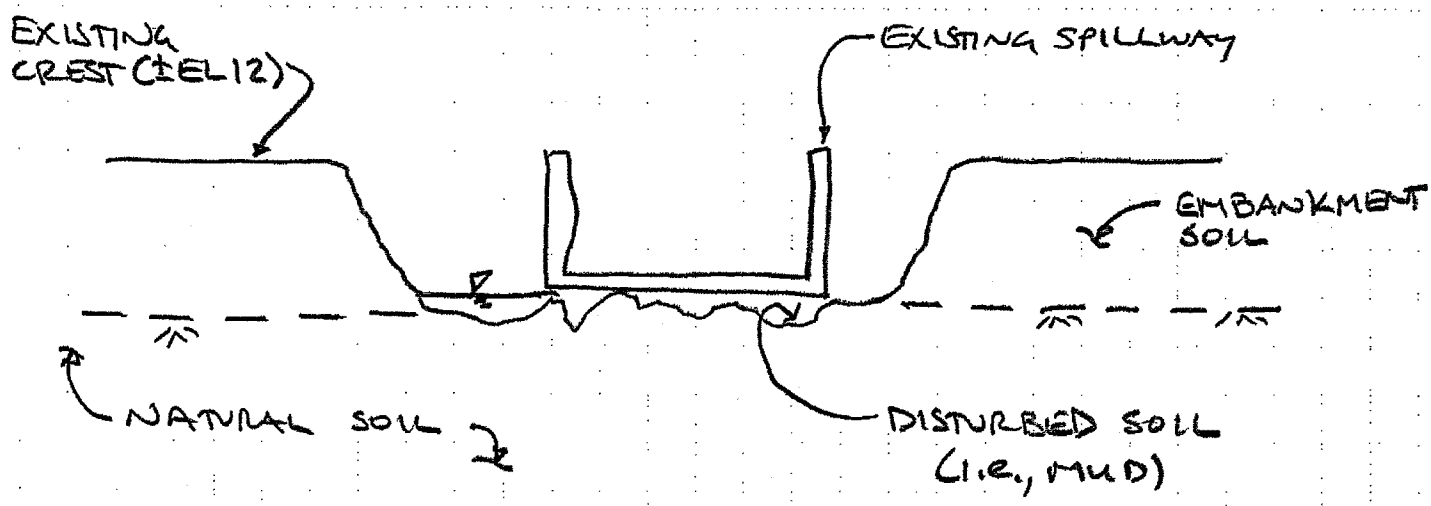
McKinney Internacional
Calle Aquilino de la Guardia
Torre Banco General, Piso II
Panamá, Republica de Panamá
(507) 265-0165
(507) 265-1185 facsimile

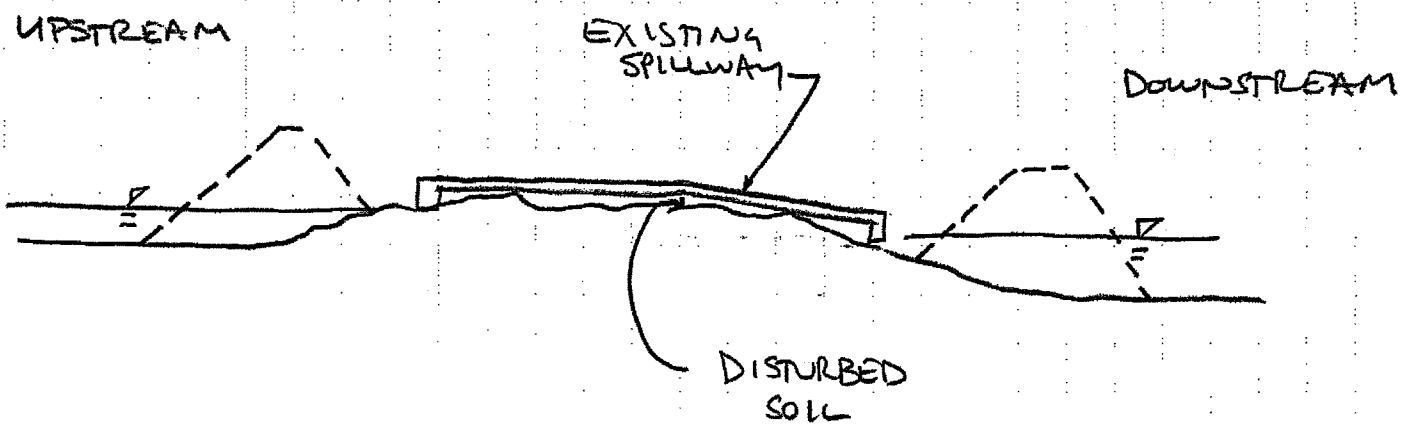
PROJECT _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____





1) CONSTRUCT COFFERDAM
2) REMOVE EXISTING SPILLWAY
3) DEWATER WORK AREA AND REMOVE DISTURBED SOIL
4) PLACE COMPACTED STRUCTURAL FILL TO 95% RELATIVE COMPACTION
5) BENCH (KEY) IN NEW FILL TO EXISTING EMBANKMENT
6) PROVIDE TOE DRAIN AS SHOWN

McKINNEY & COMPANY

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100 South Railroad Ave.
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(804) 798-7072 facsimile

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(507) 265-0165
(507) 265-1185 facsimile

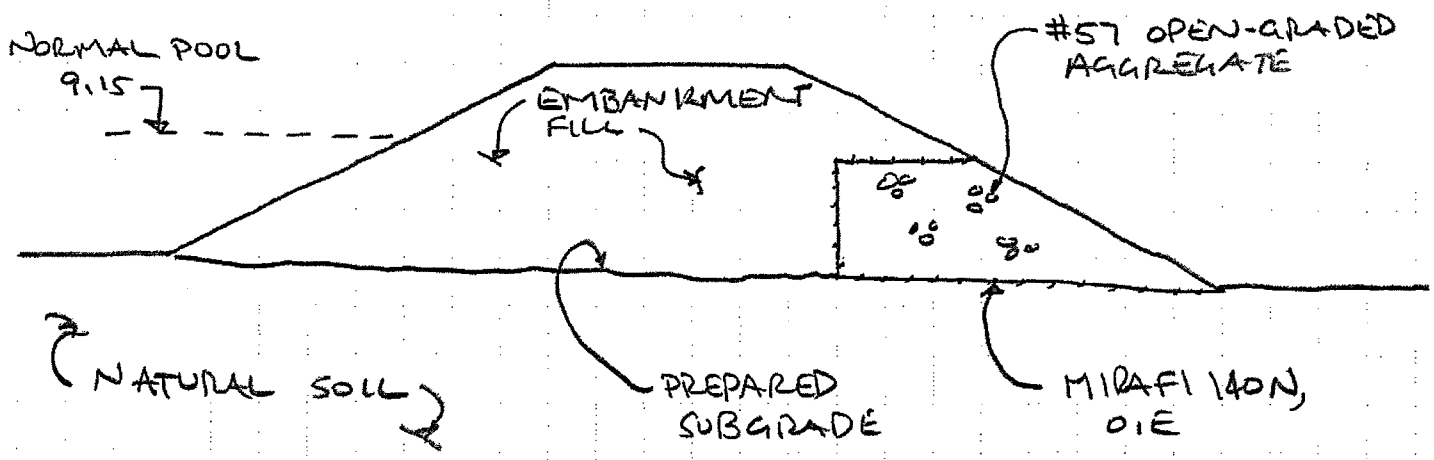
PROJECT _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

EXISTING SPILLWAY INFILL



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III. Incremental Damage Analysis.....4

IV. Hydraulics Summary.....4

V. Conclusions.....5

TECHNICAL APPENDIX

Appendix A: Excerpts from the Yarmouth Creek Watershed Plan & Memorandum

Appendix B: Soils Maps, Data and Aerial Photography

Appendix C: NRCS (SCS) Rainfall Distributions

Appendix D: Point Precipitation Frequency Estimates from NOAA Atlas 14

Appendix E: Excerpts from HMR 51

Appendix F: TR-55 Calculations

Appendix G: HEC-HMS Results

Appendix H: Cranston's Mill Pond Road Culvert Calculations

Appendix I: HEC-RAS Results

Appendix J: Flood Wave Travel Time & Depth Calculations

Appendix K: Dam Break Inundation Map

I. Objective

KOONTZ-BRYANT, P.C.
Site Development Solutions

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HYDROLOGY AND HYDRAULICS REPORT

CRANSTON'S MILL POND DAM ALTERATION

PREPARED FOR:

Steve Snell, P.E.
Regional Engineer
Virginia Department of Conservation and Recreation
Dam Safety & Floodplain Management
203 Governor Street, Ste 206
Richmond, VA 23219

PREPARED BY:

Koontz-Bryant, P.C.
1703 N. Parham Road
Suite 100
Richmond, Virginia 23229

June 14, 2010
Revised June 24, 2010
Revised August 20, 2010

Prepared by: Jonathan Murray, EIT
JN: 09114-002-00

APPENDIX A

Excerpts from the Yarmouth Creek Watershed Plan and Memorandum

surface elevations. Cross section data was developed from James City County GIS contour data. Cranston's Mill Pond road was modeled along with the culverts in HEC-RAS. The resulting water surface elevations were plotted on the dam break inundation map to be used for emergency evacuation.

V. Conclusions

There are no downstream residential or commercial structures, public utilities, major roadways, railroads, or agricultural interests within the dam break inundation zone. The secondary roadway, Cranston's Mill Pond Road, is the only public facility that will be affected by flooding. Although this makes Cranston's Mill Pond dam a significant hazard class dam, based on the incremental damage analysis the spillway design flood has been reduced to the 100-year storm.

Conservative assumptions were made throughout the hydrologic calculations and the worst case sections were analyzed for downstream flooding. The dam alterations as designed will provide adequate storage, detention and outflow to meet dam safety regulations and safely pass the spillway design flood.

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YARMOUTH CREEK WATERSHEDPLAN

Draft Report

Prepared for:
James City County, Virginia

Prepared by:
Center for Watershed Protection
8391 Main Street
Ellicott City, MD 21043
www.cwp.org

CENTER FOR WATERSHED PROTECTION

April 30, 2003

Foreword

The Yarmouth Creek Watershed Plan is the culmination of a year and a half process led by the Center for Watershed Protection that began in the summer of 2001 with initial mapping and existing data collection. That work was followed in the fall by fieldwork that included a stream assessment, a conservation area assessment and a brief stormwater survey. The *Baseline Assessment* was completed in January 2002, followed by a stakeholder meeting coordinated with the James River Association and James City County on the initial findings in early February. The *Conservation Area Report for Yarmouth Creek* was completed in June 2002 and the *Technical Memo on the Reduced Freshwater Flow in Yarmouth Creek* was produced in July 2002. A second stakeholder meeting occurred in September in which stakeholders helped craft goals for the overall plan. This initial draft for the final watershed plan was completed in January 2003.

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This report is intended to provide documentation of the means and methods as well the assumptions that were used in the development of the hydrologic and hydraulic models which were used to design the alterations of the Cranston's Mill Pond dam. A detailed technical appendix has been provided at the end of this report which includes design parameters and calculations.

II. Hydrology Summary

The basis of all hydrology used in this project was developed from an existing publication, the Yarmouth Creek Watershed Plan by the Center for Watershed Protection. The plan broke the Yarmouth Creek watershed into 9 sub watersheds, 5 of which are the drainage area to Cranston's Mill Pond. A memorandum was written in February 2009 by Michael Woolson, Senior Watershed Planner, updating the impervious cover estimates provided in the original 2003 report. We utilized the impervious area data from this memo, drainage areas and sub watershed descriptions from the original watershed plan, as well as soils data to develop our drainage areas and CN values which were used in both the HEC-HMS model and our TR-55 calculations.

IMPLIES THAT #'S USED ARE UPDATED

Aerial photography and GIS data were used in developing the TC values used in the HEC-HMS model and TR-55 calculations. Soils information was obtained from the NRCS Web Soil Survey. Due to the relatively low values of impervious areas within the watershed and the disconnected nature of the developed areas, Figure 2-4 from the TR-55 Manual was used in conjunction with the soil types to develop the curve numbers for the individual sub watersheds. A conservative assumption of 25% was used for the ratio of unconnected to total impervious area. The pervious area CN was calculated based upon a weighted curve number based upon percent of each soil type within the sub basin for open space in good condition. Type B, C and D soils were present in the basins in varying percentages. Several complex soils were present where the SCS soil type was not available. Complex soils with slopes from 0 to 2% were assigned soil type D. Complex soils with slopes from 2 to 6% slopes were assigned soil type B. Complex soils with slopes greater than 6% were assigned soil type C. Water and urban land were identified as type D soils as well.

A 9.12" 100-year 24 hour rainfall event was used for the design flood. In order to provide 6, 12, and 24 hour storm calculations it was necessary to utilize the Point Precipitation Frequency Estimates from NOAA Atlas 14. The PMF was determined using the rainfall charts in HMR No. 51 by NOAA.

A SCS type II unit hydrograph was used to create the rainfall distributions cumulative precipitation for each storm event which was entered into HEC-HMS as a specified hyetograph. Each sub watershed was entered separately with its own CN value. TC values were applied as determined in the TR-55 calculations.

The proposed dam was modeled including the proposed primary spillways and one emergency spillway. It was assumed that a future breach would occur approximately the same as it had in the past at this dam. The existing breach is approximately 30 feet wide with 1:1 side slopes. It was assumed that an overtopping breach would occur when the water surface elevation reached one foot above the top of the dam. A piping breach was assumed to occur when the dam was under the most strain just before the peak elevation reached in the design storm. Lastly, it was assumed that the piping breach would take longer to develop than overtopping and 2 hours and 1 hour were utilized respectively for development times.

There are three 21" low level drains included in the proposed design, however, all routing starts at the normal pool elevation of 9.15' and does not take into account any flow from the drains. If adequate warning of a major storm event is available the low level drains may be used to mitigate damages and flooding to less than what is shown in this model.

The 24-hour 100-year storm was used as the design flood because it produced the highest peak pond elevation out of the 6, 12, and 24 hour storms. The 12-hour PMF was used for inundation mapping because it produced the highest peak outflow out of the 6, 12, and 24 hour PMF events.

III. Incremental Damage Analysis

A culvert analysis was performed at the set of four culverts under Cranston's Mill Pond Road downstream from Cranston's Mill Pond dam. The analysis determined that the roadway starts to overtop in very minor storms. The 100-year failure outflow from the spillway is such a high magnitude larger than the maximum the culverts can carry (approximately 3%) no further increase in flow above the 100-year storm could pose any additional threat. During the 100-year failure event the depth of water over the roadway is approximately 6.0 feet. Cranston's Mill Pond Road is the only potential downstream threat to a flood at this location; therefore, the spillway design flood has been reduced to the minimum threshold of the 100-year storm rather than the half PMF which is typically required for significant hazard class dams. The roadway below the dam is the reason that the hazard classification is significant. There are no structures or houses within the inundation zone.

IV. Hydraulics Summary

HEC-RAS was used to model the downstream inundation resulting from a sunny day failure, spillway design flood with failure, spillway design flood without failure, and probable maximum flood with failure. Outflows were entered from the HEC-HMS results and routed through a series of cross sections downstream. Cross sections were chosen at pinch points in order to be conservative and produce the highest water

Map Unit Legend

James City and York Counties and the City of Williamsburg, Virginia (VA695)				SCS Group
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
10B	Craven fine sandy loam, 2 to 6 percent slopes	8.5	1.0%	B
11B	Craven-Uchee complex, 2 to 6 percent slopes	1.4	0.2%	B
11C	Craven-Uchee complex, 6 to 10 percent slopes	217.7	26.3%	C
14B	Emporia fine sandy loam, 2 to 6 percent slopes	15.9	1.9%	B
15D	Emporia complex, 10 to 15 percent slopes	7.7	0.9%	C
15E	Emporia complex, 15 to 25 percent slopes	23.2	2.8%	C
15F	Emporia complex, 25 to 50 percent slopes	196.2	23.7%	C
17	Johnston complex	48.7	5.9%	D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	23.7	2.9%	B
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	103.7	12.5%	B
20B	Kenansville loamy fine sand, 2 to 6 percent slopes	10.9	1.3%	B
29A	Slagle fine sandy loam, 0 to 2 percent slopes	10.5	1.3%	D
29B	Slagle fine sandy loam, 2 to 6 percent slopes	89.3	10.8%	B
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	56.7	6.8%	B
34B	Uchee loamy fine sand, 2 to 6 percent slopes	14.6	1.8%	B
Totals for Area of Interest		828.5	100.0%	

Pervious CN_S B = 61 C = 74 D = 80

Pervious $CN_W = (39.2\%)(61) + (52.8\%)(74) + (8\%)(80)$

$= 69$

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Map Unit Legend

James City and York Counties and the City of Williamsburg, Virginia (VA695)				SCS Group
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
8B	Caroline fine sandy loam, 2 to 6 percent slopes	0.8	0.1%	B
10C	Craven fine sandy loam, 6 to 10 percent slopes	5.8	0.8%	C
11B	Craven-Uchee complex, 2 to 6 percent slopes	5.9	0.9%	B
11C	Craven-Uchee complex, 6 to 10 percent slopes	115.9	16.8%	C
14B	Emporia fine sandy loam, 2 to 6 percent slopes	30.7	4.5%	B
14C	Emporia fine sandy loam, 6 to 10 percent slopes	11.5	1.7%	C
15D	Emporia complex, 10 to 15 percent slopes	29.7	4.3%	C
15E	Emporia complex, 15 to 25 percent slopes	52.0	7.5%	C
15F	Emporia complex, 25 to 50 percent slopes	140.5	20.4%	C
17	Johnston complex	46.9	6.8%	D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	28.1	4.1%	B
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	90.5	13.1%	B
20B	Kenansville loamy fine sand, 2 to 6 percent slopes	29.8	4.3%	B
29A	Slagle fine sandy loam, 0 to 2 percent slopes	22.4	3.3%	D
29B	Slagle fine sandy loam, 2 to 6 percent slopes	24.6	3.6%	B
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	32.7	4.7%	B
34B	Uchee loamy fine sand, 2 to 6 percent slopes	15.9	2.3%	B
34C	Uchee loamy fine sand, 6 to 10 percent slopes	3.7	0.5%	C
W	Water	1.6	0.2%	D
Totals for Area of Interest		**689.1**	**100.0%**	

Pervious CN_s B = 61 C = 74 D = 80

Pervious CN_w = (37.6%)(61) + (52%)(74) + (10.4)(80)

= 70

Map Unit Legend

James City and York Counties and the City of Williamsburg, Virginia (VA695)				SCS Group
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
8B	Caroline fine sandy loam, 2 to 6 percent slopes	6.6	0.8%	B
10B	Craven fine sandy loam, 2 to 6 percent slopes	2.6	0.3%	B
11B	Craven-Uchee complex, 2 to 6 percent slopes	25.7	3.1%	B
11C	Craven-Uchee complex, 6 to 10 percent slopes	134.5	16.2%	C
14B	Emporia fine sandy loam, 2 to 6 percent slopes	27.5	3.3%	B
14C	Emporia fine sandy loam, 6 to 10 percent slopes	9.9	1.2%	C
15D	Emporia complex, 10 to 15 percent slopes	50.3	6.1%	C
15E	Emporia complex, 15 to 25 percent slopes	29.5	3.6%	C
15F	Emporia complex, 25 to 50 percent slopes	184.8	22.3%	C
17	Johnston complex	44.7	5.4%	D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	13.8	1.7%	B
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	63.4	7.6%	B
20B	Kenansville loamy fine sand, 2 to 6 percent slopes	116.1	14.0%	B
29A	Slagle fine sandy loam, 0 to 2 percent slopes	46.9	5.6%	D
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	11.2	1.3%	B
34B	Uchee loamy fine sand, 2 to 6 percent slopes	33.1	4.0%	B
34C	Uchee loamy fine sand, 6 to 10 percent slopes	29.6	3.6%	C
Totals for Area of Interest		830.1	100.0%	

Pervious CN's B = 61 C = 74 D = 80

Pervious CN_W = (36.1%)(61) + (53%)(74) + (10.9%)(80)

= 70

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Sub watershed 105

Map Unit Legend

James City and York Counties and the City of Williamsburg, Virginia (VA695)				SCS Group
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**	
8B	Caroline fine sandy loam, 2 to 6 percent slopes	14.0	1.4%	B
10B	Craven fine sandy loam, 2 to 6 percent slopes	12.7	1.3%	B
10C	Craven fine sandy loam, 6 to 10 percent slopes	14.8	1.5%	C
11B	Craven-Uchee complex, 2 to 6 percent slopes	22.6	2.3%	B
11C	Craven-Uchee complex, 6 to 10 percent slopes	175.1	17.6%	C
14B	Emporia fine sandy loam, 2 to 6 percent slopes	44.9	4.5%	B
14C	Emporia fine sandy loam, 6 to 10 percent slopes	44.0	4.4%	C
15D	Emporia complex, 10 to 15 percent slopes	77.8	7.8%	C
15E	Emporia complex, 15 to 25 percent slopes	38.7	3.9%	C
15F	Emporia complex, 25 to 50 percent slopes	238.3	24.0%	C
17	Johnston complex	53.2	5.4%	D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	15.5	1.6%	B
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	63.6	6.4%	B
20B	Kenansville loamy fine sand, 2 to 6 percent slopes	64.1	6.4%	B
29A	Slagle fine sandy loam, 0 to 2 percent slopes	45.4	4.6%	D
29B	Slagle fine sandy loam, 2 to 6 percent slopes	7.0	0.7%	B
34B	Uchee loamy fine sand, 2 to 6 percent slopes	29.9	3.0%	B
34C	Uchee loamy fine sand, 6 to 10 percent slopes	12.5	1.3%	C
37	Urban land	15.0	1.5%	D
W	Water	4.9	0.5%	D
Totals for Area of Interest		**993.8**	**100.0%**	

Pervious CNs B = 61 C = 74 D = 80

Pervious $CN_w = (27.6\%)(61) + (60.5\%)(74) + (11.9\%)(80)$

$= 71$

Map Unit Legend

James City and York Counties and the City of Williamsburg, Virginia (VA695)				SCS Group
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
8B	Caroline fine sandy loam, 2 to 6 percent slopes	4.1	0.4%	B
10B	Craven fine sandy loam, 2 to 6 percent slopes	4.7	0.5%	B
10C	Craven fine sandy loam, 6 to 10 percent slopes	4.2	0.4%	C
11B	Craven-Uchee complex, 2 to 6 percent slopes	1.3	0.1%	B
11C	Craven-Uchee complex, 6 to 10 percent slopes	301.4	29.3%	C
14B	Emporia fine sandy loam, 2 to 6 percent slopes	61.1	5.9%	B
14C	Emporia fine sandy loam, 6 to 10 percent slopes	10.7	1.0%	C
15D	Emporia complex, 10 to 15 percent slopes	7.3	0.7%	C
15E	Emporia complex, 15 to 25 percent slopes	24.8	2.4%	C
15F	Emporia complex, 25 to 50 percent slopes	374.0	36.4%	C
17	Johnston complex	63.5	6.2%	D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	5.7	0.6%	B
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	54.4	5.3%	B
20B	Kenansville loamy fine sand, 2 to 6 percent slopes	10.2	1.0%	B
25B	Norfolk fine sandy loam, 2 to 6 percent slopes	19.2	1.9%	B
27	Peawick silt loam	2.9	0.3%	D
29A	Slagle fine sandy loam, 0 to 2 percent slopes	3.6	0.4%	B
29B	Slagle fine sandy loam, 2 to 6 percent slopes	11.5	1.1%	B
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	5.1	0.5%	B
34B	Uchee loamy fine sand, 2 to 6 percent slopes	18.6	1.8%	B
W	Water	40.3	3.9%	D
Totals for Area of Interest		1,028.3	100.0%	

Pervious CNs B = 61 C = 74 D = 80

Pervious CN_W = (19.5%)61 + (70.1%)(74) + (10.4%)(80)

= 72

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APPENDIX B

Soils Maps, Data and Aerial Photography

Michael D. Woolson

CONCUR:

Steven W. Hicks

MDW/gb
WtrshedsCover_mem

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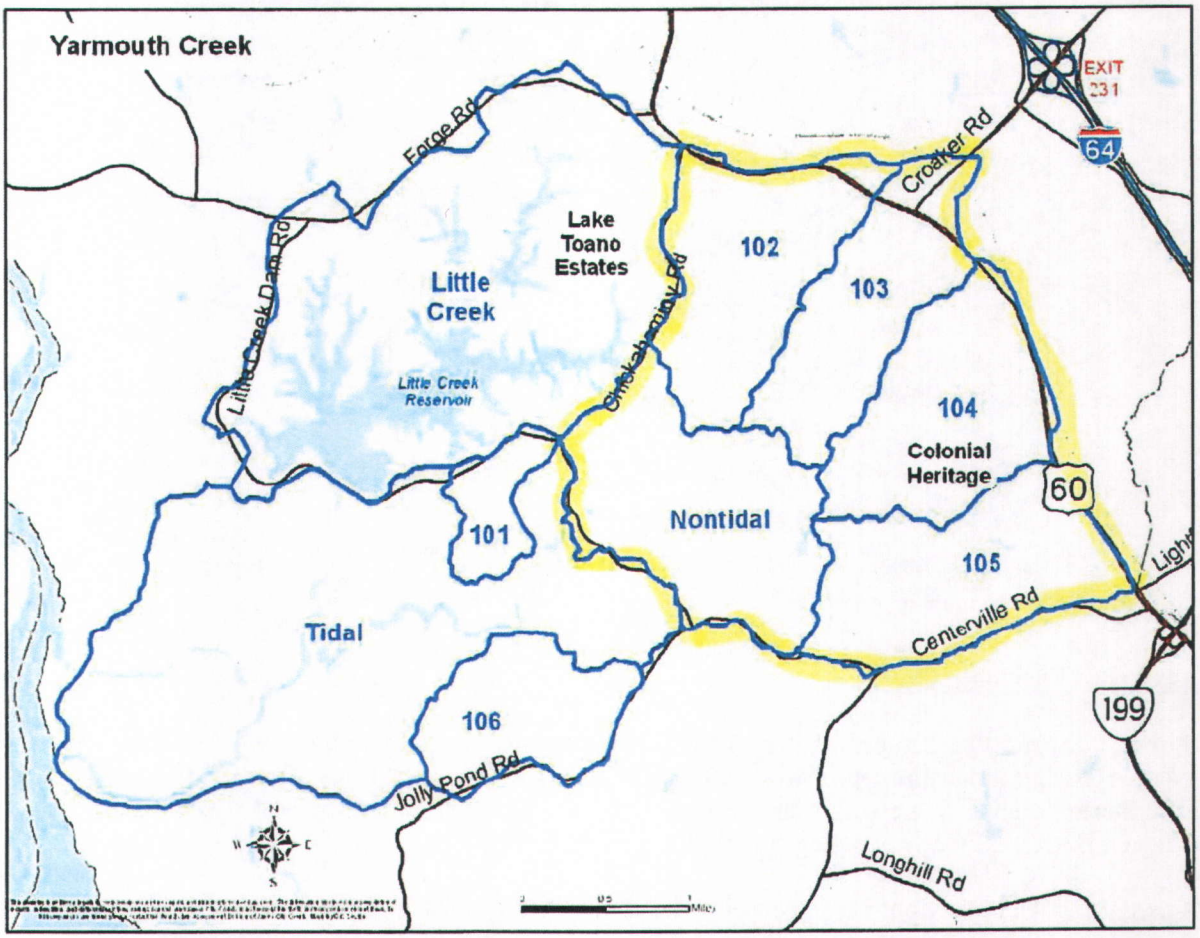
Yarmouth Creek

Sub-watershed	CWP Baseline (%)	Current (%)	Projected (%)
101	2.2	6.29	8.70
102	7.3	7.80	17.80
103	5.1	6.30	22.00
104	9.0	14.00	19.50
105	5.5	9.60	26.90
106	0.4	0.50	8.70
Non-tidal	1.1	1.11	8.50
Tidal	0.3	0.34	5.00
Little Creek	2.0	2.20	7.30



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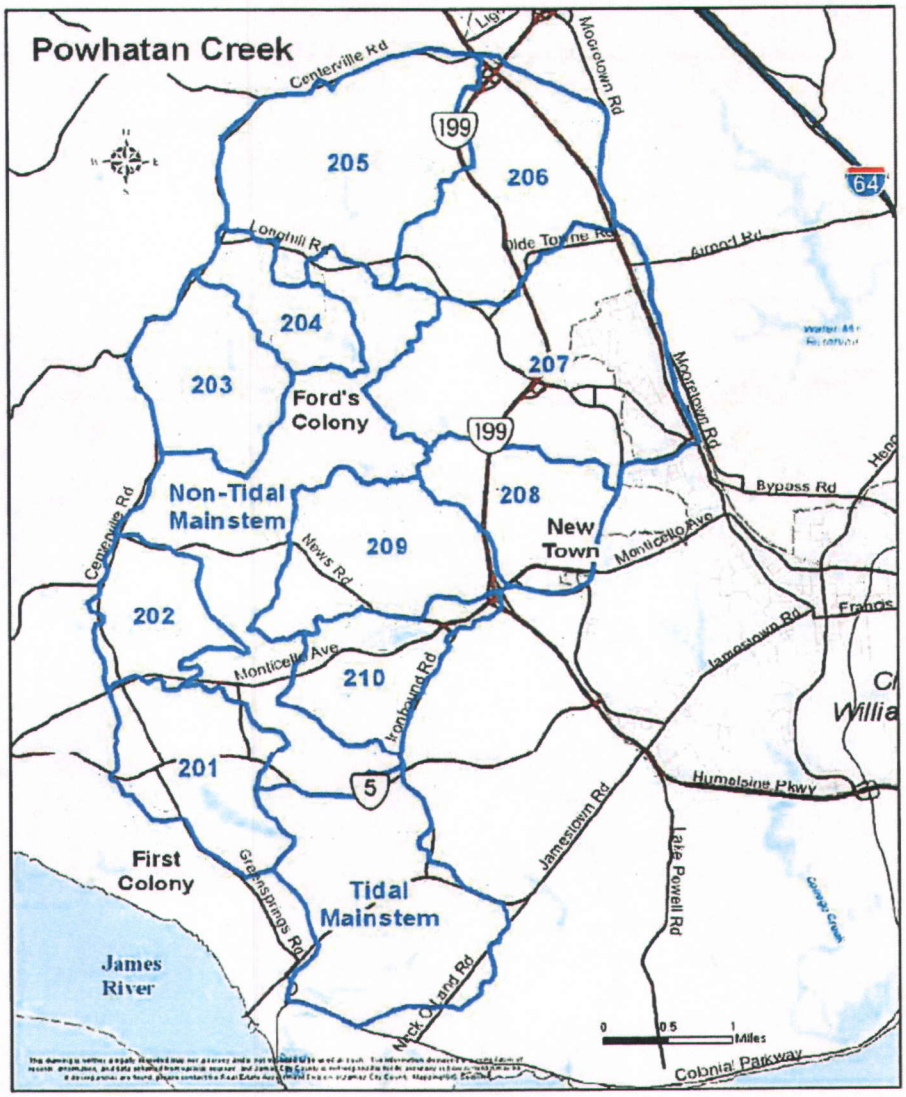

Analysis – Yarmouth Creek

Current Yarmouth Creek impervious cover numbers increased only in one category: Sub-Watershed No. 104 over the baseline numbers established in 2003. Portions of Sub-Watershed Nos. 102, 103, 104, and 105 that have increased slightly are within the PSA and have seen growth during the past five years, including Colonial Heritage, Liberty Crossing, and Walnut Grove.

Again, using the Impervious Cover Model to determine overall watershed health, the entire watershed was classified as *"Sensitive"* in the baseline study. Under current conditions, as mentioned previously, only one of the sub-watershed now moves into the *"Impacted"* classification. In the projected build-out scenario, there are three sub-watersheds that would be classified as *"Impacted"* and one that would be classified as "Non-Supporting" while the remaining watersheds remain "Sensitive." The sub-watershed that will see the least amount of change is the tidal segment while the one that will see the greatest amount of change is sub-watershed 105.

Impervious Cover Estimates

The sub-watersheds and baseline percentages for each creek were determined from the study for each applicable creek. The current (2007 data) percentages for Powhatan Creek were taken from the "Powhatan Creek Floodplain Study" by Williamsburg Environmental Group, July 2008, as were the projected percentages. The current (2007 data) percentages for Yarmouth Creek were arrived at through a comparative analysis between the baseline and 2007 aerial photography. The projected percentages for Yarmouth Creek were also arrived at through a comparative analysis between the current built-on parcels and the underlying land use designations. The impervious cover estimates for both creeks are as follows:

Analysis – Powhatan Creek

Current Powhatan Creek impervious cover numbers increases in seven categories over the baseline numbers established in 2001. Powhatan Creek is entirely contained within the Primary Service Area (PSA) and has seen growth during the last seven years, including New Town, Prime Outlets expansion, Warhill, and new residential communities.

Using the Impervious Cover Model to determine overall watershed health, there were eight sub-watersheds that were classified as *"Sensitive"* with only three sub-watersheds that were classified as *"Impacted"* in the baseline study. Under current conditions, four sub-watersheds would remain *"Sensitive"* and the remaining sub-watersheds are classified as *"Impacted."* Under the projected build-out scenario, one sub-watershed would remain *"Sensitive"* and eight would be *"Impacted"* and only two would be classified as *"Non-Supporting."*. The sub-watershed that will see the least amount of change is sub-watershed 201 while the one that will see the greatest amount is sub-watershed 208.

Powhatan Creek

Sub-watershed	CWP Baseline (%)	Current (%)	Projected (%)
201	6.8	8.31	8.31
202	6.4	6.63	14.87
203	10.5	16.05	16.60
204	10.0	18.88	22.10
205	6.4	9.45	19.06
206	16.9	20.78	21.30
207	16.4	24.64	29.30
208	5.8	14.19	27.13
209	5.3	16.4	21.88
210	18.6	22.63	23.67
Mainstems	7.9	9.06	12.51

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MEMORANDUM

DATE: February 10, 2009

TO: The Board of Supervisors

FROM: Michael D. Woolson, Senior Watershed Planner

SUBJECT: Updated Impervious Cover Estimates for Powhatan and Yarmouth Creek Watersheds

---

The impervious cover estimates for Powhatan and Yarmouth Creeks have been updated using a variety of sources including aerial photography; information from Real Estate Assessments, Planning, Stormwater, and Environmental Divisions; the Center for Watershed Protection (CWP) Powhatan Creek and Yarmouth Creek reports; and the Williamsburg Environmental Group Powhatan Creek Floodplain Study. In addition, staff analyzed the projected impervious cover figures at build-out based upon the underlying Comprehensive Plan land use designation instead of the by-right density. The latter was completed by CWP in 2001.

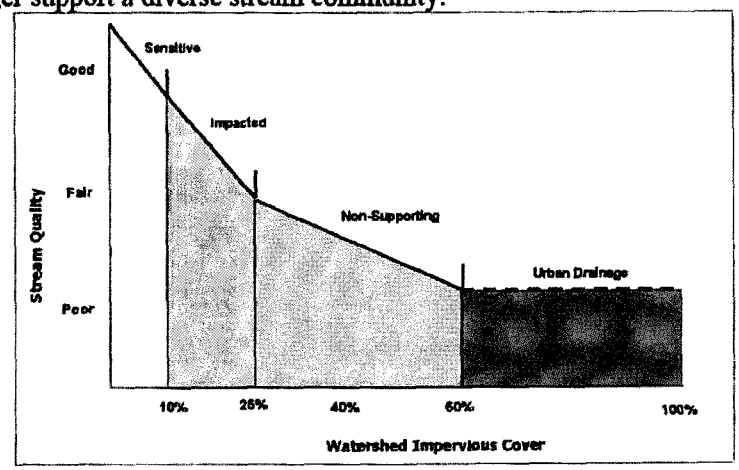
Impervious Cover Model

Stream research generally indicates that certain zones of stream quality exist, most notably at 11 percent impervious cover, where sensitive stream elements are lost from the system and a second threshold appearing at around 25 percent impervious cover, where indicators of stream quality consistently shift to a poor condition (e.g., diminished aquatic diversity, water quality, and habitat scores). The model classifies streams into one of three categories: 1) sensitive, 2) impacted, and 3) non-supporting. Each stream category can be expected to have unique characteristics as follows:

1) Sensitive Streams. These streams typically have a watershed impervious cover of zero to 10 percent. Consequently, sensitive streams are of high quality and are typified by stable channels, excellent habitat structure, good to excellent water quality, and diverse communities of both fish and aquatic insects. Since impervious cover is so low, it does not experience the hydrological changes that accompany urbanization.

2) Impacted Streams. Streams in this category possess a watershed impervious cover ranging from 11 to 25 percent and show clear signs of degradation due to watershed urbanization.

3) Non-Supporting Streams. Once watershed impervious cover exceeds 25 percent, stream quality crosses a second threshold. Streams in this category essentially become conduits for conveying stormwater flows and can no longer support a diverse stream community.



- identification of 5 subwatersheds with excellent habitat conditions
- identification of 4 subwatersheds with good habitat conditions
- identification of subwatersheds 104, 105, tidal Yarmouth Creek and Little Creek Reservoir to support excellent fisheries

*SEE UPDATED IMPERVIOUS COVER IN 2009 MEMO.

Table 1-1 Impervious Cover and Stream Conditions in Yarmouth Creek Subwatersheds

Subwatershed	Area (Acres)	Current * Impervious Cover	Future Impervious Cover	Habitat Conditions	Fish Conditions
101	220	2.2%	6.8%	Good	
102	870	7.3%	11.5%	Good	Good
103	744	5.1%	11.4%	Excellent	Good
104	860	9.0%	19.7%	Excellent	Excellent
105	931	5.5%	16.7%	Good	Excellent
106	548	0.4%	3.5%	Excellent	
Non-tidal	1072	1.1%	3.3%	Excellent	
Tidal	2912	0.3%	1.8%	Excellent	**
Little Creek Reservoir	2887	<2%*	<5%*	Good	**

* the impervious cover numbers for Little Creek are general estimates based on current and future land use

**Both the tidal portion of Yarmouth Creek and the Little Creek Reservoir are also reported by watershed stakeholders and Virginia Department of Game and Fisheries (per. comm.) to support excellent fisheries (though they were not monitored by CWP)

Salinity Issue

In recent years there has been a growing concern about rising salinity levels in the tidal portion of Yarmouth Creek. At the Yarmouth Creek watershed meeting in February 2002, stakeholders described changes in the marsh vegetation as well as an increase in saltwater species, including blue crabs, and fish species such as the croaker further up the Chickahominy River. Some residents fear that a gradual shift in the salinity may affect this marsh ecosystem. The change in the salinity regime and marsh ecosystem is a serious concern as Yarmouth Creek is considered one of the two largest relatively undisturbed tidal freshwater wetlands on the lower peninsula by Virginia Department of Conservation and Recreation (VDCR) (Clampitt, 1991).

A review of the available data supported the observation that increases in saltwater concentrations are occurring. Though the relative causes of salinity and vegetation changes that have occurred in the Yarmouth Creek watershed may be disputed, Sea Level Rise (SLR) and increases in salinity due to freshwater take for drinking water will likely continue in Yarmouth Creek, and there are limited local solutions available to address this issue. These include the following:

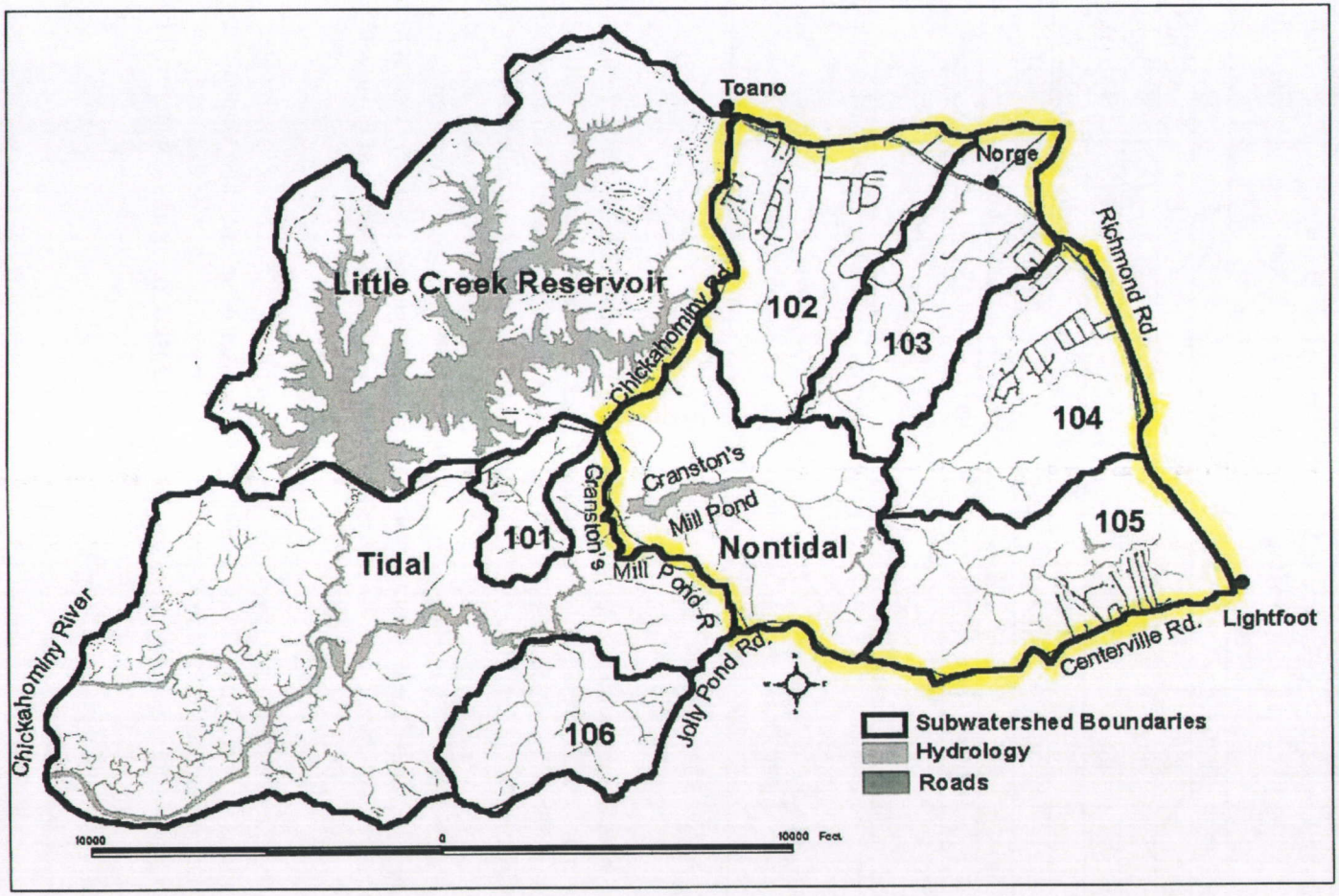


Figure E-1. Yarmouth Creek Subwatershed Map

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Subwatershed Nontidal

Map Scale: 1:5,450 if printed on D size (22" x 34") sheet
0 30 60 120 180 Meters
0 100 200 400 600 Feet

USDA Natural Resources Conservation Service

Subwatershed 103

Map Scale: 1:5,080 if printed on D size (22" x 34") sheet

Meters
0 30 60 120 180

Feet
0 100 200 400 600

N

USDA Natural Resources Conservation Service

Subwatershed 103

Map Scale: 1:4,750 if printed on D size (22 x 34) sheet.

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

APPENDIX C

NRCS (SCS) Rainfall Distributions

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Appendix B Synthetic Rainfall Distributions and Rainfall Data Sources

The highest peak discharges from small watersheds in the United States are usually caused by intense, brief rainfalls that may occur as distinct events or as part of a longer storm. These intense rainstorms do not usually extended over a large area and intensities vary greatly. One common practice in rainfall-runoff analysis is to develop a synthetic rainfall distribution to use in lieu of actual storm events. This distribution includes maximum rainfall intensities for the selected design frequency arranged in a sequence that is critical for producing peak runoff.

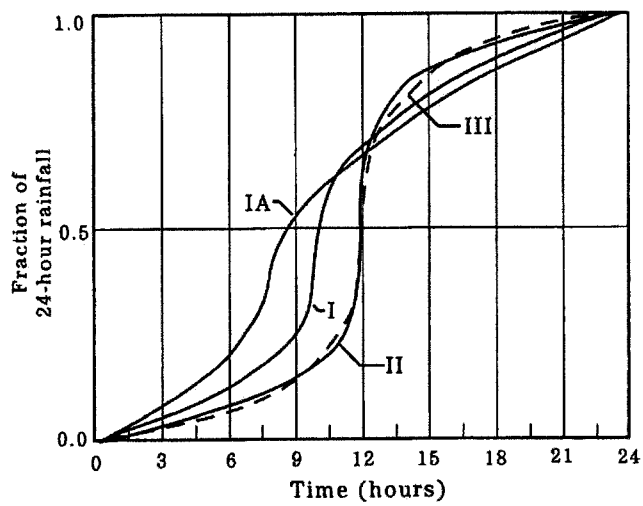
Synthetic rainfall distributions

The length of the most intense rainfall period contributing to the peak runoff rate is related to the time of concentration (T_c) for the watershed. In a hydrograph created with NRCS procedures, the duration of rainfall that directly contributes to the peak is about 170 percent of the T_c. For example, the most intense 8.5-minute rainfall period would contribute to the peak discharge for a watershed with a T_c of 5 minutes. The most intense 8.5-hour period would contribute to the peak for a watershed with a 5-hour T_c.

Different rainfall distributions can be developed for each of these watersheds to emphasize the critical rainfall duration for the peak discharges. However, to avoid the use of a different set of rainfall intensities for each drainage area size, a set of synthetic rainfall distributions having "nested" rainfall intensities was developed. The set "maximizes" the rainfall intensities by incorporating selected short duration intensities within those needed for longer durations at the same probability level.

For the size of the drainage areas for which NRCS usually provides assistance, a storm period of 24 hours was chosen the synthetic rainfall distributions. The 24-hour storm, while longer than that needed to determine peaks for these drainage areas, is appropriate for determining runoff volumes. Therefore, a single storm duration and associated synthetic rainfall distribution can be used to represent not only the peak discharges but also the runoff volumes for a range of drainage area sizes.

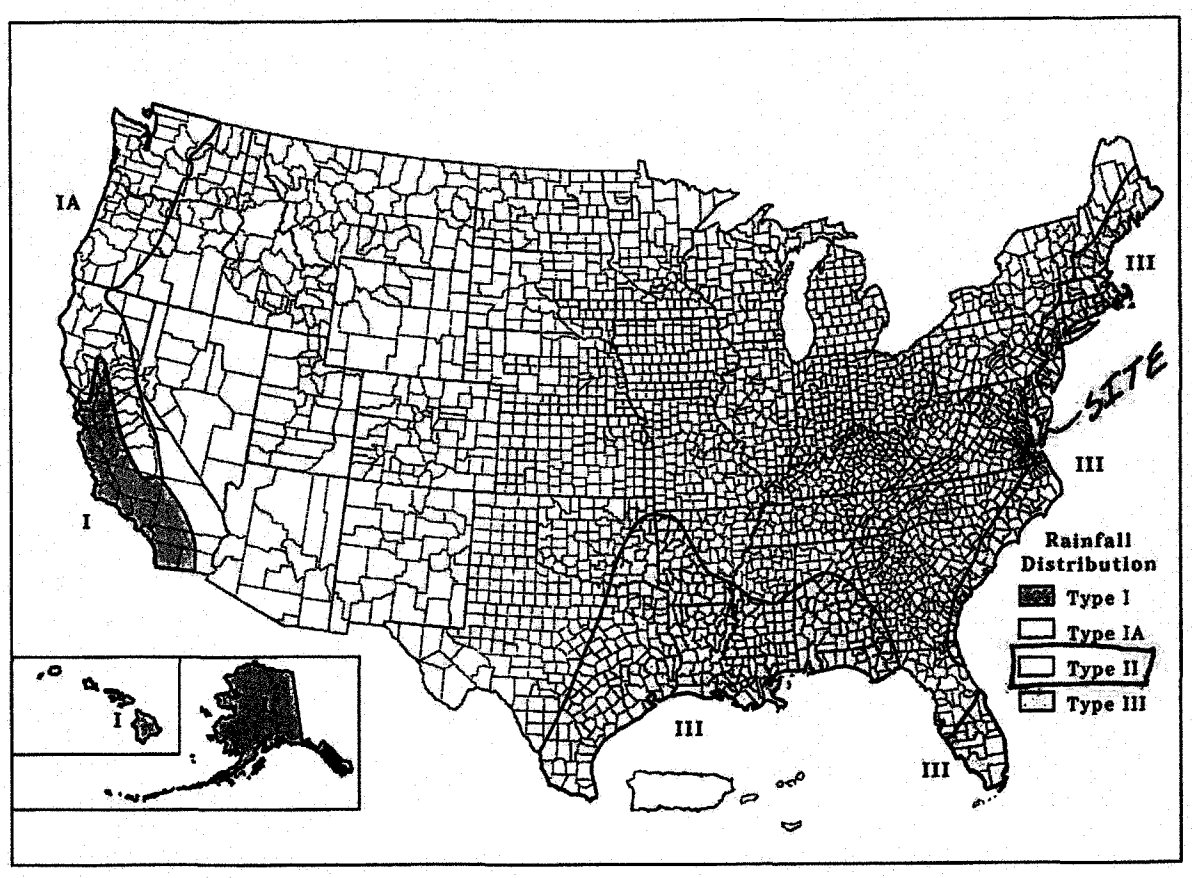
Figure B-1 SCS 24-hour rainfall distributions



The intensity of rainfall varies considerably during a storm as well as geographic regions. To represent various regions of the United States, NRCS developed four synthetic 24-hour rainfall distributions (I, IA, II, and III) from available National Weather Service (NWS) duration-frequency data (Hershfield 1061; Frederick et al., 1977) or local storm data. Type IA is the least intense and type II the most intense short duration rainfall. The four distributions are shown in figure B-1, and figure B-2 shows their approximate geographic boundaries.

Types I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large 24-hour rainfall amounts. Type II represents the rest of the country. For more precise distribution boundaries in a state having more than one type, contact the NRCS State Conservation Engineer.

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

Figure B-7 50-year, 24-hour rainfall

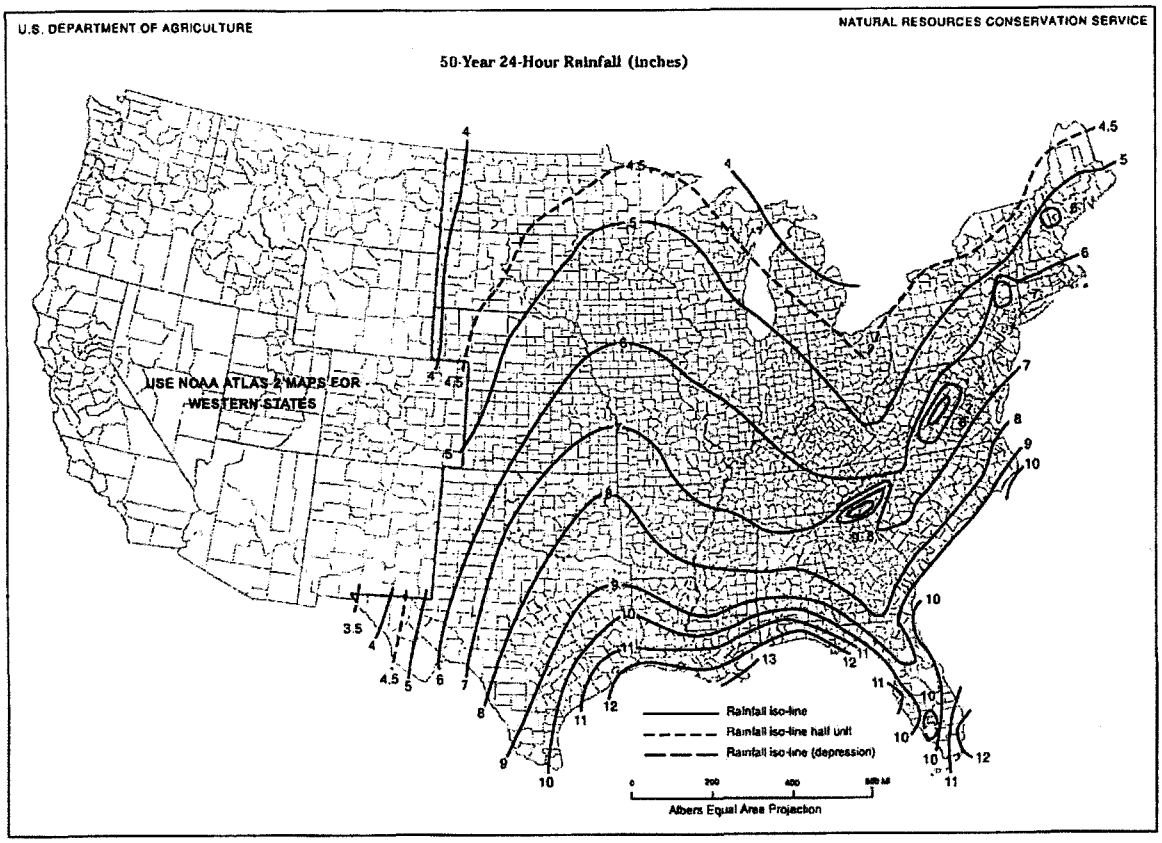
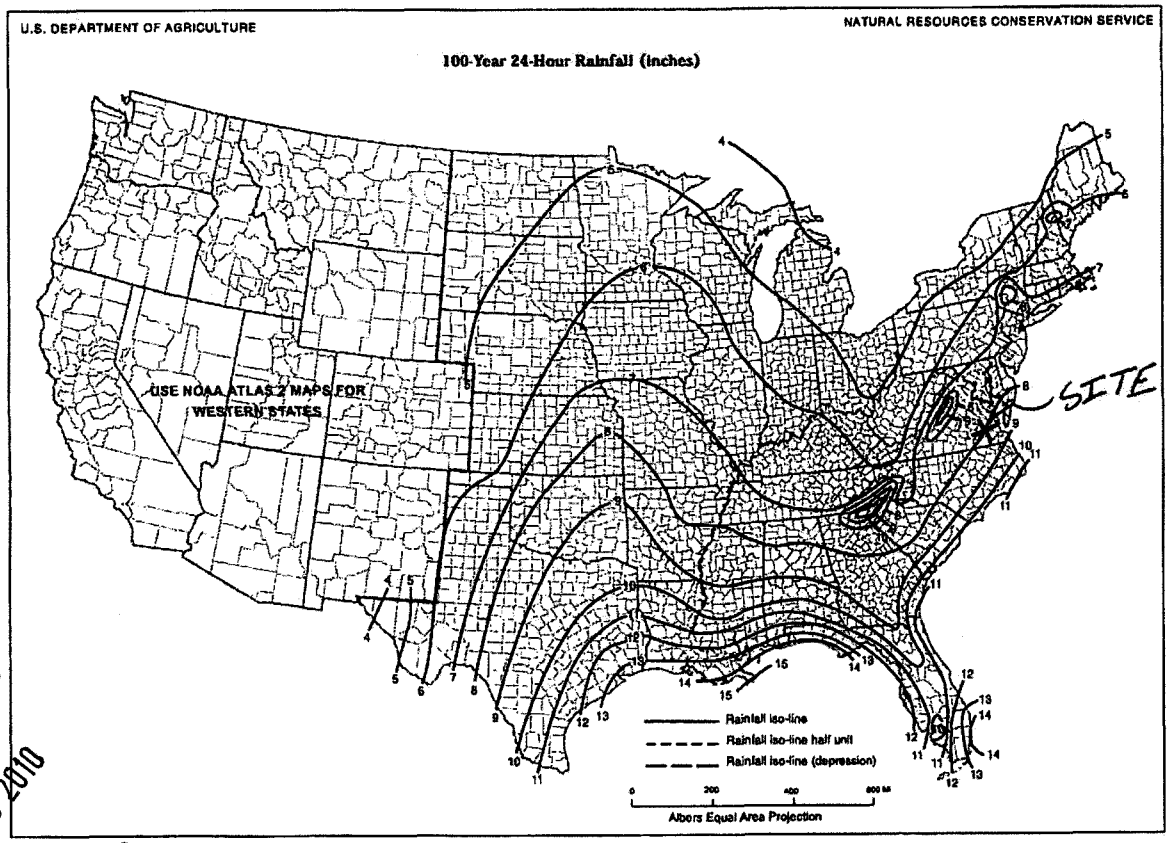


Figure B-8 100-year, 24-hour rainfall



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APPENDIX F

TR-55 Calculations

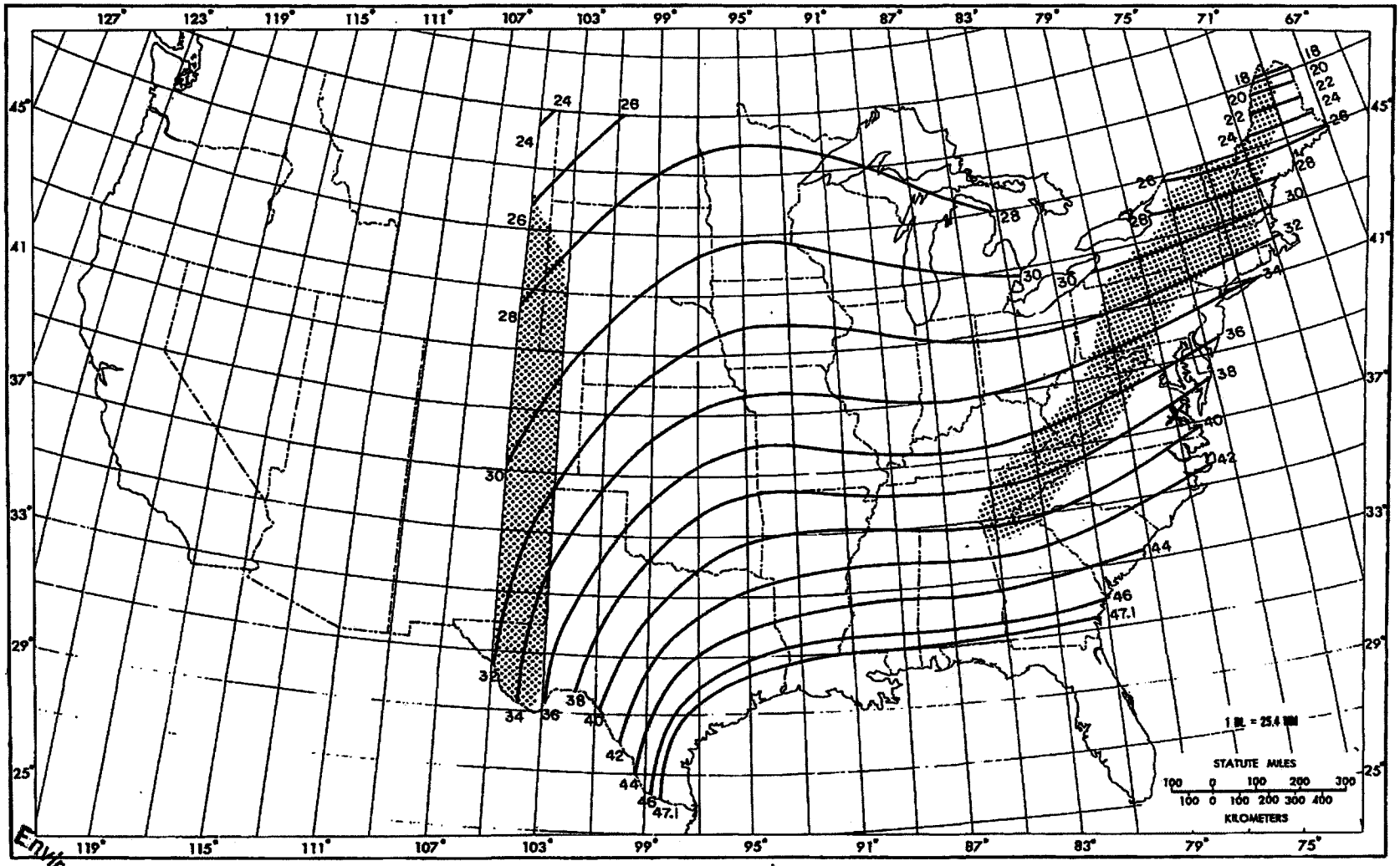

Figure 20.--All-season PMP (in.) for 24 hr 10 mi^2 (26 km^2).

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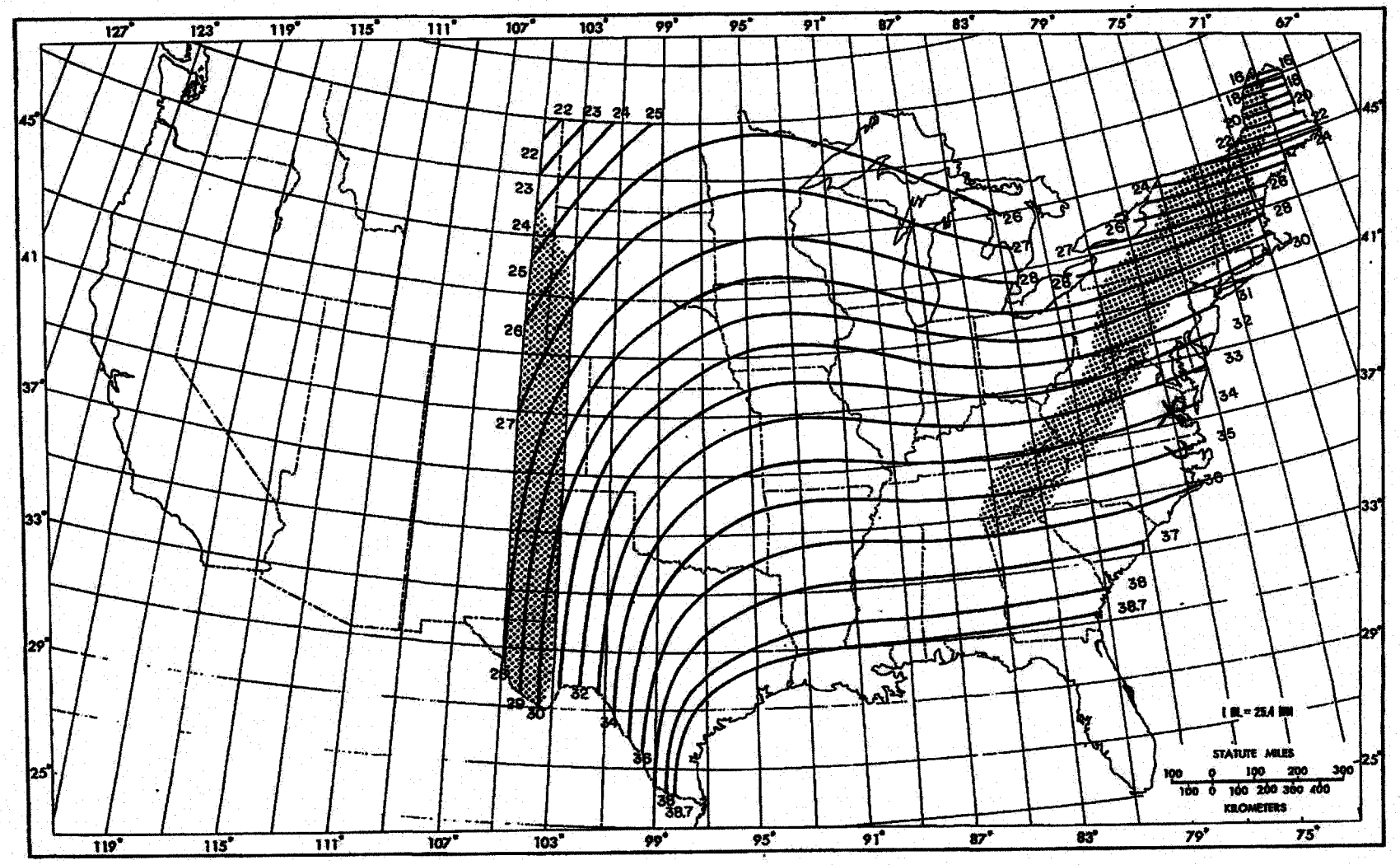

Figure 19.--All-season PMP (in.) for 12 hr 10 mi^2 (26 km^2).

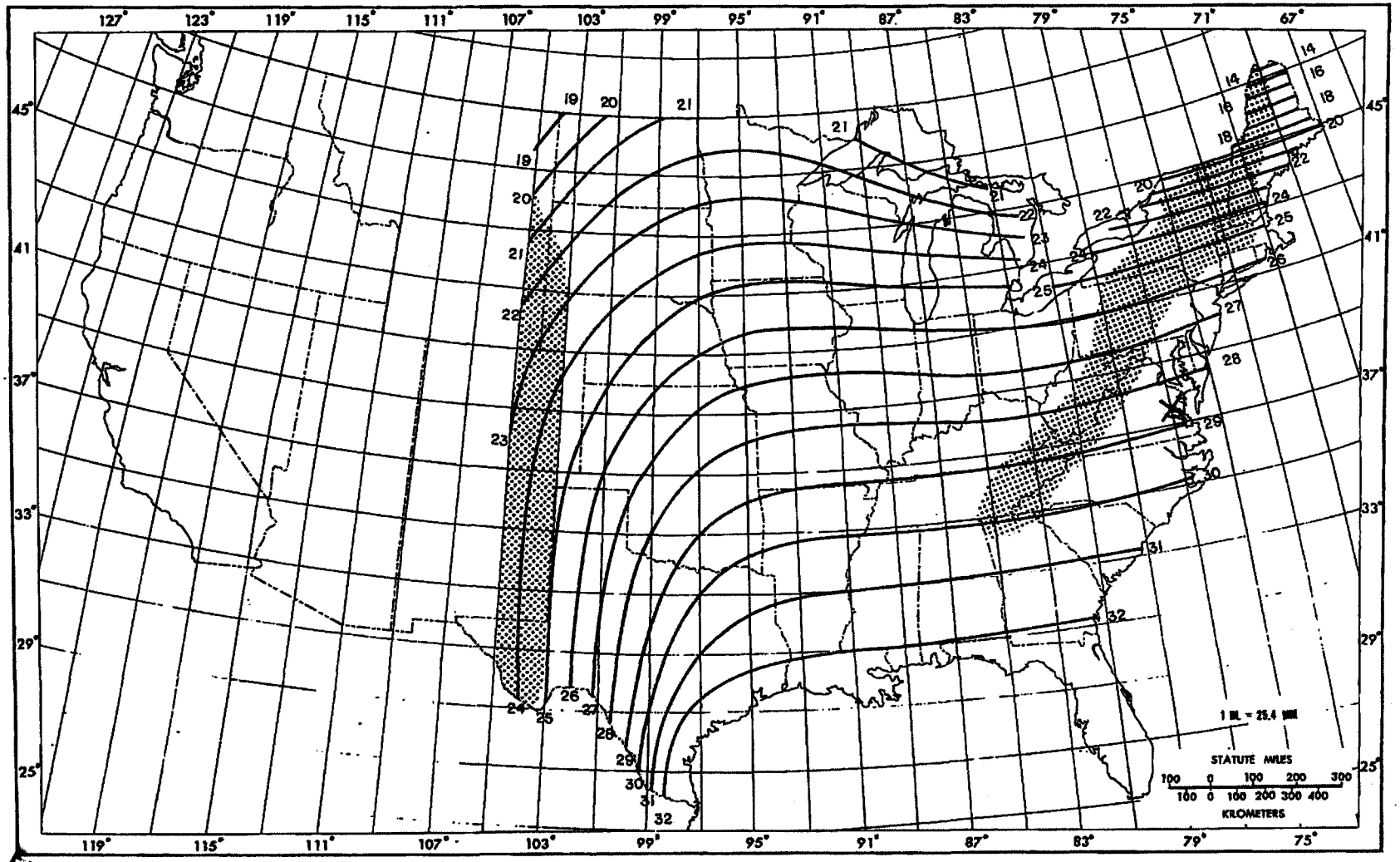

Figure 18.--All-season PMP (in.) for 6 hr 10 mi^2 (26 km^2).

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HYDROMETEOROLOGICAL REPORT NO. 51

Probable Maximum Precipitation Estimates, United States East of the 105th Meridian

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

Washington, D C
June 1978

APPENDIX E

Excerpts from HMR 51

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POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

[redacted] W 98 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Wed Jun 9 2010

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	[redacted]	[redacted]	[redacted]	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.40	0.64	0.80	1.09	1.36	1.63	1.75	2.11	2.50	2.90	3.37	3.75	4.38	5.00	6.77	8.38	10.47	12.48
2	0.47	0.76	0.95	1.31	1.65	1.98	2.11	2.54	3.01	3.52	4.09	4.54	5.27	6.00	8.06	9.95	12.38	14.72
5	0.55	0.88	1.11	1.58	2.02	2.46	2.64	3.18	3.80	4.55	5.27	5.80	6.64	7.45	9.78	11.88	14.62	17.18
10	0.62	0.99	1.25	1.81	2.36	2.91	3.15	3.80	4.56	5.43	6.27	6.85	7.77	8.64	11.16	13.41	16.39	19.07
25	0.70	1.11	1.41	2.08	2.77	3.50	3.81	4.62	5.61	6.73	7.77	8.39	9.42	10.35	13.10	15.49	18.78	21.58
50	0.76	1.21	1.53	2.30	3.12	4.00	4.39	5.36	6.56	7.87	9.06	9.70	10.81	11.76	14.66	17.14	20.66	23.49
[redacted]	0.82	1.30	1.65	2.52	3.47	4.52	5.00	[redacted]	[redacted]	[redacted]	10.50	11.12	12.31	13.27	16.28	18.80	22.54	25.37
200	0.88	1.39	1.75	2.73	3.83	5.06	5.65	6.98	8.70	10.52	12.10	12.74	13.94	14.88	17.98	20.49	24.45	27.22
500	0.95	1.50	1.89	3.01	4.32	5.82	6.57	8.20	10.34	12.62	14.50	15.16	16.31	17.20	20.34	22.78	27.02	29.65
1000	1.01	1.59	2.00	3.24	4.73	6.47	7.39	9.27	11.82	14.42	16.57	17.26	18.29	19.11	22.23	24.55	29.01	31.49

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero

APPENDIX D

Point Precipitation Frequency Estimates from NOAA Atlas 14

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CN Worksheet

Worksheet 2: Runoff curve number and runoff

Project	By	Date
CRANSTON POND	PEA	6-14-10
Location	**Checked**	**Date**
JAMES CITY COUNTY		

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN [1/] Figure 2-3	CN [1/] Figure 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area
Pervious CN	Assumed 25% unconnected all areas					
69	Subwatershed 102 7.8% imp.			71	876	
70	Subwatershed 103 6.3% imp.			72	751	
70	Subwatershed 104 14.0% imp			74	863	
71	Subwatershed 105 9.6% imp			73	958	
72	Subwatershed Non-Tidal 1.11% imp			72	1055	
See Work Sheets						

[1/] Use only one CN source per line

Totals ➡

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; **Use CN** ➡ ☐

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

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

Project	By	Date
CRANSTON MILL POND	JBM	7/21/09
Location	**Checked**	**Date**
JAMES CITY COUNTY, VA		

Check one: [X] Present [ ] Developed

Check one: [ ] T_c [X] T_t through ~~subarea~~ MILL POND DA.

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Segment ID	From 103	From 105	
1. Surface description (table 3-1)	Woods	Cultivated Soil Residue 20%	
2. Manning's roughness coefficient, n (table 3-1)	0.40	0.06	
3. Flow length, L (total L † 300 ft) ft	200	300	
4. Two-year 24-hour rainfall, P_2 in	3.5	3.5	
5. Land slope, s ft/ft	0.0175	0.01	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.63	~~+~~ OR 0.24	= 0.63

Segment ID	From 103	From 105	
7. Surface description (paved or unpaved)	unpaved	unpaved	
8. Flow length, L ft	1675	1089	
9. Watercourse slope, s ft/ft	0.029	0.043	
10. Average velocity, V (figure 3-1) ft/s	2.7	3.3	
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.17	~~+~~ OR 0.09	= 0.17

Channel flow

Segment 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	0.0047	0.0036	
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	2.5	2.5	assumed based on soil type + channel
18. ~~Flow~~ length, L ft	13068	15474	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	1.45	~~+~~ OR 1.72	= 1.45

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 2.25

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

Project	By	Date
CRANSTON MILL POND	JBM	7/14/09
Location	**Checked**	**Date**
JAMES CITY COUNTY, VA		

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☒ T_t through subarea 102

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow	Segment ID		
1. Surface description (table 3-1)	Woods		
2. Manning's roughness coefficient, n (table 3-1)	0.40		
3. Flow length, L (total L † 300 ft) ft	200		
4. Two-year 24-hour rainfall, P_2 in	3.5		
5. Land slope, s ft/ft	0.030		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.51	+	= 0.51

Shallow concentrated flow	Segment ID		
7. Surface description (paved or unpaved)	unpaved		
8. Flow length, L ft	2626		
9. Watercourse slope, s ft/ft	0.022		
10. Average velocity, V (figure 3-1) ft/s	2.4		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.30	+	= 0.30

Channel flow	Segment 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	0.004		
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	2.5	assumed based on soil + channel type	
18. Flow length, L ft	10468		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	1.16	+	= 1.16

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 1.97

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

Project	By	Date
CRANSTON MILL POND	JBM	7/14/09
Location	**Checked**	**Date**
JAMES CITY COUNTY, VA		

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☒ T_t through subarea 103

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

	Segment ID		
1. Surface description (table 3-1)	Woods		
2. Manning's roughness coefficient, n (table 3-1)	0.40		
3. Flow length, L (total L † 300 ft) ft	200		
4. Two-year 24-hour rainfall, P_2 in	3.5		
5. Land slope, s ft/ft	0.0175		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.63	+	= 0.63

	Segment ID		
7. Surface description (paved or unpaved)	Unpaved		
8. Flow length, L ft	1675		
9. Watercourse slope, s ft/ft	0.029		
10. Average velocity, V (figure 3-1) ft/s	2.7		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.17	+	= 0.17

Channel flow

	Segment 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	0.0053		
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	2.5	assumed based on soil & channel type	
18. Flow length, L ft	10520		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	1.17	+	= 1.17

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 1.97

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

Project	By	Date
CRANSTON MILL POND	JBM	7/14/09
Location	**Checked**	**Date**
JAMES CITY COUNTY, VA		

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☒ T_t through subarea 104

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Segment ID	Test 1	Test 2
1. Surface description (table 3-1)	Grass	NO OLF
2. Manning's roughness coefficient, n (table 3-1)	0.15	STARTS
3. Flow length, L (total L † 300 ft) ft	100	IN DITCH
4. Two-year 24-hour rainfall, P_2 in	3.5	
5. Land slope, s ft/ft	0.003	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t hr	0.33	+ OR 0 = 0.33

Segment ID	Test 1	Test 2
7. Surface description (paved or unpaved)	unpaved	unpaved
8. Flow length, L ft	2806	1605
9. Watercourse slope, s ft/ft	0.021	0.021
10. Average velocity, V (figure 3-1) ft/s	2.3	2.3
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.34	+ OR 0.19 = 0.34

Channel flow

Segment ID	Test 1	Test 2
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	0.0047	0.0060
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V ft/s	2.5	2.5
18. Flow length, L ft	8569	10144
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.95	+ OR 1.13 = 0.95
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		1.62

assumed based on soil + chan type

★ TEST 1 IS LONGER ∴ CONTROLS

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

Project	By	Date
CRANSTON MILL POND	JBM	7/14/09
Location	**Checked**	**Date**
JAMES CITY COUNTY, VA		

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☒ T_t through subarea 105

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow	Segment ID		
1. Surface description (table 3-1)	Cultivated Soil Residue < 20%		
2. Manning's roughness coefficient, n (table 3-1)	0.06		
3. Flow length, L (total L † 300 ft) ft	300		
4. Two-year 24-hour rainfall, P_2 in	3.5		
5. Land slope, s ft/ft	0.010	1%	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.24	+	= 0.24

Shallow concentrated flow	Segment ID		
7. Surface description (paved or unpaved)	Unpaved		
8. Flow length, L ft	1089		
9. Watercourse slope, s ft/ft	0.043	4.3%	
10. Average velocity, V (figure 3-1) ft/s	3.3		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.09	+	= 0.09

Channel flow	Segment 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	0.0042		
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	2.5	assumed based on soil type in bottom	(silt loam + fine sandy loam, E+S manual table 5-2a
18. Flow length, L ft	11645'		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	1.29	+	= 1.29
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr			1.62

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

Project	By	Date
CRANSTON MILL POND	JBM	7/14/09
Location	**Checked**	**Date**
JAMES CITY COUNTY, VA		

Check one: ☒ Present ☐ Developed

Check one: ☐ T_c ☒ T_t through subarea NON TIDAL

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

	Segment ID		
	N/A NO		
1. Surface description (table 3-1)	OVERLAND		
2. Manning's roughness coefficient, n (table 3-1)	FLOW		
3. Flow length, L (total L † 300 ft) ft	TC STARTS		
4. Two-year 24-hour rainfall, P_2 in	IN DITCH		
5. Land slope, s ft/ft			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0	+	= 0

	Segment ID		
7. Surface description (paved or unpaved)	Unpaved		
8. Flow length, L ft	1585		
9. Watercourse slope, s ft/ft	0.044		
10. Average velocity, V (figure 3-1) ft/s	3.4		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.13	+	= 0.13

Channel flow

	Segment 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	0.0056		
16. Manning's roughness coefficient, n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s	2.5	ASSUMED based on soil & channel type	
18. Flow length, L ft	8687		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.97	+	= 0.97

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr 1.10

APPENDIX G

HEC-HMS Results

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SPILLWAY SUMMARY

	Principal Spillway (Proposed)	Emergency Spillway	Total
Elevation (ft)	9.15	12	
Length (ft)	100	30	
Coefficient	3.3	3	
Flows (cfs):			
@ elevation			
10'	256	0	256
11'	943	0	943
12'	1741	7	1748
13'	2456	85	2541
14'	3553	259	3812
14.8' (peak)	4452	426	**4878**

Environmental Division
NOV 30 2010
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Project: CranstonHMS

Simulation Run: 2-Year Reservoir: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	No Failure
End of Run:	10Aug2050, 00:00	Meteorologic Model:	2-YR
Compute Time:	24Jun2010, 14:43:49	Control Specifications:	24hr (48 total/15 min incr)

Volume Units: IN

Computed Results

Peak Inflow :	1063.1 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 14:15
Peak Outflow :	803.2 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 15:15
Total Inflow :	1.14 (IN)	Peak Storage :	286.2 (AC-FT)
Total Outflow :	1.14 (IN)	Peak Elevation :	11.0 (FT)

Project: CranstonHMS

Simulation Run: [redacted]: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	No Failure
End of Run:	10Aug2050, 00:00	Meteorologic Model:	10-YR Storm
Compute Time:	24Jun2010, 14:43:42	Control Specifications:	24hr (48 total/15 min incr)

Volume Units: IN

Computed Results

Peak Inflow :	[redacted]	Date/Time of Peak Inflow :	08Aug2050, 14:00
Peak Outflow :	2029.4 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 15:00
Total Inflow :	2.63 (IN)	Peak Storage :	406.5 (AC-FT)
Total Outflow :	2.62 (IN)	Peak Elevation :	12.5 (FT)

WHERE ARE
100-YEAR INFLOW COMPS?

Environmental Division

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Project: CranstonHMS

Simulation Run: Sunny Day Piping Failure Reservoir: Cranston Mill Pond

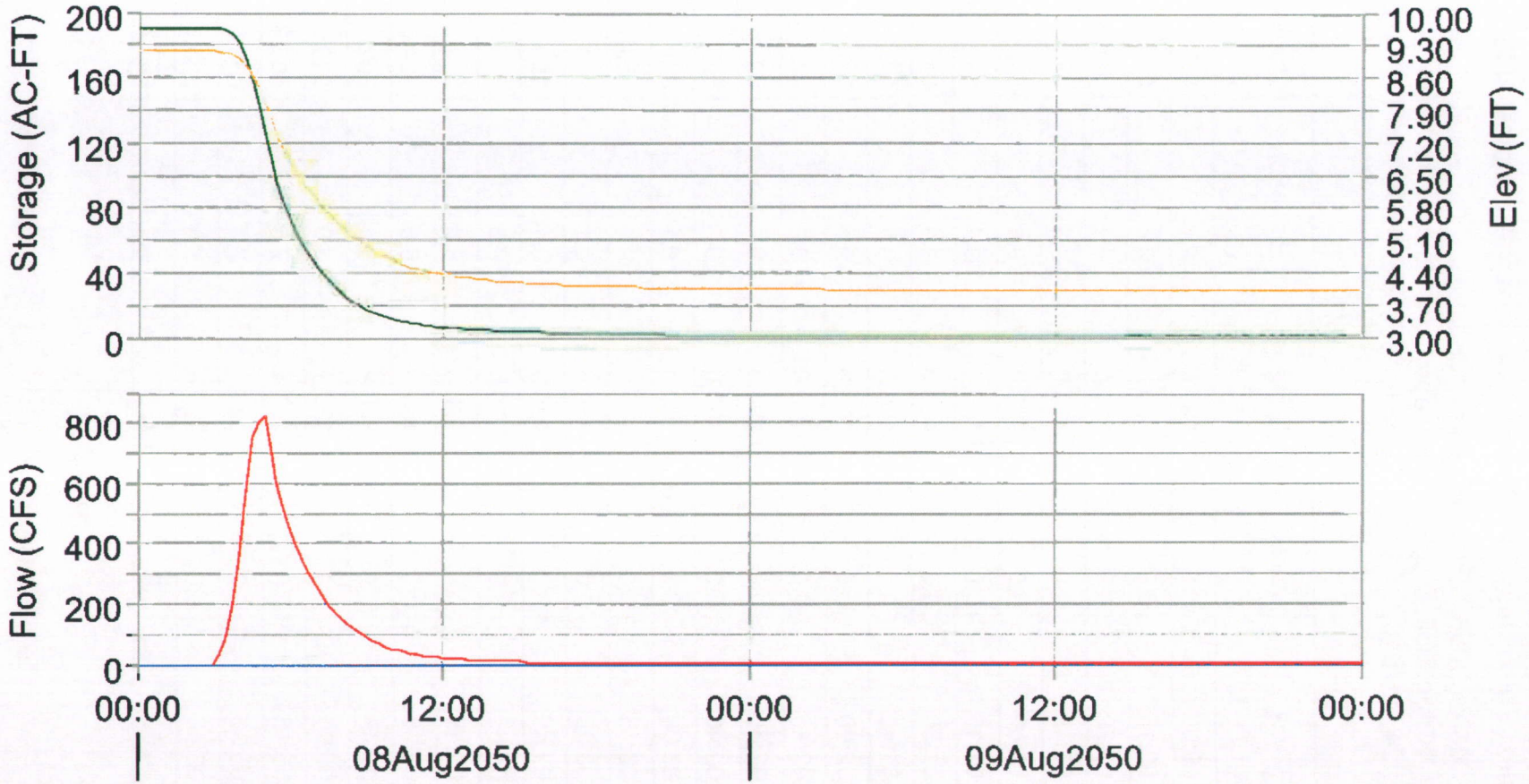
Start of Run:	08Aug2050, 00:00	Basin Model:	Sunny Day Piping Failure
End of Run:	10Aug2050, 00:00	Meteorologic Model:	No Rain
Compute Time:	24Jun2010, 14:21:23	Control Specifications:	24hr (48 total/15 min incr)

Volume Units: IN

Computed Results

Peak Inflow :	0.0 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 00:00
Peak Outflow :	820.9 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 05:00
Total Inflow :	0.00 (IN)	Peak Storage :	190.0 (AC-FT)
Total Outflow :	0.51 (IN)	Peak Elevation :	9.1 (FT)

Reservoir "Cranston Mill Pond" Results for Run "Sunny Day Piping Failure"



Run:Sunny Day Piping Failure Element:CRANSTON MILL POND Result:Storage

Run:Sunny Day Piping Failure Element:CRANSTON MILL POND Result:Pool Elevation

Run:Sunny Day Piping Failure Element:CRANSTON MILL POND Result:Outflow

Run:Sunny Day Piping Failure Element:CRANSTON MILL POND Result:Combined Inflow

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Environmental Division

Project: CranstonHMS
Simulation Run: Sunny Day Piping FailureReservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: Sunny Day Piping F
End of Run: 10Aug2050, 00:00 Meteorologic Model: No Rain
Compute Time: 24Jun2010, 14:21:23 Control Specifications: 24hr (48 total/15 mir

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:15	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:45	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:15	0.0	190.0	9.1	0.0
08Aug2050	01:30	0.0	190.0	9.1	0.0
08Aug2050	01:45	0.0	190.0	9.1	0.0
08Aug2050	02:00	0.0	190.0	9.1	0.0
08Aug2050	02:15	0.0	190.0	9.1	0.0
08Aug2050	02:30	0.0	190.0	9.1	0.0
08Aug2050	02:45	0.0	190.0	9.1	0.0
08Aug2050	03:00	0.0	190.0	9.1	0.0
08Aug2050	03:15	0.0	189.6	9.1	35.4
08Aug2050	03:30	0.0	188.5	9.1	91.2
08Aug2050	03:45	0.0	185.6	9.1	199.6
08Aug2050	04:00	0.0	179.9	9.0	354.3
08Aug2050	04:15	0.0	170.6	8.8	552.8
08Aug2050	04:30	0.0	156.9	8.6	754.0
08Aug2050	04:45	0.0	140.8	8.3	802.5
08Aug2050	05:00	0.0	123.1	8.0	820.9
08Aug2050	05:15	0.0	107.4	7.6	702.6
08Aug2050	05:30	0.0	93.9	7.3	605.8
08Aug2050	05:45	0.0	82.3	7.0	526.7
08Aug2050	06:00	0.0	72.2	6.8	453.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	06:15	0.0	63.4	6.5	393.1
08Aug2050	06:30	0.0	55.8	6.3	343.2
08Aug2050	06:45	0.0	49.2	6.1	301.6
08Aug2050	07:00	0.0	43.3	5.9	264.0
08Aug2050	07:15	0.0	38.3	5.8	226.2
08Aug2050	07:30	0.0	33.9	5.6	195.5
08Aug2050	07:45	0.0	30.2	5.5	170.2
08Aug2050	08:00	0.0	26.9	5.3	149.2
08Aug2050	08:15	0.0	24.0	5.2	131.5
08Aug2050	08:30	0.0	21.4	5.1	116.6
08Aug2050	08:45	0.0	19.1	5.1	103.9
08Aug2050	09:00	0.0	17.1	5.0	92.0
08Aug2050	09:15	0.0	15.3	4.9	78.0
08Aug2050	09:30	0.0	13.9	4.8	66.8
08Aug2050	09:45	0.0	12.6	4.7	57.6
08Aug2050	10:00	0.0	11.5	4.7	50.1
08Aug2050	10:15	0.0	10.5	4.6	43.8
08Aug2050	10:30	0.0	9.6	4.6	38.5
08Aug2050	10:45	0.0	8.9	4.5	34.1
08Aug2050	11:00	0.0	8.2	4.5	30.3
08Aug2050	11:15	0.0	7.6	4.4	27.1
08Aug2050	11:30	0.0	7.1	4.4	24.3
08Aug2050	11:45	0.0	6.6	4.4	21.9
08Aug2050	12:00	0.0	6.2	4.4	19.8
08Aug2050	12:15	0.0	5.8	4.3	17.9
08Aug2050	12:30	0.0	5.5	4.3	16.3
08Aug2050	12:45	0.0	5.1	4.3	14.9
08Aug2050	13:00	0.0	4.8	4.3	13.6
08Aug2050	13:15	0.0	4.6	4.3	12.5
08Aug2050	13:30	0.0	4.3	4.2	11.5
08Aug2050	13:45	0.0	4.1	4.2	10.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	14:00	0.0	3.9	4.2	9.8
08Aug2050	14:15	0.0	3.7	4.2	9.1
08Aug2050	14:30	0.0	3.5	4.2	8.4
08Aug2050	14:45	0.0	3.3	4.2	7.8
08Aug2050	15:00	0.0	3.2	4.2	7.3
08Aug2050	15:15	0.0	3.0	4.2	6.8
08Aug2050	15:30	0.0	2.9	4.2	6.3
08Aug2050	15:45	0.0	2.8	4.2	5.9
08Aug2050	16:00	0.0	2.7	4.2	5.5
08Aug2050	16:15	0.0	2.6	4.1	5.2
08Aug2050	16:30	0.0	2.5	4.1	4.9
08Aug2050	16:45	0.0	2.4	4.1	4.6
08Aug2050	17:00	0.0	2.3	4.1	4.3
08Aug2050	17:15	0.0	2.2	4.1	4.1
08Aug2050	17:30	0.0	2.1	4.1	3.8
08Aug2050	17:45	0.0	2.0	4.1	3.6
08Aug2050	18:00	0.0	1.9	4.1	3.4
08Aug2050	18:15	0.0	1.9	4.1	3.3
08Aug2050	18:30	0.0	1.8	4.1	3.1
08Aug2050	18:45	0.0	1.7	4.1	2.9
08Aug2050	19:00	0.0	1.7	4.1	2.8
08Aug2050	19:15	0.0	1.6	4.1	2.6
08Aug2050	19:30	0.0	1.6	4.1	2.5
08Aug2050	19:45	0.0	1.5	4.1	2.4
08Aug2050	20:00	0.0	1.5	4.1	2.3
08Aug2050	20:15	0.0	1.4	4.1	2.2
08Aug2050	20:30	0.0	1.4	4.1	2.1
08Aug2050	20:45	0.0	1.3	4.1	2.0
08Aug2050	21:00	0.0	1.3	4.1	1.9
08Aug2050	21:15	0.0	1.3	4.1	1.8
08Aug2050	21:30	0.0	1.2	4.1	1.7

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	21:45	0.0	1.2	4.1	1.7
08Aug2050	22:00	0.0	1.2	4.1	1.6
08Aug2050	22:15	0.0	1.1	4.1	1.5
08Aug2050	22:30	0.0	1.1	4.1	1.5
08Aug2050	22:45	0.0	1.1	4.1	1.4
08Aug2050	23:00	0.0	1.0	4.1	1.3
08Aug2050	23:15	0.0	1.0	4.1	1.3
08Aug2050	23:30	0.0	1.0	4.1	1.2
08Aug2050	23:45	0.0	1.0	4.1	1.2
09Aug2050	00:00	0.0	0.9	4.1	1.2
09Aug2050	00:15	0.0	0.9	4.1	1.1
09Aug2050	00:30	0.0	0.9	4.1	1.1
09Aug2050	00:45	0.0	0.9	4.0	1.0
09Aug2050	01:00	0.0	0.8	4.0	1.0
09Aug2050	01:15	0.0	0.8	4.0	1.0
09Aug2050	01:30	0.0	0.8	4.0	0.9
09Aug2050	01:45	0.0	0.8	4.0	0.9
09Aug2050	02:00	0.0	0.8	4.0	0.9
09Aug2050	02:15	0.0	0.8	4.0	0.8
09Aug2050	02:30	0.0	0.7	4.0	0.8
09Aug2050	02:45	0.0	0.7	4.0	0.8
09Aug2050	03:00	0.0	0.7	4.0	0.8
09Aug2050	03:15	0.0	0.7	4.0	0.7
09Aug2050	03:30	0.0	0.7	4.0	0.7
09Aug2050	03:45	0.0	0.7	4.0	0.7
09Aug2050	04:00	0.0	0.6	4.0	0.7
09Aug2050	04:15	0.0	0.6	4.0	0.6
09Aug2050	04:30	0.0	0.6	4.0	0.6
09Aug2050	04:45	0.0	0.6	4.0	0.6
09Aug2050	05:00	0.0	0.6	4.0	0.6
09Aug2050	05:15	0.0	0.6	4.0	0.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	05:30	0.0	0.6	4.0	0.5
09Aug2050	05:45	0.0	0.6	4.0	0.5
09Aug2050	06:00	0.0	0.6	4.0	0.5
09Aug2050	06:15	0.0	0.5	4.0	0.5
09Aug2050	06:30	0.0	0.5	4.0	0.5
09Aug2050	06:45	0.0	0.5	4.0	0.5
09Aug2050	07:00	0.0	0.5	4.0	0.5
09Aug2050	07:15	0.0	0.5	4.0	0.4
09Aug2050	07:30	0.0	0.5	4.0	0.4
09Aug2050	07:45	0.0	0.5	4.0	0.4
09Aug2050	08:00	0.0	0.5	4.0	0.4
09Aug2050	08:15	0.0	0.5	4.0	0.4
09Aug2050	08:30	0.0	0.5	4.0	0.4
09Aug2050	08:45	0.0	0.4	4.0	0.4
09Aug2050	09:00	0.0	0.4	4.0	0.4
09Aug2050	09:15	0.0	0.4	4.0	0.4
09Aug2050	09:30	0.0	0.4	4.0	0.4
09Aug2050	09:45	0.0	0.4	4.0	0.3
09Aug2050	10:00	0.0	0.4	4.0	0.3
09Aug2050	10:15	0.0	0.4	4.0	0.3
09Aug2050	10:30	0.0	0.4	4.0	0.3
09Aug2050	10:45	0.0	0.4	4.0	0.3
09Aug2050	11:00	0.0	0.4	4.0	0.3
09Aug2050	11:15	0.0	0.4	4.0	0.3
09Aug2050	11:30	0.0	0.4	4.0	0.3
09Aug2050	11:45	0.0	0.4	4.0	0.3
09Aug2050	12:00	0.0	0.4	4.0	0.3
09Aug2050	12:15	0.0	0.4	4.0	0.3
09Aug2050	12:30	0.0	0.4	4.0	0.3
09Aug2050	12:45	0.0	0.3	4.0	0.3
09Aug2050	13:00	0.0	0.3	4.0	0.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	13:15	0.0	0.3	4.0	0.2
09Aug2050	13:30	0.0	0.3	4.0	0.2
09Aug2050	13:45	0.0	0.3	4.0	0.2
09Aug2050	14:00	0.0	0.3	4.0	0.2
09Aug2050	14:15	0.0	0.3	4.0	0.2
09Aug2050	14:30	0.0	0.3	4.0	0.2
09Aug2050	14:45	0.0	0.3	4.0	0.2
09Aug2050	15:00	0.0	0.3	4.0	0.2
09Aug2050	15:15	0.0	0.3	4.0	0.2
09Aug2050	15:30	0.0	0.3	4.0	0.2
09Aug2050	15:45	0.0	0.3	4.0	0.2
09Aug2050	16:00	0.0	0.3	4.0	0.2
09Aug2050	16:15	0.0	0.3	4.0	0.2
09Aug2050	16:30	0.0	0.3	4.0	0.2
09Aug2050	16:45	0.0	0.3	4.0	0.2
09Aug2050	17:00	0.0	0.3	4.0	0.2
09Aug2050	17:15	0.0	0.3	4.0	0.2
09Aug2050	17:30	0.0	0.3	4.0	0.2
09Aug2050	17:45	0.0	0.3	4.0	0.2
09Aug2050	18:00	0.0	0.3	4.0	0.2
09Aug2050	18:15	0.0	0.3	4.0	0.2
09Aug2050	18:30	0.0	0.2	4.0	0.2
09Aug2050	18:45	0.0	0.2	4.0	0.2
09Aug2050	19:00	0.0	0.2	4.0	0.2
09Aug2050	19:15	0.0	0.2	4.0	0.1
09Aug2050	19:30	0.0	0.2	4.0	0.1
09Aug2050	19:45	0.0	0.2	4.0	0.1
09Aug2050	20:00	0.0	0.2	4.0	0.1
09Aug2050	20:15	0.0	0.2	4.0	0.1
09Aug2050	20:30	0.0	0.2	4.0	0.1
09Aug2050	20:45	0.0	0.2	4.0	0.1

