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: **CC015**

DATE VERIFIED: **November 15, 2017**

QUALITY ASSURANCE TECHNICIAN: **Jonathan Craig**

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

M E M O R A N D U M

DATE: November 15, 2017

SCANNER: Jonathan Craig, Assistant Environment Coordinator

RE: Files Approved for Scanning

Maintenance Agreements: YES
(in file as of scan date)

General File ID or BMP ID: CC015

PIN: 5130100003

Owner Name: ANHEUSER BUSCH BREWING PROPERTIES LL ATTN: GENERAL COUNSEL

Legal Description: PARCEL D-2 25 888 AC; BUSCH CORPORATE CENTER

Local Address: 7795 POCAHONTAS TRAIL

Easement:

Recorded Plat:

Comments: Scanned and added 1 addendum to record drawing. Hard copy destroyed. Added notarized copy of maintenance agreement 000001502 from courthouse records.

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: **CC-015**

DATE VERIFIED: **March 15, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 11, 2010

TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services

FROM: Tina Cantwell, Stormwater

PO: 270712

RE: Files Approved for Scanning

General File ID or BMP ID: CC015

PIN: 5130100003

Subdivision, Tract, Business or Owner Name (if known): Anheuser Busch

Property Description: Brew Site Pt Par 3

Site Address: 7795 Pocahontas Trail

(For internal use only) **Box** 11 **Drawer:** 6

Agreements: (in file as of scan date) **Y** **Book or Doc#:** 27 000001502 **Page:** 59

Comments

1. Maintenance Agreement

000 001502

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 11 day of January, ~~19~~ 2000, between Anheuser-Busch, Inc., and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the following property: Anheuser-Busch Brewery Williamsburg, Virginia June 1970 Deed Book 37, Page No. 59 or Instrument No. _____, and James City County, Virginia, hereinafter referred to as the "COUNTY."

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

JAN 24 00 0125

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

9. This COVENANT shall be recorded in the County Land Records.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 11 day of January, ~~19~~ 2000.

COVENANTOR(S)

Kirk Reno

ATTEST:

_____

COVENANTOR(S)

_____

ATTEST:

_____

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF James City County

I hereby certify that on this 11th day of January, ~~19~~ 2000, before the subscribed, a Notary Public of the State of Virginia, and for the County of York, aforesaid personally appeared ~~before me~~ Kirk Reno ~~&~~ and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 11th day of January, ~~19~~ 2000.

Notary Public

My Commission expires: My Commission Expires April 30, 2002

Sworn to and subscribed before me this 11 day of January, 2000
Witness my hand and official seal:
Notary Public

JAN 24 10:12:46

Approved as to form:

Deputy County Attorney

VIRGINIA: City of Williamsburg and County of James City, to-wit:
This Covenants was presented with certificate annexed and admitted to record on 24 January, 2000 at 9:46 AM/PM in the Clerk's Office of the Circuit Court of the City of Williamsburg and County of James City.
TESTE: BETSY B. WOOLRIDGE, CLERK
BY: Betsy B. Woolridge Deputy Clerk

This Declaration of Covenants prepared by:

William Lee Holland
(Print Name)

Assistant Project Manager
(Title)

111 Riverside Avenue
(Address)

Jacksonville, FL 32202
(City) (State) (Zip)

drainage.pre
Revised 2/97

2. Completed Construction Certification

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: Anheuser-Busch, Inc. Transportation Advantage, Williamsburg Brewery
Structure/BMP Name: POND No. 1 and POND No. 2
Project Location: 7801 Pocahontas Trail
BMP Location: WEST AREA OF PLANT SITE
County Plan No.: SP - 13 - 00

Project Type: ☐ Residential ☐ Business ☐ Commercial ☐ Office ☑ Industrial ☐ Institutional ☐ Public ☐ Roadway ☐ Other _____

Tax Map/Parcel No.: (50-2)(01-78) (51-3)(01-01) and (51-3)(01-3)
BMP ID Code (if known): CC 015 & CC 016
Zoning District:: M-2, Gen. Industrial
Land Use: Plant, Industrial
Site Area (sf or acres): 23.18 acres

Brief Description of Stormwater Management/BMP Facility: Two stormwater management ponds serving seperate collection systems. Pond systems designed to provide for water quality and attenuation of flow. Ponds are wet systems with sediment forebays.

Nearest Visible Landmark to SWM/BMP Facility: A-B Scale House

Nearest Vertical Ground Control (if known):
☐ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☒ Other
Station Number or Name:
Datum or Reference Elevation: J.C.C.
Control Description: LMDG SURVEY CONTROL POINTS
Control Location from Subject Facility: IN PARKNG LOT BETWEEN POND #1 & POND #2

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: 2-7-00
Facility Monitored by County Representative during Construction: ☑ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: Branscome, Inc.
Name of Professional Firm Who Routinely Monitored Construction: Michael H. Wheeler, PE
Date of Completion for SWM/BMP Facility: December 28, 2000 / January 31, 2001
Date of Record Drawing/Construction Certification Submittal: February 14, 2001

(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: Anheuser-Busch, Inc.
Mailing Address: 7801 Pocahontas Trail
Williamsburg, VA 23187
Business Phone: (757) 253-3868 Fax: (757) 253-2125
Contact Person: Kirk Reno Title: Project Manager

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: The Haskell Company
Mailing Address: 111 Riverside Avenue
Jacksonville, FL 32202
Business Phone: (904) 791-4577
Fax: (904) 791-4697
Responsible Plan Preparer: Michael H. Wheeler, PE
Title: Civil Engineer
Plan Name: Transportation Advantage - WMB Brewery
Firm's Project No. 32193
Plan Date: 4-10-00
Sheet No.'s Applicable to SWM/BMP Facility: 206 / 207 / 215 / ____ / ____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*

Name: Henry S. Branscome, Inc.
Mailing Address: PO Drawer 260
Williamsburg, VA 23187
Business Phone: (757) 377-1885
Fax: (757) 220-0390
Contact Person: ED SMITH
Site Foreman/Supervisor: DAVID BATHURST
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: The Haskell Company
Mailing Address: 111 Riverside Avenue
Jacksonville, FL 32202
Business Phone: (904) 791-4577
Fax: (904) 791-4697

Name: Michael H. Wheeler, PE
Title: CIVIL ENGINEER
Signature: Michael H Wheeler
Date: 2-14-01

I hereby certify to the best of my judgement, 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.

Michael H Wheeler
2-14-01

_____ (Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: The Haskell Company
Mailing Address: 111 Riverside Avenue
Jacksonville, FL 32202
Business Phone: (904) 791-4577
Fax: (904) 791-4697

Name: Michael H. Wheeler, PE
Title: CIVIL ENGINEER
Signature: Michael H Wheeler
Date: 2-14-01

I hereby certify to the best of my judgement, 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.