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Project: CranstonHMS

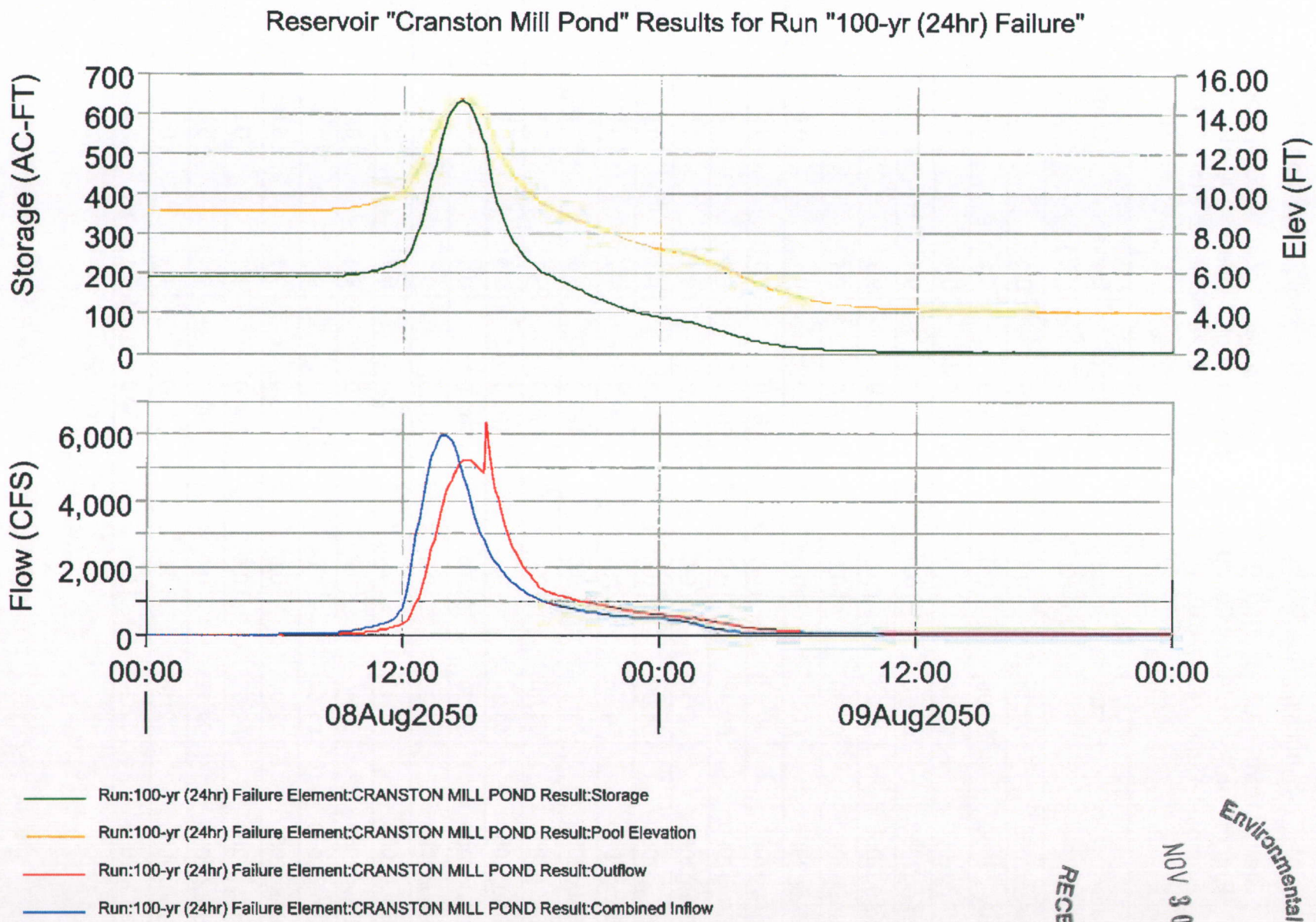
Simulation Run: 100-yr (24hr) Failure Reservoir: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	100-YR Piping Failure
End of Run:	10Aug2050, 00:00	Meteorologic Model:	100-YR (24 hr)
Compute Time:	24Jun2010, 14:23:55	Control Specifications:	24hr (48 total/6 min incr)

Volume Units: IN

Computed Results

Peak Inflow :	5973.6 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 14:00
Peak Outflow :	6360.2 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 15:54
Total Inflow :	5.74 (IN)	Peak Storage :	630.6 (AC-FT)
Total Outflow :	6.23 (IN)	Peak Elevation :	14.7 (FT)



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Project: CranstonHMS
Simulation Run: 100-yr (24hr) Failure Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: 100-YR Piping Failu
End of Run: 10Aug2050, 00:00 Meteorologic Model: 100-YR (24 hr)
Compute Time: 24Jun2010, 14:23:55 Control Specifications: 24hr (48 total/6 min

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.0	190.0	9.1	0.0
08Aug2050	00:48	0.0	190.0	9.1	0.0
08Aug2050	00:54	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:06	0.0	190.0	9.1	0.0
08Aug2050	01:12	0.0	190.0	9.1	0.0
08Aug2050	01:18	0.0	190.0	9.1	0.0
08Aug2050	01:24	0.0	190.0	9.1	0.0
08Aug2050	01:30	0.0	190.0	9.1	0.0
08Aug2050	01:36	0.0	190.0	9.1	0.0
08Aug2050	01:42	0.0	190.0	9.1	0.0
08Aug2050	01:48	0.0	190.0	9.1	0.0
08Aug2050	01:54	0.0	190.0	9.1	0.0
08Aug2050	02:00	0.0	190.0	9.1	0.0
08Aug2050	02:06	0.0	190.0	9.1	0.0
08Aug2050	02:12	0.0	190.0	9.1	0.0
08Aug2050	02:18	0.0	190.0	9.1	0.0
08Aug2050	02:24	0.0	190.0	9.1	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	0.0	190.0	9.1	0.0
08Aug2050	02:36	0.0	190.0	9.1	0.0
08Aug2050	02:42	0.0	190.0	9.1	0.0
08Aug2050	02:48	0.0	190.0	9.1	0.0
08Aug2050	02:54	0.0	190.0	9.1	0.0
08Aug2050	03:00	0.0	190.0	9.1	0.0
08Aug2050	03:06	0.0	190.0	9.1	0.0
08Aug2050	03:12	0.0	190.0	9.1	0.0
08Aug2050	03:18	0.0	190.0	9.1	0.0
08Aug2050	03:24	0.0	190.0	9.1	0.0
08Aug2050	03:30	0.0	190.0	9.1	0.0
08Aug2050	03:36	0.0	190.0	9.1	0.0
08Aug2050	03:42	0.0	190.0	9.1	0.0
08Aug2050	03:48	0.0	190.0	9.1	0.0
08Aug2050	03:54	0.0	190.0	9.1	0.0
08Aug2050	04:00	0.0	190.0	9.1	0.0
08Aug2050	04:06	0.0	190.0	9.1	0.0
08Aug2050	04:12	0.0	190.0	9.1	0.0
08Aug2050	04:18	0.0	190.0	9.1	0.0
08Aug2050	04:24	0.0	190.0	9.1	0.0
08Aug2050	04:30	0.0	190.0	9.1	0.0
08Aug2050	04:36	0.0	190.0	9.1	0.0
08Aug2050	04:42	0.0	190.0	9.1	0.0
08Aug2050	04:48	0.0	190.0	9.1	0.0
08Aug2050	04:54	0.0	190.0	9.1	0.0
08Aug2050	05:00	0.0	190.0	9.1	0.0
08Aug2050	05:06	0.0	190.0	9.1	0.0
08Aug2050	05:12	0.0	190.0	9.1	0.0
08Aug2050	05:18	0.0	190.0	9.1	0.0
08Aug2050	05:24	0.0	190.0	9.1	0.0
08Aug2050	05:30	0.0	190.0	9.1	0.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	0.0	190.0	9.1	0.0
08Aug2050	05:42	0.0	190.0	9.1	0.0
08Aug2050	05:48	0.0	190.0	9.1	0.0
08Aug2050	05:54	0.0	190.0	9.1	0.0
08Aug2050	06:00	0.0	190.0	9.1	0.0
08Aug2050	06:06	0.0	190.0	9.1	0.0
08Aug2050	06:12	0.0	190.0	9.1	0.0
08Aug2050	06:18	0.0	190.0	9.1	0.0
08Aug2050	06:24	0.0	190.0	9.1	0.0
08Aug2050	06:30	0.0	190.0	9.2	0.0
08Aug2050	06:36	0.0	190.0	9.2	0.0
08Aug2050	06:42	0.1	190.0	9.2	0.0
08Aug2050	06:48	0.2	190.0	9.2	0.0
08Aug2050	06:54	0.3	190.0	9.2	0.0
08Aug2050	07:00	0.6	190.0	9.2	0.0
08Aug2050	07:06	0.9	190.0	9.2	0.0
08Aug2050	07:12	1.4	190.0	9.2	0.0
08Aug2050	07:18	2.1	190.0	9.2	0.0
08Aug2050	07:24	3.0	190.1	9.2	0.0
08Aug2050	07:30	4.1	190.1	9.2	0.0
08Aug2050	07:36	5.4	190.1	9.2	0.1
08Aug2050	07:42	7.0	190.2	9.2	0.1
08Aug2050	07:48	8.9	190.2	9.2	0.1
08Aug2050	07:54	11.0	190.3	9.2	0.2
08Aug2050	08:00	13.4	190.4	9.2	0.3
08Aug2050	08:06	16.1	190.5	9.2	0.5
08Aug2050	08:12	19.0	190.7	9.2	0.7
08Aug2050	08:18	22.3	190.8	9.2	1.0
08Aug2050	08:24	25.8	191.0	9.2	1.3
08Aug2050	08:30	29.7	191.2	9.2	1.7
08Aug2050	08:36	33.9	191.5	9.2	2.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	38.5	191.8	9.2	2.9
08Aug2050	08:48	43.6	192.1	9.2	3.7
08Aug2050	08:54	48.9	192.4	9.2	4.7
08Aug2050	09:00	54.7	192.8	9.2	5.9
08Aug2050	09:06	60.9	193.2	9.2	7.2
08Aug2050	09:12	67.5	193.7	9.2	8.8
08Aug2050	09:18	74.6	194.2	9.3	10.7
08Aug2050	09:24	82.2	194.8	9.3	12.9
08Aug2050	09:30	90.3	195.4	9.3	15.4
08Aug2050	09:36	99.0	196.0	9.3	18.2
08Aug2050	09:42	108.1	196.7	9.3	21.5
08Aug2050	09:48	117.8	197.4	9.3	25.1
08Aug2050	09:54	128.0	198.2	9.3	29.3
08Aug2050	10:00	138.6	199.1	9.4	33.9
08Aug2050	10:06	149.8	200.0	9.4	39.0
08Aug2050	10:12	161.6	200.9	9.4	44.6
08Aug2050	10:18	174.0	201.9	9.4	50.9
08Aug2050	10:24	187.2	202.9	9.5	57.7
08Aug2050	10:30	201.2	204.0	9.5	65.2
08Aug2050	10:36	216.0	205.2	9.5	73.4
08Aug2050	10:42	231.8	206.4	9.5	82.3
08Aug2050	10:48	248.7	207.7	9.6	92.0
08Aug2050	10:54	266.8	209.0	9.6	102.6
08Aug2050	11:00	286.4	210.4	9.6	114.0
08Aug2050	11:06	307.6	211.8	9.7	126.5
08Aug2050	11:12	330.7	213.4	9.7	140.1
08Aug2050	11:18	356.2	215.0	9.8	154.9
08Aug2050	11:24	384.4	216.7	9.8	171.1
08Aug2050	11:30	415.7	218.5	9.8	188.9
08Aug2050	11:36	451.6	220.5	9.9	208.5
08Aug2050	11:42	496.5	222.6	9.9	230.5

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	11:48	558.0	224.9	10.0	255.8
08Aug2050	11:54	651.7	227.7	10.0	277.1
08Aug2050	12:00	789.5	231.3	10.1	303.6
08Aug2050	12:06	970.5	235.9	10.2	339.2
08Aug2050	12:12	1199.4	241.8	10.3	387.1
08Aug2050	12:18	1484.7	249.5	10.4	451.3
08Aug2050	12:24	1829.7	259.1	10.5	536.8
08Aug2050	12:30	2222.5	270.9	10.7	648.8
08Aug2050	12:36	2629.2	285.0	10.9	790.9
08Aug2050	12:42	3020.2	301.2	11.2	942.4
08Aug2050	12:48	3388.5	319.2	11.4	1112.9
08Aug2050	12:54	3738.3	338.6	11.7	1307.5
08Aug2050	13:00	4079.2	359.2	11.9	1524.8
08Aug2050	13:06	4415.6	380.8	12.2	1747.6
08Aug2050	13:12	4742.4	403.2	12.4	1991.5
08Aug2050	13:18	5055.0	426.1	12.7	2257.6
08Aug2050	13:24	5336.5	449.2	13.0	2540.5
08Aug2050	13:30	5564.3	472.1	13.2	2804.1
08Aug2050	13:36	5732.5	494.6	13.4	3066.2
08Aug2050	13:42	5849.3	516.0	13.6	3325.3
08Aug2050	13:48	5927.6	536.1	13.8	3575.8
08Aug2050	13:54	5970.0	554.8	14.0	3811.7
08Aug2050	14:00	5973.6	571.7	14.2	4027.3
08Aug2050	14:06	5942.8	586.8	14.3	4236.2
08Aug2050	14:12	5881.0	599.8	14.5	4435.9
08Aug2050	14:18	5784.6	610.6	14.6	4623.7
08Aug2050	14:24	5655.0	618.9	14.6	4796.5
08Aug2050	14:30	5498.5	625.1	14.7	4877.4
08Aug2050	14:36	5321.7	629.0	14.7	4990.6
08Aug2050	14:42	5127.9	630.6	14.7	5081.3
08Aug2050	14:48	4916.5	629.8	14.7	5149.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	14:54	4689.1	626.7	14.7	5194.6
08Aug2050	15:00	4450.7	621.5	14.7	5217.5
08Aug2050	15:06	4211.1	614.1	14.6	5219.3
08Aug2050	15:12	3979.0	604.9	14.5	5202.4
08Aug2050	15:18	3757.0	594.0	14.4	5169.8
08Aug2050	15:24	3548.0	581.7	14.3	5124.6
08Aug2050	15:30	3353.7	568.1	14.2	5069.8
08Aug2050	15:36	3174.8	553.4	14.0	5008.3
08Aug2050	15:42	3012.3	537.9	13.9	4931.8
08Aug2050	15:48	2863.8	521.8	13.7	4853.8
08Aug2050	15:54	2725.3	492.1	13.4	6360.2
08Aug2050	16:00	2594.8	463.6	13.1	5860.4
08Aug2050	16:06	2472.4	438.1	12.8	5395.3
08Aug2050	16:12	2358.5	415.2	12.6	4974.7
08Aug2050	16:18	2252.4	394.7	12.3	4612.7
08Aug2050	16:24	2153.4	376.1	12.1	4299.4
08Aug2050	16:30	2061.8	359.2	11.9	4016.5
08Aug2050	16:36	1975.7	343.8	11.7	3748.1
08Aug2050	16:42	1894.1	329.8	11.5	3511.2
08Aug2050	16:48	1817.1	317.0	11.4	3300.7
08Aug2050	16:54	1744.0	305.2	11.2	3112.4
08Aug2050	17:00	1675.1	294.3	11.1	2943.1
08Aug2050	17:06	1611.0	284.3	10.9	2777.2
08Aug2050	17:12	1551.3	275.1	10.8	2615.3
08Aug2050	17:18	1494.5	266.7	10.7	2471.6
08Aug2050	17:24	1441.2	258.9	10.5	2343.1
08Aug2050	17:30	1391.6	251.7	10.4	2227.6
08Aug2050	17:36	1344.9	245.0	10.3	2123.4
08Aug2050	17:42	1300.8	238.8	10.2	2029.0
08Aug2050	17:48	1259.6	233.0	10.1	1943.1
08Aug2050	17:54	1221.2	227.5	10.0	1864.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	18:00	1184.8	222.4	9.9	1773.6
08Aug2050	18:06	1150.3	217.8	9.8	1679.2
08Aug2050	18:12	1117.8	213.6	9.7	1597.8
08Aug2050	18:18	1087.5	209.8	9.6	1527.0
08Aug2050	18:24	1058.8	206.3	9.5	1464.9
08Aug2050	18:30	1031.5	203.1	9.5	1410.1
08Aug2050	18:36	1005.8	200.0	9.4	1361.5
08Aug2050	18:42	981.6	197.2	9.3	1318.5
08Aug2050	18:48	958.8	194.5	9.3	1280.4
08Aug2050	18:54	937.0	191.9	9.2	1247.2
08Aug2050	19:00	916.1	189.3	9.1	1222.2
08Aug2050	19:06	896.6	186.8	9.1	1205.6
08Aug2050	19:12	878.3	184.2	9.1	1188.9
08Aug2050	19:18	860.5	181.6	9.0	1172.3
08Aug2050	19:24	843.5	179.1	9.0	1155.7
08Aug2050	19:30	827.1	176.5	8.9	1139.2
08Aug2050	19:36	811.3	173.9	8.9	1122.9
08Aug2050	19:42	796.0	171.3	8.8	1106.6
08Aug2050	19:48	780.8	168.8	8.8	1090.5
08Aug2050	19:54	766.4	166.2	8.7	1074.6
08Aug2050	20:00	752.5	163.7	8.7	1058.9
08Aug2050	20:06	739.0	161.1	8.7	1043.3
08Aug2050	20:12	725.7	158.6	8.6	1028.0
08Aug2050	20:18	713.1	156.1	8.6	1012.8
08Aug2050	20:24	700.5	153.7	8.5	997.9
08Aug2050	20:30	688.1	151.2	8.5	983.2
08Aug2050	20:36	676.0	148.8	8.4	968.7
08Aug2050	20:42	664.2	146.4	8.4	954.4
08Aug2050	20:48	653.3	144.0	8.4	940.3
08Aug2050	20:54	642.9	141.7	8.3	926.5
08Aug2050	21:00	632.6	139.3	8.3	912.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	21:06	622.5	137.0	8.2	899.6
08Aug2050	21:12	612.6	134.7	8.2	886.5
08Aug2050	21:18	603.2	132.5	8.2	873.6
08Aug2050	21:24	594.1	130.3	8.1	860.9
08Aug2050	21:30	585.2	128.1	8.1	848.6
08Aug2050	21:36	576.7	125.9	8.1	836.4
08Aug2050	21:42	568.4	123.8	8.0	824.5
08Aug2050	21:48	560.2	121.7	8.0	811.0
08Aug2050	21:54	552.3	119.7	7.9	795.1
08Aug2050	22:00	544.8	117.7	7.9	779.9
08Aug2050	22:06	537.8	115.8	7.8	765.2
08Aug2050	22:12	531.6	113.9	7.8	751.1
08Aug2050	22:18	525.8	112.1	7.8	737.7
08Aug2050	22:24	520.1	110.4	7.7	724.8
08Aug2050	22:30	514.5	108.8	7.7	712.4
08Aug2050	22:36	509.0	107.1	7.6	700.5
08Aug2050	22:42	503.9	105.6	7.6	689.0
08Aug2050	22:48	499.2	104.1	7.6	678.0
08Aug2050	22:54	494.9	102.6	7.5	667.5
08Aug2050	23:00	491.2	101.2	7.5	657.4
08Aug2050	23:06	487.8	99.9	7.5	647.8
08Aug2050	23:12	484.6	98.6	7.4	638.5
08Aug2050	23:18	481.6	97.3	7.4	629.7
08Aug2050	23:24	478.7	96.1	7.4	621.2
08Aug2050	23:30	475.9	95.0	7.3	613.1
08Aug2050	23:36	473.1	93.9	7.3	605.3
08Aug2050	23:42	470.3	92.8	7.3	597.9
08Aug2050	23:48	467.6	91.8	7.3	590.7
08Aug2050	23:54	465.0	90.8	7.2	583.9
09Aug2050	00:00	462.6	89.8	7.2	577.3
09Aug2050	00:06	460.2	88.9	7.2	570.9

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	00:12	457.5	88.0	7.2	564.8
09Aug2050	00:18	454.2	87.1	7.1	558.9
09Aug2050	00:24	450.3	86.2	7.1	553.1
09Aug2050	00:30	445.5	85.4	7.1	547.4
09Aug2050	00:36	439.6	84.5	7.1	541.8
09Aug2050	00:42	432.5	83.7	7.1	536.2
09Aug2050	00:48	423.9	82.8	7.0	530.4
09Aug2050	00:54	414.3	81.9	7.0	524.5
09Aug2050	01:00	403.8	81.0	7.0	518.4
09Aug2050	01:06	392.3	80.0	7.0	511.2
09Aug2050	01:12	379.9	79.0	6.9	503.8
09Aug2050	01:18	366.7	78.0	6.9	496.0
09Aug2050	01:24	352.8	76.9	6.9	488.0
09Aug2050	01:30	337.9	75.7	6.9	479.6
09Aug2050	01:36	322.3	74.5	6.8	470.9
09Aug2050	01:42	306.1	73.3	6.8	461.8
09Aug2050	01:48	289.6	72.0	6.8	452.4
09Aug2050	01:54	273.1	70.6	6.7	442.7
09Aug2050	02:00	256.7	69.2	6.7	432.6
09Aug2050	02:06	240.4	67.7	6.6	422.3
09Aug2050	02:12	224.4	66.2	6.6	411.8
09Aug2050	02:18	208.7	64.6	6.5	401.1
09Aug2050	02:24	193.5	63.0	6.5	390.2
09Aug2050	02:30	178.8	61.3	6.5	379.2
09Aug2050	02:36	164.8	59.7	6.4	368.2
09Aug2050	02:42	151.4	58.0	6.4	357.1
09Aug2050	02:48	138.8	56.3	6.3	346.1
09Aug2050	02:54	126.9	54.6	6.3	335.1
09Aug2050	03:00	115.8	52.8	6.2	324.3
09Aug2050	03:06	105.6	51.1	6.2	313.6
09Aug2050	03:12	96.2	49.4	6.1	303.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	03:18	87.7	47.7	6.1	292.7
09Aug2050	03:24	79.9	46.0	6.0	282.6
09Aug2050	03:30	72.9	44.4	6.0	272.0
09Aug2050	03:36	66.5	42.7	5.9	259.5
09Aug2050	03:42	60.8	41.2	5.9	247.6
09Aug2050	03:48	55.6	39.7	5.8	236.3
09Aug2050	03:54	50.8	38.2	5.8	225.6
09Aug2050	04:00	46.4	36.8	5.7	215.4
09Aug2050	04:06	42.4	35.4	5.7	205.7
09Aug2050	04:12	38.8	34.1	5.6	196.5
09Aug2050	04:18	35.5	32.8	5.6	187.7
09Aug2050	04:24	32.4	31.5	5.5	179.4
09Aug2050	04:30	29.6	30.4	5.5	171.5
09Aug2050	04:36	27.1	29.2	5.4	164.0
09Aug2050	04:42	24.7	28.1	5.4	156.9
09Aug2050	04:48	22.6	27.0	5.4	150.2
09Aug2050	04:54	20.6	26.0	5.3	143.8
09Aug2050	05:00	18.8	25.0	5.3	137.7
09Aug2050	05:06	17.2	24.0	5.2	131.9
09Aug2050	05:12	15.7	23.1	5.2	126.4
09Aug2050	05:18	14.3	22.2	5.2	121.1
09Aug2050	05:24	13.1	21.3	5.1	116.1
09Aug2050	05:30	11.9	20.5	5.1	111.4
09Aug2050	05:36	10.9	19.7	5.1	106.9
09Aug2050	05:42	10.0	18.9	5.1	102.6
09Aug2050	05:48	9.1	18.1	5.0	98.6
09Aug2050	05:54	8.3	17.4	5.0	94.6
09Aug2050	06:00	7.6	16.7	5.0	89.0
09Aug2050	06:06	6.9	16.1	4.9	83.7
09Aug2050	06:12	6.3	15.5	4.9	78.9
09Aug2050	06:18	5.8	14.9	4.9	74.4

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	06:24	5.3	14.3	4.8	70.2
09Aug2050	06:30	4.8	13.8	4.8	66.4
09Aug2050	06:36	4.4	13.3	4.8	62.8
09Aug2050	06:42	4.0	12.8	4.7	59.4
09Aug2050	06:48	3.6	12.4	4.7	56.3
09Aug2050	06:54	3.3	12.0	4.7	53.4
09Aug2050	07:00	3.0	11.6	4.7	50.7
09Aug2050	07:06	2.7	11.2	4.6	48.2
09Aug2050	07:12	2.4	10.8	4.6	45.8
09Aug2050	07:18	2.2	10.5	4.6	43.5
09Aug2050	07:24	2.0	10.1	4.6	41.5
09Aug2050	07:30	1.8	9.8	4.6	39.5
09Aug2050	07:36	1.6	9.5	4.5	37.7
09Aug2050	07:42	1.4	9.2	4.5	35.9
09Aug2050	07:48	1.3	8.9	4.5	34.3
09Aug2050	07:54	1.1	8.7	4.5	32.7
09Aug2050	08:00	1.0	8.4	4.5	31.3
09Aug2050	08:06	0.9	8.2	4.5	29.9
09Aug2050	08:12	0.8	7.9	4.5	28.6
09Aug2050	08:18	0.7	7.7	4.4	27.4
09Aug2050	08:24	0.6	7.5	4.4	26.3
09Aug2050	08:30	0.5	7.3	4.4	25.2
09Aug2050	08:36	0.5	7.1	4.4	24.1
09Aug2050	08:42	0.4	6.9	4.4	23.1
09Aug2050	08:48	0.4	6.7	4.4	22.2
09Aug2050	08:54	0.3	6.5	4.4	21.3
09Aug2050	09:00	0.3	6.4	4.4	20.5
09Aug2050	09:06	0.2	6.2	4.4	19.7
09Aug2050	09:12	0.2	6.0	4.3	18.9
09Aug2050	09:18	0.2	5.9	4.3	18.2
09Aug2050	09:24	0.1	5.7	4.3	17.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	09:30	0.1	5.6	4.3	16.9
09Aug2050	09:36	0.1	5.5	4.3	16.3
09Aug2050	09:42	0.1	5.3	4.3	15.7
09Aug2050	09:48	0.0	5.2	4.3	15.1
09Aug2050	09:54	0.0	5.1	4.3	14.6
09Aug2050	10:00	0.0	5.0	4.3	14.1
09Aug2050	10:06	0.0	4.8	4.3	13.6
09Aug2050	10:12	0.0	4.7	4.3	13.1
09Aug2050	10:18	0.0	4.6	4.3	12.7
09Aug2050	10:24	0.0	4.5	4.3	12.3
09Aug2050	10:30	0.0	4.4	4.3	11.9
09Aug2050	10:36	0.0	4.3	4.2	11.5
09Aug2050	10:42	0.0	4.2	4.2	11.1
09Aug2050	10:48	0.0	4.1	4.2	10.7
09Aug2050	10:54	0.0	4.1	4.2	10.4
09Aug2050	11:00	0.0	4.0	4.2	10.1
09Aug2050	11:06	0.0	3.9	4.2	9.8
09Aug2050	11:12	0.0	3.8	4.2	9.5
09Aug2050	11:18	0.0	3.7	4.2	9.2
09Aug2050	11:24	0.0	3.7	4.2	8.9
09Aug2050	11:30	0.0	3.6	4.2	8.6
09Aug2050	11:36	0.0	3.5	4.2	8.4
09Aug2050	11:42	0.0	3.4	4.2	8.1
09Aug2050	11:48	0.0	3.4	4.2	7.9
09Aug2050	11:54	0.0	3.3	4.2	7.7
09Aug2050	12:00	0.0	3.2	4.2	7.5
09Aug2050	12:06	0.0	3.2	4.2	7.3
09Aug2050	12:12	0.0	3.1	4.2	7.1
09Aug2050	12:18	0.0	3.1	4.2	6.9
09Aug2050	12:24	0.0	3.0	4.2	6.7
09Aug2050	12:30	0.0	3.0	4.2	6.5

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	12:36	0.0	2.9	4.2	6.3
09Aug2050	12:42	0.0	2.9	4.2	6.2
09Aug2050	12:48	0.0	2.8	4.2	6.0
09Aug2050	12:54	0.0	2.8	4.2	5.8
09Aug2050	13:00	0.0	2.7	4.2	5.7
09Aug2050	13:06	0.0	2.7	4.2	5.5
09Aug2050	13:12	0.0	2.6	4.2	5.4
09Aug2050	13:18	0.0	2.6	4.1	5.3
09Aug2050	13:24	0.0	2.5	4.1	5.1
09Aug2050	13:30	0.0	2.5	4.1	5.0
09Aug2050	13:36	0.0	2.4	4.1	4.9
09Aug2050	13:42	0.0	2.4	4.1	4.8
09Aug2050	13:48	0.0	2.4	4.1	4.6
09Aug2050	13:54	0.0	2.3	4.1	4.5
09Aug2050	14:00	0.0	2.3	4.1	4.4
09Aug2050	14:06	0.0	2.3	4.1	4.3
09Aug2050	14:12	0.0	2.2	4.1	4.2
09Aug2050	14:18	0.0	2.2	4.1	4.1
09Aug2050	14:24	0.0	2.2	4.1	4.0
09Aug2050	14:30	0.0	2.1	4.1	3.9
09Aug2050	14:36	0.0	2.1	4.1	3.8
09Aug2050	14:42	0.0	2.1	4.1	3.8
09Aug2050	14:48	0.0	2.0	4.1	3.7
09Aug2050	14:54	0.0	2.0	4.1	3.6
09Aug2050	15:00	0.0	2.0	4.1	3.5
09Aug2050	15:06	0.0	1.9	4.1	3.4
09Aug2050	15:12	0.0	1.9	4.1	3.4
09Aug2050	15:18	0.0	1.9	4.1	3.3
09Aug2050	15:24	0.0	1.9	4.1	3.2
09Aug2050	15:30	0.0	1.8	4.1	3.2
09Aug2050	15:36	0.0	1.8	4.1	3.1

Project: CranstonHMS

Simulation Run: 100-yr (24hr) No Fail Reservoir: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	No Failure
End of Run:	10Aug2050, 00:00	Meteorologic Model:	100-YR (24 hr)
Compute Time:	24Jun2010, 14:20:45	Control Specifications:	24hr (48 total/6 min incr)

Volume Units: IN

Computed Results

Peak Inflow :	5973.6 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 14:00
Peak Outflow :	4877.6 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 14:48
Total Inflow :	5.74 (IN)	Peak Storage :	637.8 (AC-FT)
Total Outflow :	5.74 (IN)	Peak Elevation :	14.8 (FT)

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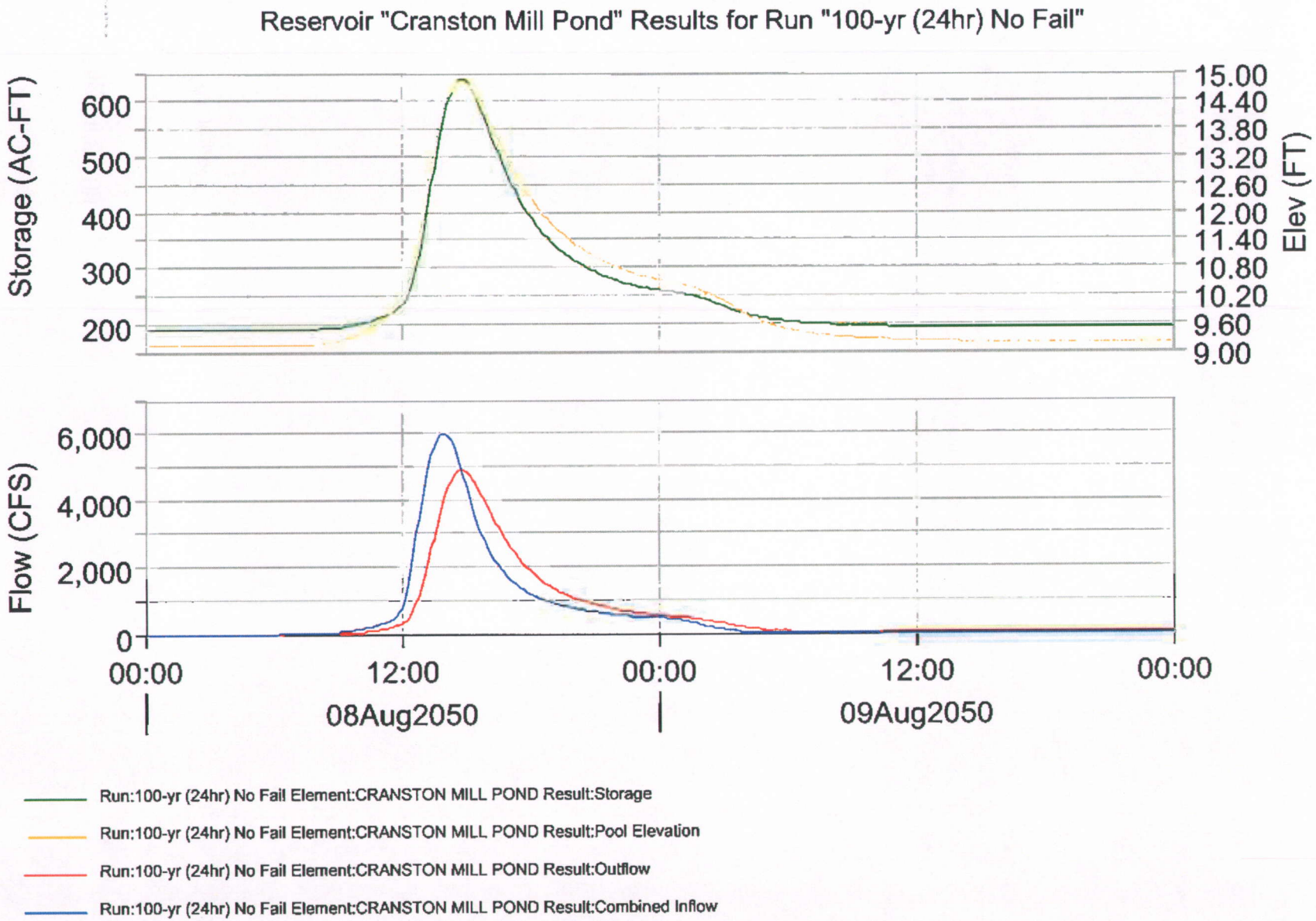
Reservoir "Cranston Mill Pond" Results for Run "100-yr (24hr) No Fail"
Storage (AC-FT)
600
500
400
300
200
Elev (FT)
15.00
14.40
13.80
13.20
12.60
12.00
11.40
10.80
10.20
9.60
9.00
Flow (CFS)
6,000
4,000
2,000
0
00:00
12:00
00:00
12:00
00:00
08Aug2050
09Aug2050
Run:100-yr (24hr) No Fail Element:CRANSTON MILL POND Result:Storage
Run:100-yr (24hr) No Fail Element:CRANSTON MILL POND Result:Pool Elevation
Run:100-yr (24hr) No Fail Element:CRANSTON MILL POND Result:Outflow
Run:100-yr (24hr) No Fail Element:CRANSTON MILL POND Result:Combined Inflow

Project: CranstonHMS
Simulation Run: 100-yr (24hr) No Fail Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: No Failure
End of Run: 10Aug2050, 00:00 Meteorologic Model: 100-YR (24 hr)
Compute Time: 24Jun2010, 14:20:45 Control Specifications: 24hr (48 total/6 min

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.0	190.0	9.1	0.0
08Aug2050	00:48	0.0	190.0	9.1	0.0
08Aug2050	00:54	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:06	0.0	190.0	9.1	0.0
08Aug2050	01:12	0.0	190.0	9.1	0.0
08Aug2050	01:18	0.0	190.0	9.1	0.0
08Aug2050	01:24	0.0	190.0	9.1	0.0
08Aug2050	01:30	0.0	190.0	9.1	0.0
08Aug2050	01:36	0.0	190.0	9.1	0.0
08Aug2050	01:42	0.0	190.0	9.1	0.0
08Aug2050	01:48	0.0	190.0	9.1	0.0
08Aug2050	01:54	0.0	190.0	9.1	0.0
08Aug2050	02:00	0.0	190.0	9.1	0.0
08Aug2050	02:06	0.0	190.0	9.1	0.0
08Aug2050	02:12	0.0	190.0	9.1	0.0
08Aug2050	02:18	0.0	190.0	9.1	0.0
08Aug2050	02:24	0.0	190.0	9.1	0.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	0.0	190.0	9.1	0.0
08Aug2050	02:36	0.0	190.0	9.1	0.0
08Aug2050	02:42	0.0	190.0	9.1	0.0
08Aug2050	02:48	0.0	190.0	9.1	0.0
08Aug2050	02:54	0.0	190.0	9.1	0.0
08Aug2050	03:00	0.0	190.0	9.1	0.0
08Aug2050	03:06	0.0	190.0	9.1	0.0
08Aug2050	03:12	0.0	190.0	9.1	0.0
08Aug2050	03:18	0.0	190.0	9.1	0.0
08Aug2050	03:24	0.0	190.0	9.1	0.0
08Aug2050	03:30	0.0	190.0	9.1	0.0
08Aug2050	03:36	0.0	190.0	9.1	0.0
08Aug2050	03:42	0.0	190.0	9.1	0.0
08Aug2050	03:48	0.0	190.0	9.1	0.0
08Aug2050	03:54	0.0	190.0	9.1	0.0
08Aug2050	04:00	0.0	190.0	9.1	0.0
08Aug2050	04:06	0.0	190.0	9.1	0.0
08Aug2050	04:12	0.0	190.0	9.1	0.0
08Aug2050	04:18	0.0	190.0	9.1	0.0
08Aug2050	04:24	0.0	190.0	9.1	0.0
08Aug2050	04:30	0.0	190.0	9.1	0.0
08Aug2050	04:36	0.0	190.0	9.1	0.0
08Aug2050	04:42	0.0	190.0	9.1	0.0
08Aug2050	04:48	0.0	190.0	9.1	0.0
08Aug2050	04:54	0.0	190.0	9.1	0.0
08Aug2050	05:00	0.0	190.0	9.1	0.0
08Aug2050	05:06	0.0	190.0	9.1	0.0
08Aug2050	05:12	0.0	190.0	9.1	0.0
08Aug2050	05:18	0.0	190.0	9.1	0.0
08Aug2050	05:24	0.0	190.0	9.1	0.0
08Aug2050	05:30	0.0	190.0	9.1	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	0.0	190.0	9.1	0.0
08Aug2050	05:42	0.0	190.0	9.1	0.0
08Aug2050	05:48	0.0	190.0	9.1	0.0
08Aug2050	05:54	0.0	190.0	9.1	0.0
08Aug2050	06:00	0.0	190.0	9.1	0.0
08Aug2050	06:06	0.0	190.0	9.1	0.0
08Aug2050	06:12	0.0	190.0	9.1	0.0
08Aug2050	06:18	0.0	190.0	9.1	0.0
08Aug2050	06:24	0.0	190.0	9.1	0.0
08Aug2050	06:30	0.0	190.0	9.2	0.0
08Aug2050	06:36	0.0	190.0	9.2	0.0
08Aug2050	06:42	0.1	190.0	9.2	0.0
08Aug2050	06:48	0.2	190.0	9.2	0.0
08Aug2050	06:54	0.3	190.0	9.2	0.0
08Aug2050	07:00	0.6	190.0	9.2	0.0
08Aug2050	07:06	0.9	190.0	9.2	0.0
08Aug2050	07:12	1.4	190.0	9.2	0.0
08Aug2050	07:18	2.1	190.0	9.2	0.0
08Aug2050	07:24	3.0	190.1	9.2	0.0
08Aug2050	07:30	4.1	190.1	9.2	0.0
08Aug2050	07:36	5.4	190.1	9.2	0.1
08Aug2050	07:42	7.0	190.2	9.2	0.1
08Aug2050	07:48	8.9	190.2	9.2	0.1
08Aug2050	07:54	11.0	190.3	9.2	0.2
08Aug2050	08:00	13.4	190.4	9.2	0.3
08Aug2050	08:06	16.1	190.5	9.2	0.5
08Aug2050	08:12	19.0	190.7	9.2	0.7
08Aug2050	08:18	22.3	190.8	9.2	1.0
08Aug2050	08:24	25.8	191.0	9.2	1.3
08Aug2050	08:30	29.7	191.2	9.2	1.7
08Aug2050	08:36	33.9	191.5	9.2	2.3

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	38.5	191.8	9.2	2.9
08Aug2050	08:48	43.6	192.1	9.2	3.7
08Aug2050	08:54	48.9	192.4	9.2	4.7
08Aug2050	09:00	54.7	192.8	9.2	5.9
08Aug2050	09:06	60.9	193.2	9.2	7.2
08Aug2050	09:12	67.5	193.7	9.2	8.8
08Aug2050	09:18	74.6	194.2	9.3	10.7
08Aug2050	09:24	82.2	194.8	9.3	12.9
08Aug2050	09:30	90.3	195.4	9.3	15.4
08Aug2050	09:36	99.0	196.0	9.3	18.2
08Aug2050	09:42	108.1	196.7	9.3	21.5
08Aug2050	09:48	117.8	197.4	9.3	25.1
08Aug2050	09:54	128.0	198.2	9.3	29.3
08Aug2050	10:00	138.6	199.1	9.4	33.9
08Aug2050	10:06	149.8	200.0	9.4	39.0
08Aug2050	10:12	161.6	200.9	9.4	44.6
08Aug2050	10:18	174.0	201.9	9.4	50.9
08Aug2050	10:24	187.2	202.9	9.5	57.7
08Aug2050	10:30	201.2	204.0	9.5	65.2
08Aug2050	10:36	216.0	205.2	9.5	73.4
08Aug2050	10:42	231.8	206.4	9.5	82.3
08Aug2050	10:48	248.7	207.7	9.6	92.0
08Aug2050	10:54	266.8	209.0	9.6	102.6
08Aug2050	11:00	286.4	210.4	9.6	114.0
08Aug2050	11:06	307.6	211.8	9.7	126.5
08Aug2050	11:12	330.7	213.4	9.7	140.1
08Aug2050	11:18	356.2	215.0	9.8	154.9
08Aug2050	11:24	384.4	216.7	9.8	171.1
08Aug2050	11:30	415.7	218.5	9.8	188.9
08Aug2050	11:36	451.6	220.5	9.9	208.5
08Aug2050	11:42	496.5	222.6	9.9	230.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	11:48	558.0	224.9	10.0	255.8
08Aug2050	11:54	651.7	227.7	10.0	277.1
08Aug2050	12:00	789.5	231.3	10.1	303.6
08Aug2050	12:06	970.5	235.9	10.2	339.2
08Aug2050	12:12	1199.4	241.8	10.3	387.1
08Aug2050	12:18	1484.7	249.5	10.4	451.3
08Aug2050	12:24	1829.7	259.1	10.5	536.8
08Aug2050	12:30	2222.5	270.9	10.7	648.8
08Aug2050	12:36	2629.2	285.0	10.9	790.9
08Aug2050	12:42	3020.2	301.2	11.2	942.4
08Aug2050	12:48	3388.5	319.2	11.4	1112.9
08Aug2050	12:54	3738.3	338.6	11.7	1307.5
08Aug2050	13:00	4079.2	359.2	11.9	1524.8
08Aug2050	13:06	4415.6	380.8	12.2	1747.6
08Aug2050	13:12	4742.4	403.2	12.4	1991.5
08Aug2050	13:18	5055.0	426.1	12.7	2257.6
08Aug2050	13:24	5336.5	449.2	13.0	2540.5
08Aug2050	13:30	5564.3	472.1	13.2	2804.1
08Aug2050	13:36	5732.5	494.6	13.4	3066.2
08Aug2050	13:42	5849.3	516.0	13.6	3325.3
08Aug2050	13:48	5927.6	536.1	13.8	3575.8
08Aug2050	13:54	5970.0	554.8	14.0	3811.7
08Aug2050	14:00	5973.6	571.7	14.2	4021.7
08Aug2050	14:06	5942.8	586.9	14.3	4213.4
08Aug2050	14:12	5881.0	600.3	14.5	4384.1
08Aug2050	14:18	5784.6	611.6	14.6	4531.5
08Aug2050	14:24	5655.0	621.0	14.7	4653.6
08Aug2050	14:30	5498.5	628.2	14.7	4749.2
08Aug2050	14:36	5321.7	633.4	14.8	4818.1
08Aug2050	14:42	5127.9	636.6	14.8	4860.7
08Aug2050	14:48	4916.5	637.8	14.8	4877.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	14:54	4689.1	637.2	14.8	4869.7
08Aug2050	15:00	4450.7	634.9	14.8	4838.3
08Aug2050	15:06	4211.1	630.9	14.8	4785.4
08Aug2050	15:12	3979.0	625.5	14.7	4713.6
08Aug2050	15:18	3757.0	618.9	14.6	4626.2
08Aug2050	15:24	3548.0	611.2	14.6	4526.2
08Aug2050	15:30	3353.7	602.8	14.5	4416.7
08Aug2050	15:36	3174.8	593.8	14.4	4300.4
08Aug2050	15:42	3012.3	584.3	14.3	4179.7
08Aug2050	15:48	2863.8	574.5	14.2	4056.8
08Aug2050	15:54	2725.3	564.6	14.1	3933.1
08Aug2050	16:00	2594.8	554.6	14.0	3809.7
08Aug2050	16:06	2472.4	544.6	13.9	3682.8
08Aug2050	16:12	2358.5	534.6	13.8	3556.8
08Aug2050	16:18	2252.4	524.8	13.7	3433.8
08Aug2050	16:24	2153.4	515.1	13.6	3314.4
08Aug2050	16:30	2061.8	505.6	13.5	3198.8
08Aug2050	16:36	1975.7	496.3	13.4	3087.2
08Aug2050	16:42	1894.1	487.2	13.3	2979.7
08Aug2050	16:48	1817.1	478.4	13.3	2876.1
08Aug2050	16:54	1744.0	469.7	13.2	2776.6
08Aug2050	17:00	1675.1	461.3	13.1	2680.9
08Aug2050	17:06	1611.0	453.1	13.0	2589.0
08Aug2050	17:12	1551.3	445.2	12.9	2490.5
08Aug2050	17:18	1494.5	437.6	12.8	2396.5
08Aug2050	17:24	1441.2	430.3	12.7	2307.7
08Aug2050	17:30	1391.6	423.3	12.7	2223.8
08Aug2050	17:36	1344.9	416.5	12.6	2144.5
08Aug2050	17:42	1300.8	410.0	12.5	2069.6
08Aug2050	17:48	1259.6	403.8	12.4	1998.7
08Aug2050	17:54	1221.2	397.8	12.4	1931.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	18:00	1184.8	392.1	12.3	1868.3
08Aug2050	18:06	1150.3	386.5	12.2	1808.4
08Aug2050	18:12	1117.8	381.2	12.2	1751.7
08Aug2050	18:18	1087.5	376.0	12.1	1698.2
08Aug2050	18:24	1058.8	371.1	12.1	1647.7
08Aug2050	18:30	1031.5	366.3	12.0	1600.2
08Aug2050	18:36	1005.8	361.7	12.0	1551.5
08Aug2050	18:42	981.6	357.3	11.9	1503.8
08Aug2050	18:48	958.8	353.0	11.8	1458.5
08Aug2050	18:54	937.0	349.0	11.8	1415.7
08Aug2050	19:00	916.1	345.1	11.7	1375.0
08Aug2050	19:06	896.6	341.4	11.7	1336.4
08Aug2050	19:12	878.3	337.9	11.6	1299.7
08Aug2050	19:18	860.5	334.4	11.6	1264.9
08Aug2050	19:24	843.5	331.2	11.6	1231.7
08Aug2050	19:30	827.1	328.0	11.5	1200.2
08Aug2050	19:36	811.3	325.0	11.5	1170.1
08Aug2050	19:42	796.0	322.1	11.4	1141.4
08Aug2050	19:48	780.8	319.3	11.4	1114.0
08Aug2050	19:54	766.4	316.6	11.4	1087.7
08Aug2050	20:00	752.5	314.0	11.3	1062.6
08Aug2050	20:06	739.0	311.5	11.3	1038.5
08Aug2050	20:12	725.7	309.0	11.3	1015.4
08Aug2050	20:18	713.1	306.7	11.2	993.3
08Aug2050	20:24	700.5	304.4	11.2	972.0
08Aug2050	20:30	688.1	302.2	11.2	951.5
08Aug2050	20:36	676.0	300.0	11.1	931.7
08Aug2050	20:42	664.2	297.9	11.1	912.7
08Aug2050	20:48	653.3	295.9	11.1	894.3
08Aug2050	20:54	642.9	294.0	11.1	876.6
08Aug2050	21:00	632.6	292.1	11.0	859.5

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	21:06	622.5	290.2	11.0	843.0
08Aug2050	21:12	612.6	288.4	11.0	826.5
08Aug2050	21:18	603.2	286.7	11.0	808.3
08Aug2050	21:24	594.1	285.0	10.9	790.9
08Aug2050	21:30	585.2	283.4	10.9	774.4
08Aug2050	21:36	576.7	281.9	10.9	758.6
08Aug2050	21:42	568.4	280.4	10.9	743.5
08Aug2050	21:48	560.2	279.0	10.8	729.0
08Aug2050	21:54	552.3	277.6	10.8	715.2
08Aug2050	22:00	544.8	276.3	10.8	701.9
08Aug2050	22:06	537.8	275.0	10.8	689.2
08Aug2050	22:12	531.6	273.8	10.8	677.0
08Aug2050	22:18	525.8	272.6	10.7	665.4
08Aug2050	22:24	520.1	271.5	10.7	654.3
08Aug2050	22:30	514.5	270.4	10.7	643.7
08Aug2050	22:36	509.0	269.4	10.7	633.6
08Aug2050	22:42	503.9	268.3	10.7	623.8
08Aug2050	22:48	499.2	267.4	10.7	614.5
08Aug2050	22:54	494.9	266.4	10.6	605.6
08Aug2050	23:00	491.2	265.5	10.6	597.1
08Aug2050	23:06	487.8	264.7	10.6	589.0
08Aug2050	23:12	484.6	263.9	10.6	581.3
08Aug2050	23:18	481.6	263.1	10.6	574.0
08Aug2050	23:24	478.7	262.3	10.6	567.0
08Aug2050	23:30	475.9	261.6	10.6	560.3
08Aug2050	23:36	473.1	260.9	10.6	554.0
08Aug2050	23:42	470.3	260.3	10.6	548.0
08Aug2050	23:48	467.6	259.7	10.5	542.2
08Aug2050	23:54	465.0	259.1	10.5	536.6
09Aug2050	00:00	462.6	258.5	10.5	531.3
09Aug2050	00:06	460.2	257.9	10.5	526.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	00:12	457.5	257.4	10.5	521.4
09Aug2050	00:18	454.2	256.9	10.5	516.7
09Aug2050	00:24	450.3	256.4	10.5	512.0
09Aug2050	00:30	445.5	255.8	10.5	507.4
09Aug2050	00:36	439.6	255.3	10.5	502.8
09Aug2050	00:42	432.5	254.8	10.5	498.0
09Aug2050	00:48	423.9	254.2	10.5	493.1
09Aug2050	00:54	414.3	253.6	10.4	487.8
09Aug2050	01:00	403.8	253.0	10.4	482.3
09Aug2050	01:06	392.3	252.3	10.4	476.4
09Aug2050	01:12	379.9	251.6	10.4	470.1
09Aug2050	01:18	366.7	250.9	10.4	463.3
09Aug2050	01:24	352.8	250.0	10.4	456.1
09Aug2050	01:30	337.9	249.1	10.4	448.5
09Aug2050	01:36	322.3	248.2	10.4	440.4
09Aug2050	01:42	306.1	247.2	10.3	431.8
09Aug2050	01:48	289.6	246.1	10.3	422.7
09Aug2050	01:54	273.1	245.0	10.3	413.2
09Aug2050	02:00	256.7	243.8	10.3	403.3
09Aug2050	02:06	240.4	242.6	10.3	393.1
09Aug2050	02:12	224.4	241.3	10.3	382.5
09Aug2050	02:18	208.7	240.0	10.2	371.7
09Aug2050	02:24	193.5	238.6	10.2	360.7
09Aug2050	02:30	178.8	237.2	10.2	349.6
09Aug2050	02:36	164.8	235.8	10.2	338.4
09Aug2050	02:42	151.4	234.3	10.1	327.1
09Aug2050	02:48	138.8	232.9	10.1	315.9
09Aug2050	02:54	126.9	231.4	10.1	304.7
09Aug2050	03:00	115.8	229.9	10.1	293.6
09Aug2050	03:06	105.6	228.5	10.1	282.7
09Aug2050	03:12	96.2	227.0	10.0	272.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	03:18	87.7	225.6	10.0	261.5
09Aug2050	03:24	79.9	224.2	10.0	247.6
09Aug2050	03:30	72.9	222.8	9.9	233.0
09Aug2050	03:36	66.5	221.5	9.9	219.4
09Aug2050	03:42	60.8	220.3	9.9	206.6
09Aug2050	03:48	55.6	219.1	9.9	194.7
09Aug2050	03:54	50.8	218.0	9.8	183.5
09Aug2050	04:00	46.4	216.9	9.8	173.1
09Aug2050	04:06	42.4	215.9	9.8	163.3
09Aug2050	04:12	38.8	214.9	9.8	154.1
09Aug2050	04:18	35.5	214.0	9.7	145.6
09Aug2050	04:24	32.4	213.1	9.7	137.5
09Aug2050	04:30	29.6	212.2	9.7	130.0
09Aug2050	04:36	27.1	211.4	9.7	123.0
09Aug2050	04:42	24.7	210.6	9.6	116.4
09Aug2050	04:48	22.6	209.9	9.6	110.2
09Aug2050	04:54	20.6	209.2	9.6	104.3
09Aug2050	05:00	18.8	208.5	9.6	98.9
09Aug2050	05:06	17.2	207.9	9.6	93.7
09Aug2050	05:12	15.7	207.3	9.6	88.9
09Aug2050	05:18	14.3	206.7	9.6	84.4
09Aug2050	05:24	13.1	206.1	9.5	80.1
09Aug2050	05:30	11.9	205.6	9.5	76.1
09Aug2050	05:36	10.9	205.0	9.5	72.3
09Aug2050	05:42	10.0	204.5	9.5	68.8
09Aug2050	05:48	9.1	204.1	9.5	65.4
09Aug2050	05:54	8.3	203.6	9.5	62.3
09Aug2050	06:00	7.6	203.2	9.5	59.3
09Aug2050	06:06	6.9	202.8	9.5	56.5
09Aug2050	06:12	6.3	202.4	9.4	53.8
09Aug2050	06:18	5.8	202.0	9.4	51.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	06:24	5.3	201.6	9.4	49.0
09Aug2050	06:30	4.8	201.2	9.4	46.8
09Aug2050	06:36	4.4	200.9	9.4	44.7
09Aug2050	06:42	4.0	200.6	9.4	42.7
09Aug2050	06:48	3.6	200.3	9.4	40.8
09Aug2050	06:54	3.3	200.0	9.4	39.0
09Aug2050	07:00	3.0	199.7	9.4	37.3
09Aug2050	07:06	2.7	199.4	9.4	35.7
09Aug2050	07:12	2.4	199.1	9.4	34.2
09Aug2050	07:18	2.2	198.9	9.4	32.8
09Aug2050	07:24	2.0	198.6	9.4	31.4
09Aug2050	07:30	1.8	198.4	9.4	30.1
09Aug2050	07:36	1.6	198.2	9.3	28.9
09Aug2050	07:42	1.4	197.9	9.3	27.7
09Aug2050	07:48	1.3	197.7	9.3	26.6
09Aug2050	07:54	1.1	197.5	9.3	25.5
09Aug2050	08:00	1.0	197.3	9.3	24.5
09Aug2050	08:06	0.9	197.1	9.3	23.6
09Aug2050	08:12	0.8	196.9	9.3	22.7
09Aug2050	08:18	0.7	196.8	9.3	21.8
09Aug2050	08:24	0.6	196.6	9.3	21.0
09Aug2050	08:30	0.5	196.4	9.3	20.2
09Aug2050	08:36	0.5	196.3	9.3	19.5
09Aug2050	08:42	0.4	196.1	9.3	18.7
09Aug2050	08:48	0.4	196.0	9.3	18.1
09Aug2050	08:54	0.3	195.8	9.3	17.4
09Aug2050	09:00	0.3	195.7	9.3	16.8
09Aug2050	09:06	0.2	195.5	9.3	16.2
09Aug2050	09:12	0.2	195.4	9.3	15.6
09Aug2050	09:18	0.2	195.3	9.3	15.1
09Aug2050	09:24	0.1	195.2	9.3	14.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	09:30	0.1	195.1	9.3	14.1
09Aug2050	09:36	0.1	194.9	9.3	13.6
09Aug2050	09:42	0.1	194.8	9.3	13.2
09Aug2050	09:48	0.0	194.7	9.3	12.7
09Aug2050	09:54	0.0	194.6	9.3	12.3
09Aug2050	10:00	0.0	194.5	9.3	11.9
09Aug2050	10:06	0.0	194.4	9.3	11.5
09Aug2050	10:12	0.0	194.3	9.3	11.2
09Aug2050	10:18	0.0	194.2	9.3	10.8
09Aug2050	10:24	0.0	194.1	9.3	10.5
09Aug2050	10:30	0.0	194.1	9.2	10.2
09Aug2050	10:36	0.0	194.0	9.2	9.9
09Aug2050	10:42	0.0	193.9	9.2	9.6
09Aug2050	10:48	0.0	193.8	9.2	9.3
09Aug2050	10:54	0.0	193.7	9.2	9.0
09Aug2050	11:00	0.0	193.7	9.2	8.7
09Aug2050	11:06	0.0	193.6	9.2	8.5
09Aug2050	11:12	0.0	193.5	9.2	8.2
09Aug2050	11:18	0.0	193.5	9.2	8.0
09Aug2050	11:24	0.0	193.4	9.2	7.8
09Aug2050	11:30	0.0	193.3	9.2	7.6
09Aug2050	11:36	0.0	193.3	9.2	7.4
09Aug2050	11:42	0.0	193.2	9.2	7.2
09Aug2050	11:48	0.0	193.2	9.2	7.0
09Aug2050	11:54	0.0	193.1	9.2	6.8
09Aug2050	12:00	0.0	193.0	9.2	6.6
09Aug2050	12:06	0.0	193.0	9.2	6.4
09Aug2050	12:12	0.0	192.9	9.2	6.3
09Aug2050	12:18	0.0	192.9	9.2	6.1
09Aug2050	12:24	0.0	192.8	9.2	5.9
09Aug2050	12:30	0.0	192.8	9.2	5.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	12:36	0.0	192.7	9.2	5.6
09Aug2050	12:42	0.0	192.7	9.2	5.5
09Aug2050	12:48	0.0	192.7	9.2	5.4
09Aug2050	12:54	0.0	192.6	9.2	5.2
09Aug2050	13:00	0.0	192.6	9.2	5.1
09Aug2050	13:06	0.0	192.5	9.2	5.0
09Aug2050	13:12	0.0	192.5	9.2	4.9
09Aug2050	13:18	0.0	192.4	9.2	4.7
09Aug2050	13:24	0.0	192.4	9.2	4.6
09Aug2050	13:30	0.0	192.4	9.2	4.5
09Aug2050	13:36	0.0	192.3	9.2	4.4
09Aug2050	13:42	0.0	192.3	9.2	4.3
09Aug2050	13:48	0.0	192.3	9.2	4.2
09Aug2050	13:54	0.0	192.2	9.2	4.1
09Aug2050	14:00	0.0	192.2	9.2	4.0
09Aug2050	14:06	0.0	192.2	9.2	3.9
09Aug2050	14:12	0.0	192.1	9.2	3.8
09Aug2050	14:18	0.0	192.1	9.2	3.8
09Aug2050	14:24	0.0	192.1	9.2	3.7
09Aug2050	14:30	0.0	192.0	9.2	3.6
09Aug2050	14:36	0.0	192.0	9.2	3.5
09Aug2050	14:42	0.0	192.0	9.2	3.4
09Aug2050	14:48	0.0	191.9	9.2	3.4
09Aug2050	14:54	0.0	191.9	9.2	3.3
09Aug2050	15:00	0.0	191.9	9.2	3.2
09Aug2050	15:06	0.0	191.9	9.2	3.2
09Aug2050	15:12	0.0	191.8	9.2	3.1
09Aug2050	15:18	0.0	191.8	9.2	3.0
09Aug2050	15:24	0.0	191.8	9.2	3.0
09Aug2050	15:30	0.0	191.8	9.2	2.9
09Aug2050	15:36	0.0	191.7	9.2	2.9

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Project: CranstonHMS

Simulation Run: 100-yr (12hr) No Fail Reservoir: Cranston Mill Pond

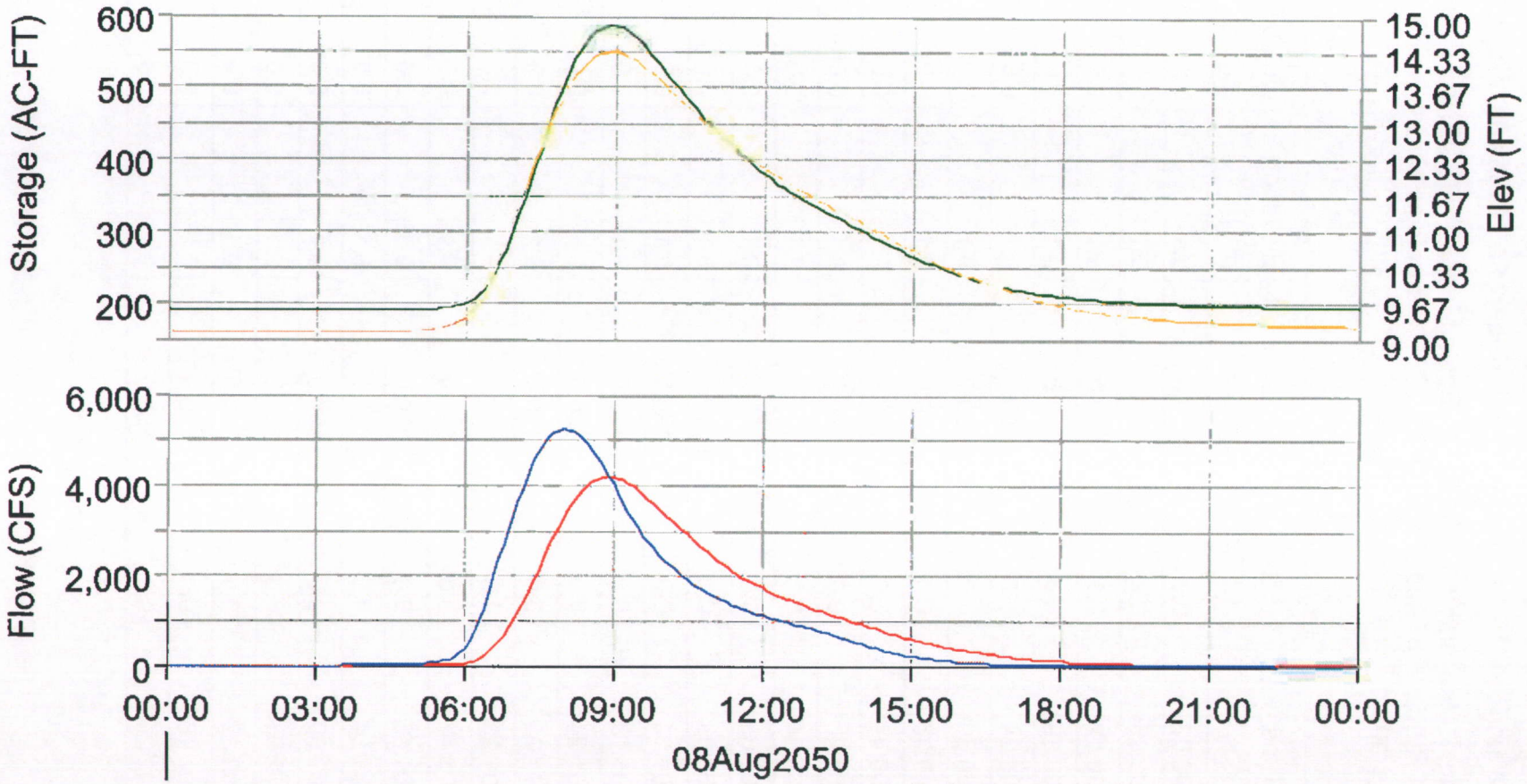
Start of Run:	08Aug2050, 00:00	Basin Model:	No Failure
End of Run:	09Aug2050, 00:00	Meteorologic Model:	100-YR (12 hr)
Compute Time:	24Jun2010, 14:23:36	Control Specifications:	12hr (24 total)

Volume Units: IN

Computed Results

Peak Inflow :	5227.1 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 08:00
Peak Outflow :	4193.6 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 08:54
Total Inflow :	4.37 (IN)	Peak Storage :	585.4 (AC-FT)
Total Outflow :	4.36 (IN)	Peak Elevation :	14.3 (FT)

Reservoir "Cranston Mill Pond" Results for Run "100-yr (12hr) No Fail"



Run:100-yr (12hr) No Fail Element:CRANSTON MILL POND Result:Storage

Run:100-yr (12hr) No Fail Element:CRANSTON MILL POND Result:Pool Elevation

Run:100-yr (12hr) No Fail Element:CRANSTON MILL POND Result:Outflow

Run:100-yr (12hr) No Fail Element:CRANSTON MILL POND Result:Combined Inflow

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Project: CranstonHMS
Simulation Run: 100-yr (12hr) No Fail Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: No Failure
End of Run: 09Aug2050, 00:00 Meteorologic Model: 100-YR (1:
Compute Time: 24Jun2010, 14:23:36 Control Specifications: 12hr (:

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.0	190.0	9.1	0.0
08Aug2050	00:48	0.0	190.0	9.1	0.0
08Aug2050	00:54	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:06	0.0	190.0	9.1	0.0
08Aug2050	01:12	0.0	190.0	9.1	0.0
08Aug2050	01:18	0.0	190.0	9.1	0.0
08Aug2050	01:24	0.0	190.0	9.1	0.0
08Aug2050	01:30	0.0	190.0	9.1	0.0
08Aug2050	01:36	0.0	190.0	9.1	0.0
08Aug2050	01:42	0.0	190.0	9.1	0.0
08Aug2050	01:48	0.0	190.0	9.1	0.0
08Aug2050	01:54	0.0	190.0	9.1	0.0
08Aug2050	02:00	0.0	190.0	9.1	0.0
08Aug2050	02:06	0.0	190.0	9.1	0.0
08Aug2050	02:12	0.0	190.0	9.1	0.0
08Aug2050	02:18	0.0	190.0	9.1	0.0
08Aug2050	02:24	0.0	190.0	9.1	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	0.0	190.0	9.1	0.0
08Aug2050	02:36	0.0	190.0	9.1	0.0
08Aug2050	02:42	0.0	190.0	9.1	0.0
08Aug2050	02:48	0.0	190.0	9.1	0.0
08Aug2050	02:54	0.0	190.0	9.1	0.0
08Aug2050	03:00	0.0	190.0	9.1	0.0
08Aug2050	03:06	0.0	190.0	9.1	0.0
08Aug2050	03:12	0.0	190.0	9.1	0.0
08Aug2050	03:18	0.0	190.0	9.1	0.0
08Aug2050	03:24	0.0	190.0	9.1	0.0
08Aug2050	03:30	0.0	190.0	9.1	0.0
08Aug2050	03:36	0.0	190.0	9.1	0.0
08Aug2050	03:42	0.0	190.0	9.1	0.0
08Aug2050	03:48	0.0	190.0	9.2	0.0
08Aug2050	03:54	0.1	190.0	9.2	0.0
08Aug2050	04:00	0.2	190.0	9.2	0.0
08Aug2050	04:06	0.5	190.0	9.2	0.0
08Aug2050	04:12	1.0	190.0	9.2	0.0
08Aug2050	04:18	1.8	190.0	9.2	0.0
08Aug2050	04:24	3.1	190.0	9.2	0.0
08Aug2050	04:30	4.8	190.1	9.2	0.0
08Aug2050	04:36	7.3	190.1	9.2	0.1
08Aug2050	04:42	10.6	190.2	9.2	0.1
08Aug2050	04:48	14.8	190.3	9.2	0.2
08Aug2050	04:54	20.2	190.4	9.2	0.4
08Aug2050	05:00	26.9	190.6	9.2	0.6
08Aug2050	05:06	35.3	190.9	9.2	1.0
08Aug2050	05:12	45.4	191.2	9.2	1.7
08Aug2050	05:18	57.7	191.6	9.2	2.6
08Aug2050	05:24	72.6	192.1	9.2	3.9
08Aug2050	05:30	90.4	192.8	9.2	5.7

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	112.4	193.5	9.2	8.3
08Aug2050	05:42	142.0	194.5	9.3	11.9
08Aug2050	05:48	185.9	195.7	9.3	17.1
08Aug2050	05:54	258.5	197.4	9.3	25.0
08Aug2050	06:00	371.2	199.8	9.4	37.8
08Aug2050	06:06	523.4	203.1	9.5	58.5
08Aug2050	06:12	719.4	207.6	9.6	91.4
08Aug2050	06:18	967.6	213.6	9.7	142.0
08Aug2050	06:24	1272.5	221.4	9.9	217.8
08Aug2050	06:30	1624.5	231.1	10.1	302.7
08Aug2050	06:36	1993.0	243.2	10.3	398.2
08Aug2050	06:42	2350.4	257.3	10.5	521.0
08Aug2050	06:48	2689.6	273.2	10.8	671.5
08Aug2050	06:54	3013.8	290.5	11.0	845.9
08Aug2050	07:00	3331.5	309.1	11.3	1015.8
08Aug2050	07:06	3646.6	328.7	11.5	1207.0
08Aug2050	07:12	3955.1	349.3	11.8	1418.4
08Aug2050	07:18	4253.7	370.5	12.1	1642.1
08Aug2050	07:24	4527.0	392.3	12.3	1870.8
08Aug2050	07:30	4753.4	414.2	12.6	2117.0
08Aug2050	07:36	4926.3	435.6	12.8	2372.2
08Aug2050	07:42	5052.5	456.2	13.0	2623.0
08Aug2050	07:48	5143.9	475.7	13.2	2845.1
08Aug2050	07:54	5203.1	494.0	13.4	3060.1
08Aug2050	08:00	5227.1	511.0	13.6	3264.2
08Aug2050	08:06	5219.5	526.4	13.7	3453.9
08Aug2050	08:12	5183.8	540.1	13.9	3626.3
08Aug2050	08:18	5116.3	552.1	14.0	3779.1
08Aug2050	08:24	5017.8	562.2	14.1	3903.6
08Aug2050	08:30	4893.9	570.5	14.2	4006.3
08Aug2050	08:36	4750.3	576.9	14.2	4086.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	4590.6	581.5	14.3	4144.4
08Aug2050	08:48	4413.9	584.3	14.3	4179.9
08Aug2050	08:54	4221.0	585.4	14.3	4193.6
08Aug2050	09:00	4016.4	584.8	14.3	4186.2
08Aug2050	09:06	3809.2	582.6	14.3	4159.0
08Aug2050	09:12	3607.5	579.1	14.3	4114.3
08Aug2050	09:18	3414.1	574.4	14.2	4054.7
08Aug2050	09:24	3230.9	568.6	14.2	3982.8
08Aug2050	09:30	3060.0	562.0	14.1	3901.2
08Aug2050	09:36	2902.7	554.8	14.0	3812.2
08Aug2050	09:42	2759.6	547.1	13.9	3714.9
08Aug2050	09:48	2628.9	539.1	13.9	3613.0
08Aug2050	09:54	2506.5	530.9	13.8	3509.6
08Aug2050	10:00	2390.8	522.5	13.7	3405.8
08Aug2050	10:06	2282.3	514.1	13.6	3302.2
08Aug2050	10:12	2181.1	505.7	13.5	3199.8
08Aug2050	10:18	2086.5	497.3	13.4	3098.9
08Aug2050	10:24	1998.3	489.0	13.4	3000.1
08Aug2050	10:30	1916.1	480.8	13.3	2903.7
08Aug2050	10:36	1838.6	472.7	13.2	2810.1
08Aug2050	10:42	1764.9	464.7	13.1	2719.2
08Aug2050	10:48	1695.1	456.9	13.0	2631.1
08Aug2050	10:54	1629.0	449.3	13.0	2541.2
08Aug2050	11:00	1566.6	441.8	12.9	2448.8
08Aug2050	11:06	1508.8	434.7	12.8	2360.9
08Aug2050	11:12	1454.7	427.8	12.7	2277.4
08Aug2050	11:18	1403.3	421.1	12.6	2197.9
08Aug2050	11:24	1354.8	414.6	12.6	2122.4
08Aug2050	11:30	1309.8	408.4	12.5	2050.6
08Aug2050	11:36	1267.6	402.4	12.4	1982.4
08Aug2050	11:42	1227.6	396.6	12.4	1917.7

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	11:48	1190.3	391.0	12.3	1856.3
08Aug2050	11:54	1155.5	385.5	12.2	1798.1
08Aug2050	12:00	1122.8	380.3	12.2	1742.9
08Aug2050	12:06	1091.4	375.3	12.1	1690.6
08Aug2050	12:12	1061.1	370.4	12.1	1641.1
08Aug2050	12:18	1031.9	365.7	12.0	1594.5
08Aug2050	12:24	1003.4	361.1	11.9	1545.5
08Aug2050	12:30	974.9	356.7	11.9	1498.0
08Aug2050	12:36	946.1	352.5	11.8	1452.5
08Aug2050	12:42	916.6	348.4	11.8	1408.8
08Aug2050	12:48	886.5	344.3	11.7	1366.7
08Aug2050	12:54	855.8	340.4	11.7	1325.9
08Aug2050	13:00	824.4	336.6	11.6	1286.3
08Aug2050	13:06	792.7	332.8	11.6	1247.8
08Aug2050	13:12	760.7	329.0	11.5	1210.2
08Aug2050	13:18	728.1	325.3	11.5	1173.3
08Aug2050	13:24	694.8	321.7	11.4	1137.2
08Aug2050	13:30	660.8	318.0	11.4	1101.6
08Aug2050	13:36	626.4	314.4	11.3	1066.4
08Aug2050	13:42	591.7	310.7	11.3	1031.7
08Aug2050	13:48	557.1	307.1	11.2	997.4
08Aug2050	13:54	522.9	303.5	11.2	963.4
08Aug2050	14:00	489.5	299.8	11.1	929.8
08Aug2050	14:06	456.8	296.2	11.1	896.6
08Aug2050	14:12	425.0	292.6	11.0	863.9
08Aug2050	14:18	394.1	288.9	11.0	831.7
08Aug2050	14:24	364.3	285.3	10.9	794.3
08Aug2050	14:30	335.8	281.8	10.9	757.9
08Aug2050	14:36	308.5	278.4	10.8	722.7
08Aug2050	14:42	282.9	275.0	10.8	688.7
08Aug2050	14:48	259.1	271.7	10.7	656.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	14:54	236.8	268.4	10.7	624.5
08Aug2050	15:00	216.1	265.3	10.6	594.3
08Aug2050	15:06	196.9	262.2	10.6	565.4
08Aug2050	15:12	179.4	259.2	10.5	537.6
08Aug2050	15:18	163.4	256.3	10.5	511.1
08Aug2050	15:24	148.8	253.4	10.4	485.9
08Aug2050	15:30	135.6	250.7	10.4	461.8
08Aug2050	15:36	123.5	248.0	10.4	438.9
08Aug2050	15:42	112.5	245.5	10.3	417.2
08Aug2050	15:48	102.4	243.0	10.3	396.6
08Aug2050	15:54	93.2	240.6	10.2	377.0
08Aug2050	16:00	84.7	238.3	10.2	358.4
08Aug2050	16:06	76.9	236.1	10.2	340.8
08Aug2050	16:12	69.8	233.9	10.1	324.1
08Aug2050	16:18	63.5	231.9	10.1	308.3
08Aug2050	16:24	57.8	229.9	10.1	293.3
08Aug2050	16:30	52.7	228.0	10.0	279.1
08Aug2050	16:36	48.1	226.1	10.0	265.7
08Aug2050	16:42	43.9	224.4	10.0	250.2
08Aug2050	16:48	40.0	222.7	9.9	232.5
08Aug2050	16:54	36.4	221.2	9.9	216.3
08Aug2050	17:00	33.2	219.8	9.9	201.5
08Aug2050	17:06	30.3	218.4	9.8	188.0
08Aug2050	17:12	27.6	217.2	9.8	175.6
08Aug2050	17:18	25.2	216.0	9.8	164.2
08Aug2050	17:24	22.9	214.9	9.8	153.8
08Aug2050	17:30	20.9	213.8	9.7	144.1
08Aug2050	17:36	19.1	212.8	9.7	135.2
08Aug2050	17:42	17.4	211.9	9.7	127.0
08Aug2050	17:48	15.8	211.0	9.7	119.4
08Aug2050	17:54	14.4	210.2	9.6	112.4

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	18:00	13.2	209.4	9.6	105.9
08Aug2050	18:06	12.0	208.6	9.6	99.8
08Aug2050	18:12	10.9	207.9	9.6	94.2
08Aug2050	18:18	9.9	207.3	9.6	89.0
08Aug2050	18:24	9.0	206.6	9.6	84.1
08Aug2050	18:30	8.2	206.0	9.5	79.5
08Aug2050	18:36	7.5	205.4	9.5	75.3
08Aug2050	18:42	6.8	204.9	9.5	71.3
08Aug2050	18:48	6.2	204.4	9.5	67.6
08Aug2050	18:54	5.6	203.9	9.5	64.2
08Aug2050	19:00	5.1	203.4	9.5	60.9
08Aug2050	19:06	4.6	203.0	9.5	57.9
08Aug2050	19:12	4.1	202.5	9.5	55.0
08Aug2050	19:18	3.7	202.1	9.4	52.3
08Aug2050	19:24	3.4	201.7	9.4	49.8
08Aug2050	19:30	3.0	201.3	9.4	47.4
08Aug2050	19:36	2.7	201.0	9.4	45.2
08Aug2050	19:42	2.4	200.6	9.4	43.1
08Aug2050	19:48	2.1	200.3	9.4	41.1
08Aug2050	19:54	1.9	200.0	9.4	39.2
08Aug2050	20:00	1.7	199.7	9.4	37.5
08Aug2050	20:06	1.5	199.4	9.4	35.8
08Aug2050	20:12	1.3	199.1	9.4	34.2
08Aug2050	20:18	1.2	198.9	9.4	32.7
08Aug2050	20:24	1.0	198.6	9.4	31.3
08Aug2050	20:30	0.9	198.4	9.4	30.0
08Aug2050	20:36	0.8	198.1	9.3	28.7
08Aug2050	20:42	0.7	197.9	9.3	27.6
08Aug2050	20:48	0.6	197.7	9.3	26.4
08Aug2050	20:54	0.5	197.5	9.3	25.4
08Aug2050	21:00	0.4	197.3	9.3	24.3

Project: CranstonHMS

Simulation Run: 100-yr (6hr) No Fail Reservoir: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	No Failure
End of Run:	08Aug2050, 12:00	Meteorologic Model:	100-YR (6 hr)
Compute Time:	24Jun2010, 14:43:35	Control Specifications:	6hr (12 total)

Volume Units: IN

Computed Results

Peak Inflow :	4311.0 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 05:12
Peak Outflow :	3414.1 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 06:06
Total Inflow :	3.14 (IN)	Peak Storage :	523.2 (AC-FT)
Total Outflow :	3.05 (IN)	Peak Elevation :	13.7 (FT)

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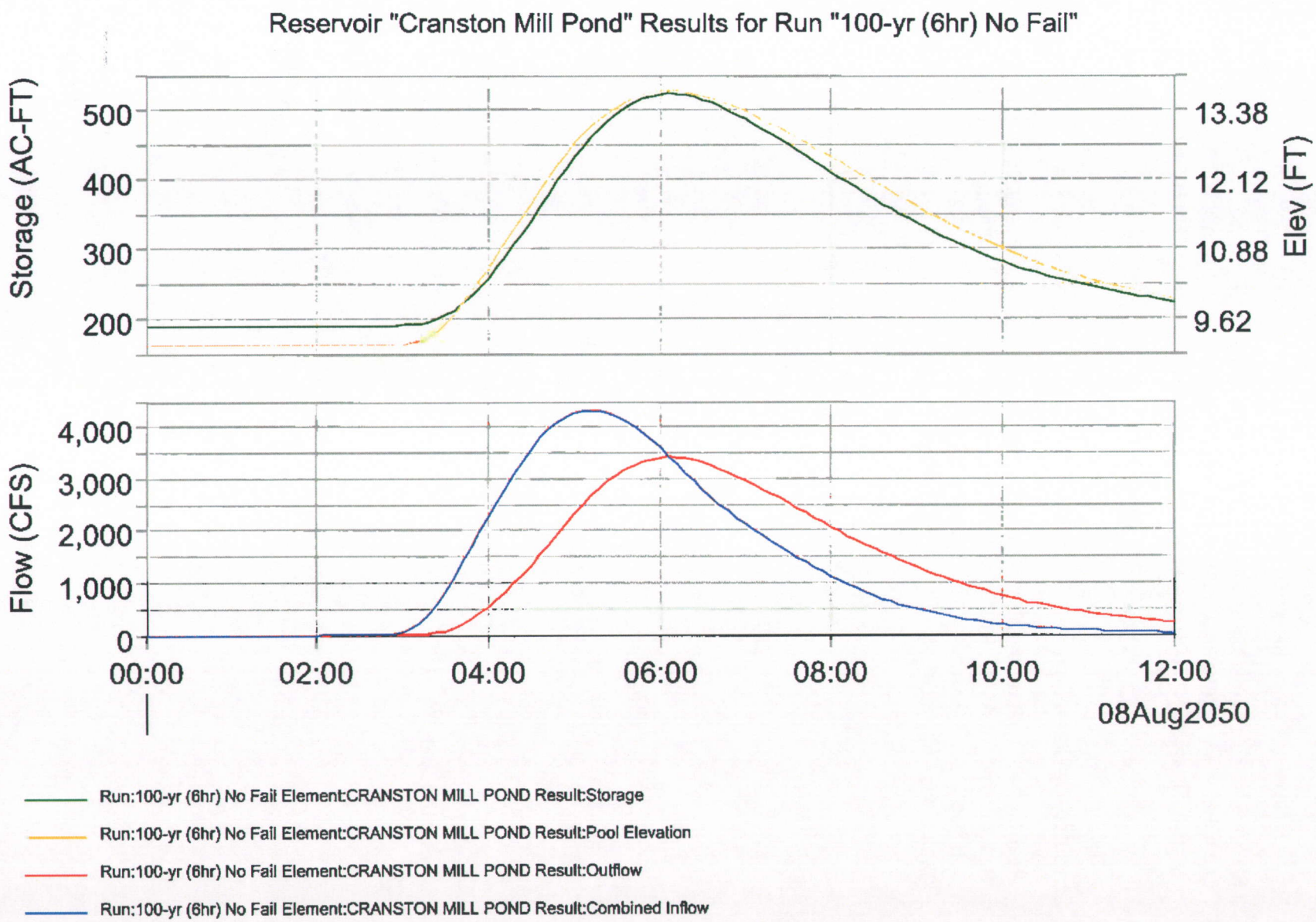
Reservoir "Cranston Mill Pond" Results for Run "100-yr (6hr) No Fail"
Storage (AC-FT)
500
400
300
200
13.38
12.12
10.88
9.62
Elev (FT)
Flow (CFS)
4,000
3,000
2,000
1,000
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00
08Aug2050
Run:100-yr (6hr) No Fail Element:CRANSTON MILL POND Result:Storage
Run:100-yr (6hr) No Fail Element:CRANSTON MILL POND Result:Pool Elevation
Run:100-yr (6hr) No Fail Element:CRANSTON MILL POND Result:Outflow
Run:100-yr (6hr) No Fail Element:CRANSTON MILL POND Result:Combined Inflow

Project: CranstonHMS
Simulation Run: 100-yr (6hr) No Fail Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: No Failure
End of Run: 08Aug2050, 12:00 Meteorologic Model: 100-YR (6
Compute Time: 24Jun2010, 14:43:35 Control Specifications: 6hr (1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.0	190.0	9.1	0.0
08Aug2050	00:48	0.0	190.0	9.1	0.0
08Aug2050	00:54	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:06	0.0	190.0	9.1	0.0
08Aug2050	01:12	0.0	190.0	9.1	0.0
08Aug2050	01:18	0.0	190.0	9.1	0.0
08Aug2050	01:24	0.0	190.0	9.1	0.0
08Aug2050	01:30	0.0	190.0	9.1	0.0
08Aug2050	01:36	0.0	190.0	9.1	0.0
08Aug2050	01:42	0.0	190.0	9.1	0.0
08Aug2050	01:48	0.0	190.0	9.1	0.0
08Aug2050	01:54	0.0	190.0	9.1	0.0
08Aug2050	02:00	0.0	190.0	9.1	0.0
08Aug2050	02:06	0.0	190.0	9.1	0.0
08Aug2050	02:12	0.0	190.0	9.2	0.0
08Aug2050	02:18	0.2	190.0	9.2	0.0
08Aug2050	02:24	0.6	190.0	9.2	0.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	1.4	190.0	9.2	0.0
08Aug2050	02:36	3.1	190.0	9.2	0.0
08Aug2050	02:42	6.4	190.1	9.2	0.0
08Aug2050	02:48	13.9	190.2	9.2	0.1
08Aug2050	02:54	31.1	190.3	9.2	0.2
08Aug2050	03:00	71.0	190.8	9.2	0.8
08Aug2050	03:06	144.0	191.6	9.2	2.6
08Aug2050	03:12	250.3	193.2	9.2	7.2
08Aug2050	03:18	393.2	195.8	9.3	17.2
08Aug2050	03:24	581.2	199.6	9.4	36.8
08Aug2050	03:30	819.9	204.9	9.5	71.6
08Aug2050	03:36	1103.3	212.1	9.7	128.5
08Aug2050	03:42	1405.9	221.0	9.9	214.2
08Aug2050	03:48	1702.9	231.7	10.1	306.7
08Aug2050	03:54	1987.0	244.0	10.3	404.8
08Aug2050	04:00	2260.7	257.7	10.5	524.2
08Aug2050	04:06	2531.5	272.6	10.7	665.0
08Aug2050	04:12	2803.1	288.5	11.0	827.0
08Aug2050	04:18	3072.2	305.3	11.2	980.2
08Aug2050	04:24	3336.6	322.9	11.4	1149.8
08Aug2050	04:30	3583.7	341.3	11.7	1334.9
08Aug2050	04:36	3793.7	359.9	11.9	1532.2
08Aug2050	04:42	3959.5	378.5	12.2	1723.5
08Aug2050	04:48	4086.4	396.7	12.4	1919.0
08Aug2050	04:54	4184.4	414.2	12.6	2117.2
08Aug2050	05:00	4255.7	430.7	12.8	2313.2
08Aug2050	05:06	4296.7	446.2	12.9	2502.5
08Aug2050	05:12	4311.0	460.3	13.1	2669.8
08Aug2050	05:18	4301.6	473.3	13.2	2816.9
08Aug2050	05:24	4264.8	484.8	13.3	2951.2
08Aug2050	05:30	4200.8	494.9	13.4	3070.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	4114.0	503.5	13.5	3173.0
08Aug2050	05:42	4009.4	510.5	13.6	3257.7
08Aug2050	05:48	3890.3	515.9	13.6	3324.3
08Aug2050	05:54	3755.1	519.8	13.7	3372.5
08Aug2050	06:00	3604.5	522.3	13.7	3402.3
08Aug2050	06:06	3441.8	523.2	13.7	3414.1
08Aug2050	06:12	3274.0	522.8	13.7	3408.6
08Aug2050	06:18	3108.6	521.1	13.7	3387.5
08Aug2050	06:24	2947.1	518.2	13.7	3352.6
08Aug2050	06:30	2791.2	514.4	13.6	3305.9
08Aug2050	06:36	2642.4	509.8	13.6	3249.4
08Aug2050	06:42	2501.0	504.5	13.5	3184.7
08Aug2050	06:48	2368.0	498.5	13.5	3113.8
08Aug2050	06:54	2242.6	492.2	13.4	3037.9
08Aug2050	07:00	2122.1	485.4	13.3	2958.4
08Aug2050	07:06	2005.1	478.4	13.3	2876.1
08Aug2050	07:12	1891.9	471.1	13.2	2791.7
08Aug2050	07:18	1782.6	463.5	13.1	2705.9
08Aug2050	07:24	1677.1	455.8	13.0	2619.1
08Aug2050	07:30	1575.3	448.0	12.9	2525.5
08Aug2050	07:36	1477.3	440.1	12.9	2427.9
08Aug2050	07:42	1382.2	432.3	12.8	2332.1
08Aug2050	07:48	1290.0	424.5	12.7	2238.0
08Aug2050	07:54	1201.5	416.6	12.6	2145.9
08Aug2050	08:00	1116.2	408.8	12.5	2055.9
08Aug2050	08:06	1034.3	401.1	12.4	1968.3
08Aug2050	08:12	957.0	393.4	12.3	1883.2
08Aug2050	08:18	884.0	385.8	12.2	1800.8
08Aug2050	08:24	814.4	378.3	12.2	1721.3
08Aug2050	08:30	748.6	370.8	12.1	1645.1
08Aug2050	08:36	687.4	363.5	12.0	1570.9

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	630.4	356.2	11.9	1492.7
08Aug2050	08:48	577.1	349.2	11.8	1417.8
08Aug2050	08:54	527.7	342.4	11.7	1346.0
08Aug2050	09:00	482.1	335.7	11.6	1277.4
08Aug2050	09:06	440.2	329.2	11.5	1212.0
08Aug2050	09:12	401.7	322.9	11.4	1149.6
08Aug2050	09:18	366.7	316.8	11.4	1090.3
08Aug2050	09:24	334.9	311.0	11.3	1033.9
08Aug2050	09:30	306.2	305.3	11.2	980.5
08Aug2050	09:36	280.0	299.8	11.1	929.8
08Aug2050	09:42	256.1	294.6	11.1	881.9
08Aug2050	09:48	234.4	289.5	11.0	836.6
08Aug2050	09:54	214.7	284.6	10.9	786.8
08Aug2050	10:00	196.7	280.0	10.9	739.4
08Aug2050	10:06	180.2	275.7	10.8	695.4
08Aug2050	10:12	165.2	271.5	10.7	654.4
08Aug2050	10:18	151.6	267.6	10.7	616.2
08Aug2050	10:24	139.2	263.8	10.6	580.7
08Aug2050	10:30	127.6	260.3	10.6	547.6
08Aug2050	10:36	116.9	256.9	10.5	516.7
08Aug2050	10:42	107.1	253.6	10.4	487.8
08Aug2050	10:48	97.9	250.6	10.4	460.8
08Aug2050	10:54	89.4	247.6	10.4	435.6
08Aug2050	11:00	81.6	244.8	10.3	412.0
08Aug2050	11:06	74.5	242.2	10.3	389.8
08Aug2050	11:12	68.0	239.6	10.2	369.0
08Aug2050	11:18	61.9	237.2	10.2	349.6
08Aug2050	11:24	56.3	234.9	10.2	331.3
08Aug2050	11:30	51.1	232.6	10.1	314.1
08Aug2050	11:36	46.4	230.5	10.1	298.0
08Aug2050	11:42	42.0	228.5	10.1	282.8

Project: CranstonHMS

Simulation Run: PMF Failure 24 hr Reservoir: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	PMF w/ Dam Failure
End of Run:	10Aug2050, 00:00	Meteorologic Model:	PMF (24 hr)
Compute Time:	24Jun2010, 14:44:12	Control Specifications:	24hr (48 total/6 min incr)

Volume Units: IN

Computed Results

Peak Inflow :	34287.3 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 13:54
Peak Outflow :	33890.0 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 14:06
Total Inflow :	34.27 (IN)	Peak Storage :	1205.6 (AC-FT)
Total Outflow :	34.77 (IN)	Peak Elevation :	18.9 (FT)

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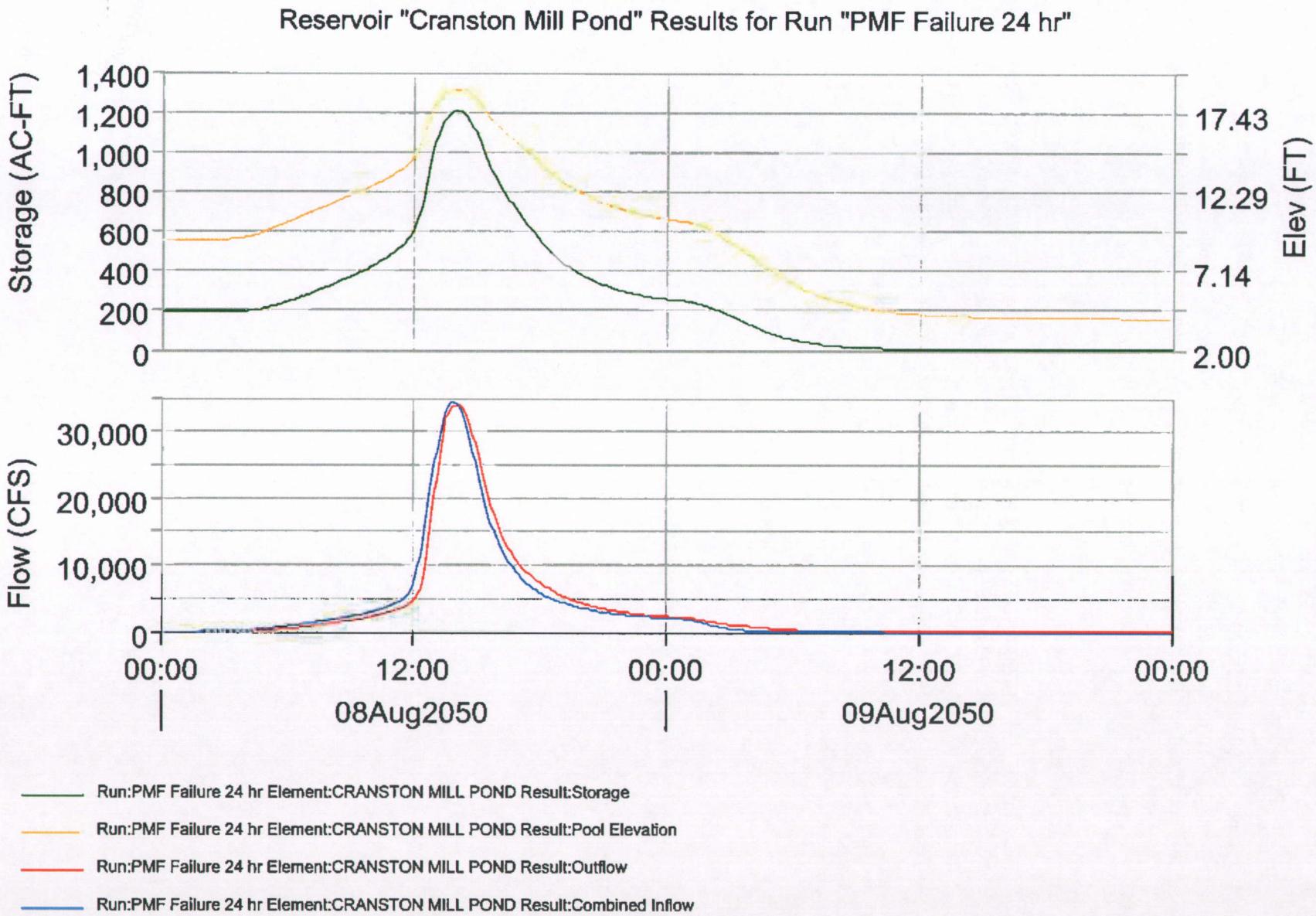
Reservoir "Cranston Mill Pond" Results for Run "PMF Failure 24 hr"
Storage (AC-FT)
1,400
1,200
1,000
800
600
400
200
0
17.43
12.29
7.14
2.00
Elev (FT)
Flow (CFS)
30,000
20,000
10,000
0
00:00
12:00
00:00
12:00
00:00
08Aug2050
09Aug2050
Run:PMF Failure 24 hr Element:CRANSTON MILL POND Result:Storage
Run:PMF Failure 24 hr Element:CRANSTON MILL POND Result:Pool Elevation
Run:PMF Failure 24 hr Element:CRANSTON MILL POND Result:Outflow
Run:PMF Failure 24 hr Element:CRANSTON MILL POND Result:Combined Inflow

Project: CranstonHMS
Simulation Run: PMF Failure 24 hr Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: PMF w/ Dam Failur
End of Run: 10Aug2050, 00:00 Meteorologic Model: PMF (24 hr)
Compute Time: 24Jun2010, 14:44:12 Control Specifications: 24hr (48 total/6 min

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.0	190.0	9.1	0.0
08Aug2050	00:48	0.0	190.0	9.1	0.0
08Aug2050	00:54	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:06	0.0	190.0	9.1	0.0
08Aug2050	01:12	0.0	190.0	9.1	0.0
08Aug2050	01:18	0.0	190.0	9.1	0.0
08Aug2050	01:24	0.0	190.0	9.1	0.0
08Aug2050	01:30	0.0	190.0	9.1	0.0
08Aug2050	01:36	0.0	190.0	9.1	0.0
08Aug2050	01:42	0.0	190.0	9.1	0.0
08Aug2050	01:48	0.0	190.0	9.1	0.0
08Aug2050	01:54	0.0	190.0	9.1	0.0
08Aug2050	02:00	0.0	190.0	9.2	0.0
08Aug2050	02:06	0.1	190.0	9.2	0.0
08Aug2050	02:12	0.3	190.0	9.2	0.0
08Aug2050	02:18	0.7	190.0	9.2	0.0
08Aug2050	02:24	1.4	190.0	9.2	0.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	2.5	190.0	9.2	0.0
08Aug2050	02:36	4.3	190.1	9.2	0.0
08Aug2050	02:42	6.7	190.1	9.2	0.0
08Aug2050	02:48	10.1	190.2	9.2	0.1
08Aug2050	02:54	14.6	190.3	9.2	0.2
08Aug2050	03:00	20.2	190.4	9.2	0.3
08Aug2050	03:06	27.0	190.6	9.2	0.6
08Aug2050	03:12	35.2	190.9	9.2	1.0
08Aug2050	03:18	44.9	191.2	9.2	1.6
08Aug2050	03:24	56.1	191.6	9.2	2.5
08Aug2050	03:30	69.0	192.1	9.2	3.7
08Aug2050	03:36	83.5	192.7	9.2	5.4
08Aug2050	03:42	99.7	193.4	9.2	7.7
08Aug2050	03:48	117.5	194.2	9.3	10.6
08Aug2050	03:54	136.9	195.1	9.3	14.4
08Aug2050	04:00	157.9	196.2	9.3	19.2
08Aug2050	04:06	180.6	197.4	9.3	25.1
08Aug2050	04:12	204.7	198.8	9.4	32.3
08Aug2050	04:18	230.3	200.3	9.4	40.9
08Aug2050	04:24	257.1	201.9	9.4	51.0
08Aug2050	04:30	285.3	203.7	9.5	62.8
08Aug2050	04:36	314.8	205.6	9.5	76.4
08Aug2050	04:42	345.5	207.6	9.6	91.8
08Aug2050	04:48	377.2	209.8	9.6	109.1
08Aug2050	04:54	409.9	212.1	9.7	128.5
08Aug2050	05:00	443.7	214.4	9.7	149.8
08Aug2050	05:06	478.5	216.9	9.8	173.1
08Aug2050	05:12	513.9	219.5	9.9	198.5
08Aug2050	05:18	549.9	222.1	9.9	225.7
08Aug2050	05:24	586.7	224.8	10.0	254.9
08Aug2050	05:30	624.3	227.6	10.0	276.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	662.7	230.6	10.1	298.4
08Aug2050	05:42	701.7	233.6	10.1	321.8
08Aug2050	05:48	741.1	236.8	10.2	346.8
08Aug2050	05:54	781.0	240.2	10.2	373.4
08Aug2050	06:00	821.6	243.6	10.3	401.4
08Aug2050	06:06	862.6	247.1	10.3	431.0
08Aug2050	06:12	904.2	250.7	10.4	462.1
08Aug2050	06:18	946.2	254.4	10.5	494.6
08Aug2050	06:24	988.8	258.2	10.5	528.5
08Aug2050	06:30	1031.7	262.0	10.6	563.8
08Aug2050	06:36	1074.9	265.9	10.6	600.4
08Aug2050	06:42	1118.4	269.8	10.7	638.3
08Aug2050	06:48	1162.5	273.8	10.8	677.3
08Aug2050	06:54	1206.8	277.9	10.8	717.5
08Aug2050	07:00	1251.4	281.9	10.9	758.8
08Aug2050	07:06	1296.4	286.0	11.0	801.1
08Aug2050	07:12	1341.8	290.1	11.0	842.2
08Aug2050	07:18	1387.6	294.3	11.1	879.4
08Aug2050	07:24	1433.7	298.5	11.1	917.8
08Aug2050	07:30	1480.1	302.8	11.2	957.2
08Aug2050	07:36	1526.8	307.1	11.2	997.8
08Aug2050	07:42	1573.7	311.5	11.3	1039.3
08Aug2050	07:48	1620.9	316.0	11.4	1081.8
08Aug2050	07:54	1668.2	320.4	11.4	1125.3
08Aug2050	08:00	1715.6	324.9	11.5	1169.5
08Aug2050	08:06	1762.8	329.5	11.5	1214.6
08Aug2050	08:12	1810.3	334.0	11.6	1260.4
08Aug2050	08:18	1857.9	338.6	11.7	1306.8
08Aug2050	08:24	1906.0	343.1	11.7	1354.0
08Aug2050	08:30	1954.7	347.7	11.8	1401.7
08Aug2050	08:36	2004.2	352.3	11.8	1450.1

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	2054.9	356.8	11.9	1499.2
08Aug2050	08:48	2107.1	361.4	12.0	1548.9
08Aug2050	08:54	2161.1	366.1	12.0	1598.2
08Aug2050	09:00	2217.3	370.8	12.1	1644.7
08Aug2050	09:06	2275.8	375.5	12.1	1693.2
08Aug2050	09:12	2337.0	380.4	12.2	1743.6
08Aug2050	09:18	2401.1	385.4	12.2	1796.0
08Aug2050	09:24	2468.0	390.4	12.3	1850.4
08Aug2050	09:30	2537.7	395.6	12.3	1906.8
08Aug2050	09:36	2610.3	400.8	12.4	1965.3
08Aug2050	09:42	2685.7	406.2	12.5	2026.1
08Aug2050	09:48	2763.9	411.7	12.5	2089.2
08Aug2050	09:54	2844.7	417.4	12.6	2154.7
08Aug2050	10:00	2928.3	423.2	12.7	2222.6
08Aug2050	10:06	3015.0	429.1	12.7	2293.0
08Aug2050	10:12	3105.1	435.1	12.8	2366.0
08Aug2050	10:18	3199.1	441.3	12.9	2441.8
08Aug2050	10:24	3297.9	447.6	12.9	2520.6
08Aug2050	10:30	3401.9	454.1	13.0	2600.4
08Aug2050	10:36	3511.5	460.9	13.1	2676.2
08Aug2050	10:42	3627.4	468.0	13.2	2756.2
08Aug2050	10:48	3750.2	475.3	13.2	2840.6
08Aug2050	10:54	3881.1	483.0	13.3	2929.9
08Aug2050	11:00	4021.4	491.1	13.4	3024.6
08Aug2050	11:06	4172.4	499.5	13.5	3125.2
08Aug2050	11:12	4336.5	508.4	13.6	3232.4
08Aug2050	11:18	4515.5	517.8	13.7	3347.1
08Aug2050	11:24	4711.8	527.7	13.8	3470.5
08Aug2050	11:30	4928.1	538.3	13.9	3603.6
08Aug2050	11:36	5174.7	549.7	14.0	3748.4
08Aug2050	11:42	5478.6	562.1	14.1	3902.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	11:48	5885.0	576.1	14.2	4076.4
08Aug2050	11:54	6477.2	592.6	14.4	4285.9
08Aug2050	12:00	7313.9	613.1	14.6	4550.4
08Aug2050	12:06	8391.5	639.0	14.8	4892.8
08Aug2050	12:12	9734.3	671.5	15.1	5374.5
08Aug2050	12:18	11383.8	710.6	15.4	6280.6
08Aug2050	12:24	13342.5	755.4	15.8	7598.6
08Aug2050	12:30	15529.5	804.8	16.1	9269.5
08Aug2050	12:36	17755.2	857.2	16.5	11276.6
08Aug2050	12:42	19866.7	909.7	16.9	13585.9
08Aug2050	12:48	21833.4	959.6	17.3	15943.7
08Aug2050	12:54	23682.8	1005.6	17.6	18368.8
08Aug2050	13:00	25467.3	1046.4	17.9	20817.3
08Aug2050	13:06	27207.2	1081.7	18.1	23189.0
08Aug2050	13:12	28873.1	1112.3	18.3	25490.7
08Aug2050	13:18	30436.2	1137.4	18.4	27745.7
08Aug2050	13:24	31802.2	1156.3	18.6	29905.4
08Aug2050	13:30	32857.4	1168.1	18.6	31900.6
08Aug2050	13:36	33580.2	1177.1	18.7	32371.0
08Aug2050	13:42	34021.5	1186.8	18.8	32884.0
08Aug2050	13:48	34252.0	1195.3	18.8	33335.8
08Aug2050	13:54	34287.3	1201.6	18.8	33673.9
08Aug2050	14:00	34113.4	1205.1	18.9	33865.0
08Aug2050	14:06	33754.3	1205.6	18.9	33890.0
08Aug2050	14:12	33229.0	1202.9	18.9	33745.3
08Aug2050	14:18	32519.9	1197.0	18.8	33429.7
08Aug2050	14:24	31638.1	1187.9	18.8	32942.3
08Aug2050	14:30	30619.7	1175.6	18.7	32291.7
08Aug2050	14:36	29499.9	1160.4	18.6	31497.3
08Aug2050	14:42	28297.8	1142.7	18.5	30581.2
08Aug2050	14:48	27009.5	1122.7	18.4	29560.8

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	14:54	25645.9	1100.6	18.2	28448.4
08Aug2050	15:00	24237.2	1076.5	18.1	27259.8
08Aug2050	15:06	22836.6	1051.1	17.9	25967.9
08Aug2050	15:12	21488.8	1025.2	17.7	24640.0
08Aug2050	15:18	20208.2	999.2	17.5	23344.0
08Aug2050	15:24	19008.7	973.5	17.4	22094.9
08Aug2050	15:30	17899.5	948.3	17.2	20905.2
08Aug2050	15:36	16884.2	923.9	17.0	19784.3
08Aug2050	15:42	15962.6	900.7	16.9	18676.3
08Aug2050	15:48	15121.2	879.0	16.7	17658.1
08Aug2050	15:54	14338.2	858.6	16.5	16732.3
08Aug2050	16:00	13602.5	839.3	16.4	15883.0
08Aug2050	16:06	12915.8	820.9	16.3	15099.0
08Aug2050	16:12	12278.3	803.2	16.1	14373.4
08Aug2050	16:18	11685.9	786.2	16.0	13701.3
08Aug2050	16:24	11136.5	770.0	15.9	13051.5
08Aug2050	16:30	10626.5	754.5	15.8	12455.6
08Aug2050	16:36	10146.4	739.6	15.6	11909.5
08Aug2050	16:42	9692.3	725.3	15.5	11406.5
08Aug2050	16:48	9265.1	711.3	15.4	10942.7
08Aug2050	16:54	8861.7	697.5	15.3	10515.6
08Aug2050	17:00	8483.1	683.9	15.2	10125.2
08Aug2050	17:06	8132.9	670.3	15.1	9774.9
08Aug2050	17:12	7807.3	656.6	15.0	9480.3
08Aug2050	17:18	7499.3	642.7	14.9	9201.1
08Aug2050	17:24	7210.0	628.5	14.7	8922.2
08Aug2050	17:30	6942.2	614.4	14.6	8646.6
08Aug2050	17:36	6692.3	600.4	14.5	8376.8
08Aug2050	17:42	6457.8	586.6	14.3	8114.3
08Aug2050	17:48	6238.2	573.1	14.2	7860.2
08Aug2050	17:54	6032.8	559.8	14.1	7615.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	18:00	5839.7	546.9	13.9	7374.9
08Aug2050	18:06	5657.6	534.5	13.8	7138.5
08Aug2050	18:12	5486.4	522.5	13.7	6913.7
08Aug2050	18:18	5326.1	510.9	13.6	6700.2
08Aug2050	18:24	5175.7	499.8	13.5	6497.6
08Aug2050	18:30	5033.7	489.0	13.4	6305.3
08Aug2050	18:36	4899.2	478.7	13.3	6122.8
08Aug2050	18:42	4772.5	468.8	13.2	5949.6
08Aug2050	18:48	4653.5	459.3	13.1	5785.3
08Aug2050	18:54	4541.0	450.1	13.0	5624.0
08Aug2050	19:00	4434.4	441.4	12.9	5458.2
08Aug2050	19:06	4334.0	433.2	12.8	5303.6
08Aug2050	19:12	4239.0	425.4	12.7	5159.1
08Aug2050	19:18	4147.7	417.9	12.6	5023.8
08Aug2050	19:24	4059.4	410.9	12.5	4896.5
08Aug2050	19:30	3974.3	404.1	12.4	4776.4
08Aug2050	19:36	3892.1	397.6	12.4	4662.8
08Aug2050	19:42	3812.7	391.3	12.3	4555.0
08Aug2050	19:48	3736.1	385.3	12.2	4452.7
08Aug2050	19:54	3662.4	379.5	12.2	4355.2
08Aug2050	20:00	3591.3	373.8	12.1	4262.5
08Aug2050	20:06	3521.6	368.4	12.0	4174.1
08Aug2050	20:12	3453.6	363.1	12.0	4086.0
08Aug2050	20:18	3387.8	357.9	11.9	3995.0
08Aug2050	20:24	3323.8	353.0	11.8	3908.4
08Aug2050	20:30	3261.6	348.3	11.8	3825.6
08Aug2050	20:36	3201.3	343.7	11.7	3746.5
08Aug2050	20:42	3143.5	339.3	11.7	3670.7
08Aug2050	20:48	3088.6	335.0	11.6	3598.1
08Aug2050	20:54	3035.9	330.8	11.6	3528.5
08Aug2050	21:00	2984.7	326.8	11.5	3461.8

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	21:06	2935.0	322.9	11.4	3397.7
08Aug2050	21:12	2886.9	319.2	11.4	3336.0
08Aug2050	21:18	2840.3	315.5	11.4	3276.6
08Aug2050	21:24	2795.1	312.0	11.3	3219.4
08Aug2050	21:30	2751.3	308.5	11.3	3164.2
08Aug2050	21:36	2709.5	305.1	11.2	3110.9
08Aug2050	21:42	2669.5	301.9	11.2	3059.5
08Aug2050	21:48	2630.9	298.7	11.1	3010.0
08Aug2050	21:54	2593.8	295.6	11.1	2962.3
08Aug2050	22:00	2558.0	292.6	11.1	2916.2
08Aug2050	22:06	2524.1	289.7	11.0	2871.8
08Aug2050	22:12	2492.3	286.9	11.0	2823.7
08Aug2050	22:18	2463.0	284.2	10.9	2775.9
08Aug2050	22:24	2436.1	281.7	10.9	2731.2
08Aug2050	22:30	2411.1	279.3	10.9	2689.4
08Aug2050	22:36	2387.5	277.1	10.8	2650.3
08Aug2050	22:42	2365.2	275.0	10.8	2613.6
08Aug2050	22:48	2344.0	273.0	10.8	2579.1
08Aug2050	22:54	2323.9	271.1	10.7	2546.7
08Aug2050	23:00	2304.8	269.3	10.7	2516.2
08Aug2050	23:06	2286.5	267.6	10.7	2487.3
08Aug2050	23:12	2269.0	266.0	10.6	2460.1
08Aug2050	23:18	2252.2	264.4	10.6	2434.3
08Aug2050	23:24	2236.0	263.0	10.6	2409.9
08Aug2050	23:30	2220.4	261.6	10.6	2386.7
08Aug2050	23:36	2205.5	260.2	10.6	2364.6
08Aug2050	23:42	2191.1	258.9	10.5	2343.5
08Aug2050	23:48	2177.5	257.7	10.5	2323.5
08Aug2050	23:54	2164.5	256.5	10.5	2304.3
09Aug2050	00:00	2151.8	255.4	10.5	2286.1
09Aug2050	00:06	2138.6	254.3	10.5	2268.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	00:12	2124.4	253.2	10.4	2251.6
09Aug2050	00:18	2108.4	252.2	10.4	2234.9
09Aug2050	00:24	2089.9	251.1	10.4	2218.2
09Aug2050	00:30	2067.9	250.0	10.4	2201.2
09Aug2050	00:36	2040.7	248.9	10.4	2183.3
09Aug2050	00:42	2007.6	247.7	10.4	2164.0
09Aug2050	00:48	1968.5	246.3	10.3	2142.8
09Aug2050	00:54	1924.3	244.8	10.3	2119.3
09Aug2050	01:00	1875.7	243.1	10.3	2093.2
09Aug2050	01:06	1823.0	241.2	10.3	2064.4
09Aug2050	01:12	1766.3	239.1	10.2	2032.8
09Aug2050	01:18	1705.5	236.8	10.2	1998.4
09Aug2050	01:24	1640.8	234.2	10.1	1961.2
09Aug2050	01:30	1572.0	231.5	10.1	1921.0
09Aug2050	01:36	1499.8	228.4	10.1	1878.1
09Aug2050	01:42	1425.2	225.2	10.0	1832.5
09Aug2050	01:48	1349.6	221.8	9.9	1761.4
09Aug2050	01:54	1273.7	218.4	9.8	1691.3
09Aug2050	02:00	1197.9	214.9	9.8	1622.7
09Aug2050	02:06	1122.7	211.4	9.7	1555.5
09Aug2050	02:12	1048.5	207.8	9.6	1489.9
09Aug2050	02:18	975.8	204.1	9.5	1426.4
09Aug2050	02:24	904.9	200.3	9.4	1365.5
09Aug2050	02:30	836.4	196.4	9.3	1307.9
09Aug2050	02:36	770.8	192.5	9.2	1255.1
09Aug2050	02:42	708.4	188.4	9.1	1216.3
09Aug2050	02:48	649.3	184.1	9.0	1188.1
09Aug2050	02:54	593.6	179.5	9.0	1158.7
09Aug2050	03:00	541.7	174.8	8.9	1128.3
09Aug2050	03:06	493.7	169.8	8.8	1097.3
09Aug2050	03:12	449.8	164.8	8.7	1065.9

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	03:18	409.8	159.7	8.6	1034.3
09Aug2050	03:24	373.6	154.5	8.5	1002.8
09Aug2050	03:30	340.8	149.3	8.5	971.6
09Aug2050	03:36	311.1	144.1	8.4	940.7
09Aug2050	03:42	284.2	138.9	8.3	910.4
09Aug2050	03:48	259.9	133.7	8.2	880.7
09Aug2050	03:54	237.6	128.6	8.1	851.7
09Aug2050	04:00	217.2	123.6	8.0	823.4
09Aug2050	04:06	198.5	118.7	7.9	787.4
09Aug2050	04:12	181.5	113.9	7.8	750.7
09Aug2050	04:18	165.9	109.2	7.7	716.0
09Aug2050	04:24	151.6	104.8	7.6	683.1
09Aug2050	04:30	138.6	100.5	7.5	651.9
09Aug2050	04:36	126.7	96.3	7.4	622.3
09Aug2050	04:42	115.7	92.3	7.3	594.2
09Aug2050	04:48	105.6	88.4	7.2	567.6
09Aug2050	04:54	96.4	84.6	7.1	542.4
09Aug2050	05:00	88.0	81.0	7.0	518.5
09Aug2050	05:06	80.4	77.5	6.9	492.7
09Aug2050	05:12	73.4	74.2	6.8	468.4
09Aug2050	05:18	67.0	71.0	6.7	445.5
09Aug2050	05:24	61.2	67.9	6.6	424.0
09Aug2050	05:30	55.9	65.0	6.6	403.8
09Aug2050	05:36	51.1	62.2	6.5	384.8
09Aug2050	05:42	46.6	59.5	6.4	366.9
09Aug2050	05:48	42.6	56.9	6.3	350.0
09Aug2050	05:54	38.9	54.4	6.3	334.1
09Aug2050	06:00	35.5	52.0	6.2	319.1
09Aug2050	06:06	32.4	49.7	6.1	304.9
09Aug2050	06:12	29.6	47.5	6.1	291.5
09Aug2050	06:18	27.0	45.4	6.0	278.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	06:24	24.6	43.3	5.9	264.2
09Aug2050	06:30	22.4	41.4	5.9	249.5
09Aug2050	06:36	20.4	39.6	5.8	235.9
09Aug2050	06:42	18.6	37.9	5.7	223.2
09Aug2050	06:48	16.9	36.2	5.7	211.4
09Aug2050	06:54	15.4	34.6	5.6	200.5
09Aug2050	07:00	14.0	33.1	5.6	190.2
09Aug2050	07:06	12.7	31.7	5.5	180.6
09Aug2050	07:12	11.5	30.4	5.5	171.6
09Aug2050	07:18	10.4	29.1	5.4	163.2
09Aug2050	07:24	9.4	27.8	5.4	155.4
09Aug2050	07:30	8.4	26.7	5.3	148.0
09Aug2050	07:36	7.6	25.5	5.3	141.0
09Aug2050	07:42	6.8	24.5	5.3	134.5
09Aug2050	07:48	6.0	23.4	5.2	128.3
09Aug2050	07:54	5.4	22.4	5.2	122.5
09Aug2050	08:00	4.8	21.5	5.1	117.1
09Aug2050	08:06	4.2	20.6	5.1	111.9
09Aug2050	08:12	3.7	19.7	5.1	107.1
09Aug2050	08:18	3.3	18.9	5.1	102.5
09Aug2050	08:24	2.9	18.1	5.0	98.1
09Aug2050	08:30	2.5	17.3	5.0	93.6
09Aug2050	08:36	2.2	16.6	4.9	87.7
09Aug2050	08:42	1.9	15.9	4.9	82.2
09Aug2050	08:48	1.7	15.2	4.9	77.2
09Aug2050	08:54	1.5	14.6	4.8	72.6
09Aug2050	09:00	1.3	14.1	4.8	68.3
09Aug2050	09:06	1.1	13.5	4.8	64.4
09Aug2050	09:12	0.9	13.0	4.7	60.7
09Aug2050	09:18	0.8	12.5	4.7	57.3
09Aug2050	09:24	0.6	12.1	4.7	54.2

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	09:30	0.5	11.6	4.7	51.3
09Aug2050	09:36	0.4	11.2	4.6	48.6
09Aug2050	09:42	0.3	10.8	4.6	46.1
09Aug2050	09:48	0.2	10.5	4.6	43.7
09Aug2050	09:54	0.1	10.1	4.6	41.5
09Aug2050	10:00	0.1	9.8	4.6	39.5
09Aug2050	10:06	0.1	9.5	4.5	37.5
09Aug2050	10:12	0.0	9.2	4.5	35.7
09Aug2050	10:18	0.0	8.9	4.5	34.1
09Aug2050	10:24	0.0	8.6	4.5	32.5
09Aug2050	10:30	0.0	8.4	4.5	31.0
09Aug2050	10:36	0.0	8.1	4.5	29.6
09Aug2050	10:42	0.0	7.9	4.5	28.3
09Aug2050	10:48	0.0	7.6	4.4	27.1
09Aug2050	10:54	0.0	7.4	4.4	25.9
09Aug2050	11:00	0.0	7.2	4.4	24.8
09Aug2050	11:06	0.0	7.0	4.4	23.8
09Aug2050	11:12	0.0	6.8	4.4	22.8
09Aug2050	11:18	0.0	6.6	4.4	21.9
09Aug2050	11:24	0.0	6.4	4.4	21.0
09Aug2050	11:30	0.0	6.3	4.4	20.1
09Aug2050	11:36	0.0	6.1	4.4	19.4
09Aug2050	11:42	0.0	6.0	4.3	18.6
09Aug2050	11:48	0.0	5.8	4.3	17.9
09Aug2050	11:54	0.0	5.7	4.3	17.2
09Aug2050	12:00	0.0	5.5	4.3	16.6
09Aug2050	12:06	0.0	5.4	4.3	16.0
09Aug2050	12:12	0.0	5.3	4.3	15.4
09Aug2050	12:18	0.0	5.1	4.3	14.9
09Aug2050	12:24	0.0	5.0	4.3	14.3
09Aug2050	12:30	0.0	4.9	4.3	13.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
09Aug2050	12:36	0.0	4.8	4.3	13.4
09Aug2050	12:42	0.0	4.7	4.3	12.9
09Aug2050	12:48	0.0	4.6	4.3	12.5
09Aug2050	12:54	0.0	4.5	4.3	12.1
09Aug2050	13:00	0.0	4.4	4.3	11.7
09Aug2050	13:06	0.0	4.3	4.2	11.3
09Aug2050	13:12	0.0	4.2	4.2	10.9
09Aug2050	13:18	0.0	4.1	4.2	10.6
09Aug2050	13:24	0.0	4.0	4.2	10.2
09Aug2050	13:30	0.0	3.9	4.2	9.9
09Aug2050	13:36	0.0	3.8	4.2	9.6
09Aug2050	13:42	0.0	3.8	4.2	9.3
09Aug2050	13:48	0.0	3.7	4.2	9.0
09Aug2050	13:54	0.0	3.6	4.2	8.8
09Aug2050	14:00	0.0	3.5	4.2	8.5
09Aug2050	14:06	0.0	3.5	4.2	8.3
09Aug2050	14:12	0.0	3.4	4.2	8.0
09Aug2050	14:18	0.0	3.3	4.2	7.8
09Aug2050	14:24	0.0	3.3	4.2	7.6
09Aug2050	14:30	0.0	3.2	4.2	7.4
09Aug2050	14:36	0.0	3.2	4.2	7.2
09Aug2050	14:42	0.0	3.1	4.2	7.0
09Aug2050	14:48	0.0	3.0	4.2	6.8
09Aug2050	14:54	0.0	3.0	4.2	6.6
09Aug2050	15:00	0.0	2.9	4.2	6.4
09Aug2050	15:06	0.0	2.9	4.2	6.2
09Aug2050	15:12	0.0	2.8	4.2	6.1
09Aug2050	15:18	0.0	2.8	4.2	5.9
09Aug2050	15:24	0.0	2.7	4.2	5.8
09Aug2050	15:30	0.0	2.7	4.2	5.6
09Aug2050	15:36	0.0	2.6	4.2	5.5

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Project: CranstonHMS

Simulation Run: PMF Failure 12 hr Reservoir: Cranston Mill Pond

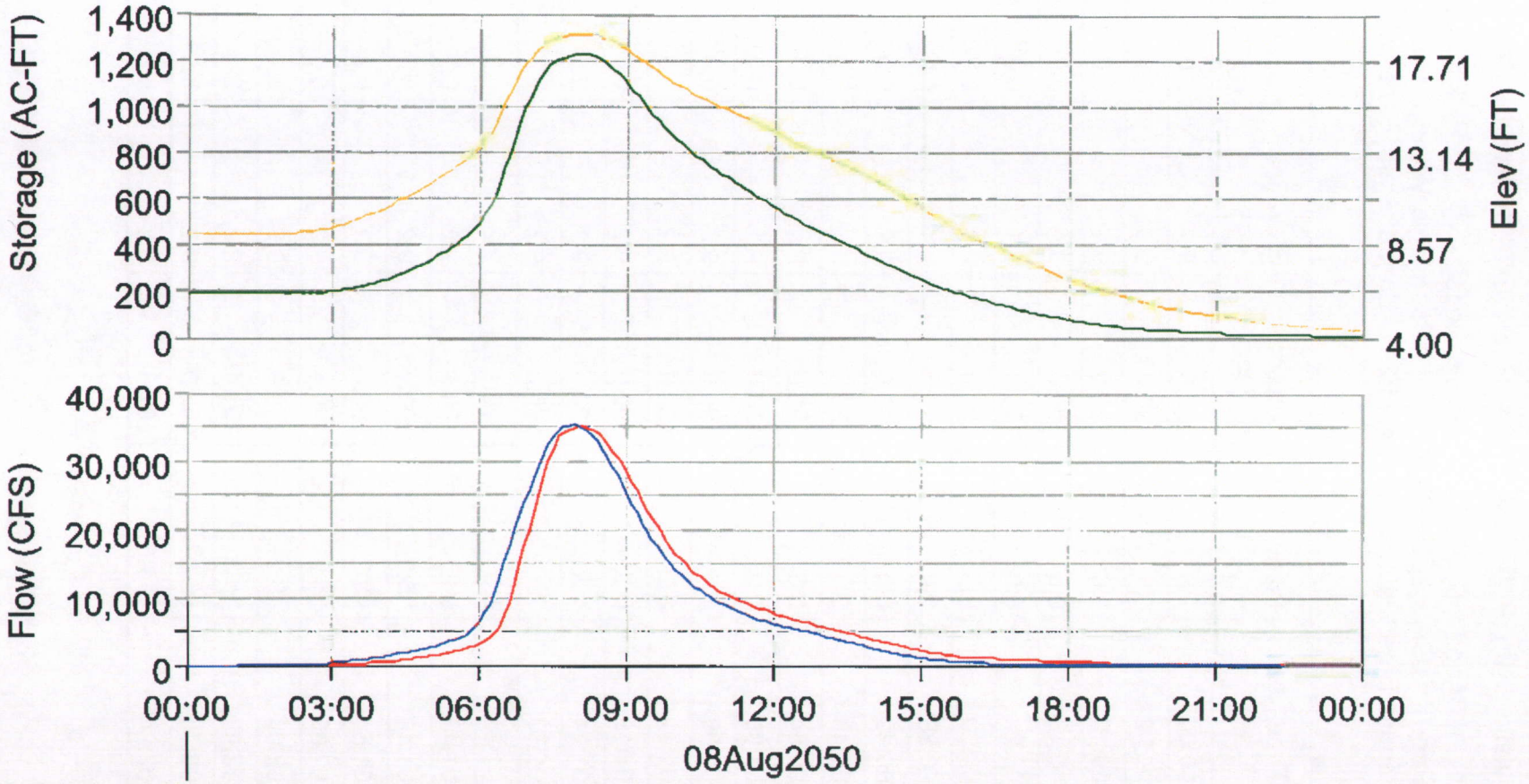
Start of Run:	08Aug2050, 00:00	Basin Model:	PMF w/ Dam Failure
End of Run:	09Aug2050, 00:00	Meteorologic Model:	PMF (12 hr)
Compute Time:	24Jun2010, 14:44:28	Control Specifications:	12hr (24 total)

Volume Units: IN

Computed Results

Peak Inflow :	**35210.0 (CFS)**	**Date/Time of Peak Inflow :**	**08Aug2050, 07:54**
Peak Outflow :	**34874.6 (CFS)**	**Date/Time of Peak Outflow :**	**08Aug2050, 08:06**
Total Inflow :	**29.82 (IN)**	**Peak Storage :**	**1223.8 (AC-FT)**
Total Outflow :	**30.30 (IN)**	**Peak Elevation :**	**19.0 (FT)**

Reservoir "Cranston Mill Pond" Results for Run "PMF Failure 12 hr"



Run:PMF Failure 12 hr Element:CRANSTON MILL POND Result:Storage

Run:PMF Failure 12 hr Element:CRANSTON MILL POND Result:Pool Elevation

Run:PMF Failure 12 hr Element:CRANSTON MILL POND Result:Outflow

Run:PMF Failure 12 hr Element:CRANSTON MILL POND Result:Combined Inflow

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Project: CranstonHMS
Simulation Run: PMF Failure 12 hr Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: PMF w/ Dam Fail
End of Run: 09Aug2050, 00:00 Meteorologic Model: PMF (12 hr)
Compute Time: 24Jun2010, 14:44:28 Control Specifications: 12hr (24

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.0	190.0	9.1	0.0
08Aug2050	00:48	0.0	190.0	9.1	0.0
08Aug2050	00:54	0.0	190.0	9.1	0.0
08Aug2050	01:00	0.0	190.0	9.1	0.0
08Aug2050	01:06	0.0	190.0	9.2	0.0
08Aug2050	01:12	0.2	190.0	9.2	0.0
08Aug2050	01:18	0.5	190.0	9.2	0.0
08Aug2050	01:24	1.3	190.0	9.2	0.0
08Aug2050	01:30	2.8	190.0	9.2	0.0
08Aug2050	01:36	5.3	190.1	9.2	0.0
08Aug2050	01:42	9.2	190.1	9.2	0.1
08Aug2050	01:48	15.0	190.2	9.2	0.1
08Aug2050	01:54	23.2	190.4	9.2	0.3
08Aug2050	02:00	34.2	190.6	9.2	0.6
08Aug2050	02:06	48.2	190.9	9.2	1.1
08Aug2050	02:12	65.6	191.4	9.2	2.1
08Aug2050	02:18	86.6	192.0	9.2	3.5
08Aug2050	02:24	111.8	192.8	9.2	5.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	141.4	193.8	9.2	9.1
08Aug2050	02:36	175.7	195.0	9.3	13.8
08Aug2050	02:42	215.2	196.5	9.3	20.4
08Aug2050	02:48	260.2	198.2	9.3	29.3
08Aug2050	02:54	310.8	200.3	9.4	41.0
08Aug2050	03:00	367.4	202.7	9.5	56.1
08Aug2050	03:06	430.0	205.4	9.5	75.3
08Aug2050	03:12	498.8	208.6	9.6	99.2
08Aug2050	03:18	573.8	212.1	9.7	128.5
08Aug2050	03:24	654.9	215.9	9.8	163.8
08Aug2050	03:30	742.0	220.2	9.9	205.6
08Aug2050	03:36	834.8	224.8	10.0	254.5
08Aug2050	03:42	933.2	229.8	10.1	292.8
08Aug2050	03:48	1036.8	235.4	10.2	335.2
08Aug2050	03:54	1145.5	241.4	10.3	383.6
08Aug2050	04:00	1258.9	248.0	10.4	438.3
08Aug2050	04:06	1377.1	255.0	10.5	499.7
08Aug2050	04:12	1500.3	262.5	10.6	568.0
08Aug2050	04:18	1628.8	270.4	10.7	643.4
08Aug2050	04:24	1762.8	278.7	10.8	726.3
08Aug2050	04:30	1902.6	287.5	11.0	816.8
08Aug2050	04:36	2048.7	296.7	11.1	901.4
08Aug2050	04:42	2201.6	306.5	11.2	991.3
08Aug2050	04:48	2362.2	316.7	11.4	1089.0
08Aug2050	04:54	2531.1	327.5	11.5	1194.9
08Aug2050	05:00	2709.6	338.8	11.7	1309.3
08Aug2050	05:06	2899.1	350.6	11.8	1433.0
08Aug2050	05:12	3101.6	363.0	12.0	1566.3
08Aug2050	05:18	3319.3	376.1	12.1	1698.7
08Aug2050	05:24	3554.4	389.8	12.3	1844.2
08Aug2050	05:30	3809.8	404.4	12.4	2004.9

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	4096.2	419.7	12.6	2182.0
08Aug2050	05:42	4441.3	436.1	12.8	2378.9
08Aug2050	05:48	4891.5	454.1	13.0	2600.2
08Aug2050	05:54	5534.2	474.7	13.2	2834.0
08Aug2050	06:00	6430.8	499.5	13.5	3125.8
08Aug2050	06:06	7577.8	530.0	13.8	3499.3
08Aug2050	06:12	9000.8	567.6	14.1	3970.8
08Aug2050	06:18	10743.3	614.0	14.6	4561.7
08Aug2050	06:24	12809.6	670.4	15.1	5353.7
08Aug2050	06:30	15117.1	735.1	15.6	6968.1
08Aug2050	06:36	17467.8	802.7	16.1	9196.8
08Aug2050	06:42	19701.7	869.5	16.6	11762.7
08Aug2050	06:48	21786.1	931.8	17.1	14517.6
08Aug2050	06:54	23749.1	988.5	17.5	17208.1
08Aug2050	07:00	25645.7	1038.8	17.8	19918.2
08Aug2050	07:06	27497.1	1082.5	18.1	22530.5
08Aug2050	07:12	29272.3	1120.2	18.3	25013.6
08Aug2050	07:18	30942.4	1152.3	18.5	27453.8
08Aug2050	07:24	32408.8	1177.5	18.7	29780.3
08Aug2050	07:30	33552.3	1195.1	18.8	31922.5
08Aug2050	07:36	34349.0	1204.1	18.9	33809.1
08Aug2050	07:42	34851.1	1209.4	18.9	34096.8
08Aug2050	07:48	35132.6	1215.5	18.9	34423.4
08Aug2050	07:54	35210.0	1220.5	19.0	34697.1
08Aug2050	08:00	35068.7	1223.5	19.0	34859.2
08Aug2050	08:06	34733.6	1223.8	19.0	34874.6
08Aug2050	08:12	34224.1	1221.1	19.0	34729.5
08Aug2050	08:18	33521.4	1215.4	18.9	34415.9
08Aug2050	08:24	32637.0	1206.3	18.9	33928.6
08Aug2050	08:30	31608.3	1194.1	18.8	33274.1
08Aug2050	08:36	30471.9	1179.0	18.7	32470.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	29247.8	1161.2	18.6	31540.2
08Aug2050	08:48	27931.8	1141.1	18.5	30500.3
08Aug2050	08:54	26535.7	1118.8	18.3	29363.6
08Aug2050	09:00	25090.4	1094.5	18.2	28145.9
08Aug2050	09:06	23651.2	1068.6	18.0	26872.2
08Aug2050	09:12	22265.2	1041.9	17.8	25494.9
08Aug2050	09:18	20947.6	1015.4	17.7	24147.9
08Aug2050	09:24	19712.3	989.2	17.5	22853.7
08Aug2050	09:30	18568.7	963.6	17.3	21623.0
08Aug2050	09:36	17521.3	938.8	17.1	20464.4
08Aug2050	09:42	16570.4	915.1	17.0	19368.2
08Aug2050	09:48	15702.6	892.8	16.8	18300.3
08Aug2050	09:54	14895.4	872.0	16.6	17334.5
08Aug2050	10:00	14136.8	852.3	16.5	16451.5
08Aug2050	10:06	13428.5	833.6	16.4	15638.1
08Aug2050	10:12	12770.5	815.7	16.2	14886.1
08Aug2050	10:18	12158.5	798.6	16.1	14189.8
08Aug2050	10:24	11590.5	782.2	16.0	13539.5
08Aug2050	10:30	11063.1	766.5	15.9	12914.3
08Aug2050	10:36	10566.5	751.5	15.7	12342.4
08Aug2050	10:42	10097.2	737.0	15.6	11815.9
08Aug2050	10:48	9655.3	723.0	15.5	11329.6
08Aug2050	10:54	9237.8	709.3	15.4	10880.1
08Aug2050	11:00	8845.4	695.8	15.3	10465.8
08Aug2050	11:06	8481.9	682.5	15.2	10087.5
08Aug2050	11:12	8143.5	669.2	15.1	9749.0
08Aug2050	11:18	7823.5	655.8	15.0	9464.2
08Aug2050	11:24	7523.1	642.1	14.9	9190.7
08Aug2050	11:30	7245.3	628.3	14.7	8917.9
08Aug2050	11:36	6985.9	614.5	14.6	8648.8
08Aug2050	11:42	6742.4	600.9	14.5	8385.5

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	11:48	6514.5	587.4	14.3	8129.4
08Aug2050	11:54	6301.4	574.2	14.2	7881.5
08Aug2050	12:00	6100.8	561.3	14.1	7642.5
08Aug2050	12:06	5910.2	548.8	14.0	7409.4
08Aug2050	12:12	5728.4	536.6	13.8	7177.7
08Aug2050	12:18	5554.5	524.8	13.7	6956.8
08Aug2050	12:24	5386.2	513.4	13.6	6745.7
08Aug2050	12:30	5220.3	502.3	13.5	6543.4
08Aug2050	12:36	5053.6	491.5	13.4	6348.7
08Aug2050	12:42	4884.7	480.8	13.3	6160.2
08Aug2050	12:48	4713.8	470.4	13.2	5976.6
08Aug2050	12:54	4540.6	459.9	13.1	5797.0
08Aug2050	13:00	4365.8	449.6	13.0	5614.1
08Aug2050	13:06	4191.2	439.4	12.8	5419.6
08Aug2050	13:12	4015.8	429.3	12.7	5231.1
08Aug2050	13:18	3838.0	419.2	12.6	5047.5
08Aug2050	13:24	3657.5	409.2	12.5	4867.7
08Aug2050	13:30	3474.2	399.2	12.4	4691.1
08Aug2050	13:36	3288.9	389.1	12.3	4517.1
08Aug2050	13:42	3103.0	378.9	12.2	4345.6
08Aug2050	13:48	2918.8	368.6	12.0	4177.2
08Aug2050	13:54	2738.1	358.2	11.9	3998.8
08Aug2050	14:00	2561.2	347.8	11.8	3816.8
08Aug2050	14:06	2388.2	337.4	11.6	3639.2
08Aug2050	14:12	2220.1	327.1	11.5	3466.3
08Aug2050	14:18	2057.5	316.8	11.4	3298.0
08Aug2050	14:24	1900.8	306.6	11.2	3134.5
08Aug2050	14:30	1750.7	296.5	11.1	2975.9
08Aug2050	14:36	1608.0	286.4	11.0	2815.7
08Aug2050	14:42	1474.0	276.6	10.8	2642.2
08Aug2050	14:48	1349.2	267.1	10.7	2479.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	14:54	1233.0	258.0	10.5	2327.9
08Aug2050	15:00	1124.9	249.1	10.4	2185.9
08Aug2050	15:06	1024.8	240.4	10.2	2053.4
08Aug2050	15:12	933.1	232.1	10.1	1930.0
08Aug2050	15:18	849.4	224.0	10.0	1807.0
08Aug2050	15:24	773.3	216.4	9.8	1652.2
08Aug2050	15:30	703.9	209.4	9.6	1520.0
08Aug2050	15:36	640.7	202.9	9.5	1407.3
08Aug2050	15:42	583.0	196.7	9.3	1312.1
08Aug2050	15:48	530.2	190.8	9.2	1235.5
08Aug2050	15:54	481.7	185.0	9.1	1194.0
08Aug2050	16:00	437.0	179.1	9.0	1155.8
08Aug2050	16:06	396.1	173.1	8.9	1117.9
08Aug2050	16:12	359.2	167.2	8.8	1080.5
08Aug2050	16:18	326.3	161.2	8.7	1043.7
08Aug2050	16:24	297.2	155.3	8.6	1007.8
08Aug2050	16:30	271.0	149.5	8.5	972.7
08Aug2050	16:36	247.2	143.7	8.4	938.6
08Aug2050	16:42	225.3	138.1	8.3	905.5
08Aug2050	16:48	205.4	132.5	8.2	873.5
08Aug2050	16:54	187.2	127.0	8.1	842.5
08Aug2050	17:00	170.6	121.7	8.0	810.7
08Aug2050	17:06	155.5	116.5	7.9	770.6
08Aug2050	17:12	141.8	111.5	7.7	732.8
08Aug2050	17:18	129.3	106.7	7.6	697.2
08Aug2050	17:24	117.8	102.1	7.5	663.7
08Aug2050	17:30	107.4	97.7	7.4	632.1
08Aug2050	17:36	97.9	93.4	7.3	602.3
08Aug2050	17:42	89.3	89.3	7.2	574.2
08Aug2050	17:48	81.4	85.4	7.1	547.6
08Aug2050	17:54	74.2	81.6	7.0	522.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	18:00	67.6	78.0	6.9	496.2
08Aug2050	18:06	61.6	74.5	6.8	470.9
08Aug2050	18:12	56.1	71.2	6.7	447.2
08Aug2050	18:18	51.0	68.1	6.6	425.0
08Aug2050	18:24	46.5	65.1	6.6	404.2
08Aug2050	18:30	42.3	62.2	6.5	384.7
08Aug2050	18:36	38.4	59.4	6.4	366.3
08Aug2050	18:42	34.9	56.7	6.3	349.1
08Aug2050	18:48	31.7	54.2	6.3	332.8
08Aug2050	18:54	28.7	51.8	6.2	317.5
08Aug2050	19:00	26.0	49.4	6.1	303.1
08Aug2050	19:06	23.5	47.2	6.1	289.5
08Aug2050	19:12	21.3	45.0	6.0	276.7
08Aug2050	19:18	19.2	43.0	5.9	261.3
08Aug2050	19:24	17.3	41.0	5.9	246.5
08Aug2050	19:30	15.5	39.2	5.8	232.9
08Aug2050	19:36	13.9	37.4	5.7	220.1
08Aug2050	19:42	12.4	35.8	5.7	208.3
08Aug2050	19:48	11.0	34.2	5.6	197.3
08Aug2050	19:54	9.8	32.7	5.6	187.1
08Aug2050	20:00	8.7	31.3	5.5	177.5
08Aug2050	20:06	7.7	29.9	5.5	168.5
08Aug2050	20:12	6.8	28.6	5.4	160.2
08Aug2050	20:18	6.0	27.4	5.4	152.3
08Aug2050	20:24	5.2	26.2	5.3	145.0
08Aug2050	20:30	4.6	25.0	5.3	138.1
08Aug2050	20:36	4.0	24.0	5.2	131.6
08Aug2050	20:42	3.5	22.9	5.2	125.5
08Aug2050	20:48	3.0	22.0	5.2	119.8
08Aug2050	20:54	2.6	21.0	5.1	114.4
08Aug2050	21:00	2.2	20.1	5.1	109.3

Project: CranstonHMS

Simulation Run: PMF Failure 6 hr Reservoir: Cranston Mill Pond

Start of Run:	08Aug2050, 00:00	Basin Model:	PMF w/ Dam Failure
End of Run:	08Aug2050, 12:00	Meteorologic Model:	PMF (6 hr)
Compute Time:	24Jun2010, 14:44:38	Control Specifications:	6hr (12 total)

Volume Units: IN

Computed Results

Peak Inflow :	33521.6 (CFS)	Date/Time of Peak Inflow :	08Aug2050, 05:00
Peak Outflow :	33812.0 (CFS)	Date/Time of Peak Outflow :	08Aug2050, 04:54
Total Inflow :	24.35 (IN)	Peak Storage :	1204.2 (AC-FT)
Total Outflow :	24.49 (IN)	Peak Elevation :	18.9 (FT)

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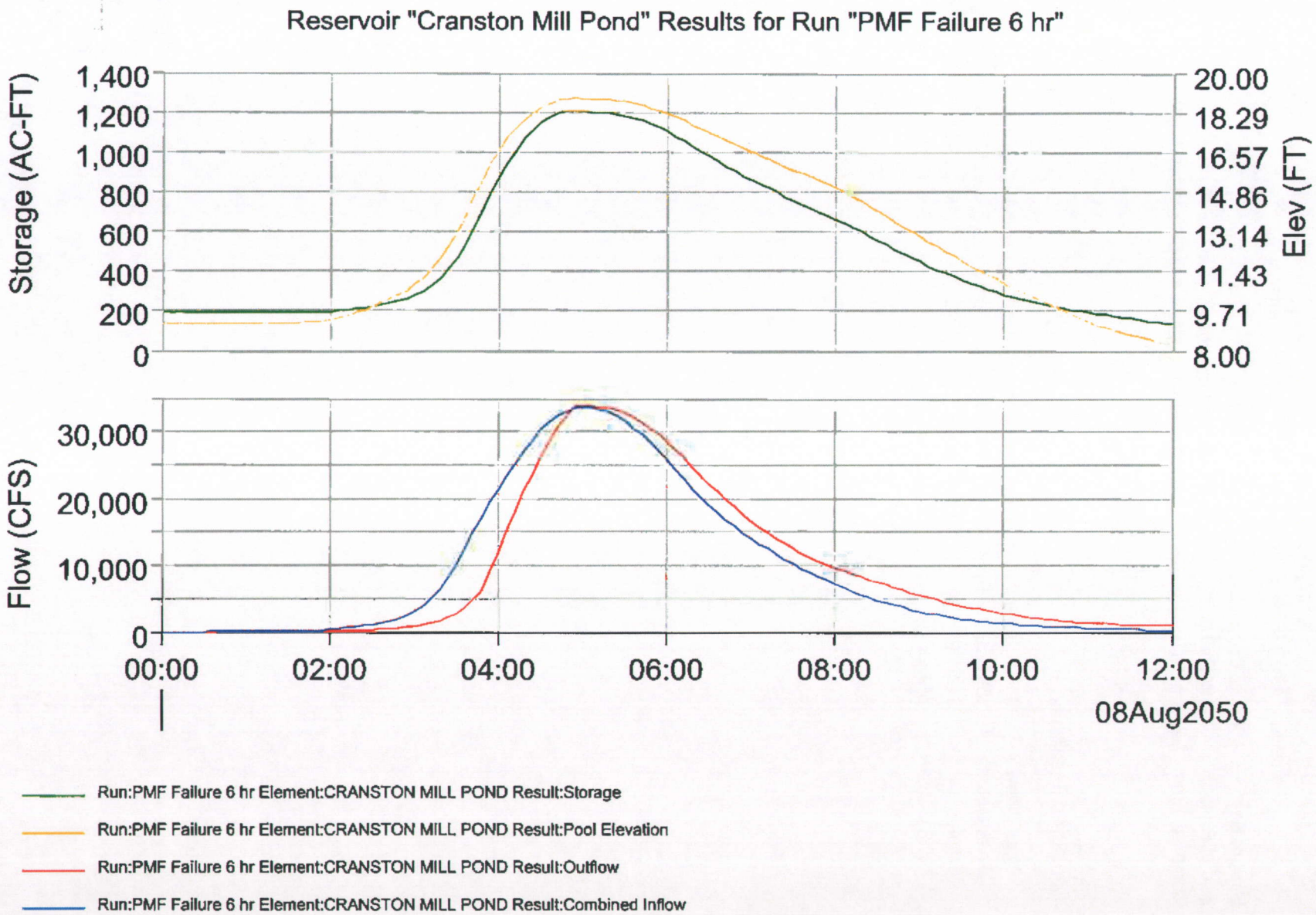
Reservoir "Cranston Mill Pond" Results for Run "PMF Failure 6 hr"
Storage (AC-FT)
1,400
1,200
1,000
800
600
400
200
0
Elev (FT)
20.00
18.29
16.57
14.86
13.14
11.43
9.71
8.00
Flow (CFS)
30,000
20,000
10,000
0
00:00
02:00
04:00
06:00
08:00
10:00
12:00
08Aug2050
Run:PMF Failure 6 hr Element:CRANSTON MILL POND Result:Storage
Run:PMF Failure 6 hr Element:CRANSTON MILL POND Result:Pool Elevation
Run:PMF Failure 6 hr Element:CRANSTON MILL POND Result:Outflow
Run:PMF Failure 6 hr Element:CRANSTON MILL POND Result:Combined Inflow

Project: CranstonHMS
Simulation Run: PMF Failure 6 hr Reservoir: Cranston Mill Pond

Start of Run: 08Aug2050, 00:00 Basin Model: PMF w/ Dam Fail
End of Run: 08Aug2050, 12:00 Meteorologic Model: PMF (6 hr)
Compute Time: 24Jun2010, 14:44:38 Control Specifications: 6hr (12 t

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	00:00	0.0	190.0	9.1	0.0
08Aug2050	00:06	0.0	190.0	9.1	0.0
08Aug2050	00:12	0.0	190.0	9.1	0.0
08Aug2050	00:18	0.0	190.0	9.1	0.0
08Aug2050	00:24	0.0	190.0	9.1	0.0
08Aug2050	00:30	0.0	190.0	9.1	0.0
08Aug2050	00:36	0.0	190.0	9.1	0.0
08Aug2050	00:42	0.1	190.0	9.2	0.0
08Aug2050	00:48	0.5	190.0	9.2	0.0
08Aug2050	00:54	1.6	190.0	9.2	0.0
08Aug2050	01:00	3.9	190.0	9.2	0.0
08Aug2050	01:06	8.3	190.1	9.2	0.0
08Aug2050	01:12	15.7	190.2	9.2	0.1
08Aug2050	01:18	27.4	190.4	9.2	0.3
08Aug2050	01:24	45.0	190.7	9.2	0.7
08Aug2050	01:30	70.1	191.1	9.2	1.5
08Aug2050	01:36	104.1	191.8	9.2	3.1
08Aug2050	01:42	148.3	192.8	9.2	5.9
08Aug2050	01:48	204.3	194.2	9.3	10.7
08Aug2050	01:54	273.9	196.1	9.3	18.6
08Aug2050	02:00	358.5	198.5	9.4	30.7
08Aug2050	02:06	460.0	201.5	9.4	48.6
08Aug2050	02:12	580.5	205.3	9.5	74.5
08Aug2050	02:18	722.1	210.0	9.6	110.5
08Aug2050	02:24	887.3	215.5	9.8	159.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	02:30	1078.8	222.0	9.9	224.8
08Aug2050	02:36	1299.1	229.7	10.1	291.8
08Aug2050	02:42	1558.3	238.8	10.2	362.3
08Aug2050	02:48	1882.8	249.6	10.4	452.8
08Aug2050	02:54	2317.6	262.8	10.6	570.9
08Aug2050	03:00	2949.5	279.2	10.8	730.6
08Aug2050	03:06	3839.1	300.3	11.2	934.1
08Aug2050	03:12	4982.4	327.9	11.5	1199.2
08Aug2050	03:18	6404.5	363.5	12.0	1571.7
08Aug2050	03:24	8148.9	408.7	12.5	2054.3
08Aug2050	03:30	10222.0	464.8	13.1	2720.7
08Aug2050	03:36	12543.6	533.1	13.8	3537.0
08Aug2050	03:42	14917.8	613.1	14.6	4550.1
08Aug2050	03:48	17184.8	702.5	15.4	6069.7
08Aug2050	03:54	19310.4	791.8	16.1	8823.8
08Aug2050	04:00	21320.8	873.7	16.7	11935.2
08Aug2050	04:06	23269.5	945.7	17.2	15093.0
08Aug2050	04:12	25177.1	1008.3	17.6	18097.8
08Aug2050	04:18	27013.6	1061.9	18.0	21023.3
08Aug2050	04:24	28750.6	1107.2	18.3	23680.0
08Aug2050	04:30	30290.5	1144.7	18.5	26198.3
08Aug2050	04:36	31513.4	1173.9	18.7	28539.1
08Aug2050	04:42	32394.3	1193.5	18.8	30607.1
08Aug2050	04:48	32983.8	1203.5	18.9	32363.7
08Aug2050	04:54	33354.3	1204.2	18.9	33812.0
08Aug2050	05:00	33521.6	1201.6	18.8	33676.2
08Aug2050	05:06	33470.4	1200.4	18.8	33610.9
08Aug2050	05:12	33225.4	1198.6	18.8	33515.6
08Aug2050	05:18	32806.0	1195.2	18.8	33334.7
08Aug2050	05:24	32192.8	1189.6	18.8	33033.3
08Aug2050	05:30	31396.1	1181.2	18.7	32588.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	05:36	30452.6	1169.9	18.7	31993.3
08Aug2050	05:42	29398.6	1155.8	18.6	31259.5
08Aug2050	05:48	28254.2	1139.3	18.5	30403.8
08Aug2050	05:54	27014.8	1120.4	18.3	29440.2
08Aug2050	06:00	25691.4	1099.2	18.2	28379.3
08Aug2050	06:06	24312.6	1076.0	18.1	27235.3
08Aug2050	06:12	22930.8	1051.4	17.9	25980.7
08Aug2050	06:18	21591.0	1026.0	17.7	24682.0
08Aug2050	06:24	20306.6	1000.4	17.5	23404.9
08Aug2050	06:30	19089.1	974.9	17.4	22163.9
08Aug2050	06:36	17944.9	949.7	17.2	20970.6
08Aug2050	06:42	16875.9	925.0	17.0	19833.3
08Aug2050	06:48	15883.0	901.1	16.9	18696.9
08Aug2050	06:54	14956.0	878.4	16.7	17632.3
08Aug2050	07:00	14075.0	856.7	16.5	16648.6
08Aug2050	07:06	13230.2	835.8	16.4	15731.0
08Aug2050	07:12	12423.7	815.3	16.2	14869.6
08Aug2050	07:18	11655.6	795.3	16.1	14058.5
08Aug2050	07:24	10923.2	775.6	15.9	13277.2
08Aug2050	07:30	10223.9	756.4	15.8	12527.9
08Aug2050	07:36	9556.3	737.5	15.6	11832.0
08Aug2050	07:42	8914.1	718.7	15.5	11185.2
08Aug2050	07:48	8297.0	699.8	15.3	10586.4
08Aug2050	07:54	7708.1	680.7	15.2	10040.7
08Aug2050	08:00	7144.5	661.1	15.0	9567.3
08Aug2050	08:06	6608.3	640.6	14.8	9159.6
08Aug2050	08:12	6105.5	619.2	14.6	8739.0
08Aug2050	08:18	5633.3	597.3	14.4	8316.2
08Aug2050	08:24	5185.1	575.0	14.2	7896.2
08Aug2050	08:30	4763.9	552.6	14.0	7482.7
08Aug2050	08:36	4373.3	530.3	13.8	7059.9

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
08Aug2050	08:42	4010.5	508.3	13.6	6653.2
08Aug2050	08:48	3672.7	486.7	13.3	6264.2
08Aug2050	08:54	3359.5	465.6	13.1	5893.8
08Aug2050	09:00	3071.0	445.0	12.9	5525.6
08Aug2050	09:06	2805.3	425.1	12.7	5155.2
08Aug2050	09:12	2561.8	406.2	12.5	4813.0
08Aug2050	09:18	2339.8	388.0	12.3	4497.8
08Aug2050	09:24	2138.3	370.5	12.1	4208.7
08Aug2050	09:30	1955.6	353.8	11.9	3922.9
08Aug2050	09:36	1789.3	338.1	11.6	3650.2
08Aug2050	09:42	1637.5	323.1	11.5	3400.3
08Aug2050	09:48	1499.5	308.9	11.3	3171.0
08Aug2050	09:54	1374.2	295.5	11.1	2960.5
08Aug2050	10:00	1259.4	282.7	10.9	2750.0
08Aug2050	10:06	1154.2	270.9	10.7	2543.0
08Aug2050	10:12	1058.7	259.8	10.5	2357.6
08Aug2050	10:18	972.0	249.4	10.4	2191.1
08Aug2050	10:24	892.0	239.6	10.2	2041.1
08Aug2050	10:30	817.8	230.4	10.1	1905.7
08Aug2050	10:36	749.2	221.7	9.9	1758.5
08Aug2050	10:42	685.6	213.8	9.7	1600.4
08Aug2050	10:48	626.4	206.5	9.5	1468.1
08Aug2050	10:54	571.6	199.8	9.4	1357.7
08Aug2050	11:00	521.4	193.5	9.2	1267.5
08Aug2050	11:06	475.5	187.4	9.1	1209.7
08Aug2050	11:12	433.2	181.3	9.0	1170.3
08Aug2050	11:18	393.9	175.2	8.9	1131.3
08Aug2050	11:24	357.7	169.1	8.8	1092.9
08Aug2050	11:30	324.5	163.1	8.7	1055.3
08Aug2050	11:36	293.7	157.1	8.6	1018.4
08Aug2050	11:42	265.5	151.1	8.5	982.5

APPENDIX H

Cranston's Mill Pond Road Culvert Calculations

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Culvert Designer/Analyzer Report
Downstream road & culverts

Analysis Component			
Storm Event	Design	Discharge	203.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	203.00 cfs	Check Discharge	0.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	2.05 ft

Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	1-36 inch Circular	51.97 cfs	4.99 ft	8.77 ft/s
Culvert-2	1-36 inch Circular	55.02 cfs	4.99 ft	9.05 ft/s
Culvert-3	1-36 inch Circular	54.75 cfs	4.99 ft	9.02 ft/s
Culvert-4	1-36 inch Circular	41.27 cfs	4.99 ft	7.84 ft/s
Weir	Broad Crested	0.00 cfs	4.99 ft	N/A
Total	----------	203.02 cfs	4.99 ft	N/A

Culvert Designer/Analyzer Report
Downstream road & culverts

Component:Culvert-1

Culvert Summary			
Computed Headwater Elev	4.99 ft	Discharge	51.97 cfs
Inlet Control HW Elev.	4.99 ft	Tailwater Elevation	2.05 ft
Outlet Control HW Elev.	4.99 ft	Control Type	Inlet Control
Headwater Depth/Height	1.39		

Grades			
Upstream Invert	0.83 ft	Downstream Invert	0.77 ft
Length	32.56 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	H2	Depth, Downstream	2.34 ft
Slope Type	Horizontal	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	2.34 ft
Velocity Downstream	8.77 ft/s	Critical Slope	0.006666 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	4.99 ft	Upstream Velocity Head	0.67 ft
Ke	0.50	Entrance Loss	0.44 ft

Inlet Control Properties			
Inlet Control HW Elev.	4.99 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	7.1 ft2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

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Culvert Designer/Analyzer Report
Downstream road & culverts

Component:Culvert-2

Culvert Summary			
Computed Headwater Elev	4.99 ft	Discharge	55.02 cfs
Inlet Control HW Elev.	4.99 ft	Tailwater Elevation	2.05 ft
Outlet Control HW Elev.	4.93 ft	Control Type	Inlet Control
Headwater Depth/Height	1.47		

Grades			
Upstream Invert	0.57 ft	Downstream Invert	0.29 ft
Length	33.48 ft	Constructed Slope	0.000000 ft/ft

Hydraulic Profile			
Profile	H2	Depth, Downstream	2.41 ft
Slope Type	Horizontal	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	2.41 ft
Velocity Downstream	9.05 ft/s	Critical Slope	0.007080 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	4.93 ft	Upstream Velocity Head	0.95 ft
Ke	0.50	Entrance Loss	0.48 ft

Inlet Control Properties			
Inlet Control HW Elev.	4.99 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	7.1 ft2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Downstream road & culverts

Component:Culvert-3

Culvert Summary			
Computed Headwater Elev	4.99 ft	Discharge	54.75 cfs
Inlet Control HW Elev.	4.99 ft	Tailwater Elevation	2.05 ft
Outlet Control HW Elev.	4.94 ft	Control Type	Inlet Control
Headwater Depth/Height	1.50		

Grades			
Upstream Invert	0.50 ft	Downstream Invert	0.59 ft
Length	34.14 ft	Constructed Slope	-0.002636 ft/ft

Hydraulic Profile			
Profile	CompositeA2PressureProfile	Depth, Downstream	2.40 ft
Slope Type	Adverse	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	2.40 ft
Velocity Downstream	9.02 ft/s	Critical Slope	0.007041 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	4.94 ft	Upstream Velocity Head	0.93 ft
Ke	0.50	Entrance Loss	0.47 ft

Inlet Control Properties			
Inlet Control HW Elev.	4.99 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	7.1 ft2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

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Culvert Designer/Analyzer Report
Downstream road & culverts

Component:Culvert-4

Culvert Summary			
Computed Headwater Elev	4.99 ft	Discharge	41.27 cfs
Inlet Control HW Elev.	4.93 ft	Tailwater Elevation	2.05 ft
Outlet Control HW Elev.	4.99 ft	Control Type	Outlet Control
Headwater Depth/Height	1.39		

Grades			
Upstream Invert	0.82 ft	Downstream Invert	1.52 ft
Length	42.32 ft	Constructed Slope	-0.016541 ft/ft

Hydraulic Profile			
Profile	CompositeA2PressureProfile	Depth, Downstream	2.09 ft
Slope Type	Adverse	Normal Depth	0.00 ft
Flow Regime	Subcritical	Critical Depth	2.09 ft
Velocity Downstream	7.84 ft/s	Critical Slope	0.005514 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	4.99 ft	Upstream Velocity Head	0.53 ft
Ke	0.50	Entrance Loss	0.26 ft

Inlet Control Properties			
Inlet Control HW Elev.	4.93 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	7.1 ft2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Downstream road & culverts

Component:Weir

Hydraulic Component(s): Broad Crested					
Discharge	0.00	cfs	Allowable HW Elevation	4.99	ft
Weir Coefficient	3.00	US	Length	250.00	ft
Crest Elevation	5.00	ft	Headwater Elevation	N/A	ft

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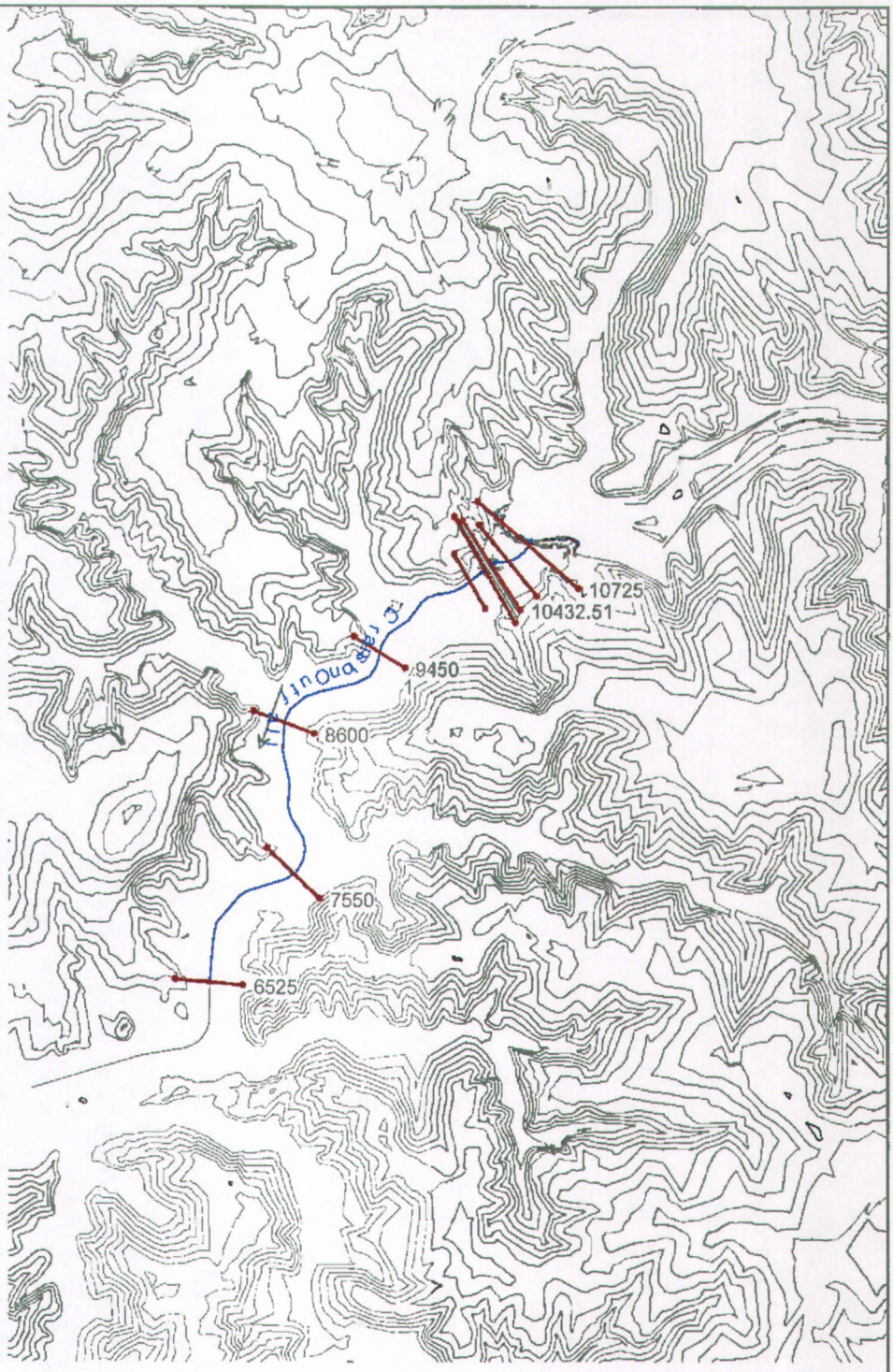
APPENDIX I

HEC-RAS Results



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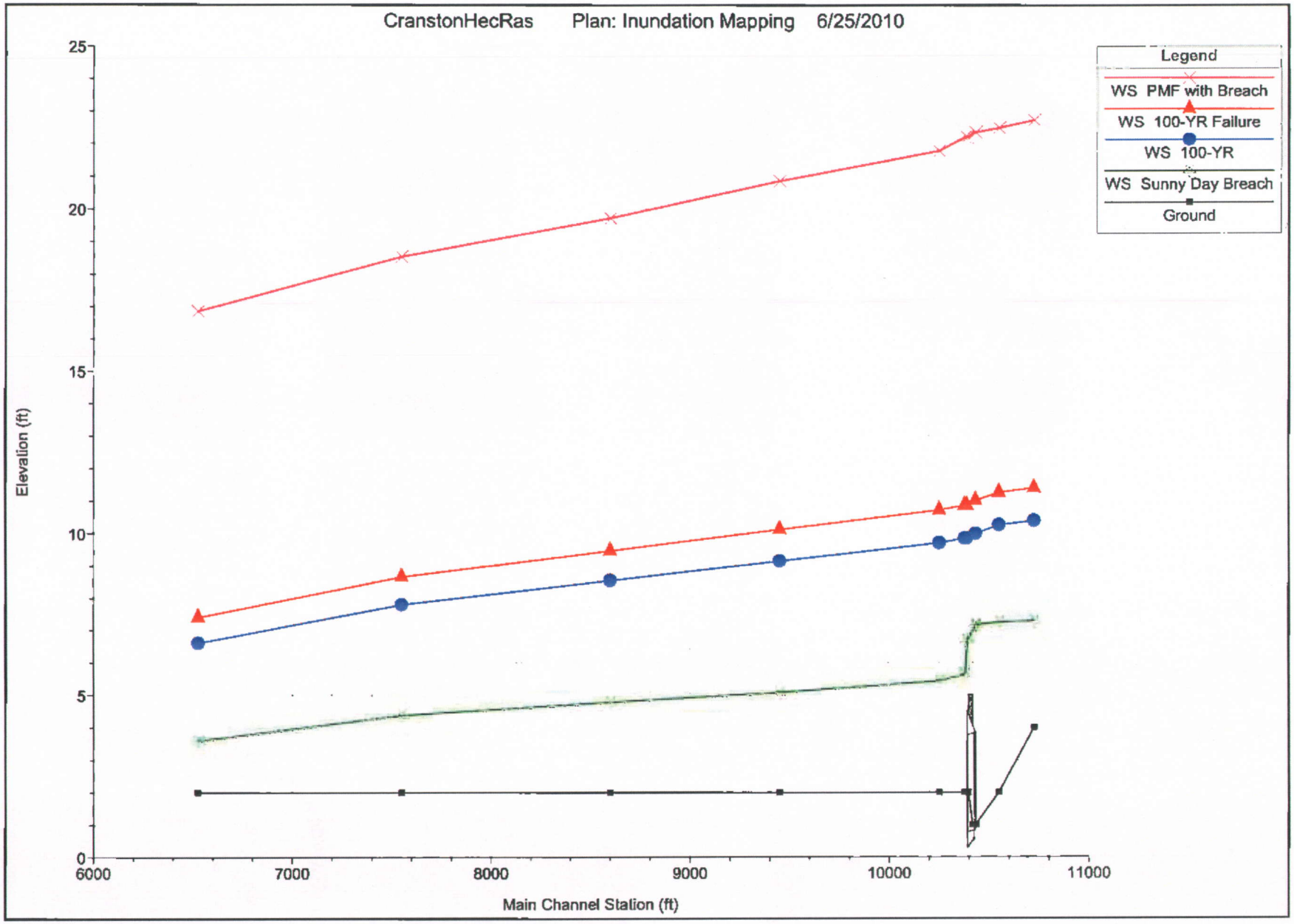
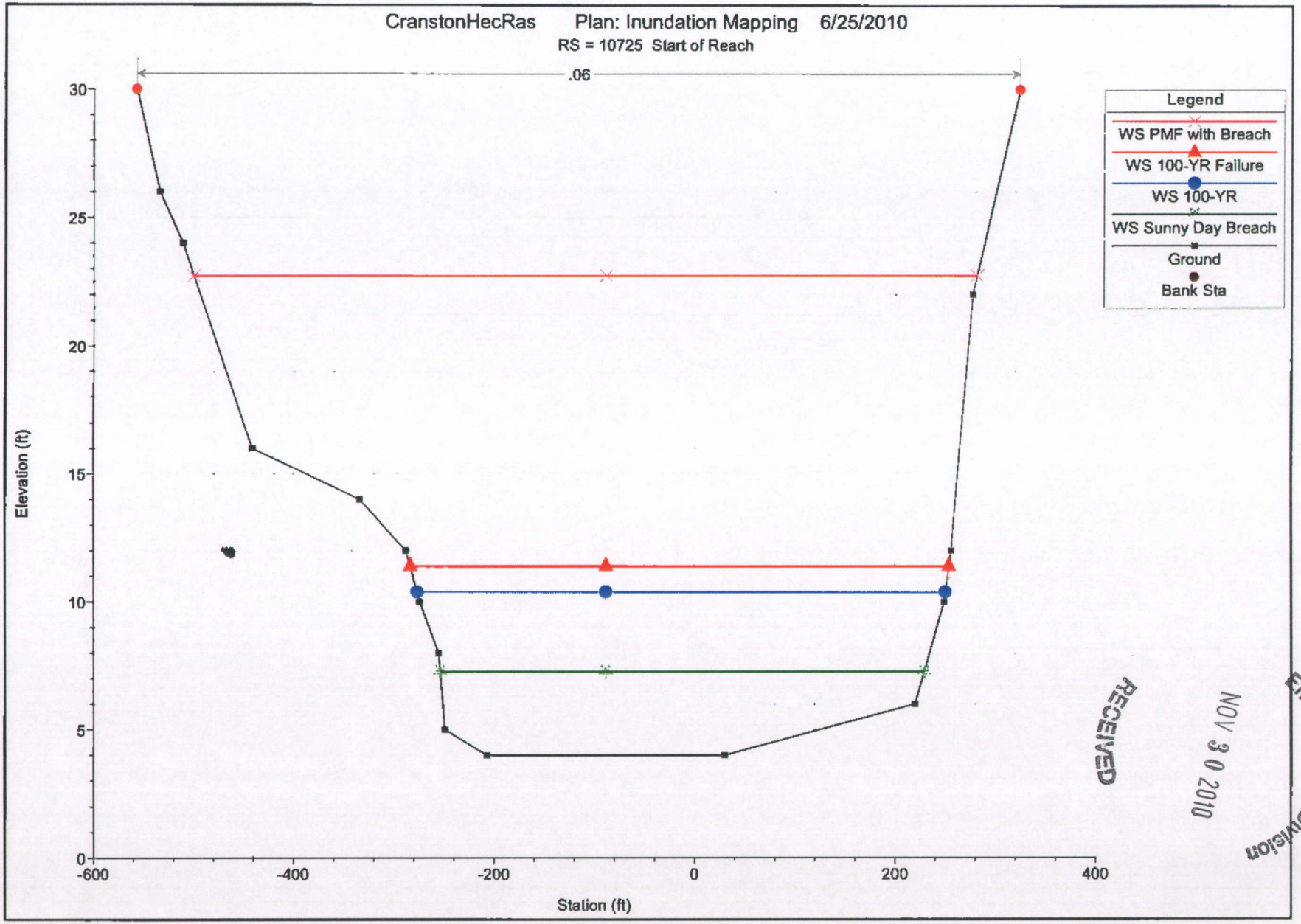
None of the XS's are Geo-Referenced (- Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)


CranstonHecRas Plan: Inundation Mapping 6/25/2010
Legend
WS PMF with Breach
WS 100-YR Failure
WS 100-YR
WS Sunny Day Breach
Ground
Elevation (ft)
Main Channel Station (ft)
0
5
10
15
20
25
6000
7000
8000
9000
10000
11000



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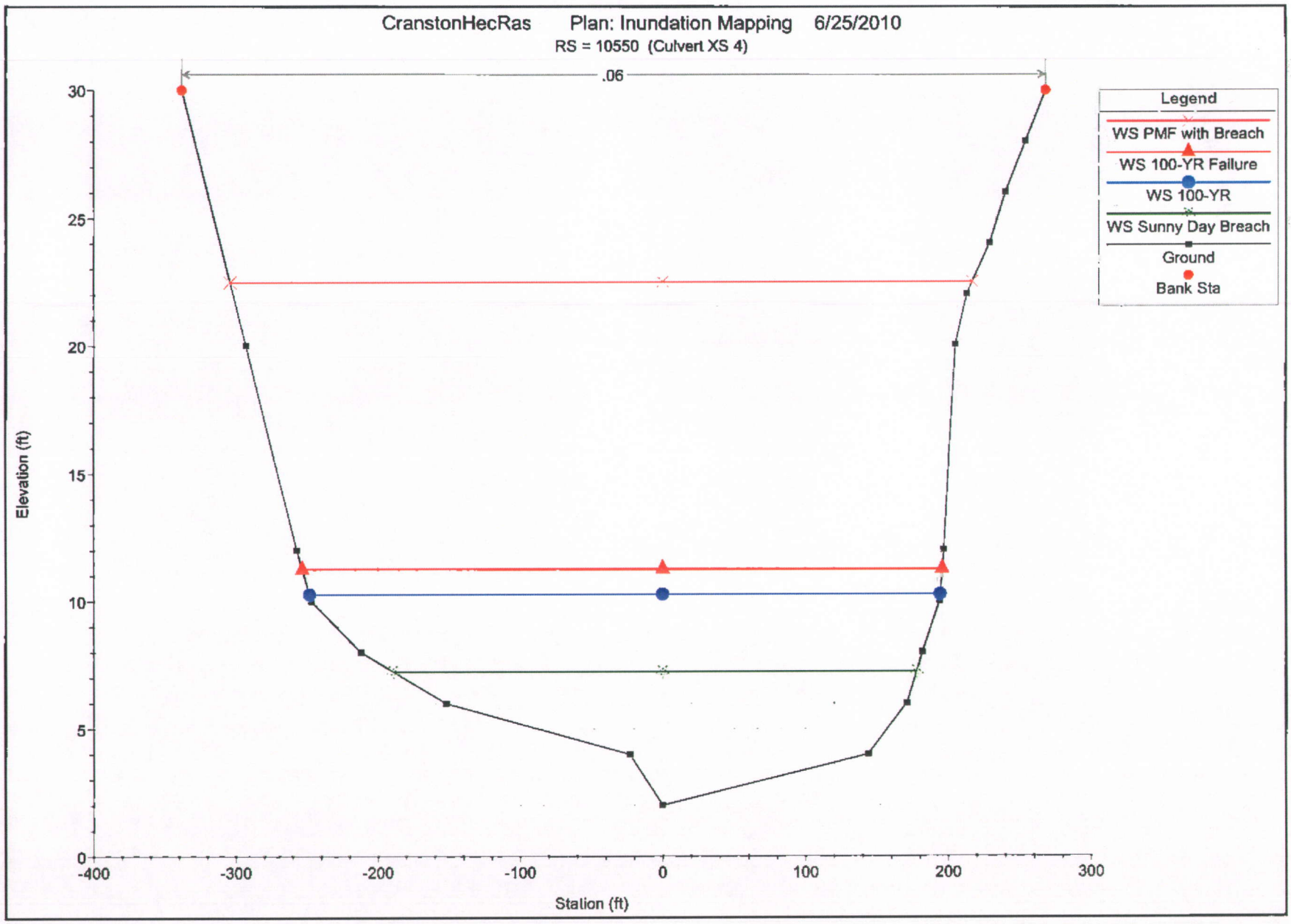
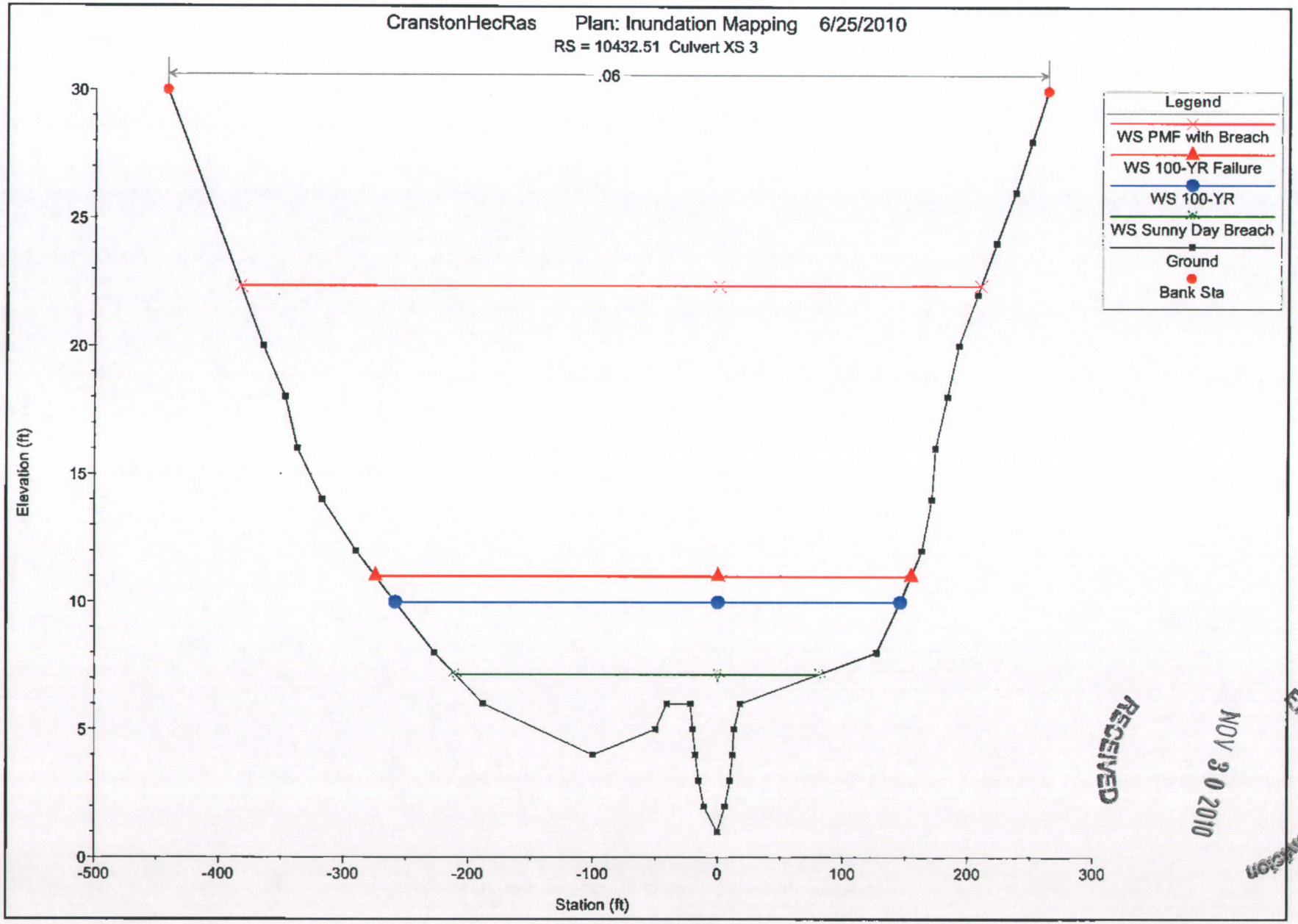

CranstonHecRas Plan: Inundation Mapping 6/25/2010
RS = 10550 (Culvert XS 4)
.06
Legend
WS PMF with Breach
WS 100-YR Failure
WS 100-YR
WS Sunny Day Breach
Ground
Bank Sta
Elevation (ft)
Station (ft)
30
25
20
15
10
5
0
-400
-300
-200
-100
0
100
200
300



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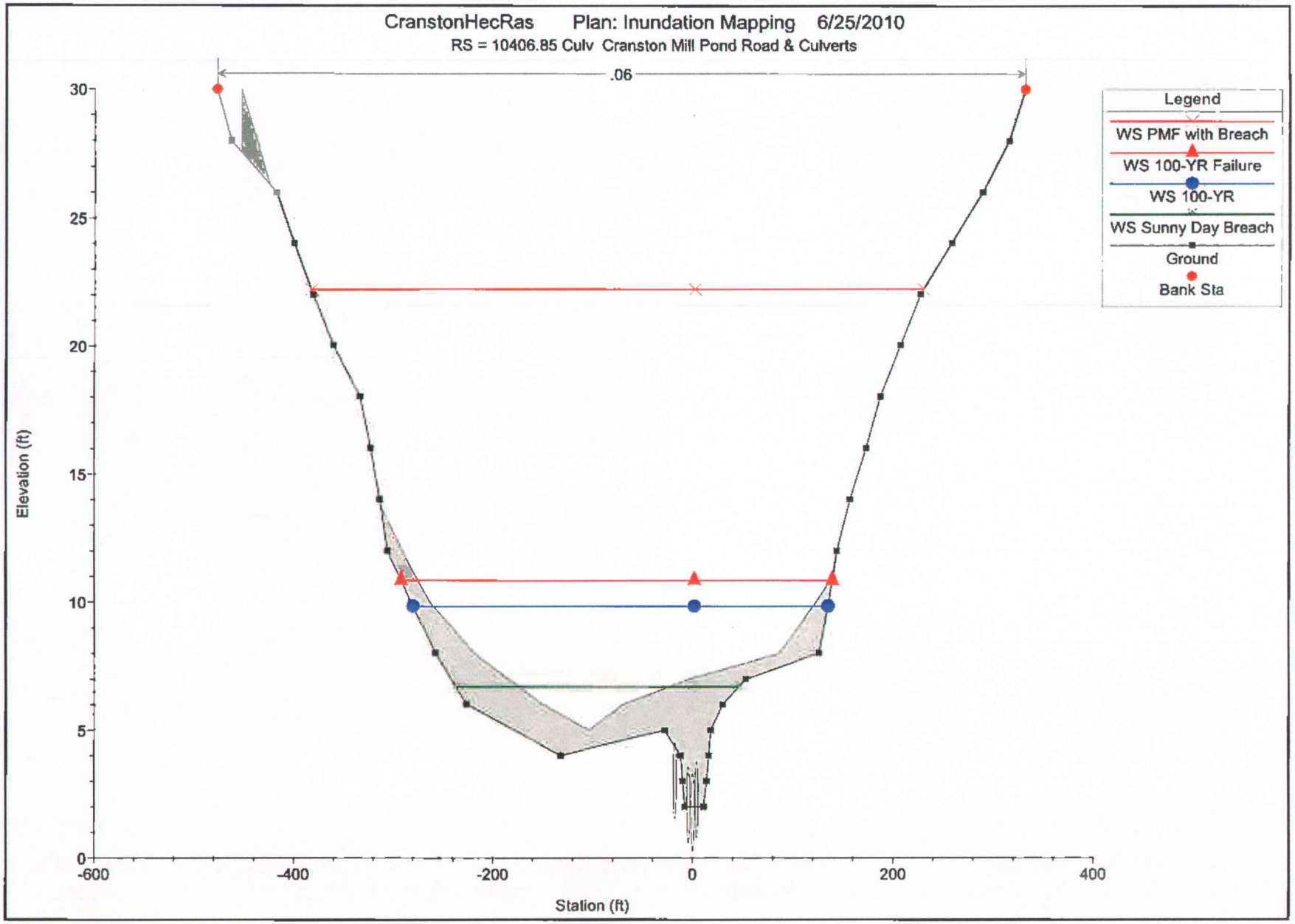
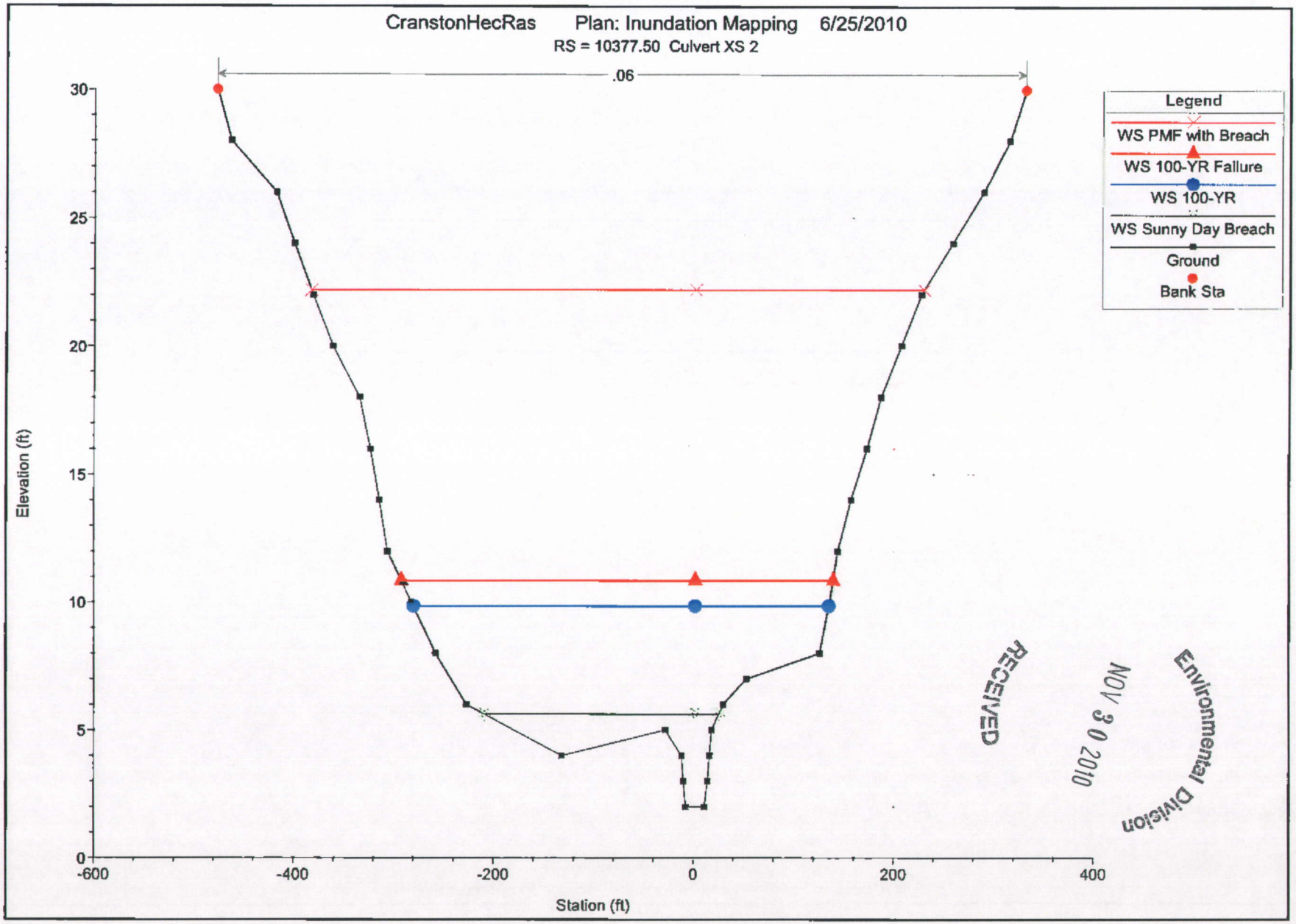