Michael H Wheeler
2-14-01

_____ (Seal)

Virginia Registered Professional Engineer

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: The Haskell Company
Mailing Address: 111 Riverside Ave.
Jacksonville, FL 32202
Business Phone: (904) 791-4577
Fax: (904) 791-4697

Name: Michael H. Wheeler, P.E.
Title: Civil Engineer

Signature: Michael H Wheeler
Date: 3-13-01

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Michael H Wheeler (Seal)
3-13-01
Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

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Mailing Address: 111 Riverside Ave.
Jacksonville, FL 32202
Business Phone: (904) 791-4577
Fax: (904) 791-4697

Name: Michael H. Wheeler, P.E.
Title: Civil Engineer

Signature: Michael H Wheeler
Date: 3-13-01

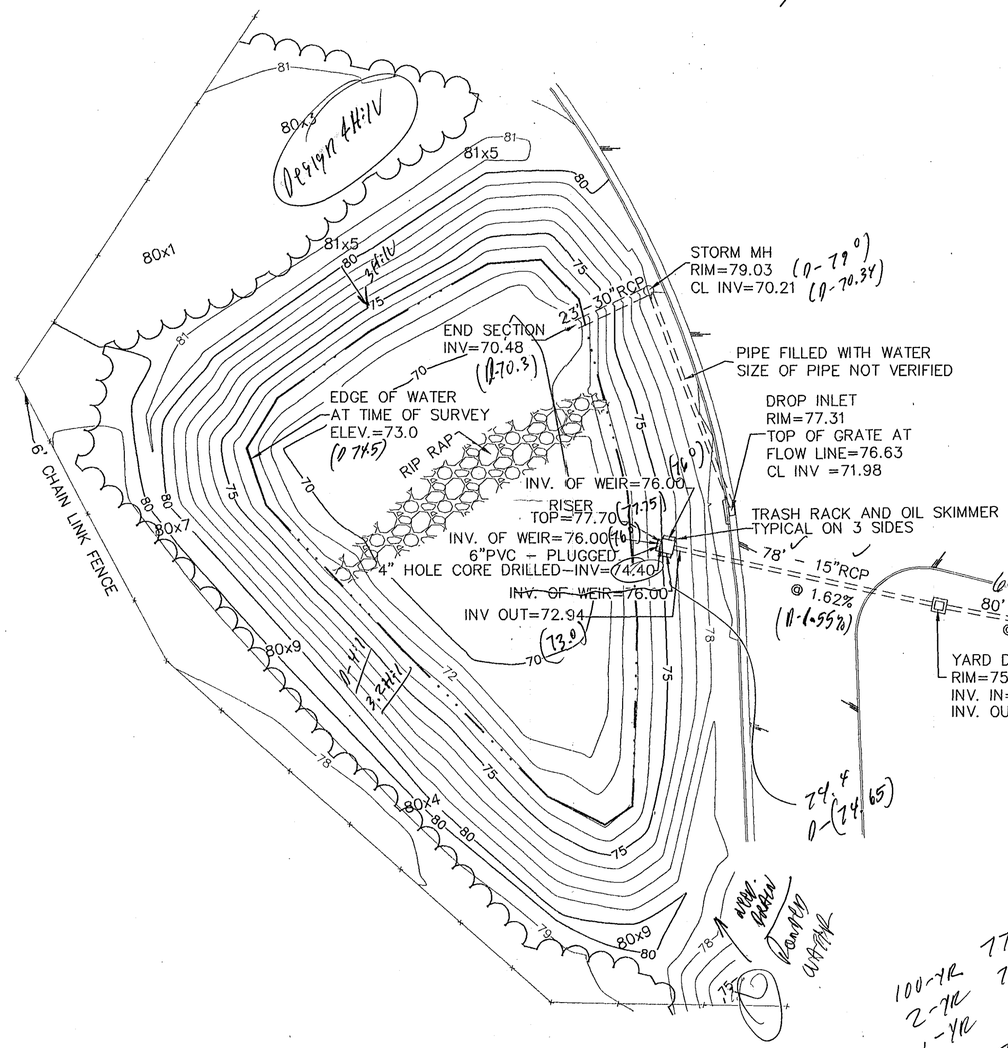
I hereby certify to the best of my judgement, knowledge and belief that this Stormwater Management / BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

Michael H Wheeler (Seal)
3-13-01
Virginia Registered Professional Engineer

3. As-Built Plan

Design AB

Design 4H:1V



Approved Plan Sheet 207 As revised per Planning Set.

ADD "MODIFIED VDOT STD. DROP INLET POND CONTROL STRUCTURE" CS-11 detail as noted on plan

RISER STRUCTURE DETAIL

▷ CONST CART OK

▷ flowable water

COMMONWEALTH OF VIRGINIA
2/14/01
ALISTAIR JAMES RAMSAY
002411
LAND SURVEYOR

THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY, PERFORMED BY LANDMARK DESIGN GROUP, 11/00 – 02/01.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

RECORD DRAWING
OF
STORMWATER POND NO. 1
ANHEUSER BUSCH BREWERY
TRANSPORTATION ADVANTAGE PH. II

DATE: 02/14/01 SCALE: 1"=30'
JAMES CITY COUNTY, VIRGINIA

LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

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Fax (757) 229-0049
Email: lmdg@landmarkdgwb.com

5544 Greenwich Road
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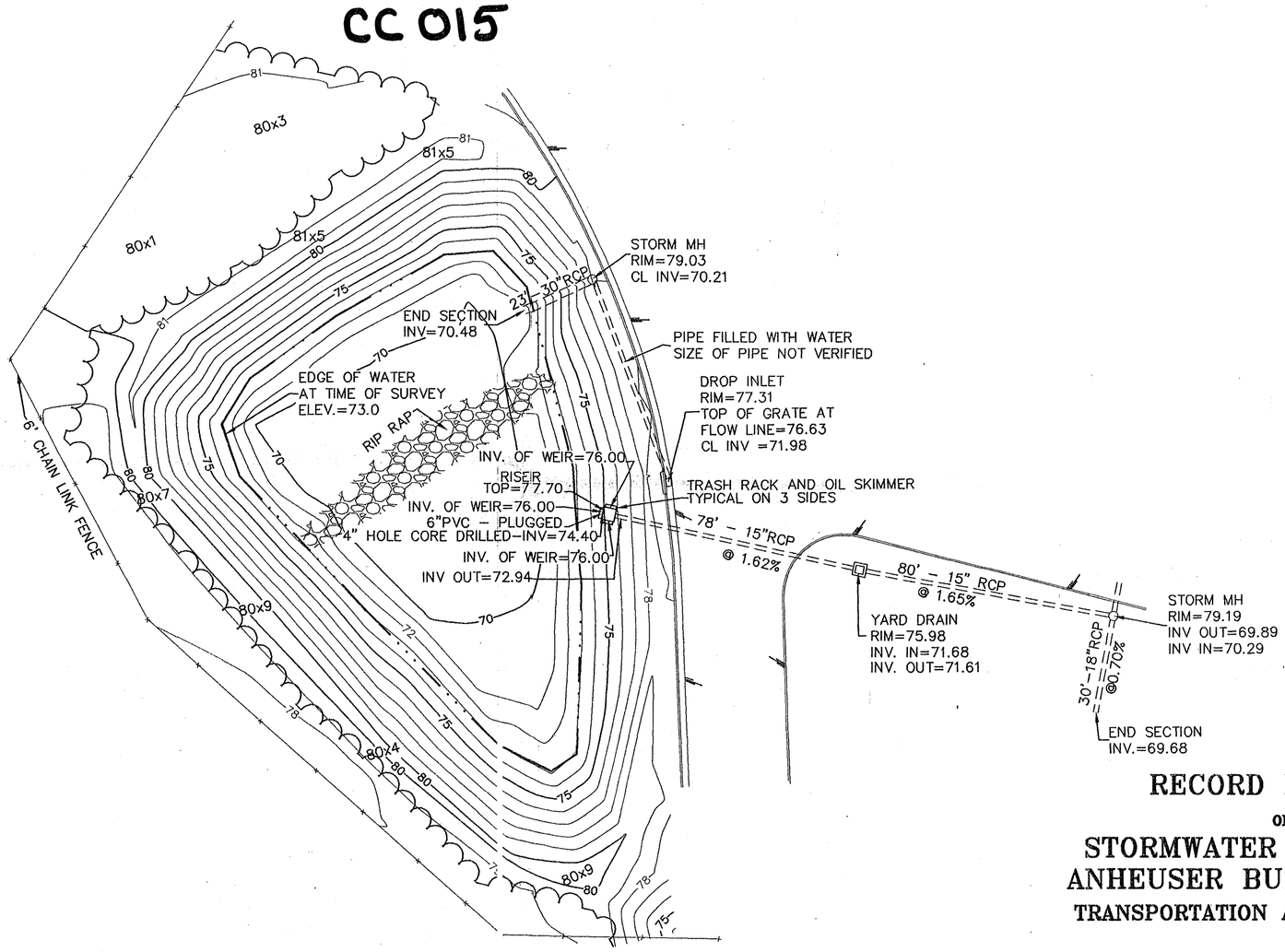
Virginia Beach, VA 23462
Tel. (757) 473-2000
Fax (757) 497-7933
Email: lmdg@landmarkdg.com