CranstonHecRas Plan: Inundation Mapping 6/25/2010
RS = 10406.85 Culv Cranston Mill Pond Road & Culverts
.06
Legend
WS PMF with Breach
WS 100-YR Failure
WS 100-YR
WS Sunny Day Breach
Ground
Bank Sta
Elevation (ft)
Station (ft)
30
25
20
15
10
5
0
-600
-400
-200
0
200
400



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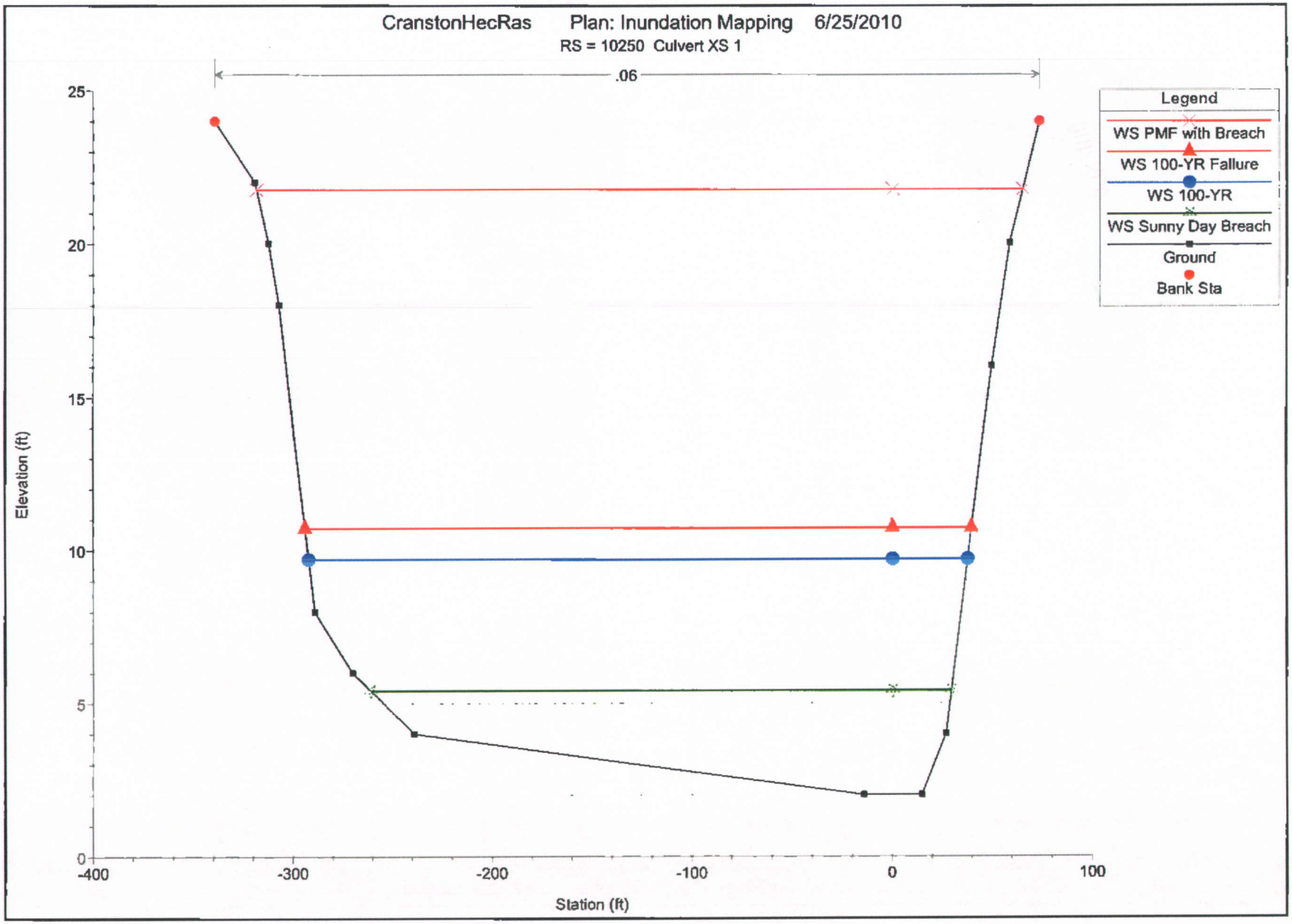
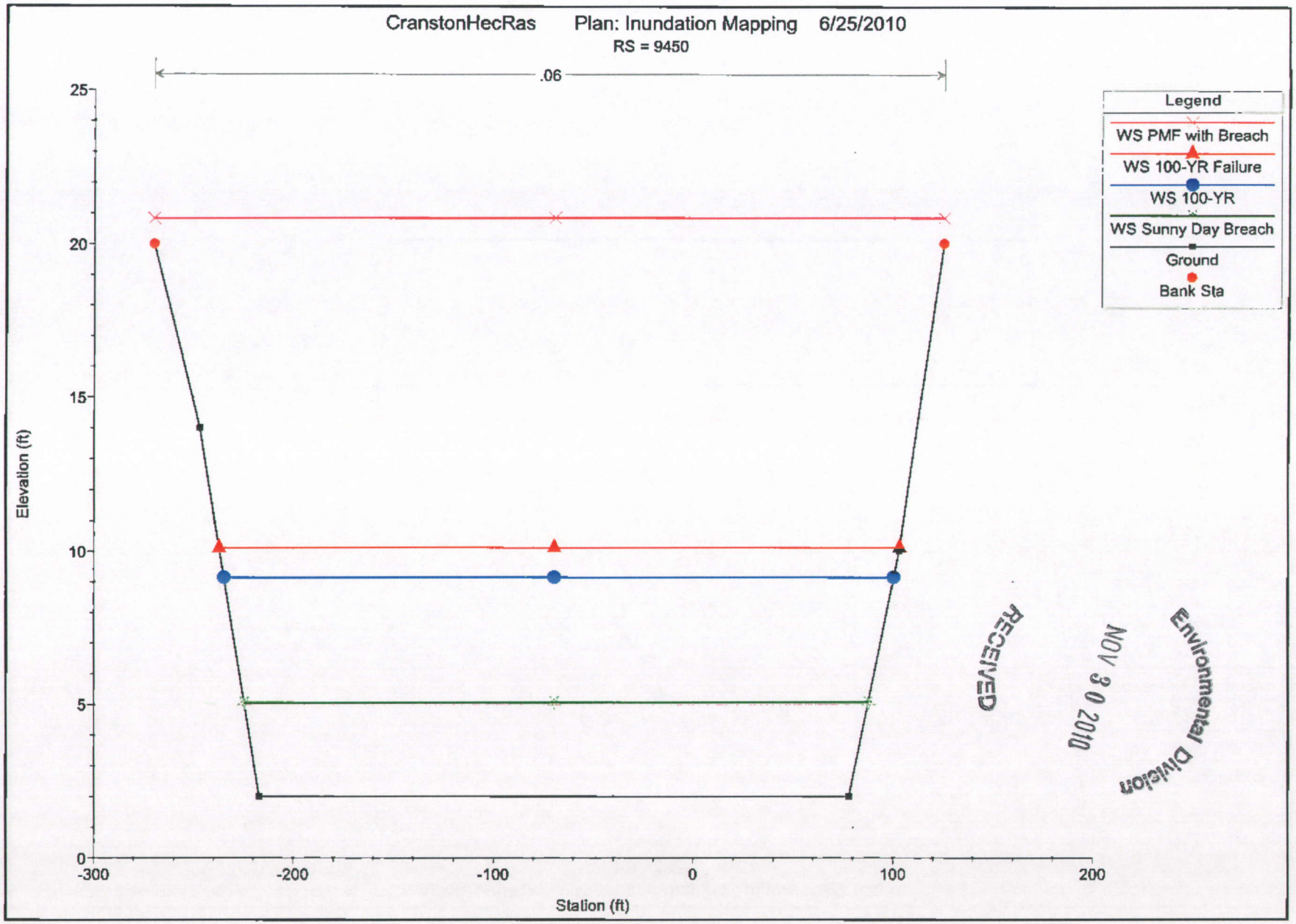

CranstonHecRas Plan: Inundation Mapping 6/25/2010
RS = 10250 Culvert XS 1
.06
Legend
WS PMF with Breach
WS 100-YR Failure
WS 100-YR
WS Sunny Day Breach
Ground
Bank Sta
Elevation (ft)
Station (ft)
25
20
15
10
5
0
-400
-300
-200
-100
0
100



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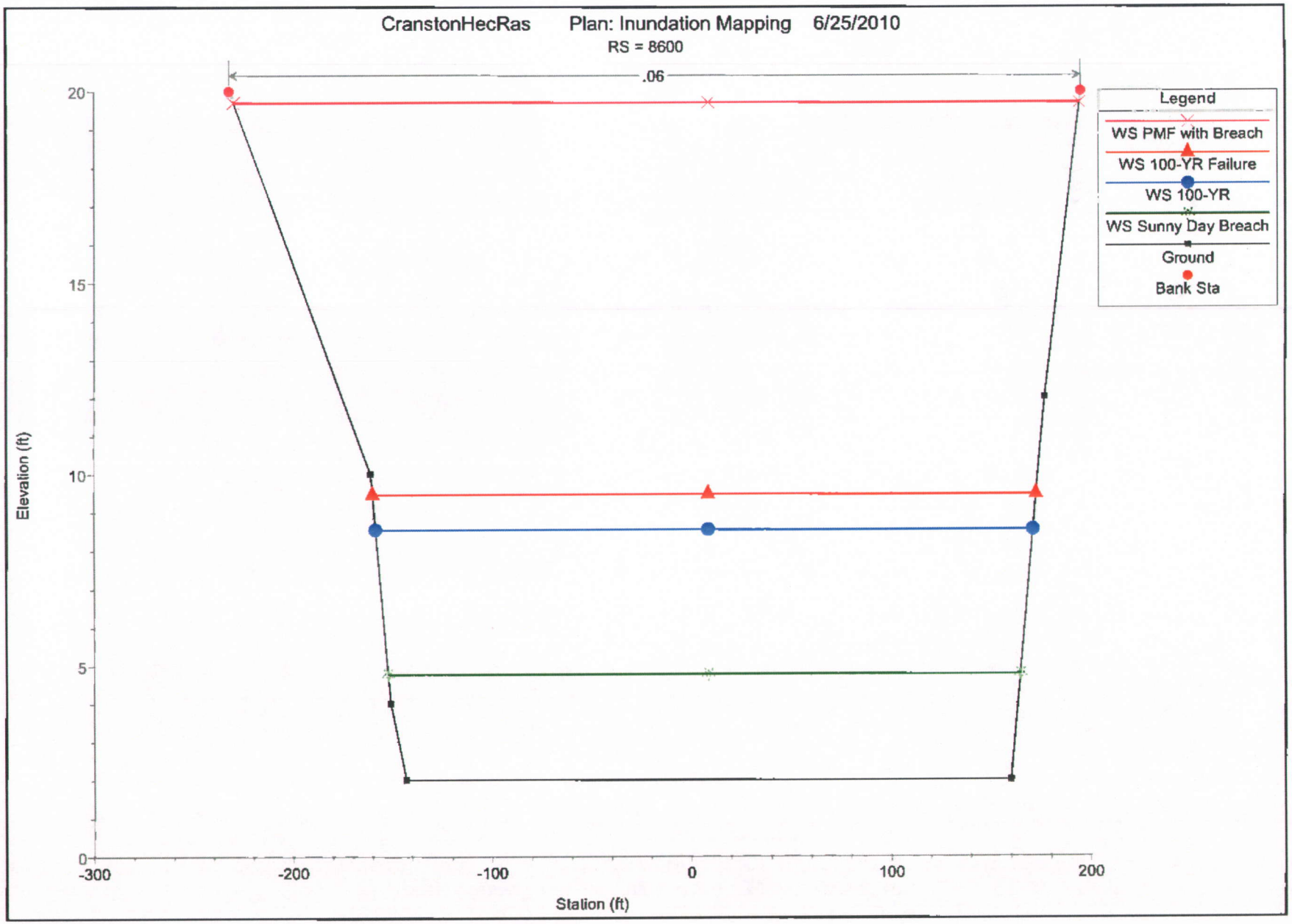
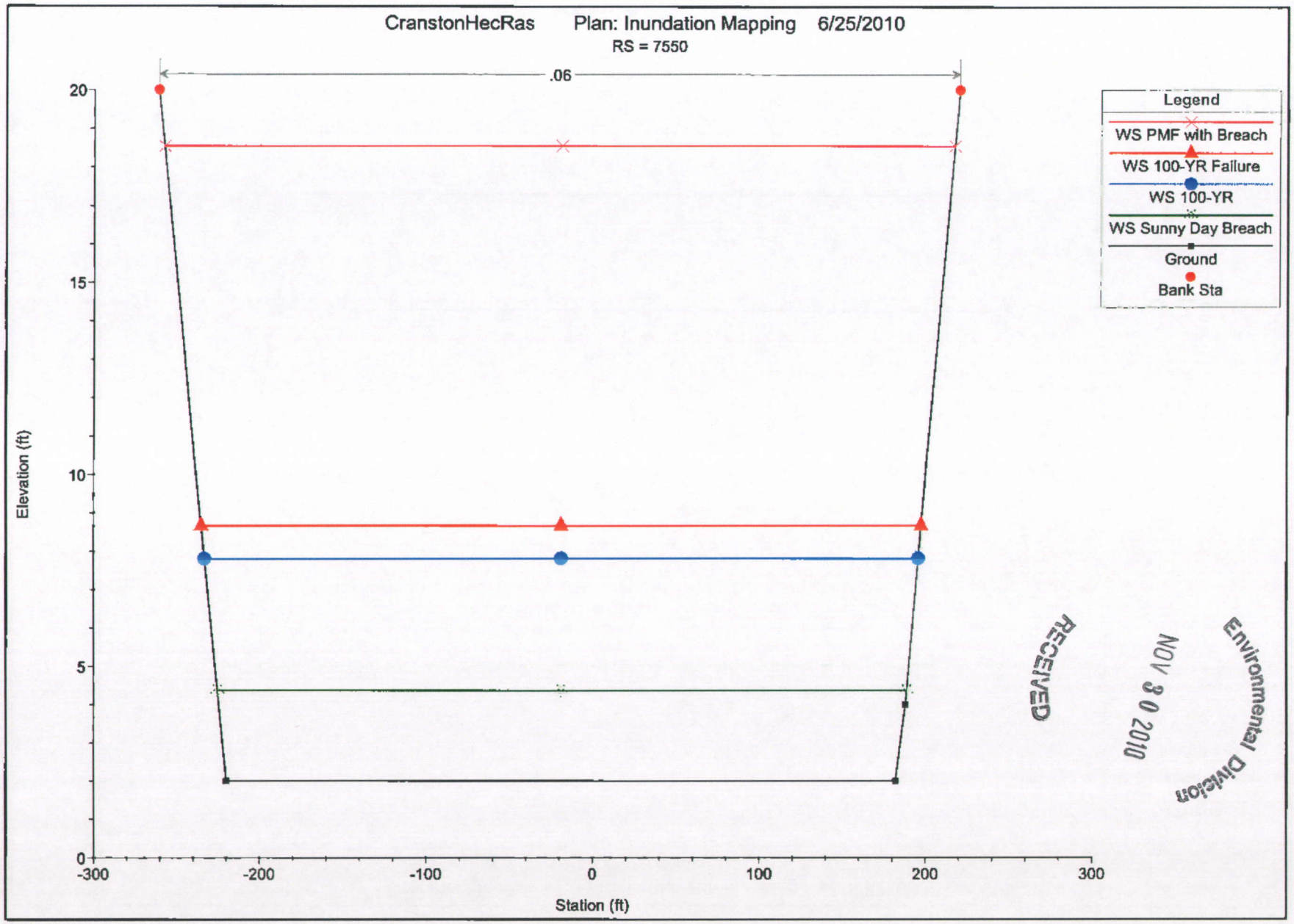

CranstonHecRas Plan: Inundation Mapping 6/25/2010
RS = 8600
.06
Legend
WS PMF with Breach
WS 100-YR Failure
WS 100-YR
WS Sunny Day Breach
Ground
Bank Sta
Elevation (ft)
Station (ft)
20
15
10
5
0
-300
-200
-100
0
100
200



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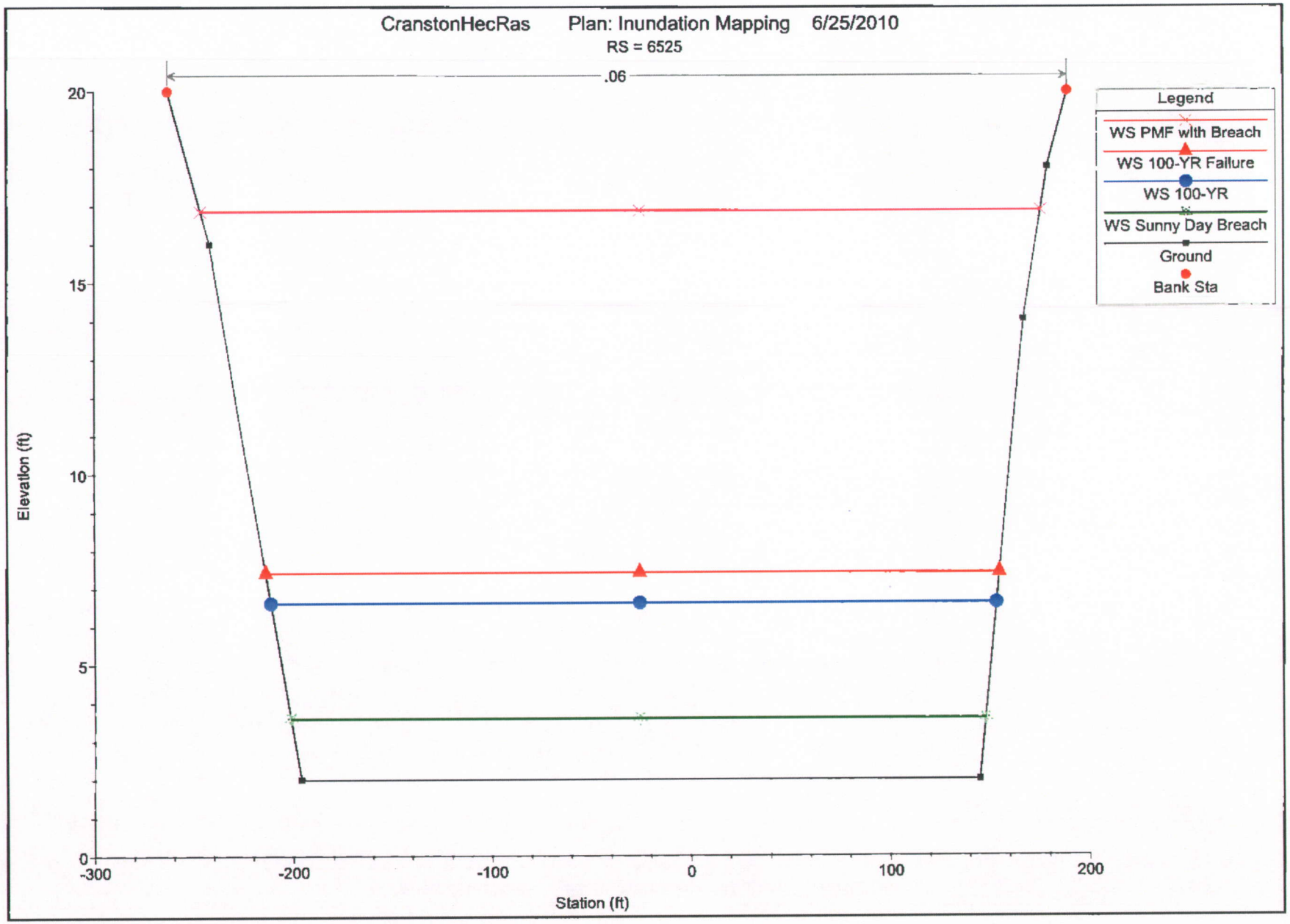

CranstonHecRas Plan: Inundation Mapping 6/25/2010
RS = 6525
.06
Legend
WS PMF with Breach
WS 100-YR Failure
WS 100-YR
WS Sunny Day Breach
Ground
Bank Sta
Elevation (ft)
Station (ft)
20
15
10
5
0
-300
-200
-100
0
100
200

HEC-RAS Plan: Inundation River: CranstonOutfall Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	10725	100-YR	4877.80	4.00	10.39		10.43	0.000474	1.68	2904.90	527.08	0.13
1	10725	100-YR Failure	6360.20	4.00	11.39		11.44	0.000472	1.85	3437.37	537.58	0.13
1	10725	Sunny Day Breach	820.90	4.00	7.28		7.28	0.000158	0.61	1337.77	482.83	0.06
1	10725	PMF with Breach	34874.60	4.00	22.72		22.87	0.000458	3.12	11191.57	781.02	0.15
1	10550	100-YR	4877.80	2.00	10.26		10.32	0.000791	2.10	2321.98	442.66	0.16
1	10550	100-YR Failure	6360.20	2.00	11.25		11.34	0.000766	2.30	2766.74	449.15	0.16
1	10550	Sunny Day Breach	820.90	2.00	7.24		7.25	0.000220	0.76	1085.82	367.12	0.08
1	10550	PMF with Breach	34874.60	2.00	22.47		22.75	0.000769	4.27	8169.37	520.90	0.19
1	10432.51	100-YR	4877.60	1.00	9.99	7.22	10.13	0.002411	3.04	1605.75	404.64	0.27
1	10432.51	100-YR Failure	6360.20	1.00	11.00	7.68	11.15	0.002030	3.13	2029.50	429.06	0.25
1	10432.51	Sunny Day Breach	820.90	1.00	7.16	5.02	7.19	0.001318	1.42	579.80	291.47	0.18
1	10432.51	PMF with Breach	34874.60	1.00	22.33	12.25	22.64	0.001024	4.43	7878.97	592.48	0.21
1	10408.85		Culvert									
1	10377.50	100-YR	4877.60	2.00	9.84		9.97	0.001906	2.80	1740.10	415.33	0.24
1	10377.50	100-YR Failure	6360.20	2.00	10.86		10.99	0.001638	2.93	2168.80	431.68	0.23
1	10377.50	Sunny Day Breach	820.90	2.00	5.62		5.74	0.009398	2.79	294.65	234.52	0.44
1	10377.50	PMF with Breach	34874.60	2.00	22.18		22.48	0.001034	4.38	7956.02	612.61	0.21
1	10250	100-YR	4877.60	2.00	9.70		9.79	0.000828	2.39	2040.72	329.97	0.17
1	10250	100-YR Failure	6360.20	2.00	10.71		10.82	0.000860	2.67	2377.84	333.75	0.18
1	10250	Sunny Day Breach	820.90	2.00	5.41		5.43	0.000737	1.19	688.09	290.60	0.14
1	10250	PMF with Breach	34874.60	2.00	21.76		22.23	0.001225	5.53	6305.62	383.75	0.24
1	9450	100-YR	4877.60	2.00	9.14		9.21	0.000611	2.17	2250.02	335.17	0.15
1	9450	100-YR Failure	6360.20	2.00	10.12		10.21	0.000673	2.47	2580.02	340.55	0.16
1	9450	Sunny Day Breach	820.90	2.00	5.08		5.08	0.000296	0.88	930.06	312.23	0.09
1	9450	PMF with Breach	34874.60	2.00	20.84		21.28	0.001135	5.34	6529.96	395.00	0.23
1	8600	100-YR	4877.60	2.00	8.54		8.63	0.000778	2.34	2080.71	329.70	0.16
1	8600	100-YR Failure	6360.20	2.00	9.46		9.57	0.000854	2.67	2383.61	332.78	0.18
1	8600	Sunny Day Breach	820.90	2.00	4.77		4.79	0.000392	0.95	861.52	317.00	0.10
1	8600	PMF with Breach	34874.60	2.00	19.71		20.19	0.001441	5.59	6244.18	424.28	0.26
1	7550	100-YR	4877.60	2.00	7.80		7.87	0.000670	2.02	2413.96	428.82	0.15
1	7550	100-YR Failure	6360.20	2.00	8.66		8.74	0.000718	2.29	2782.82	432.48	0.16

HEC-RAS Plan: Inundation River: CranstonOutfall Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7550	Sunny Day Breach	820.90	2.00	4.37		4.38	0.000380	0.85	967.29	414.14	0.10
1	7550	PMF with Breach	34874.60	2.00	18.54		18.90	0.001009	4.80	7266.24	474.76	0.22
1	6525	100-YR	4877.60	2.00	6.62	3.84	6.75	0.002003	3.00	1628.26	364.62	0.25
1	6525	100-YR Failure	6360.20	2.00	7.41	4.19	7.58	0.002000	3.31	1919.23	368.69	0.26
1	6525	Sunny Day Breach	820.90	2.00	3.59	2.56	3.63	0.002001	1.50	548.80	349.14	0.21
1	6525	PMF with Breach	34874.60	2.00	16.87	8.74	17.46	0.002000	6.18	5641.48	422.16	0.30

Environmental Division

NOV 30 2010

RECEIVED

APPENDIX J

Flood Wave Travel Time & Depth Calculations

Environmental Division
NOV 30 2010
RECEIVED

KOONTZ-BRYANT, P.C.
Site Development Solutions

Project Name: CRANSTON'S MILL POND
Project #: 09114-002 Sheet 1 of 1
By: JBM Date: 6/25/10
Subject: ROAD OVERTOPPING + FLOOD WAVE TRAVEL TIME Checked: Date:

Determine flood wave travel time of water from breach to get to Cranston's Mill Pond Rd.

→ There are 3 upstream cross-sections During the 100-YR failure their flow velocities are:

1.85 fps
2.80 fps
3.13 fps
7.28 fps / 3 = Avg. Velocity = 2.43 fps

Round to 2.5 fps

→ First flood waters will arrive at:

$\frac{320\text{ft (distance of road downstream)}}{2.5\text{ fps}}$ = 128 seconds = 2 minutes

→ Peak flood levels will occur 2 minutes after peak flow occurs @ spillway

Peak outflow occurs @ 15:54
Breach occurs @ 13:54) 2 hours

→ Peak flood level occurs 2 hours + 2 minutes after breach.

OR 122 minutes

→ Max depth of water over Road:

In 100-YR failure WSE @ road = 11.00'
Road low elevation = 5.00'
Max Depth = 11 − 5 = 6'

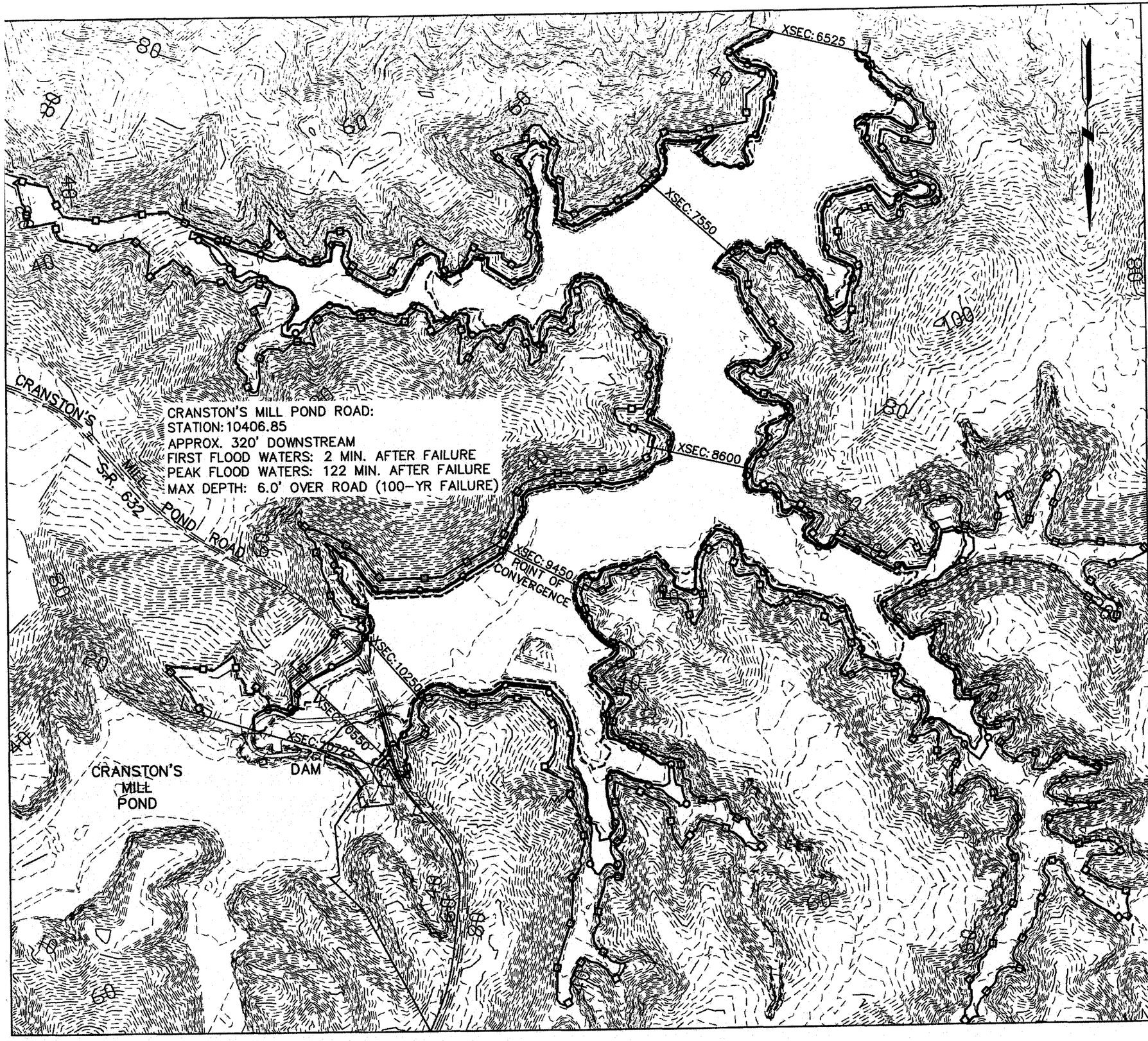
APPENDIX K

Dam Break Inundation Map

Environmental Division
NOV 30 2010
RECEIVED

DAM BREAK INUNDATION MAP FOR CRANSTON'S MILL POND

SIGNIFICANT HAZARD CLASS



LEGEND

- SUNNY DAY FAILURE
- SPILLWAY DESIGN FLOOD WITH FAILURE
- SPILLWAY DESIGN FLOOD (NO FAILURE)
- PROBABLE MAXIMUM FLOOD WITH FAILURE

NOTES

1. THE INFORMATION CONTAINED IN THIS MAP IS PREPARED FOR USE IN NOTIFICATION OF DOWNSTREAM PROPERTY OWNERS BY EMERGENCY MANAGEMENT PERSONNEL.
2. MAPPING OF FLOODED AREAS AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE. TIMING AND EXTENT OF ACTUAL INUNDATION MAY DIFFER FROM THE INFORMATION PRESENTED ON THIS MAP.
3. ALL TOPOGRAPHICAL INFORMATION FROM JAMES CITY COUNTY GIS.
4. DATUM: HORIZONTAL=NAD 83, VERTICAL=NGVD 29

0 400 800 1200

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-20-10
PROFESSIONAL ENGINEER

DRAWN BY: JBM

CHECKED BY: PFH

DATE: 6/14/10
REV. 6/24/10
REV. 8/20/10

SCALE: 1"=400'

KOONTZ-BRYANT, P.C.
SITE DEVELOPMENT SOLUTIONS

1703 N. PARHAM ROAD, SUITE 100, RICHMOND, VIRGINIA 23229
(804)740-9200 kbpc@koontzbryant.com FAX (804)740-7338

Environmental Division

NOV 30 2010

RECEIVED

Scott Thomas

From: Scott Thomas
Sent: Tuesday, November 09, 2010 9:43 AM
To: Mike Woolson
Subject: FW: cranston's mill pond

Scott J. Thomas
Director
James City County Environmental Division

-----Original Message-----
From: Scott Thomas
Sent: Monday, September 13, 2010 12:39 PM
To: Mike Woolson
Subject: RE: cranston's mill pond

Please put a copy of this into the file for record.

-----Original Message-----
From: Mike Woolson
Sent: Friday, September 10, 2010 7:43 AM
To: William Cain; Scott Thomas
Subject: FW: cranston's mill pond

-----Original Message-----
From: Kube, Peter R NAO [mailto:Peter.R.Kube@usace.army.mil]
Sent: Friday, September 10, 2010 7:07 AM
To: Floyd, Scharlene A NAO; Mike Woolson
Subject: RE: cranston's mill pond

Our regulations require us to consider not just the impacts from the direct filling of wetlands and waters (the dam footprint) but the flooding of wetlands and waters caused by the fill. Since 2006, wetlands and waters have re-established in much of the 50 acre site. Nationwide permits, including NWP #3, are issued for work that has minimal environmental impacts. The flooding of this extensive area is not a minor impact and NWP # 3 would not be applicable. Cranston Mill Pond, LLC should apply for a standard permit from the Corps if they intend to rebuild the dam.

Peter Kube
201-7504

-----Original Message-----
From: Floyd, Scharlene A NAO
Sent: Thursday, September 09, 2010 5:36 PM
To: Mike Woolson
Cc: Kube, Peter R NAO
Subject: RE: cranston's mill pond

Mike,

I may be mistaken, but I believe this is/was Pete's project from a while back.

Pete, isn't this your pond project that the guys who owned it were going to do a mitigation bank and then backed out???

-----Original Message-----
From: Mike Woolson [mailto:mwoolson@james-city.va.us]
Sent: Thursday, September 09, 2010 9:28 AM
To: Floyd, Scharlene A NAO
Subject: cranston's mill pond

Scharlene,

We are requiring the owners of Cranston's Mill Pond to get a Special Use Permit (SUP) for the reconstruction of the dam. Attached is a narrative they sent in with the application. Is it possible to get someone from the Corps to look this over and see if it is correct? They state they are using a NWP #3. Impacts are real close to a 1/10 acre. Thanks in advance.

Michael Woolson, CLA

Senior Watershed Planner

James City County

757-253-6670

TRANSMITTAL

Environmental Division
OCT 20 2010
RECEIVED

DATE: **October 20, 2010**

TO: Environmental Division

FROM: Jose Ribeiro, Senior Planner

SUBJECT: SP-0093-2010, Cranston's Mill Pond Dam Repair

ITEMS ATTACHED:
Site Plan
Major Water Quality Impact Assessment — separate cover
Erosion and Sediment Control and Stormwater Management
Design Plan Checklists (incomplete but applicant is submitting additional material)
RPA and Steep Slope Variance Letters (already submitted to the Environment Division)

Please review and return comments by November 05, 2010

NOTE: This site plan has been submitted by the applicant prior to the SUP for this project being considered by the Board of Supervisors on November 09, 2010. Should you have any questions please do not hesitate to contact me at (757) 253-6890.

Thank you for your review,
José-Ricardo Linhares Ribeiro
JCC Planner

PLEASE UPLOAD YOUR COMMENTS ON CASE TRAK

ENVIRONMENTAL DIVISION REVIEW COMMENTS
Cranston's Mill Pond Dam Improvements – Nutrient Management Bank
County Plan SUP-023-10
September 14, 2010

General:

1. Please show the proposed wetland impacts, including the proposed wetland clearing at the toe of slope for dam safety purposes. Please quantify the impacts in tabular form in the application.

2. The proposed work will require the submittal and approval of a water quality impact assessment during the site plan approval process. Be advised that this may require the approval of the James City County Chesapeake Bay Board.

3. The Chesapeake Bay Preservation Area buffers provided on the James City County website may be used as a guide to provide the general location of RPA's; however, be advised that the true site specific boundaries of the RPA will be determined and based on a delineation of the wetland limits. This information must be provide by the applicant and reflected in an environmental inventory to be provided in the construction documents. Be advised that these boundaries shall be reviewed and approved by the Environmental Division and that a Jurisdictional Determination to verify the wetland limits will be required.

4. In the narrative that was provided with the application, it states that "Wetland impacts will be less than 1/10 acre and the United States Army Corps of Engineers Nationwide Permit #3 will be used." Please provide written evidence from the Corps of Engineers that this is the appropriate permit to use, as one of the qualifiers for using this permit is for "the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage."

9/9/10

Bill-

Comments on

SUP-023-10.0

Mike-

TRANSMITTAL

→ Public Hearing Case←

Environmental Division

AUG 27 2010

RECEIVED

DATE: August 27, 2010

TO:

- ✓ **JCSA**
- ✓ **VDOT**
- ✓ **Fire Department**
- ✓ **Environmental Division**
- ✓ **County Engineer**
- ✓ **Proffer Administrator**
- ✓ **Landscape Planner**
- ✓ **Health Department**
- ✓ **Planning Director, Mr. Allen Murphy**
- ✓ **Principal Planner, Mr. Christopher Johnson**

FROM: Jose Ribeiro, Senior Planner

SUBJECT: **SUP-0023-2010, Cranston's Mill Pond-Dam Improvements/Nutrient Bank**

ITEMS ATTACHED: Master Plan
Projective Narrative

ACTION: **Please review and return comments <u>no later than</u>**

September 10, 2010

This case is schedule to be considered at the October 06, 2010 Planning Commission meeting

NOTE: Please also submit SUP conditions for this case if applicable

Thank you for your review
Jose-Ricardo Linhares Ribeiro- JCC Planner
JCC Planner

Cranston Mill Pond
Project Narrative

Cranston Mill Pond is an existing pond located at 6616 Cranston Mill Pond Road. The pond's dam was breached during a tropical storm in 2006. Prior to the breach the pond had an area of 50.2 acres at the permanent normal pool elevation of 9.15'.

The applicant (Cranston Mill Pond, LLC) proposes to repair the breach in accordance with the requirements of the Commonwealth's Dam Safety Act and associated Regulations. The facility is considered a regulated facility in accordance with state regulations as the dam creates an impoundment capacity in excess of 50 acre feet. The existing dam does not meet current state requirements. The dam improvements will bring the dam into compliance with the Dam Safety Act and Regulations.

The dam has been operating under a Conditional Operation and Maintenance Certificate from the Department of Conservation and Recreation's (DCR) Soil and Water Conservation Board due to the dam's non-conformance with state requirements. An Alteration Permit application was prepared and submitted by the applicant to the DCR Dam Safety Division for the required modifications to the existing dam. On January 14, 2010, DCR's Soil and Water Conservation Board issued a Dam Alteration Permit, which is valid thru January 31, 2011, to the applicant. The applicant has discussed modifications to the Alteration Permit based on refined design specifications and expects the revisions to be approved at the Board's September 16, 2010, meeting.

The proposed improvements to the dam (which will bring it into compliance with current dam safety regulations) include the construction of 100' of new concrete broad crested weir spillway. The new spillway would be constructed to maintain the same water surface elevation as the existing spillway. The existing 30' wide concrete broad crested weir spillway would be removed as part of the proposed alterations. A new 30' earthen emergency spillway would also be constructed. Woody vegetation on the dam embankment and within 25' of the up and down stream toes would also be removed in accordance with state regulations. The existing dam embankment would be raised approximately 3' and the existing embankment slopes would be re-graded as required to provide a stable slope. Wetland impacts will be less than 1/10 acre and the United States Army Corps of Engineers Nationwide Permit #3 will be used.

In conjunction with the preparation of the Alteration Permit package for the DCR Dam Safety Division, a dam break inundation zone map has been prepared. The map and research of down stream properties revealed that there are no existing structures or houses within the limits of the dam break inundation zone. Cranston's Mill Pond Road is located below the dam and has an average daily traffic count (ADT) of 470 vehicles per day in accordance with VDOT's 2008 traffic data base. The property below the dam is shown to be within an RPA in accordance with James City County's GIS data base.

Studies of the Yarmouth Creek drainage basin have been performed by the Center for Watershed Protection. The studies indicate that the pond provided environmental benefits for the Yarmouth Creek drainage basin. Once repaired, the dam will provide environmental and safety benefits.

Environmental Division

AUG 27 2010

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33 x 23

27

3600

4.5

30

5.0

760
365
300
3000

4,425 ft
grading

10,800 ft
clearing

15,225 ft
total
~~ft~~
wetland
impact

SCOOP THE POOP

WWW.HRSTORM.ORG

FROM THE HOMEFRONT TO THE WATERFRONT

H R STORM

CLEAN WATERWAYS BEGIN WITH YOU

INFO LINE:
58-STORM

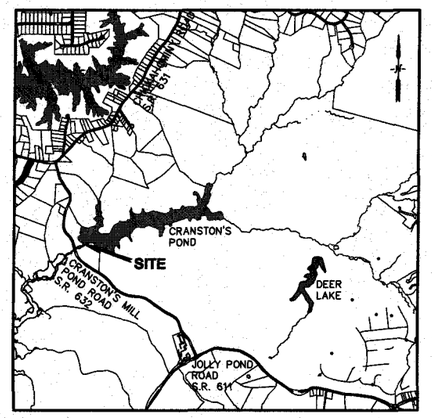
Be a pooper scooper - pick up after your pet!

It's the law! Be a good citizen and follow your community's Pooper Scooper codes.

SUP-0023-2010

CRANSTON MILL POND
SPECIAL USE PERMIT

POWHATAN DISTRICT **JAMES CITY COUNTY, VIRGINIA**



VICINITY MAP
SCALE: 1" = 2000'
0 2000 4000 6000

SITE DATA

OWNER/CONTRACT PURCHASER
CRANSTON MILL POND, LLC
C/O EARTHSOURCE SOLUTIONS INC.
5735 S. LABURNUM AVENUE
RICHMOND, VA 23231
CONTACT: BRENT FULTS – PRESIDENT
PHONE: (804) 222-5114
FAX: (804) 222-5220
EMAIL: BFULTS@ESSWETLANDS.COM

CIVIL ENGINEER
KOONTZ-BRYANT, P.C.
1703 NORTH PARHAM ROAD
SUITE 100
RICHMOND, VA 23229
CONTACT: PAUL HINSON, P.E., LEED AP
PHONE: (804) 740-9200
FAX: (804) 740-7338
EMAIL: PHINSON@KOONTZBRYANT.COM

SITE ADDRESS
6616 CRANSTON'S MILL POND ROAD
TOANO, VA 23168-9067

ZONING
A1

MAP REFERENCE
PARCEL ID: 2230100044

FIRM FLOOD MAP REFERENCE
FLOOD ZONE X
MAP NUMBERS: 51095C0105C
51095C0110C

UTILITIES
WATER: NONE
SEWER: NONE

AREA
153.48 AC. (WHOLE EXISTING PARCEL)
59.33 AC. (PROPOSED PARCEL)
3.56 AC. (DISTURBED AREA)

WATERSHED
THE ENTIRE PROJECT LIES WITHIN THE YARMOUTH CREEK WATERSHED.

TOPOGRAPHICAL INFORMATION
SURVEY PERFORMED BY TIMMONS GROUP IN FALL 2009.
SURVEY MERGED WITH JAMES CITY COUNTY GIS.

HORIZONTAL AND VERTICAL DATUM
NAD 83 & NGVD 29

Environmental Division
AUG 27 2010
RECEIVED

RECEIVED
AUG 2010
Planning Department

CONTENTS

C1.0 TITLE SHEET
C2.0 EXISTING CONDITIONS PLAN
C3.0 LAYOUT AND GRADING PLAN

ENVIRONMENTAL INVENTORY

1. TIDAL WETLANDS: NONE ON SITE
2. TIDAL SHORES: NONE ON SITE
3. NONTIDAL WETLANDS (RPA): PRESENT
4. 100' BUFFER (RPA): PRESENT – ENTIRE SITE IS IN RPA
5. NONTIDAL WETLANDS (RMA): NONE ON SITE (ALL WETLANDS WITHIN RPA)
6. 100-YR FLOODPLAIN: FEMA FLOODPLAIN SHOWN ON PLANS.
7. SLOPES 25% OR GREATER: PRESENT

REVISIONS:

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Engineering Consultants
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND
JAMES CITY COUNTY, VIRGINIA
POWHATAN DISTRICT
TITLE SHEET

DATE: AUGUST 20, 2010
JN: 09114-001

C1.0

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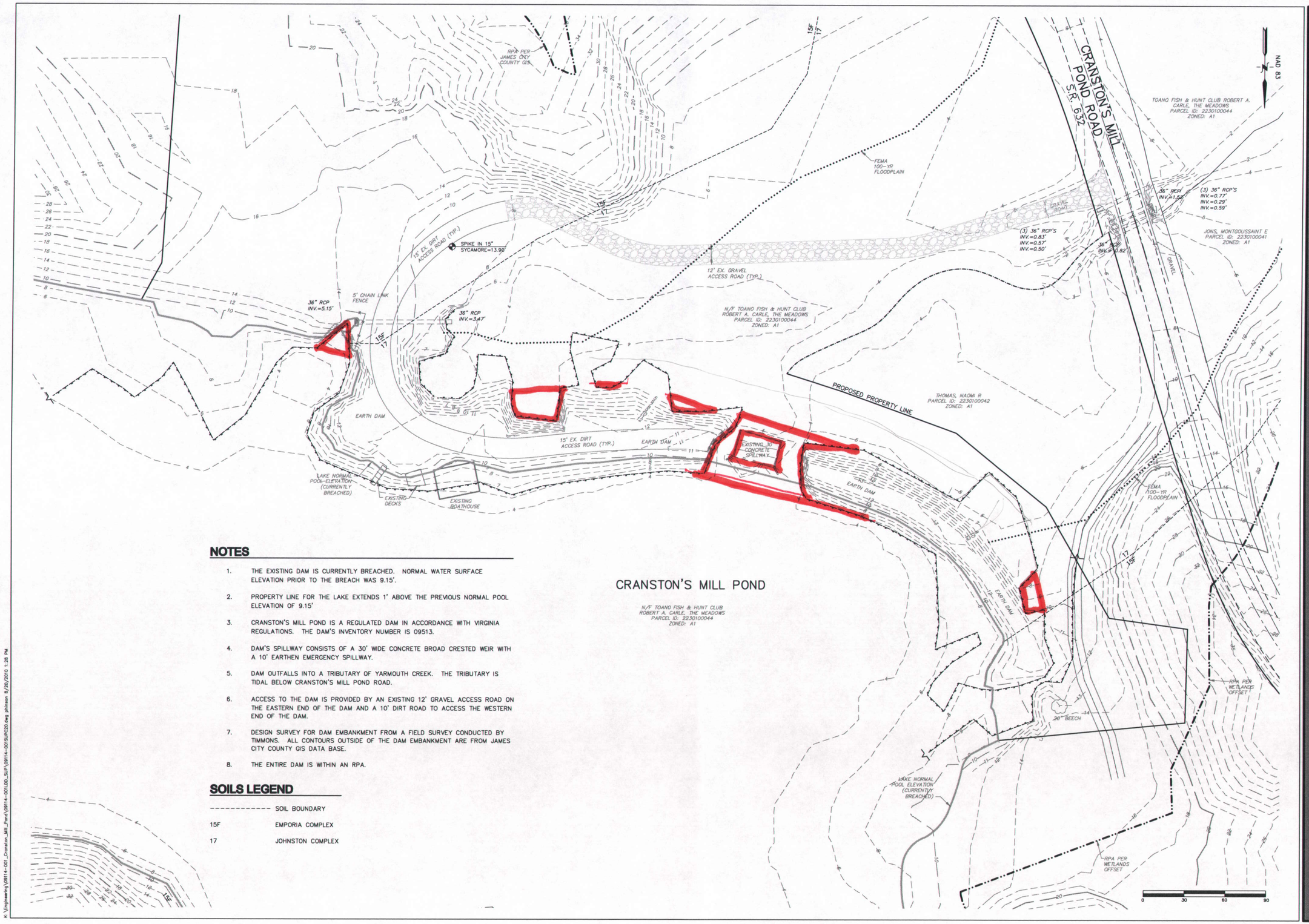


NOTES

1. THE EXISTING DAM IS CURRENTLY BREACHED. NORMAL WATER SURFACE ELEVATION PRIOR TO THE BREACH WAS 9.15'.
2. PROPERTY LINE FOR THE LAKE EXTENDS 1' ABOVE THE PREVIOUS NORMAL POOL ELEVATION OF 9.15'
3. CRANSTON'S MILL POND IS A REGULATED DAM IN ACCORDANCE WITH VIRGINIA REGULATIONS. THE DAM'S INVENTORY NUMBER IS 09513.
4. DAM'S SPILLWAY CONSISTS OF A 30' WIDE CONCRETE BROAD CRESTED WEIR WITH A 10' EARTHEN EMERGENCY SPILLWAY.
5. DAM OUTFALLS INTO A TRIBUTARY OF YARMOUTH CREEK. THE TRIBUTARY IS TIDAL BELOW CRANSTON'S MILL POND ROAD.
6. ACCESS TO THE DAM IS PROVIDED BY AN EXISTING 12' GRAVEL ACCESS ROAD ON THE EASTERN END OF THE DAM AND A 10' DIRT ROAD TO ACCESS THE WESTERN END OF THE DAM.
7. DESIGN SURVEY FOR DAM EMBANKMENT FROM A FIELD SURVEY CONDUCTED BY TIMMONS. ALL CONTOURS OUTSIDE OF THE DAM EMBANKMENT ARE FROM JAMES CITY COUNTY GIS DATA BASE.
8. THE ENTIRE DAM IS WITHIN AN RPA.

SOILS LEGEND

----------	SOIL BOUNDARY
15F	EMPORIA COMPLEX
17	JOHNSTON COMPLEX

K:\Engineering\09114-001_Cranston_Mill_Pond\09114-001LDD_SUP\09114-001SUPC20.dwg johnson 8/20/2010 1:28 PM

REVISIONS:

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-8200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND

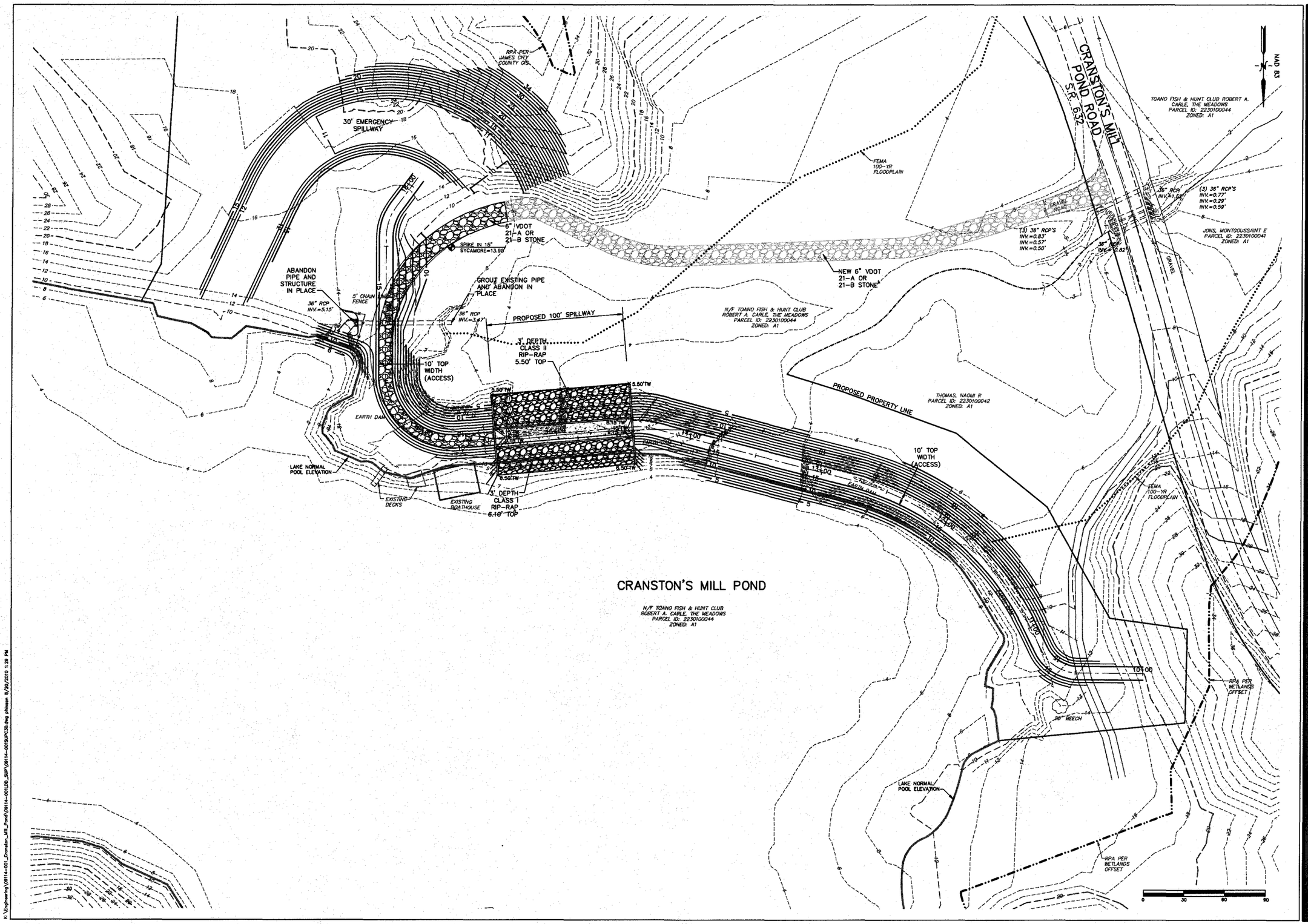
POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

EXISTING CONDITIONS PLAN

DATE: AUGUST 20, 2010

JN: 09114-001

C2.0



REVISIONS:

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

MONTE-BRYANT, P.C.
Land Development Consultants
1708 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-8200 FAX (804) 740-7338
bbpc@montebryant.com

CRANSTON MILL POND

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

LAYOUT AND GRADING PLAN

DATE: AUGUST 20, 2010

JN: 09114-001

C3.0

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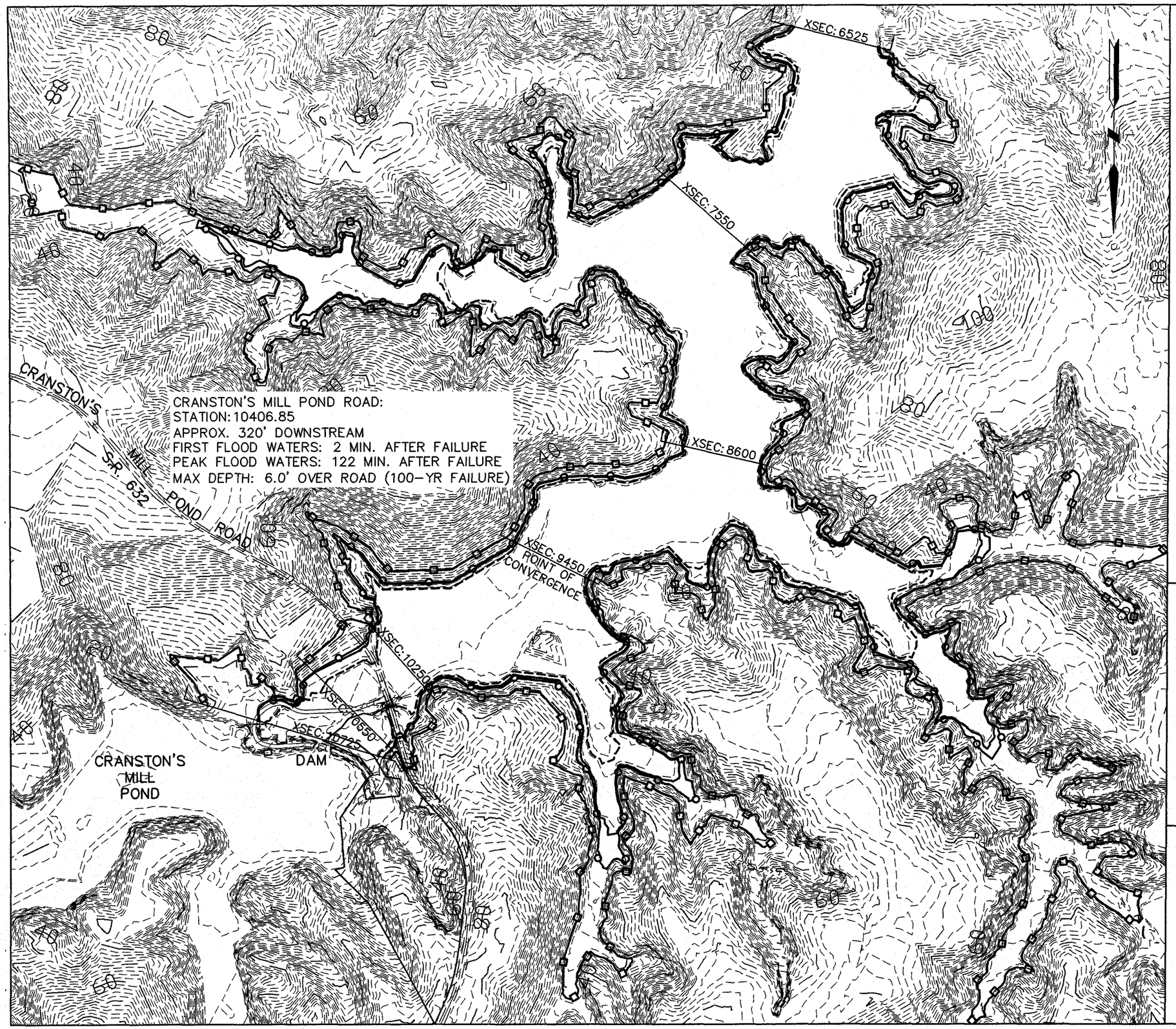

DAM BREAK INUNDATION MAP FOR CRANSTON'S MILL POND

SIGNIFICANT HAZARD CLASS

LEGEND

- SUNNY DAY FAILURE
- SPILLWAY DESIGN FLOOD WITH FAILURE
- SPILLWAY DESIGN FLOOD (NO FAILURE)
- PROBABLE MAXIMUM FLOOD WITH FAILURE

NOTES

1. THE INFORMATION CONTAINED IN THIS MAP IS PREPARED FOR USE IN NOTIFICATION OF DOWNSTREAM PROPERTY OWNERS BY EMERGENCY MANAGEMENT PERSONNEL.
2. MAPPING OF FLOODED AREAS AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE. TIMING AND EXTENT OF ACTUAL INUNDATION MAY DIFFER FROM THE INFORMATION PRESENTED ON THIS MAP.
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4. DATUM: HORIZONTAL=NAD 83, VERTICAL=NGVD 29

0 400 800 1200

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-20-10
PROFESSIONAL ENGINEER

DRAWN BY: JBM

CHECKED BY: PFH

DATE: 6/14/10
REV. 6/24/10
REV. 8/20/10

SCALE: 1"=400'

KOONTZ-BRYANT, P.C.
SITE DEVELOPMENT SOLUTIONS
1703 N. PARHAM ROAD, SUITE 100, RICHMOND, VIRGINIA 23229
(804)740-9200 kbpc@koontzbryant.com FAX (804)740-7338

OWNER'S CERTIFICATE

THE VACATION AND ADJUSTMENT OF THE PROPERTY LINES AS SHOWN ON THIS PLAT AND ENTITLED "SUBDIVISION OF CRANSTON'S MILL POND AND ADJACENT PROPERTY" LOCATED IN JAMES CITY COUNTY, VIRGINIA, IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNERS OR PROPRIETORS OF THE LAND.

OWNER:

OWNER REPRESENTATIVE DATE

(PRINT NAME) TITLE

CERTIFICATE OF NOTARIZATION

STATE OF _____
COUNTY/CITY OF _____ } TO WIT

I, _____ A NOTARY PUBLIC IN AND FOR THE JURISDICTION AFORESAID, DO HEREBY CERTIFY THE ABOVE NAMED PERSON(S) WHOSE NAME(S) ARE SIGNED TO THE FOREGOING WRITING HAVE ACKNOWLEDGED THE SAME BEFORE ME IN MY JURISDICTION AFORESAID.

GIVEN UNDER MY HAND THIS _____ DAY OF _____,2010

NOTARY PUBLIC MY COMMISSION EXPIRES

REGISTRATION NUMBER: _____

OWNER'S CERTIFICATE

THE VACATION AND ADJUSTMENT OF THE PROPERTY LINES AS SHOWN ON THIS PLAT AND ENTITLED "SUBDIVISION OF CRANSTON'S MILL POND AND ADJACENT PROPERTY" LOCATED IN JAMES CITY COUNTY, VIRGINIA, IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNERS OR PROPRIETORS OF THE LAND.

OWNER:

OWNER REPRESENTATIVE DATE

(PRINT NAME) TITLE

CERTIFICATE OF NOTARIZATION

STATE OF _____
COUNTY/CITY OF _____ } TO WIT

I, _____ A NOTARY PUBLIC IN AND FOR THE JURISDICTION AFORESAID, DO HEREBY CERTIFY THE ABOVE NAMED PERSON(S) WHOSE NAME(S) ARE SIGNED TO THE FOREGOING WRITING HAVE ACKNOWLEDGED THE SAME BEFORE ME IN MY JURISDICTION AFORESAID.

GIVEN UNDER MY HAND THIS _____ DAY OF _____,2010

NOTARY PUBLIC MY COMMISSION EXPIRES

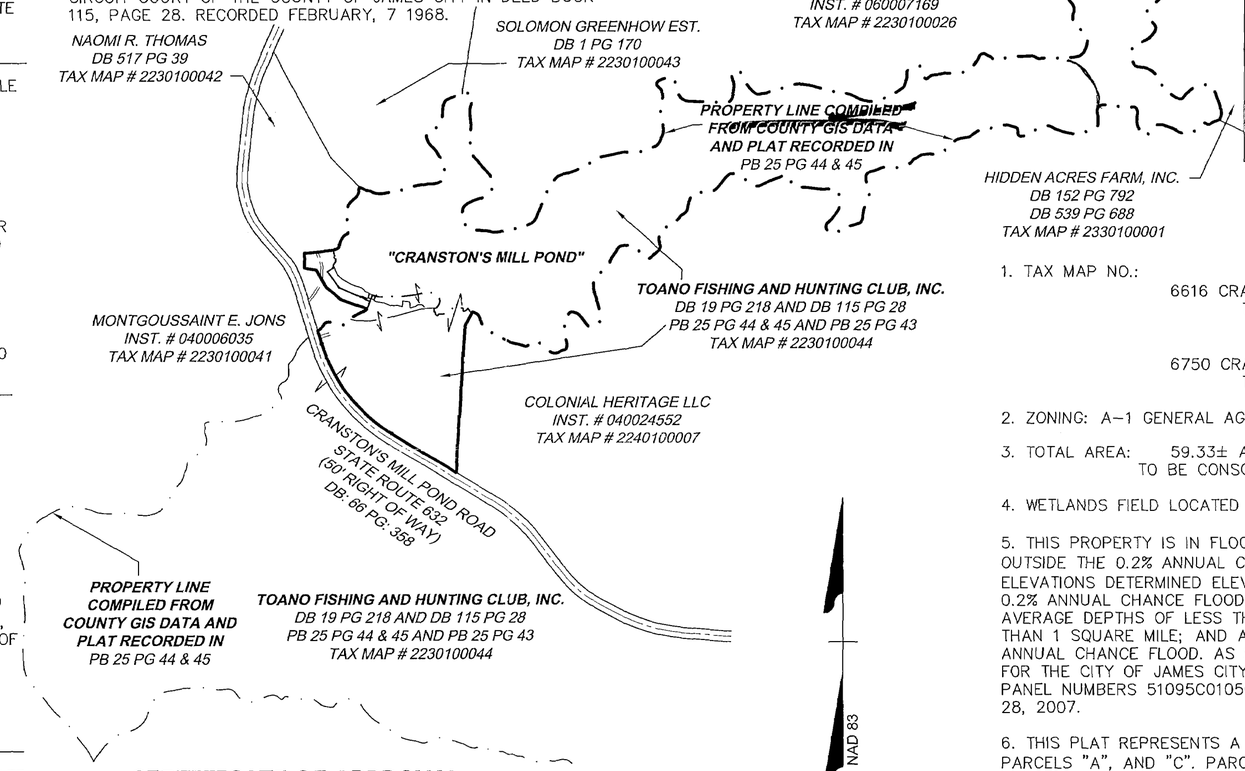
REGISTRATION NUMBER: _____

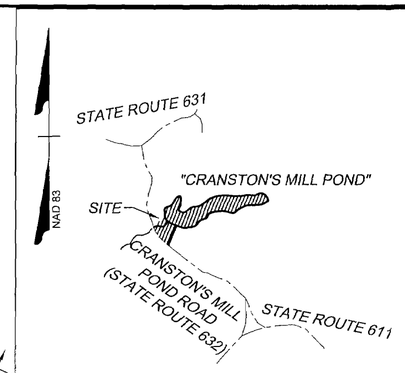
CERTIFICATE OF SOURCE OF TITLE

THE PROPERTY SHOWN ON THIS PLAT AS PARCELS "B", "C" AND "D" WAS CONVEYED TO TOANO FISHING & HUNTING CLUB, INCORPORATED BY A.W. JENNINGS AND OTHERS BY DEED, DATED DECEMBER, 20 1920 AND RECORDED IN THE OFFICE OF THE CLERK OF THE CIRCUIT COURT OF THE COUNTY OF JAMES CITY IN DEED BOOK 19, PAGE 218. RECORDED APRIL, 4 1921. ALSO WITHIN THE ABOVE PARCEL "C" TOANO FISHING & HUNTING CLUB, INCORPORATED WAS CONVEYED 0.68 OF AN ACRE BY ORISON T. NEBLETT BY DEED, DATED JANUARY, 22 1968 AND RECORDED IN THE OFFICE OF THE CLERK OF THE CIRCUIT COURT OF THE COUNTY OF JAMES CITY IN DEED BOOK 115, PAGE 28. RECORDED FEBRUARY, 7 1968.

CERTIFICATE OF SOURCE OF TITLE CONTINUED

THE PROPERTY SHOWN ON THIS PLAT AS PARCEL "A" WAS CONVEYED TO _____ BY _____ BY INST, DATED _____ AND RECORDED IN THE OFFICE OF THE CLERK OF THE CIRCUIT COURT OF THE COUNTY OF JAMES CITY IN INST. _____. RECORDED _____.





VICINITY MAP 1" = 1000'

1. TAX MAP NO.: 2230100044
6616 CRANSTON'S MILL POND ROAD
TOANO, VIRGINIA

2230100042
6750 CRANSTON'S MILL POND ROAD
TOANO, VIRGINIA

2. ZONING: A-1 GENERAL AGRICULTURAL.

3. TOTAL AREA: 59.33± ACRES
TO BE CONSOLIDATED

4. WETLANDS FIELD LOCATED BY TIMMONS GROUP ENVIRONMENTAL SECTION.

5. THIS PROPERTY IS IN FLOOD ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN), ZONE AE (BASE FLOOD ELEVATIONS DETERMINED ELEVATION 7.5') AND ZONE X SHADED (AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD. AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE CITY OF JAMES CITY COUNTY, VIRGINIA AND BEING COMMUNITY PANEL NUMBERS 51095C0105C AND 51095C0110C BOTH DATED SEPTEMBER 28, 2007.

6. THIS PLAT REPRESENTS A CURRENT TIMMONS GROUP FIELD SURVEY FOR PARCELS "A", AND "C". PARCELS "B" AND "D" COMPILED FROM RECORDS.

✓7. "WETLANDS AND LAND WITHIN RESOURCE PROTECTION AREAS SHALL REMAIN IN A NATURAL UNDISTURBED STATE EXCEPT FOR THOSE ACTIVITIES PERMITTED BY SECTION 23-7(c)(1) OF THE JAMES CITY COUNTY CODE."

8. PROPERTY LINE ALONG POND IS AT ELEVATION 9.15' AND THE TOP OF THE CONCRETE SPILLWAY ELEVATION IS AT 8.15'. THE REFERENCE VERTICAL DATUM IS NGVD 29.

CERTIFICATE OF APPROVAL

THIS SUBDIVISION IS APPROVED BY THE UNDERSIGNED IN ACCORDANCE WITH THE EXISTING SUBDIVISION REGULATIONS AND MAY BE ADMITTED TO RECORD.

DATE VIRGINIA DEPARTMENT OF TRANSPORTATION

DATE VIRGINIA DEPARTMENT OF HEALTH

DATE SUBDIVISION AGENT OF JAMES CITY COUNTY

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE OR BELIEF, THIS PLAT COMPLIES WITH ALL OF THE REQUIREMENTS OF THE BOARD OF SUPERVISORS AND ORDINANCES OF THE COUNTY OF JAMES CITY, VIRGINIA, REGARDING THE PLATTING OF SUBDIVISIONS WITHIN THE COUNTY.

COMMONWEALTH OF VIRGINIA
M. DWAYNE DUNEVANT
Lic. No. 2287
LAND SURVEYOR
FOR REVIEW

SCALE 1"=500'
0 500' 1000'

RECEIVED
OCT 2010
Environmental Division

RECEIVED
NOV 1 2010
Development Management

SUBDIVISION PLAT
OF CRANSTON'S MILL POND AND ADJACENT PROPERTY

Powhatan District	James City County, VA
Date: Aug. 2, 2010	Scale: 1"=500
Sheet 1 of 2	J.N.: 30323
Drawn by: C.G. Marston	Checked by: M.D.D.
CP#JCC-C-0018-2010, CRANSTON'S MILL POND	

THIS DRAWING PREPARED AT THE CORPORATE OFFICE
1001 Boulder Parkway, Suite 300 | Richmond, VA 23225
TEL 804.200.6500 FAX 804.560.1016 www.timmons.com

Site Development | Residential | Infrastructure | Technology

YOUR VISION ACHIEVED THROUGH OURS.

TIMMONS GROUP

S-0049-2010

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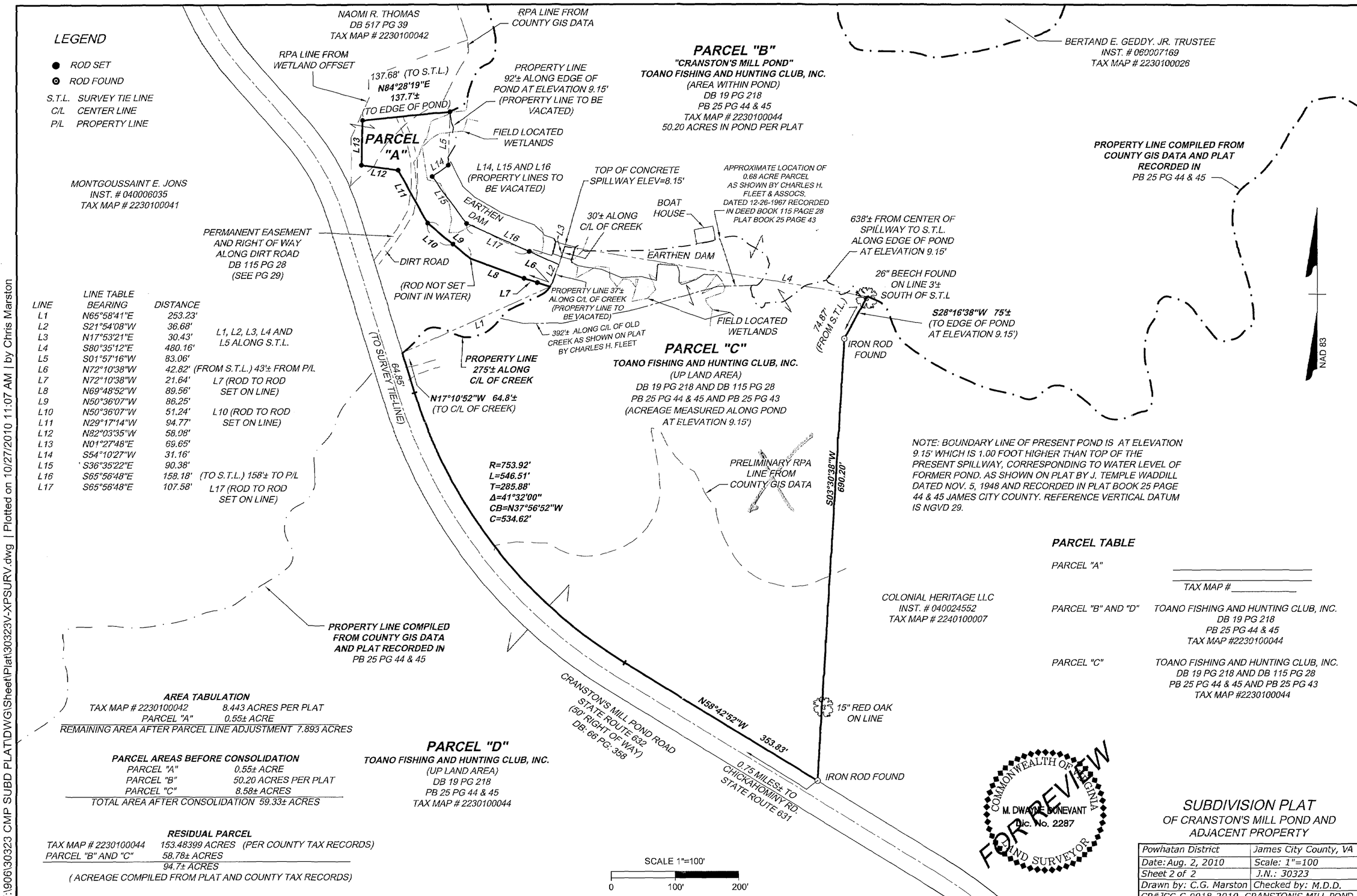

LINE	LINE TABLE BEARING	DISTANCE	
L1	N65°58'41"E	253.23'	
L2	S21°54'08"W	36.68'	
L3	N17°53'21"E	30.43'	L1, L2, L3, L4 AND L5 ALONG S.T.L.
L4	S80°35'12"E	480.16'	
L5	S01°57'16"W	83.06'	
L6	N72°10'38"W	42.82'	(FROM S.T.L.) 43'± FROM P/L
L7	N72°10'38"W	21.64'	L7 (ROD TO ROD SET ON LINE)
L8	N69°48'52"W	89.56'	
L9	N50°36'07"W	86.25'	
L10	N50°36'07"W	51.24'	L10 (ROD TO ROD SET ON LINE)
L11	N29°17'14"W	94.77'	
L12	N82°03'35"W	58.08'	
L13	N01°27'48"E	69.65'	
L14	S54°10'27"W	31.16'	
L15	S36°35'22"E	90.38'	
L16	S65°56'48"E	158.18'	(TO S.T.L.) 158'± TO P/L
L17	S65°56'48"E	107.58'	L17 (ROD TO ROD SET ON LINE)

AREA TABULATION

TAX MAP # 2230100042	8.443 ACRES PER PLAT
PARCEL "A"	0.55± ACRE
REMAINING AREA AFTER PARCEL LINE ADJUSTMENT	7.893 ACRES

PARCEL AREAS BEFORE CONSOLIDATION

PARCEL "A"	0.55± ACRE
PARCEL "B"	50.20 ACRES PER PLAT
PARCEL "C"	8.58± ACRES
TOTAL AREA AFTER CONSOLIDATION	59.33± ACRES

RESIDUAL PARCEL

TAX MAP # 2230100044	153.48399 ACRES	(PER COUNTY TAX RECORDS)
PARCEL "B" AND "C"	58.78± ACRES	
	94.7± ACRES	

(ACREAGE COMPILED FROM PLAT AND COUNTY TAX RECORDS)

PARCEL TABLE

PARCEL "A"	_____
	_____ TAX MAP # _____
PARCEL "B" AND "D"	TOANO FISHING AND HUNTING CLUB, INC. DB 19 PG 218 PB 25 PG 44 & 45 TAX MAP #2230100044
PARCEL "C"	TOANO FISHING AND HUNTING CLUB, INC. DB 19 PG 218 AND DB 115 PG 28 PB 25 PG 44 & 45 AND PB 25 PG 43 TAX MAP #2230100044

SUBDIVISION PLAT
OF CRANSTON'S MILL POND AND ADJACENT PROPERTY

Powhatan District	James City County, VA
Date: Aug. 2, 2010	Scale: 1"=100
Sheet 2 of 2	J.N.: 30323
Drawn by: C.G. Marston	Checked by: M.D.D.
CP#JCC-C-0018-2010, CRANSTON'S MILL POND	

TIMMONS GROUP
THIS DRAWING PREPARED AT THE CORPORATE OFFICE
1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL 804-200-6500 FAX 804-560.1016 www.timmons.com
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MDW/WAC

ENVIRONMENTAL DIVISION REVIEW COMMENTS
Cranston's Mill Pond BLA
County Plan S-049-10
November 17, 2010

General:

1. All subdivision plats submitted for approval after August 6, 1990 shall clearly identify the boundaries of any RPA within the property. Please delete any references that say "Preliminary RPA line from County GIS data". It is the responsibility of the applicant to provide an accurate RPA line for recordation purposes. The RPA line taken from the outer edge of all perennial streams and the connected and contiguous wetlands associated with said streams.

2. Please provide the entire wetland line for the parcel as referenced in Note 4 on the cover sheet.

3. There are two references provided on the cover sheet of the plat for the parcel belonging to the Toano Fishing and Hunting Club, Inc. Please remove the reference to the County GIS Data reference as this information is not accurate in scale, location, shape, and several other properties and the legal reference provided is sufficient.

4. As the normal pool elevations associated with the basin may have changed, metes and bounds of the recorded plat may not correspond with the new spillway elevations. This being the case, references contained in note 8 of the cover sheet may need to change.

TRANSMITTAL

DATE: October 29, 2010

Environmental Division
NOV 1 2010
RECEIVED

TO:

- VDOT
- Environmental Division
- County Engineer, Mr. Darryl Cook
- JCSA
- Proffer Administrator

FROM: Jose Ribeiro, Senior Planner

SUBJECT: S-0049-2010, Subdivision of Cranston's Mill Pond and Boundary Line Adjustment

ITEMS ATTACHED:

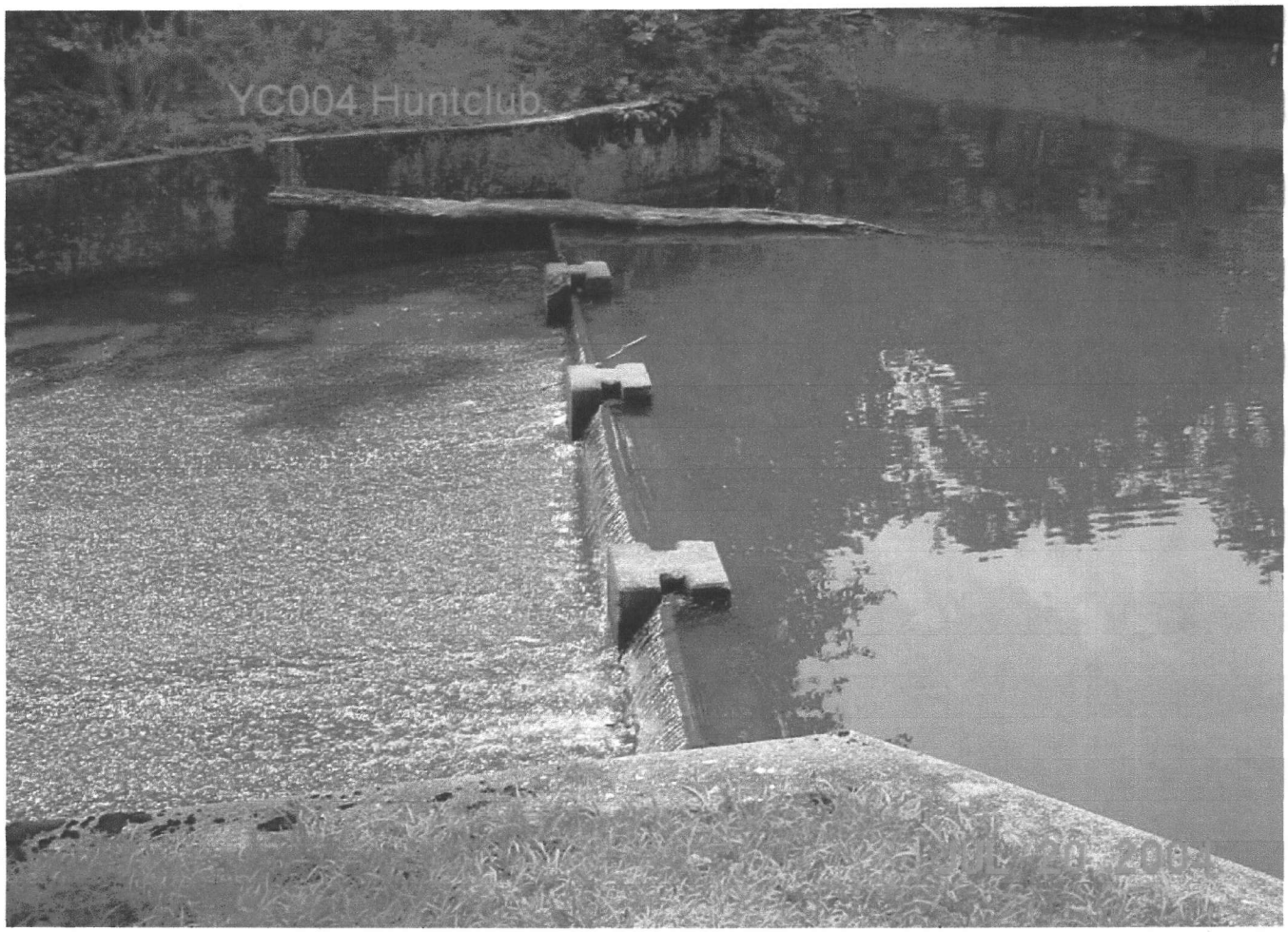
- ✓ Plat

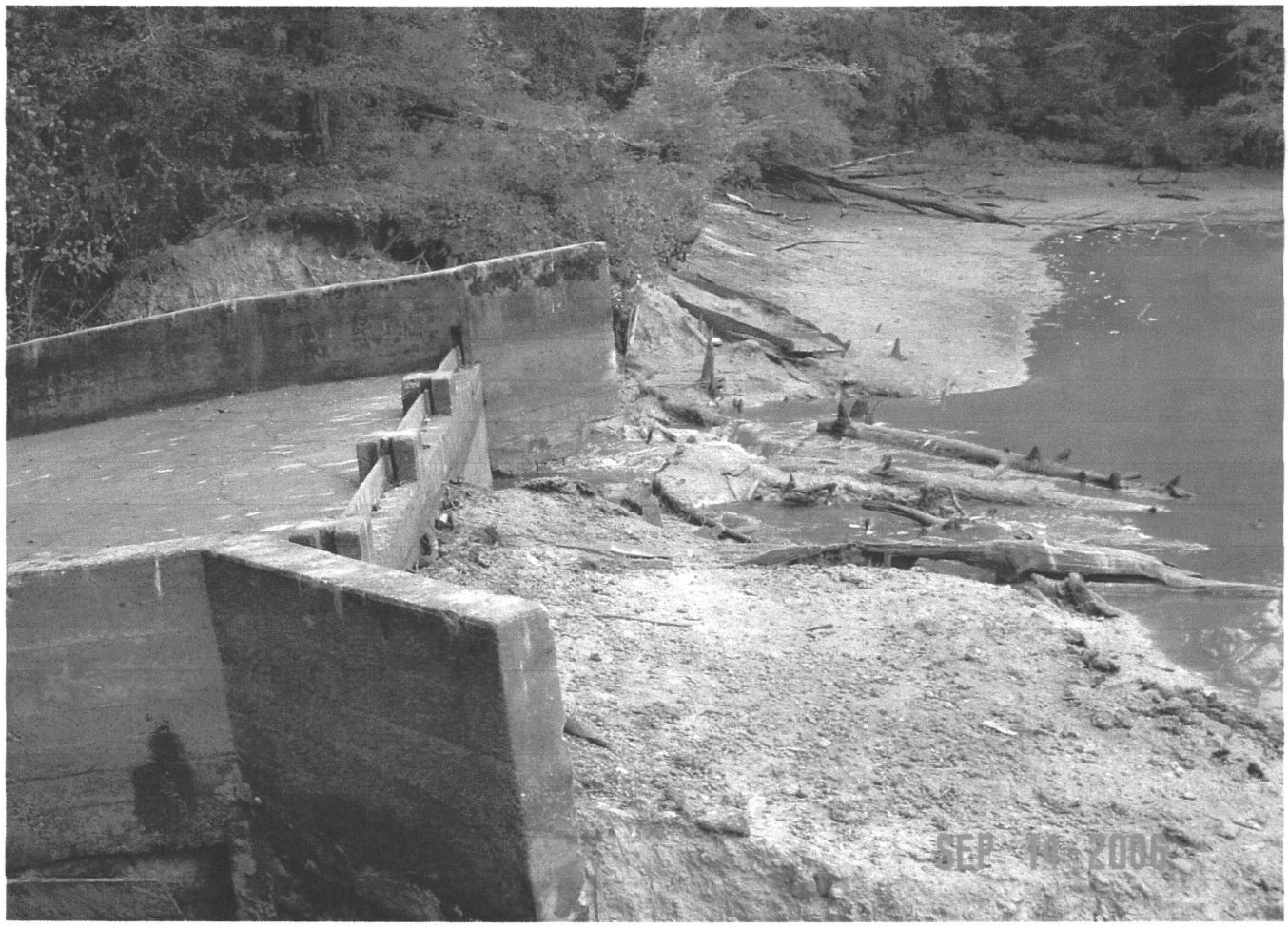
ACTION: Please review and return comments no later than **November 12, 2010**

1st revision

Thank you for your review,
José-Ricardo Linhares Ribeiro
JCC Planner

Please upload your comments on CaseTrak





CRANSTONS MILL POND DAM

July 2004 vs
Sept 2006

Environmental Division

DEC 09 2010

RECEIVED

TRANSMITTAL

DATE: **December 8, 2010**

TO: Environmental Division
Emergency Management Operation Center-Ms. Kate Hale, Director

FROM: Jose Ribeiro, Senior Planner

SUBJECT: SP-0093-2010, Cranston's Mill Pond Dam Repair

ITEMS ATTACHED: **Emergency Action Plan** (EAP-Emergency Action Plan)

Please review and return comments by December 17, 2010

Thank you for your review,
José-Ricardo Linhares Ribeiro
JCC Planner

The Environmental Division has no comments on this emergency action plan for Cranstons Mill Pond Dam, DCR Inventory #09513. Applicable Virginia Dam Safety regulations apply.

12-17-10

Yarmouth Creek Watershed
HUC Code JL 28

KOONTZ-BRYANT, P.C.
Site Development Solutions

Emergency Action Plan

CRANSTON MILL POND
INVENTORY # 09513

Environmental Division
DEC 09 2010
RECEIVED

Bill. ✓ 12/14/10
No comments.
M.

Scott ✓ 12/15/10
No comments.
Approve
BJK

PREPARED FOR:

Brent Fults
Chesapeake Bay Nutrient Land Trust \
Earth Source Solutions Inc.
5735 S. Laburnum Avenue
Richmond, VA 23231
(804) 222-5114
bfults@esswetlands.com

PREPARED BY:

Paul F. Hinson, P.E.
Koontz-Bryant, P.C.
1703 N. Parham Road
Suite 100
Richmond, Virginia 23229

SP-93-10
CBE-11-050

December 8, 2010

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
12-8-10
PROFESSIONAL ENGINEER

JN: 09114-002-00

EMERGENCY ACTION PLAN

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	F. Site Layout Plan	vi.

Environmental Division

DEC 09 2010

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Certification by Dam Owner/Operator

I certify that procedures for implementation of this Emergency Action Plan have been coordinated with and a copy given to each local Emergency Services Coordinator serving the areas potentially impacted by the dam. Also, that a copy of this Emergency Action Plan has been filed with the Virginia Department of Emergency Management in Richmond and a copy of the Dam Break Inundation Map has been provided to the local government office with plat and plan approval authority or zoning responsibilities as designated by the locality for each locality in which the dam break inundation zone resides; that this plan shall be adhered to during the life of the project; and that the information contained herein is current and correct to the best of my knowledge.

Brent L Fults

(Signature of Dam Owner/Operator)

This 8 day of DECEMBER, 20 10

Printed Name BRENT L FULTS

Certification by Preparer

I certify that the information provided in this report has been examined by me and found to be true and correct in my professional judgment.

Paul F. Hinson

(Signature of Preparer)

This 8th day of December, 20 10

Printed Name: Paul F. Hinson, P.E.