DRAWN BY : PF	PROJ. NO. : 1990223-000.20
CHKD. BY : AJR	DWG. NO. : 12109 W

CHECKSET: FIELD COPY - SJT 2/08/01
MIKE WOODS on SCOTT THOMAS

APPROVED MAR 2 0 2001

CC 015



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OF
STORMWATER POND NO. 1
ANHEUSER BUSCH BREWERY
TRANSPORTATION ADVANTAGE PH. II

DATE: 02/14/00 SCALE: 1"=30'
JAMES CITY COUNTY, VIRGINIA

REVISED 03/13/01 PER JAMES CITY COUNTY COMMENTS

LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

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COUNTY PLAN NO. SP-121-99
BMP ID NO. CC 015

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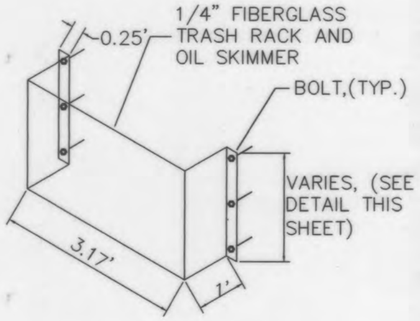
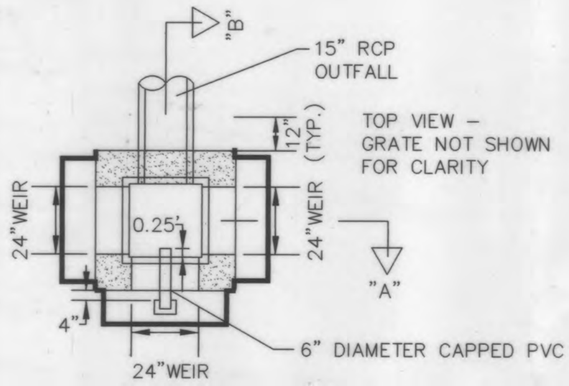
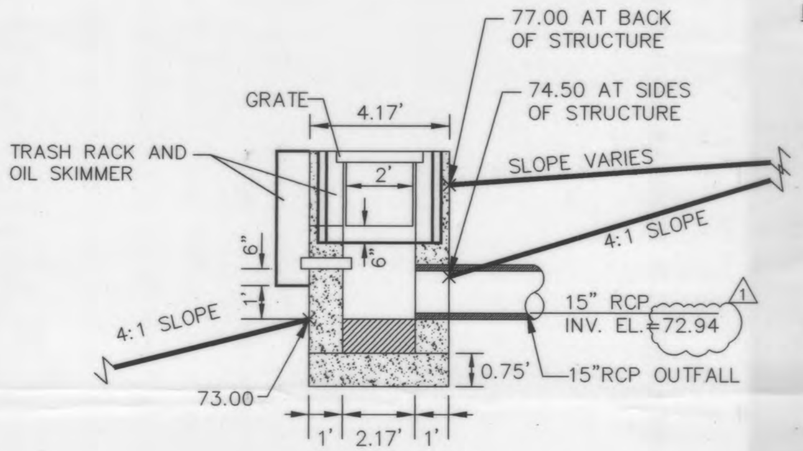


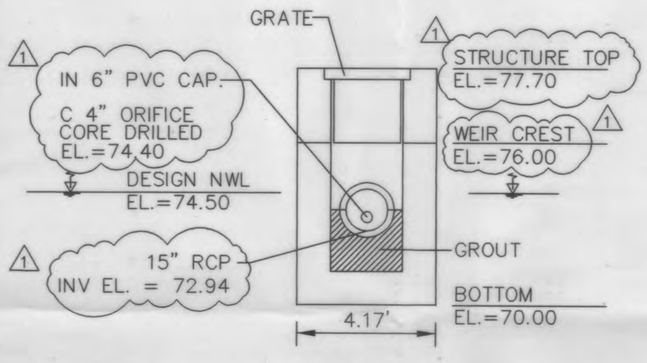
TRASH RACK AND OIL SKIMMER



PLAN



SECTION "B-B"



SECTION "A-A"

MODIFIED V.D.O.T. STANDARD DROP INLET POND CONTROL STRUCTURE CS-1

N.T.S.

1 INDICATES INFORMATION REVISED PER FIELD SURVEY
ALL OTHER INFORMATION SHOWN IS FROM APPROVED DESIGN DRAWINGS SUPPLIED BY THE DESIGN FIRM, THE HASKELL CO.

THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY, PERFORMED BY LANDMARK DESIGN GROUP, 11/00 - 02/01

INSPECTION & MAINTENANCE

PROGRAM THE FOLLOWING INSPECTION AND MAINTENANCE PROGRAM IS PROVIDED TO ASSURE THE FACILITIES FUNCTION AS DESIGNED. SHORT-TERM INSPECTIONS SHALL BE PROVIDED ON A REGULAR QUARTERLY OR "AS-NEEDED" BASIS AND AFTER SIGNIFICANT RAINFALL EVENTS OF ONE INCH OR MORE. LONG-TERM INSPECTIONS SHALL REQUIRE DRAINING OF POND FOR INSPECTION AND MAINTENANCE OF SEDIMENT FORE-BAY AREAS AND MAINTENANCE OF ROCK BAFFLES DEFINING THE SEDIMENT FOREBAY. LONG-TERM INSPECTIONS SHALL BE MADE ON A 5-YEAR TO 10-YEAR BASIS UNLESS THE SHORT-TERM INSPECTIONS REVEAL OTHERWISE.

SHORT-TERM INSPECTION & MAINTENANCE:

(a) INSPECTION OF INLETS AND OUTLETS FOR OBSTRUCTIONS AND FUNCTIONAL CAPABILITY.
(b) INSPECTION OF ALL STRUCTURAL COMPONENTS FOR SIGNS OF DAMAGE.
(c) INSPECTION OF ALL SLOPES FOR SIGNS OF EROSION OR SLOUGHING OF SIDE BANKS.
(d) INSPECTION FOR SEEPAGE AT DOWNSTREAM SIDE OF EARTHEN EMBANKMENTS, (*).
(e) REMOVAL OF TRASH AND DEBRIS FROM ALL CONVEYANCE FACILITIES.
(f) REGULAR MOWING AND REMOVAL OF ACCUMULATED VEGETATION.
(g) STABILIZATION AND RESTORATION OF ERODED AREAS.

(*) EVIDENCE OF SEEPAGE SHALL IMMEDIATELY BE BROUGHT TO ENGINEER'S ATTENTION.

LONG TERM INSPECTION & MAINTENANCE:

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(a) REMOVE ACCUMULATED SEDIMENTS.
(b) INSPECTION AND REPAIR OF ROCK BAFFLES.

ADDENDUM TO RECORD DRAWING

OF

STORMWATER POND NO. 1
ANHEUSER BUSCH BREWERY
TRANSPORTATION ADVANTAGE, PH. II

DATE: 03/15/01 N.T.S.
JAMES CITY COUNTY, VIRGINIA

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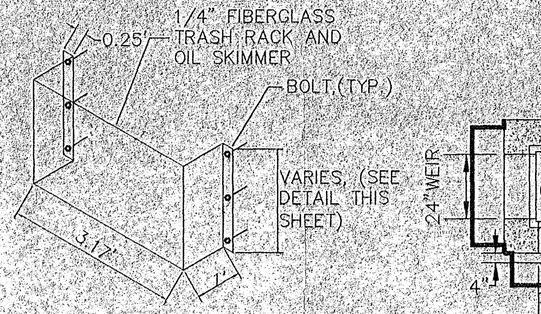
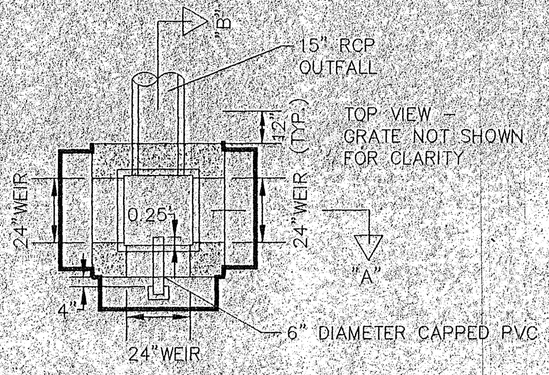
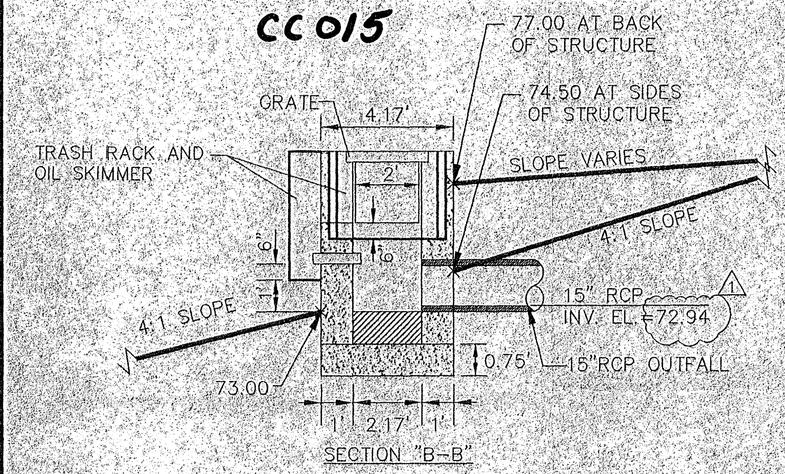


TRASH RACK AND OIL SKIMMER



PLAN

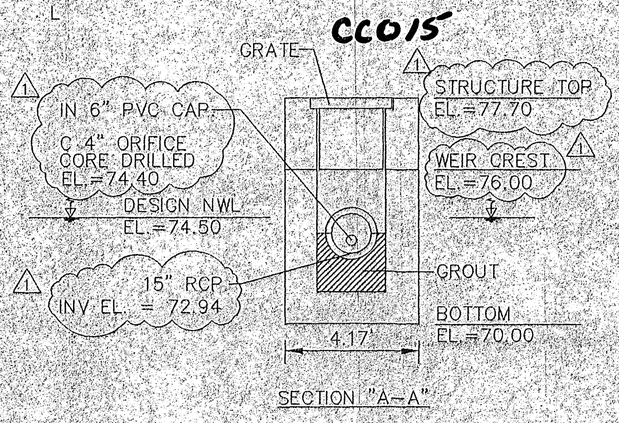
CC 015



SECTION "B-B"

L

CC015



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(d) INSPECTION FOR SEEPAGE AT DOWNSTREAM SIDE OF EARTHEN EMBANKMENTS. (*).
(e) REMOVAL OF TRASH AND DEBRIS FROM ALL CONVEYANCE FACILITIES.
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(a) REMOVE ACCUMULATED SEDIMENTS.
(b) INSPECTION AND REPAIR OF ROCK BAFFLES.

ADDENDUM TO RECORD DRAWING

OF

STORMWATER POND NO. 1
ANHEUSER BUSCH BREWERY
TRANSPORTATION ADVANTAGE, PH. II

DATE: 03/15/01 N.T.S.
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4029 Ironbound Road
Suite 100
Williamsburg, VA 23188
Tel: (757) 253-2975
Fax (757) 229-0049
Email: lmdg@landmarkdgwb.com

5544 Greenwich Road
Suite 200
Virginia Beach, VA 23462
Tel: (757) 473-2000
Fax (757) 497-7933
Email: lmdg@landmarkdg.com

COUNTY PLAN NO. SR-121-99
BMP ID NO. CC 015

DRAWN BY : PF | PROJ. NO. : 199022 3-00 20
CHKD. BY : AJR | DWG. NO.

5. Construction Plan

TEMPORARY STOCKPILE AREA AND EQUIPMENT STORAGE AND STAGING AREA

9/215 SCOUR PROTECTION

INSTALL SUBMERGED ROCK BAFFLE, SEE SECTION C-C, THIS SHEET

100 YR 24 HR EL 77.53

10 YR 24 HR EL 76.82

1YR 24 HR EL 75.93

DESIGN POOL EL 74.50

SEE POND OUTFALL STRUCTURE CS-1 (DETAIL THIS SHEET)

~39 LF 30" RCP @S=0.14%

~70LF 15"RCP @ S=0.23%

~162LF 30"RCP @ S=0.10%

~192 LF 24"RCP @ S=0.234%

60LF 15" RCP @ S=2.0%

~94 LF 15" RCP @2.00%

81 LF 15" RCP @ 1.55%

60LF 15" RCP @ S=1.55%

32LF 18" RCP @ S=1.00%

SEDIMENT FOREBAY

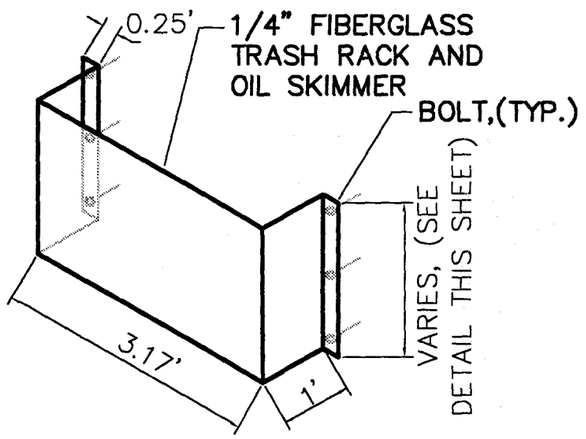
DETENTION POND 1

ELECTRIC SUBSTATION

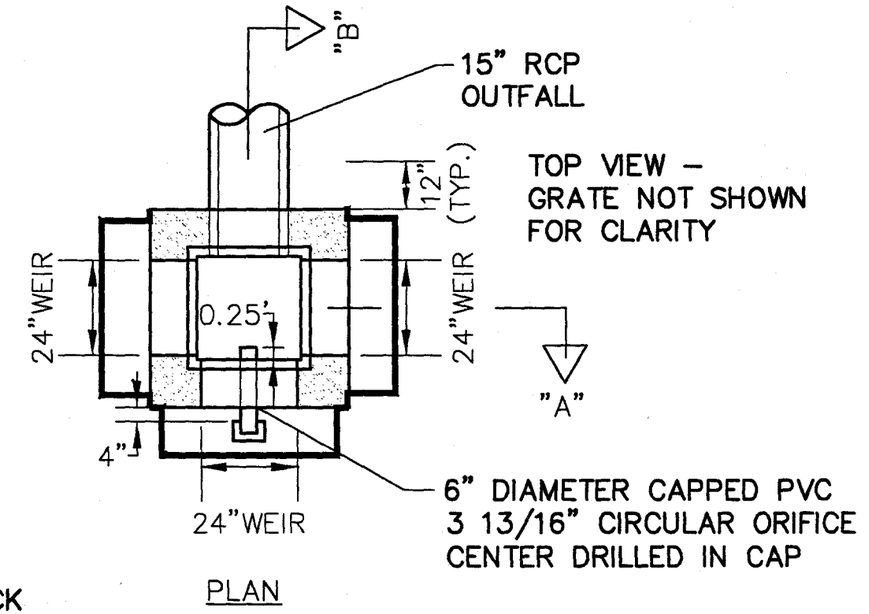
ST-3 ST-4 ST-5 ST-6 ST-7 ST-8 ST-9 ST-10 ST-11 ST-12 ST-13 ST-14

81.91 82.00 79.10 79.25 77.72 77.88 77.00 77.50 77.44 77.95 76.74 75.75 77.60 77.60