Title: Director of Engineering

Address: Koontz-Bryant, P.C. Phone: 804 200-1914

1403 N. Parham Rd, Suite 100

Richmond, VA 23229

EMERGENCY ACTION PLAN FOR HIGH AND SIGNIFICANT HAZARD IMPOUNDING STRUCTURES

Reference: Impounding Structure Regulations, 4VAC 50-20-10 et seq., including 4VAC 50-20-175, Virginia Soil and Water Conservation Board

BASIC INFORMATION

A. Name of Impounding Structure: Cranston Mil Pond
Inventory Number: 09513

B. Hazard Potential Classification, Virginia Dam Safety Regulations:

Significant

C. Name of Owner: Brent L. Fults c\o Cranston Mill Pond, LLC
Address: 5735 S. Laburnum Ave, Richmond, VA 23231
Telephone: (Business)(804) 222-5114
(Residential) (____) _____ (Cell) (804) 357-1251

D. Name of Dam Operator: Brent L. Fults c\o Cranston Mill Pond, LLC
Address: 5735 S. Laburnum Ave, Richmond, VA 23231
Telephone: (Business)(804) 222-5114
(Residential) (____) _____ (Cell) (804) 357-1251

Name of Alternate Dam Operator: Scott Reed
Address: 10214 Steuben Court, Glen Allen, VA 23060
Telephone: (Business) (804) 222-5114
(Residential) (804) 672-3460 (Cell) (804)-690-8136

E. Name of Rain/Staff Gage Observer: Jim Goins
Address: P. O. Box 395, Gloucester, VA 23062
Telephone: (Business)(804) 815-8696
(Residential) (804) 642-5408 (Cell) (804) 815-8696

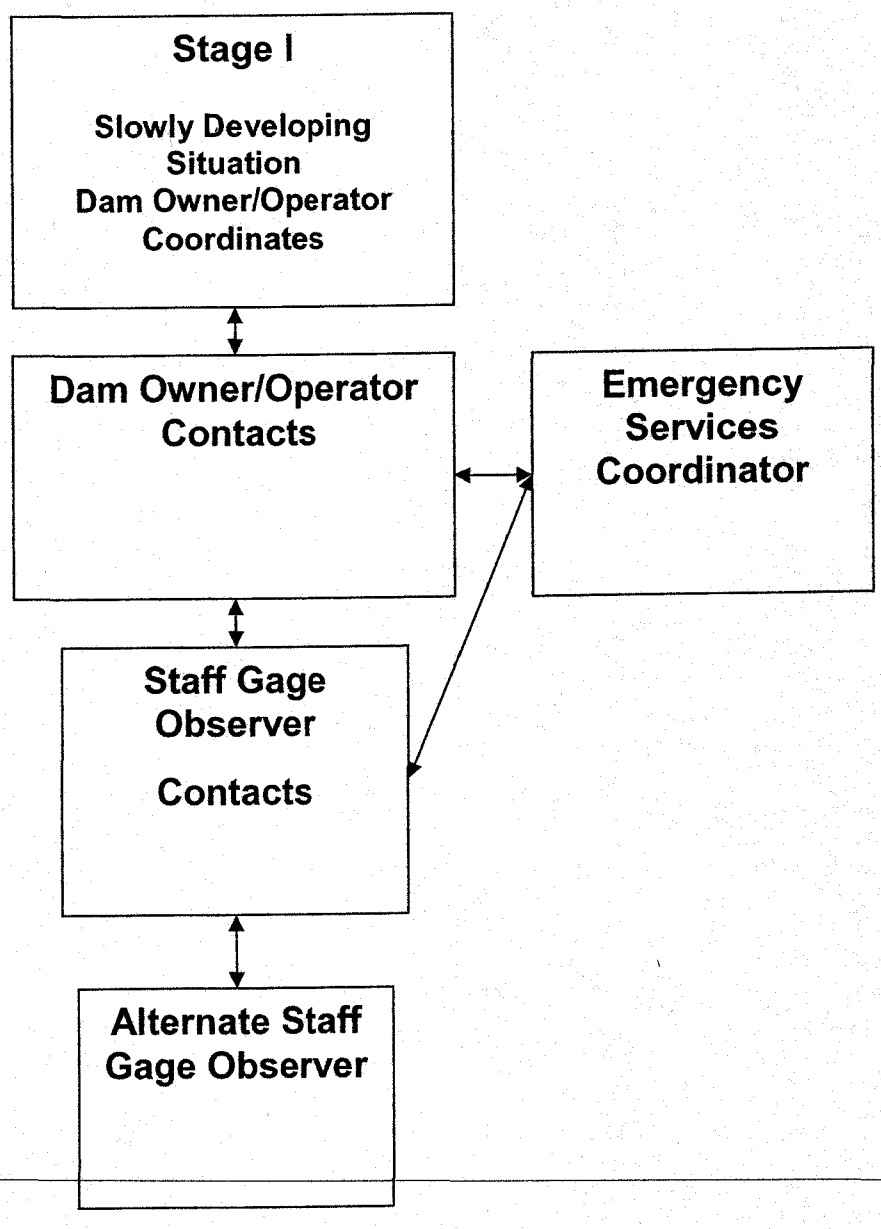
Name of Alternate Rain/Staff Gage Observer: Bill Collins
Address: 562 New Beginnings Road, Shacklefords, VA 23156
Telephone: (Business) (804) 432-2748
(Residential) (804)-785-9015 (Cell) (757) 570-6536

F. Name of 24-Hour Dispatch Center: James City County Emergency Operations Center
Address: 3127 Forge Road, Toano, VA 23168
Telephone: (Business)(757) 564-2140 or local emergency # 911

G. Name of Local Government Emergency Services Coordinator: Kate Hale
Address: 3127 Forge Road, Toano, VA 23168
Telephone: (Business) (757) 564-2141 (Cell)(____) _____

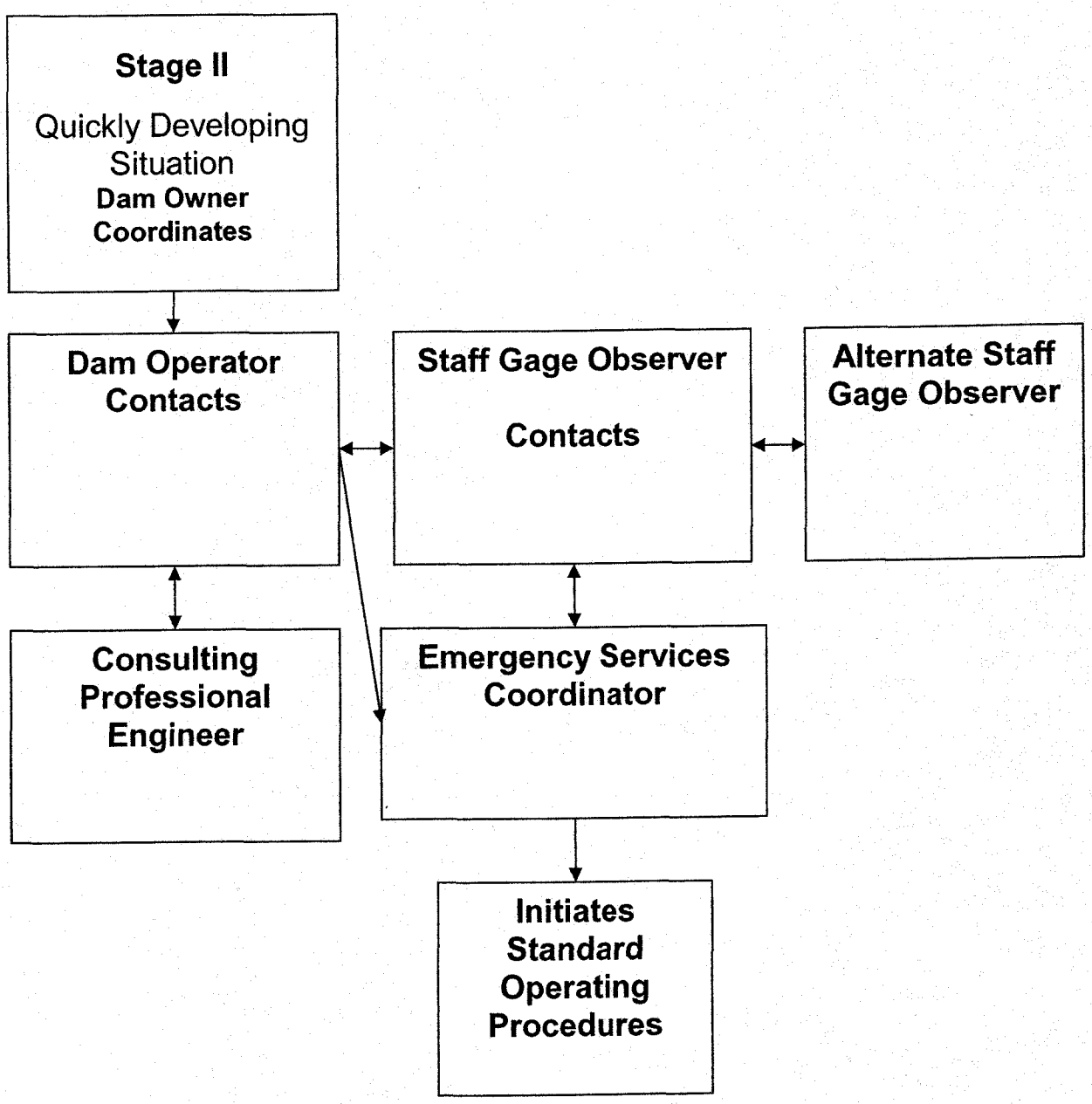
II. NOTIFICATION FLOW CHARTS

A. STAGE I NOTIFICATION



Message from dam owner/operator to ESC: *Our staff gage observer is at **Cranston Mill Pond** evaluating the general conditions at the dam and coordinating with the alternate staff gage observer as recommended in the emergency action plan. If the impending storm occurs, we may move to stage II and perform more frequent evaluations, otherwise we will visit and make observations every six hours.*

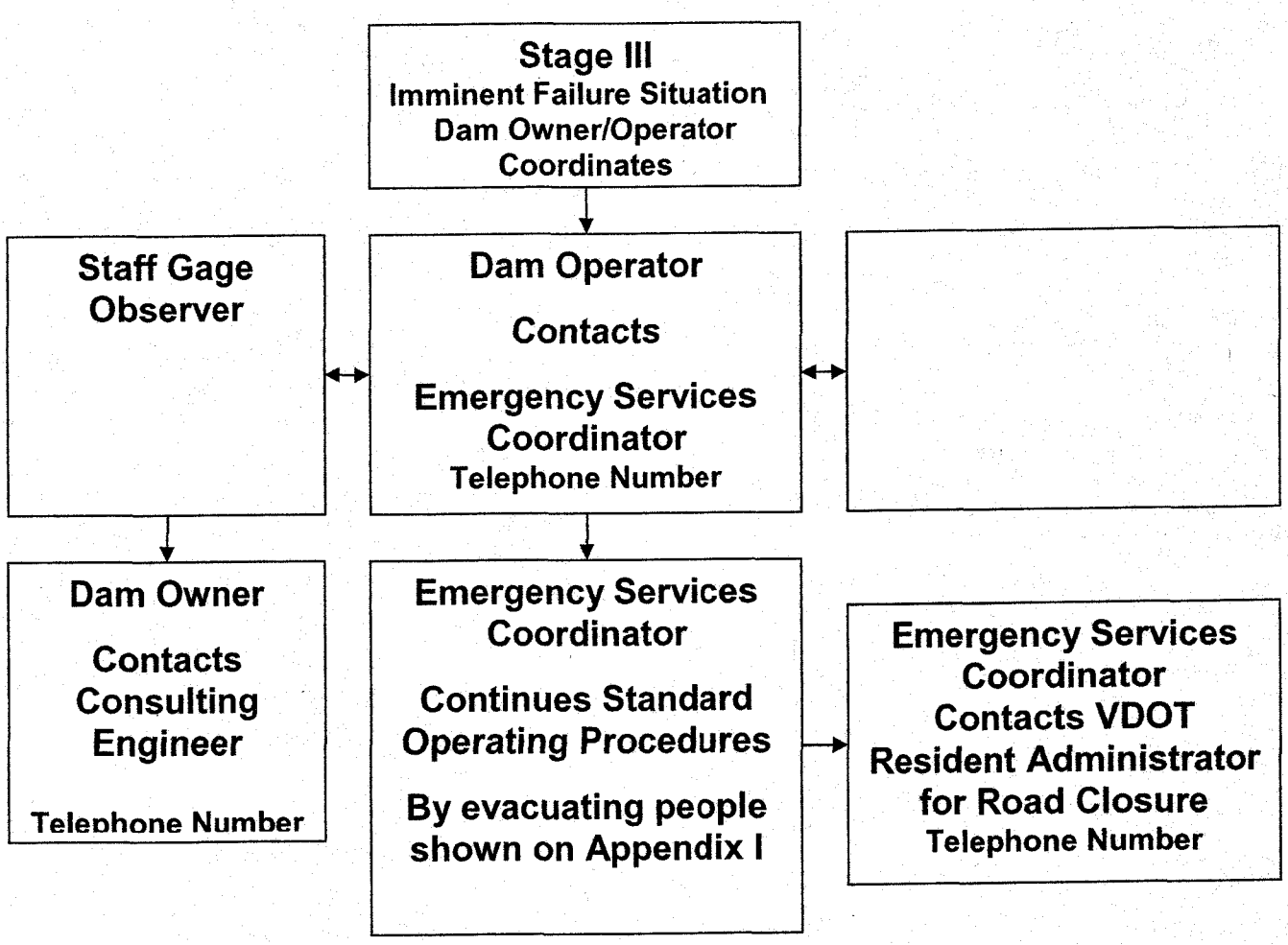
B. STAGE II NOTIFICATION



Message from dam owner/operator to ESC: *Our staff gage observer is at **Cranston Mill Pond** and the water level has risen into the emergency spillway to the threshold established in the emergency action plan to move to the Stage II Emergency Level. Please prepare your personnel in case an evacuation is necessary and continue to initiate your standard operating procedures (SOP). I will be observing the emergency spillway every 2 hours.*

Note: Standard Operating Procedures shall include notification of the evacuation team, contacting the National Weather Service for rainfall projections, contacting the state Department of Emergency Management and contacting VDOT to close the road.

C. STAGE III NOTIFICATION



Message from dam operator to ESC: *Our staff gage observer is at* ***Cranston Mill Pond*** *and the water level has risen in the emergency spillway to the threshold established in the emergency action plan to move to the Stage III Emergency level. Please proceed with the Standard Operating Procedures. I will remain at the dam to monitor continuously until the dam breaks or the water level recedes to safe levels and the ESC directs me to terminate my responsibility.*

III. STATEMENT OF PURPOSE

"The purpose of this emergency action plan is to safeguard the lives and reduce damage to the property of citizens of James City County living and/or working along Yarmouth Creek below Cranston Mill Pond, in the event of failure of Cranston Mill Pond, Inventory #09513.

Impounded water upstream of a dam when released uncontrollably may threaten lives in the flow path downstream or cause damage to homes, roads, bridges and any other infrastructure(s) in its way. This uncontrolled release occurs when the dam or a part of the dam breaks and stored water is released."

IV. PROJECT DESCRIPTION

Cranston's Mill Pond is located in Toano, Virginia approximately eight miles northwest of downtown Williamsburg at 6616 Cranston's Mill Pond Road. The pond is part of the sixteen square mile Yarmouth Creek watershed. Approximately seven square miles of this watershed drain through Cranston Mill Pond. Cranston Mill Pond is an earthen embankment dam approximately 10' in height equipped with a 100' wide concrete principal spillway, 4-16" low level drains and a 30' wide earthen emergency spillway. Access to the dam is provided to the south end of the dam by a 12' wide gravel access road. A 6' wide maintenance access is provided across the spillway to assist in monitoring the flows over the spillway, operating the low level drains and for maintenance access to the south end of the dam. Access is also provided to the south end of the dam by a 10' wide dirt road. This road is only intended to be used for maintenance access requiring heavy equipment or site access during periods when Cranston's Mill Pond Road is flooded.

A vicinity map is included as Appendix E showing the location and surrounding roadways. A layout plan of the dam with spillways and access routes identified is included as Appendix F.

V. EMERGENCY DETECTION, EVALUATION, & CLASSIFICATION

The dam owner is responsible for operation and maintenance of this dam. The dam operator and the staff gage observer are responsible for monitoring conditions at the dam and notifying the ESC when emergency stage conditions are activated.

Generally speaking, the dam owner may initiate this emergency action plan based on the issuance of a flood watch or flood warning in the area or when conditions at the dam indicate that the reservoir will continue to rise which will result in flows through the emergency spillway. Embankment erosion or appurtenant malfunction may dictate initiation of the emergency action plan. Public safety is the primary reason that it is incumbent on all responsible parties having roles in the activation of the emergency action plan to work together as a team. While it is the dam owner's responsibility to initiate this process, the Local Government Emergency Services Coordinator may contact the dam owner to inform the team that a flood watch has

been issued locally by the National Weather Service and team members would initiate their duties as required in this EAP.

In this section, the specific milestones that trigger the progression from Stage I (slowly developing condition, dam not in danger of failure but downstream flooding possible), to Stage II (quickly developing conditions that could cause the dam to fail if conditions continue to escalate) to Stage III (impending failure/evacuation) are provided. Depth of flow through the emergency spillway is the best indication of flood conditions and should be used as an indicator of the potential impacts downstream. In the absence of actual flow depth data through the emergency spillway, measured rainfall depths in inches monitored in the contributing watershed may be used to determine the emergency level. Visual observations should be made by a team member so that accurate and up to date information can be provided to the ESC.

A. The amount of flow in emergency spillway that will initiate a:

Stage II Condition **1.0'** in emergency spillway or **4.9'** in primary spillway.

This depth of flow in the emergency spillway should give the ESC enough time/warning to prepare for increased flooding downstream of the dam.

Stage III Condition **2.0'** in emergency spillway or **5.9'** in primary spillway.

This depth of flow in the emergency spillway should identify when failure is likely to occur or that overtopping of the dam's embankment commences.

B. Amount of rainfall that will initiate a:

Stage II Emergency	**5.0**	inches per 6 hrs.
	5.5	inches per 12 hrs.
	6.0	inches per 24 hrs.
Stage III Emergency	**6.1**	inches per 6 hrs.
	7.6	inches per 12 hrs.
	9.1	inches per 24 hrs.

C. Frequency of observations by rainfall/staff gauge observer during:

~~Stage I **6 hours**; Stage II **2 hour**; Stage III **Continuous**.~~

The Gage Observer should use access routes to the dam bearing in mind that roads crossing small streams may be flooded.

D. Public Roads Downstream from this Dam:

State roads are located downstream of this dam and coordination with the ESC and the local transportation office responsible for the

road/bridge(s) should determine flood levels in which the roads will be closed to all traffic. These roads are shown below.

The resident administrator, Virginia Department of Transportation/County Office of Transportation, responsible for opening and closing these roads are listed with area of coverage responsibility and telephone numbers is shown below.

Name of Transportation Administrator: Rossi Carroll
Telephone: (Business)(757)-253-5140;
Transportation Operations Center 24 hour phone number (757) 424-9920
Route # 632, Cranston's Mill Pond Road , 0.1 Miles below the dam.

Use the Table below for guidance in determining the proper emergency stage for various situations.

Event	Situation	Emergency Level
Emergency Spillway Flow	Spillway flowing with active gully erosion	II
	Spillway flowing with advancing head cut that is threatening the control section	III
Embankment Overtopping	Any overtopping flow within 2 feet of the top of the dam, water level rising	III
Seepage	New seepage areas on or near the dam	I
	New seepage areas with cloudy discharge or increasing flow rate	III
	Rapid flow rate increase with cloudy discharge from existing seepage area(s)	III
Sinkholes	Observation of new sinkhole on embankment	I
	Rapidly enlarging sinkhole	III
Embankment Cracking	New cracks in the embankment greater than 1/4 inch wide without seepage	I
	Cracks in embankment with seepage	I
Embankment Movement	Visual movement of the embankment slope	I
	Sudden or rapidly progressing slides of the slopes	III
Vortex in Pond	Whirl pool with discharge downstream	III
Earthquake	Measurable earthquake felt or reported on or within 50 miles of the dam	I
	Earthquake resulting in visible damage to the dam	I
	Earthquake resulting in potential uncontrolled release of water from the dam	III
Security Threat, Sabotage & Vandalism	Verified bomb threat that, if carried out, could result in damage to the dam	I
	Detonated bomb that has resulted in damage to the dam or it appurtenances	I
	Damage to the dam or appurtenances with no impacts to the functioning of the dam	I
	Damage to the dam or appurtenances that has resulted in seepage flow	I
	Damage to the dam or appurtenances that has resulted in a potential uncontrolled water release	III

VI. GENERAL RESPONSIBILITIES UNDER THE EAP

A. Impounding Structure Owner Responsibilities

1. The dam owner/operator **IS RESPONSIBLE** for notifying local ESC of any problem or potential problem at the dam site.

2. The dam owner/operator **WILL INITIATE** dam surveillance under Stage I conditions, **when a flood watch is issued by the National Weather Service.**

3. The dam owner/operator **WILL DETERMINE** when Stage II conditions are met at the dam.

4. The dam owner/operator **WILL DETERMINE** when Stage III conditions are met at the dam.

5. The dam owner/operator **WILL BE RESPONSIBLE** for operating such devices as spillway gates and low level outlets such as to cause the dam to function effectively.

B. Responsibility for Notification

1. The dam owner/operator **WILL NOTIFY** the 24-hour dispatch center and local ESC before beginning dam surveillance under Stage I conditions.

2. The dam owner/operator **WILL NOTIFY** the 24-hour dispatch center and the local ESC when Stage II conditions are met in order to alert them to review actions that may be required for the safety and protection of people and property and to mobilize their evacuation team.

3. The dam owner/operator **WILL NOTIFY** the 24-hour dispatch center and the local ESC to initiate warning/ evacuation of residents when Stage III conditions or imminent dam failure are probable.

C. Responsibility for Evacuation

1. The local ESC **WILL NOTIFY** the people, business owners and land owners, attached to the Dam Break Inundation Zone Map, to notify residents of the potential emergency or evacuation prior to or in the event Stage III conditions are met.

2. The local ESC and 24-hour dispatch center should utilize their Standard Operating Procedures (SOPs) to implement in the event that dam failure is possible or occurring. These SOPs should include evacuation plans.

3. The local ESC **WILL CONTACT** the Virginia Department of Transportation (VDOT) or other authorized personnel to set up barricades to close roads where flood waters will cross on the roads across the dam or within the inundation zone downstream of the dam.

D. Responsibility for Termination & Follow-UP

1. Once the Stage III condition has been met the staff gauge observer will continue to provide the ESC with information concerning water level rise, erosion in the emergency spillway and/or dam overtopping. It is particularly important for the ESC to know when the breach is occurring to evacuate their rescue personnel. The staff gauge observer will remain at the dam until the dam breaks and is released from duty by the ESC.

2. Regional flooding may occur prior to an incident at this dam and could continue for long periods of time. The staff gauge observer needs to have plans for staying or returning to the dam as conditions worsen. The termination responsibility should be handled by the ESC.

3. Post flood event discussions should be used to determine strengths and weaknesses in the emergency action plan while the experience is fresh in the minds of those living through it.

E. EAP Coordinator Responsibility

The dam owner should specify in this EAP the designated EAP coordinator who will be responsible for EAP-related activities, including (but not limited to) preparing revisions to the EAP, establishing training seminars, and coordinating EAP exercises. This person should be the EAP contact if any involved parties have questions about the plan.

F. Methods for Notification and Warning:

Check appropriate method(s) to be used during an emergency:

_____ Telephone/Reverse 911 automated warning systems
_____ Police/fire/sheriff radio dispatch vehicles with loudspeakers, bullhorns, etc.
_____ ~~Personal runners from door-to-door alerting residents~~
_____ Radio/television broadcasts for area involved
___X___ Other methods, as described: **Close the road.**

G. Evacuation Procedures:

Once the ESC has been notified of any problem at a dam site, the ESC will take appropriate protective measures in accordance with the local Emergency Operations Plan, and accompanying Emergency Action Plan and Standing Operations Procedures.

1. Monitoring the situation and, if time permits, review of evacuation plans.

2. Begin Alert, Notification, and Warning

3. Evacuating the inundation areas, if conditions warrant.

4. Expanding Direction and Control as well as beginning Emergency Public Information and operating shelters.

5. Provide Situation Reports to the State Emergency Operations Center (804)-674-2400 or (800)-468-8892.

VII. PREPAREDNESS

A. Surveillance

This dam is unattended under normal operating conditions.

District management and staff should monitor the status of weather fronts through the National Weather Service (NWS). The NWS maintains a hurricane center that reports on hurricanes, tropical storms & tropical depressions as they travel and affect coastal and inland areas. The web site address is: http://www.nhc.noaa.gov/

The expected response time to the dam from the staff gauge observer's home to the dam should be less than one (1) hour from the time they receive the information that a flood watch has been declared. The staff gauge observer should never put themselves in harms way. In the event a hurricane or tropical depression occurs with high winds the staff gauge observer shall use extreme caution monitoring conditions.

Preplanned access routes should be utilized given that small streams crossing under state roads may flood preventing safe access. The gauge observers and district staff should never attempt to cross a road that has flood water crossing it at a depth greater than one (1) foot unless the vehicle is specially designed for that purpose.

Alternative routes should be chosen for access by foot in the event that a car is unsafe for use. Other alternative means of transportation may be considered.

B. Response During Periods of Darkness

The staff gauge should be easily read from the location chosen by the staff gauge observer with a flashlight after dark.

The staff gauge observer should check the emergency spillway for erosion once the spillway starts to flow by crossing the top of the dam, if necessary.

The staff gauge observer should monitor the water level and go to higher ground when the level rises to within one (1) foot of overtopping the dam.

C. Access to the Site

Access to the site in all weather conditions has been preplanned by the staff gauge observer and alternate observer to avoid areas of flooding.

D. Response During Weekends & Holidays

Staff gauge observers live locally and will respond as needed on a 24 hours per day and a 7 days per week basis.

E. Response During Adverse Weather

The staff gauge observer should never put themselves in harms way. In the event a hurricane or tropical depression occurs with high winds the staff gauge observer should use extreme caution monitoring flood conditions at the dam.

Each staff gauge observer should have protective clothing adequate to ensure their safety at all times during any response to the dam.

F. Alternative Systems of Communications

Communications during a major rainfall event may be problematic. Telephone land lines may be used as the first means of communication. Cellular telephones can be used to supplement the land lines. Unfortunately, telephone lines like electrical lines are subject to being broken by falling trees so radio communication during these events is normally required.

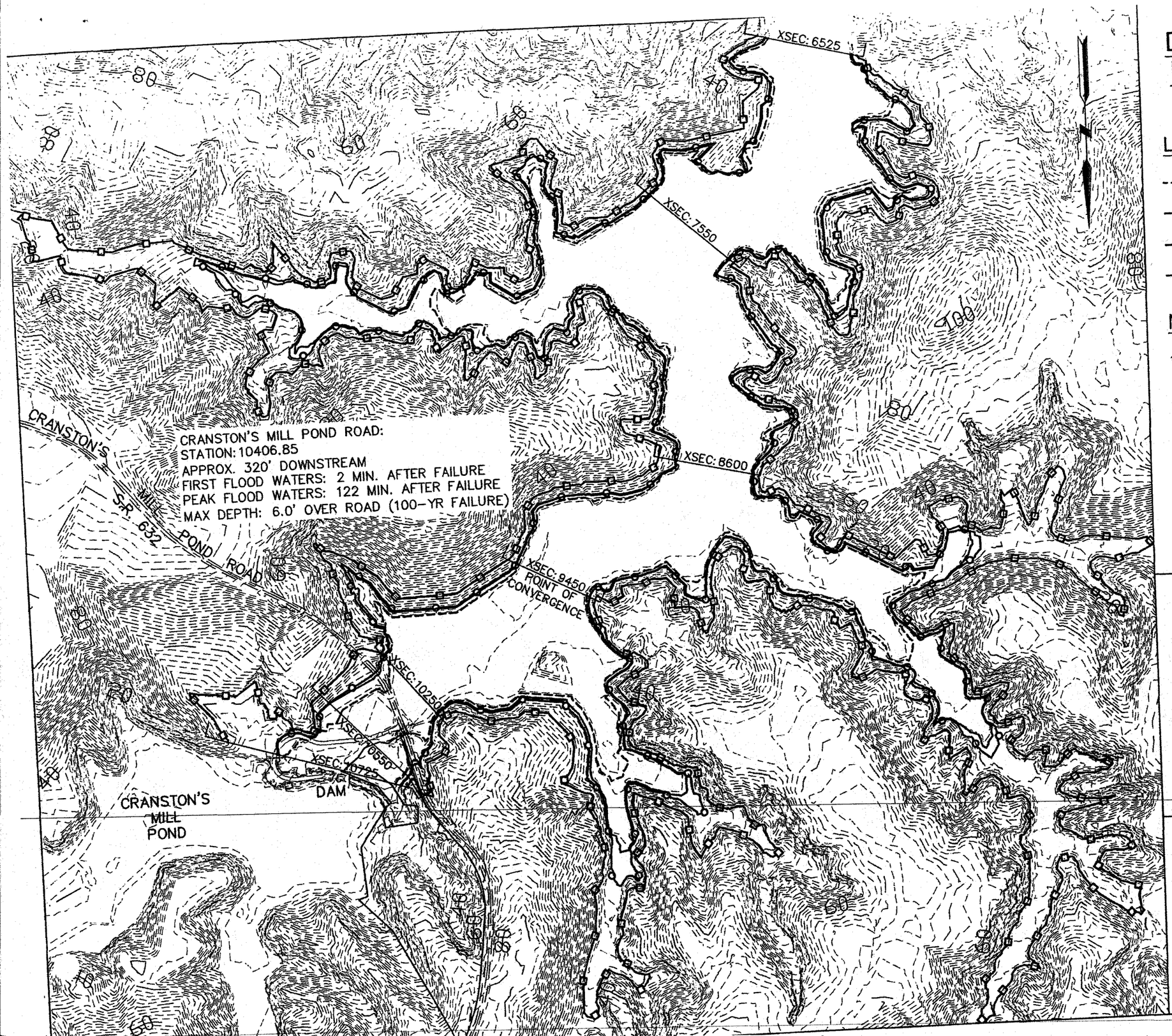
G. Emergency Supplies

Stockpiling of Materials & Equipment: The location of necessary supplies and material, such as barricades, sand, sandbags, etc should be known and available should the need arise.

Emergency access to supplies and equipment should be planned before any emergency is called. The dam owner should list potential supplies and equipment that may be required during an emergency and note address and telephone numbers of the contract sources.

VIII. INUNDATION MAP

A copy of the inundation zone map for Cranston's Mill Pond is located on the following page.



DAM BREAK INUNDATION MAP FOR CRANSTON'S MILL POND

SIGNIFICANT HAZARD CLASS

LEGEND

- SUNNY DAY FAILURE
- SPILLWAY DESIGN FLOOD WITH FAILURE
- SPILLWAY DESIGN FLOOD (NO FAILURE)
- PROBABLE MAXIMUM FLOOD WITH FAILURE

NOTES

1. THE INFORMATION CONTAINED IN THIS MAP IS PREPARED FOR USE IN NOTIFICATION OF DOWNSTREAM PROPERTY OWNERS BY EMERGENCY MANAGEMENT PERSONNEL.
2. MAPPING OF FLOODED AREAS AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE. TIMING AND EXTENT OF ACTUAL INUNDATION MAY DIFFER FROM THE INFORMATION PRESENTED ON THIS MAP.
3. ALL TOPOGRAPHICAL INFORMATION FROM JAMES CITY COUNTY GIS.
4. DATUM: HORIZONTAL=NAD 83, VERTICAL=NGVD 29

0 400 800 1200

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-20-10
PROFESSIONAL ENGINEER

DRAWN BY: JBM

CHECKED BY: PFH

DATE: 6/14/10
REV. 6/24/10
REV. 8/20/10

SCALE: 1"=400'

KOONTZ-BRYANT, P.C.
SITE DEVELOPMENT SOLUTIONS
1703 N. PARHAM ROAD, SUITE 100, RICHMOND, VIRGINIA 23229
(804)740-9200 kbpc@koontzbryant.com FAX (804)740-7338

IX. Notification List

NAME, ADDRESS AND TELEPHONE NUMBER OF RESIDENTS AT RISK, COMMERCIAL BUSINESS AT RISK AND OCCUPIED PROPERTIES IN THE DAM BREAK INUNDATION ZONE

Name, address and telephone number of all occupied dwellings, businesses, and other constructed facilities that are shown on the Dam Break Inundation Zone Map that may be impacted in the event of a dam failure.

Name	Address	Telephone Number
NONE		

Name, address and telephone number of owners and or lease holder of lands that are shown on the Dam Break Inundation Zone Map that may be impacted in the event of a dam failure.

APPENDIX A

INVESTIGATION & ANALYSIS OF IMPOUNDING STRUCTURE FAILURE FLOODS

Stage II

A stage II storm event for Cranston Mill Pond was set at a 1' flow level in the emergency spillway. This equates to between a 25 yr and 50 yr storm event. This level was chosen as it will have flows within the earthen lined emergency spillway and would be the appropriate time to assess whether there may be any erosion of the spillway. Velocities in the spillway for this flow event are less than 3 fps and well within the acceptable velocity limits for a grass lined channel.

Stage III

A stage III storm event for Cranston Mill Pond was set at the principal spillway design storm elevation of 2' in the emergency spillway. This is equivalent to a 100-yr storm event. At the 2' of flow in the emergency spillway, there is approximately 1' of freeboard remaining before the dam would be overtopped. When this level of flow is reached, the emergency spillway may start eroding and the principal spillway will be flowing at the capacities for which it was designed.

APPENDIX B

PLANS FOR TRAINING, EXERCISING, UPDATING, & POSTING THE EAP

1. **Training**

   Emergency action planning, generally, will be offered all Soil & Water Conservation Districts once a year. The schedule for this training may vary but this training opportunity is usually offered during the month of May.

   a. **Included in this training will be a generic version of a table top exercise that requires the decision to evacuate homes and business in harms way downstream.**

   b. **Time available a second scenario will be presented that does not lead to an evacuation order being given.**

2. **Exercises**

   a. **Table Top Exercises - Table top exercises will be held, at a minimum, once every 6 years. This exercise will occur in the year that certification is required.**

   b. **Drills - A drills will be conducted each year by the owner except when a table top exercise is required.**

3. **Updating**

   This emergency action plan will be checked yearly during the drill exercise by the Soil & Water Conservation District to determine if names, addresses and telephone numbers of the people shown in Section II. are accurate. The document will be updated at any time when a major change is determined to have occurred.

4. **Posting**

   This document will be on file with the Soil & Water Conservation District, the County Office of the Emergency Services Manager, the DCR Division of Dam Safety, the DCR Division of Conservation & Recreation – Dam Safety Consultant, and at the Department of Emergency Management.

APPENDIX C

SITE SPECIFIC CONCERNS

Cranston Mill Pond's southern main access road is within a low area below the dam and will not be usable during a Stage II or Stage III event. Access to the site will be from the northern or secondary access road as shown on the site layout plan. The staff gage observer can park on the road and access the emergency spillway and main dam by means of the maintenance access bridge over the principal spillway.

APPENDIX D

ADDITIONAL RESOURCES

DIRECTORY OF ADDITIONAL PERSONNEL WITH DAM SAFETY EXPERTISE

In addition to personnel shown elsewhere in this plan, the following list identifies other individuals with expertise in dam safety, design and construction that may be consulted about taking specific actions at the dam when there is an emergency situation:

Name	Telephone	Responsibility
DCR, Division of Dam Safety	804-786-1359	Regional Engineer

SUPPLIES AND RESOURCES

In an emergency situation, equipment, supplies and other resources might be needed on short notice, such as sandbags, rip rap, fill material, and heavy equipment. The table below lists resources that may be helpful and indicates contacts to access them.

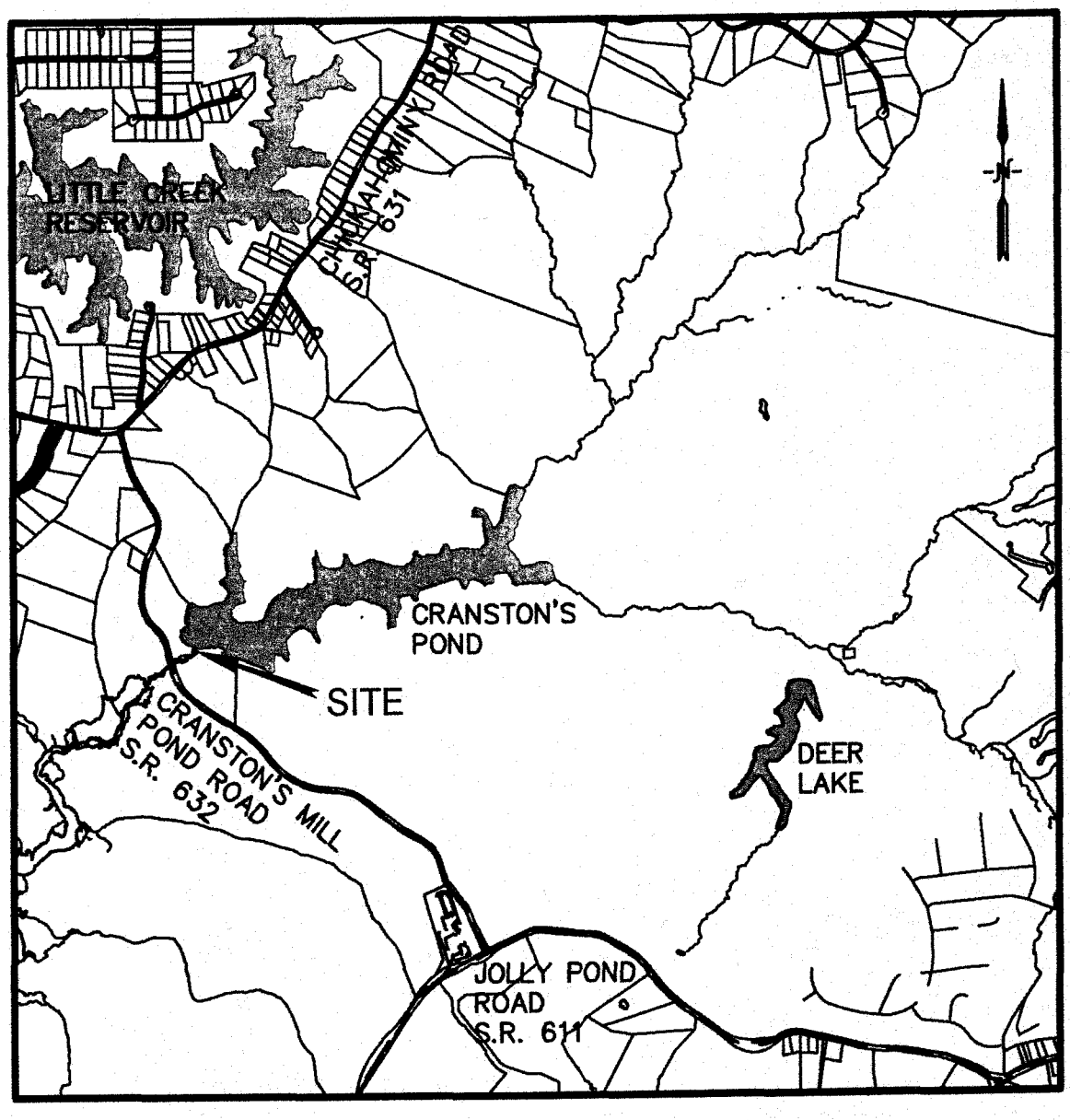
Earth Moving Equipment	Rip rap	Sand & Gravel

Sandbags	Pumps	Pipe

Lighting Equipment	Laborers	Other

APPENDIX E

VICINITY MAP

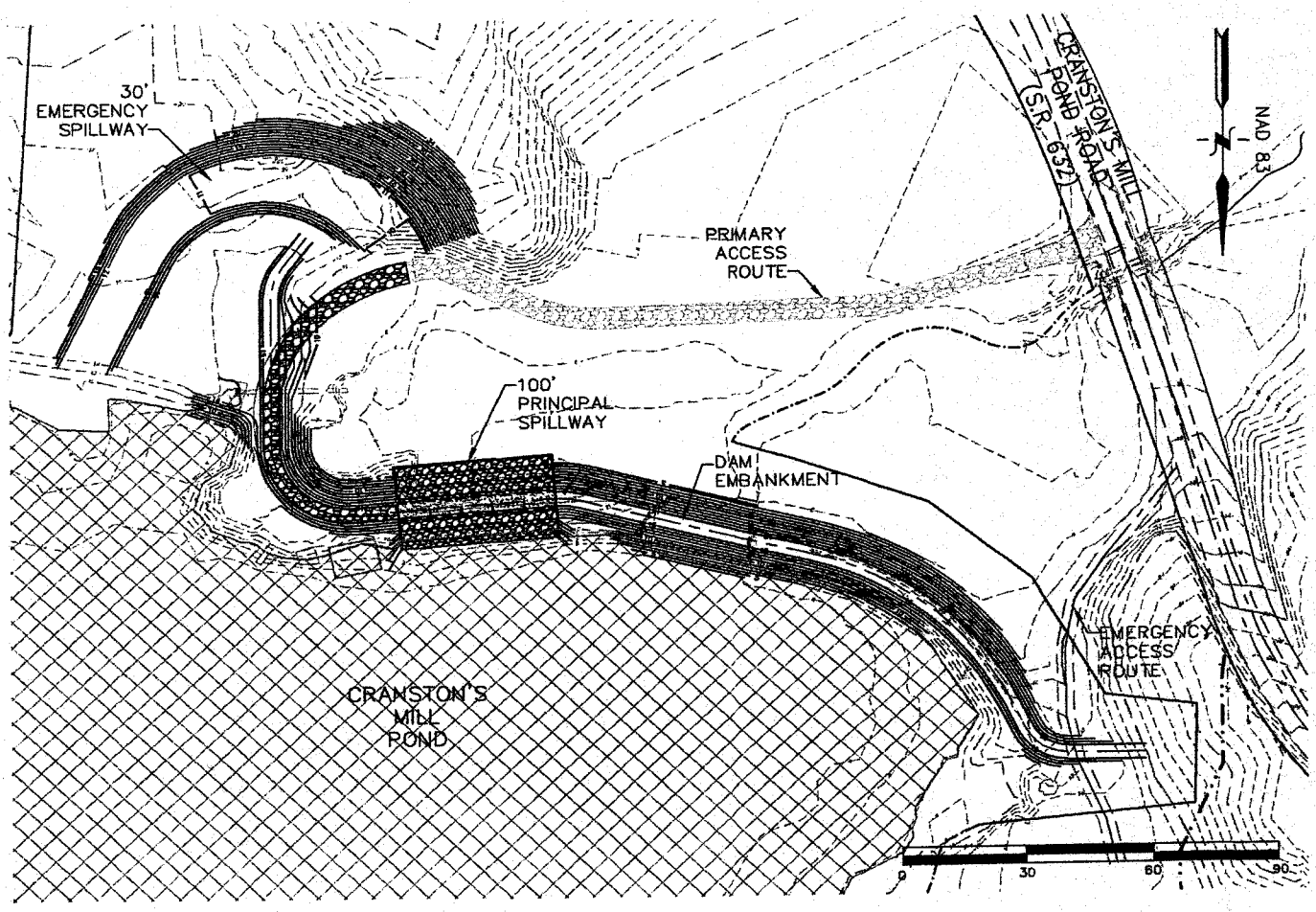


VICINITY MAP

SCALE: 1" = 2000'

APPENDIX F

LAYOUT PLAN



TRANSMITTAL

Environmental Division

NOV 30 2010

RECEIVED

DATE: November 30, 2010

TO:

- Environmental Division

FROM: Jose Ribeiro, Senior Planner

SUBJECT: S-0049-2010, Subdivision of Cranston's Mill Pond and Boundary Line Adjustment

ITEMS ATTACHED:

- ✓ Revised Plat
- ✓ Applicant's Response Letter

ACTION: Please review and return comments no later than **December 07, 2010**

2nd revision

Thank you for your review,
José-Ricardo Linhares Ribeiro
JCC Planner

Please upload your comments on CaseTrak

Plat is approved by the Environmental Division (Boundary line adjustment).

12-08-10

KOONTZ-BRYANT, P.C.
Site Development Solutions

November 24, 2010

Environmental Division

NOV 30 2010

RECEIVED

Mr. José-Ricardo L. Ribeiro
JCC Planning Division
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784

Reference: Cranston's Mill Pond Dam Restoration
County Plan JCC-SP-0093-2010
KB Project No: 09114.002.00

Dear Mr. Ribeiro:

In response to your comment letter dated November 12, 2010 and the Environmental Division's comments dated November 18, 2010, we have revised the construction plans for the above-referenced project. The revisions to the plans and our responses to the comments are outlined below in accordance with comment numbers in the letters:

Planning Division:

Fees:

1. Noted.

Site Plan-Application Designation:

1. The county plan number has been added to all construction sheets and is listed on this correspondence.

Site Plan-Analysis:

1.
    a. Note added to C1.0.
    b. Note added to C1.0.
    c. Information added to Site Data on C1.0.
    d. Information added to Site Data on C1.0.
2. The required flood plain statement has been added to the notes under the Site Data on Sheet C1.0.
3. No modifications to any stream courses is proposed. We have attached a copy of the Alteration Permit obtained from DCR for the proposed dam alterations as well as letter from the USACOE authorizing the use of a Nationwide 3 are included with this submittal.

SUP Conditions (per SUP-0023-2010)

- The required plat has been submitted and is under review.
- An Emergency Action Plan has been prepared and will be submitted to Kate Hale, Emergency Services Director, under separate cover. A copy of the plan and transmittal will be sent to your office as well.
- All required permits except for site plan approval and issuance of a land disturbance permit have been obtained and are included with this submittal.

VDOT:

1. Noted.

County Engineer:

1. All fill to be placed within the flood plain meets the requirements of Section 24-600. All needed permits from DCR and the USACOE have been obtained.

Fire Department:

1. Noted.

James City County Service Authority (JCSA):

1. The waterline has been shown and labeled as requested on all relevant plan sheets.

James City County Environmental Division:

General

1. Noted.
2. Noted.
3. Noted.
4. "Miss Utility" note has been added to C3.0.
5. A copy of the signed and sealed geotechnical engineering report prepared by McKinney and Company is included with this submittal. The report includes all requested information and calculations. Details as outlined by the geotechnical engineer for fill placement and filling of the area of the old spillway are included on Sheet C5.0 of the plan set.
6. The requested note added to Notes under Site Data on Sheet C1.0.
7. A copy of a letter from the USACOE stating that this project qualifies for coverage under the Nationwide 3 permit is included with this submittal.
8. An Alteration Permit has been obtained from the DCR and is included with this submittal. The Alteration Permit has the permanent pool elevation listed as elevation 9.0' We contacted DCR concerning the adjustment of the permanent pool elevation and they indicated that this was a relatively minor change and that this modification could be included on the required "As Built" report at the completion of construction.
9. A VSMP permit has been applied for. A copy of the permit will be submitted with the land disturbance application.
10. Noted.
11. The county site plan number has been added to all sheets.
12. Cranston's Mill Pond is located within the 6th order NWBD HUC: JL28. A note has been added to the watershed data section on C1.0.

Erosion & Sediment Control Plan:

13. A note has been added to the legend on C2.1 and C2.2 referencing the location of the sediment trap sizing calculations.
14. A note has been added to C2.2 and modified on C3.0 requiring the filling of the existing pipe with flowable fill and that it is to be abandoned in place.
15. The note has been modified in the sequence of construction on C2.2 requiring the use of EC-2 (soil stabilization blanket) on all slope 3:1 or steeper. The symbol for soil stabilization blankets

have been added to the EC legend and called out directly on the plans on C2.2. EC-2 has also been added to the entire width of the emergency spillway section

16. A note has been added to the sequence of construction on C2.2 required that all pumped discharges be pumped through a "dirtbag" and a detail added to sheet C2.4.

Stormwater Management / Drainage:

17. A copy of the Hydrology and Hydraulics Report that was included in the Design Report approved by the DCR as part of the Alteration Permit for the dam alterations is included with this submittal. It includes all requested information.
18. Details for the fill placement are included on Sheet C5.0 and additional information has been added to the sequence of construction. Information on requirements for the concrete spillway are included on the structural plans that have been incorporated into the site plan set.
19. The structural plans for the spillway construction are now included as part of the site plan set.
20. The calculated velocities in the emergency spillway are acceptable for the proposed grass lined spillway up to and including the outflow from a 100-year design flood. EC-2 has also been added to the emergency spillway. An output sheet from Flow Master for a 100-year flow with the calculated velocity is included with this submittal.
21. DCR will require an Operation and Maintenance plan as a requirement to obtain a permit Operational Permit for the facility. A draft of the plan is included for your review. We believe the plan meets the requirements of Section 23-10(4)(*b*). The final plan cannot be submitted to DCR until after the alteration are completed.

Twelve copies of the revised site plan are included with this submittal as well as one copy of requested permits, reports and calculations. Please call me if you have any questions or need anything else.

Sincerely,
Koontz-Bryant, P.C.

Paul F. Hinson, P.E., LEED AP
Director of Engineering

Enclosures

Cc: Mr. Brent L. Fults, LA

Environmental Division
NOV 30 2010
RECEIVED

MDW/WAC

ENVIRONMENTAL DIVISION REVIEW COMMENTS
Cranston's Mill Pond Dam Repair
County Plan SP-093-10
November 18, 2010

General:

1. A Land-Disturbing Permit and Siltation Agreement, with surety, are required for this project.

2. RLD. The applicant must provide the name of an individual holding a valid Responsible Land Disturber (RLD) certificate who will be responsible for the land-disturbing activity prior to engaging in the land-disturbing activity. This will be necessary prior to issuance of land-disturbing for the project, not during the erosion and sediment control plan approval process. It will be required that the assigned RLD attend the preconstruction conference for the project.

3. Offsite Work. As Cranston Mill Pond, LLC does not own all of the affected property yet, please be advised that it may be necessary to provide evidence of permission to occupy and disturb the offsite, adjacent tract from the parcel owner.

4. Miss Utility. Provide standard notes requiring contact of Miss Utility prior to any utility or site work excavations.

5. A Geotechnical Report, prepared by a professional engineer, is required to be submitted for the BMP design prior to issuance of a Land-Disturbing permit for the project. Information must include construction requirements and specifications for both material placement and seepage with all relevant and appropriate information contained in the plan set. All associated information is to be sealed by a qualified Virginia licensed Professional Engineer.

6. Record Drawing and Construction Certification. The stormwater management/BMP facility and associated stormwater conveyance systems as proposed for this project will require submission, review, and approval of a record drawing (as-built) <u>and</u> construction certification prior to release of the posted bond/surety. Provide notes on the plan accordingly to ensure this activity is adequately coordinated and performed before, during and following construction in accordance with current County guidelines.

7. Wetlands. Prior to initiating grading or other on-site activities on any portion of a lot or parcel, all wetland permits required by federal, state and county laws and regulations shall be obtained and evidence of such submitted to the Environmental Division. Refer to Section 23-9(b) (9) and 23-10(7) (d) of the Chapter 23 Chesapeake Bay Preservation ordinance.

8. Dam Permit. Based on the height of dam and storage volumes as presented for the proposed dam on the plans and design report, it appears the impounding structure is subject to the provisions of Virginia Dam Safety Program and 4 VAC 50-20 Impounding Structure Regulations. Evidence of a construction permit from the Virginia Soil and Water Conservation Board will be required prior to final approval of the plan of development by the Environmental Division, unless the impounding is specifically excluded from the regulations.

9. VSMP. Disturbed area for the site exceeds 2,500 square feet. Therefore, it is the owner's responsibility to register for coverage under the General Permit for Discharge of Stormwater from Construction Activities, in accordance with current requirements of the Virginia Department of Conservation and Recreation and the Virginia Stormwater Management Program. Visit http://www.dcr.virginia.gov/sw/vsmp.htm or contact the DCR Central Office at 804-371-7330 for additional information. *(Note: Evidence of VSMP registration will be required by the County prior to the preconstruction meeting and must be provided prior to issuance of a local land-disturbing permit and start of land-disturbing activities.)*

10. VDOT. It appears a VDOT CE-7 (temporary construction entrance permit) may be required. Contact the Williamsburg Residency, Permits, and Subdivisions at 757-253-4832 for further information.

11. Plan Number. Please reference the assigned County plan number on all subsequent submissions.

12. HUC. Provide reference to the hydrologic unit code (HUC) designation for where the project is located. The HUC codes are current Virginia 6th order NWBD hydrologic unit codes VAHU6. Refer to the Virginia DCR, Soil & Water Conservation, Hydrologic Unit Geography website for additional information. *{HUC Codes in JCC include: JL26, JL27, JL28, JL29, JL31, JL30, JL33, JL34, JL35, YO62 and YO63.}*

Erosion & Sediment Control Plan:

13. Sediment Traps. Add a clarification note to both sediment traps (Sheet C2.1 and C2.2) that the sizing requirements are located on Sheet C2.4.

14. Structure Removal. Clarify on Sheet C2.2 and C3.0 that the existing pipe and structure are to be abandoned in place with flowable fill.

15. Slope Stabilization. In accordance with James City County standard erosion and sediment control note # 13, all slopes steeper than 3H:1V require use of erosion control blankets installed in accordance with the minimum standards of the VESCH. No slopes shall be created steeper than 2H:1V.

16. Dewatering. It appears that dewatering operations may be required for the temporary control water due to spillway reconstruction. Provide information for anticipated dewatering methods and required erosion and sediment controls (secondary filtering structures, bags, etc.).

Stormwater Management / Drainage:

17. Pond Hydraulics. Provide all information relative to the pond design with the next submittal. Information must convey that appropriate considerations have been used for the overall watershed and that areas adjacent to the properly will not be subject to inundation as a result of normal operation of the facility.

18. Pond Construction. Provide notes or details showing specific construction requirements for the pond (fill) embankment and concrete control structure. Include requirements for sub-grade preparation, fill material type and placement, soil compaction, concrete anti-seep collars (or toe drain), and core/key trench, as applicable.

19. Structural Requirements. Provide information from a qualified Virginia licensed Professional Engineer relative to the construction of the concrete spillway. Reinforcing bar size, spacing, and placement along with concrete section requirements are also needed. Be advised that building permits may also be required to be obtained for the construction of these components.

20. Outfall Protections. Provide information as to the stability of the emergency spillway and the souls on which this structure will lie. Erodibility is of great concern, and while this component is only intended to function during larger events, it must be appropriately demonstrated that this has been taken into consideration.

21. Maintenance Plan. Provide a maintenance plan for the stormwater management/BMP facility. Section 23-10(4)(b) of the Chesapeake Bay Preservation Ordinance requires stormwater management plans to include a long-term schedule for inspection and maintenance of stormwater management/BMP facilities. The plan should be specific for a wet pond type facility. This information may be contained in the Dam Safety permitting package which would be sufficient to address the comment.

Bill - No further comments on this. M. 12/6/10

Scott, ✓ 12/7/10
Approved.
PBR

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Environmental Division
NOV 30 2010

RECEIVED
NOV 2010
Planning Department

November 17, 2010

Mr. Jose-Ricardo Linhares Ribeiro – Senior Planner

Development Management
101-A Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784

RECEIVED

RE: JCC-S-004902010, Cranston's Mill Pond Dam Subdivision and Boundary Line Adjustment (Plat)

Mr. Ribeiro,

Timmons Group has reviewed the JCC plat comments. This letter is being submitted in order to note the action taken for each requested modification along with 10 copies of the revised plat.

JCC Comments and Timmons Group Response **(Bold)**:

Plat-Application Designation:

1. Please refer to and titled this plat as James City County project number JCC-S-004902010 on all future plat revisions and associated correspondence. **(Added in Title Block for all sheets.)**

General Comment:

1. For clarity purposes, staff suggests that this plat be re-organized into more than two sheets. Further, clearly indicate which areas are the subject of a boundary line adjustment/extinguishment and which areas are being subdivided by this plat. **(Plat has been expanded into three sheets to accommodate request.)**

2. Remove reference to the conceptual plan JCC-C-0018-2010, Cranston's Mill Pond from the bottom of all pages. **(Done.)**

Cover Sheet:

3. On Sheet #1 keep all notes, certificates and signature boxes, and the vicinity map (scale should be no less than one inch equals 2,000 feet) but remove the map showing the "Properties", with the adjacent property owners' information, from this page and insert onto a separate one. Please further revise the cover sheet based on comment # 2 below. **(Vicinity map changed to 1"=2000')**

4. Please include items 1 through 8 under a section labeled "Notes" **(Done).** Under this section add and/or revise the following notes:
    a. Notes. "Unless otherwise noted, all drainage easements designated on this plat shall remain private". **(Note #9 added to reflect that no drainage easements have been designated by this plat.)**
    b. Notes. If the subdivided property contains drainfield locations for a septic tank, the plat shall include the following note: "Septic tank and soils information should be verified

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and reevaluated by the Health Department prior to any construction". **(Note #10 added to reflect that the consolidated area contains no drainfields.**

c. Notes. Note # 3. Please list the individual acreage of all areas subject to the proposed consolidation and subdivision; **(Added)**
d. Remove the term "Parcel A" from the Certificate of Source of Title and from Note # 6 and substitute with "Area A" or equivalent. Area A is currently part of a parcel but it is not a parcel itself. **(Done)**
e. Please remove the Virginia Department of Health (VDH) Signature Box from the Certificate of Approval section as this plat will not be reviewed by the VDH, unless the proposed subdivision/boundary line adjustment is for uses other than uses related to the restoration of Cranston's Mill Pond; and **(Done)**
f. Notes. "On November 9, 2010, the James City County Board of Supervisors approved the special use permit: SUP-0023-2010". **(Added as note #11)**

Sheet # 2

5. On Sheet # 2 please show both parcels (tax map ID # 2230100044 and 2230100042) and the area subject to the boundary line adjustment (0.55 acres). Do not refer to this area as "Parcel A", as this area is not a parcel. Show existing and proposed acreage for both parcels. **(Done)**

6. Delete the "Parcel Table" information.
Sheet # 3 (proposed): **(Done)**

7. On Sheet #3 show the entire parcel (tax map ID # 2230100044) and clearly indicate if this is, 1) a boundary line extinguishment proposed between areas (delete reference to the word parcel) "B" and "c" and, 2) a subdivision of this property into two parcels (east and west of Cranston's Mill Pond Road). Show the acreage of the two parcels before and after the proposed subdivision/boundary line extinguishment. **(entire parcel is shown on sheet 2 and in detail form on sheet 3)** Incorporate the meets and bound information shown on the plat recorded on February 7, 1968 into this plat. **(boundary limits shown, metes and bounds left off as this parcel has already been incorporated within tax map id #2230100044)**

8. A note on the plat states that: "Boundary line of present pond is at elevation 9.15 feet which is 1.00 foot higher than top of the present spillway, corresponding to water level of former pond." Where does the elevation of 9.15 feet come from? It does not appear to be referenced on the plat recorded on February 7, 1968. Further, the 1968 plat shows 50.20 acres in pond. Given that the pond water elevation is now proposed at 8.15 feet, how will this affect the "acreage in pond?" **(The date of the plat showing the 50.20 acres is 1948. On this 1948 plat the property line surrounding the pond was noted to be one foot higher than the spillway. The survey ties these elevations to NGVD 29 which is the JCC GIS Vertical Datum. 8.15' at the top of the spillway and 9.15' is one foot above that. See note on sheet 3)**

9. Please identify the purpose of Line L4. **(L4 has been removed. It was originally intended as a survey-tie-line used to separate the pond area from the upland area.)**

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10. There is a note on the plat indicating the "Approximate location of 0.68 acre parcel as shown by Charles H. Fleet and Associates...."How is this parcel being incorporated into this proposal?" **(This is one of the properties that make up tax map #2230100044. The outline of this parcel is plotted on the survey per note 7 request above.)**

Environmental Comments:

1. All subdivision plats submitted for approval after August 6, 1990 shall clearly identify the boundaries of any RPA within the property. Please delete any references that say "Preliminary RPA line from County GIS data". It is the responsibility of the applicant to provide an accurate RPA line for recordation purposes. The RPA line taken from the outer edge of all perennial streams and the connected and contiguous wetlands associated with said streams. **(RPA has been plotted on project site).**

2. Please provide the entire wetland line for the parcel as referenced in Note 4 on the cover sheet. **(Wetlands have been plotted and Note 4 revised)**

3. There are two references provided on the cover sheet of the plat for the parcel belonging to the Toana Fishing and Hunting Club, Inc. Please remove the reference to the County GIS Data reference as this information is not accurate in scale, location, shape, and several other properties and the legal reference provided is sufficient. **(Done)**

4. As the normal pool elevations associated with the basin may have changed, metes and bounds of the recorded plat may not correspond with the new spillway elevations. This being the case, references contained in note 8 of the cover sheet may need to change. **(Please see response to comment 8 above and note 8 on revised survey.)**

Please do not hesitate to contact me with any further comments or questions.

Sincerely,

M. Dwayne Dunevant, LS
Timmons Group
804.200.6556

1001 Boulders Parkway, Suite 300 | Richmond, Virginia 23225
TEL 804.200.6500 FAX 804.560.1016
Site Development | Residential | Infrastructure | Technology
www.timmons.com

Scott Thomas

From: Scott Thomas
Sent: Wednesday, November 17, 2010 12:23 PM
To: 'bfults@esswetlands.com'
Cc: William Cain; Mike Woolson; Jose Ribeiro
Subject: Misc. Data for Cranston's Mill Pond

In 2006 a HEC-1 analyses was done for Colonial Heritage. This was done in conjunction with the Master Stormwater Management Plan SWM-01-05. This HEC-1 analyses provided data on peak flows, both at predevelopment and at postdevelopment levels. Also it had scenario at postdevelopment with stormwater management control incorporated. Keep in mind, the SWM facilities were plugged into the model with best available information as most of the land bays were not at final design. Postdevelopment being a look into the future development plan of Colonial Heritage. Our Division required the HEC-1 analyses to get a sense of compliance with MS-19/quantity control early into the project.

Of course the development plan overall includes a very complex system of stormwater management BMPs to address water quality and quantity control. It includes 24 stormwater BMPs (wet and dry ponds), 660 acres of dedicated natural open space (conservation easement) and a Low Impact Development (LID) component.

As discussed, I wanted to provide you a summary of this data, for your information only, and to use at your discretion to compare to your specific design for the Cranstons Mill Pond rehabilitation project.

The information provided below is a HEC-RAS analyses at Node 3. Node 3 is on the nontidal mainstem of Yarmouth Creek just to the north of the outfall of Deer Lake and which is approximately 1.5 upstream of the Cranstons Mill Pond dam.

<u>Node 3</u>
Drainage Area = 1800 acres
2-year flow estimates
- Predev 910 cfs
- Postdev 1047 cfs
- Postdev with SWM 809 cfs

100-year flow estimates
- Predev 877
- Postdev 1894 cfs

We do not have design data submitted for DCR dam safety design. Again, I am providing this information to you for reference purposes only and as it is historical background information in our files that you may not be aware of.

Scott J. Thomas
Director
Environmental Division
101-E Mounts Bay Road
Williamsburg, VA 23187
P: 757-253-6639
F: 757-259-4032
jccEgov.com

Create a new file
Cranstons Mill Pond Dam Repair.

It will probably be assigned a County site Plan # later.

No need to copy comments to Planning.

WAC/SJT

ENVIRONMENTAL DIVISION REVIEW COMMENTS
CRANSTON'S MILL POND REPAIR
COUNTY PLAN NO. E&S - 08 - 07
July 9, 2007

Note: As this is a private dam, not a designed stormwater management facility, our Division will only review information as submitted for Land-Disturbing Permit purposes. It will not be reviewed as intensively as if it were a designed or master planned stormwater management/BMP facility.

General:

1. Revised plans needs to be submitted through the County's Planning Division rather than direct to the Environmental Division. This is to make proper determination as to whether other agencies need to review the plan (JCSA, Codes Compliance, VDOT, etc.). If it is determined that a site plan and building permit are not required, then you will be notified and this plan can be handled as an erosion and sediment control plan through the County's Environmental Division.

2. A Land-Disturbing Permit and Siltation Agreement, with surety, are required for this project. The County's Land-Disturbing permit procedures and application forms can be accessed at the following website link: http://www.jccegov.com/government/forms/environmental.html2.

3. Wetlands. Evidence of approved wetland permit(s) must be provided to the Environmental Division prior to issuance of a Land-Disturbing permit for the project. *(Refer to Section 23-9(b)(9) and 23-10(7)(d) of the Chapter 23 Chesapeake Bay Preservation ordinance).*

4. Dam Permit. Based on information submitted with the plan, it appears that improvements/repairs as proposed on the impounding structure may be subject to the provisions of Virginia Dam Safety Program and 4 VAC 50-20 Impounding Structure Regulations. Evidence of an Alterations permit from the Virginia Soil and Water Conservation Board must be provided to the Environmental Division prior to issuance of a Land-Disturbing permit for the project. *(Note: A Land-Disturbing permit will not be issued for the project until approval of the project concept from the DCR Dam Safety Program director is verified).*

5. VSMP. If disturbed area for the project exceeds 2,500 square feet, it is the owner's responsibility to register for coverage under the General Permit for Discharge of Stormwater from Construction Activities, in accordance with current requirements of the Virginia Department of Conservation and Recreation and the Virginia Stormwater Management Program. Visit http://www.dcr.virginia.gov/sw/vsmp.htm or contact the DCR Central Office at 804-371-7330 for additional information.

6. Disturbed Area. Provide a disturbed area estimate for the project. It is preferred that this information be placed within the plan set.

7. Presentation. Provide a vicinity/location map. Provide a note on the cover sheet of the plans indicating that the site lies in the Non-tidal Mainstem of Yarmouth Creek. Also, label the private dam with County BMP Code (identifier) YC 004. This is our inventory number for the private dam and lake.

Floodplain:

8. Provide a note referencing the correct FEMA FIRM panel and any designated special flood hazard areas or zone designations associated with this site, as applicable.

Chesapeake Bay Preservation:

9. Environmental Inventory. Provide an environmental inventory in accordance with Section 23-10(2) of the County's Chesapeake Bay Preservation ordinance. Components include tidal wetlands, tidal shores, non-tidal wetlands in RPA, resource protection areas, non-tidal wetlands in RMA, hydric soils, floodplains and slopes 25 percent or greater. The environmental inventory must also show a limit of work for the project including that associated with access off of Cranstons Mill Pond road, installation of site erosion and sediment control measures and actual pond spillway work areas.

10. Steep Slope Areas. Section 23-5 of the Chesapeake Bay Preservation Ordinance does not allow land-disturbing activities to be performed on slopes 25 percent or greater. It appears that steep slope areas are impacted due to primary and emergency spillway construction; therefore, a request for a waiver or exception is required, in writing. *Note: This provision of the ordinance also applies to man-made dam slope areas that will be denuded.*

11. Water Quality Impact Assessment. Once the environmental inventory for the project is presented, a determination will be made as to whether a water quality impact assessment (WQIA) and administrative and/or Chesapeake Bay Board Chesapeake Bay Exception (CBE) is required for the project. Refer to Sections 23-7(b) and 23-11 of the Chesapeake Bay Preservation ordinance.

Grading Plan:

12. The work plan must show proposed grading in the areas of the principal and/or emergency spillways. This is needed to validate the limits of work that are to be shown on the next submittal, convey the intention of the dam reconstruction to the contractor in charge of performing the work, and reflect that the limits have been minimized for consistency with the ordinance and to assist with approval of the WQIA.

Erosion & Sediment Control Plan:

13. Design Checklist. Please provide a completed standard James City County Erosion and Sediment Control and Stormwater Management Design Plan Checklist, specific to this project. The intent of the checklist is to ensure the plan preparer has provided all items necessary for a complete and expeditious review.

14. Standard E&SC Notes. Replace the Erosion Control Notes on *{List Sheet}* with revised James City County Erosion Control Notes dated 7/06/01. Contact the Environmental Division at 757-253-6639 if you need a hard or electronic copy of the standard notes.

15. E&SC Narrative. Provide a brief erosion and sediment control plan narrative in accordance with VESCH requirements. The narrative should include important site, adjacent parcel, soil and development information as well as specific control and stabilization measures as proposed.

16. Existing Drainage. Describe how flow/runoff in existing streams or natural drainage channels will be handled during construction of all proposed culvert or storm drains.

17. Temporary Stockpile Areas. Show any temporary soil stockpile, staging and equipment storage areas (with required erosion and sediment controls) or indicate on the plans that none are anticipated for the project site.

18. Limits of Work. Show and label a distinct limit of work (clearing and grading) around the site periphery. Be sure to include work associated with access and installation of erosion and sediment controls. Ensure disturbed area estimates match land-disturbance inclusive within the limits of work.

19. Clearing. If clearing of the top of and downstream slope faces of the dam are part of the work plan, this needs to be so indicated on the plan sheet and shown within the limit of work.

20. Sequence of Construction. Provide a sequence of construction outlining mobilization, demolition, installation of erosion and sediment control measures and associated site work for the project.

21. E&S Plan. Overall, the erosion and sediment control plan appears to be acceptable for the work proposed in the submittal package; however, a few modifications are suggested. First, the location of the construction entrance should be at/near the paved public roadway and construction road stabilization (CRS) used from the CE to the access to the proposed work area. If CRS is not used any low points in the access road may also require silt fence at appropriate locations due to road disturbance.

21. Slope Stabilization. Consider use of EC-2 matting on all disturbed or graded slopes steeper than 3H:1V. This will aid in immediate stabilization and germination of seeding after reconstruction of the dam has been completed. *(Note: This is a requirement of County Standard Erosion and Sediment Control Note # 14.)*

22. Riprap. Provide the classification of the rip rap that is to be used on the downstream side of the control structure. Ensure that all rip rap used is labeled as Class I or greater. Additionally, should the northern area of improvements be used with any frequency, the nature of the soils in this area suggests that the outfall of the 36-inch RCP should have an outlet protection pad or a stilling basin.

Stormwater Management / Drainage:

23. Design. No design computation information or design report was provided to support the dam repair plan. Provide basic hydrology and hydraulic information to support the repair plan, especially for the spillway design flood as determined by DCR dam safety. Development in the upslope watershed should be considered in the design of the principal and/or emergency spillway repair. *(Note: As this is a private dam, not a designed stormwater management facility, our Division will not review this information as intensively as we would if it was a designed stormwater management/BMP facility. It will only be reviewed from the aspect of Land-Disturbing. However, a copy of relevant hydrology, hydraulic and pond routing information is requested so that it is in our files and readily available.)*

24. Design High Water. Clearly label design high water elevation on the pond plan and/or detail sheets. Based on information shown on Sheet 3, it does not appear that adequate freeboard is provided from design high water elevation (El. 12.78) to top of dam (El. 13.0). If this elevation is greater than the historical high water elevation of the lake, ensure this elevation does not impact any existing structures upslope of the lake shoreline.

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JAMES CITY COUNTY - ENVIRONMENTAL DIVISION

Office Phone: 757-253-6670 Fax Number: 757-259-4032

DATE SENT: 07/10/07

Name: L. Clarke Jones / Joe F. Alexander

Firm or Company: Jones Realty / AlexCom & Associates

Facsimile Number: 804-329-7023 / 540-371-7920

Number of pages including this transmittal: 5

From: Scott J. Thomas

James City County
P O Box 8784
Williamsburg VA 23187-8784

Comments: Dam Repair plan for Cranstons Mill Pond Dam
County E+S Plan No. E+S-08-07

If you do not receive all pages, call 757-253-6670 as soon as possible

PROTECTING RESOURCES
PRIDE
IN DELICATE ENVIRONMENTS

SCOTT J. THOMAS, P.E.
CHIEF ENGINEER – STORMWATER

ENVIRONMENTAL DIVISION

101 MOUNTS BAY ROAD, P.O. BOX 8784 (757) 253-6639
WILLIAMSBURG, VIRGINIA 23187-8784 FAX: (757) 259-4032
E-MAIL: scottt@james-city.va.us

WAC/SJT

ENVIRONMENTAL DIVISION REVIEW COMMENTS
CRANSTON'S MILL POND REPAIR
COUNTY PLAN NO. E&S - 08 - 07
July 9, 2007

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ERS-08-07
1ST Review

Some special issues we need to talk about.

DCR Permit #
09513

Due 7/17/07

7/9/07

Scott,
See comments ERS-008-07.0.

ERS-08-07
YC004

Bill

SUBMIT TO PLANNING

MATT SMOLNIK

JONES REALTY & CONSTRUCTION CORPORATION

5103 Thrush Lane
Richmond, Virginia 23227-3604
804.321.1700 Fax: 804.329.7023

June 22, 2007

James City County
Environmental Department
Mr. Scott Thomas
101 Mounts Bay Road
Williamsburg, VA 23187

Dear Scott,

Enclosed please find the information we discussed regarding Cranstons Mill Pond Dam.

Thank you.

Sincerely,

L. Clarke Jones, Jr.

COMMONWEALTH *of* VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF DAM SAFETY
VIRGINIA SOIL AND WATER CONSERVATION BOARD

DAM SAFETY CERTIFICATE
CONDITIONAL
CLASS III OPERATION & MAINTENANCE CERTIFICATE NUMBER 09513

Toano Fishing & Hunting Club, owner of Cranstons Pond Dam in the James City County, is entitled to operate and maintain this dam pursuant to the provisions of the Dam Safety Act (Section 10.1-604 et seq., Code of Virginia) and Regulations promulgated thereunder.

This Conditional Operation and Maintenance Certificate is issued because the dam does not satisfy the current Regulations. The conditions that must be corrected to qualify for a Regular Operation and Maintenance Certificate are listed on the Data Sheet dated May 16, 2007.

This certificate is for a term of eight-months, effective May 17, 2007 and expires January 31, 2008. The Certificate may be renewed in accordance with §4VAC50-20-150C of the Virginia Impounding Regulations.

Joseph H. Maroon
Secretary, Virginia Soil and Water Conservation Board
Director, Department of Conservation and Recreation

L. Preston Bryant, Jr.
Secretary of Natural Resources

RECEIVED
JUN 14 2007
JONES REALTY & CONSTRUCTION CORP.

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street, Suite 206
Richmond, Virginia 23219-2010
(804) 371-6095 Fax (804) 371-2630

June 13, 2007

Mr. L. Clarke Jones, Jr.
Toano Fishing and Hunting Club
c/o Jones Realty and Construction Corp.
5103 Thrush Lane
Richmond, VA 23227-3604

Re: Cranstons Pond Dam, Inventory No. 09513, James City County

Dear Mr. Jones:

As you no doubt are aware, your engineer Mr. Joe Alexander called me a couple weeks ago to inquire about some seemingly inaccurate information on the Data Sheet enclosed with the new Operation and Maintenance Certificate. He was correct and a quick check revealed that the same errors appeared on the Data Sheet for the Alteration Permit as well, which you had not received as of that call.

In that correcting the Data Sheets does not reflect new design or submission documentation, we are transmitting herewith corrected newly executed versions without further review by the Stormwater and Conservation Board. I trust the information now meets with your approval. I have initialed each change.

Should you have questions, please feel free to contact me at (804) 786-1359 and by e-mail at david.conniff@dcr.virginia.gov.

Sincerely,

David D. Conniff, P.E.
Dam Safety Regional Engineer

Enclosures As Stated

cc: Joe Alexander, Alexcom and Associates
William G. Browning, Director, Dam Safety and Floodplain Management
James M. Robinson, P.E., Dam Safety Program Manager
DS&FM Region 2 Files

copy

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

DESIGN REPORT FOR THE CONSTRUCTION/ALTERATION OF IMPOUNDING STRUCTURES

Reference: Impounding Structure Regulations, 4VAC50-20-00 et seq., Virginia Soil & Water Conservation Board

Please fill out and mail to:
Department of Conservation and Recreation
Division of Dam Safety
203 Governor Street
Richmond, Virginia 23219-2094

1. Project Information:
   a. Proposed Construction: _____
      Alteration: Replacing the combined Principal & Emergency spillway
   b. Name of Impounding Structure: Cranstons Pond Dam
   c. Inventory Number: 09513 (Leave blank if new Construction)
   d. Name or Reservoir: Cranstons Pond
   e. Purpose of Reservoir: Recreation

2. Impounding Structure Classification:
   a. Size Classification Table I Impounding Structure Regulations
      Large Medium (Small) (Circle One)
   b. Hazard Potential Classification Table I Impounding Structure Regulations
      Class I Class II (Class III) Class IV (Circle One)

3. Location of Impounding Structure:
   a. City/County: James City County Magisterial District: _____
   b. Located 300 (feet)/miles upstream/downstream of Highway # 632
   c. Name of River of Stream: Yarmouth Creek
   d. Latitude: N 37° 20' 50.5" Longitude: W 76° 48' 47.5"

4. Ownership:
   a. Owner's Name: Toano Fishing & Hunting Club

b. Mailing Address: L. Clarke Jones Jr. President
C/o Jones Realty & Construction Corp 5103 Thrush Lane
Richmond, Va. 23227-3604

c. Telephone: (804) 321-1700

5. Design Engineer:

a. Design Engineer/Design Firm: Joe F. Alexander AlexCom & Assoc.

b. Design Engineer Virginia Number: 04583

c. Mailing Address: 11 Debruen Lane
Fredericksburg, Va. 22405

d. Telephone: (540) 371 3157

6. Impounding Structure Data

a. Type of material ✓ earth _____ concrete _____ masonry _____ other
with Concrete Spillway

Note: All elevations NGVD unless noted.
For new construction complete the design configuration column
For alteration complete both the existing and design configuration column

		Existing Configuration	Design Configuration
b.	Top of Dam	12.0	13.0 Elev.
c.	Downstream Toe (Lowest)	0	0 Elev.
d.	Height of Dam	12	13 Feet
e.	Crest Length(Less Spillway)	505'	485 Feet
f.	Crest Width	20'	20' Feet.
g.	Upstream Slope Varies - steepest	2:5 H: 1 V	2:5 H: 1 V
h.	Downstream Slope Varies - steepest	2 H: 1 V	2 H: 1 V

7. Reservoir Data:

		Existing Configuration	Design Configuration
a.	Maximum Capacity from the elev to top of Dam	624 Acft	935 Acre-Feet
b.	Maximum Pool Top of Dam	12	13 Elev.
c.	Maximum Pool Surface Area Top of Dam	135.2	147.8 Acres

d.	Normal Capacity	234	234 Acre-Feet
e.	Normal Pool	9.0	9.0 Elev. NORTHERN CONTROL STRUCTURES @ 8.78
f.	Normal Pool Surface Area	50.2	50.2 Acres
g.	Freeboard (Normal Pool to Top)	~~3'~~	4' Feet

8. Spillway Data:

		Type	Construction Material	Design Configuration
a.	Low Level Drain	36" pipe	Concrete	Adjustable board weir
b.	Principal Spillway } Combined	Weir	Concrete	50' fixed weir
c.	Emergency Spillway } Combined	Weir	Concrete	50' fixed weir

		Existing Configuration	Design Configuration
d.	Low Level Drain (low inlet) Variable	6.0	(Variable) Elev.
e.	Principal Spillway (high inlet)	9.0	9.0 Elev.
f.	Emergency Spillway (crest)	9.0	9.0 Elev.

9. Watershed Data:

a. Drainage Area 4,616 AC. 7.2 – Sq. Miles

b. Type and extent of Watershed Development: approx. 20% Developed in upper ends with mixture of Subdivisions and Commercial. a large subdivision is planned for approx 25% of D.A.

c. Time of Concentration: 2 hr. Method: _____

d. Spillway Design Flood used (check and state source)

____ PMF, source: _____

____ 1/2PMF, source: _____

✓ 100 Year, source: S.C.S. 6 hr. duration

____ 50 year, source: _____

____ Other, source: _____

e. Design inflow hydrograph: Volume 945 acre-feet: Peak inflow 4,448 CFS

Rainfall duration of design inflow hydrograph 6 hours

f. Freeboard during passage of spillway design flood 0.22 feet.

10. Additional Information:

Provide as attachments to the Design Report the following information. Note: For alteration permits the detail of this information is to be in accordance with the scope of the proposed alteration:

a. A description of properties located in the inundation zone downstream from the site of the impounding structure, including the location and number of residential structures, buildings, roads, utilities and other property that would be endangered should the impounding structure fail.

b. A statement from the governing body of the local political subdivision or other evidence confirming that this body is aware of the proposal to build or alter an impounding structure and of the land use classifications applicable to the inundation zone.

c. Maps showing the location of the impounding structure that include: the county or city in which the impounding structure is located, the location of roads, access to the site and the outline of the impoundment.

d. A report of the geotechnical investigation(s) of the foundation soils or bedrock and of the materials to be used to construct the impounding structure.

e. Design assumptions and analyses sufficient to indicate that the impounding structure will be stable during construction and during the life of the impounding structure under all conditions of reservoir operations, including rapid filling and rapid drawdown of the impoundment.

f. Confirmation of the stability of the reservoir rim area in order to safeguard against reservoir rim slides of such magnitude as to create waves capable of overtopping the impounding structure and confirmation of rim stability during seismic activity.

g. Design assumptions and analyses sufficient to indicate that seepage in, around, through, or under the impounding structure, foundation, and abutments will be reasonably and practically controlled so that internal or external forces or results thereof will not endanger the stability of the impounding structure.

h. Calculations and assumptions relative to design of the spillway(s).

i. A description of provisions to insure that the impounding structure and appurtenances will be protected against deterioration or erosion due to freezing and thawing, wind and rain, or any combination thereof.

j. List and provide any other pertinent design data, assumptions, and analyses commensurate with the nature of the impounding structure and specific site conditions:

_____

_____

_____

k. A proposed schedule indicating construction sequence and time to completion.

l. A proposed impoundment and impounding structure operating schedule.

m. A proposed impoundment and impounding structure maintenance schedule.

n. A proposed inspection schedule to be utilized in making periodic safety inspections during the life of the project.

11. SUMMARY DATA SHEET

Name of Dam: Cranstons Pond Inventory Number: 09513

Location (stream): Yarmouth Creek County: James City County

Owner: Toano Hunting and Fishing Club

Address: L. Clark Jones President c/o Jones Realty & Construction Corp 5103 Thrush Lane

City/Town: Richmond, Va. Zip Code: 23227-3603

Designed By: unknown Design Year: unknown

Constructed By: unknown Completion Year: unknown. over 100 yrs old

Alteration Designed By: Joe F. Alexander Co. Alteration Design Year 2007

Alteration Construction By: _____ Alteration Completion Year: _____

Type of Dam: Earth Embankment Purpose: Recreation

Drainage Area (Sq. Mi.): 7.2 Type of Watershed: _____

Total Height; Crest (Ft.): 13 Elevation: 13

Normal Pool Height (Ft.): 9 Elevation: 9

Maximum Capacity (Acre Ft.): 935 Maximum Area (Acres): 147.8

Normal Capacity (Acre Ft.): 234 Normal Area (Acres): 50.2

Size Classification: Small Hazard Classification: III

Required Spillway Design Flood: 50 - 100 yr

Available Spillway Design Flood: 100 yr

Type of Emergency Spillway: Concrete weir

Emergency Action Plan filed with:

( ) Virginia Department of Emergency Management

( ) Local Coordinator of Emergency Services County/City: James City County

CERTIFICATION BY OWNER'S ENGINEER

I hereby certify that the information provided in this form and the attachments to this form have been examined by me and found to be true and correct in my professional judgment.

Signed: _____
(Professional Engineer)

Virginia Number: 04583

This 30th day of April, 2007.

MASTER DESIGN STORM SUMMARY

Network Storm Collection: 100yr-Toano-6hr

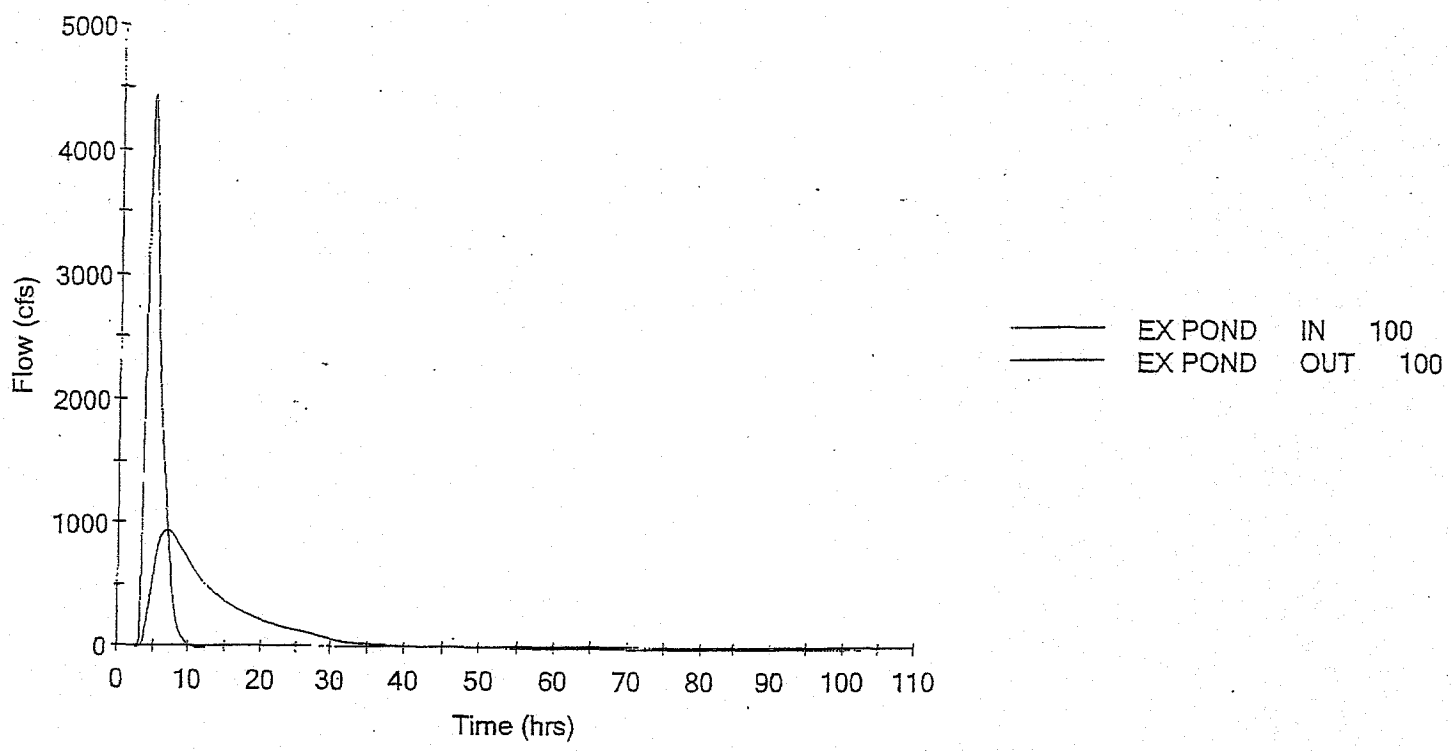
Return Event	Total Depth in	Rainfall Type	RNF ID
100	6.0000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

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

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
EX POND	IN	POND	100	904.492		4.5000	4448.42		
EX POND	OUT	POND	100	904.439		7.0500	955.79	3.78	653.911
*OUT 10		JCT	100	904.439		7.0500	955.79		
TOANO		AREA	100	904.492		4.5000	4448.42		

Hydrograph
EX POND OUT 100



File.... H:\Pondpack-Win\Jobs\
Title... Project Date: 3/5/2007
Project Engineer: Zeke Moore, P.E.
Project Title: Toano
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = 100yr-Toano-6hr

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 6.0000 in 8.
Duration Multiplier = 0.25
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .0250 hrs End= 6.0000 hrs

9

File.... H:\Pondpack-Win\Jobs\TEST-JOE.PPW

::

TIME OF CONCENTRATION CALCULATOR

::

Segment #1: Tc: User Defined

Segment #1 Time: 2.0000 hrs

Total Tc: 2.0000 hrs

10

File.... H:\Pondpack-Win\Jobs\TEST-JOE.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Woods	65	4616.000			65.00
COMPOSITE AREA & WEIGHTED CN --->		4616.000			65.00 (65)

11

REQUESTED POND WS ELEVATIONS:

Min. Elev.= .00 ft
Increment = .50 ft
Max. Elev.= 5.00 ft

****
OUTLET CONNECTIVITY
****

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

Structure	No.		Outfall	E1, ft	E2, ft
Weir-Rectangular	1	--->	TW	.000	5.000
TW SETUP, DS Channel					

12

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = 1
Structure Type     = Weir-Rectangular
-----------------------------------
# of Openings      =         1
Crest Elev.        =       .00 ft
Weir Length        =     50.00 ft
Weir Coeff.        =  2.600000

Weir TW effects      (Use adjustment equation)


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

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

13

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 1 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
.00	.00	Free Outfall		H=.00; Htw=.00; Qfree=.00;
.50	45.96	Free Outfall		H=.50; Htw=.00; Qfree=45.96;
1.00	130.00	Free Outfall		H=1.00; Htw=.00; Qfree=130.00;
1.50	238.83	Free Outfall		H=1.50; Htw=.00; Qfree=238.83;
2.00	367.70	Free Outfall		H=2.00; Htw=.00; Qfree=367.70;
2.50	513.87	Free Outfall		H=2.50; Htw=.00; Qfree=513.87;
3.00	675.50	Free Outfall		H=3.00; Htw=.00; Qfree=675.50;
3.50	851.23	Free Outfall		H=3.50; Htw=.00; Qfree=851.23;
4.00	1040.00	Free Outfall		H=4.00; Htw=.00; Qfree=1040.00;
4.50	1240.97	Free Outfall		H=4.50; Htw=.00; Qfree=1240.97;
5.00	1453.44	Free Outfall		H=5.00; Htw=.00; Qfree=1453.44;

Cranstons Pond – Limited Geotechnical Investigation

A limited Geotechnical Investigation was performed on the existing Cranston Mill Pond Dam located on Yarmouth Creek In James City County, Virginia. The purpose of the investigation was to determine the types of soil, which exist in the dam and its foundation. Particular attention was paid to the area immediately adjacent to the existing concrete spillway, which had been compromised in the fall of 2006.

Three test borings were made to a depth of 14 feet below the existing top of the dam and were terminated in original black highly organic peat soil. The top of the peat layer is located at elevations varying from elevation 0.27 to elevation –1.38. The original dam embankment consists of clays and sandy silts placed over the organics of the original swamp. The boundary between the dam embankment and the original ground occurs at a depth of 4.5 feet to 6.5 feet below the top of the dam. This equates to elevation 5.8 to 8.0. The area adjacent to the spillway has been eroded away and water is currently running around both sides of the spillway structure. The water surface elevation at the time of this study was an elevation 5. The embankment and foundation has been eroded way adjacent to the spillway. At the down stream end the elevation was 0.85 and down to elevation 2.88 adjacent to the spillway at the centerline of the dam.

During normal operations, the water surface above the dam is elevation 9 and below the dam elevation 5. Beaver activity has dammed water up below the dam to elevation 5.

At the time of the investigation saturated conditions existed in the dam embankment below elevation 7.0. This indicates that a phreatic surface was fully developed between the normal pool elevation of 9 and the backwater below the dam at elevation 5. This would be consistent with what would occur in a dam, which has been in place for more than 100 years.

The dam has a broad base varying in width from 60 to 110 feet with a top width varying from 20 to 50 feet. Side slopes also vary from as flat as 7:1 to as steep as 2:1. The dam has been stable against piping failures through its embankment and foundation for over a century and will continue to be stable in spite of the organics in the foundation soils. The gradient of the phreactic surface is gentle enough to prevent piping of the soil particles from the foundation. During normal operations there is only a 4-foot head difference between the upstream and downstream water surfaces.

Large trees have grown on the downstream embankment of the dam and stabilizes the downstream slope. The upstream embankment slope is grassed.

The dam has been overtopped with floodwaters on three known occasions and the only place that has experienced any erosion problems was in the area of the concrete spillway. The top of the walls of the existing concrete spillway are at elevation 12.14, which is the lowest point along the top of the dam. Floodwaters have eroded the soils adjacent to the concrete spillway and the dam. In the fall of 2006, the wash out around the spillway, undermined the spillway and it tilted. The existing spillway is a concrete slab that slopes from elevation 8.67 down to elevation 5.57 with cutoffs down to elevation 1.5. No cutoff walls exist on the sidewalls of the spillway, which speeded up the erosion process around the spillway during the storm.

The design of the new spillway maintains the same crest elevation of 9.0 to control the normal pool elevation. The spillway is confined within sidewalls, which have cutoffs extending 4 feet into the dam embankment. The bottom of the spillway is a concrete slab with cutoffs extending into the organic peat layer. The slab is flat with a vertical stem wall acting as a control weir. Clay soils are to be placed within the confines of the spillway walls on the upstream side of the weir wall and concrete riprap made from the demolished spillway will be placed on the downstream side of the weir wall.

The mass of the concrete spillway, soil and riprap coupled with the 4 foot wall cutoff and three cutoffs along the bottom of the spillway slab will be much more than sufficient to resist the horizontal force exerted by water behind the dam.

The organic peat, which the spillway will be founded on has a fairly stiff consistency and when excavated will break down into clods similar to that mined for fuel from peat bogs in Ireland. The peat is somewhat cohesive and exhibits moderate shear strength.

Recommendations

Coffer dams will have to be installed to hold back water on both the upstream and downstream side of the spillway construction area. Pumping will be required throughout most of the construction period. Pumping may be terminated once the clay fill material is placed above the waterline behind the coffer dams. For environmental reasons its recommended that either wood or steel sheet pilling be used for the coffer dams especially the one on the downstream end below the spillway. Clay soils could be used on the upstream end, but removing a soil coffer dam on the downstream side would introduce considerable amounts of soil into the stream and swamp area below.
Soils for backfilling should consist of clay or sandy clays with a plasticity index greater than 15 and should be compacted to 95% of the standard proctor dry density within ±3 percentage points of the optimum moisture content. Manual compacting will be required immediately adjacent to the concrete walls of the spillway.

The soil should be placed in 8 inch layers and be free of any stone. The construction and compaction of the soil fill should be monitored and tested by a Geotechnical Engineering Firm by the state of Virginia.

Cranstons Pond

Construction Sequence

1. Obtain permits for construction from James City County. They will require documentation that the Virginia Department of Conservation and Recreation has permitted the construction.
2. Submit sketches to the Engineer for Coffer Dam construction. Install erosion control measures including the Coffer Dams.
3. Break out the existing concrete spillway. Stock pile the concrete for use as riprap. The concrete may be stockpiled on the dam between the waterline on the upstream side of the dam and the top of the dam.
4. Install pumps for dewatering.
5. Excavate down to the bottom of the spillway and cut trenches for the cutoffs. Have the bottom of the excavation approved by the Geotechnical Engineer.
6. Construct the concrete spillway pad foundation.
7. Construct the concrete sidewalls and weir walls.
8. Backfill the areas adjacent to and within the walls of the spillway obtaining the compaction densities specified on the plans.
9. Backfill the area within the walls of the spillway the concrete riprap.
10. Remove the coffer dams. Place boarding in the weir of the pond drain structure to raise the water to the spillway elevation.
11. Grade the top of the dam adding topsoil where necessary to insure the dam is constructed to the specified height shown on the drawings.
12. Seed lime, fertilize, and mulch all denuded areas.
13. Send completion and as-built report to the Department of Conservation and Recreation.
14. After vegetation is sufficiently established remove silt fencing.

AlexCom & Associates, Inc.
11 Debruen Lane
Fredericksburg, Virginia 22405
Tel: (540) 371-3157 Fax: (540) 371-7920
Email: alexcom@vacoxmail.com

Cranstons Pond

Description of properties in inundation zone below the dam.

There are no houses in the inundation zone below the dam. Only one road, state route 632 is located approximately 300 feet down stream from the dam. A large swamp exists below route 632. Extensive beaver activity has backed water up into the four 36" culverts under state route 632. The 100-year flood elevation from the FEMA firm map indicate that water floods route 632 to elevation 8.5. This is 0.5 feet below the control weir elevation on the dam. Based on this, if the dam failed during the 100-year storm event very little more flooding would occur. The flood wave would be rapidly damped out by the already flooded swamp area. During a sunny day failure event the flood elevation wave would approximate the 100-year storm event below the dam. Future development downstream will not be allowed in the 100 year flood plain or within the resource protection area in accordance with the James City Counties zoning ordinances.

ALEXCOM & ASSOCIATES

Confirmation That James City County has been Notified

From: Scott Thomas [SCOTTT@james-city.va.us]
Sent: Thursday, April 12, 2007 6:05 PM
To: alexcom@vacoxmail.com
Cc: Cheryl Waldren; Wayland Bass; William A. Cain
Subject: Cranstons Mill Pond Information
Attachments: CranstonsMillPond.1.jpg; CranstonsMillPond.2.jpg; CountySSCcriteria.121404.pdf; CountyDesignPlanChecklist.pdf

Joe – it was good talking to you again. Tell Roland and the crew I said hello.

Here is some information on Cranstons Mill Pond, if it becomes a project. You stated that the hunting club may have retained you to prepare a plan for submission to DCR Dam Safety.

Plan Submission

Normally all site plans need to come through the Planning Division. They are the clearinghouse for plans. But if it only involves minor repair/improvement to an existing dam and probably only involves erosion and sediment control, I think it can just come to our Division directly. However, if you think it is more than some minor work and involves the roadway and utilities (ie. VDOT, JCSA, etc.) it will need to come through our Planning Division and be assigned a County site plan number. I think there are hydrants along the road. The James City Service Authority (JCSA) is our utility arm. Wayland Bass is the County Engineer. We work closely with him. If it comes through Planning, he and us and VDOT, Planning and the JCSA will get a copy for review. If you submit if directly to us as an E&S control plan only, we would assign it a Division E&S plan number and I would make sure Wayland sees it also.

It just depends how extensive the work plan is but the rule of thumb is normally through Planning, only minor E&S plans get submitted directly to our Division.