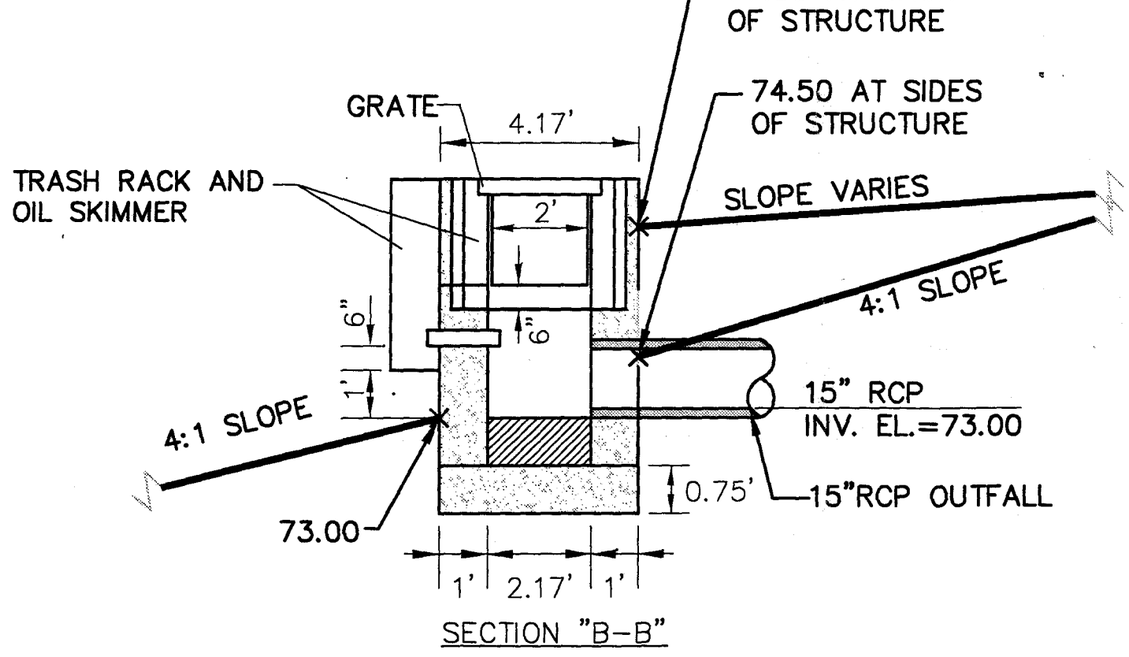
POND I
CC015; SP-121-99



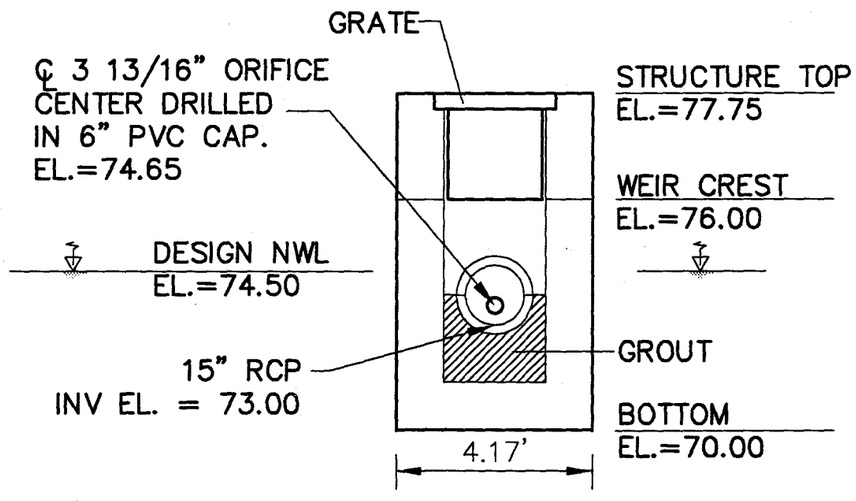
TRASH RACK AND OIL SKIMMER



PLAN



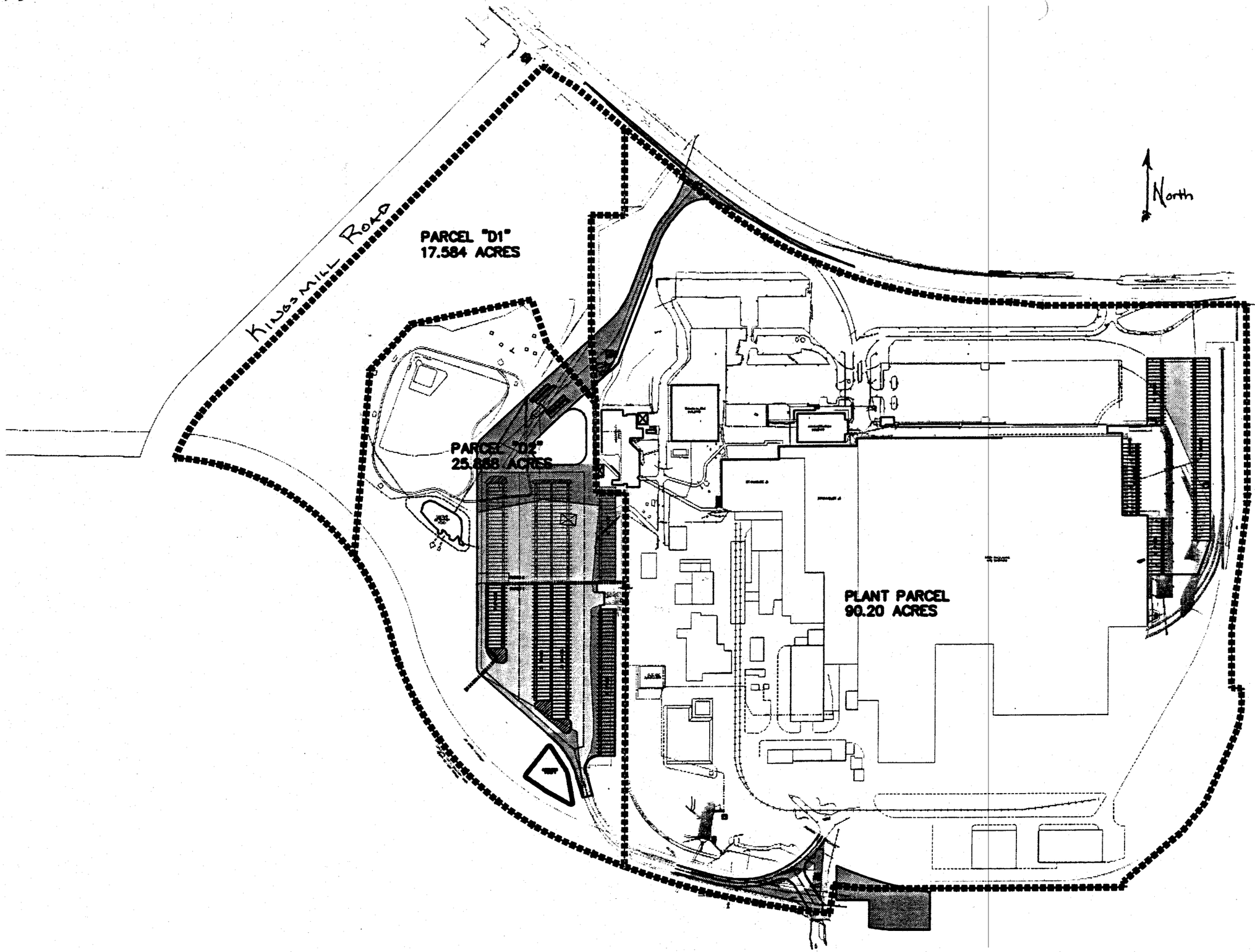
SECTION "B–B"



SECTION "A–A"