General

The assigned County BMP Code number is YC 004, although this facility is deemed a "private facility" not an actual BMP. Based on County GIS, roughly the drainage area to Cranstons Mill Pond is 4300 acres. Colonial Heritage is about 35 percent of the drainage area to Cranstons Mill Pond. The current master stormwater management master plan for Colonial Heritage has 24 structural BMPs, 667.5 acres of dedicated natural open space and an LID component to meet water quality requirements. However, our requirements would not address the 100-year storm event. If you have any questions about what development has or is to occur in the watershed for your assumptions on design discharge for the spillway let us know.

As this is not a BMP for a land development project, it would not have to meet our stormwater management requirements per our County BMP manual.

FIRM maps 15B and 20B show SFHA Zone AE and Zone X in the vicinity of the dam (provide general notes on plan). The State Road is State Route 632 Cranstons Mill Pond Road.

Yarmouth Creek Watershed

The area is also within the Yarmouth Creek Watershed Management Plan area which was adopted by the Board of Supervisors. It is in the nontidal mainstem of Yarmouth Creek. Provide a general note on the plan stating that this project is situated in the nontidal mainstem of Yarmouth Creek. Special Stormwater Criteria, which applies to Yarmouth and Powhatan Creek Watersheds, would apply to the project. However, based on the nature of the project, and it is not a development plan or adding impervious cover or even subject to stormwater management,

we could probably work with you on that one. Perhaps use of EC-3 matting on slopes that you would probably not mat otherwise may be a good choice to show that you are complying with the SSC. I've attached the SSC criteria.

RPA/RPA Buffer

Unfortunately, dam repairs and improvement would fall under some of our Chesapeake Bay ordinance requirements because work activities will be conducted in an area shown as RPA/RPA buffer. Even if it is an existing dam. The nature of the project really has no bearing on this. If it was purely dam maintenance it probably would not be an issue, but as it is may be considered an improvement it needs to comply with our Chapter 23 requirements. I believe you will need to submit a letter with the plan, stating the reason for the project, work activities to occur and a request for waiver/exception from Chesapeake Bay ordinance requirements. For this type of case (existing dam), usually this is an administrative review and approval and does not go to the Chesapeake Bay Board. I've included a map which shows RPA/RPA buffer area. The red is historic (pre-2004), the purple is projected and the green confirmed. Environmental inventory requirements of Section 23-10(2) of the Ches Bay ordinance would also apply; however, you may be under the 5,000 sf disturbance threshold. Probably for this case you would list the components and state either not present or no impact, except for RPA/RPA buffer. This can be done on a table on the cover or plan view sheet.

If you are disturbing slope 25 percent or steeper, even if man-made, you need a waiver from our Division. Submit a letter which states the amount of impact, measures you are providing to limit impact or control erosion. This is an administrative waiver and pretty simple. Section 23-5 of the Ches Bay ordinance governs this.

Here's a link to the Ches Bay ordinance: http://www.jccegov.com/pdf/county_code/chp23.pdf

Land-Disturbing

Our threshold for land-disturbing is 2,500 square feet of disturbance. As discussed, I believe at a minimum we would have to review the plan for Land-Disturbing permit purposes which would include our Division reviewing and approving an erosion and sediment control plan for proposed dam maintenance/improvement activities. I assume that it is more an improvement activity than routine or non-routine maintenance. We would require evidence of a permit from the DCR prior to issuing land-disturbing permit. If there are any wetland impacts, we would need evidence of that also before we issue the LD permit also. Sometimes this happens if there are impacts to perimeter shoreline wetlands.

Part of our land-disturbing permit process is to post a surety for siltation. This would probably be a pretty low amount for this project. Our land-disturbing application and information is on our website at http://www.jccegov.com/government/forms/environmental.html . Some of the forms won't apply. I've also attached our erosion and sediment control plan checklist to guide you in preparing the E&S plan.

Hints: On the E&S plan, clearly show the limit of work, e&s control measures, a sequence of construction and address environmental inventory requirements.

Scott J. Thomas, P.E.
Chief Engineer - Stormwater
James City County
Environmental Division

Visit:
http://www.james-city.va.us/resources/devmgmt/div_devmgmt_environ.html
and
www.protectedwithpride.org

DATA SHEET – ALTERATION PERMIT

Department of Conservation & Recreation
Division of Dam Safety & Floodplain Management
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Name of Dam: **Cranstons Pond Dam**	Inventory Number: **09513**
Location: **Yarmouth Creek**	City/County: **James City**
Owner: **Toano Fishing & Hunting Club** **Attn: L. Clark Jones, Jr.** **c/o Jones Realty & Construction Corp.** Address: **5103 Thrush Lane** City/Town/Zip: **Richmond, VA 23227-3604**	Designed by: Constructed by: Year Constructed (Modified): **unk (1964)**
Type of Dam: **Earthfill**	Purpose: **recreation**
Drainage Area (Sq. Mi.): **7.2**	Type of Watershed: **rural development**
Total Height (Ft.): **13.0**	Elevation: **13.0**
Normal Pool Height (Ft.): **9.0**	Elevation: **9.0**
Maximum Capacity (Acre Ft.): **935**	Maximum Area (Acres): **148**
Normal Capacity (Acre Ft.): **234**	Normal Area (Acres): **50**
Size Classification: **Small**	Hazard Classification: **III**
Required Spillway Design Flood: **97-yr**	Available Spillway Design Flood: **100-yr**
Type of Spillway: **combined concrete weir**	*(Note if Section 130):*

Operation and Maintenance Plans & Schedule by: **Joe F. Alexander, VA P.E. # 004583**

( ) Reinspection or (X) Inventory Report by: **Joe F. Alexander, VA P.E. # 004583**

Emergency Action Plan filed with:
(X) Virginia Dept. of Emergency Management
(X) Local Coordinator of Emergency Services City/County: **Albemarle**

Application Reviewed and Recommended for: **Eight-month Alteration Permit (5/17/07 – 1/31/08) to**
replace the breached combined spillway
improve embankment vegetation
install low-level drain system
per plans and specs sealed 4/30/07 by JFA as amended

By: **David D. Conniff, P.E. VA #033641** Date: **May 14, 2007**

Concurrence with the Recommendation:

By: **William G. Browning, Director** Date: **May 16, 2007**

DATA SHEET – ALTERATION PERMIT

Department of Conservation & Recreation
Division of Dam Safety & Floodplain Management
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Name of Dam: **Cranstons Pond Dam**	Inventory Number: **09513**
Location: **Yarmouth Creek**	City/County: **James City**
Owner: **Toano Fishing & Hunting Club** **Attn: L. Clark Jones, Jr.** **c/o Jones Realty & Construction Corp.** Address: **5103 Thrush Lane** City/Town/Zip: **Richmond, VA 23227-3604**	**Designed by: John McNair and Associates** Constructed by: **Faulconer Constr. Co.** Year Constructed (Modified): **1975**
Type of Dam: **Earthfill**	Purpose: **recreation**
Drainage Area (Sq. Mi.): **7.2**	Type of Watershed: **rural development**
Total Height (Ft.): **13.0**	Elevation: **40.5**
Normal Pool Height (Ft.): **9.0**	Elevation: **36.5**
Maximum Capacity (Acre Ft.): **935**	Maximum Area (Acres): **148.0**
Normal Capacity (Acre Ft.): **234**	Normal Area (Acres): **50.2**
Size Classification: **Small**	Hazard Classification: **III**
Required Spillway Design Flood: **97-yr**	Available Spillway Design Flood: **100-yr**
Type of Spillway: **vegetated earth channel**	*(Note if Section 130):*

Operation and Maintenance Plans & Schedule by: **Joe F. Alexander, VA P.E. # 004583**

( ) Reinspection or (**X**) Inventory Report by: **Joe F. Alexander, VA P.E. # 004583**

Emergency Action Plan filed with:
(**X**) Virginia Dept. of Emergency Management
(**X**) Local Coordinator of Emergency Services City/County: **Albemarle**

Application Reviewed and Recommended for: **Eight-month Alteration Permit (5/17/07 – 1/31/08) to**
replace the breached combined spillway
improve embankment vegetation
install low-level drain system
per plans and specs sealed 4/30/07 by JFA as amended

By: **David D. Conniff, P.E. VA #033641** Date: **May 9, 2007**

Concurrence with the Recommendation:

By: **William G. Browning, Director** Date: **May 16, 2007**

DATA SHEET - OPERATION AND MAINTENANCE CERTIFICATE

Department of Conservation & Recreation
Division of Dam Safety & Floodplain Management
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Name of Dam: **Cranstons Pond Dam**	Inventory Number: **09513**
Location: **Yarmouth Creek**	City/County: **James City**
Owner: **Toano Fishing & Hunting Club** **Attn: L. Clark Jones, Jr.** **c/o Jones Realty & Construction Corp.** Address: **5103 Thrush Lane** City/Town/Zip: **Richmond, VA 23227-3604**	Designed by: Constructed by: Year Constructed (Modified): **unk (1964)**
Type of Dam: **Earthfill**	Purpose: **recreation**
Drainage Area (Sq. Mi.): **7.2**	Type of Watershed: **rural development**
Total Height (Ft.): **13.0**	Elevation: **13.0**
Normal Pool Height (Ft.): **9.0**	Elevation: **9.0**
Maximum Capacity (Acre Ft.): **935**	Maximum Area (Acres): **148**
Normal Capacity (Acre Ft.): **234**	Normal Area (Acres): **50**
Size Classification: **Small**	Hazard Classification: **III**
Required Spillway Design Flood: **97-yr**	Available Spillway Design Flood: **100-yr**
Type of Spillway: **combined concrete weir**	*(Note if Section 130):*

Operation and Maintenance Plans & Schedule by: **Joe F. Alexander, VA P.E. # 004583**

( ) Reinspection or (**X**) Inventory Report by: **Joe F. Alexander, VA P.E. # 004583**

Emergency Action Plan filed with:
(**X**) Virginia Dept. of Emergency Management
(**X**) Local Coordinator of Emergency Services City/County: **Albemarle**

Application Reviewed and Recommended for: **Eight-month Conditional O & M Certificate (5/17/07 – 1/31/08)**

If Conditional Certificate, the conditions are: **replace the breached combined spillway**
improve embankment vegetation
install low-level drain system

By: **David D. Conniff, P.E. VA #033641** Date: **May 14, 2007**

Concurrence with the Recommendation:

By: **William G. Browning, Director** Date: **May 16, 2007**

DATA SHEET - OPERATION AND MAINTENANCE CERTIFICATE

Department of Conservation & Recreation
Division of Dam Safety & Floodplain Management
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Name of Dam: **Cranstons Pond Dam**	Inventory Number: **09513**
Location: **Yarmouth Creek**	City/County: **James City**
Owner: **Toano Fishing & Hunting Club** **Attn: L. Clark Jones, Jr.** **c/o Jones Realty & Construction Corp.** Address: **5103 Thrush Lane** City/Town/Zip: **Richmond, VA 23227-3604**	**Designed by: John McNair and Associates** Constructed by: **Faulconer Constr. Co.** Year Constructed (Modified): **1975**
Type of Dam: **Earthfill**	Purpose: **recreation**
Drainage Area (Sq. Mi.): **7.2**	Type of Watershed: **rural development**
Total Height (Ft.): **13.0**	Elevation: **40.5**
Normal Pool Height (Ft.): **9.0**	Elevation: **36.5**
Maximum Capacity (Acre Ft.): **935**	Maximum Area (Acres): **148.0**
Normal Capacity (Acre Ft.): **234**	Normal Area (Acres): **50.2**
Size Classification: **Small**	Hazard Classification: **III**
Required Spillway Design Flood: **97-yr**	Available Spillway Design Flood: **100-yr**
Type of Spillway: **vegetated earth channel**	*(Note if Section 130):*

Operation and Maintenance Plans & Schedule by: **Joe F. Alexander, VA P.E. # 004583**

( ) Reinspection or (**X**) Inventory Report by: **Joe F. Alexander, VA P.E. # 004583**

Emergency Action Plan filed with:
(**X**) Virginia Dept. of Emergency Management
(**X**) Local Coordinator of Emergency Services City/County: **Albemarle**

Application Reviewed and Recommended for: **Eight-month Conditional O & M Certificate (5/17/07 – 1/31/08)**

If Conditional Certificate, the conditions are: **replace the breached combined spillway**
improve embankment vegetation
install low-level drain system

By: **David D. Conniff, P.E. VA #033641** Date: **May 9, 2007**

Concurrence with the Recommendation:

By: **William G. Browning, Director** Date: **May 16, 2007**

DCR

Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

OPERATION AND MAINTENANCE APPLICATION
CLASS I, II AND III IMPOUNDING STRUCTURES

Reference: Impounding Structures Regulations, 4VAC 50-20-00 et seq., Virginia Soil and Water Conservation Board

1. Name of Impounding Structure: Cranstons Pond

   Inventory Number: 09513 Other Name (if any) _____

2. Hazard Potential Classification from Table 1, Impounding Structure Regulations:

   (Circle One) Class I Class II Class III

3. Name of Owner: Travis Fishing & Hunting Club D. Clark Jones Pres.

   Address: c/o Jones Realty and Construction 5103 Thresh Lane Richmond, Va. 23227-3604

   Telephone: (Business) (804) 321 1700 (Residential) ( ) _____

4. Operating Plan and Schedule.

   Provide a narrative for each item:

   a. Operation of control gates and spillways. None Required

   b. Operation of Reservoir Drain (not to exceed ½ foot drawdown per day on embankment dams).

   Board Weir - Boards are removed to lower water

5. Maintenance Plan and Schedule

   Provide a narrative for each item:

   a. Embankment Dams:

      (1) embankment: Mow twice Annually, Inspect annually for erosion or burrowing animals

      (2) principal spillway: The principal spillway and Emergency spillway are a combined Concrete weir

      (3) emergency spillway: Inspec monthly and after each major rain event. Remove any logs, debris or loose boats.

      (4) low level outlet: Inspec weir control boards and outlet annually. Remove any debris from inlet and outlet

      (5) reservoir area: Inspec Annually, note any deposits of Soil from the drain area. If severe deposits, report it to James City County Soil & Erosion Control department

      (6) downstream channel: Inspect annually and remove any Logs or debris that may be blocking flow from

      (7) other: the spillway. Annually Inspect the Concrete spillway for deteriorating concrete or eroding of soil adjacent to the spillway

   b. Concrete dams (including masonry and others):

      (1) upstream face: _____

(2) downstream face: _____

(3) crest: _____

(4) galleries: _____

(5) tunnels, etc.: _____

(6) abutments: _____

(7) spillways: _____

(8) gates and outlets: _____

(9) other: _____

6. Inspection schedule (attach schedule and checklist):

(1) operator inspection (daily, weekly, etc.)

(2) maintenance inspection (monthly, quarterly, semi-annual, annual)

(3) technical safety reinspection by a professional engineer. (required for certification update: Class I dams every two years, Class II dams every three years. All dams inspected after overtopping).

7. Emergency Action Plan Schedule.

Provide the information that initiates the Emergency Action Plan:

a. rainfall amounts and/or: 4 inches per 6 hr.

b. spillway flows: 2'

c. frequency of observation: Continuous at Stage II

8. For a newly constructed impounding structure, provide certification from a Professional Engineer who has inspected the impounding structure during construction that, to the best of the engineer's judgment, knowledge and belief, the impounding structure and all appurtenances have been constructed in conformance with the plans, specifications and drawings submitted to the Department of Conservation and Recreation.

OPERATION AND MAINTENANCE PERMIT APPLICATION

OPERATION AND MAINTENANCE SCHEDULES
CERTIFICATION BY OWNER

I hereby certify that the operation and maintenance plans and schedules provided herewith will be adhered to during the life of the project except in cases of unanticipated emergency requiring departure therefrom in order to mitigate hazards to life and property, at which time my engineer and the Department of Conservation and Recreation will be notified.

Signed: _____
(Owner)

This _____ day of _____, 20_____.

CERTIFICATE BY OWNER'S ENGINEER

I hereby certify that the information provided in this form has been examined by me and found in my professional judgment to be appropriate to operation and maintenance considerations for this dam.

Signed: _____ Virginia Number: 04583
Professional Engineer

This 30th day of April, 2007.

Remarks: _____

Please fill out and mail this form to:
Department of Conservation and Recreation
Division of Dam Safety
203 Governor Street
Richmond, Virginia 23219-2094

Public Notice

U.S. Army Corps of Engineers, Norfolk District

June 26, 2007

CENAO-REG
NAO-2006-8301-prk

FEDERAL PUBLIC NOTICE

The District Commander has received a joint application for Federal and State permits as described below:

APPLICANT
Toano Fishing & Hunting Club
c/o L. Clark Jones Jr., President

WATERWAY AND LOCATION OF THE PROPOSED WORK: The project is located in Yarmouth Creek, a tributary to the Chickahominy River, in James City County, Virginia.

PROPOSED WORK AND PURPOSE: The applicant proposes to rebuild the combined principal and emergency spillway of Cranston's Pond dam that was washed out due to high water flows in the fall of 2006. The pond water has drained through the breach in the dam and emergent vegetation is re-establishing on the formerly flooded areas.

Cranston's Pond was created by damming off Yarmouth Creek approximately 70 years ago. The purpose of the original dam was to provide water for a grist mill. The mill has long disappeared and the pond was being used by the Toano Fishing and Hunting Club, which has a membership of 10 people. The pond was approximately 30 acres in size. Yarmouth Creek below Cranston's Pond dam is a confirmed anadromous fish use area, with striped bass, blueback herring, and yellow perch being collected. In addition, American eels have been collected downstream and upstream of the former pond.

Issues such as possible anadromous fish runs in the area, the possibility of establishing a wetland, braided stream complex in the area formerly flooded, effects on endangered species in the area and measures to mitigate adverse impacts by providing fish passage are being examined.

In addition to the required Department of the Army permit, the applicant must obtain a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ) assuring that applicable laws and regulations pertaining to water quality are not violated and a permit from the James City County Wetlands Board. Project drawings are attached.

AUTHORITY: Permits are required pursuant to Sections 401 and 404 of the Clean Water Act (Public Law 95-217) and Title 62.1 of the Code of Virginia.

FEDERAL EVALUATION OF APPLICATION: The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. The decision will reflect the national concern for both protection and utilization of important resources. The benefits which reasonably may be expected from the proposal must be balanced against its reasonably foreseeable detriments. All of the proposal's

relevant factors will be considered, including conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use classification, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, consideration of property ownership and, in general, the needs and welfare of the people. The Environmental Protection Agency's "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" will also be applied (Section 404(b)(1) of the Clean Water Act).

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity. Anyone may request a public hearing to consider this permit application by writing to the District Commander within 30 days of the date of this notice, stating specific reasons for holding the public hearing. The District Commander will then decide if a hearing should be held.

Preliminary review indicates that: (l) no environmental impact statement will be required; (2) no species of fish, wildlife, or plant (or their critical habitat) listed as endangered or threatened under the Endangered Species Act of 1973 (PL 93-205) will be affected; and (3) no known properties eligible for inclusion or included in the National Register of Historic Places are in or near the permit area, or would likely be affected by the proposal. Additional information might change any of these findings. For compliance with the Coastal Zone Management Act of 1972, as amended, the applicant must certify that federally licensed or permitted activities affecting Virginia's coastal zone (Tidewater) will be conducted in a manner consistent with the Virginia Coastal Resources Management Program (VCP). For more information or to obtain a list of the enforceable programs of the VCP, contact the Department of Environmental Quality, Office of Environmental Impact Review at (804) 698-4330 or e-mail: elirons@deq.virginia.gov.

COMMENT PERIOD: Comments on this project should be made in writing, addressed to the Norfolk District, Corps of Engineers (ATTN: CENAO-REG), 803 Front Street, Norfolk, Virginia 23510-1096, and should be received by the close of business on July 26, 2007.

If you have any questions about this project or the permit process, please call Peter Kube at (757) 201-7504.

FOR THE DISTRICT COMMANDER:

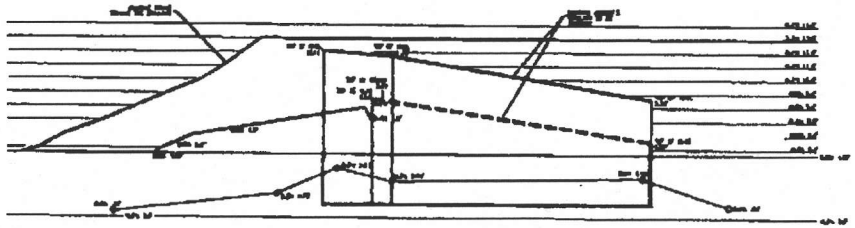
Michael A. Schwinn
Chief, Western Virginia
Regulatory Section

Attachment: Drawings

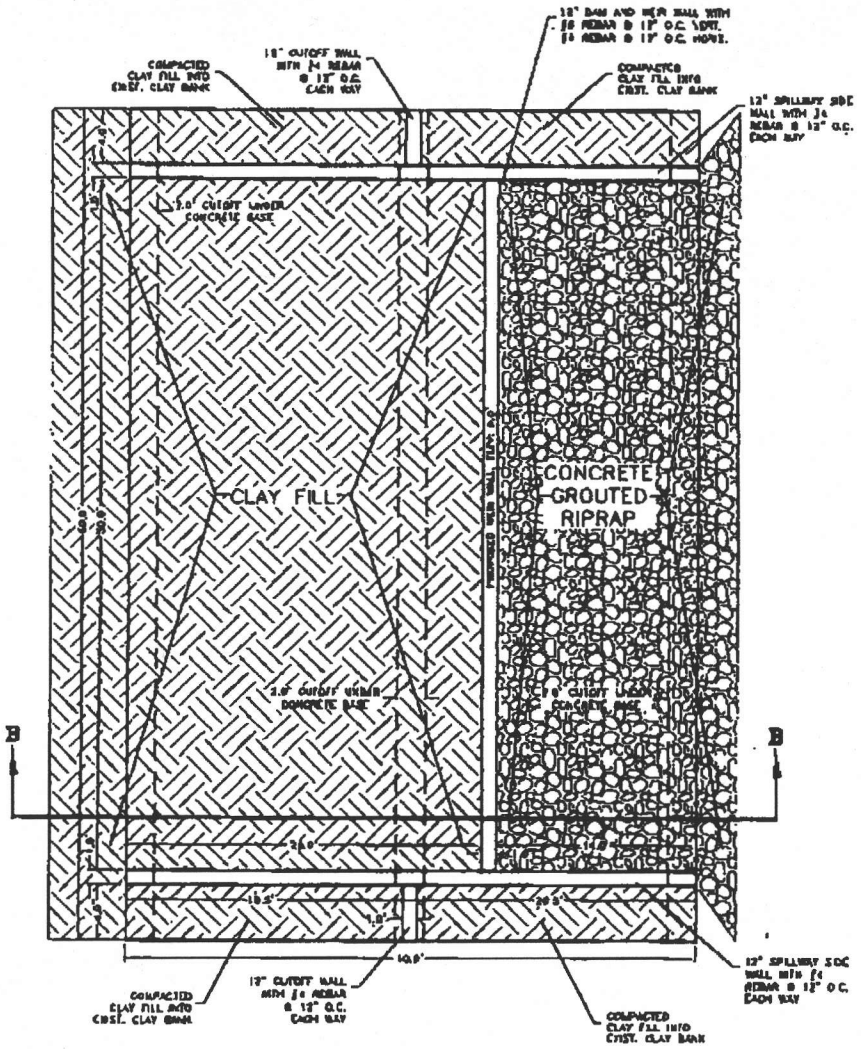
Copyright (C) 1997, Maptech, Inc.

Received
Jun. 8. 2007 2:04PM
Jun 8 2007 03:10pm
No.1940 P. 2

Received
Jun. 8. 2007 2:05PM No. 1940 P. 3
Jun 8 2007 03:10pm



SECTION A–A
EXISTING CONDITIONS



PROPOSED SPILLWAY
TOP VIEW

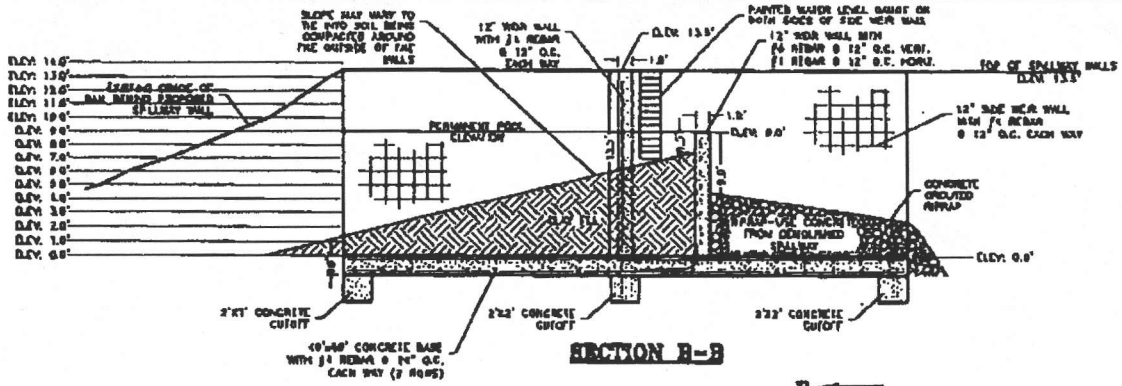
NOTES:
- *CONCRETE 3,000 PSI WITH 7% AIR ENTRAINMENT
- *STEEL = GRADE 60
- *COMPACT BACKFILL TO 95% OF STANDARD PROCTOR DRY DENSITY AT MOISTURE CONTENTS WITHIN ± 3 PERCENTAGE POINTS OF OPTIMUM
- *SEED, LIME, FERTILIZE, AND MULCH ALL DENUDED AREAS

ALECON & ASSOCIATES, INC.

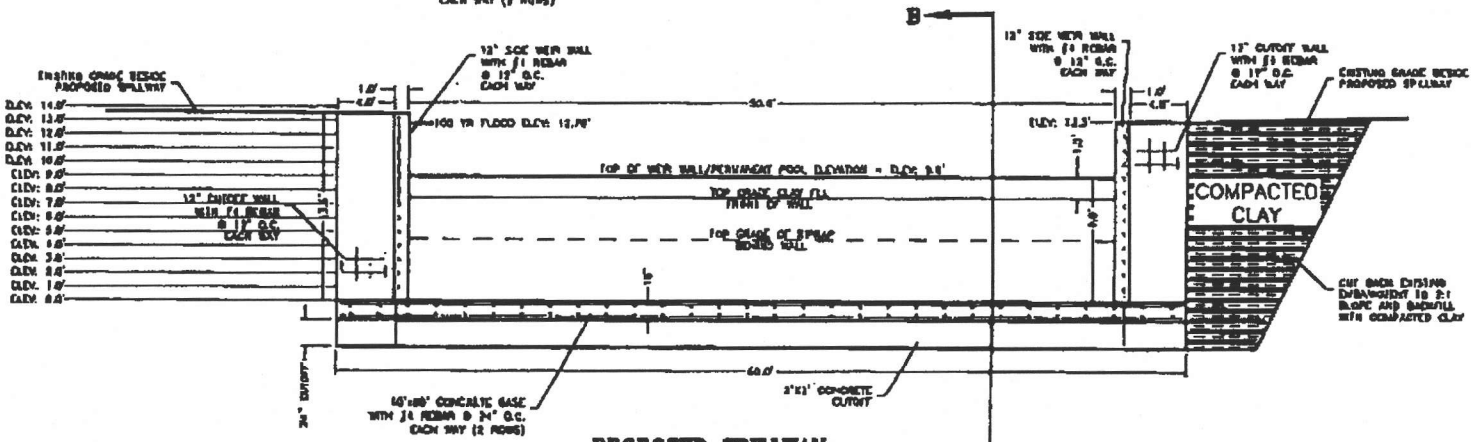
DETAILS
TOANA HUNTING AND FISHING CLUB
CRANSTONS POND DAM
JAMES CITY COUNTY MAGISTERIAL DISTRICT
James City County, VA.

1/4" = 1'

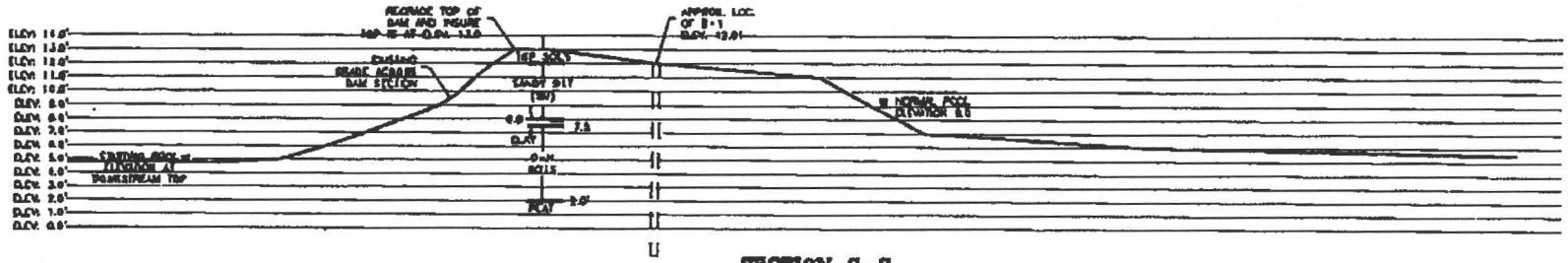
03070196



SECTION B-B



PROPOSED SPILLWAY
FRONT VIEW
(LOOKING DOWN STREAM)



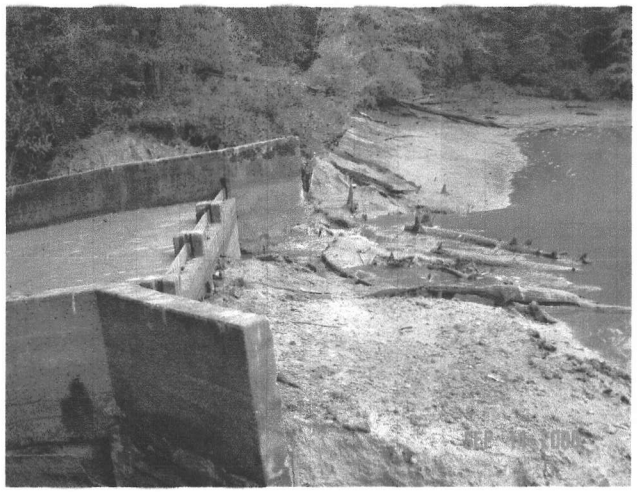
SECTION C-C
EXISTING GRADE

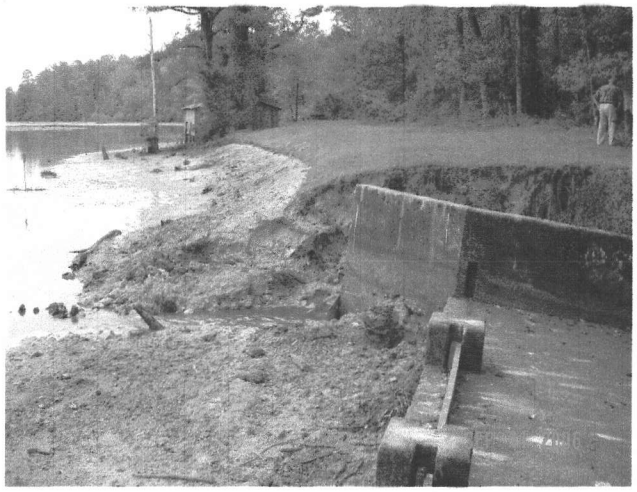
ALLCOM & ASSOCIATES, INC.

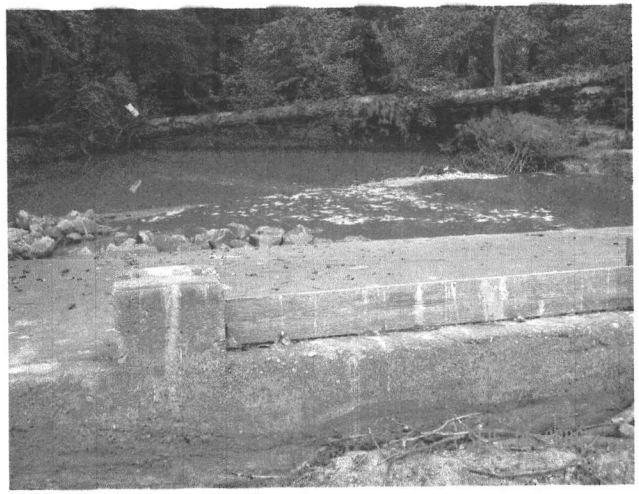
DETAILS
TOANA HUNTING AND FISHING CLUB
CRANSTONS POND DAM
JAMES CITY COUNTY MUNICIPAL DISTRICT
James City County, VA

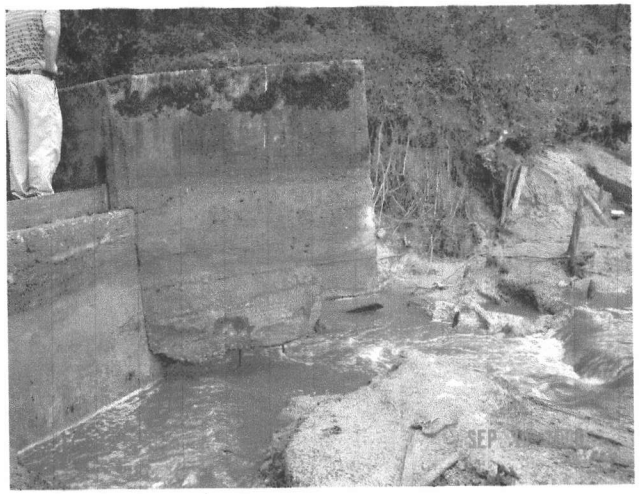
1/4" = 1'

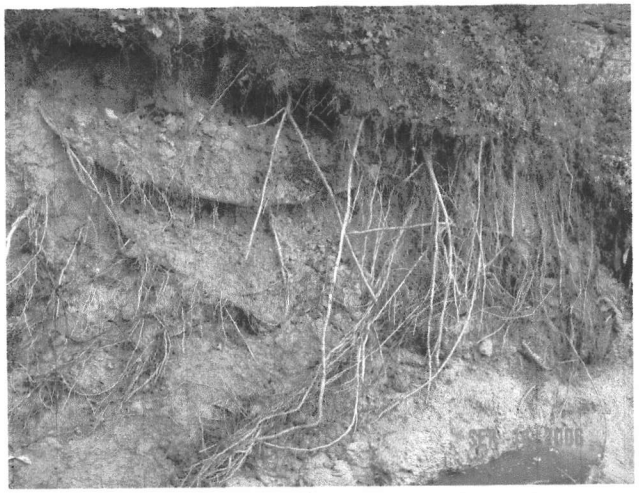
03070196

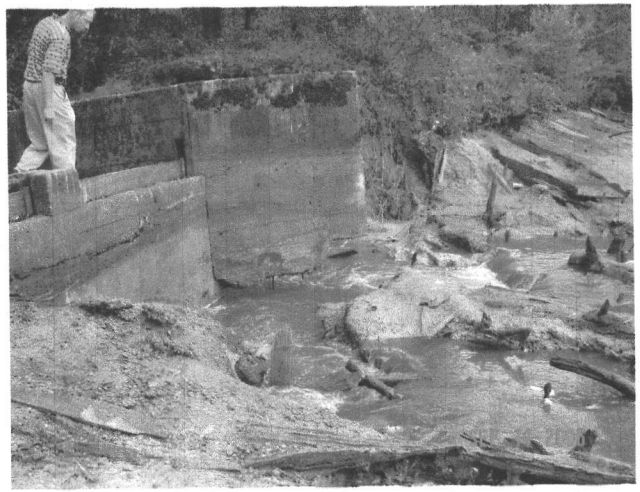












RECORD Drawing Transmittal

DATE: ~~7/06/2011~~ 11/3/11

To: James City County Stormwater Division

From: Environmental Division- Tina Creech

Subject: Cranston's Mill Pond File

Comments: For your files.

RECEIVED
NOV 3 '11
Stormwater Division

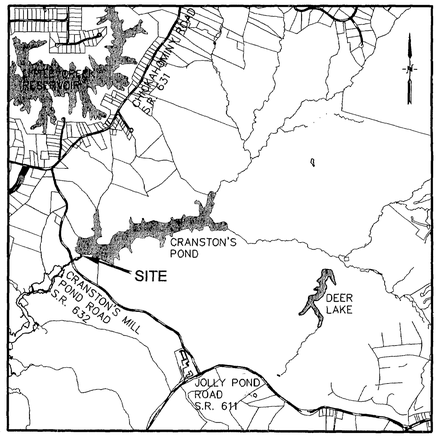
DIE 5/23/13 JMR

Part of YC004

SP-0093-2010

CRANSTON MILL POND
INVENTORY # 09513
JCC-SP-0093-2010

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA



VICINITY MAP
SCALE: 1" = 2000'
0 2000 4000 6000

ENVIRONMENTAL INVENTORY

1. **TIDAL WETLANDS**: NONE ON SITE
2. **TIDAL SHORES**: NONE ON SITE
3. **NONTIDAL WETLANDS (RPA)**: PRESENT (3534 SF IMPACTED)
4. **100' BUFFER (RPA)**: PRESENT – ENTIRE SITE IS IN RPA (3.56 ACRES IMPACTED)
5. **NONTIDAL WETLANDS (RMA)**: NONE ON SITE (ALL WETLANDS WITHIN RPA)
6. **100–YR FLOODPLAIN**: FEMA FLOODPLAIN SHOWN ON PLANS.
7. **SLOPES 25% OR GREATER**: PRESENT (28,031 SF IMPACTED)

SITE DATA

OWNER/CONTRACT PURCHASER
CRANSTON MILL POND, LLC
C/O EARTHSOURCE SOLUTIONS INC.
5735 S. LABURNUM AVENUE
RICHMOND, VA 23231
CONTACT: BRENT FULTS
PHONE: (804) 222–5114
FAX: (804) 222–5220
EMAIL: BFULTS@ESSWETLANDS.COM

CIVIL ENGINEER
KOONTZ–BRYANT, P.C.
1703 NORTH PARHAM ROAD
SUITE 100
RICHMOND, VA 23229
CONTACT: PAUL HINSON, P.E., LEED AP
PHONE: (804) 200–1914
FAX: (804) 740–7338
EMAIL: PHINSON@KOONTZBRYANT.COM

SITE ADDRESS
6616 CRANSTON'S MILL POND ROAD
TOANO, VA 23168–9067

ZONING
A1

MAP REFERENCE
PARCEL ID: 2230100044

FIRM FLOOD MAP REFERENCE
FLOOD ZONE X
MAP NUMBERS: 51095C0105C
51095C0110C

PORTIONS OF THE PROPERTY SHOWN ON THIS SITE PLAN ARE AT AN ELEVATION BELOW THE FEMA 100–YEAR FLOODPLAIN ELEVATION SHOWN ON THE FIRM MAP. THE LIMITS OF THE FEMA FLOODPLAIN ARE SHOWN ON THE SITE PLANS.

UTILITIES
WATER: NONE
SEWER: NONE

AREA
153.48 AC. (WHOLE EXISTING PARCEL)
59.33 AC. (PROPOSED PARCEL)
3.56 AC. (DISTURBED AREA)

WATERSHED
THE ENTIRE PROJECT LIES WITHIN THE YARMOUTH CREEK WATERSHED.
VIRGINIA 6TH ORDER NWBD HUC: JL28

TOPOGRAPHICAL INFORMATION
SURVEY PERFORMED BY TIMMONS GROUP IN FALL 2009.
SURVEY MERGED WITH JAMES CITY COUNTY GIS.

HORIZONTAL AND VERTICAL DATUM
NAD 83 & NGVD 29

IMPOUNDING STRUCTURE DATA
TOP OF DAM: 15.00'
HEIGHT: 11'
CREST WIDTH: 10'
NORMAL POOL ELEVATION: 8.15'

COUNTY OF JAMES CITY
FINAL SITE PLAN
APPROVED
DATE
Planning JBJ/C 10/22/10
Health YFJ/C 11/11/10
Public Works CHJ 11/11/10
Comm. Dev. STJ/C 12/30/10
Zoning Admin MAB 1/21/11
JCSA DW/JC 12/09/10
County Eng. DC/JC 12/16/10
PRA
Other JC/JC 11/9/10
Code Compliance

RECEIVED NOV 2010 Planning Department

Environmental Division MAR 18 2011

RECEIVED

NOTES

1. THE STORMWATER MANAGEMENT/BMP FACILITY AND ASSOCIATED STORMWATER CONVEYANCE SYSTEMS AS PROPOSED FOR THIS PROJECT WILL REQUIRE SUBMISSION, REVIEW, AND APPROVAL OF A RECORD DRAWING (AS–BUILT) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND/SURETY. CERTIFICATION IS REQUIRED BY A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE STRUCTURE BEFORE, DURING, AND AFTER ITS CONSTRUCTION IN ACCORDANCE WITH CURRENT COUNTY GUIDELINES.
2. OUTDOOR SIGNS ON THE PROPERTIES WITHIN THIS DISTRICT SHALL COMPLY WITH THE REGULATIONS FOR EXTERIOR SIGNS IN ARTICLE II, DIVISION 3 OF THE ZONING ORDINANCE.
3. ON NOVEMBER 9TH, 2010 THE JAMES CITY COUNTY BOARD OF SUPERVISORS APPROVED THE SPECIAL USE PERMIT: SUP–0023–2010.
4. PORTIONS OF THE PROPERTY SHOWN ON THIS SITE PLAN ARE AT AN ELEVATION BELOW THE FEMA 100–YR FLOODPLAIN ELEVATION. THE LIMITS OF THE FEMA FLOODPLAIN ARE SHOWN ON THE SITE PLAN.

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C2.3	EROSION CONTROL NOTES AND DETAILS
C2.4	EROSION CONTROL NOTES AND DETAILS
C3.0	LAYOUT AND GRADING PLAN
C4.0	CROSS SECTIONS
C4.1	CROSS SECTIONS
C5.0	NOTES AND DETAILS
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S–102	NEW SPILLWAY STRUCTURE
S–103	NEW SPILLWAY STRUCTURE

COMMONWEALTH OF VIRGINIA PAUL F. HINSON Lic. No. 022860 PROFESSIONAL ENGINEER 11-24-10

REVISIONS:
10/14/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND
POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA
TITLE SHEET

DATE: JUNE 14, 2010
JN: 09114-001

C1.0

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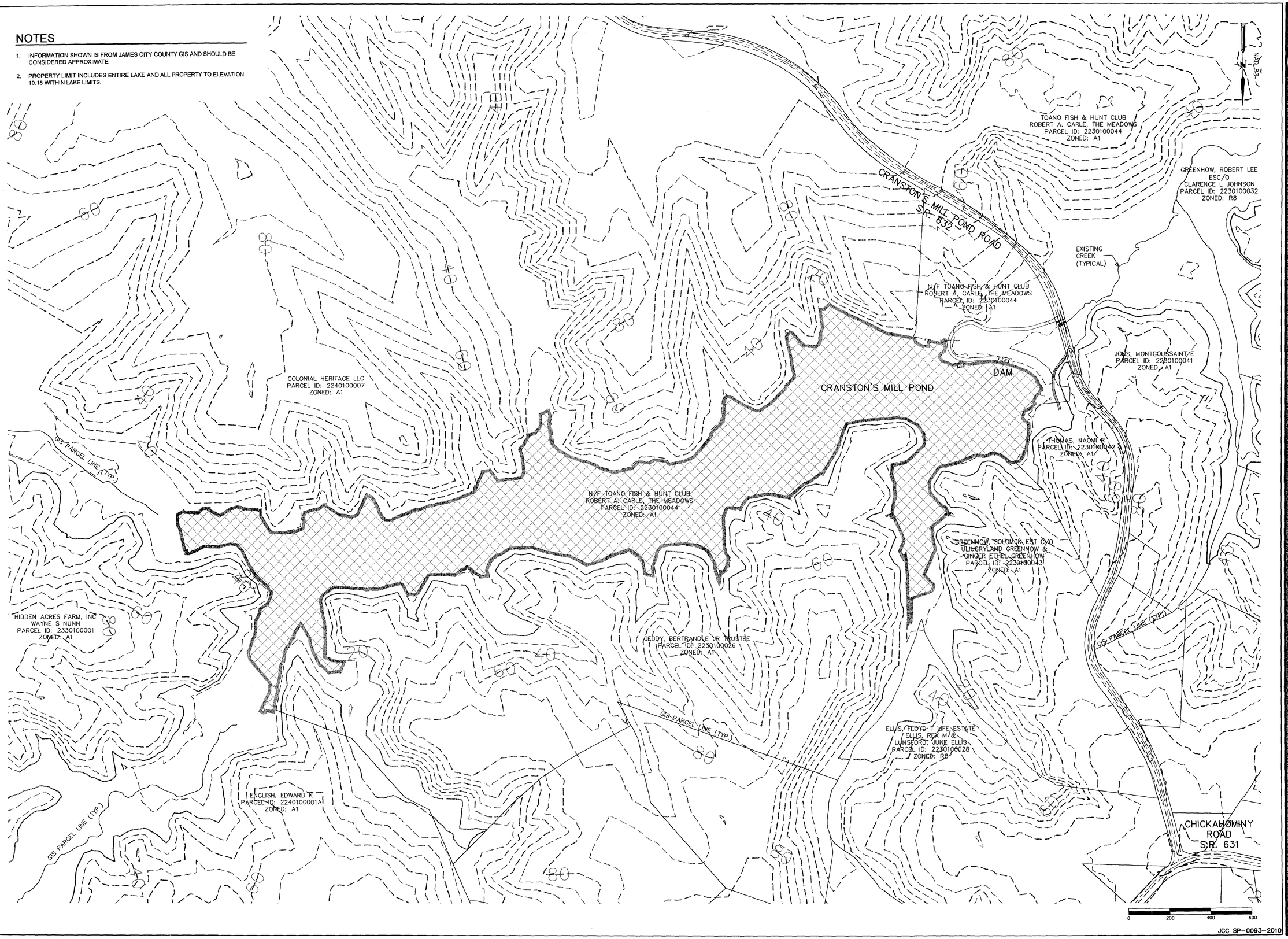
NOTES

1. INFORMATION SHOWN IS FROM JAMES CITY COUNTY GIS AND SHOULD BE CONSIDERED APPROXIMATE
2. PROPERTY LIMIT INCLUDES ENTIRE LAKE AND ALL PROPERTY TO ELEVATION 10.15 WITHIN LAKE LIMITS.



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COMMONWEALTH OF VIRGINIA
PAUL R. HINSON
Lic. No. 022880
11-24-10
PROFESSIONAL ENGINEER

REVISIONS:
REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND

POWHATAN DISTRICT

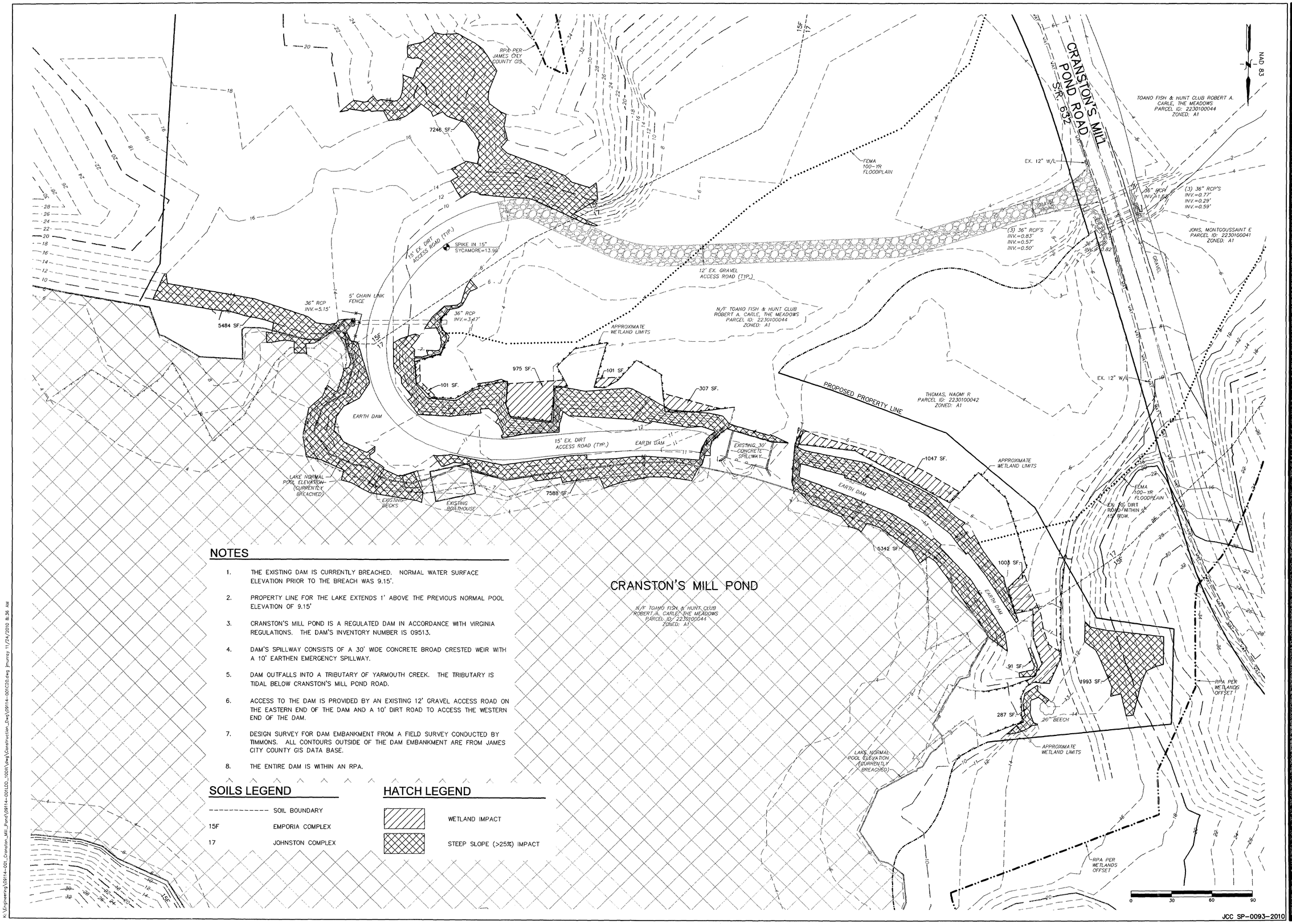
JAMES CITY COUNTY, VIRGINIA

OVERALL LAYOUT

DATE: JUNE 14, 2010

JN: 09114-001

C1.1



NOTES

1. THE EXISTING DAM IS CURRENTLY BREACHED. NORMAL WATER SURFACE ELEVATION PRIOR TO THE BREACH WAS 9.15'.
2. PROPERTY LINE FOR THE LAKE EXTENDS 1' ABOVE THE PREVIOUS NORMAL POOL ELEVATION OF 9.15'
3. CRANSTON'S MILL POND IS A REGULATED DAM IN ACCORDANCE WITH VIRGINIA REGULATIONS. THE DAM'S INVENTORY NUMBER IS 09513.
4. DAM'S SPILLWAY CONSISTS OF A 30' WIDE CONCRETE BROAD CRESTED WEIR WITH A 10' EARTHEN EMERGENCY SPILLWAY.
5. DAM OUTFALLS INTO A TRIBUTARY OF YARMOUTH CREEK. THE TRIBUTARY IS TIDAL BELOW CRANSTON'S MILL POND ROAD.
6. ACCESS TO THE DAM IS PROVIDED BY AN EXISTING 12' GRAVEL ACCESS ROAD ON THE EASTERN END OF THE DAM AND A 10' DIRT ROAD TO ACCESS THE WESTERN END OF THE DAM.
7. DESIGN SURVEY FOR DAM EMBANKMENT FROM A FIELD SURVEY CONDUCTED BY TIMMONS. ALL CONTOURS OUTSIDE OF THE DAM EMBANKMENT ARE FROM JAMES CITY COUNTY GIS DATA BASE.
8. THE ENTIRE DAM IS WITHIN AN RPA.

SOILS LEGEND

----------	SOIL BOUNDARY
15F	EMPORIA COMPLEX
17	JOHNSTON COMPLEX

HATCH LEGEND

	WETLAND IMPACT
	STEEP SLOPE (>25%) IMPACT

JCC SP-0093-2010

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COMMONWEALTH OF VIRGINIA
PAUL R. FISHER
Lic. No. 022808
11-24-10
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/22/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

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CRANSTON MILL POND

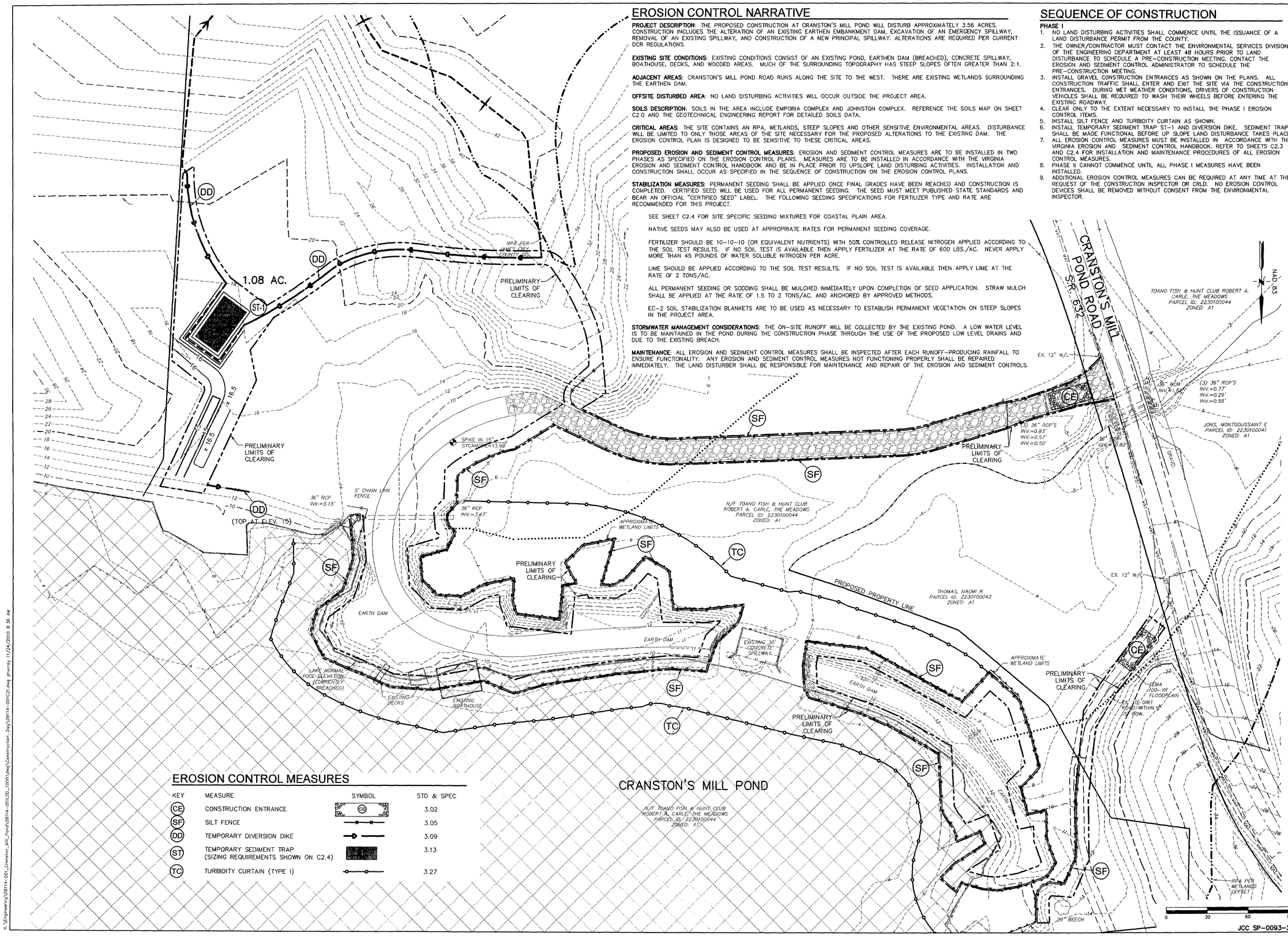
POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

EXISTING CONDITIONS PLAN

DATE: JUNE 14, 2010

JN: 09114-001

C2.0



EROSION CONTROL NARRATIVE

PROJECT DESCRIPTION: THE PROPOSED CONSTRUCTION AT CRANSTON'S MILL POND WILL DISTURB APPROXIMATELY 3.56 ACRES. CONSTRUCTION INCLUDES THE ALTERATION OF AN EXISTING EARTHEN EMBANKMENT DAM, EXCAVATION OF AN EMERGENCY SPILLWAY, REMOVAL OF AN EXISTING SPILLWAY, AND CONSTRUCTION OF A NEW PRINCIPAL SPILLWAY. ALTERATIONS ARE REQUIRED PER CURRENT DCR REGULATIONS.

EXISTING SITE CONDITIONS: EXISTING CONDITIONS CONSIST OF AN EXISTING POND, EARTHEN DAM (BREACHED), CONCRETE SPILLWAY, BOATHOUSE, DECKS, AND WOODED AREAS. MUCH OF THE SURROUNDING TOPOGRAPHY HAS STEEP SLOPES OFTEN GREATER THAN 2:1.

ADJACENT AREAS: CRANSTON'S MILL POND ROAD RUNS ALONG THE SITE TO THE WEST. THERE ARE EXISTING WETLANDS SURROUNDING THE EARTHEN DAM.

OFFSITE DISTURBED AREA: NO LAND DISTURBING ACTIVITIES WILL OCCUR OUTSIDE THE PROJECT AREA.

SOILS DESCRIPTION: SOILS IN THE AREA INCLUDE EMPORIA COMPLEX AND JOHNSTON COMPLEX. REFERENCE THE SOILS MAP ON SHEET C2.0 AND THE GEOTECHNICAL ENGINEERING REPORT FOR DETAILED SOILS DATA.

CRITICAL AREAS: THE SITE CONTAINS AN RPA, WETLANDS, STEEP SLOPES AND OTHER SENSITIVE ENVIRONMENTAL AREAS. DISTURBANCE WILL BE LIMITED TO ONLY THOSE AREAS OF THE SITE NECESSARY FOR THE PROPOSED ALTERATIONS TO THE EXISTING DAM. THE EROSION CONTROL PLAN IS DESIGNED TO BE SENSITIVE TO THESE CRITICAL AREAS.

PROPOSED EROSION AND SEDIMENT CONTROL MEASURES: EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED IN TWO PHASES AS SPECIFIED ON THE EROSION CONTROL PLANS. MEASURES ARE TO BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND BE IN PLACE PRIOR TO UPSLOPE LAND DISTURBING ACTIVITIES. INSTALLATION AND CONSTRUCTION SHALL OCCUR AS SPECIFIED IN THE SEQUENCE OF CONSTRUCTION ON THE EROSION CONTROL PLANS.

STABILIZATION MEASURES: PERMANENT SEEDING SHALL BE APPLIED ONCE FINAL GRADES HAVE BEEN REACHED AND CONSTRUCTION IS COMPLETED. CERTIFIED SEED WILL BE USED FOR ALL PERMANENT SEEDING. THE SEED MUST MEET PUBLISHED STATE STANDARDS AND BEAR AN OFFICIAL "CERTIFIED SEED" LABEL. THE FOLLOWING SEEDING SPECIFICATIONS FOR FERTILIZER TYPE AND RATE ARE RECOMMENDED FOR THIS PROJECT.

SEE SHEET C2.4 FOR SITE SPECIFIC SEEDING MIXTURES FOR COASTAL PLAIN AREA.

NATIVE SEEDS MAY ALSO BE USED AT APPROPRIATE RATES FOR PERMANENT SEEDING COVERAGE.

FERTILIZER SHOULD BE 10-10-10 (OR EQUIVALENT NUTRIENTS) WITH 50% CONTROLLED RELEASE NITROGEN APPLIED ACCORDING TO THE SOIL TEST RESULTS. IF NO SOIL TEST IS AVAILABLE THEN APPLY FERTILIZER AT THE RATE OF 600 LBS./AC. NEVER APPLY MORE THAN 45 POUNDS OF WATER SOLUBLE NITROGEN PER ACRE.

LIME SHOULD BE APPLIED ACCORDING TO THE SOIL TEST RESULTS. IF NO SOIL TEST IS AVAILABLE THEN APPLY LIME AT THE RATE OF 2 TONS/AC.

ALL PERMANENT SEEDING OR SODDING SHALL BE MULCHED IMMEDIATELY UPON COMPLETION OF SEED APPLICATION. STRAW MULCH SHALL BE APPLIED AT THE RATE OF 1.5 TO 2 TONS/AC. AND ANCHORED BY APPROVED METHODS.

EC-2 SOIL STABILIZATION BLANKETS ARE TO BE USED AS NECESSARY TO ESTABLISH PERMANENT VEGETATION ON STEEP SLOPES IN THE PROJECT AREA.

STORMWATER MANAGEMENT CONSIDERATIONS: THE ON-SITE RUNOFF WILL BE COLLECTED BY THE EXISTING POND. A LOW WATER LEVEL IS TO BE MAINTAINED IN THE POND DURING THE CONSTRUCTION PHASE THROUGH THE USE OF THE PROPOSED LOW LEVEL DRAINS AND DUE TO THE EXISTING BREACH.

MAINTENANCE: ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AFTER EACH RUNOFF-PRODUCING RAINFALL TO ENSURE FUNCTIONALITY. ANY EROSION AND SEDIMENT CONTROL MEASURES NOT FUNCTIONING PROPERLY SHALL BE REPAIRED IMMEDIATELY. THE LAND DISTURBER SHALL BE RESPONSIBLE FOR MAINTENANCE AND REPAIR OF THE EROSION AND SEDIMENT CONTROLS.

SEQUENCE OF CONSTRUCTION

PHASE I

1. NO LAND DISTURBING ACTIVITIES SHALL COMMENCE UNTIL THE ISSUANCE OF A LAND DISTURBANCE PERMIT FROM THE COUNTY.
2. THE OWNER/CONTRACTOR MUST CONTACT THE ENVIRONMENTAL SERVICES DIVISION OF THE ENGINEERING DEPARTMENT AT LEAST 48 HOURS PRIOR TO LAND DISTURBANCE TO SCHEDULE A PRE-CONSTRUCTION MEETING. CONTACT THE EROSION AND SEDIMENT CONTROL ADMINISTRATOR TO SCHEDULE THE PRE-CONSTRUCTION MEETING.
3. INSTALL GRAVEL CONSTRUCTION ENTRANCES AS SHOWN ON THE PLANS. ALL CONSTRUCTION TRAFFIC SHALL ENTER AND EXIT THE SITE VIA THE CONSTRUCTION ENTRANCES. DURING WET WEATHER CONDITIONS, DRIVERS OF CONSTRUCTION VEHICLES SHALL BE REQUIRED TO WASH THEIR WHEELS BEFORE ENTERING THE EXISTING ROADWAY.
4. CLEAR ONLY TO THE EXTENT NECESSARY TO INSTALL THE PHASE I EROSION CONTROL ITEMS.
5. INSTALL SILT FENCE AND TURBIDITY CURTAIN AS SHOWN.
6. INSTALL TEMPORARY SEDIMENT TRAP ST-1 AND DIVERSION DIKE. SEDIMENT TRAP SHALL BE MADE FUNCTIONAL BEFORE UP SLOPE LAND DISTURBANCE TAKES PLACE.
7. ALL EROSION CONTROL MEASURES MUST BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK. REFER TO SHEETS C2.3 AND C2.4 FOR INSTALLATION AND MAINTENANCE PROCEDURES OF ALL EROSION CONTROL MEASURES.
8. PHASE II CANNOT COMMENCE UNTIL ALL PHASE I MEASURES HAVE BEEN INSTALLED.
9. ADDITIONAL EROSION CONTROL MEASURES CAN BE REQUIRED AT ANY TIME AT THE REQUEST OF THE CONSTRUCTION INSPECTOR OR CRLD. NO EROSION CONTROL DEVICES SHALL BE REMOVED WITHOUT CONSENT FROM THE ENVIRONMENTAL INSPECTOR.

EROSION CONTROL MEASURES

KEY	MEASURE	SYMBOL	STD & SPEC
CE	CONSTRUCTION ENTRANCE	CE	3.02
SF	SILT FENCE		3.05
DD	TEMPORARY DIVERSION DIKE		3.09
ST	TEMPORARY SEDIMENT TRAP (SIZING REQUIREMENTS SHOWN ON C2.4)		3.13
TC	TURBIDITY CURTAIN (TYPE I)		3.27

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 022860
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7-24-10

REVISIONS:
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10/04/10 REVISED SPILLWAY
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CRANSTON MILL POND

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

EROSION CONTROL PHASE I

DATE: JUNE 14, 2010

JN: 09114-001

C2.1

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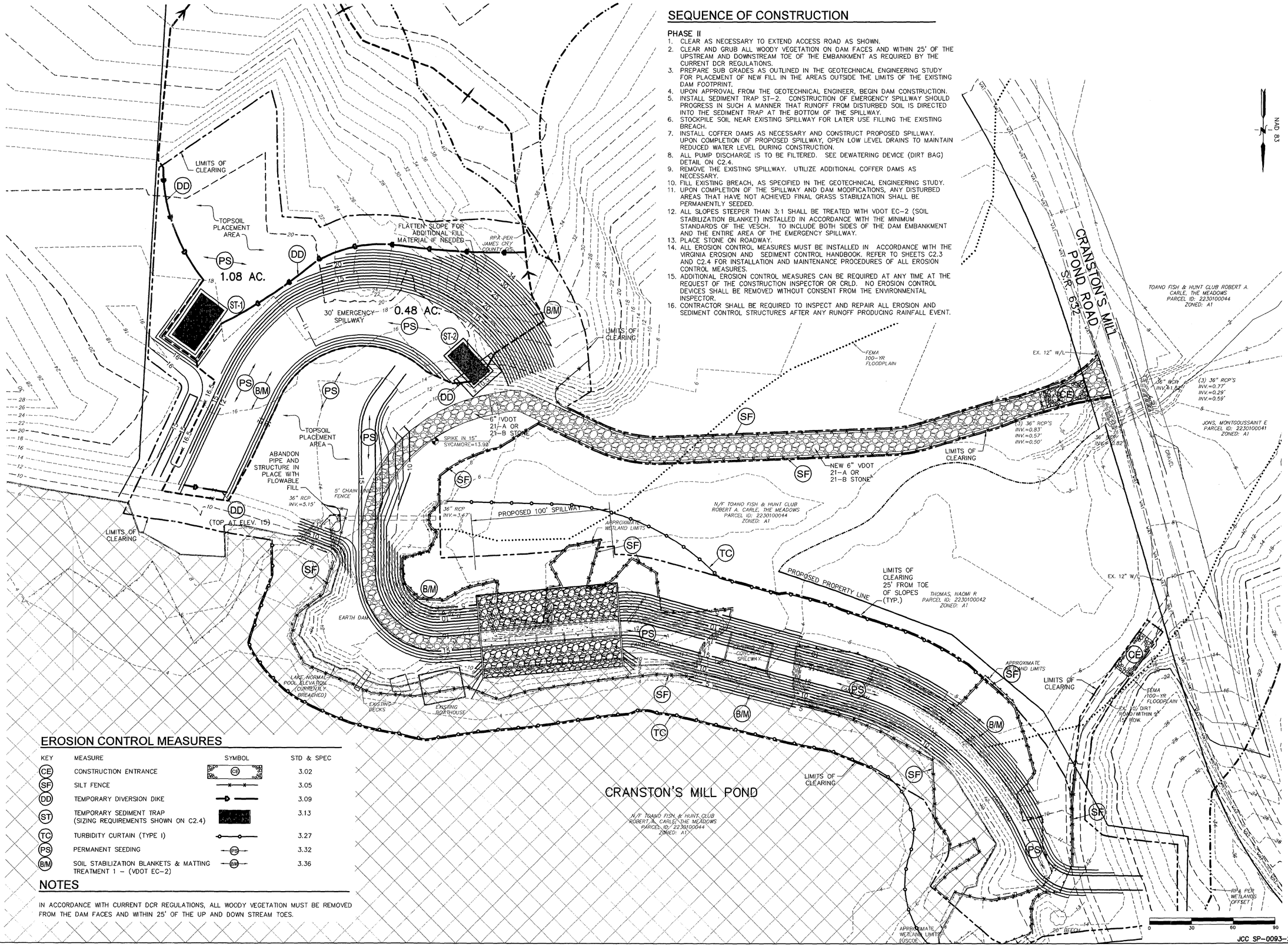

JCC SP-0093-2010

SEQUENCE OF CONSTRUCTION

PHASE II

1. CLEAR AS NECESSARY TO EXTEND ACCESS ROAD AS SHOWN.
2. CLEAR AND GRUB ALL WOODY VEGETATION ON DAM FACES AND WITHIN 25' OF THE UPSTREAM AND DOWNSTREAM TOE OF THE EMBANKMENT AS REQUIRED BY THE CURRENT DCR REGULATIONS.
3. PREPARE SUB GRADES AS OUTLINED IN THE GEOTECHNICAL ENGINEERING STUDY FOR PLACEMENT OF NEW FILL IN THE AREAS OUTSIDE THE LIMITS OF THE EXISTING DAM FOOTPRINT.
4. UPON APPROVAL FROM THE GEOTECHNICAL ENGINEER, BEGIN DAM CONSTRUCTION.
5. INSTALL SEDIMENT TRAP ST-2. CONSTRUCTION OF EMERGENCY SPILLWAY SHOULD PROGRESS IN SUCH A MANNER THAT RUNOFF FROM DISTURBED SOIL IS DIRECTED INTO THE SEDIMENT TRAP AT THE BOTTOM OF THE SPILLWAY.
6. STOCKPILE SOIL NEAR EXISTING SPILLWAY FOR LATER USE FILLING THE EXISTING BREACH.
7. INSTALL COFFER DAMS AS NECESSARY AND CONSTRUCT PROPOSED SPILLWAY. UPON COMPLETION OF PROPOSED SPILLWAY, OPEN LOW LEVEL DRAINS TO MAINTAIN REDUCED WATER LEVEL DURING CONSTRUCTION.
8. ALL PUMP DISCHARGE IS TO BE FILTERED. SEE DEWATERING DEVICE (DIRT BAG) DETAIL ON C2.4.
9. REMOVE THE EXISTING SPILLWAY. UTILIZE ADDITIONAL COFFER DAMS AS NECESSARY.
10. FILL EXISTING BREACH, AS SPECIFIED IN THE GEOTECHNICAL ENGINEERING STUDY.
11. UPON COMPLETION OF THE SPILLWAY AND DAM MODIFICATIONS, ANY DISTURBED AREAS THAT HAVE NOT ACHIEVED FINAL GRASS STABILIZATION SHALL BE PERMANENTLY SEEDED.
12. ALL SLOPES STEEPER THAN 3:1 SHALL BE TREATED WITH VDOT EC-2 (SOIL STABILIZATION BLANKET) INSTALLED IN ACCORDANCE WITH THE MINIMUM STANDARDS OF THE VESCH. TO INCLUDE BOTH SIDES OF THE DAM EMBANKMENT AND THE ENTIRE AREA OF THE EMERGENCY SPILLWAY.
13. PLACE STONE ON ROADWAY.
14. ALL EROSION CONTROL MEASURES MUST BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK. REFER TO SHEETS C2.3 AND C2.4 FOR INSTALLATION AND MAINTENANCE PROCEDURES OF ALL EROSION CONTROL MEASURES.
15. ADDITIONAL EROSION CONTROL MEASURES CAN BE REQUIRED AT ANY TIME AT THE REQUEST OF THE CONSTRUCTION INSPECTOR OR CRLD. NO EROSION CONTROL DEVICES SHALL BE REMOVED WITHOUT CONSENT FROM THE ENVIRONMENTAL INSPECTOR.
16. CONTRACTOR SHALL BE REQUIRED TO INSPECT AND REPAIR ALL EROSION AND SEDIMENT CONTROL STRUCTURES AFTER ANY RUNOFF PRODUCING RAINFALL EVENT.

EROSION CONTROL MEASURES

KEY	MEASURE	SYMBOL	STD & SPEC
CE	CONSTRUCTION ENTRANCE	CE	3.02
SF	SILT FENCE		3.05
DD	TEMPORARY DIVERSION DIKE		3.09
ST	TEMPORARY SEDIMENT TRAP (SIZING REQUIREMENTS SHOWN ON C2.4)		3.13
TC	TURBIDITY CURTAIN (TYPE I)		3.27
PS	PERMANENT SEEDING	PS	3.32
B/M	SOIL STABILIZATION BLANKETS & MATTING TREATMENT 1 – (VDOT EC-2)	B/M	3.36

NOTES

IN ACCORDANCE WITH CURRENT DCR REGULATIONS, ALL WOODY VEGETATION MUST BE REMOVED FROM THE DAM FACES AND WITHIN 25' OF THE UP AND DOWN STREAM TOES.

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COMMONWEALTH OF VIRGINIA
PAUL F. HANSON
Lic. No. 023860
11-24-10
PROFESSIONAL ENGINEER

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CRANSTON MILL POND

POWHATAN DISTRICT

JAMES CITY COUNTY, VIRGINIA

EROSION CONTROL PHASE II

DATE: JUNE 14, 2010

JN: 09114-001

C2.2

EROSION CONTROL MINIMUM STANDARDS

1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

2. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.

3. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT, IN THE OPINION OF THE LOCAL PROGRAM ADMINISTRATOR OR HIS DESIGNATED AGENT, IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.

4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

5. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.

6. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.
   A. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.
   B. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25-YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.

7. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.

8. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.

9. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.

10. ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.

11. BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.

12. WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.

13. WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY STREAM CROSSING CONSTRUCTED OF NON-ERODIBLE MATERIAL SHALL BE PROVIDED.

14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSE SHALL BE MET.

15. THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.

16. UNDERGROUND UTILITY SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:
   A. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
   B. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
   C. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
   D. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.
   E. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THESE REGULATIONS.
   F. APPLICABLE SAFETY REGULATION SHALL BE COMPLIED WITH.

17. WHERE CONSTRUCTION VEHICLES ACCESS ROUTES INTERSECT PAVED PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL SUBDIVISION LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.

18. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM ADMINISTRATOR. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

19. PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24-HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA:
   A. CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN-MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.
   B. ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:
   (1) THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS ONE HUNDRED TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR
   (2) (A) NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A TWO-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.
   (B) ALL PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A TEN-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO-YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND
   (C) PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A TEN-YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.
   C. IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:
   (1) IMPROVE THE CHANNELS TO A CONDITION WHERE A TEN-YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO-YEAR STORM WILL NOT CAUSE EROSION TO THE CHANNEL BED OR BANKS; OR
   (2) IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE TEN-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES; OR
   (3) DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TWO-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TEN-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN-MADE CHANNEL; OR
   (4) PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE PLAN-APPROVING AUTHORITY TO PREVENT DOWNSTREAM EROSION.
   D. THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.
   E. ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT OF THE SUBJECT PROJECT.
   F. IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE LOCALITY OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.
   G. OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATORS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.
   H. ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.
   I. INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE OR PIPE SYSTEM, OR TO A DETENTION FACILITY.
   J. IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. INSTEAD, THE DEVELOPMENT, AS A WHOLE, SHALL BE CONSIDERED TO BE A SINGLE DEVELOPMENT PROJECT. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.
   K. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.

JAMES CITY COUNTY STANDARD EROSION AND SEDIMENT CONTROL NOTES

1. ALL THE PROVISIONS OF VIRGINIA EROSION AND SEDIMENT CONTROL LAW AND REGULATIONS, MINIMUM STANDARDS, HANDBOOKS, AND TECHNICAL BULLETINS AS PUBLISHED BY THE VIRGINIA SOIL & WATER CONSERVATION BOARD AND/OR THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION, DIVISION OF SOIL & WATER CONSERVATION SHALL APPLY TO THE PROJECT.

2. MINIMUM STANDARDS # 1 THROUGH # 19 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS (4VAC50-30-40) SHALL APPLY TO THE PROJECT.

3. THE OWNER OR APPLICANT SHALL BE RESPONSIBLE TO REGISTER FOR COVERAGE UNDER THE GENERAL PERMIT FOR DISCHARGE OF STORMWATER FROM CONSTRUCTION ACTIVITIES, IN ACCORDANCE WITH CURRENT REQUIREMENTS OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) AND THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION.

4. THE OWNER OR APPLICANT SHALL PROVIDE THE NAME OF AN INDIVIDUAL HOLDING A VALID RESPONSIBLE LAND DISTURBER (RLD) CERTIFICATE OF COMPETENCE WHO WILL BE RESPONSIBLE FOR THE LAND-DISTURBING ACTIVITY PRIOR TO ENGAGING IN THE LAND-DISTURBING ACTIVITY. THIS WILL BE NECESSARY PRIOR TO ISSUANCE OF A LAND-DISTURBING PERMIT FOR THE PROJECT. THE RLD IS REQUIRED TO ATTEND THE PRECONSTRUCTION CONFERENCE FOR THE PROJECT.

5. THE CONTRACTOR IS RESPONSIBLE TO CONTACT MISS UTILITY (DIAL 811 IN VA OR 1-800-552-7001) PRIOR TO ANY UTILITY OR SITE WORK EXCAVATIONS.

6. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PLANNED, DESIGNED, IMPLEMENTED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). THE CONTRACTOR SHALL MAINTAIN, INSPECT AND REPAIR ALL EROSION AND SEDIMENT CONTROL MEASURES AS NEEDED THROUGHOUT THE LIFE OF THE PROJECT TO ENSURE CONTINUED ACCEPTABLE PERFORMANCE.

7. A PRECONSTRUCTION CONFERENCE (MEETING) SHALL BE HELD ON SITE BETWEEN THE COUNTY ENVIRONMENTAL DIVISION, THE OWNER-APPLICANT, THE RESPONSIBLE LAND-DISTURBER (RLD), THE CONTRACTOR AND OTHER RESPONSIBLE AGENCIES, AS APPLICABLE, PRIOR TO ISSUANCE OF A LAND-DISTURBING PERMIT. THE OWNER OR APPLICANT IS REQUIRED TO COORDINATE SCHEDULING OF THE PRECONSTRUCTION CONFERENCE BETWEEN ALL APPLICABLE PARTIES. THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF CONSTRUCTION TO THE COUNTY ENVIRONMENTAL DIVISION FOR REVIEW AND APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING.

8. ALL PERIMETER EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
9. ADDITIONAL SAFETY FENCE OR DUST CONTROL MEASURES, IN ACCORDANCE WITH THE PROVISIONS OF MINIMUM STANDARDS & SPECS. 3.01 AND 3.39 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), MAY BE REQUIRED TO BE IMPLEMENTED IN ADDITION TO THAT SHOWN ON THE APPROVED PLAN IN ORDER TO ENSURE ADEQUATE PROTECTION OF THE HEALTH, SAFETY AND WELFARE OF THE PUBLIC OR IF SITE CONDITIONS CHANGE, BECOME APPARENT OR ALTER SIGNIFICANTLY FOLLOWING THE DATE OF PLAN APPROVAL.
10. EROSION AND SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT OR FOLLOWING TIME OF CONSTRUCTION TO ENSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED, TO ENSURE ADEQUATE PROTECTION OF THE HEALTH, SAFETY AND WELFARE OF THE PUBLIC, OR IF SITE CONDITIONS CHANGE, BECOME APPARENT OR ALTER SIGNIFICANTLY FOLLOWING THE DATE OF PLAN APPROVAL. COUNTY ENVIRONMENTAL DIVISION APPROVAL SHALL BE REQUIRED FOR ANY DEVIATION OF EROSION AND SEDIMENT CONTROL MEASURES FROM THE APPROVED PLAN.
11. OFF-SITE WASTE OR BORROW AREAS SHALL BE APPROVED BY THE COUNTY ENVIRONMENTAL DIVISION PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.
12. CULVERT AND STORM DRAIN INLET PROTECTIONS, IN ACCORDANCE WITH THE PROVISIONS OF MINIMUM STANDARDS & SPECS. 3.07 & 3.08 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), MAY BE REMOVED AT THE DISCRETION OF THE ASSIGNED COUNTY ENVIRONMENTAL DIVISION INSPECTOR SHOULD PLACEMENT OF THE MEASURE RESULT IN EXCESSIVE ROAD FLOODING OR TRAFFIC HAZARD OR RESULT IN THE REDIRECTION OF DRAINAGE ONTO OR TOWARD EXISTING LOTS, DRIVEWAYS OR STRUCTURES. DECISIONS SHALL BE MADE ON A CASE-BY-CASE BASIS BASED ON FIELD SITUATIONS ENCOUNTERED.
13. DRAINAGE FACILITIES SHALL BE INSTALLED AND FUNCTIONAL WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT.
14. NO MORE THAN 300 FEET OF TRENCH MAY BE OPEN AT ONE TIME FOR UNDERGROUND UTILITY LINES, INCLUDING STORM WATER CONVEYANCES. ALL OTHER PROVISIONS OF MINIMUM STANDARD # 16 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS APPLY.
15. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING IN ACCORDANCE WITH MINIMUM STANDARD & SPEC. 3.35 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.
16. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABILIZATION ON THE APPROVED PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED, IN ACCORDANCE WITH MINIMUM STANDARDS & SPECS. 3.29 THROUGH 3.37 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), AS APPLICABLE. IRRIGATION, IF NECESSARY, SHALL COMPLY WITH ALL APPLICABLE OUTDOOR WATER USE RESTRICTIONS OF THE JAMES CITY SERVICE AUTHORITY.
17. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL NOT BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. REMOVAL SHALL NOT OCCUR WITHOUT AUTHORIZATION BY THE COUNTY ENVIRONMENTAL DIVISION. DISTURBANCES ASSOCIATED WITH THE REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROPERLY STABILIZED.
18. NO SEDIMENT TRAP OR SEDIMENT BASIN SHALL BE REMOVED UNTIL A) AT LEAST 75 PERCENT OF THE SINGLE-FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN SOLD TO A THIRD PARTY FOR THE CONSTRUCTION OF HOMES (UNRELATED TO THE DEVELOPER); AND/OR, B) 60 PERCENT OF THE SINGLE-FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN ARE COMPLETED AND STABILIZED. A BULK SALE OF THE LOTS TO ANOTHER BUILDER DOES NOT SATISFY THIS PROVISION. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL NOT BE REMOVED WITHOUT AUTHORIZATION OF THE COUNTY ENVIRONMENTAL DIVISION.
19. APPLICABLE PROVISIONS OF THE COUNTY BMP MANUAL (JAMES CITY COUNTY GUIDELINES FOR DESIGN AND CONSTRUCTION OF STORMWATER MANAGEMENT BMPS) AND THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (VSMH) APPLY TO THE PROJECT.
20. DESIGN AND CONSTRUCTION OF PRIVATE-TYPE STORM DRAINAGE SYSTEMS, OUTSIDE VDOT RIGHT-OF-WAY, SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER DRAINAGE CONVEYANCE SYSTEMS (NON-BMP RELATED), GENERAL DESIGN AND CONSTRUCTION GUIDELINES.
21. RECORD DRAWINGS (ASBUILTS) AND CONSTRUCTION CERTIFICATIONS ARE REQUIRED FOR ALL STORMWATER FACILITIES INCLUDING STORMWATER MANAGEMENT/BMP FACILITIES AND STORM DRAINAGE CONVEYANCE SYSTEMS. RECORD DRAWINGS AND CONSTRUCTION CERTIFICATIONS MUST MEET ESTABLISHED PROGRAM REQUIREMENTS OF BOTH THE COUNTY ENVIRONMENTAL AND STORMWATER DIVISIONS.
22. ALL STORMWATER FACILITIES INCLUDING BMPS, STORM DRAINAGE PIPES, STORMWATER CONVEYANCES, INLETS, MANHOLES, OUTFALLS AND ROADSIDE AND OTHER OPEN CHANNELS SHALL BE INSPECTED BY THE COUNTY STORMWATER DIVISION AND GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ESTABLISHED COUNTY STORMWATER DIVISION PROGRAM REQUIREMENTS.

GENERAL EROSION AND SEDIMENT CONTROL NOTES

ES-1 UNLESS OTHERWISE INDICATED, ALL VEGETATION AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS (4 VAC 50-30).

ES-2 THE PLAN APPROVING AUTHORITY (DRC EROSION AND SEDIMENT CONTROL SPECIALIST @ 925-2468) MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION. THE NAME OF THE RESPONSIBLE LAND DISTURBER MUST BE PROVIDED TO THE PLAN-APPROVING AUTHORITY PRIOR TO ACTUAL ENGAGEMENT IN LAND-DISTURBING ACTIVITY SHOWN ON THE APPROVED SITE PLAN. IF THE NAME IS NOT PROVIDED PRIOR TO ENGAGING IN THE LAND-DISTURBING ACTIVITY THE PLAN'S APPROVAL WILL BE REVOKED.

ES-3 ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.

ES-4 A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.

ES-5 PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.

ES-6 THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE PLAN APPROVING AUTHORITY.

ES-7 ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED, AFTER WHICH, UPON APPROVAL OF THE DCR EROSION AND SEDIMENT CONTROL SPECIALIST, THE CONTROLS SHALL BE REMOVED. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE REMOVAL OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

ES-8 DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.

ES-9 THE CONTRACTOR SHALL INSPECT ALL EROSION MEASURES AT LEAST EVERY 2 WEEKS AND IMMEDIATELY AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY. THE RESPONSIBLE LAND DISTURBER ASSOCIATED WITH THIS PROJECT WILL SUBMIT E&S MONITORING REPORTS, AT LEAST ONCE EVERY 2 WEEKS AND WITHIN 48 HOURS A RUNOFF-PRODUCING STORM EVENT, TO THE DCR EROSION AND SEDIMENT CONTROL SPECIALIST.

ES-10 THE CONTRACTOR IS RESPONSIBLE FOR THE DAILY REMOVAL OF SEDIMENT THAT HAS BEEN TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE.

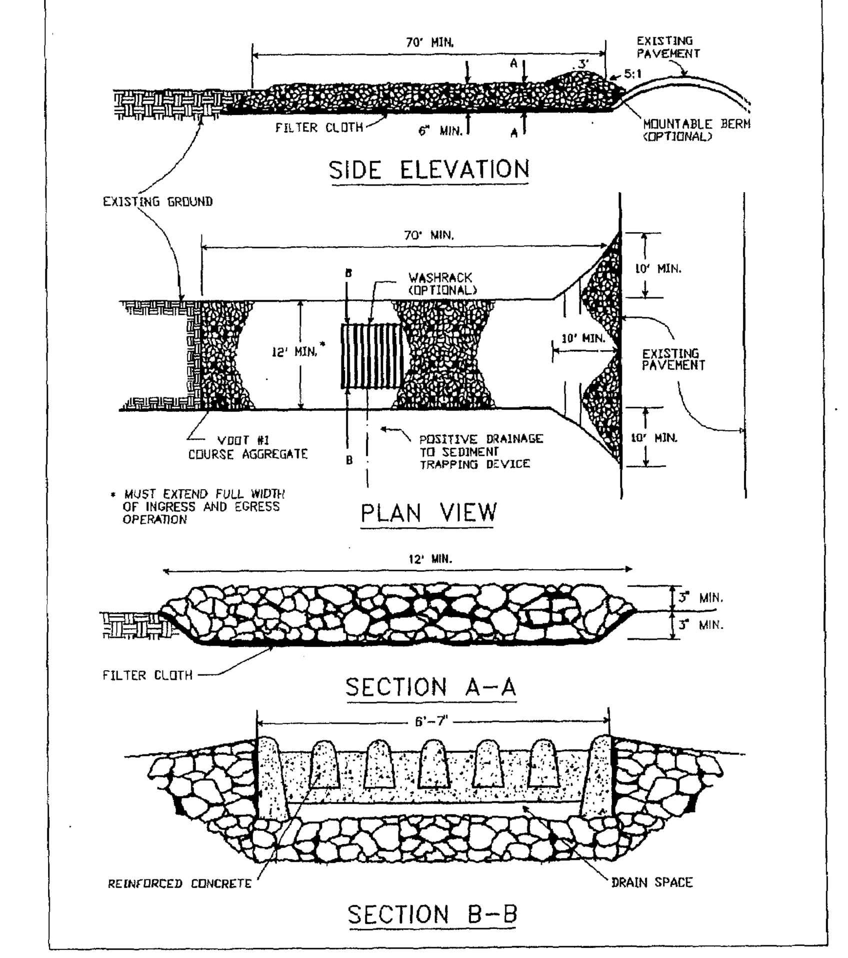
ES-11 SEEDING SHALL BE INITIATED WITHIN 7 DAYS REACHING FINAL GRADE OR UPON SUSPENSION OF GRADING OPERATIONS FOR ANTICIPATED DURATION OF GREATER THAN 30 DAYS OR UPON COMPLETION OF GRADING OPERATIONS FOR A SPECIFIC AREA.

ES-12 THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING SURFACE AND AIR MOVEMENT OF DUST FROM EXPOSED SOILS WHICH MAY PRESENT HEALTH HAZARDS, TRAFFIC SAFETY PROBLEMS, OR HARM ANIMAL OR PLANT LIFE.

ES-13 A VIRGINIA STORMWATER MANAGEMENT PROGRAM PERMIT (VSMPP) FOR THE DISCHARGE OF STORMWATER FROM CONSTRUCTION ACTIVITIES IS REQUIRED FOR PROJECTS DISTURBING 1 ACRE OR GREATER. A VSMPP IS ALSO REQUIRED FOR PROJECTS DISTURBING 2,500 SQ. FT. OR GREATER IN A DESIGNATED CHESAPEAKE BAY PRESERVATION AREA. VISIT THE VIRGINIA STORMWATER MANAGEMENT PROGRAM PERMITTING WEB PAGE AT HTTP://WWW.DCR.STATE.VA.US/SW/VSMP.HTM FOR MORE INFORMATION.

1992 3.02

STONE CONSTRUCTION ENTRANCE



Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC

Plate 3.02-1

III - 9

JCC SP-0093-2010

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
11-24-10
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

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CRANSTON MILL POND
POWHATAN DISTRICT
JAMES CITY COUNTY, VIRGINIA

EROSION CONTROL NOTES AND DETAILS

DATE: JUNE 14, 2010

JN: 09114-001

C2.3

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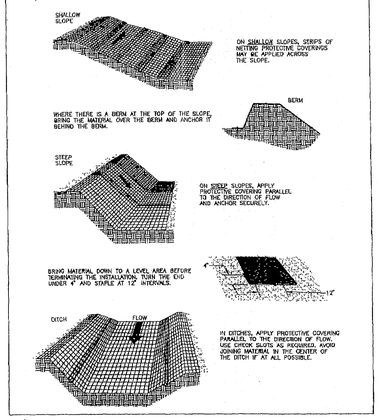
1992 3.36

TYPICAL ORIENTATION OF TREATMENT – 1 (SOIL STABILIZATION BLANKET)

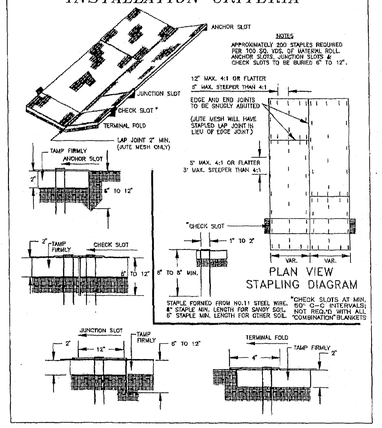


Source: Adapted from Ludlow Products Brochure

Plate 3.36-1

1992 3.36

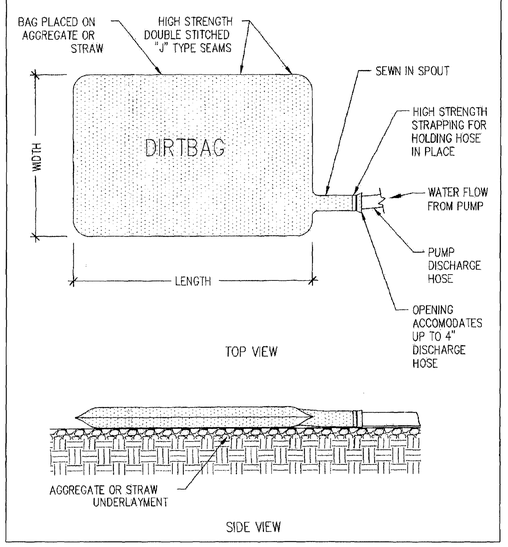
TYPICAL TREATMENT – 1 (SOIL STABILIZATION BLANKET) INSTALLATION CRITERIA



Source: VDOT Road and Bridge Standards

Plate 3.36-2

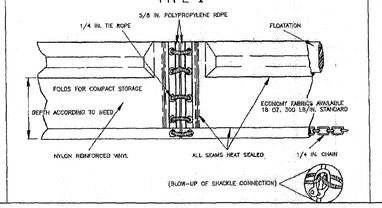
Typical Dirtbag® Construction



1992 3.27

TURBIDITY CURTAIN

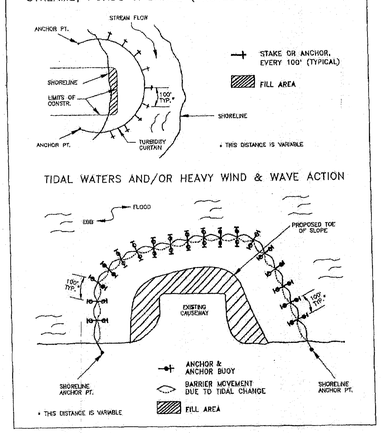
TYPE I



1992 3.27

TURBIDITY CURTAIN

TYPICAL LAYOUTS:
STREAMS, PONDS & LAKES (PROTECTED & NON-TIDAL)



Source: Adapted from Florida Department of Transportation Road and Design Specifications

Plate 3.27-3

1992 3.32

TABLE 3.32-D

SITE SPECIFIC SEEDING MIXTURES FOR COASTAL PLAIN AREA

	Total Lbs. Per Acre
Minimum Care Lawn	
- Commercial or Residential	
- Kentucky 31 or Turf-Type Tall Fescue	175-200 lbs.
or	
- Common Bermudagrass **	75 lbs.
High-Maintenance Lawn	
- Kentucky 31 or Turf-Type Tall Fescue	200-250 lbs.
or	
- Hybrid Bermudagrass (seed) **	40 lbs. (unhulled)
or	30 lbs. (hulled)
- Hybrid Bermudagrass (by other vegetative establishment method, see Std. & Spec. 3.34)	
General Slope (3:1 or less)	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
	150 lbs.
Low Maintenance Slope (Steeper than 3:1)	
- Kentucky 31 Tall Fescue	93-108 lbs.
- Common Bermudagrass **	0-15 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
- Sericea Lespedeza **	20 lbs.
	150 lbs.