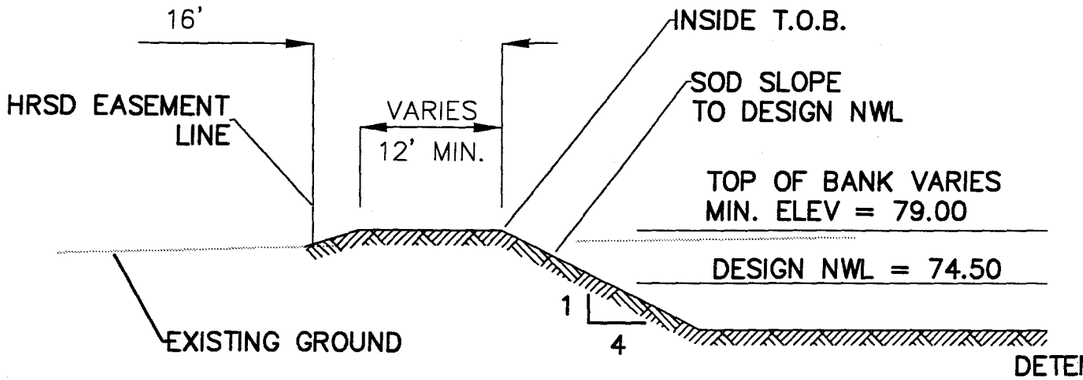
MODIFIED V.D.O.T. STANDARD DROP INLET POND CONTROL STRUCTURE CS–1

N.T.S.

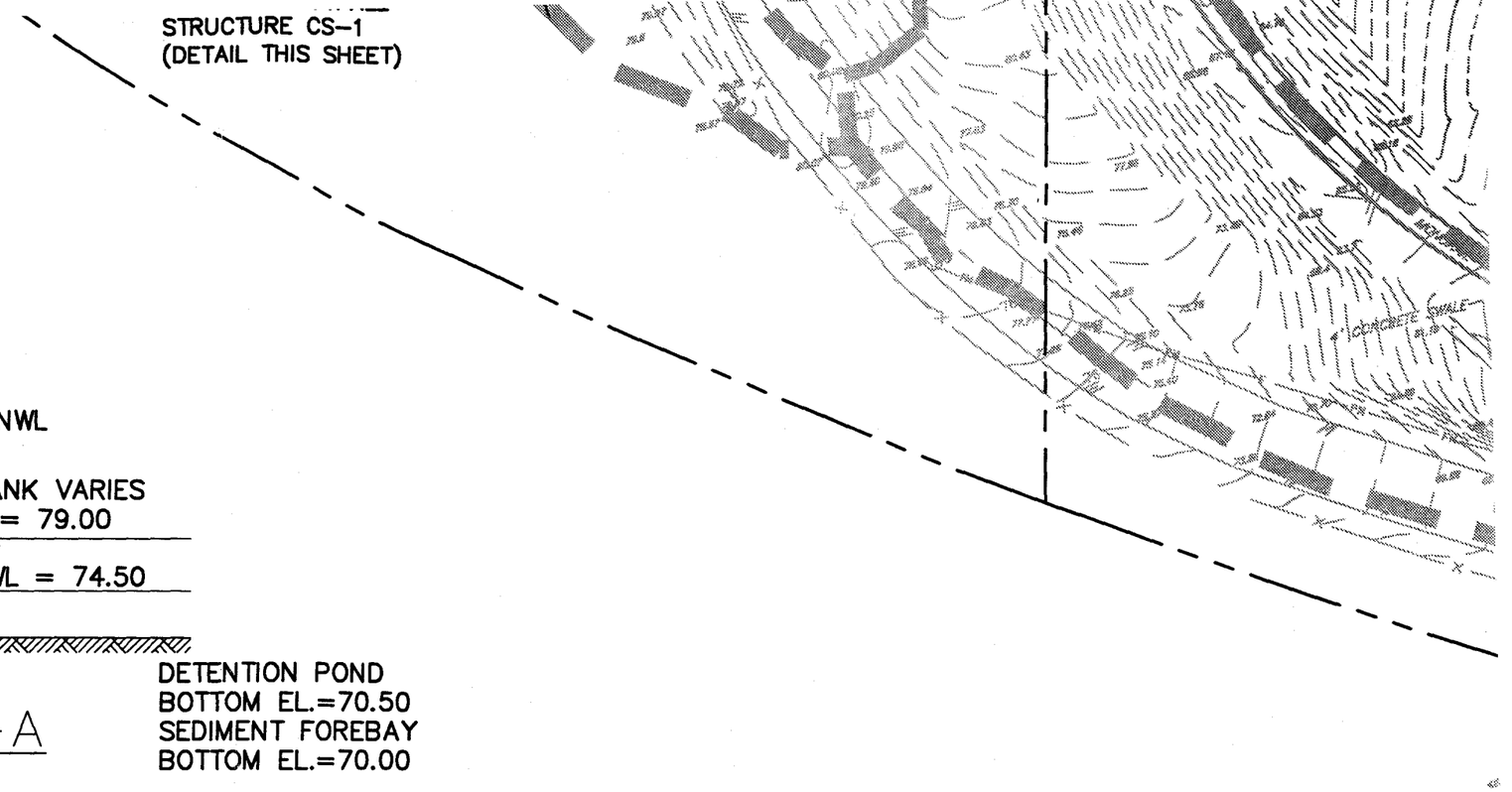


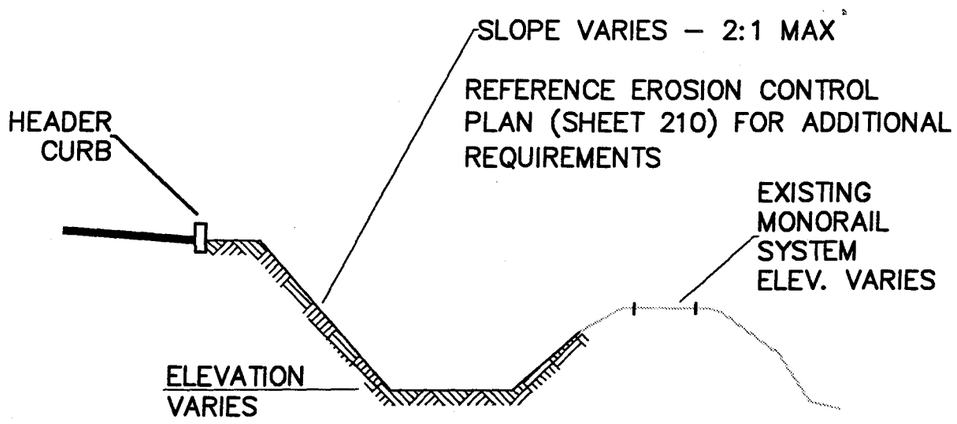
Busch Gardens

Transportation Advanta
Anheuser-Busch, Inc
Land Use Summa
12-2-99

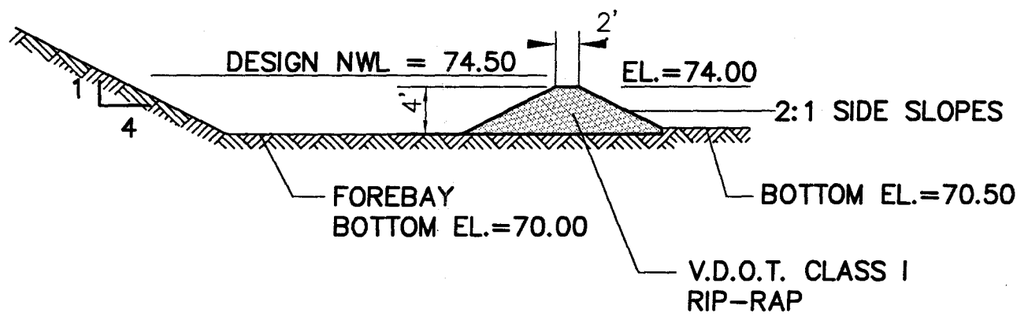


TYPICAL POND SECTION A–A





TYPICAL SWALE SECTION B–B



SECTION C–C

A B C

INSPECTION & MAINTENANCE PROGRAM

THE FOLLOWING INSPECTION AND MAINTENANCE PROGRAM IS PROVIDED TO ASSURE THE FACILITIES FUNCTION AS DESIGNED. SHORT-TERM INSPECTIONS SHALL BE PROVIDED ON A REGULAR QUARTERLY OR "AS-NEEDED" BASIS AND AFTER SIGNIFICANT RAINFALL EVENTS OF ONE INCH OR MORE. LONG-TERM INSPECTIONS SHALL REQUIRE DRAINING OF POND FOR INSPECTION AND MAINTENANCE OF SEDIMENT FORE-BAY AREAS AND MAINTENANCE OF ROCK BAFFLES DEFINING THE SEDIMENT FOREBAY. LONG-TERM INSPECTIONS SHALL BE MADE ON A 5-YEAR TO 10-YEAR BASIS UNLESS THE SHORT-TERM INSPECTIONS REVEAL OTHERWISE.

SHORT-TERM INSPECTION & MAINTENANCE:

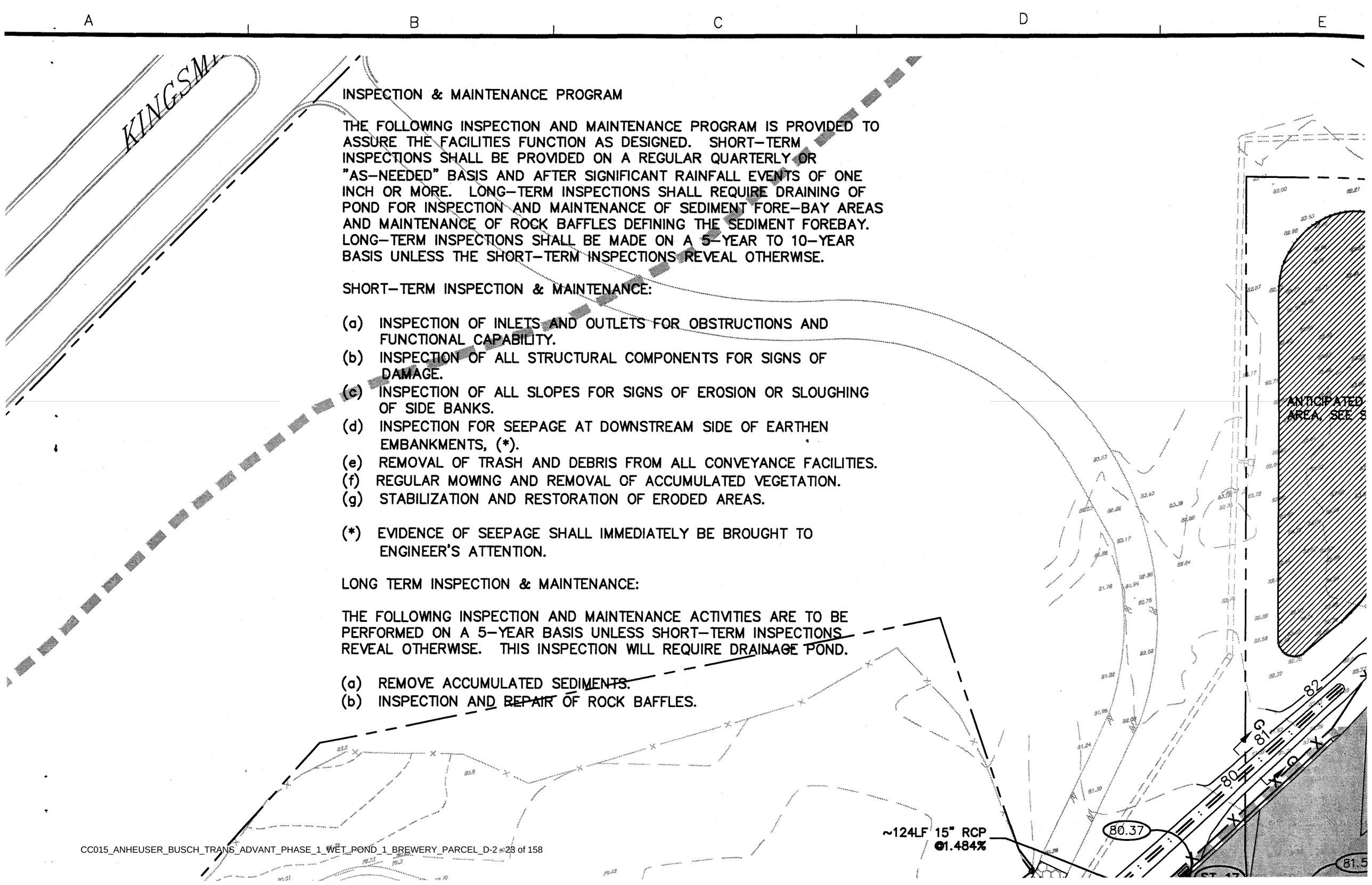
(a) INSPECTION OF INLETS AND OUTLETS FOR OBSTRUCTIONS AND FUNCTIONAL CAPABILITY.
(b) INSPECTION OF ALL STRUCTURAL COMPONENTS FOR SIGNS OF DAMAGE.
(c) INSPECTION OF ALL SLOPES FOR SIGNS OF EROSION OR SLOUGHING OF SIDE BANKS.
(d) INSPECTION FOR SEEPAGE AT DOWNSTREAM SIDE OF EARTHEN EMBANKMENTS, (*).
(e) REMOVAL OF TRASH AND DEBRIS FROM ALL CONVEYANCE FACILITIES.
(f) REGULAR MOWING AND REMOVAL OF ACCUMULATED VEGETATION.
(g) STABILIZATION AND RESTORATION OF ERODED AREAS.

(*) EVIDENCE OF SEEPAGE SHALL IMMEDIATELY BE BROUGHT TO ENGINEER'S ATTENTION.

LONG TERM INSPECTION & MAINTENANCE:

THE FOLLOWING INSPECTION AND MAINTENANCE ACTIVITIES ARE TO BE PERFORMED ON A 5-YEAR BASIS UNLESS SHORT-TERM INSPECTIONS REVEAL OTHERWISE. THIS INSPECTION WILL REQUIRE DRAINAGE POND.

(a) REMOVE ACCUMULATED SEDIMENTS.
(b) INSPECTION AND REPAIR OF ROCK BAFFLES.



CTION "B–B"

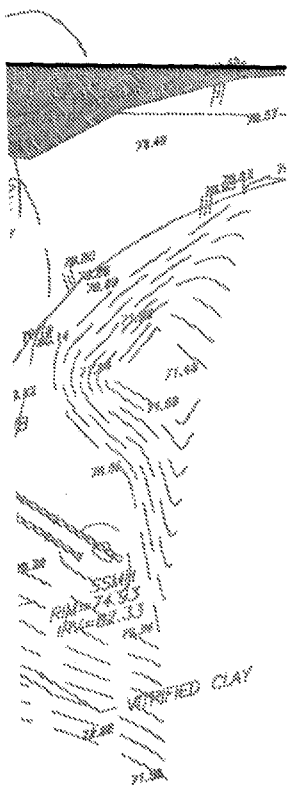
SECTION "A–A"

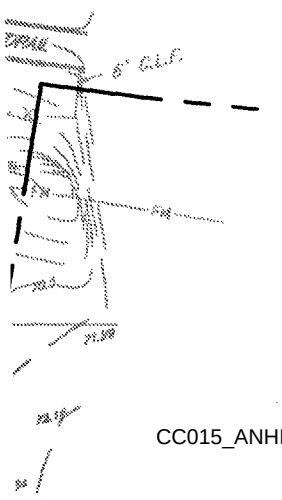
MODIFIED V.D.O.T. STANDARD DROP INLET POND CONTROL STRUCTURE CS–1

N.T.S.