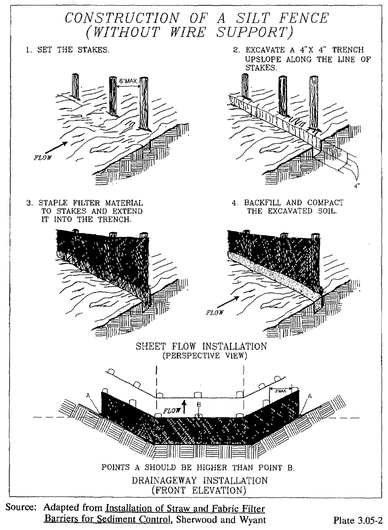
* Use seasonal nurse crop in accordance with seeding dates as stated below:

February, March through April ..... Annual Rye
May 1st through August ..... Foxtail Millet
September, October through November 15th ..... Annual Rye
November 16th through January ..... Winter Rye

** May through October, use hulled seed. All other seeding periods, use unhulled seed. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in mixes.

1992 3.05

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

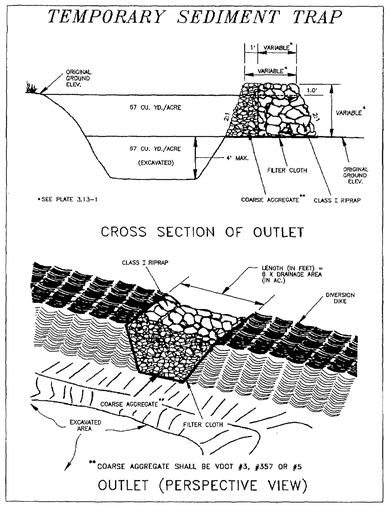


Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-2

1992 3.13

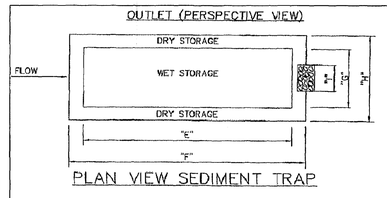
TEMPORARY SEDIMENT TRAP



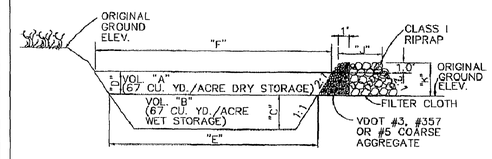
Source: Va. DSWC

Plate 3.13-2

OUTLET (PERSPECTIVE VIEW)



PLAN VIEW SEDIMENT TRAP



CROSS SECTION OF OUTLET

Sediment Trap I.D.	Drainage Area (Ac.)	Req'd. Vol. "A" & "B" (C.Y. Each)	Volume Provided "A" (C.Y.)	Volume Provided "B" (C.Y.)	(ALL DIMENSIONS IN FEET) C	D	E	F	G	H	I	J	K	Wet Dim.
1	1.08	72.4	76.2	72.4	4	2	36	44	20	28	6.5	2.5	3	20' x 36'
2	0.48	32.2	33.3	32.2	3	1.5	28	34	15	21	2.9	2.5	2.5	15' x 28'

JCC SP-0093-2010

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COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER
Lic. No. 023860
11-24-10

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/10/10 REV. PER FEDERAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JSM/PFH
DRAWN: JBM
CHECKED: PFH

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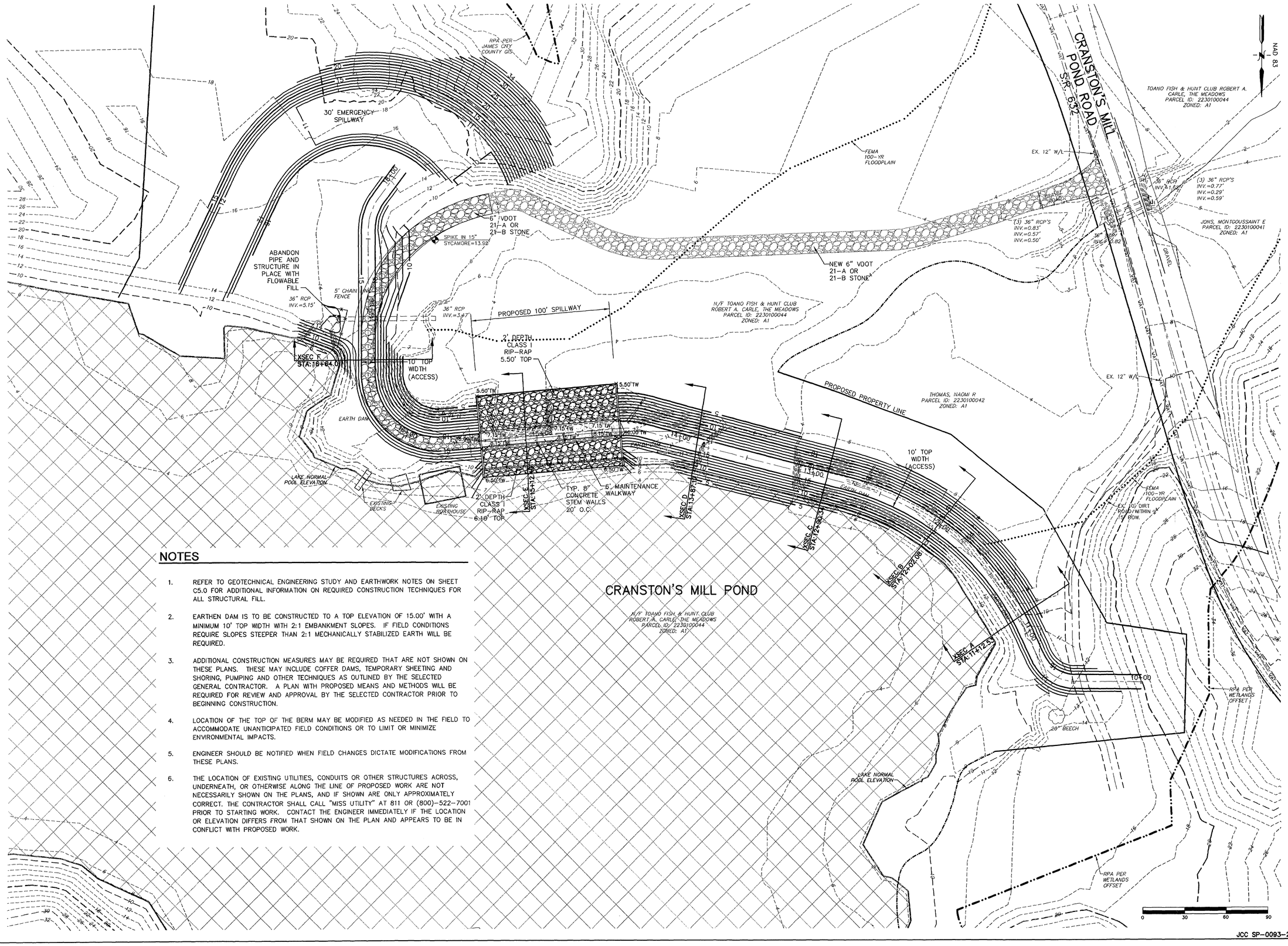
CRANSTON MILL POND
POWHATAN DISTRICT
JAMES CITY COUNTY, VIRGINIA

EROSION CONTROL NOTES AND DETAILS

DATE: JUNE 14, 2010
JN: 09114-001

C2.4



NOTES

1. REFER TO GEOTECHNICAL ENGINEERING STUDY AND EARTHWORK NOTES ON SHEET C5.0 FOR ADDITIONAL INFORMATION ON REQUIRED CONSTRUCTION TECHNIQUES FOR ALL STRUCTURAL FILL.
2. EARTHEN DAM IS TO BE CONSTRUCTED TO A TOP ELEVATION OF 15.00' WITH A MINIMUM 10' TOP WIDTH WITH 2:1 EMBANKMENT SLOPES. IF FIELD CONDITIONS REQUIRE SLOPES STEEPER THAN 2:1 MECHANICALLY STABILIZED EARTH WILL BE REQUIRED.
3. ADDITIONAL CONSTRUCTION MEASURES MAY BE REQUIRED THAT ARE NOT SHOWN ON THESE PLANS. THESE MAY INCLUDE COFFER DAMS, TEMPORARY SHEETING AND SHORING, PUMPING AND OTHER TECHNIQUES AS OUTLINED BY THE SELECTED GENERAL CONTRACTOR. A PLAN WITH PROPOSED MEANS AND METHODS WILL BE REQUIRED FOR REVIEW AND APPROVAL BY THE SELECTED CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
4. LOCATION OF THE TOP OF THE BERM MAY BE MODIFIED AS NEEDED IN THE FIELD TO ACCOMMODATE UNANTICIPATED FIELD CONDITIONS OR TO LIMIT OR MINIMIZE ENVIRONMENTAL IMPACTS.
5. ENGINEER SHOULD BE NOTIFIED WHEN FIELD CHANGES DICTATE MODIFICATIONS FROM THESE PLANS.
6. THE LOCATION OF EXISTING UTILITIES, CONDUITS OR OTHER STRUCTURES ACROSS, UNDERNEATH, OR OTHERWISE ALONG THE LINE OF PROPOSED WORK ARE NOT NECESSARILY SHOWN ON THE PLANS, AND IF SHOWN ARE ONLY APPROXIMATELY CORRECT. THE CONTRACTOR SHALL CALL "MISS UTILITY" AT 811 OR (800)-522-7001 PRIOR TO STARTING WORK. CONTACT THE ENGINEER IMMEDIATELY IF THE LOCATION OR ELEVATION DIFFERS FROM THAT SHOWN ON THE PLAN AND APPEARS TO BE IN CONFLICT WITH PROPOSED WORK.

COMMONWEALTH OF VIRGINIA
PAUL F. PARKSON
Lic. No. 022860
11-24-10
PROFESSIONAL ENGINEER

REVISIONS:
REVISIONS REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

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CRANSTON MILL POND

JAMES CITY COUNTY, VIRGINIA

POWHATAN DISTRICT

LAYOUT AND GRADING PLAN

DATE: JUNE 14, 2010

JN: 09114-001

C3.0

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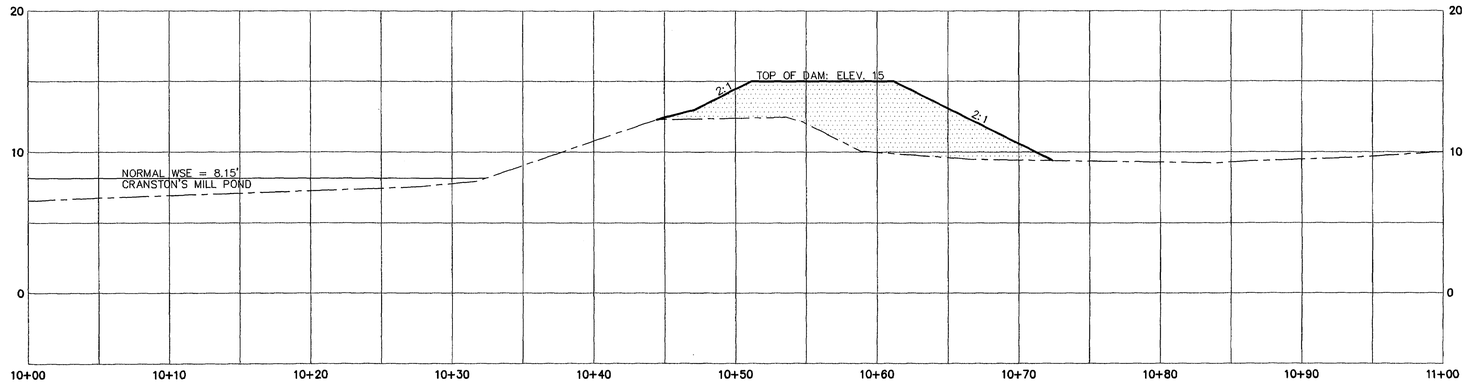
LEGEND

EXISTING GRADE

PROPOSED GRADE



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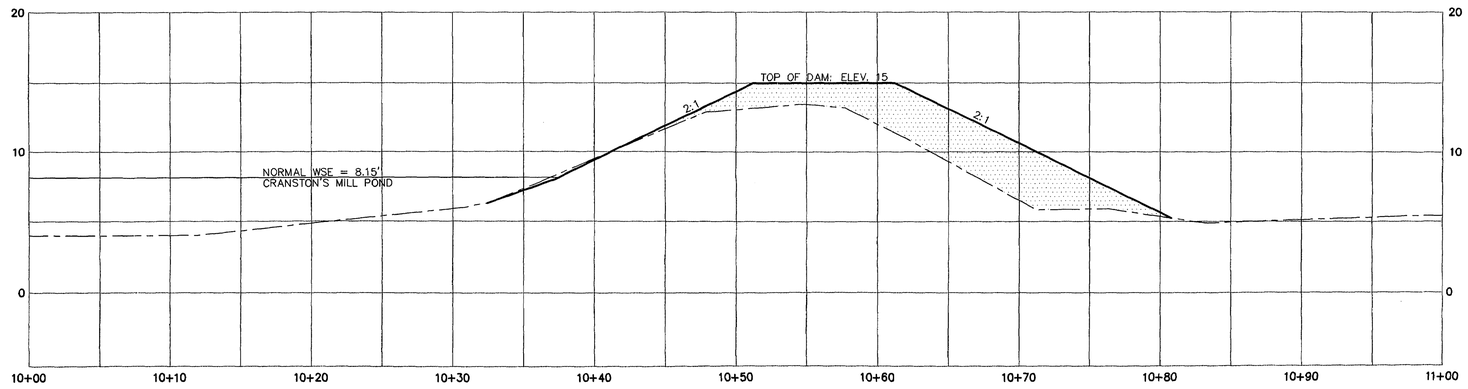

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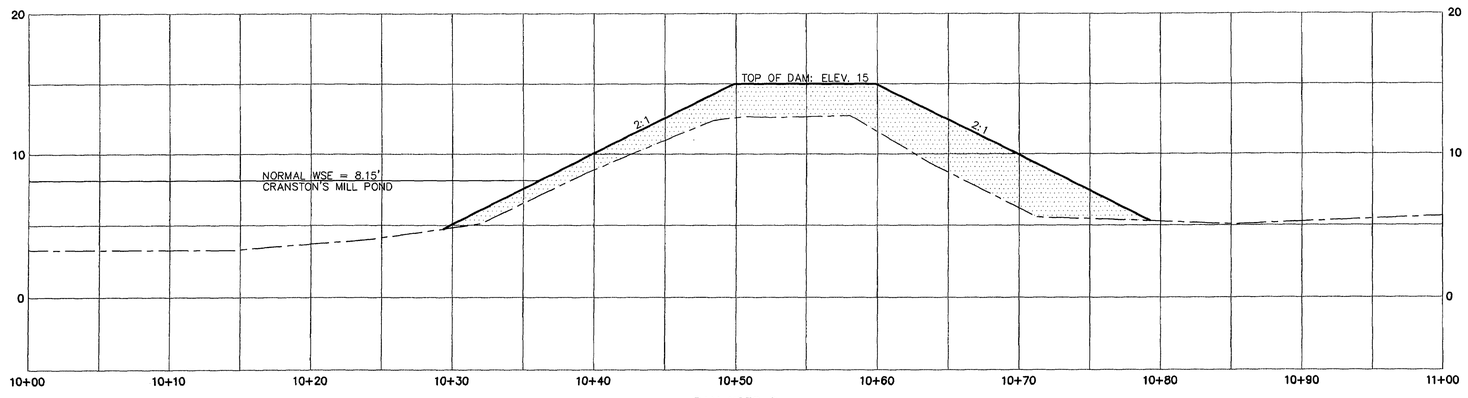

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JCC SP-0093-2010

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
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11-24-10
PROFESSIONAL ENGINEER

REVISIONS:
8/14/10 REVISED SPILLWAY
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DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

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CRANSTON MILL POND

JAMES CITY COUNTY, VIRGINIA

POWHATAN DISTRICT

CROSS SECTIONS

DATE: JUNE 14, 2010

JN: 09114-001

C4.0

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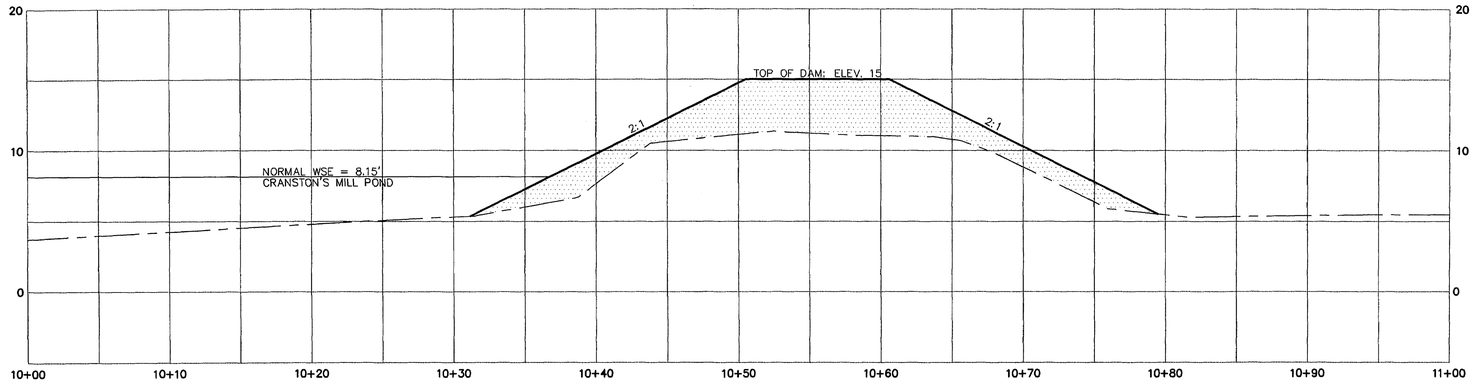
LEGEND

EXISTING GRADE

PROPOSED GRADE



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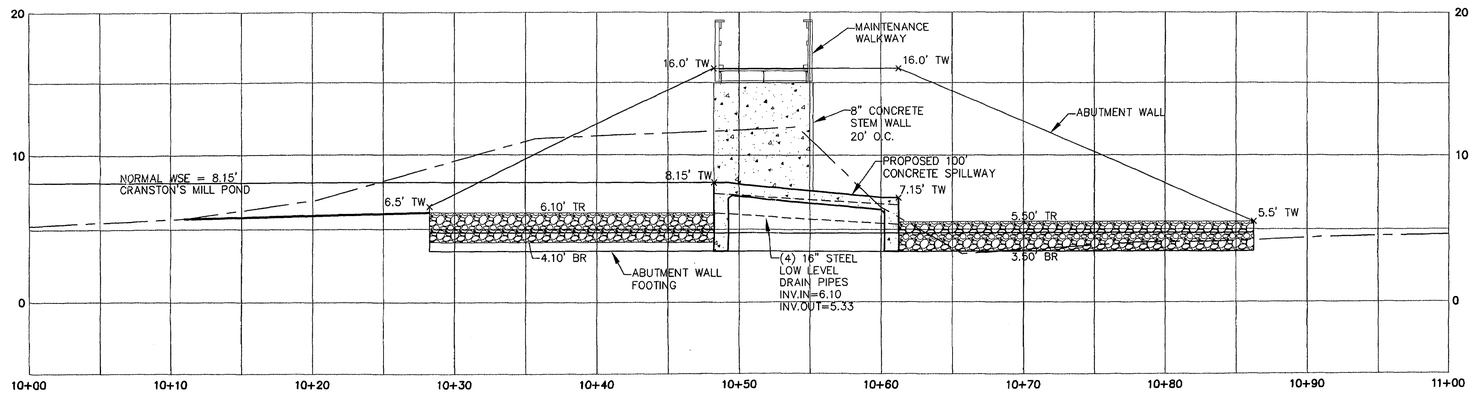

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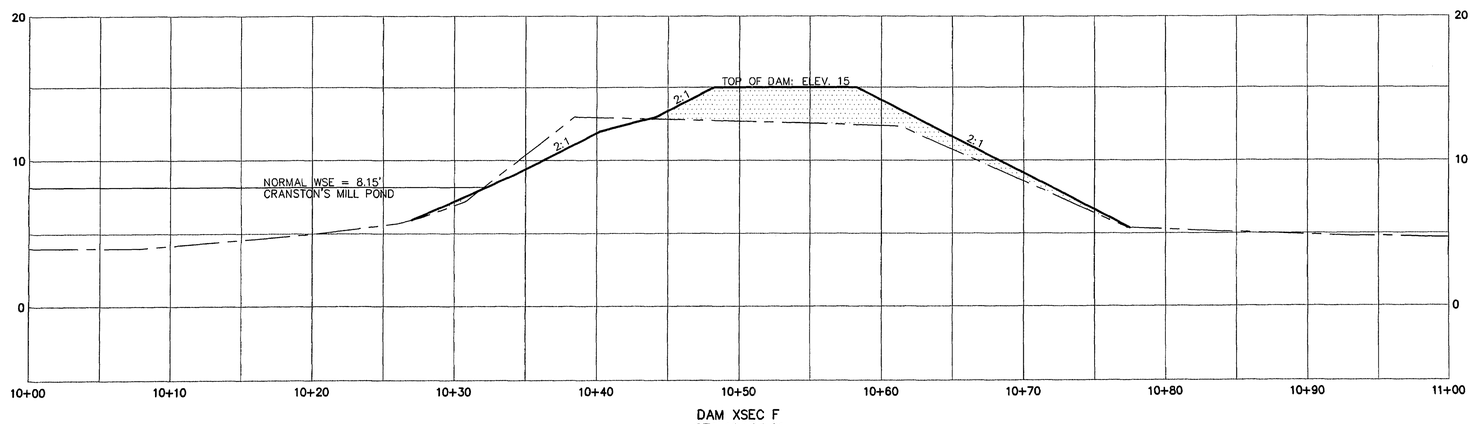

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VERT. 0 5 10 15

HORZ. 0 5 10 15

JCC SP-0093-2010

COMMONWEALTH OF VIRGINIA
PAUL F. HENSON
Lic. No. 023860
11-24-10
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

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CRANSTON MILL POND

JAMES CITY COUNTY, VIRGINIA

POWHATAN DISTRICT

CROSS SECTIONS

DATE: JUNE 14, 2010

JN: 09114-001

C4.1

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Ave. Samuel Lewis y calle 53
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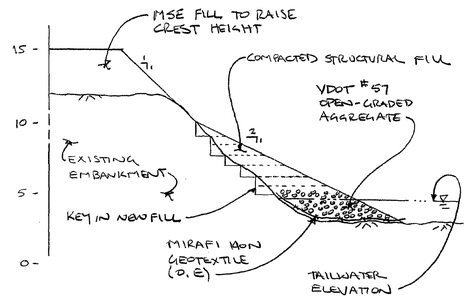
(507) 265-1185 facsimile

PROJECT 14752A09
SHEET NO. 1 OF 1
CALCULATED BY CWS DATE 8/2/11
CHECKED BY — DATE —

FIGURE 2



PRODUCT D5875-1 ABCDEF

STOP GATES

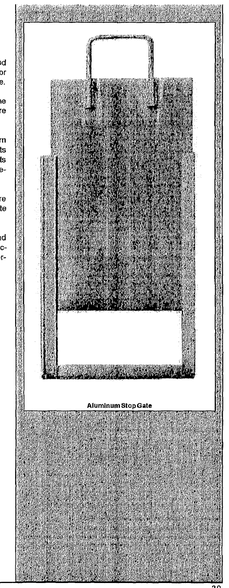
Waterman Stop Gates can be fitted with either rod handles or a slot grip for hand placing. Guide rails for embedded, flatback or channel mounting are available.

These gates are designed for a maximum head of one foot over the slide, unless otherwise specified and are used generally in diversion applications.

Options available include "J" Bulb seals for minimum leakage, ultra high molecular weight polyethylene seats for increased ease of operation and special cut outs such as "V" notch or slot openings for water measurement.

All frames feature welded construction. Slides are minimum ¼" thick to minimize deflection and contribute to long gate life.

Available in an almost unlimited range of sizes and configurations, Waterman stop gates can be manufactured from aluminum, steel, stainless steel or fiberglass.



Aluminum Stop Gate

Waterman INDUSTRIES, INC.

39

TYPICAL SPECIFICATIONS
ALUMINUM STOP GATES

Guides
The gate frame shall be a rigid, welded unit with a clear opening the same size as the waterway, unless otherwise specified. The guides shall be of structural or stainless steel shapes or aluminum extrusions. The guides will be of the length specified.

Additional members will be added to the frame as required for flushbottom closure, spigots, and "J" Bulb seals.

Slide
The slide shall be plate reinforced with structural shapes welded to the plate. The slide shall not deflect more than 1/360 of the span of the gate under maximum head.

Flushbottom Closure
When indicated on the plans or in the gate schedule, gates shall be furnished with a flush seal arrangement. A resilient neoprene seal shall be securely attached to the frame along the invert, and shall extend to the depth of the guide groove.

"J" Bulb Seals
When an unsealing head is shown on the plans, or specified in the gate schedule, the gate shall be provided with "J" Bulb seals along the sides of the gate. Seals shall be mounted either on the frame or slide, such that seals do not protrude into the specified opening of the gate.

(Optional). Gates shall be furnished complete with ultra high molecular weight (U.H.M.W.) polymer seats which contact the slide face.

For steel and stainless steel gates, ultra high molecular weight bearing strips shall be mechanically retained to lock seat in place. For aluminum gates, strips shall be installed in dovetail grooves in the extruded frame.

Material
Frames and Slides
Mild steel - ASTM A-36, or
~~Stainless Steel - ASTM A-276, Type 304, 316 as specified~~
Aluminum - ASTM B-209 and B-211 alloy 6061-T6

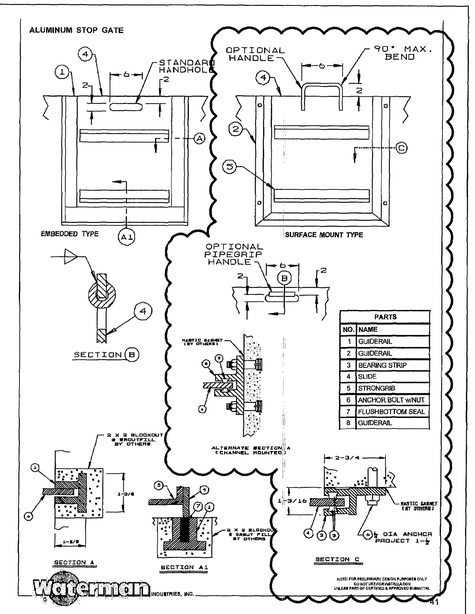
Fasteners
~~Mild Steel - ASTM A-307 Galvanized per ASTM A-153, or~~
~~Stainless Steel - ASTM A-276, Type 304, 316, or~~
Stainless Steel - ASTM A-193 18-8, as specified

Flushbottom Seals and "J" Bulb Seals
Rubber - ASTM D-2000 BC 610/615 or other suitable composition for extended use in water and sewage

Finish
Manufacturer's Standard Paint on mild steel
~~Mill finish on all aluminum and stainless steel~~

Waterman INDUSTRIES, INC.

40



Waterman INDUSTRIES, INC.

41

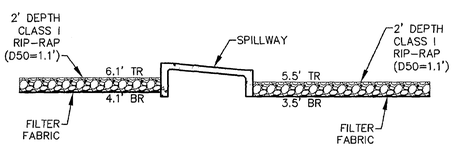
EARTH WORK NOTES

1. ALLOWABLE SOIL TYPES INCLUDE CL, ML, SM AND SC PROVIDING THAT THE SOILS SHALL CONTAIL AT LEAST 30% SAND OR 30% FINES AND HAVE A PLASITICITY INDEX OF LESS THAN 35.
2. ALL SOILS SHALL BE COMPACTED TO AT LEAST A DENSITY OF 95% OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698. COMPACTION MOISTURE CONTENT SHOULD BE CONTROLLED TO WITHIN 3% OF OPTIMUM MOISTURE
3. SUBGRADES TO RECEIVE COMPACTED STRUCTURAL FILL SHALL BE CLEARED OF ALL TOPSOIL AND ORGANIC, WET OR OTHERWISE DISTURBED SOILS.
4. WHERE FILL PLACEMENT IS REQUIRED IN STANDING WATER OR IN AREAS OF SATURATED SUBGRADE, THE SUBGRADE SHALL CLEARED OF ALL TOPSOIL AND ORGANICS, OVERLAIN WITH MIRAFI 140N OR EQUIVALENT GEOTEXTILE FABRIC AND BACKFILLED WITH VDOT #57 STONE SUFFICIENT TO ALLOW A STABLE BASE FOR THE PLACEMENT OF STRUCTURAL FILL.

LOW LEVEL OUTLET SLUICE GATES

1. OUTLET GATE TO BE 18"X18" OR AS REQUIRED TO SEAL A 16" ROUND OPENING
2. FOUR GATES WILL BE PROVIDED. ONE FOR EACH 16" LOW LEVEL DRAIN PIPE.
3. OPENING SPACING TO BE ALTERED AS REQUIRED TO ALLOW FOR INSTALLATION OF GATES.
4. SHOP DRAWING TO BE SUBMITTED PRIOR TO ORDERING AND INSTALLING.
5. GATE AS MANUFACTURED BY WATERMAN AND ASSOCIATES OR EQUIVALENT.

RIP-RAP ARMORING



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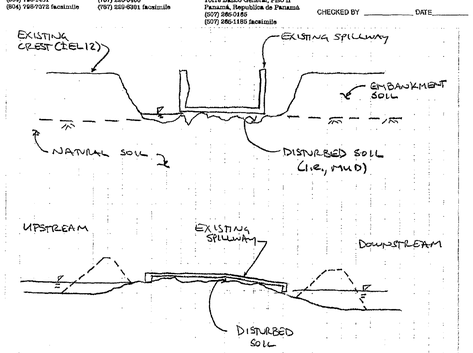
(507) 265-1185 facsimile

PROJECT
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE



1) CONSTRUCT COFFERDAM
2) REMOVE EXISTING SPILLWAY
3) DEWATER WORK AREA AND REMOVE DISTURBED SOIL
4) PLACE COMPACTED STRUCTURAL FILL TO 95% RELATIVE COMPACTION
5) BENCH (KEY) IN NEW FILL TO EXISTING EMBANKMENT
6) PROVIDE TOE DRAIN AS SHOWN

PRODUCT D5875-1 ABCDEF

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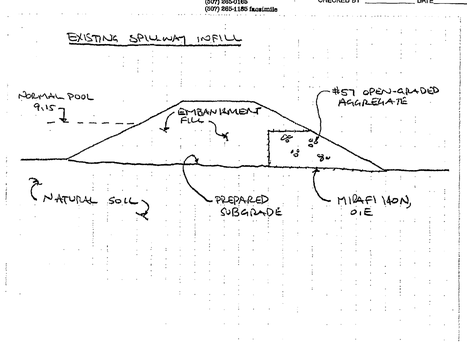

PRODUCT D5875-1 ABCDEF

JCC SP-0093-2010

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COMMONWEALTH OF VIRGINIA
PAUL F. HIRSCH
LIC. NO. 022580
11-24-10
REGISTERED PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

CRANSTON MILL POND

POWHATAN DISTRICT

JAMES CITY COUNTY, VIRGINIA

NOTES & DETAILS

DATE: JUNE 14, 2010

JN: 09114-001

C5.0

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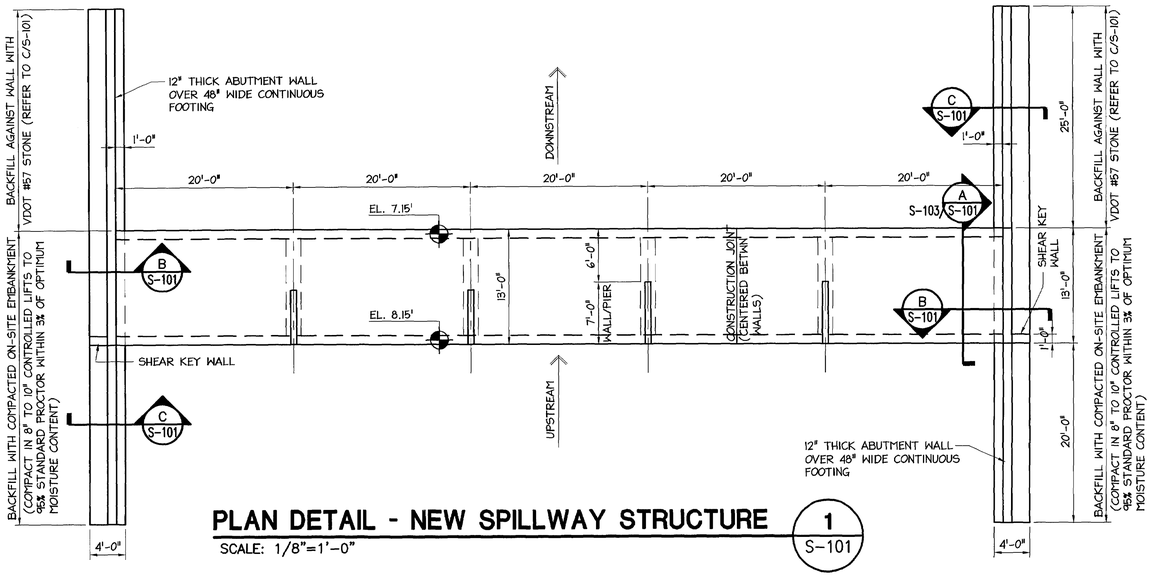
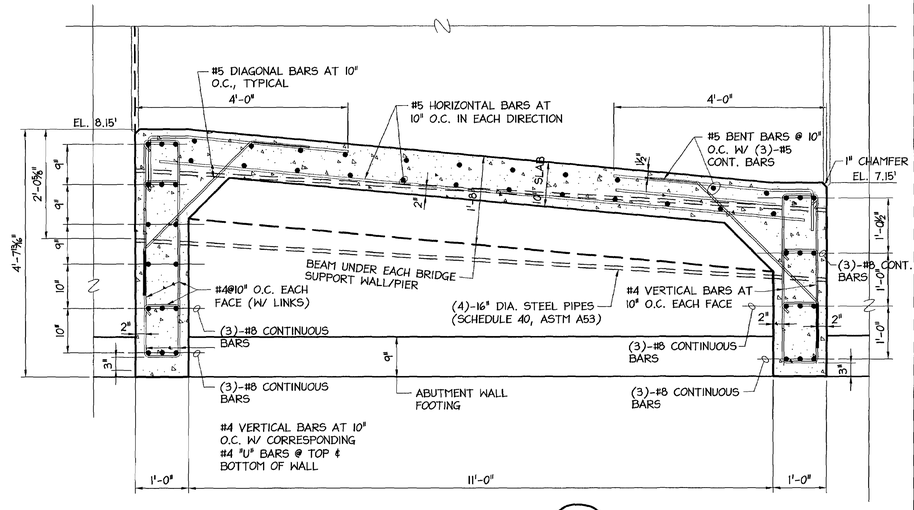


PLAN DETAIL - NEW SPILLWAY STRUCTURE

SCALE: 1/8"=1'-0"

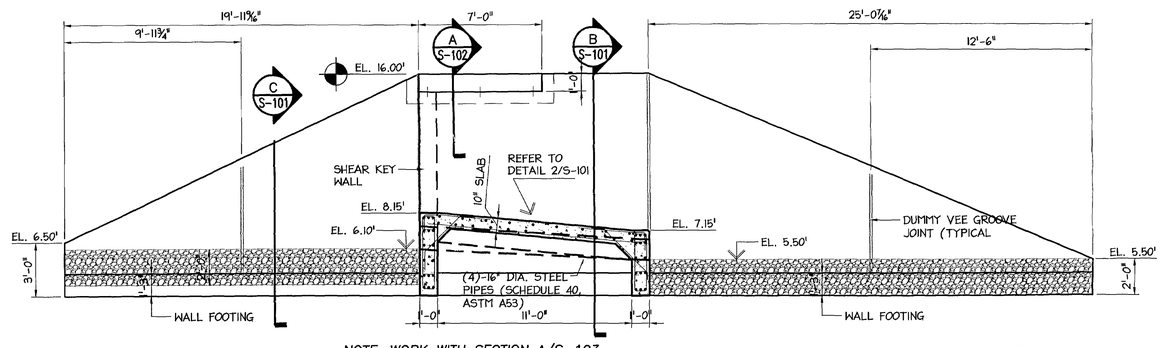
1 / S-101



DETAIL

SCALE: 3/4"=1'-0"

2 / S-101

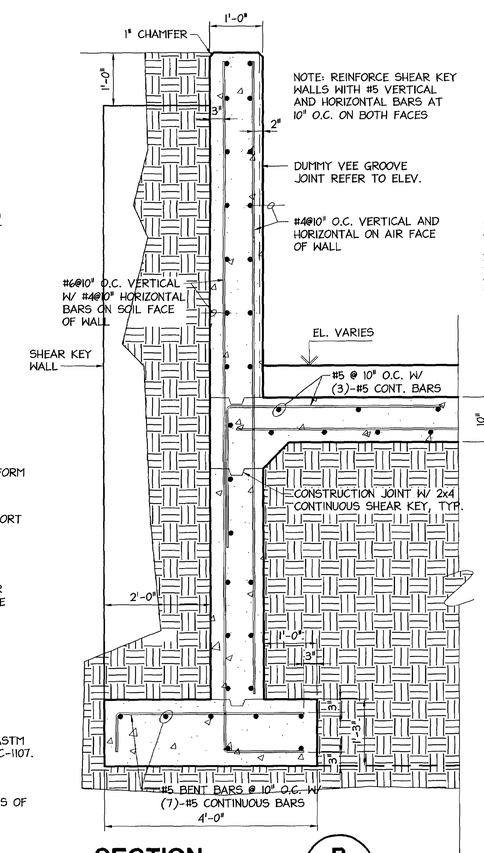


NOTE: WORK WITH SECTION A/S-103

SECTION

SCALE: 1/4"=1'-0"

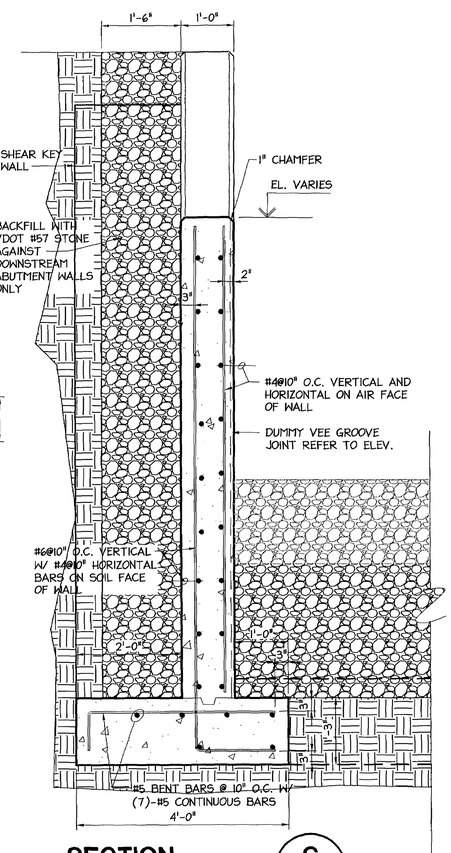
A / S-101



SECTION

SCALE: 3/4"=1'-0"

B / S-101



SECTION

SCALE: 3/4"=1'-0"

C / S-101

DESIGN CRITERIA AND GENERAL NOTES:

1. DESIGN LOADS:

   DESIGN CODES: VIRGINIA UNIFORM STATEWIDE BUILDING CODE; AND "MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES", ASCE 7-05.

   BRIDGE DESIGN LIVE LOAD = 85 PSF (LIGHT PEDESTRIAN OCCASIONAL USE)

   SNOW LOAD:

   GROUND SNOW LOAD, Pg = 20 PSF
   IMPORTANCE FACTOR, I=1.0
   EXPOSURE FACTOR, Ce=0.7

   WIND LOAD:

   BASIC WIND SPEED = 100 MPH
   IMPORTANCE FACTOR, I = 1.0
   EXPOSURE B

   SEISMIC LOAD:

   IMPORTANCE FACTOR, I=1.25
   S_s = 0.1509g, Fa = 1.6
   S_1 = 0.0522g, Fv = 2.4
   SITE CLASS D
   SEISMIC DESIGN CATEGORY B
   R = 3.5

2. TEMPORARY BRACING, GUY WIRES, ETC., SHALL BE USED WHERE NECESSARY TO ADEQUATELY RESIST ALL LOADS TO WHICH THE STRUCTURE MAY BE SUBJECTED DURING CONSTRUCTION, INCLUDING EQUIPMENT AND ITS OPERATION.

3. SPECIAL INSPECTIONS AS REQUIRED BY IBC 2006, SECTION 1704 (INCLUDING REVISIONS TO THIS SECTION BY THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE), SHALL BE PROVIDED FOR STRUCTURAL STEEL, TIMBER AND CONCRETE WORK.

4. THE CONTRACTOR SHALL SUBMIT, FOR REVIEW AND COMMENT, CONCRETE CONSTRUCTION SHOP DRAWINGS, PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF VIRGINIA.

MATERIAL NOTES:

1. ALL SPILLWAY FACING CONCRETE SURFACES, INCLUDING SLAB SURFACES, SHALL BE SMOOTH FORM FINISH COMPLIANT WITH PROVISIONS OF ACI 301.
2. CONCRETE SPILLWAY SUBSTRUCTURE SHALL BEAR ON UNDISTURBED, FIRM NATURAL SOIL OR COMPACTED FILL WITH A MINIMUM ALLOWABLE BEARING CAPACITY OF 2,000 PSF. A SOILS REPORT HAS BEEN PREPARED AND IS AVAILABLE FOR REFERENCE, UPON REQUEST.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI, AND SHALL CONTAIN 6% (±1%) ENTRAINED AIR.
4. ALL CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF ACI 301, "SPECIFICATION FOR STRUCTURAL CONCRETE BUILDINGS". HOT WEATHER CONCRETE WORK SHALL BE IN ACCORDANCE WITH ACI 305, AND COLD WEATHER CONCRETING SHALL CONFORM WITH ACI 306.
5. ALL CONCRETE REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60. CONTINUOUS REINFORCING STEEL SHALL BE LAPPED WITH CLASS B TENSION LAP SPLICE, PER ACI 318-05.
6. ALL STRUCTURAL STEEL WORK SHALL CONFORM TO THE PROVISIONS OF THE AISC STEEL CONSTRUCTION MANUAL, THIRTEENTH EDITION.
7. ALL ROLLED STRUCTURAL STEEL SHAPES SHALL BE ASTM ASTM A-99, GRADE 50. ALL STEEL PLATES AND ANGLES SHALL BE ASTM A-36.
8. ALL STEEL CONNECTION BOLTS SHALL BE ASTM A-325. ALL STEEL ANCHOR RODS SHALL BE ASTM A-36 OR ASTM A-307. ALL BEARING GROUTS SHALL BE NONSHRINK, CONFORMING WITH ASTM C-1107. ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 USING E70XX ELECTRODES.
9. ALL WOOD FRAMING MATERIAL SHALL BE SURFACE DRY FOR USE AT 19% MAXIMUM MOISTURE CONTENT. ALLOWABLE STRESS REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION (NDS).
10. ALL WOOD FRAMING MATERIALS SHALL BE SOUTHERN YELLOW PINE LUMBER (GRADE No 2, OR BETTER), TREATED WITH WATERBORNE PRESERVATIVES IN ACCORDANCE WITH AWPA STANDARD U1, COMMODITY SPECIFICATION A, TO THE REQUIREMENTS OF USE CATEGORY 2 (UC2). ALL FIELD CUTS AND HOLES SHALL BE BRUSHED WITH TWO COATS OF A COMPATIBLE PRESERVATIVE SOLUTION.
11. ALL STEEL BOLTS AND FASTENERS SHALL BE HOT-DIPPED GALVANIZED, WITH A MINIMUM COATING OF G90 PER ASTM A123 AND/OR ASTM A153.

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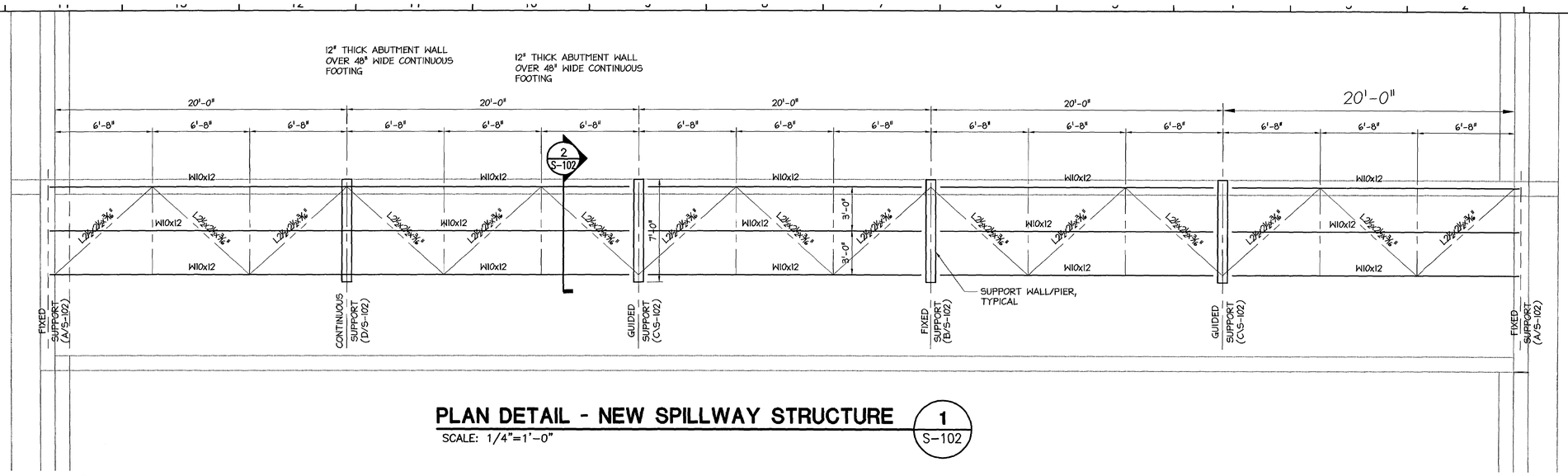
TOANO, JAMES CITY COUNTY
VIRGINIA

COMMONWEALTH OF VIRGINIA
YUSUFU WAKILI LERE
Lic. No. 025329
November 08 2010
PROFESSIONAL ENGINEER

DESIGN: YW LERE
DRAWN: YW LERE
CHECKED: YW LERE
REVISIONS:

DATE: NOVEMBER 8, 2010
JOB NO. 15102-10
CAD NO. 15102S-101
DRAWING TITLE: NEW SPILLWAY STRUCTURE
SHEET NO. S-101

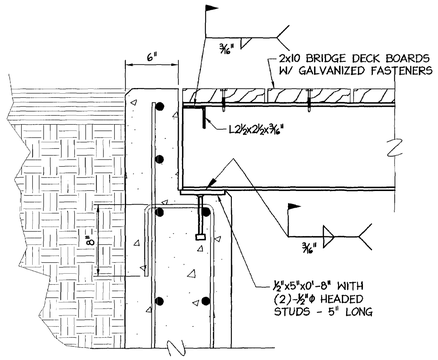
P:\15102-10\Stru\151025-101-102.dwg Nov 08, 2010 - 4:29pm ylere



PLAN DETAIL - NEW SPILLWAY STRUCTURE

SCALE: 1/4"=1'-0"

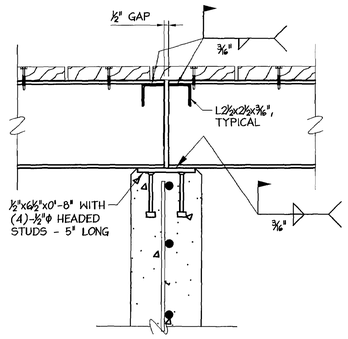
1 / S-102



FIXED SUPPORT

SECTION A / S-102

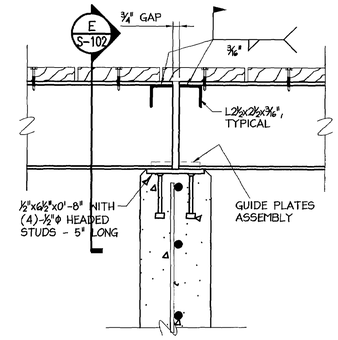
SCALE: 1 1/2"=1'-0"



FIXED SUPPORT (INTERIOR)

SECTION B / S-102

SCALE: 1 1/2"=1'-0"



GUIDED SUPPORT

SECTION C / S-102

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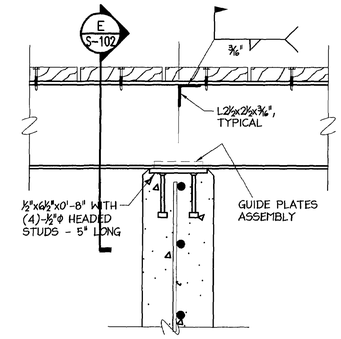
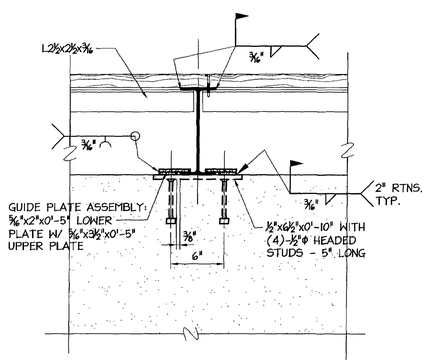


CONTINUOUS SUPPORT

SECTION D / S-102

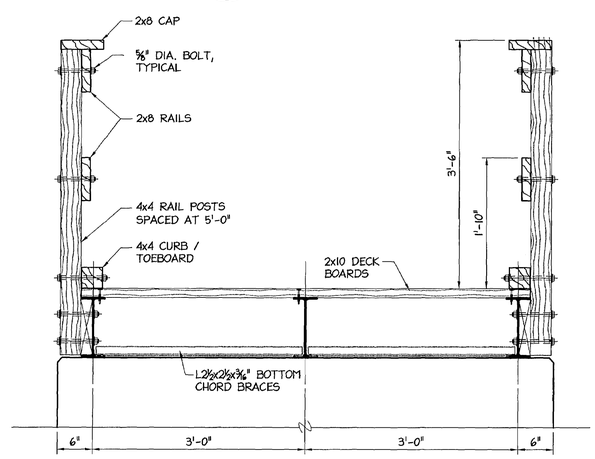
SCALE: 1 1/2"=1'-0"



SECTION

SECTION E / S-102

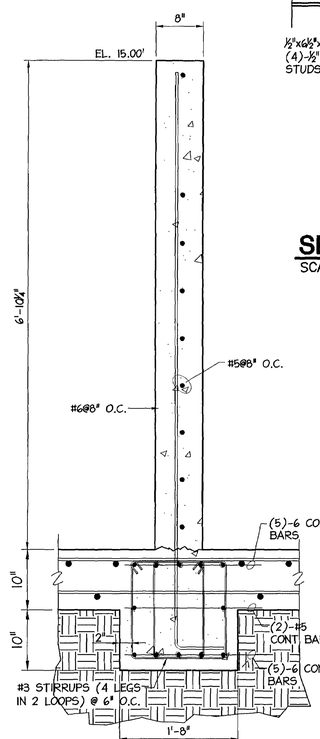
SCALE: 1 1/2"=1'-0"



DETAIL

DETAIL 2 / S-102

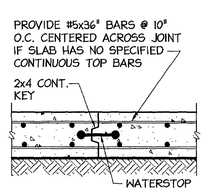
SCALE: 1"=1'-0"



SECTION

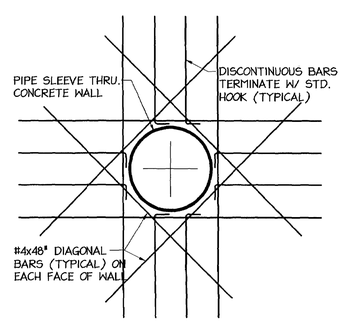
SECTION F / S-102

SCALE: 1"=1'-0"



CONSTRUCTION JOINT

SCALE: ¾"=1'-0"



REINFORCING DETAIL AT PIPE SLEEVE

SCALE: ¾"=1'-0"

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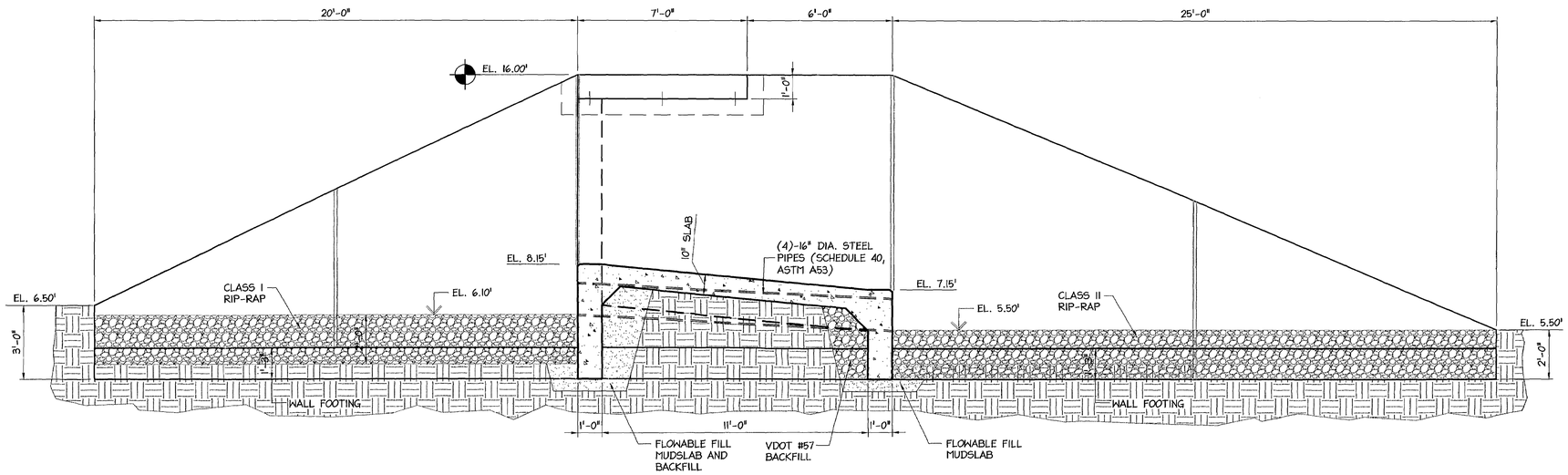
CHESAPEAKE BAY NLT \ EARTHSOURCE SOLUTIONS
TOANO, JAMES CITY COUNTY
VIRGINIA

COMMONWEALTH OF VIRGINIA
YUSUFU WAKILI LERE
Lic. No. 025329
November 08, 2010
PROFESSIONAL ENGINEER

DESIGN: YW LERE
DRAWN: YW LERE
CHECKED: YW LERE
REVISIONS:

DATE: NOVEMBER 8, 2010
JOB NO. 15102-10
CAD NO. 15102S-101
DRAWING TITLE: NEW SPILLWAY STRUCTURE
SHEET NO. S-102

P:\15102-10\Stru\15102S-101-102.dwg Nov 08, 2010 - 4:30pm ylere



NOTE: WORK WITH SECTION A/S-101

SECTION A / S-103

SCALE: 3/8"=1'-0"

McKINNEY AND COMPANY
planning • design • construction

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Environmental Division

AUG 31 2011

RECEIVED

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities
Record Drawing and Construction Certification Forms

(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name: Cranston's Mill Pond - Inventory #09513
Structure/BMP Name: Cranston's Mill Pond Dam
Project Location: 6616 Cranston's Mill Pond Road / Toano, Virginia 23168-9067
BMP Location: Approximately 320' upstream of Cranston's Mill Pond Road (SR 623)
County Plan No.: JCC-SP - 0093 - 2010

Project Type: ❒ Residential ❒ Business ❒ Commercial ❒ Office ❒ Institutional ❒ Industrial ❒ Public ❒ Roadway ☑ Other Dam Restoration

Tax Map/Parcel No.: 2230100044
BMP ID Code (if known): Inventory #09513
Zoning District:: A1
Land Use: Hunting/Recreation
Site Area (sf or acres): 59.33 AC

Brief Description of Stormwater Management/BMP Facility:

Cranston's Mill Pond has a drainage area of approximately 4500 acres. The original dam was breached in 2006 during a tropical storm. The impoundment structure has been repaired and improved and new spillways added. The pond has been returned to the original 8.15' elevation which corresponds with a 50 acre permanent pool.

Nearest Visible Landmark to SWM/BMP Facility: Chickahominy Baptist Church is 1/2 mile to the north

Nearest Vertical Ground Control (if known):
❒ JCC Geodetic Ground Control ❒ USGS ❒ Temporary ❒ Arbitrary ❒ Other
Station Number or Name:
Datum or Reference Elevation: NAD 83 & NGVD 29
Control Description: Benchmark added on site -- spike in 15" sycamore = 13.90'
Control Location from Subject Facility: Along access road between primary and emergency spillways

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☑ No ☐ Unknown
Approx. Construction Start Date for SWM/BMP Facility: January 24, 2011
Facility Monitored by County Representative during Construction: ☐ Yes ☑ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: Baldwin Contracting and Development
Name of Professional Firm Who Routinely Monitored Construction: Koontz-Bryant, P.C.; Geotechnical by AGS
Date of Completion for SWM/BMP Facility: June 16, 2011
Date of Record Drawing/Construction Certification Submittal: June 24, 2011

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: Cranston Mill Pond, LLC, c/o Earthsource Solutions, Inc.
Mailing Address: 5735 S. Laburnum Avenue
Richmond, Virginia 23231
Business Phone: (804) 222-5114 Fax: (804) 222-5220
Contact Person: Brent L. Fults Title: Principal

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*

Firm Name: Koontz-Bryant, P.C.
Mailing Address: 1703 N. Parham Road, Suite 100
Richmond, Virginia 23229
Business Phone: (804) 740-9200
Fax: (804) 740-7338
Responsible Plan Preparer: Paul F. Hinson, P.E., LEED AP
Title: Director of Engineering
Plan Name: Cranston Mill Pond, Inventory #09513
Firm's Project No. 09114-001
Plan Date: June 14, 2010 (last revised 11/24/10)
Sheet No.'s Applicable to SWM/BMP Facility: C3.0 / C4.0 / C4.1 / S101 / S102

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*

Name: Baldwin Contracting and Development
Mailing Address: P.O. Box 26404
Richmond, Virginia 23260-6404
Business Phone: (804) 355-0071
Fax: (804) 355-0509
Contact Person: Todd Baldwin
Site Foreman/Supervisor: Todd Baldwin
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 - Professional Certifications:

Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: Koontz-Bryant, P.C.
Mailing Address: 1703 N. Parham Road
Richmond, Virginia 23229
Business Phone: (804) 740-9200
Fax: (804) 740-7338

Name: Paul F. Hinson, P.E., LEED AP
Title: Director of Engineering
Signature:
Date:

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-19-11
PROFESSIONAL ENGINEER

_____ (Seal)

Virginia Registered Professional Engineer
or Certified Land Surveyor

Construction Certification

Firm Name: Koontz-Bryant, P.C.
Mailing Address: 1703 N. Parham Road
Richmond, Virginia 23229
Business Phone: (804) 740-9200
Fax: (804) 740-7338

Name: Paul F. Hinson, P.E., LEED AP
Title: Director of Engineering
Signature:
Date:

I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 023860
8-19-11
PROFESSIONAL ENGINEER

_____ (Seal)

Virginia Registered
Professional Engineer

Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

☐ PreConstruction Meeting - Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.

☑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM*** and ***RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.

☑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.

☑ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.

☑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

Dual Purpose Facilities - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

Interim Construction Certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

❒ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*

❒ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate **"RECORD DRAWING "** in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, ***or similar forms thereof***, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.

❒ Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

I. Methods and Presentation: *(Required for all Stormwater Management / BMP facilities.)*

✓ 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.

✓ 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.

✓ 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).

✓ 4. All plan sheet revision blocks modified to indicate date and record drawing status.

✓ 5. All plan sheets have certification statements and certifying professional's signature and seal.

II. Minimum Standards: *(Required for all Stormwater Management / BMP facilities, as applicable.)*

✓ 1. All requirements of Section I (Methods and Presentation) apply to this section.

✓ 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.

✓ 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.

✓ 4. Top widths, berm widths and embankment side slopes. SEE XSECTIONS

✓ 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

✓ 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

✓ 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

✓ 8. Elevation of the principal spillway crest or outlet crest of the structure.

✓ 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
Concrete spillway. Access road shown.

✓ 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

N/A 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.

✓ 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**

N/A 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**

N/A 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.

N/A 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.

✓ 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.

✓ 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.

✓ 18. Maintenance plan taken from approved design plan transposed onto record drawing set.

N/A 19. Fencing location and type, if applicable to facility.

✓ 20. BMP vicinity properly cleaned of stockpiles and construction debris.

✓ 21. No visual signs of erosion or channel degradation immediately downstream of facility.

✓ 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

III. Group A - Wet Ponds *(Includes A-1 Small Wet Ponds; A-2 Wet Ponds; A-3 Wet Ext Det Ponds.)*

✓ A1. All requirements of Section II, Minimum Standards, apply to Group A facilities.

N/A A2. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

N/A A3. Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.

N/A A4. Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.

N/A A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.

N/A A6. Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.

N/A A7. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).

✓ A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.

✓ A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.

N/A A10. Low flow orifice has a non-clogging mechanism.

✓ A11. A pond drain pipe with valve was provided.

✓ A12. Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.

N/A A13. End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IV. Group B - Wetlands *(Includes B-1 Shallow Marsh; B-2 Ext Det Shallow Wetlands; B-3 Pond Wetland System and B-4 Pocket Wetland)*

_____ B1. Same requirements as Group A Wet Ponds.

_____ B2. Minimum 2:1 length to width flow path provided across the facility.

_____ B3. Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).

_____ B4. Wetland type landscaping provided in accordance with approved plan. Includes correct pondscaping zones, plant species, planting arrangements, wetland beds, etc. Wetland plants include 5 to 7 emergent wetland species. Individual plants at 18 inches on center in clumps.

_____ B5. Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).

_____ B6. No more than one-half (½) of the wetland surface area is planted.

_____ B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

_____ B8. Planting zones staked or flagged in field and locations subsequently established by appropriate field surveying methods for record drawing presentation.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

V. Group C - Infiltration Practices

(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)

_____ C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.

_____ C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.

_____ C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.

_____ C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel; grass filter strip; bottom sand layer; upper filter fabric layer; use of washed bank run gravel aggregate.

_____ C5. Sides of infiltration practice lined with filter fabric.

_____ C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

_____ C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.

_____ C9. Minimum twenty-five (25) foot separation down gradient from any structure.

_____ C10. Stormwater outfalls provided for overflow associated with larger design storms.

_____ C11. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.

_____ C13. Observation well provided.

_____ C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VI. Group D - Filtering Systems *(Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters)*

_____ D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

_____ D2. Sediment pretreatment devices provided.

_____ D3. For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.

_____ D4. For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.

_____ D5. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ D6. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed .

_____ D7. Filtering system is off-line from storm drainage conveyance system.

_____ D8. Overflow outlet has adequate erosion protection.

_____ D9. Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.

_____ D10. Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.

_____ D11. Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.

_____ D12. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

_____ D13. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ D14. Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VII. Group E - Open Channel Systems *(Includes E-1 Wet Swales (Check Dams); E-2 Dry Swales;and E-3 Biofilters)*

_____ E1. All requirements of Section II, Minimum Standards, apply to Group E facilities as applicable.

_____ E2. Open channel system has constructed longitudinal slope of less than four (4) percent.

_____ E3. No visual signs of erosion in the open channel system's soil and/or vegetative cover.

_____ E4. Open channel side slopes are no steeper than 2H:1V at any location. Preferred channel sideslope is 3H:1V or flatter.

_____ E5. No visual signs of ponding are present at any location in the open channel system, except at rock check dam locations for E-1 systems (Wet Swales).

_____ E6. For E-2 BMPs (Dry Swales), an underdrain system was provided.

_____ E7. Treated timber or rock check dams provided as pretreatment devices for the open channel system.

_____ E8. Gravel diaphragm provided in areas where lateral sheet flow from impervious surfaces are directly connected to the open channel system.

_____ E9. Grass cover/stabilization in the open channel system appears adaptable to the specific soils and hydric conditions for the site and along the channel system.

_____ E10. Open channel system areas with grass covers higher than four (4) to six (6) inches were properly mowed.

_____ E11. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ E12. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

_____ E13. For E-3 BMPs (Biofilters), the bottom width is six (6) feet maximum at any location.

_____ E14. For E-3 BMPs (Biofilters), sideslopes are 3H:1V maximum at any location.

_____ E15. For E-3 BMPs (Biofilters), the constructed channel slope is less than or equal to three (3) percent at any location.

_____ E16. For E-3 BMPs (Biofilters), the constructed grass channel is approximately equivalent to the constructed roadway length.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VIII. Group F - Extended Dry Detention *(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)*

_____ F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

_____ F2. Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.

_____ F3. Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)

_____ F4. Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.

_____ F5. A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging.

_____ F6. Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

_____ F7. Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.

_____ F8. Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.

_____ F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

_____ F10. Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.

_____ F11. Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.

_____ F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

_____ F13. Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide, slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.

_____ F14. No visual signs of undercutting of timber walls or clogging of the low orifice were present.

_____ F15. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ F16. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IX. Group G - Open Spaces *(Includes All Open Space Types G-1; G-2; and G-3)*

_____ G1. All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.

_____ G2. Constructed impervious areas appear to conform with locations indicated on the approved plan and appear less than sixty (60) percent impervious in accordance with the requirements of the James City County Chesapeake Bay Preservation Ordinance.

_____ G3. Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.

_____ G4. Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).

_____ G5. Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.

_____ G6. Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

X. Storm Drainage Systems (Associated with BMP's Only)

(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)

_____ SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

_____ SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.

_____ SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).

_____ SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.

_____ SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XII. Other Systems

(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception .)

_____ O1. All requirements of Section II, Minimum Standards, apply to this section.

_____ O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

XIII. References

(The James City County Record Drawing and Construction Certification Forms and Checklists for Stormwater Management / BMP facilities were developed using the following sources and references.)

- ❒ Baltimore County, Maryland Soil Conservation District, As-Built Stormwater Management Pond Checklist.
- ❒ James City County, Virginia, Guidelines for Design and Construction of Stormwater Management BMP's (October 1999).
- ❒ James City County, Virginia, Stormwater Detention/Retention Basin Design Checklist and Erosion and Sediment Control and Stormwater Management Design Plan Checklists.
- ❒ James City County Stormwater Policy Framework, Final Report of the James City County BMP Policy Project, October 1998, The Center for Watershed Protection.
- ❒ Prince Georges County, Maryland, As-Built Requirements Retention or Detention Pond/Basin.
- ❒ Prince William County, Virginia, Stormwater Management Fact Sheet.
- ❒ Stafford County, Virginia, As-Built Plan Checklist.
- ❒ Stormwater Management Design Manual, NRCS Maryland Code No. 378, Pond Standards and Specifications.
- ❒ USEPA/Watershed Management Institute, Stormwater Management Inspection Forms.
- ❒ Virginia Impounding Structure Regulations (Dam Safety), Department of Conservation & Recreation, 1997.
- ❒ Virginia Erosion and Sediment Control Handbook, Third Edition 1992, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.
- ❒ Virginia Stormwater Management Handbook, 1999 edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.

File: Shared\SWMProg\BMP\Certif\RDCC_fillable.wpd

KOONTZ-BRYANT, P.C.
Site Development Solutions

Environmental Division

AUG 31 2011

TRANSMITTAL

TO: Mike Woolson
James City County Environmental
101-E Mounts Bay Road
Williamsburg, VA 23185
PHONE: 757-253-6670

DATE: 8-26-11

RECEIVED

REFERENCE: Cranston Mill Pond
CBB Site Plans
PROJECT NO: 9114.002.00

FROM: Paul Hinson
PHONE: 804-200-1914

cc: Brent Fults

Transmitted By:
☒ Mail/UPS ☐ Overnight ☐ Courier ☐ Hand Deliver ☐ Client Pickup ☐ _____

Attached are the following items:

COPIES	DATE	DESCRIPTION
2	8-22-11	Record Drawing Set of Cranston Mill Pond
1	8-22-11	JCC Stormwater Management/BMP Facilities Record Drawings and Construction Certification Forms

These items are transmitted as checked below:

☒ For approval ☐ As requested ☐ Information returned after loan
☐ For your use ☐ Review & comment ☐ _____

Additional Comments:

Mike,

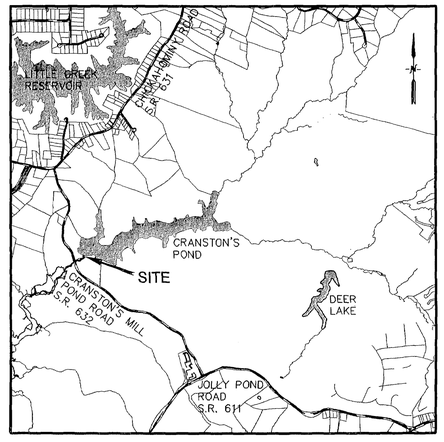
Attached are the record drawings for the CMP.

CRANSTON MILL POND - RECORD DRAWINGS

INVENTORY # 09513

JCC-SP-0093-2010

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA



VICINITY MAP

SCALE: 1" = 2000'

0 2000 4000 6000

ENVIRONMENTAL INVENTORY

1. **TIDAL WETLANDS**: NONE ON SITE
2. **TIDAL SHORES**: NONE ON SITE
3. **NONTIDAL WETLANDS (RPA)**: PRESENT (3534 SF IMPACTED)
4. **100' BUFFER (RPA)**: PRESENT – ENTIRE SITE IS IN RPA (3.56 ACRES IMPACTED)
5. **NONTIDAL WETLANDS (RMA)**: NONE ON SITE (ALL WETLANDS WITHIN RPA)
6. **100-YR FLOODPLAIN**: FEMA FLOODPLAIN SHOWN ON PLANS.
7. **SLOPES 25% OR GREATER**: PRESENT (28,031 SF IMPACTED)

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

SITE DATA

OWNER/CONTRACT PURCHASER
CRANSTON MILL POND, LLC
C/O EARTHSOURCE SOLUTIONS INC.
5735 S. LABURNUM AVENUE
RICHMOND, VA 23231
CONTACT: BRENT FULTS
PHONE: (804) 222-5114
FAX: (804) 222-5220
EMAIL: BFULTS@ESSWETLANDS.COM

CIVIL ENGINEER
KOONTZ-BRYANT, P.C.
1703 NORTH PARHAM ROAD
SUITE 100
RICHMOND, VA 23229
CONTACT: PAUL HINSON, P.E., LEED AP
PHONE: (804) 200-1914
FAX: (804) 740-7338
EMAIL: PHINSON@KOONTZBRYANT.COM

SITE ADDRESS
6616 CRANSTON'S MILL POND ROAD
TOANO, VA 23168-9067

ZONING
A1

MAP REFERENCE
PARCEL ID: 2230100044

FIRM FLOOD MAP REFERENCE
FLOOD ZONE X
MAP NUMBERS: 51095C0105C
51095C0110C

PORTIONS OF THE PROPERTY SHOWN ON THIS SITE PLAN ARE AT AN ELEVATION BELOW THE FEMA 100-YEAR FLOODPLAIN ELEVATION SHOWN ON THE FIRM MAP. THE LIMITS OF THE FEMA FLOODPLAIN ARE SHOWN ON THE SITE PLANS.

UTILITIES
WATER: NONE
SEWER: NONE

AREA
153.48 AC. (WHOLE EXISTING PARCEL)
59.33 AC. (PROPOSED PARCEL)
3.56 AC. (DISTURBED AREA)

WATERSHED
THE ENTIRE PROJECT LIES WITHIN THE YARMOUTH CREEK WATERSHED.
VIRGINIA 6TH ORDER NWBD HUC: JL28

TOPOGRAPHICAL INFORMATION
SURVEY PERFORMED BY TIMMONS GROUP IN FALL 2009.
SURVEY MERGED WITH JAMES CITY COUNTY GIS.

HORIZONTAL AND VERTICAL DATUM
NAD 83 & NGVD 29

IMPOUNDING STRUCTURE DATA
TOP OF DAM: 15.00' **(AS-BUILT 14.6' LOW POINT)**
HEIGHT: 11'
CREST WIDTH: 10'
NORMAL POOL ELEVATION: 8.15' **(AS-BUILT 8.08' LOW POINT)**

NOTES

1. THE STORMWATER MANAGEMENT/BMP FACILITY AND ASSOCIATED STORMWATER CONVEYANCE SYSTEMS AS PROPOSED FOR THIS PROJECT WILL REQUIRE SUBMISSION, REVIEW, AND APPROVAL OF A RECORD DRAWING (AS-BUILT) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND/SURETY. CERTIFICATION IS REQUIRED BY A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE STRUCTURE BEFORE, DURING, AND AFTER ITS CONSTRUCTION IN ACCORDANCE WITH CURRENT COUNTY GUIDELINES.
2. OUTDOOR SIGNS ON THE PROPERTIES WITHIN THIS DISTRICT SHALL COMPLY WITH THE REGULATIONS FOR EXTERIOR SIGNS IN ARTICLE II, DIVISION 3 OF THE ZONING ORDINANCE.
3. ON NOVEMBER 9TH, 2010 THE JAMES CITY COUNTY BOARD OF SUPERVISORS APPROVED THE SPECIAL USE PERMIT: SUP-0023-2010.
4. PORTIONS OF THE PROPERTY SHOWN ON THIS SITE PLAN ARE AT AN ELEVATION BELOW THE FEMA 100-YR FLOODPLAIN ELEVATION. THE LIMITS OF THE FEMA FLOODPLAIN ARE SHOWN ON THE SITE PLAN.

CONTENTS

C1.0	TITLE SHEET
C2.0	OVERALL LAYOUT
C3.0	LAYOUT AND GRADING PLAN
C4.0	CROSS SECTIONS
C4.1	CROSS SECTIONS
C5.0	NOTES AND DETAILS
C5.1	OPERATION AND MAINTENANCE PLAN
S-101	NEW SPILLWAY STRUCTURE
S-102	NEW SPILLWAY STRUCTURE
S-103	NEW SPILLWAY STRUCTURE

Environmental Division
AUG 31 2011
RECEIVED

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 020880
8-22-11
PROFESSIONAL ENGINEER

REVISIONS:
8/26/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS
POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

TITLE SHEET

DATE: JUNE 14, 2010

JN: 09114-001

C1.0

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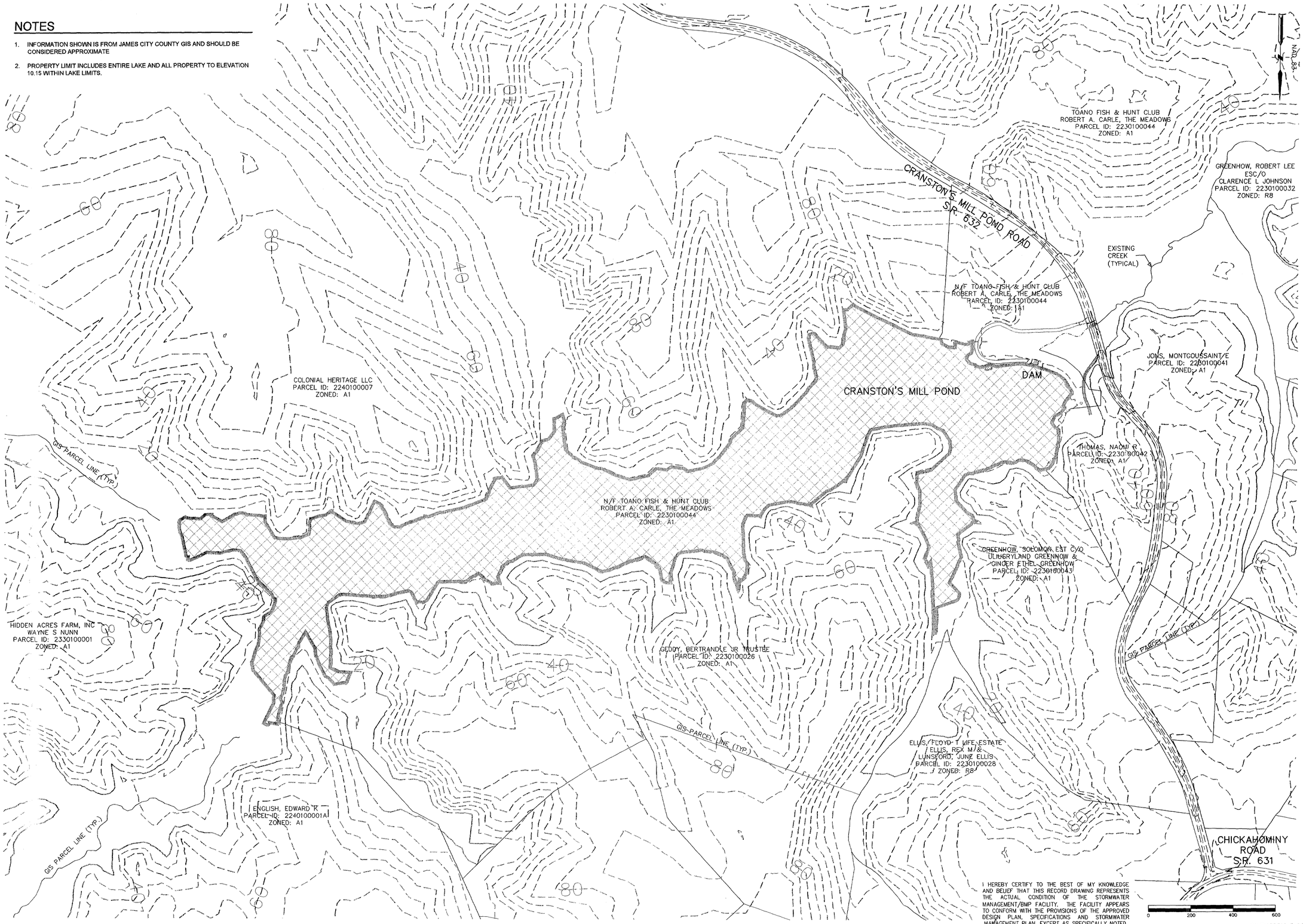
NOTES

1. INFORMATION SHOWN IS FROM JAMES CITY COUNTY GIS AND SHOULD BE CONSIDERED APPROXIMATE
2. PROPERTY LIMIT INCLUDES ENTIRE LAKE AND ALL PROPERTY TO ELEVATION 10.15 WITHIN LAKE LIMITS.



I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HERSON
Lic. No. 023860
PROFESSIONAL ENGINEER
9-22-11

REVISIONS:
9/22/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
9/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

JAMES CITY COUNTY, VIRGINIA

POWHATAN DISTRICT

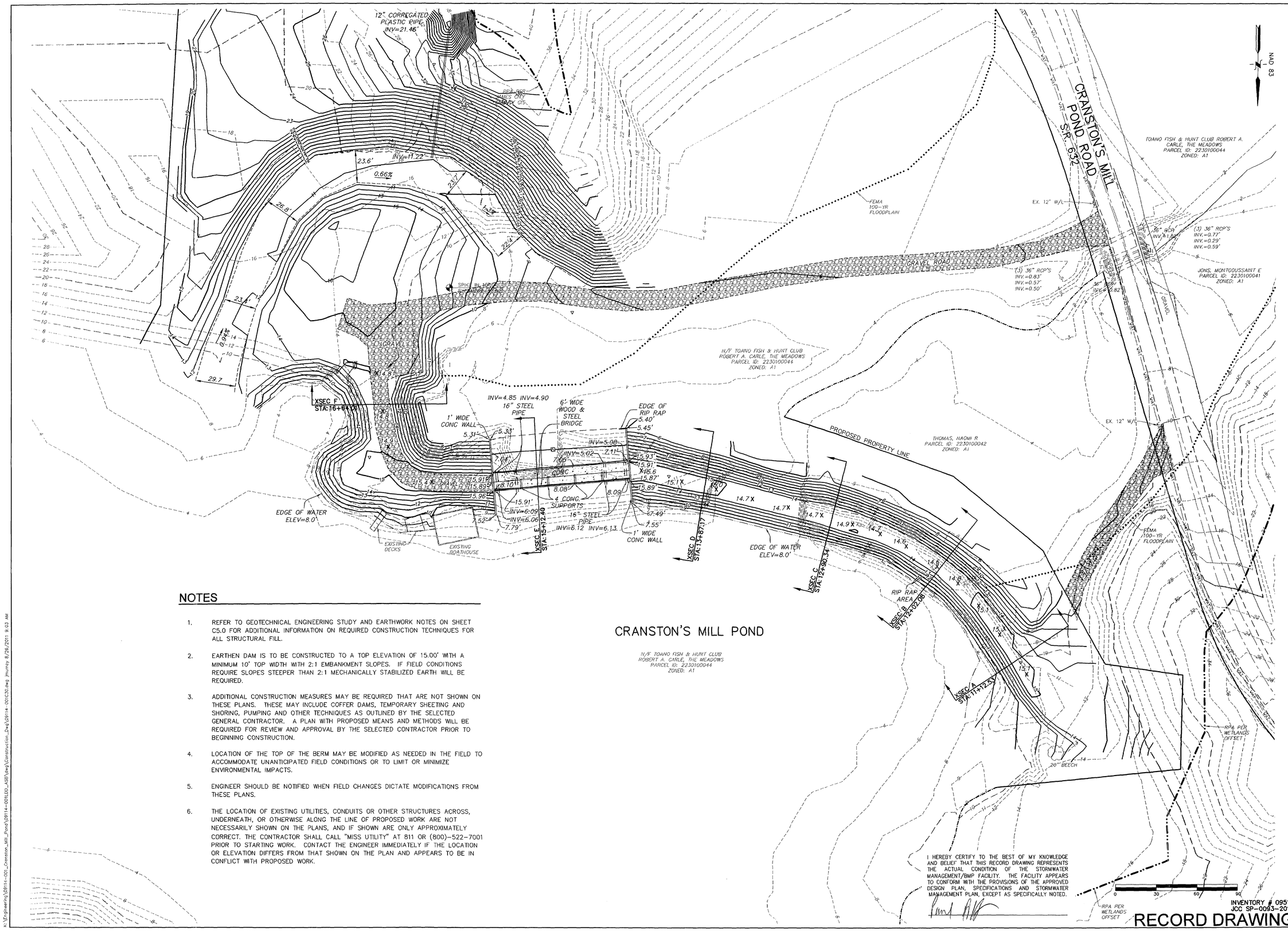
OVERALL LAYOUT

DATE: JUNE 14, 2010

JN: 09114-001

C2.0

K:\Engineering\09114-001_Cranston_Mill_Pond\09114-001LDD_ASB\Live\Construction_Dwg\09114-001C20.dwg jmurray 8/26/2011 9:04 AM



NOTES

1. REFER TO GEOTECHNICAL ENGINEERING STUDY AND EARTHWORK NOTES ON SHEET C5.0 FOR ADDITIONAL INFORMATION ON REQUIRED CONSTRUCTION TECHNIQUES FOR ALL STRUCTURAL FILL.
2. EARTHEN DAM IS TO BE CONSTRUCTED TO A TOP ELEVATION OF 15.00' WITH A MINIMUM 10' TOP WIDTH WITH 2:1 EMBANKMENT SLOPES. IF FIELD CONDITIONS REQUIRE SLOPES STEEPER THAN 2:1 MECHANICALLY STABILIZED EARTH WILL BE REQUIRED.
3. ADDITIONAL CONSTRUCTION MEASURES MAY BE REQUIRED THAT ARE NOT SHOWN ON THESE PLANS. THESE MAY INCLUDE COFFER DAMS, TEMPORARY SHEETING AND SHORING, PUMPING AND OTHER TECHNIQUES AS OUTLINED BY THE SELECTED GENERAL CONTRACTOR. A PLAN WITH PROPOSED MEANS AND METHODS WILL BE REQUIRED FOR REVIEW AND APPROVAL BY THE SELECTED CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
4. LOCATION OF THE TOP OF THE BERM MAY BE MODIFIED AS NEEDED IN THE FIELD TO ACCOMMODATE UNANTICIPATED FIELD CONDITIONS OR TO LIMIT OR MINIMIZE ENVIRONMENTAL IMPACTS.
5. ENGINEER SHOULD BE NOTIFIED WHEN FIELD CHANGES DICTATE MODIFICATIONS FROM THESE PLANS.
6. THE LOCATION OF EXISTING UTILITIES, CONDUITS OR OTHER STRUCTURES ACROSS, UNDERNEATH, OR OTHERWISE ALONG THE LINE OF PROPOSED WORK ARE NOT NECESSARILY SHOWN ON THE PLANS, AND IF SHOWN ARE ONLY APPROXIMATELY CORRECT. THE CONTRACTOR SHALL CALL "MISS UTILITY" AT 811 OR (800)-522-7001 PRIOR TO STARTING WORK. CONTACT THE ENGINEER IMMEDIATELY IF THE LOCATION OR ELEVATION DIFFERS FROM THAT SHOWN ON THE PLAN AND APPEARS TO BE IN CONFLICT WITH PROPOSED WORK.

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HUNTON
Lic. No. 023950
8-22-11
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
10/25/10 REV. PER INTERDISCIPLINARY COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

LAYOUT AND GRADING PLAN

DATE: JUNE 14, 2010

JN: 09114-001

C3.0

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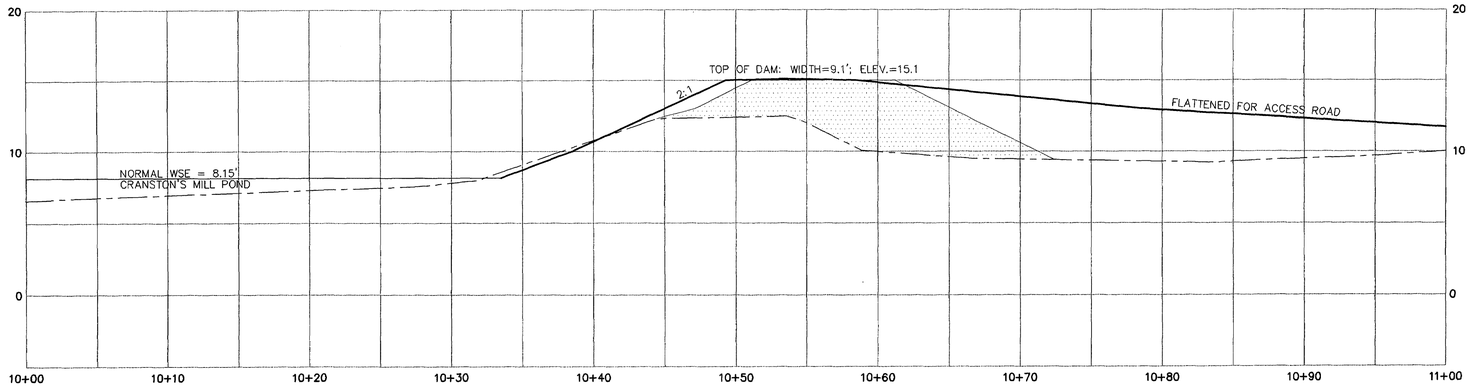
LEGEND

- EXISTING GRADE
- "AS-BUILT" GRADE
- PROPOSED GRADE



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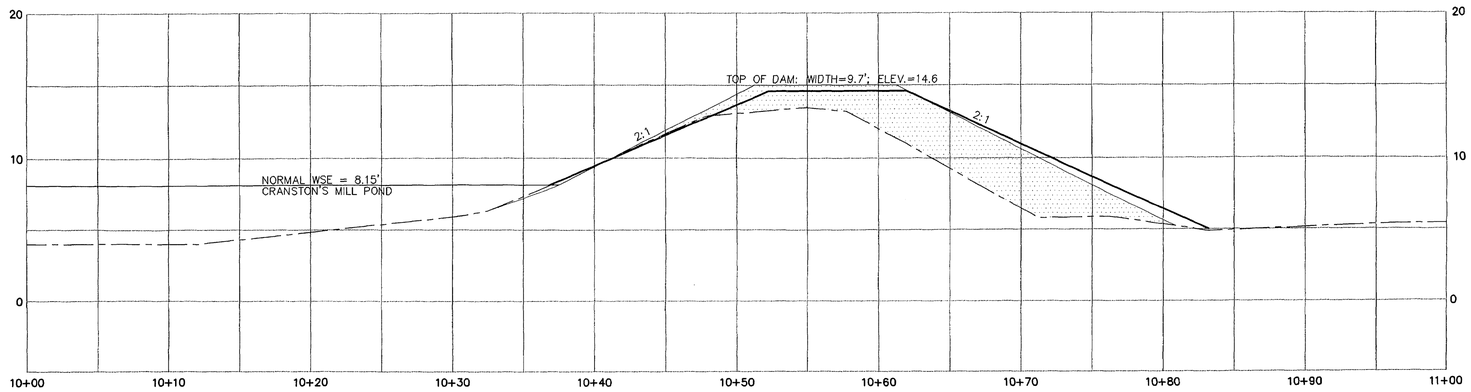

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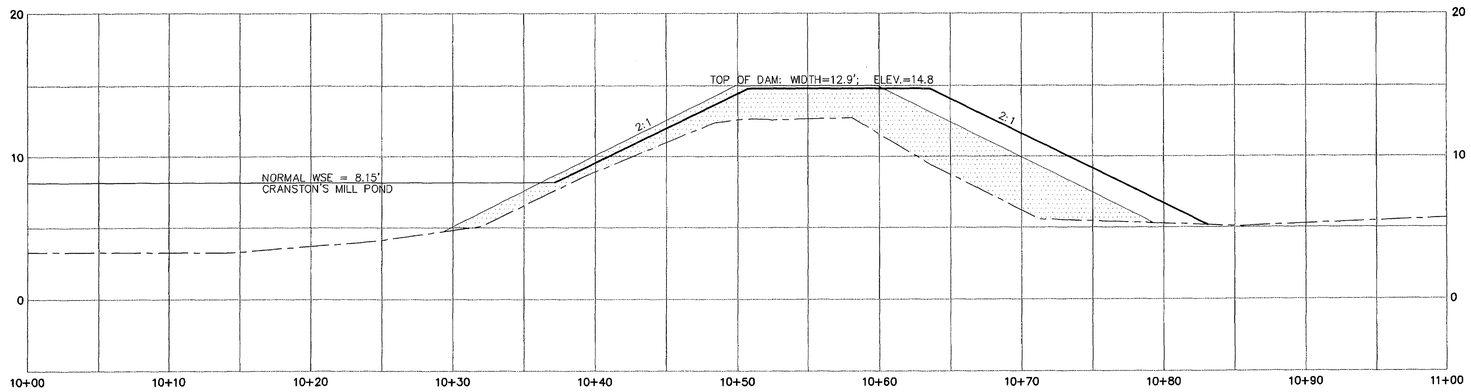

DAM XSEC C
STA: 12+90.34

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

VERT.
0 5 10 15
HORZ.
0 5 10 15

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER
Lic. No. 022600
9-22-11

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT
JAMES CITY COUNTY, VIRGINIA

CROSS SECTIONS

DATE: JUNE 14, 2010

JN: 09114-001

C4.0

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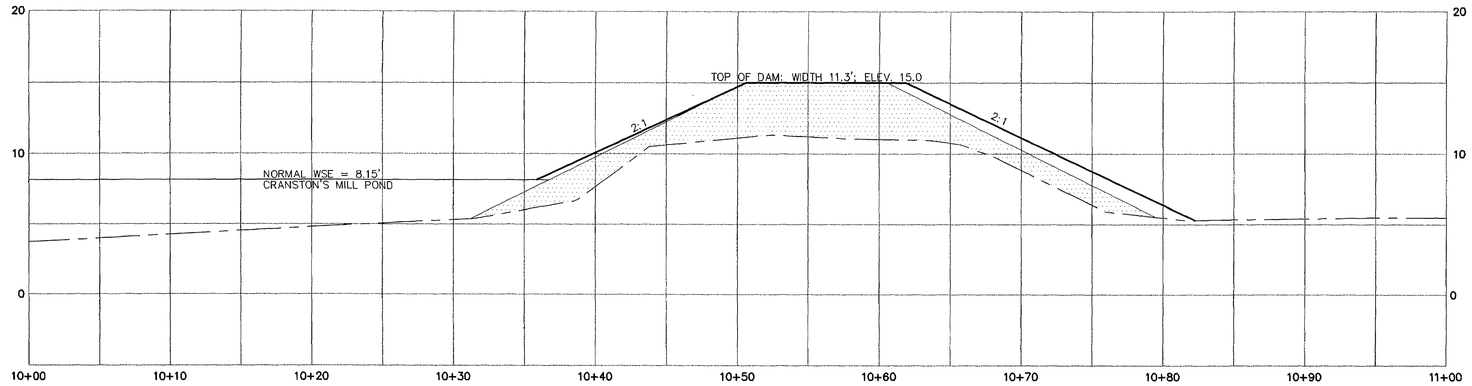
LEGEND

- EXISTING GRADE
- "AS-BUILT" GRADE
- PROPOSED GRADE



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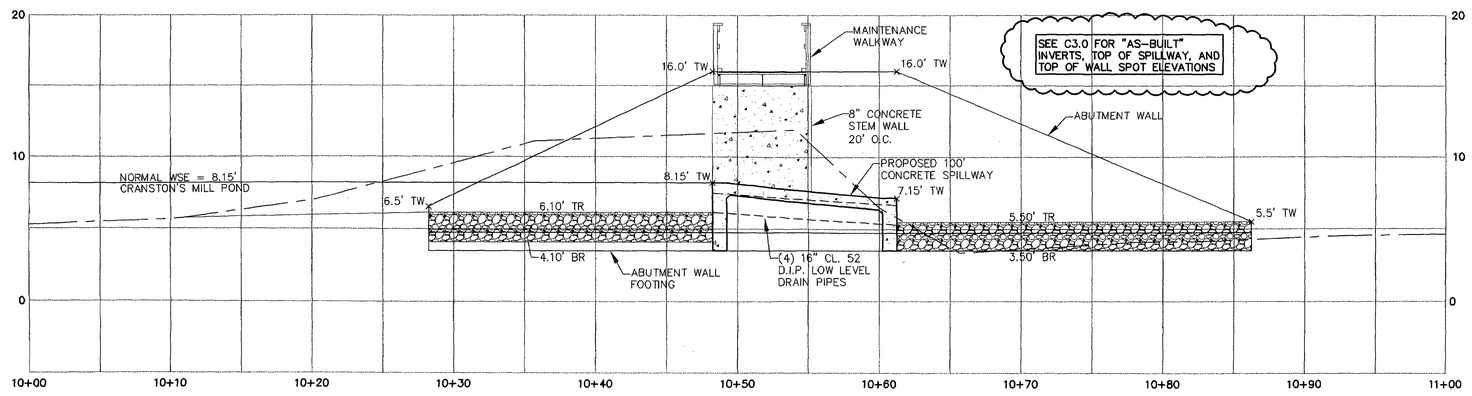

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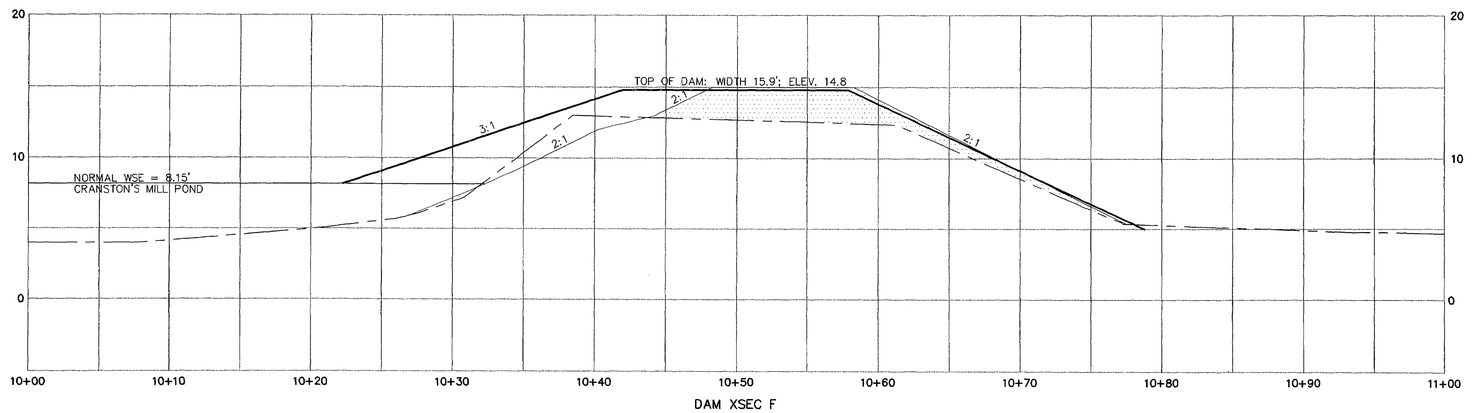

DAM XSEC F
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I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

VERT.
0 5 10 15

HORZ.
0 5 10 15

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HUNSON
Lic. No. 063880
PROFESSIONAL ENGINEER
9-22-11

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/29/10 REV. PER STRUCTURAL COORDINATION
1/24/11 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
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kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

JAMES CITY COUNTY, VIRGINIA

POWHATAN DISTRICT

CROSS SECTIONS

DATE: JUNE 14, 2010

JN: 09114-001

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McKINNEY & COMPANY

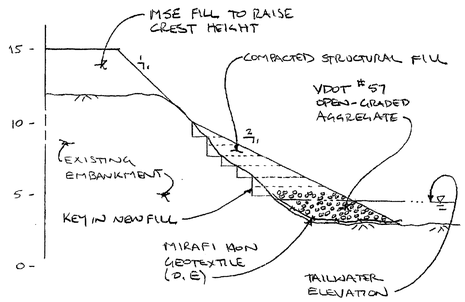
MAIN OFFICE
100 South Railroad Ave.
Ashland, Virginia 23005
(804) 798-1451
(804) 798-7072 facsimile

WILLIAMSBURG
460 McLaws Circle, Suite 150
Williamsburg, Va. 23185
(757) 220-0400
(757) 229-6301 facsimile

PANAMA
McKinney International
Torre AIR
Ave. Samuel Lewis y calle 56
Piso 10, oficina 1042
Panamá, República de Panamá
(507) 265-0185
(507) 265-1185 facsimile

PROJECT 14752A09
SHEET NO. 1 OF 1
CALCULATED BY CVS DATE 5/2/11
CHECKED BY ____ DATE ____

FIGURE 2



PRODUCT DS575-1 ABCDEF

STOP GATES

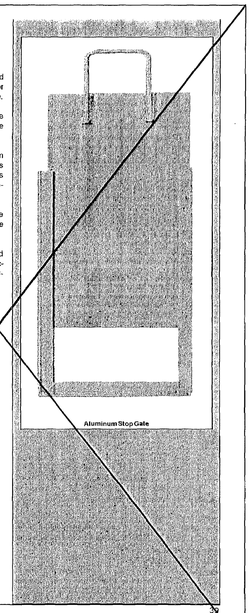
Waterman Stop Gates can be fitted with either rod handles or a slot grip for hand placing. Guide rails for embedded, flatback or channel mounting are available.

These gates are designed for a maximum head of one foot over the slide, unless otherwise specified and are used generally in diversion applications.

Options available include "J" Bulb seals for minimum leakage, ultra high molecular weight polyethylene seats for increased ease of operation and special cut outs such as "V" notch or slot openings for water measurement.

All frames feature welded construction. Slides are minimum ¼" thick to minimize deflection and contribute to long gate life.

Available in an almost unlimited range of sizes and configurations, Waterman stop gates can be manufactured from aluminum, steel, stainless steel or fiberglass.



Aluminum Stop Gate

Waterman INDUSTRIES, INC.

TYPICAL SPECIFICATIONS
ALUMINUM STOP GATES

Guides
The gate frame shall be a rigid, welded unit with a clear opening the same size as the waterway, unless otherwise specified. The guides shall be of structural or stainless steel shapes or aluminum extrusions. The guides will be of the length specified.

Additional members will be added to the frame as required for flushbottom closure, spigots, and "J" Bulb seals.

Slide
The slide shall be plate reinforced with structural shapes welded to the plate. The slide shall not deflect more than 1/360 of the span of the gate under maximum head.

Flushbottom Closure
When indicated on the plans or in the gate schedule, gates shall be furnished with a flush seal arrangement. A resilient neoprene seal shall be securely attached to the frame along the invert, and shall extend to the depth of the guide groove.

"J" Bulb Seals
When an unseating head is shown on the plans, or specified in the gate schedule, the gate shall be provided with "J" Bulb seals along the sides of the gate. Seals shall be mounted either on the frame or slide, such that seals do not protrude into the specified opening of the gate.

(Optional). Gates shall be furnished complete with ultra high molecular weight (U.H.M.W.) polymer seats which contact the slide face.

For steel and stainless steel gates, ultra high molecular weight bearing strips shall be mechanically retained to lock seat in place. For aluminum gates, strips shall be installed in dovetail grooves in the extruded frame.

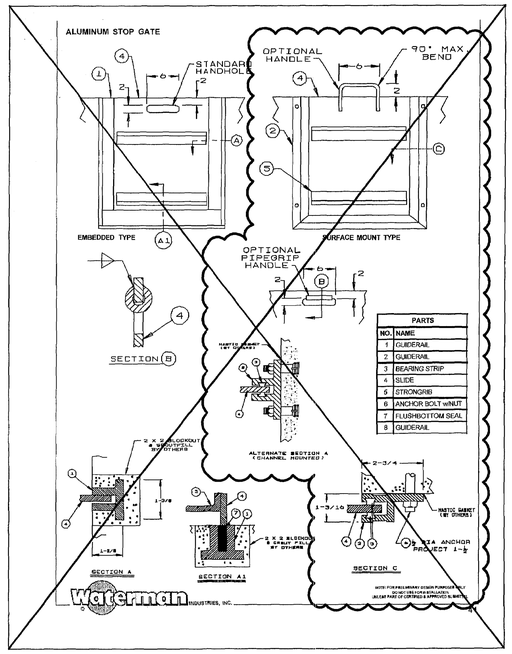
Material
Frames and Slides
Mild steel - ASTM A-36, or
Stainless Steel - ASTM A-276, Type 304, unless specified
Aluminum - ASTM B-209 and B-211 alloy 6061-T6

Fasteners
Steel - ASTM A-307 Galvanized per ASTM A-153, or
Stainless Steel - ASTM A-276, Type 304, unless specified
Stainless Steel - ASTM A-193 18-8, as specified

Flushbottom Seals and "J" Bulb Seals
Rubber - ASTM D-2000 BC 610/615 or other suitable composition for extended use in water and sewage

Finish
Manufacturer's Standard Paint on mild steel
Mill finish on all aluminum and stainless steel

Waterman INDUSTRIES, INC.



Waterman INDUSTRIES, INC.

EARTH WORK NOTES

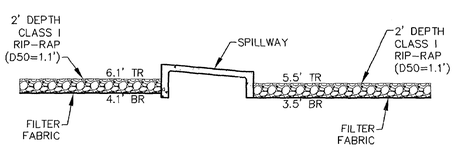
1. ALLOWABLE SOIL TYPES INCLUDE CL, ML, SM AND SC PROVIDING THAT THE SOILS SHALL CONTAIL AT LEAST 30% SAND OR 30% FINES AND HAVE A PLASTICITY INDEX OF LESS THAN 35.
2. ALL SOILS SHALL BE COMPACTED TO AT LEAST A DENSITY OF 95% OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698. COMPACTION MOISTURE CONTENT SHOULD BE CONTROLLED TO WITHIN 3% OF OPTIMUM MOISTURE
3. SUBGRADES TO RECEIVE COMPACTED STRUCTURAL FILL SHALL BE CLEARED OF ALL TOPSOIL AND ORGANIC, WET OR OTHERWISE DISTURBED SOILS.
4. WHERE FILL PLACEMENT IS REQUIRED IN STANDING WATER OR IN AREAS OF SATURATED SUBGRADE, THE SUBGRADE SHALL CLEARED OF ALL TOPSOIL AND ORGANICS, OVERLAIN WITH MIRAFI 140N OR EQUIVALENT GEOTEXTILE FABRIC AND BACKFILLED WITH VDOT #57 STONE SUFFICIENT TO ALLOW A STABLE BASE FOR THE PLACEMENT OF STRUCTURAL FILL.

LOW LEVEL OUTLET SLUICE GATE S

1. OUTLET GATE TO BE 18"X18" OR AS REQUIRED TO SEAL A 16" ROUND OPENING
2. FOUR GATES WILL BE PROVIDED. ONE FOR EACH 16" LOW LEVEL DRAIN PIPE.
3. OPENING SPACING TO BE ALTERED AS REQUIRED TO ALLOW FOR INSTALLATION OF GATES.
4. SHOP DRAWING TO BE SUBMITTED PRIOR TO ORDERING AND INSTALLING.
5. GATE AS MANUFACTURED BY WATERMAN AND ASSOCIATES OR EQUIVALENT.

NOTE: SLUICE GATES REPLACED WITH 16" AWWA GATE VALVES WITH OPERATOR EXTENSIONS TO THE TOP OF THE MAINTENACE BRIDGE.

RIP-RAP ARMORING



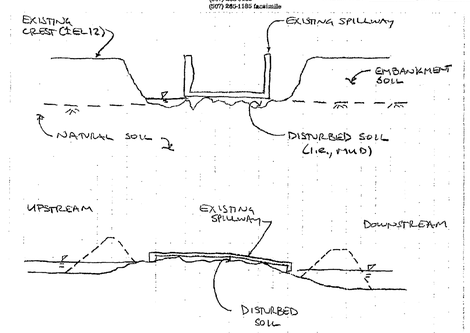
McKINNEY & COMPANY

MAIN OFFICE
100 South Railroad Ave.
Ashland, Virginia 23005
(804) 798-1451
(804) 798-7072 facsimile

WILLIAMSBURG
460 McLaws Circle, Suite 150
Williamsburg, Va. 23185
(757) 220-0400
(757) 229-6301 facsimile

PANAMA
McKinney International
Calle Aquilino de la Guardia
Torre Banco General, Piso II
Panamá, República de Panamá
(507) 265-0185
(507) 265-1185 facsimile

PROJECT ____
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____



1) CONSTRUCT COFFERDAM
2) REMOVE EXISTING SPILLWAY
3) DEWATER WORK AREA AND REMOVE DISTURBED SOIL
4) PLACE COMPACTED STRUCTURAL FILL TO 95% RELATIVE COMPACTION
5) BENCH (KEY) IN NEW FILL TO EXISTING EMBANKMENT
6) PROVIDE TOE DRAIN AS SHOWN

PRODUCT DS575-1 ABCDEF

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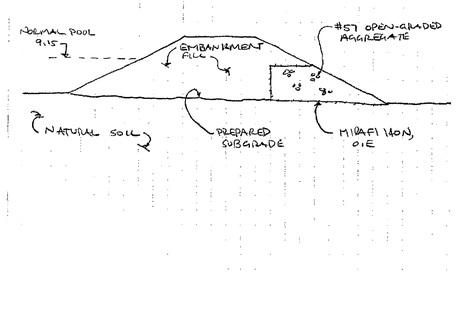
PROJECT ____
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____

EXISTING SPILLWAY INFILL



PRODUCT DS575-1 ABCDEF

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INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. THOMSON
LIC. No. 023860
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/24/10 REV. PER STRUCTURAL COORDINATION
1/10/11 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS
POWHATAN DISTRICT
JAMES CITY COUNTY, VIRGINIA

NOTES & DETAILS

DATE: JUNE 14, 2010
JN: 09114-001

C5.0

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DCR
Virginia Department of Conservation & Recreation
State Parks • Soil & Water Conservation • Natural Heritage
Chesapeake Bay Local Assistance • Dam Safety & Floodplain Management
Outdoor Recreation Planning • Earth Sciences & Mineral Resources

Date Prepared: July 12, 2011
Prepared By: Paul F. Hinson, P.E.
Koontz-Bryant, P.C.
1703 N. Parham Rd.
Richmond, VA 23229

OPERATION AND MAINTENANCE CERTIFICATE APPLICATION FOR VIRGINIA REGULATED IMPOUNDING STRUCTURES

Note: Any executed Application for an Operation and Maintenance Certificate must be mailed to the appropriate Regional Engineer. In addition, a completed Certificate and Permit Application Fee Form (DCR199-192) and the required fee must be mailed under separate cover to: Virginia Department of Conservation and Recreation, Division of Finance, Accounts Payable, 203 Governor Street, 4th Floor, Richmond, Virginia 23219.

Reference: Impounding Structures Regulations, 4VAC 50-20-10 et seq., including 4VAC 50-20-105 and 4VAC 50-20-150, Virginia Soil and Water Conservation Board

1. Name of Dam: Cranstons Mill Pond Dam Inventory Number: 09513
Other Name (if any):

2. Hazard Potential Classification (See 4VAC 50-20-40 Hazard Classifications of the Virginia Impounding Structure Regulations):
(Check one) ☐ HIGH ☒ SIGNIFICANT ☐ LOW

3. Name of Owner(s): Cranston Mill Pond, LLC, c/o Earth Source Solutions
If a corporation, name of representative: Brent L. Falls, LA
Mailing address: 5735 S. Laburnum Avenue, Richmond, VA 23231
Telephone: (Business) 804-222-5114 (Residential) 804-303-8632
Other means of communication: 804-357-1251 (M)

4 Operating Plan and Schedule:
Provide a narrative for each item:
a. Operation of control gates and spillways: Annually
b. Operation of Impoundment Drain: None

5. Maintenance Plan and Schedule:
Provide a narrative explaining the Maintenance Plan and Schedule.
a. Earthen Embankment Impounding Structures:
(1) embankment: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Mow a minimum of 3 times a year. Repair any erosion within 30 days of detection. Permanently seed any denuded areas.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(2) principal spillway: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Items to be inspected will include the primary weir, wing walls, rip rap armoring, maintenance walkway and level gauge painted on wing walls. If any significant cracks or imperfections are detected, perform a follow-up inspection within 30 days by a professional engineer. Repair any deficiences within 30 days of detection.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(3) emergency spillway: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Mow a minimum of 3 times a year. Repair any erosion within 30 days of detection. Permanently seed any denuded areas.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(4) low level outlet: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Gates should be operated to ensure they are functioning properly.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(5) impoundment area: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Inspection will be from the water surface by boat. Inspection for evidence of erosion, sloughing, accumulation of sediment or other debris within the inflow channels or the impoundment area.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(6) downstream channel: Annual inspection by Owner or Owner's representative. Inspect for debris within the channel or other impediments to the flows. Repair or remove as allowed by regulations for wetlands and waters of the U.S.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(7) staff gages: Annual inspection by Owner or Owner's representative. Examine level gauges painted on wing walls of principal spillway walls and depth gauge within emergency spillway is still in place and legible. Repair or replace as needed.

Inspection report prepared by a professional engineer a minimum of every 3 years.

(8) other maintenance actions: Annual inspection by Owner or Owner's representative of maintenace walkway. Check for loose boards, railing, supports. Ensure steel beams are properly supported on the foundations and still sound. Inspection report prepared by a professional engineer a minimum of every 3 years.

b. Concrete Impounding Structures (including masonry and others): **Not Applicable**
(1) upstream face:
(2) downstream face:
(3) crest of dam:
(4) galleries (tunnels):
(5) abutments:
(6) spillways:
(7) gates and outlets:
(8) staff gages:
(9) other maintenance actions:

6. Inspection schedule (provide appropriate response):
a. Operator inspection (daily, weekly, etc.): Facility is not manned. Annual inspections by Owner or Owner's Representative and after every Stage 2 and 3 condition as outlined in the EAP.
b. Maintenance inspection (monthly, quarterly, semi-annual, annual): Annual inspections by Owner or Owner's Representative and after every Stage 2 and 3 condition as outlined in the EAP.
c. Technical safety inspection by a professional engineer. (Required for certification update: High Hazard Dams – every two years, Significant Hazard Dams – every three years and Low Hazard Dams – every six years: Every 3 years or as required based upon deficiences discovered during annual inspections.
d. Inspection by dam owner or designee (years in which a Professional Engineer does not inspect): Annually
e. Note: All dams must be inspected by a professional engineer each time a dam is overtopped or significant flows through the emergency spillway are experienced.

7. Emergency Action Plan Schedule:
Provide the events that initiate the Emergency Action Plan.
a. Rainfall amounts, emergency spillway flow levels or storm event: Stage I Condition – Flood Watch
Stage II Condition – 1' of flow in emergency spillway or 4.9' of flow over primary spillway.
Stage III Condition – 2' of flow in emergency spillway or 5.9' of flow over primary spillway.

b. Frequency of observation: Stage I condition: 6 hours Stage II condition: 2 hours Stage III condition: Continuous

8. State whether or not the current hazard classification for the impounding structure is appropriate and whether or not additional work is needed to make an appropriate hazard designation:

Dam is currently classified as a Significant Hazard. An Alteration Permit has been granted and construction was completed in June of 2011.

9. For newly constructed or recently altered impounding structures, provide certification from a Professional Engineer who has inspected the impounding structure during construction or alteration that, to the best of the engineer's judgment, knowledge and belief, the impounding structure and its appurtenances have been constructed or altered in conformance with the plans, specifications, drawings and other requirements approved by the Virginia Soil and Water Conservation Board.

OPERATION AND MAINTENANCE CERTIFICATE APPLICATION

OPERATION AND MAINTENANCE PLAN AND SCHEDULE CERTIFICATION BY OWNER

I hereby certify that the operation and maintenance plan and schedule provided herewith will be adhered to during the certification period except in cases of unanticipated emergency requiring departure therefrom in order to mitigate hazards to life and property, at which time my engineer and the Department of Conservation and Recreation will be notified.

Signed: Paul F. Falls, CRANSTON MILL POND LLC (Owner's Signature) Brent L. Falls/LMP (Print Name)

This JULY day of 12, 20 11.

CERTIFICATION BY OWNER'S ENGINEER

I hereby certify that the information provided in this form has been examined by me and found in my professional judgment to be true and correct.

Signed: (Professional Engineer's Signature) Paul F. Hinson, P.E. (Print Name) Virginia Number: 023860

This 12 day of July, 20 11.

Engineer's Virginia Seal: COMMONWEALTH OF VIRGINIA PAUL F. HINSON Lic. No. 023860 7-12-11 PROFESSIONAL ENGINEER

Remarks:

Mail the executed form to the appropriate Department of Conservation and Recreation Division of Dam Safety and Floodplain Management Regional Engineer

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

INVENTORY # 09513
JCC SP-0093-2010
RECORD DRAWING

COMMONWEALTH OF VIRGINIA PAUL F. HINSON Lic. No. 023860 7-22-11 PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER CITY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-0970 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS
POWHATAN DISTRICT
JAMES CITY COUNTY, VIRGINIA
OPERATION AND MAINTENANCE PLAN

DATE: JUNE 14, 2010
JN: 09114-001
C5.1

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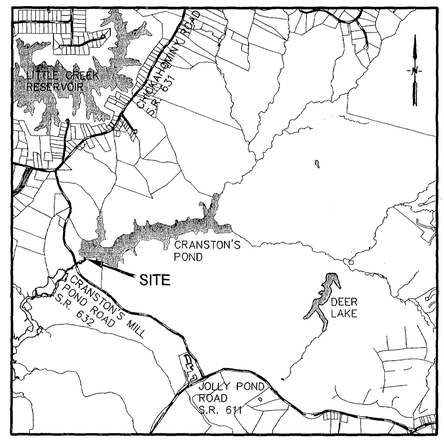
CRANSTON MILL POND - RECORD DRAWINGS

INVENTORY # 09513

JCC-SP-0093-2010

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA



VICINITY MAP

SCALE: 1" = 2000'

0 2000 4000 6000

ENVIRONMENTAL INVENTORY

1. **TIDAL WETLANDS**: NONE ON SITE
2. **TIDAL SHORES**: NONE ON SITE
3. **NONTIDAL WETLANDS (RPA)**: PRESENT (3534 SF IMPACTED)
4. **100' BUFFER (RPA)**: PRESENT – ENTIRE SITE IS IN RPA (3.56 ACRES IMPACTED)
5. **NONTIDAL WETLANDS (RMA)**: NONE ON SITE (ALL WETLANDS WITHIN RPA)
6. **100–YR FLOODPLAIN**: FEMA FLOODPLAIN SHOWN ON PLANS.
7. **SLOPES 25% OR GREATER**: PRESENT (28,031 SF IMPACTED)

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

SITE DATA

OWNER/CONTRACT PURCHASER
CRANSTON MILL POND, LLC
C/O EARTHSOURCE SOLUTIONS INC.
5735 S. LABURNUM AVENUE
RICHMOND, VA 23231
CONTACT: BRENT FULTS
PHONE: (804) 222–5114
FAX: (804) 222–5220
EMAIL: BFULTS@ESSWETLANDS.COM

CIVIL ENGINEER
KOONTZ–BRYANT, P.C.
1703 NORTH PARHAM ROAD
SUITE 100
RICHMOND, VA 23229
CONTACT: PAUL HINSON, P.E., LEED AP
PHONE: (804) 200–1914
FAX: (804) 740–7338
EMAIL: PHINSON@KOONTZBRYANT.COM

SITE ADDRESS
6616 CRANSTON'S MILL POND ROAD
TOANO, VA 23168–9067

ZONING
A1

MAP REFERENCE
PARCEL ID: 2230100044

FIRM FLOOD MAP REFERENCE
FLOOD ZONE X
MAP NUMBERS: 51095C0105C
51095C0110C

PORTIONS OF THE PROPERTY SHOWN ON THIS SITE PLAN ARE AT AN ELEVATION BELOW THE FEMA 100–YEAR FLOODPLAIN ELEVATION SHOWN ON THE FIRM MAP. THE LIMITS OF THE FEMA FLOODPLAIN ARE SHOWN ON THE SITE PLANS.

UTILITIES
WATER: NONE
SEWER: NONE

AREA
153.48 AC. (WHOLE EXISTING PARCEL)
59.33 AC. (PROPOSED PARCEL)
3.56 AC. (DISTURBED AREA)

WATERSHED
THE ENTIRE PROJECT LIES WITHIN THE YARMOUTH CREEK WATERSHED.
VIRGINIA 6TH ORDER NWBD HUC: JL28

TOPOGRAPHICAL INFORMATION
SURVEY PERFORMED BY TIMMONS GROUP IN FALL 2009.
SURVEY MERGED WITH JAMES CITY COUNTY GIS.

HORIZONTAL AND VERTICAL DATUM
NAD 83 & NGVD 29

IMPOUNDING STRUCTURE DATA
TOP OF DAM: 15.00' **(AS–BUILT 14.6' LOW POINT)**
HEIGHT: 11'
CREST WIDTH: 10'
NORMAL POOL ELEVATION: 8.15' **(AS–BUILT 8.08' LOW POINT)**

NOTES

1. THE STORMWATER MANAGEMENT/BMP FACILITY AND ASSOCIATED STORMWATER CONVEYANCE SYSTEMS AS PROPOSED FOR THIS PROJECT WILL REQUIRE SUBMISSION, REVIEW, AND APPROVAL OF A RECORD DRAWING (AS–BUILT) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND/SURETY. CERTIFICATION IS REQUIRED BY A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE STRUCTURE BEFORE, DURING, AND AFTER ITS CONSTRUCTION IN ACCORDANCE WITH CURRENT COUNTY GUIDELINES.
2. OUTDOOR SIGNS ON THE PROPERTIES WITHIN THIS DISTRICT SHALL COMPLY WITH THE REGULATIONS FOR EXTERIOR SIGNS IN ARTICLE II, DIVISION 3 OF THE ZONING ORDINANCE.
3. ON NOVEMBER 9TH, 2010 THE JAMES CITY COUNTY BOARD OF SUPERVISORS APPROVED THE SPECIAL USE PERMIT: SUP–0023–2010.
4. PORTIONS OF THE PROPERTY SHOWN ON THIS SITE PLAN ARE AT AN ELEVATION BELOW THE FEMA 100–YR FLOODPLAIN ELEVATION. THE LIMITS OF THE FEMA FLOODPLAIN ARE SHOWN ON THE SITE PLAN.

CONTENTS

C1.0	TITLE SHEET
C2.0	OVERALL LAYOUT
C3.0	LAYOUT AND GRADING PLAN
C4.0	CROSS SECTIONS
C4.1	CROSS SECTIONS
C5.0	NOTES AND DETAILS
C5.1	OPERATION AND MAINTENANCE PLAN
S–101	NEW SPILLWAY STRUCTURE
S–102	NEW SPILLWAY STRUCTURE
S–103	NEW SPILLWAY STRUCTURE

Environmental Division
AUG 31 2011
RECEIVED

INVENTORY # 09513
JCC SP–0093–2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HINSON
Lic. No. 022860
8-22-11
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/04/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
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RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS
POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

TITLE SHEET

DATE: JUNE 14, 2010

JN: 09114-001

C1.0

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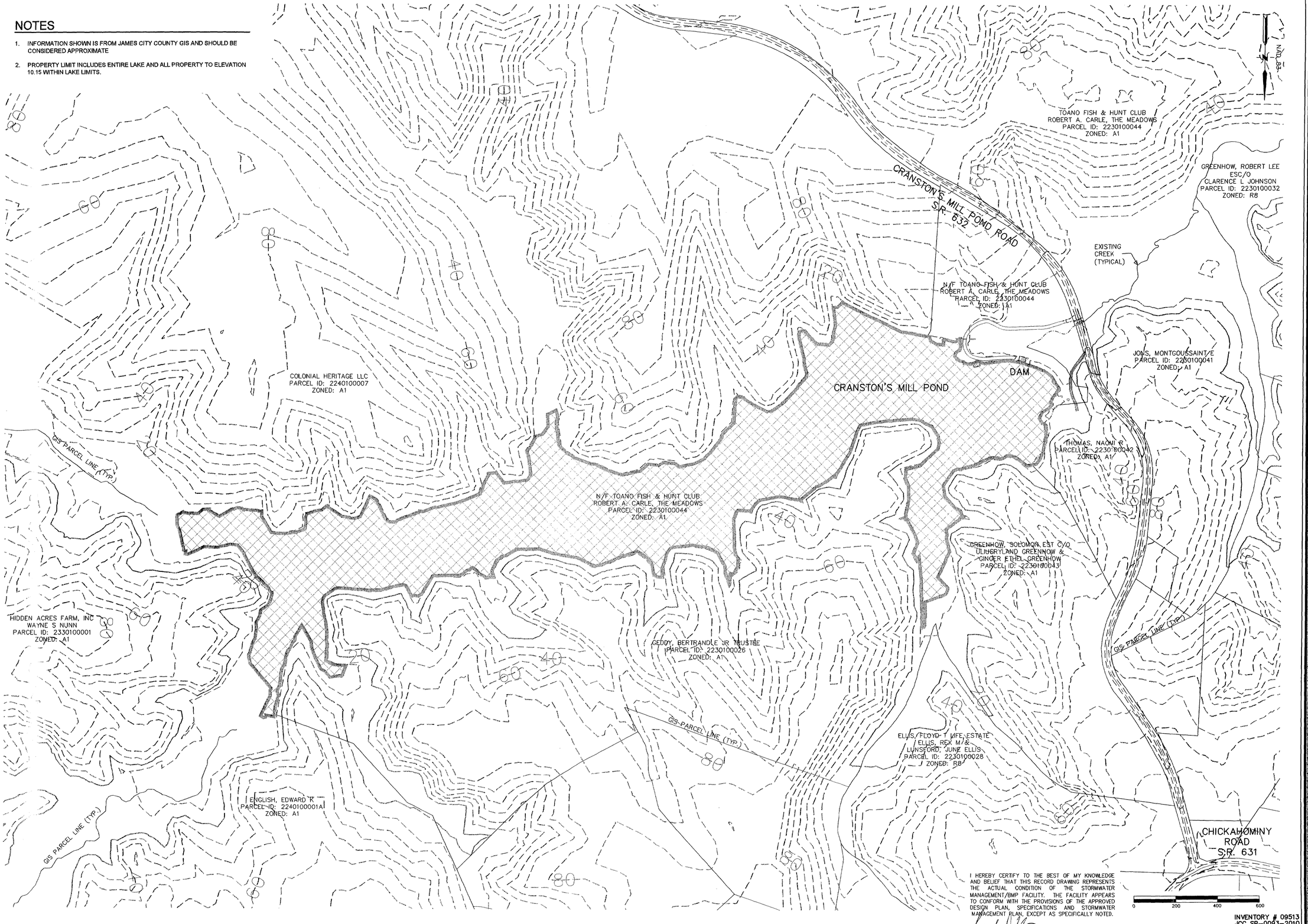
NOTES

1. INFORMATION SHOWN IS FROM JAMES CITY COUNTY GIS AND SHOULD BE CONSIDERED APPROXIMATE
2. PROPERTY LIMIT INCLUDES ENTIRE LAKE AND ALL PROPERTY TO ELEVATION 10.15 WITHIN LAKE LIMITS.



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INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HUNSON
Lic. No. 023880
8-22-11
PROFESSIONAL ENGINEER

REVISIONS:
8/19/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/22/10 REV. PER COUNTY COMMENTS
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DESIGNED: JBM/PFH
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CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

OVERALL LAYOUT

DATE: JUNE 14, 2010

JN: 09114-001

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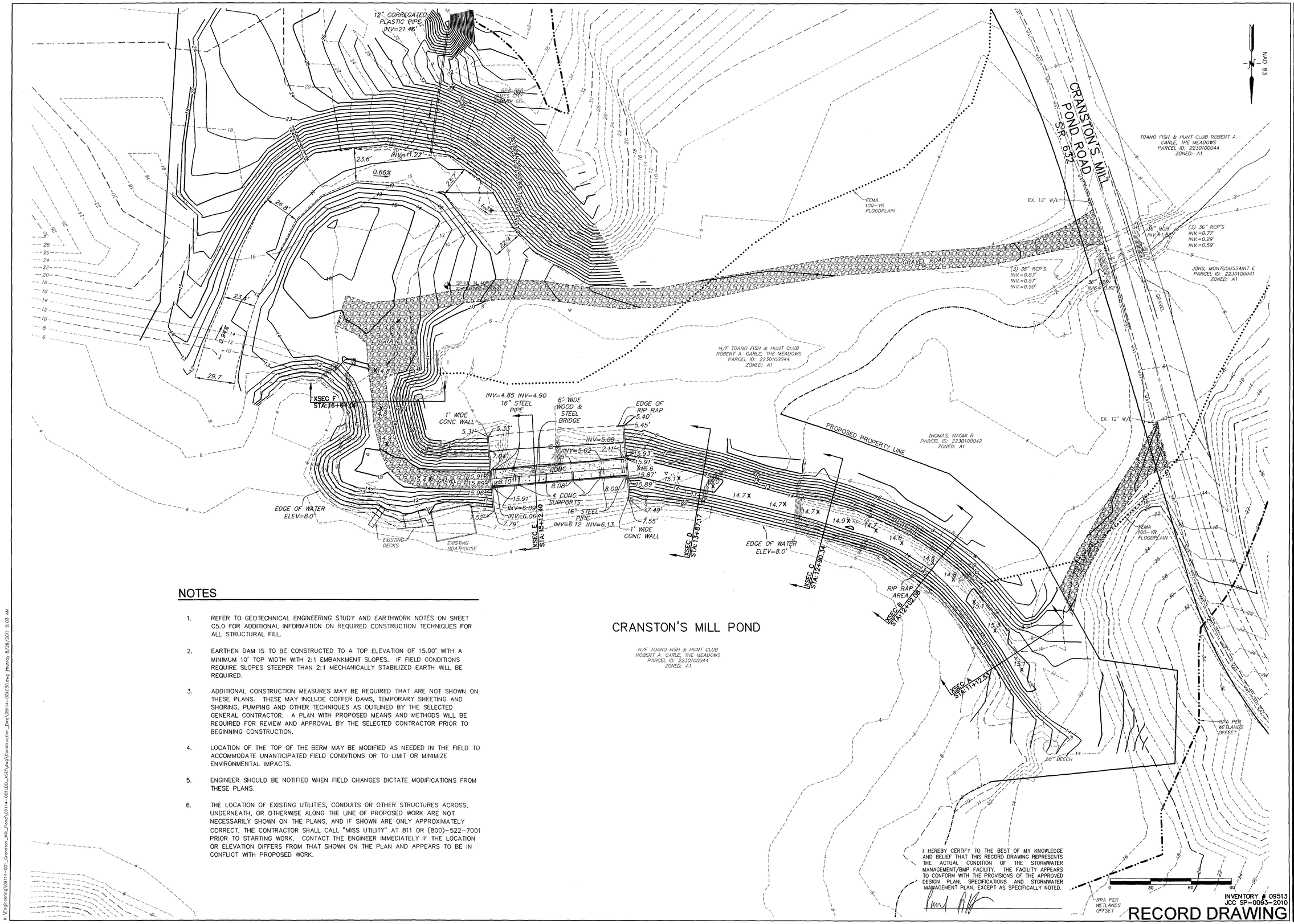

NOTES

1. REFER TO GEOTECHNICAL ENGINEERING STUDY AND EARTHWORK NOTES ON SHEET C5.0 FOR ADDITIONAL INFORMATION ON REQUIRED CONSTRUCTION TECHNIQUES FOR ALL STRUCTURAL FILL.
2. EARTHEN DAM IS TO BE CONSTRUCTED TO A TOP ELEVATION OF 15.00' WITH A MINIMUM 10' TOP WIDTH WITH 2:1 EMBANKMENT SLOPES. IF FIELD CONDITIONS REQUIRE SLOPES STEEPER THAN 2:1 MECHANICALLY STABILIZED EARTH WILL BE REQUIRED.
3. ADDITIONAL CONSTRUCTION MEASURES MAY BE REQUIRED THAT ARE NOT SHOWN ON THESE PLANS. THESE MAY INCLUDE COFFER DAMS, TEMPORARY SHEETING AND SHORING, PUMPING AND OTHER TECHNIQUES AS OUTLINED BY THE SELECTED GENERAL CONTRACTOR. A PLAN WITH PROPOSED MEANS AND METHODS WILL BE REQUIRED FOR REVIEW AND APPROVAL BY THE SELECTED CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION.
4. LOCATION OF THE TOP OF THE BERM MAY BE MODIFIED AS NEEDED IN THE FIELD TO ACCOMMODATE UNANTICIPATED FIELD CONDITIONS OR TO LIMIT OR MINIMIZE ENVIRONMENTAL IMPACTS.
5. ENGINEER SHOULD BE NOTIFIED WHEN FIELD CHANGES DICTATE MODIFICATIONS FROM THESE PLANS.
6. THE LOCATION OF EXISTING UTILITIES, CONDUITS OR OTHER STRUCTURES ACROSS, UNDERNEATH, OR OTHERWISE ALONG THE LINE OF PROPOSED WORK ARE NOT NECESSARILY SHOWN ON THE PLANS, AND IF SHOWN ARE ONLY APPROXIMATELY CORRECT. THE CONTRACTOR SHALL CALL "MISS UTILITY" AT 811 OR (800)-522-7001 PRIOR TO STARTING WORK. CONTACT THE ENGINEER IMMEDIATELY IF THE LOCATION OR ELEVATION DIFFERS FROM THAT SHOWN ON THE PLAN AND APPEARS TO BE IN CONFLICT WITH PROPOSED WORK.

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PATRICK H. HANSEN
Lic. No. 026880
PROFESSIONAL ENGINEER
8-22-11

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/10/10 REV. PER STRUCTURAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

LAYOUT AND GRADING PLAN

DATE: JUNE 14, 2010

JN: 09114-001

C3.0

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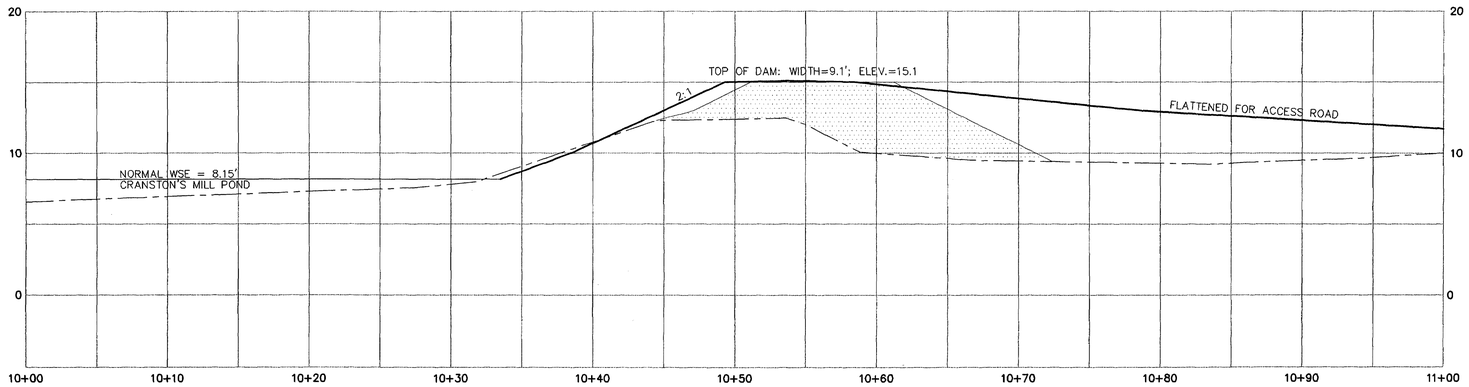
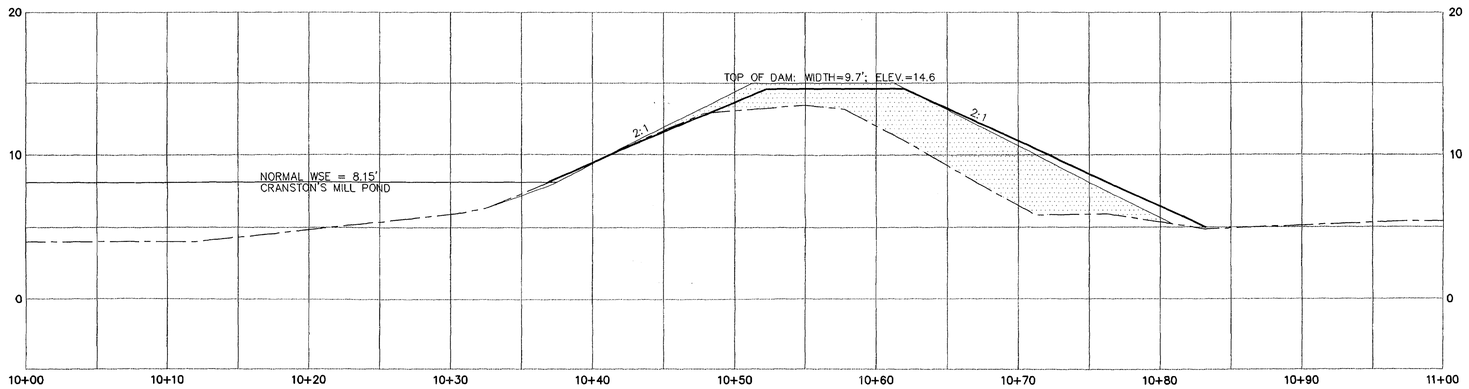
LEGEND

- EXISTING GRADE
- "AS-BUILT" GRADE
- PROPOSED GRADE



DAM XSEC A
STA: 11+12.53



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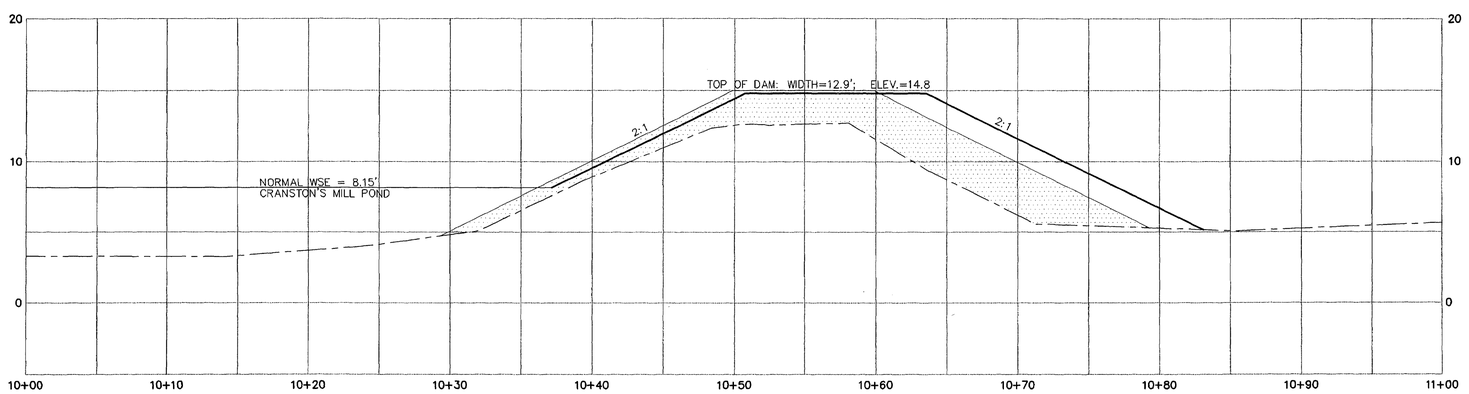

DAM XSEC C
STA: 12+90.34

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VERT.
0 5 10 15
HORZ.
0 5 10 15

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HUDSON
Lic. No. 026060
9-22-11
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STAFF/INTERDISCIPLINARY COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
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RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT
JAMES CITY COUNTY, VIRGINIA

CROSS SECTIONS

DATE: JUNE 14, 2010

JN: 09114-001

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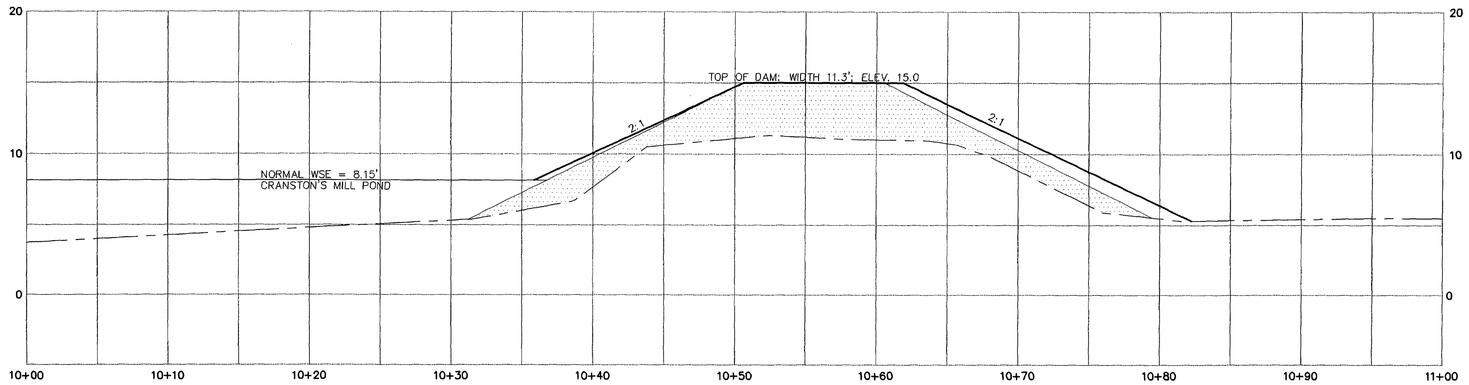
LEGEND

- EXISTING GRADE
- "AS-BUILT" GRADE
- PROPOSED GRADE



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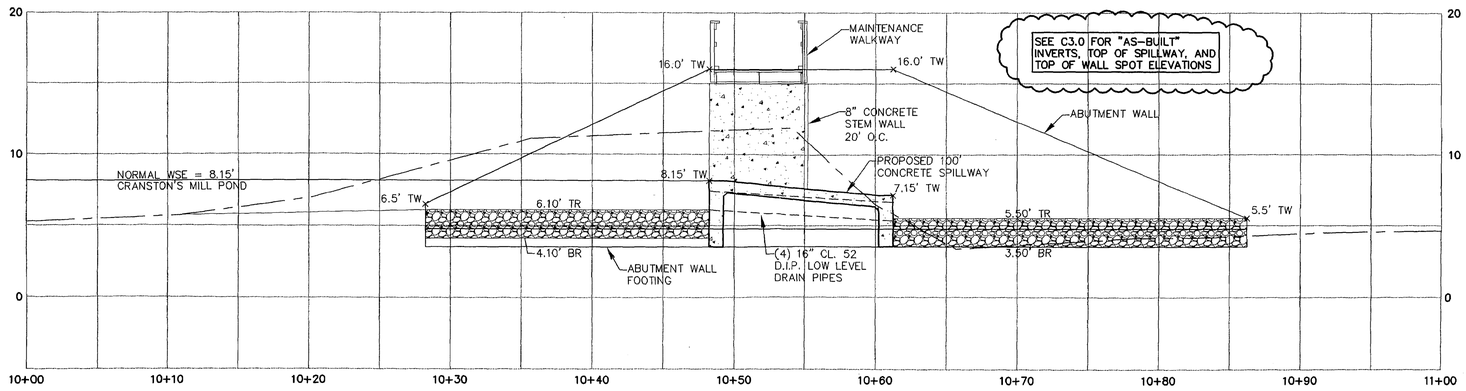

DAM XSEC E
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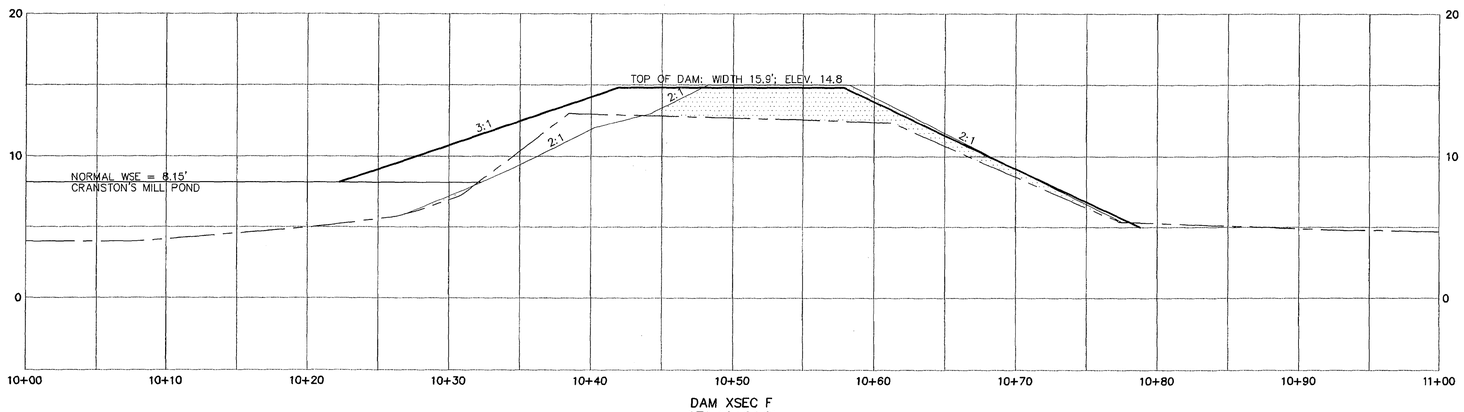

DAM XSEC F
STA: 16+64.01

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VERT. 0 5 10 15

HORZ. 0 5 10 15

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. HANSON
Lic. No. 023360
8-22-11
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STATE/FEDERAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

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CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT — JAMES CITY COUNTY, VIRGINIA

CROSS SECTIONS

DATE: JUNE 14, 2010

JN: 09114-001

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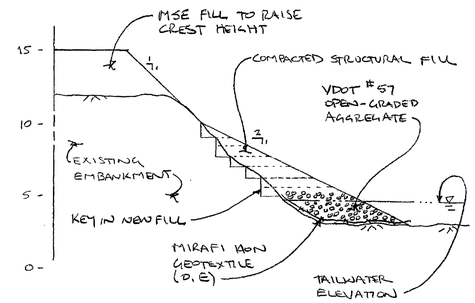
Williamsburg, Va. 23185
(757) 220-5400
(757) 229-5301 facsimile

PANAMA
McKinney International
Torre ADR
Ave. Samuel Lewis y calle 58
Piso 12, oficina 12-C
Panamá, República de Panamá
(507) 265-0165
(507) 265-1185 facsimile

PROJECT 14752A09
SHEET NO. 1 OF 1
CALCULATED BY CJS DATE 5/27/11
CHECKED BY — DATE —

FIGURE 2



PRODUCT D5615-1 A B C D E F

STOP GATES

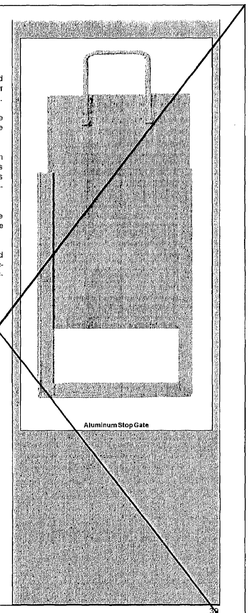
Waterman Stop Gates can be fitted with either rod handles or a slot grip for hand placing. Guide rails for embedded, flatback or channel mounting are available.

These gates are designed for a maximum head of one foot over the slide, unless otherwise specified and are used generally in diversion applications.

Options available include "J" Bulb seals for minimum leakage, ultra high molecular weight polyethylene seats for increased ease of operation and special cut outs such as "V" notch or hot openings for water measurement.

All frames feature welded construction. Slides are minimum ¼" thick to minimize deflection and contribute to long gate life.

Available in an almost unlimited range of sizes and configurations, Waterman stop gates can be manufactured from aluminum, steel, stainless steel or fiberglass.



Waterman INDUSTRIES, INC. 39

TYPICAL SPECIFICATIONS
ALUMINUM STOP GATES

Guides
The gate frame shall be a rigid, welded unit with a clear opening the same size as the waterway, unless otherwise specified. The guides shall be of structural or stainless steel shapes or aluminum extrusions. The guides will be of the length specified.

Additional members will be added to the frame as required for flushbottom closure, spigots, and "J" Bulb seals.

Slide
The slide shall be plate reinforced with structural shapes welded to the plate. The slide shall not deflect more than 1/360 of the span of the gate under maximum head.

Flushbottom Closure
When indicated on the plans or in the gate schedule, gates shall be furnished with a flush seal arrangement. A resilient neoprene seal shall be securely attached to the frame along the invert, and shall extend to the depth of the guide groove.

"J" Bulb Seals
When an unseating head is shown on the plans, or specified in the gate schedule, the gate shall be provided with "J" Bulb seals along the sides of the gate. Seals shall be mounted either on the frame or slide, such that seals do not protrude into the specified opening of the gate.

(Optional). Gates shall be furnished complete with ultra high molecular weight (U.H.M.W.) polymer seats which contact the slide face.

For steel and stainless steel gates, ultra high molecular weight bearing strips shall be mechanically retained to lock seat in place. For aluminum gates, strips shall be installed in dovetail grooves in the extruded frame.

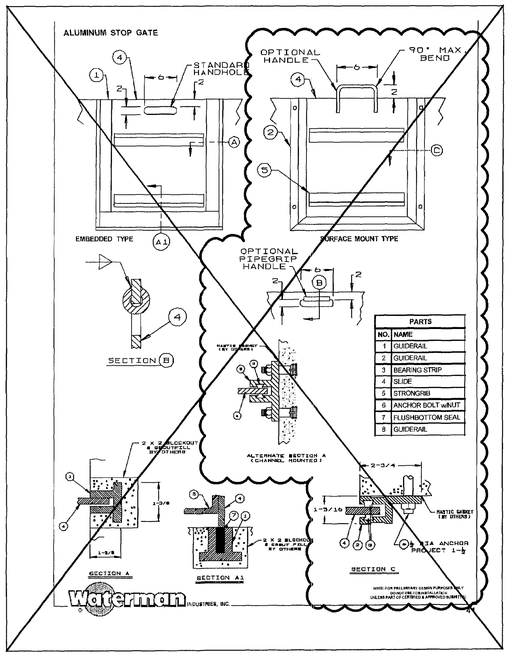
Material
Frames and Slides
Mild steel - ASTM A-36, or
Stainless Steel - ASTM A-276 Type 304 unless specified
Aluminum - ASTM B-209 and B-211 alloy 6061-T6

Fasteners and Anchor Bolts
Steel - ASTM A-307 Galvanized per ASTM A-153, or
Stainless Steel - ASTM A-276 Type 304 or 316
Stainless Steel - ASTM A-193 18-8, as specified

Flushbottom Seals and "J" Bulb Seals
Rubber - ASTM D-2000 BC610/615 or other suitable composition for extended use in water and sewage

Finish
Manufacturer's Standard Paint on mild steel
Mill finish on all aluminum and stainless steel

Waterman INDUSTRIES, INC. 40



Waterman INDUSTRIES, INC.

EARTH WORK NOTES

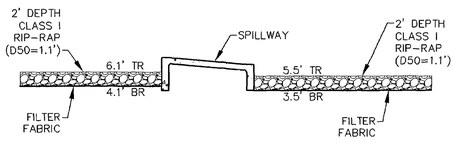
1. ALLOWABLE SOIL TYPES INCLUDE CL, ML, SM AND SC PROVIDING THAT THE SOILS SHALL CONTAIL AT LEAST 30% SAND OR 30% FINES AND HAVE A PLASITICITY INDEX OF LESS THAN 35.
2. ALL SOILS SHALL BE COMPACTED TO AT LEAST A DENSITY OF 95% OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698. COMPACTION MOISTURE CONTENT SHOULD BE CONTROLLED TO WITHIN 3% OF OPTIMUM MOISTURE
3. SUBGRADES TO RECEIVE COMPACTED STRUCTURAL FILL SHALL BE CLEARED OF ALL TOPSOIL AND ORGANIC, WET OR OTHERWISE DISTURBED SOILS.
4. WHERE FILL PLACEMENT IS REQUIRED IN STANDING WATER OR IN AREAS OF SATURATED SUBGRADE, THE SUBGRADE SHALL CLEARED OF ALL TOPSOIL AND ORGANICS, OVERLAIN WITH MIRAFI 140N OR EQUIVALENT GEOTEXTILE FABRIC AND BACKFILLED WITH VDOT #57 STONE SUFFICIENT TO ALLOW A STABLE BASE FOR THE PLACEMENT OF STRUCTURAL FILL.

~~LOW LEVEL OUTLET SLUICE GATE S~~

1. OUTLET GATE TO BE 18"X18" OR AS REQUIRED TO SEAL A 16" ROUND OPENING
2. FOUR GATES WILL BE PROVIDED. ONE FOR EACH 16" LOW LEVEL DRAIN PIPE.
3. OPENING SPACING TO BE ALTERED AS REQUIRED TO ALLOW FOR INSTALLATION OF GATES.
4. SHOP DRAWING TO BE SUBMITTED PRIOR TO ORDERING AND INSTALLING.
5. GATE AS MANUFACTURED BY WATERMAN AND ASSOCIATES OR EQUIVALENT.

NOTE: SLUICE GATES REPLACED WITH 16" AWWA GATE VALVES WITH OPERATOR EXTENSIONS TO THE TOP OF THE MAINTENACE BRIDGE.

RIP-RAP ARMORING



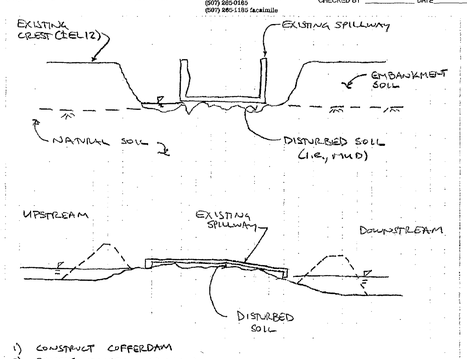
McKINNEY & COMPANY

MAIN OFFICE
100 South Railroad Ave.
Ashland, Virginia 23005
(804) 798-1451
(804) 798-7972 facsimile

WILLIAMSBURG
480 McLaws Circle, Suite 150
Williamsburg, Va. 23185
(757) 220-5400
(757) 229-5301 facsimile

PANAMA
McKinney International
Calle Aquilino de la Guardia
Torre Banco General, Piso II
Panamá, República de Panamá
(507) 265-0165
(507) 265-1185 facsimile

PROJECT
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE



1) CONSTRUCT COFFERDAM
2) REMOVE EXISTING SPILLWAY
3) DEWATER WORK AREA AND REMOVE DISTURBED SOIL
4) PLACE COMPACTED STRUCTURAL FILL TO 95% RELATIVE COMPACTION
5) BENCH (KEY) IN NEW FILL TO EXISTING EMBANKMENT
6) PROVIDE TOE DRAIN AS SHOWN

PRODUCT D5615-1 A B C D E F

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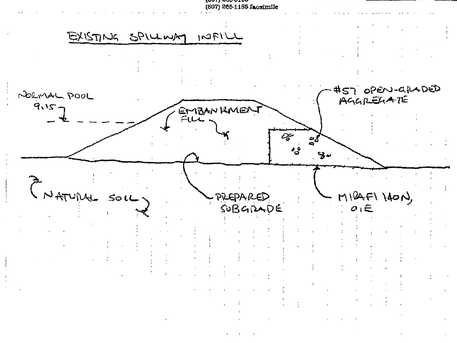

PRODUCT D5615-1 A B C D E F

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS PRESCRIBED NOTED.

INVENTORY # 09513
JCC SP-0093-2010

RECORD DRAWING

COMMONWEALTH OF VIRGINIA
PAUL F. RIBSON
Lic. No. 022800
PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/09/10 REV. PER STRUCTURAL COORDINATION
11/22/10 REV. PER DCR COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PPH
DRAWN: JBM
CHECKED: PPH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-7000 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT

JAMES CITY COUNTY, VIRGINIA

NOTES & DETAILS

DATE: JUNE 14, 2010

JN: 09114-001

C5.0

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DCR
Virginia Department of Conservation & Recreation
State Parks • Soil & Water Conservation • Natural Heritage
Chesapeake Bay Local Assistance • Land Conservation
Outdoor Recreation Planning • Dam Safety & Floodplains

Date Prepared: July 12, 2011
Prepared By: Paul F. Hinson, P.E.
Koontz-Bryant, P.C.
1703 N. Parham Rd.
Richmond, VA 23229

OPERATION AND MAINTENANCE CERTIFICATE APPLICATION FOR VIRGINIA REGULATED IMPOUNDING STRUCTURES

Note: Any executed Application for an Operation and Maintenance Certificate must be mailed to the appropriate Regional Engineer. In addition, a completed Certificate and Permit Application Fee Form (DCR199-192) and the required fee must be mailed under separate cover to: Virginia Department of Conservation and Recreation, Division of Finance, Accounts Payable, 203 Governor Street, 4th Floor, Richmond, Virginia 23219.

Reference: Impounding Structures Regulations, 4VAC 50-20-10 et seq., including 4VAC 50-20-105 and 4VAC 50-20-150, Virginia Soil and Water Conservation Board

1. **Name of Dam:** Cranstons Mill Pond Dam Inventory Number: 09513
   Other Name (if any):

2. **Hazard Potential Classification** (See 4VAC 50-20-40 Hazard Classifications of the Virginia Impounding Structure Regulations):
   (Check one) ☐ HIGH ☒ SIGNIFICANT ☐ LOW

3. **Name of Owner(s):** Cranston Mill Pond, LLC, c/o Earth Source Solutions
   If a corporation, name of representative: Brent L. Fults, LA
   Mailing address: 5735 S. Laburnum Avenue, Richmond, VA 23231
   Telephone: (Business) 804-222-5114 (Residential) 804-303-8632
   Other means of communication: 804-357-1251 (M)

4. **Operating Plan and Schedule:**
   Provide a narrative for each item:
   a. Operation of control gates and spillways: Annually
   b. Operation of Impoundment Drain: None

5. **Maintenance Plan and Schedule:**
   Provide a narrative explaining the Maintenance Plan and Schedule.
   a. Earthen Embankment Impounding Structures:
   (1) embankment: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Mow a minimum of 3 times a year. Repair any erosion within 30 days of detection. Permanently seed any denuded areas.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (2) principal spillway: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Items to be inspected will include the primary weir, wing walls, rip rap armoring, maintenance walkway and level gauge painted on wing walls. If any significant cracks or imperfections are detected, perform a follow-up inspection within 30 days by a professional engineer. Repair any deficiences within 30 days of detection.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (3) emergency spillway: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Mow a minimum of 3 times a year. Repair any erosion within 30 days of detection. Permanently seed any denuded areas.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (4) low level outlet: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Gates should be operated to ensure they are functioning properly.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (5) impoundment area: Annual inspection by Owner or Owner's representative and after every Stage II or III condition as outlined in the EAP. Inspection will be from the water surface by boat. Inspection for evidence of erosion, sloughing, accumulation of sediment or other debris within the inflow channels or the impoundment area.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (6) downstream channel: Annual inspection by Owner or Owner's representative. Inspect for debris within the channel or other impediments to the flows. Repair or remove as allowed by regulations for wetlands and waters of the U.S.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (7) staff gages: Annual inspection by Owner or Owner's representative. Examine level gauges painted on wing walls of principal spillway walls and depth gauge within emergency spillway is still in place and legible. Repair or replace as needed.

   Inspection report prepared by a professional engineer a minimum of every 3 years.

   (8) other maintenance actions: Annual inspection by Owner or Owner's representative of maintenace walkway. Check for loose boards, railing, supports. Ensure steel beams are properly supported on the foundations and still sound. Inspection report prepared by a professional engineer a minimum of every 3 years.

b. Concrete Impounding Structures (including masonry and others): **Not Applicable**
   (1) upstream face:
   (2) downstream face:
   (3) crest of dam:
   (4) galleries (tunnels):
   (5) abutments:
   (6) spillways:
   (7) gates and outlets:
   (8) staff gages:
   (9) other maintenance actions:

6. **Inspection schedule (provide appropriate response):**
   a. Operator inspection (daily, weekly, etc.): Facility is not manned. Annual inspections by Owner or Owner's Representative and after every Stage 2 and 3 condition as outlined in the EAP.
   b. Maintenance inspection (monthly, quarterly, semi-annual, annual): Annual inspections by Owner or Owner's Representative and after every Stage 2 and 3 condition as outlined in the EAP.
   c. Technical safety inspection by a professional engineer. (Required for certification update: High Hazard Dams – every two years, Significant Hazard Dams – every three years and Low Hazard Dams – every six years: Every 3 years or as required based upon deficiences discovered during annual inspections.
   d. Inspection by dam owner or designee (years in which a Professional Engineer does not inspect): Annually
   e. Note: All dams must be inspected by a professional engineer each time a dam is overtopped or significant flows through the emergency spillway are experienced.

7. **Emergency Action Plan Schedule:**
   Provide the events that initiate the Emergency Action Plan.
   a. Rainfall amounts, emergency spillway flow levels or storm event: Stage I Condition – Flood Watch
   Stage II Condition – 1' of flow in emergency spillway or 4.9' of flow over primary spillway.
   Stage III Condition – 2' of flow in emergency spillway or 5.9' of flow over primary spillway.
   b. Frequency of observation: Stage I condition: 6 hours Stage II condition: 2 hours Stage III condition: Continuous

8. **State whether or not the current hazard classification for the impounding structure is appropriate and whether or not additional work is needed to make an appropriate hazard designation:**

   Dam is currently classified as a Significant Hazard. An Alteraion Permit has been granted and construction was completed in June of 2011.

9. **For newly constructed or recently altered impounding structures, provide certification from a Professional Engineer who has inspected the impounding structure during construction or alteration that, to the best of the engineer's judgment, knowledge and belief, the impounding structure and its appurtenances have been constructed or altered in conformance with the plans, specifications, drawings and other requirements approved by the Virginia Soil and Water Conservation Board.**

OPERATION AND MAINTENANCE CERTIFICATE APPLICATION

OPERATION AND MAINTENANCE PLAN AND SCHEDULE CERTIFICATION BY OWNER

I hereby certify that the operation and maintenance plan and schedule provided herewith will be adhered to during the certification period except in cases of unanticipated emergency requiring departure therefrom in order to mitigate hazards to life and property, at which time my engineer and the Department of Conservation and Recreation will be notified.

Signed: Brent L Fults (CRANSTON MILL POND LLC) Brent L Fults/EMP
Owner's Signature Print Name

This JULY day of 12, 20 11.

CERTIFICATION BY OWNER'S ENGINEER

I hereby certify that the information provided in this form has been examined by me and found in my professional judgment to be true and correct.

Signed: Paul F Hinson, P.E. Virginia Number: 023860
Professional Engineer's Signature Print Name

This 12 day of July, 20 11.

Engineer's Virginia Seal: COMMONWEALTH OF VIRGINIA PAUL F. HINSON Lic. No. 023860 7-12-11 PROFESSIONAL ENGINEER

Remarks:

Mail the executed form to the appropriate Department of Conservation and Recreation Division of Dam Safety and Floodplain Management Regional Engineer

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT/BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

INVENTORY # 09513
JCC SP-0093-2010
RECORD DRAWING

COMMONWEALTH OF VIRGINIA PAUL F. HINSON Lic. No. 023860 7-22-11 PROFESSIONAL ENGINEER

REVISIONS:
8/18/10 REVISED SPILLWAY
10/14/10 REVISED SPILLWAY
11/04/10 REV. PER INTERNAL COORDINATION
11/24/10 REV. PER COUNTY COMMENTS
8/22/11 RECORD DRAWINGS

DESIGNED: JBM/PFH
DRAWN: JBM
CHECKED: PFH

KOONTZ-BRYANT, P.C.
Site Development Solutions
1703 NORTH PARHAM ROAD, SUITE 100
RICHMOND, VIRGINIA 23229
(804) 740-9200 FAX (804) 740-7338
kbpc@koontzbryant.com

CRANSTON MILL POND - RECORD DRAWINGS

POWHATAN DISTRICT JAMES CITY COUNTY, VIRGINIA

OPERATION AND MAINTENANCE PLAN

DATE: JUNE 14, 2010
JN: 09114-001

C5.1

K:\Engineering\09114-001_Cranston_Mill_Pond\09114-001LDD_ASB\dwg\Construction_Dwg\09114-001C51.dwg jmurray 8/26/2011 8:57 AM

TRANSMITTAL

Environmental Division
MAR 18 2011
RECEIVED

DATE: March 18, 2011

TO: Records Management
JCSA
Fire
Environmental
VDOT
County Engineer

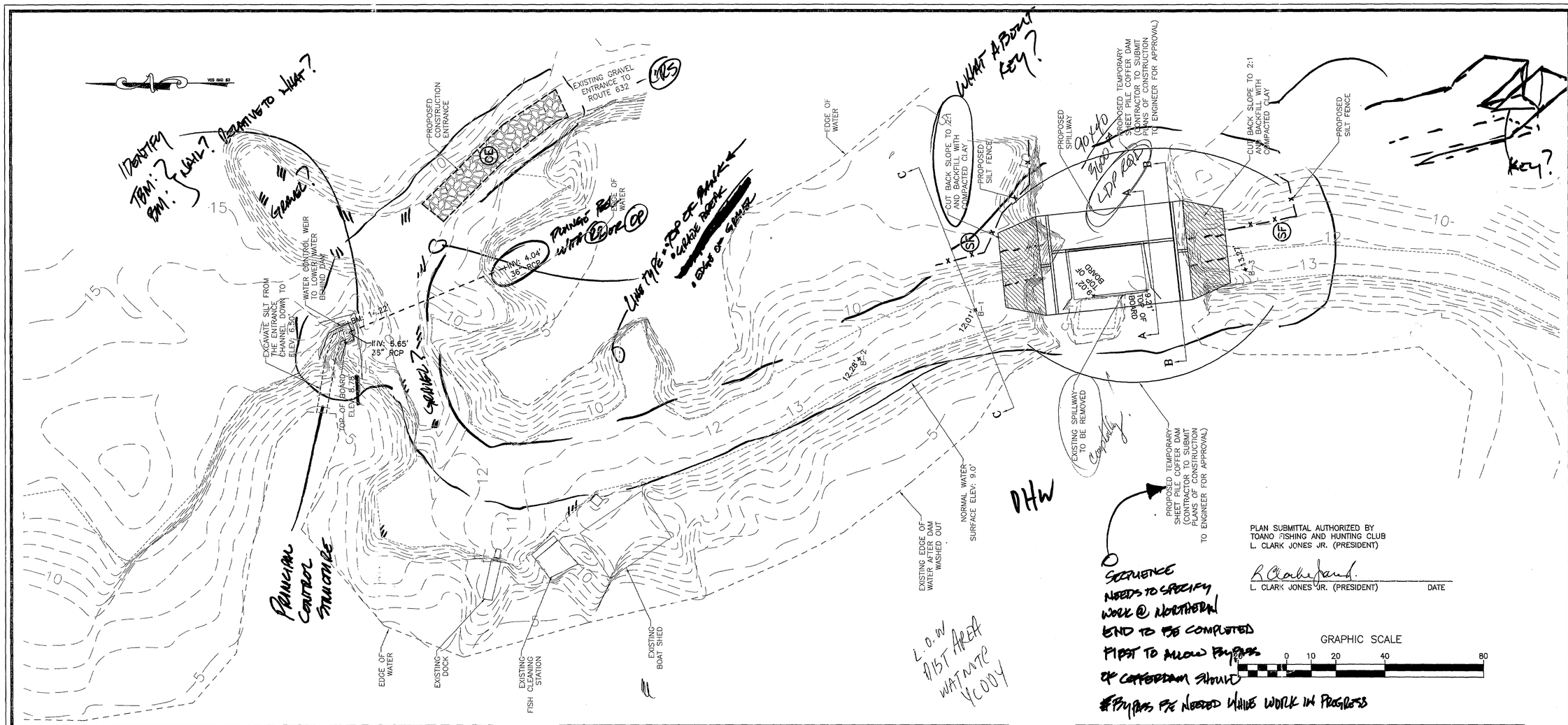
FROM: **Jennifer VanDyke, Administrative Services Coordinator**

SUBJECT: **SP-0093-2010, Cranston's Mill Pond Dam Alteration**

TAX ID: **2230100044**

ACTION: For your files.

NEED CONTROL DEFINED & DEFINITE



PLAN SUBMITTAL AUTHORIZED BY
TOANO FISHING AND HUNTING CLUB
L. CLARK JONES JR. (PRESIDENT)

L. CLARK JONES JR. (PRESIDENT) DATE

BORING LOG
BOREHOLE NUMBER: B-1

PROJECT	CRANSTONS POND DAM	PROJECT NUMBER	3070196
CLIENT	TOANA HUNTING AND FISHING CLUB	DATE	3/19/2007
LOCATION		ELEVATION	12.01' SITE PLAN ASSUMED
EXCAVATION METHOD	HA PH DB BH	LOGGER	KB
DEPTH TO WATER: N/A	WHEN CHECKED: 03-19-07	CAVING	138" WHILE DIGGING, 84" AFTER COMPLETION

DCP	DEPTH:	US CS:	DESCRIPTION:
	0"–8"	CH	YELLOWISH–BROWN SANDY FAT CLAY WITH BROWNISH–YELLOW, REDDISH–YELLOW, AND YELLOWISH–RED MOTTLES, AND SOME GRAY FAT CLAY PLUGS THROUGHOUT
	8"–38"	SM	YELLOWISH–BROWN GRANULAR SILTY SAND WITH FEW GRAY FAT CLAY PLUGS, MOTTLED THROUGHOUT, SLIGHTLY MOIST
	38"–49"	SM	LIGHT YELLOWISH–BROWN TO PALE BROWN MOIST, GRANULAR SILTY SAND WITH FEW GRAY FAT CLAY PLUGS AND LEAN CLAY PLUGS, MOTTLED
	49"–54"	CL	LIGHT YELLOWISH–BROWN TO PALE BROWN VERY MOIST SANDY LEAN CLAY WITH FEW GRAY FAT CLAY PLUGS, MOTTLED WATER FILM ON PEDS NOTICED AT 52"
	54"–108"	OH	GRAYISH–BROWN FINE CLAYEY SAND TO SANDY LEAN CLAY WITH 40%+ ORGANICS VERY MOIST TO SATURATED, MOTTLED
	108"–120"	OH	GREENISH–GRAY TO GRAYISH–BROWN FAT CLAY WITH FIND SANDS, HEAVY, MOTTLED WITH ORGANICS, MOIST TO VERY MOIST
	120"–164"	ML	GREENISH–GRAY TO BLUISH–GRAY SANDY SILT GRADING TO A SILTY SAND, SATURATED, HIGHLY SATURATED AT 132"–164" WITH PALE BROWN MOTTLES
	164"–168"	PI	BLACK PEAT, HIGHLY ORGANIC

NOTES:

BORING LOG
BOREHOLE NUMBER: B-2

PROJECT	CRANSTONS POND DAM	PROJECT NUMBER	3070196
CLIENT	TOANA HUNTING AND FISHING CLUB	DATE	3/19/2007
LOCATION		ELEVATION	12.28' SITE PLAN ASSUMED
EXCAVATION METHOD	HA PH DB BH	LOGGER	KB
DEPTH TO WATER: N/A	WHEN CHECKED: 03-19-07	CAVING:	N/A

DCP	DEPTH:	US CS:	DESCRIPTION:
	0"–16"	CL	STRONG BROWN SANDY CLAY WITH GRAY FAT CLAY PLUGS, AND YELLOWISH–RED, REDDISH–YELLOW, AND BROWNISH–YELLOW MOTTLES
	16"–24"	SM	STRONG BROWN FINE SILTY SAND WITH FEW GRAY FAT CLAY PLUGS, SLIGHTLY MOIST, MOTTLED
	24"–52"	SM	PALE BROWN TO LIGHT YELLOWISH–BROWN FINE SILTY SAND WITH FEW GRAY LEAN CLAY PLUGS, MOIST, MOTTLED
	52"–78"	CL	PALE BROWN FIND SANDY CLAY, MOIST TO VERY MOIST, MOTTLED; WATER FILM ON PEDS NOTICED AT 60"
	78"–126"	OL/ OH	BROWNISH–GRAY TO GRAYISH BROWN SANDY SILT TO SANDY ELASTIC SILT, MOIST TO VERY MOIST, MOTTLED WITH 30%+ ORGANICS
	126"–158"	SM	PALE BROWN TO LIGHT GRAY FINE SILTY SAND, VERY MOIST WITH 20%+ ORGANICS, MOTTTLED
	158"–168"	ML	BLACK PEAT, HIGHLY ORGANIC

NOTES:

BORING LOG
BOREHOLE NUMBER: B-3

PROJECT	CRANSTONS POND DAM	PROJECT NUMBER	3070196
CLIENT	TOANA HUNTING AND FISHING CLUB	DATE	3/19/2007
LOCATION		ELEVATION	13.27' SITE PLAN ASSUMED
EXCAVATION METHOD	HA PH DB BH	LOGGER	KB
DEPTH TO WATER: 118"	WHEN CHECKED: 03-19-07	CAVING:	96"

DCP	DEPTH:	US CS:	DESCRIPTION:
	0"–20"	CL	RED HEAVY SILTY CLAY WITH SANDS WITH A POCKET OF YELLOWISH–RED GRANULAR SANDY LEAN CLAY AT 8"–12", AND PALE BROWN, BROWNISH–YELLOW, AND REDDISH–YELLOW MOTTLES
	20"–48"	CL	RED LEAN CLAY WITH FINE SANDS AND WITH POCKETS OF LIGHT YELLOWISH–BROWN TO PALE BROWN CLAYEY SAND INTERMIXED, MOIST TO SATURATED, MOTTLED
	48"–64"	ML	MULTICOLORED: YELLOWISH–RED, YELLOWISH–BROWN, LIGHT GRAY, AND RED SATURATED SANDY SILT TO ELASTIC SILT, MOTTLED
	64"–78"	OH	RED TO REDDISH–BROWN SILTY CLAY WITH FINE SANDS, MOIST TO SATURATED WITH 10%+ ORGANICS AT 64", MOTTLED
	78"–156"	SM	GREENISH–GRAY TO BLUISH–GRAY SATURATED TO HIGHLY SATURATED FINE SILTY SAND, WITH PALE BROWN MOTTLES
	156"–168"	PI	BLACK PEAT, HIGHLY ORGANIC

E+S 08-07

NOTES:

ALEXCOM & ASSOCIATES, INC.
GEOTECHNICAL / CIVIL AND STRUCTURAL ENGINEERS
11 DEBRUEN LANE
FREDERICKSBURG, VIRGINIA 22405
PHONE (540) 371–3157, FAX (540) 371–7920

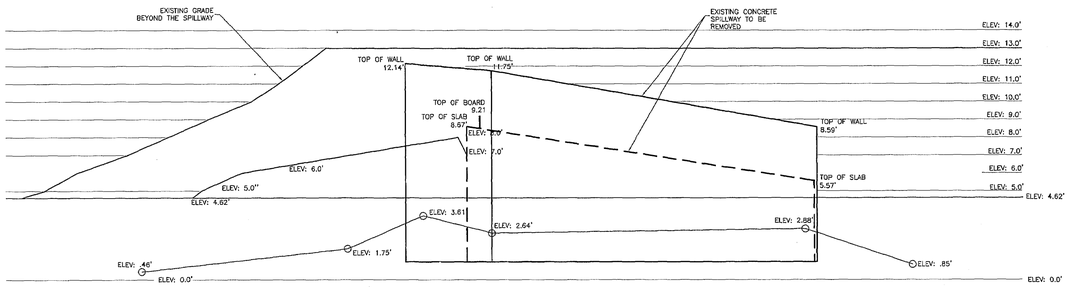
DATE	NO.	REVISION

DAM REPAIR
TOANA HUNTING AND FISHING CLUB
CRANSTONS POND DAM
JAMES CITY COUNTY MAGISTERIAL DISTRICT
James City County, VA

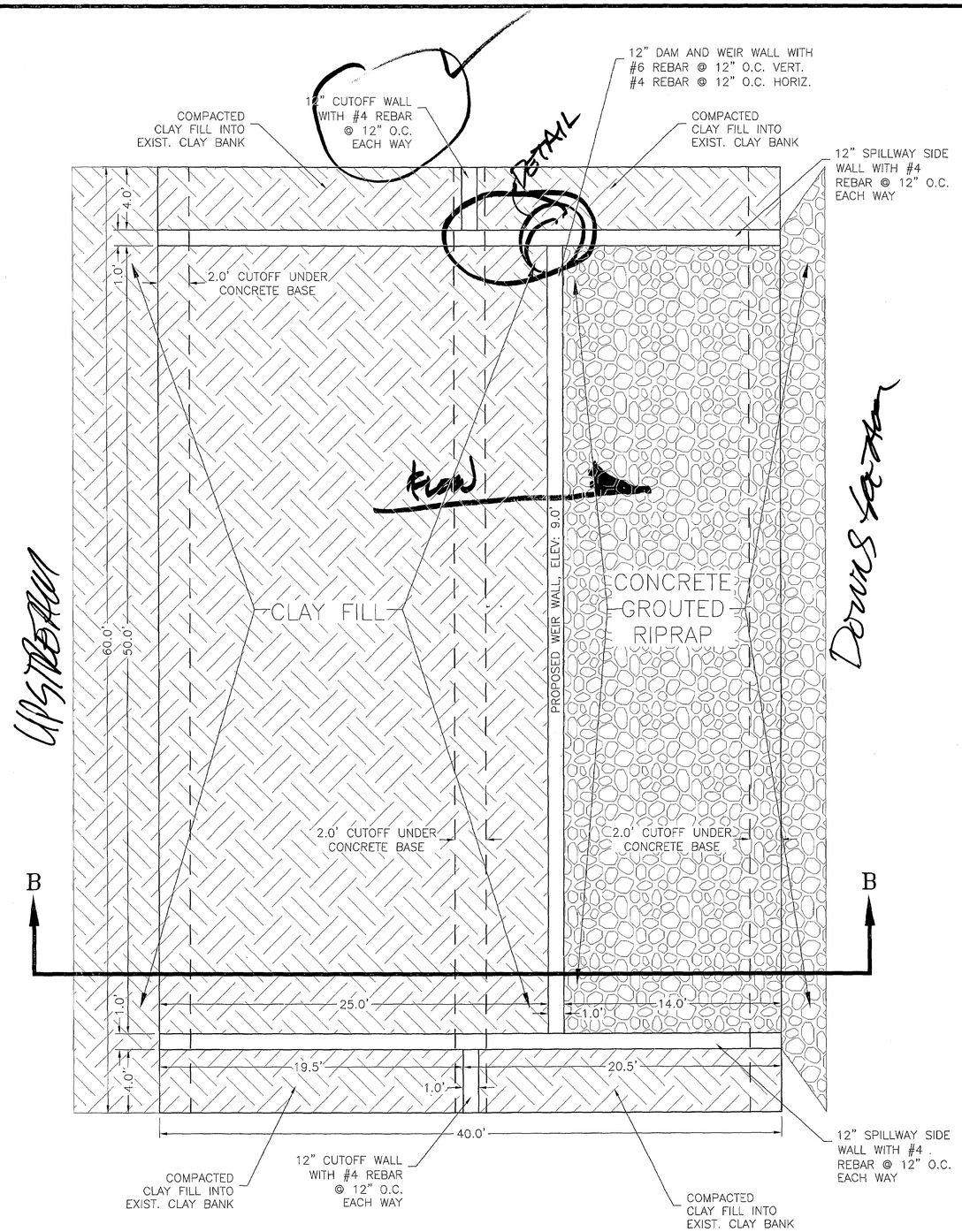
DESIGNED BY	CHECKED BY	DRAWN BY	SURVEYED BY
J.F.A.	J.F.A.	R.G.F.	ALEX
DATE 04/09/07	DATE 04/09/07	DATE 04/09/07	DATE

COMMONWEALTH OF VIRGINIA
JOE F. ALEXANDER
No. 04583
PROFESSIONAL ENGINEER
4/30/07

SCALE 1" = 20'
SHEET 1 OF 3 SHEETS
JOB NUMBER 03070196



SECTION A-A
EXISTING CONDITIONS



PROPOSED SPILLWAY
TOP VIEW

NOTES:
*CONCRETE 3,000 PSI WITH 7% AIR ENTRAINMENT
*STEEL = GRADE 60
*COMPACT BACKFILL TO 95% OF STANDARD PROCTOR DRY DENSITY AT MOISTURE CONTENTS WITHIN ± 3 PERCENTAGE POINTS OF OPTIMUM
*SEED, LIME, FERTILIZE, AND MULCH ALL DENUDED AREAS

DATE	NO.	REVISION

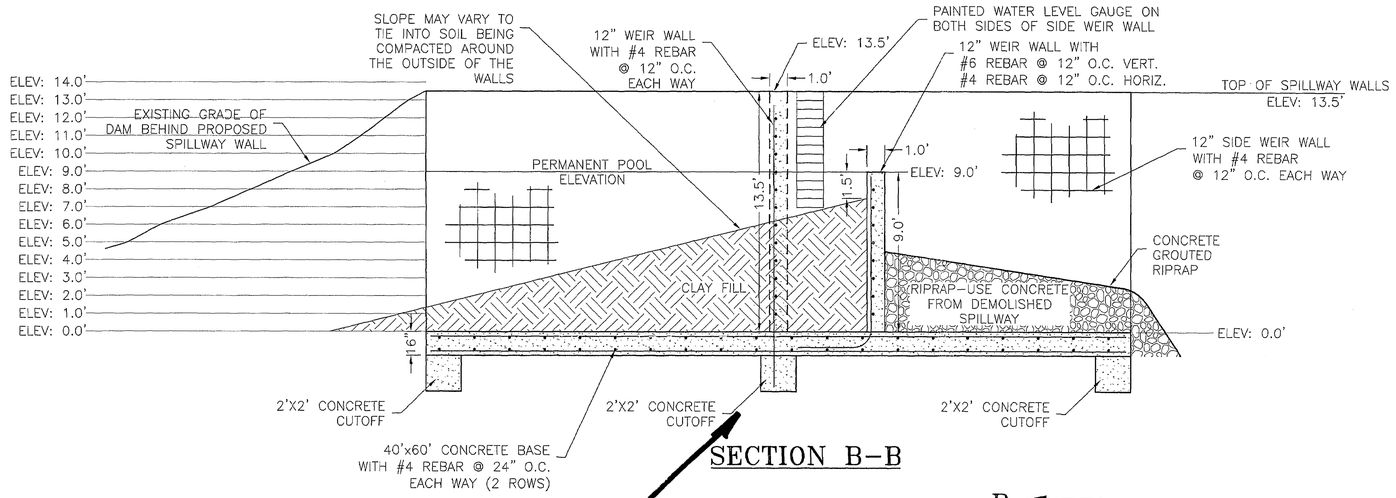
ALEXCOM & ASSOCIATES, INC.
GEOTECHNICAL / CIVIL AND STRUCTURAL ENGINEERS
11 DEBRUEN LANE
FREDERICKSBURG, VIRGINIA 22405
PHONE (540) 371-3157, FAX (540) 371-7920

DETAILS
TOANA HUNTING AND FISHING CLUB
CRANSTONS POND DAM
JAMES CITY COUNTY MAGISTERIAL DISTRICT
James City County, VA

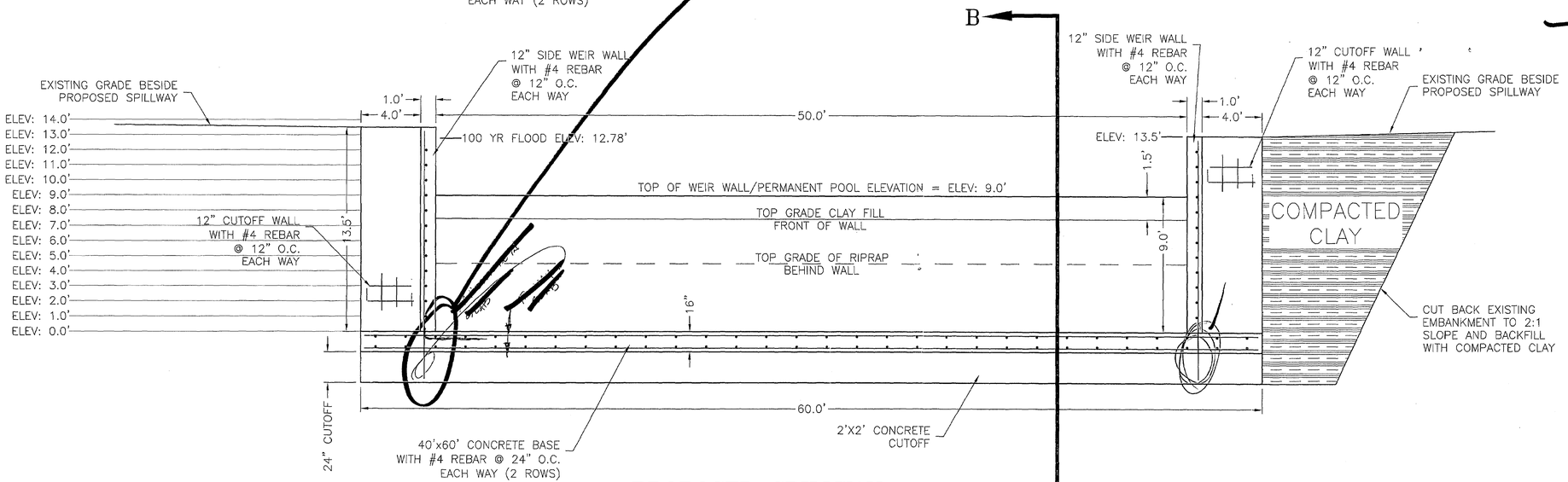
DESIGNED BY	DATE	CHECKED BY	DATE	DRAWN BY	DATE	SURVEYED BY	DATE
J.F.A.	04/09/07	J.F.A.	04/09/07	R.G.F.	04/09/07	ALEX	

COMMONWEALTH OF VIRGINIA
JOE F. ALEXANDER
No. 04583
PROFESSIONAL ENGINEER

SCALE 1/4" = 1'
SHEET 2 OF 3 SHEETS
JOB NUMBER 03070196

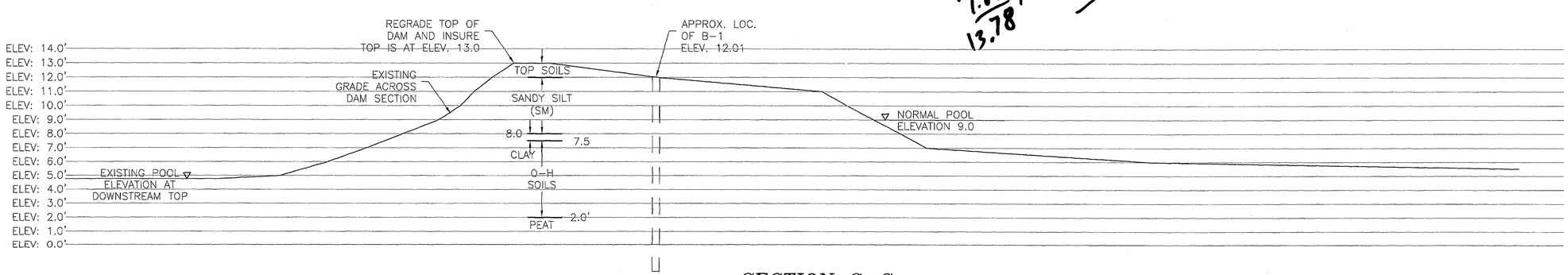


SECTION B–B

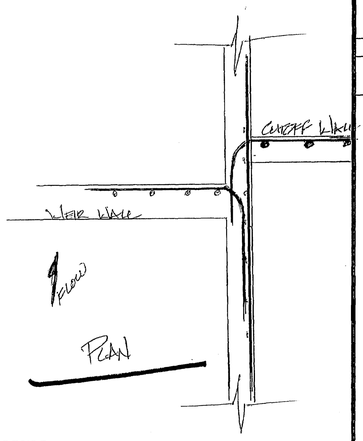


PROPOSED SPILLWAY
FRONT VIEW
(LOOKING DOWN STREAM)

12.78
1.00
13.78'



SECTION C–C
EXISTING GRADE



NO.	DATE	REVISION

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FREDERICKSBURG, VIRGINIA 22405
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DETAILS

TOANA HUNTING AND FISHING CLUB

CRANSTONS POND DAM

JAMES CITY COUNTY MAGISTERIAL DISTRICT
James City County, VA

DESIGNED BY	DRAWN BY	SURVEYED BY
J.E.A.	R.G.F.	ALEX
DATE 04/09/07	DATE 04/09/07	DATE
CHECKED BY J.E.A.	DATE 04/09/07	

COMMONWEALTH OF VIRGINIA
JOE F. ALEXANDER
No. 04593
PROFESSIONAL ENGINEER

SCALE 1/4" = 1'

SHEET 3 OF 3 SHEETS

JOB NUMBER 03070196

"Tomorrow's Natural Resources Today"

Scott A. Reed
sreed@esswetlands.com

C.B.N.L.T.

Chesapeake Bay
Nutrient Land Trust, LLC
5735 S. Laburnum Avenue
Richmond, VA 23231
P: 804.222.5114

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