STORM DRAINAGE STRUCTURE TABLE

ST–*	DESCRIPTION OR TYPE	CURB OPENING WIDTH, L (FT)	TOP/ GRATE ELEV. (3)	INVERTS				DETAIL NO.
				N	S	E	W	
ST–1	V.D.O.T. STD. PRECAST TOP T–D1–1 W/ BASE B–1	NA	78.00	–	73.03	–	–	8/213 11/213
ST–2	V.D.O.T. STD. PRECAST TOP T–D1–1 W/ BASE B–1	NA	77.25	72.70	71.95	–	–	8/213 11/213
ST–3	V.D.O.T. STANDARD PRECAST MANHOLE	NA	79.10	71.45	71.45	–	–	16/213
ST–4	V.D.O.T. STD. PRECAST TOP T–D1–1 W/ BASE B–1	NA	77.25	71.00	–	–	70.50	8/213 11/213
ST–5	V.D.O.T. STANDARD PRECAST MANHOLE	NA	79.00	–	71.59	70.34	70.34	16/213
ST–6	CONCRETE FLARED END SECTION	NA	NA	70.30	–	–	–	15/213
ST–7	POND 1 CONTROL STRUCTURE – MODIFIED V.D.O.T. DROP INLET DI–1	NA	REFERENCE DETAIL (THIS SHEET)					
ST–8	V.D.O.T. STD. PRECAST MANHOLE	NA	78.00	70.06	69.81	–	69.81	16/213
ST–9	V.D.O.T. STD. CURB DROP INLET TOP T–DI–2C W/ BASE UNIT B–1	6.00	77.00	71.75	–	–	–	9/213 13/213
ST–10	CONCRETE FLARED END SECTION	NA	–	71.26	–	–	–	15/213
ST–11	CONCRETE FLARED END SECTION	NA	–	–	69.49	–	–	15/213
ST–12	CONCRETE FLARED END SECTION	NA	–	69.85	–	–	–	15/213
ST–13	CONCRETE FLARED END SECTION	NA	–	–	68.50	–	–	15/213
ST–14	V.D.O.T. STD. DROP INLET DI–1 W/ GRATE	NA	76.00	–	–	70.74	71.74	12/213
ST–15	V.D.O.T. STD. PRECAST TOP T–D1–1 W/ BASE B–1	NA	75.75	–	67.12	–	–	8/213 11/213





NOTES:

1. ALL GRATES WITHIN TRAFFIC AREAS SHALL BE RATED FOR HEAVY DUTY TRUCK TRAFFIC.
2. TOP/GRATE ELEVATION REFERS TO THE SURFACE INFLOW ELEVATION AND NOT THE TOP OF CURB.
3. STEPS SHALL BE PROVIDED IN ACCORDANCE WITH V.D.O.T. STANDARD ST–1 FOR STRUCTURE DEPTHS GREATER THAN FOUR FEET.
4. UPON COMPLETION OF CONSTRUCTION THE WET EXTENDED DETENTION PONDS (INCLUDING THE DAM ASSOCIATED WITH POND 2) WILL BE CERTIFIED BY A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE FACILITIES DURING CONSTRUCTION. UPON COMPLETION OF CONSTRUCITON, "AS–BUILT" DRAWINGS WILL BE PROVIDED WITH CERTIFICATION OF COMPLETION OF CONSTRUCTION.
5. ALL CONCRETE PIPE INSTALLED BENEATH TRAFFIC AREAS SHALL BE CLASS IV B–WALL PIPE.
6. MANHOLE AND INLET INVERTS SHALL BE SHAPED IN ACCORDANCE WITH V.D.O.T. STANDARD IS–1. (SEE DETAIL NO. 17, SHEET 213).

6. Design Calculations

75/100 = 80/x 106.67

ANHEUSER-BUSCH - TRANSPORTATION ADVANTAGE PROJECT

LAND USE SUMMARY TABLE

****

The Anheuser-Busch properties at the Williamsburg Brewery have been subdivided into several individual properties with distinct ownership. The Transportation Advantage project will potentially impact four separate properties. The properties and their ownership are identified on the accompanying property description map.

PROPERTY DESCRIPTION	OWNERSHIP	REAL ESTATE NUMBER	TOTAL AREA
Plant Parcel	Anheuser-Busch, Inc.	(51-3)(01-1)	90.2 acres
Parcel 'D-1'	?	(50-2)(01-78)	17.6 acres
Parcel 'D-2'	?	(51-3)(01-3)	25.9 acres
Busch Gardens	Busch Properties, Inc.	(51-4)(01-9)	?
			133.7 ac

Parcel 'D-1'	Interior Trailer Parking Additions & Driveway Improvements	
Building Areas	0.000 acres	0%
Pavement Areas	0.629 acres	4%
Grass, Trees, & Open Areas	16.955 acres	96%
Pond Areas	0.000 acres	0%
Total Area	17.584 acres	100%

133.7
.6
80.2

133.7
- 80.2
53.5 - green ruled prov.

Parcel 'D-2'	Interior Trailer Parking Additions & Driveway Improvements	
Building Areas	0.050 acres	0%
Pavement Areas	9.950 acres	38%
Grass, Trees, & Open Areas	14.170 acres	55%
Pond Areas	1.718 acres	7%
Total Area	25.888 acres	100%

32.8

20.7 - ruled - brewery

15.888
16.755
32.643

Note: The Phase 1 portion of the Transportation Advantage project lies entirely within the limits of Parcel 'D-2'.

80

STORMWATER MANAGEMENT PLAN

for

TRANSPORTATION ADVANTAGE – PHASE 1
ANHEUSER BUSCH

Williamsburg, Virginia

THE HASKELL COMPANY
Haskell Building
Jacksonville, Florida

Project 32193

Original Issue: November 16, 1999
Prepared By: Joseph W. Stepp, P.E.

THE HASKELL COMPANY
ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES

11/16/99

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II. STORMWATER SYSTEM ANALYSIS

III. APPENDIX

STORMWATER MANAGEMENT PLAN

Anheuseur-Busch
Transportation Advantage – Phase I
Jacksonville, Florida

November 16, 1999

DESIGN NARRATIVE

▫ Introduction

Anheuser-Busch is proposing to expand their truck and trailer staging and storage areas through the "Transportation Advantage" project. Phase One of the Transportation Advantage project will consist of an expansion of existing parking facility to accommodate 123 truck and trailer storage spaces.

▫ Project Description

Phase One expansion will include construction of 39 new asphalt paved truck storage spaces and addition of new stormwater facilities to serve the new construction. In addition, existing paved areas will be revitalized and new asphalt overlay provided. Re-striping of the area and provision of curbing and/or curb & gutter will be provided where necessary for stormwater control.

▫ Project Location

As shown on the location map included herewith, Phase One is located in the southwest area of the existing brewery.

▫ Existing Land Use

Currently, Phase One project area is used as a construction staging area. Access to the area is from an existing guarded paved roadway from the south.

▫ Flood Zone

Based on the Flood Insurance Rate Map (Panel Number 510201 0050 B, Effective Date February 6, 1991), the site and surrounding areas are located in Zone X. This zone is outside of the 500-year flood plain. Maps and related information are included in the appendix of this report.

- **Soil Conditions**

References: SCS Soil Survey Map and Related Information
URS Griner Woodward Clyde Soil Boring Logs

Based on the SCS Soil Survey, the project is located within an area designated Urban Land (#37). With reference to the survey narrative, included with this mapping unit are areas of undisturbed soils, commonly well-drained Emporia soils (19A), and moderately well drained Slagle soils (#29B).

In addition to the soil survey, test borings were provided by URS Greiner Woodward Clyde. A comparison of the boring logs with the Engineering Index Properties (Table 13) of the above-mentioned survey shows a close resemblance between Emporia and Slagle soil units and the existing soils on site.

The above referenced information is contained in the Appendix of this report.

- **Design Concept**

In designing the grading scheme for the newly paved areas (and, in an effort to match existing drainage patterns of the site) collection of stormwater runoff from the newly paved areas would also include a portion of the existing paved parking area which was not included previously collected. Since, the Chesapeake Bay Preservation Ordinance requires a 10 percent reduction in non-point source pollution load for re-development sites, inclusion of the existing paved parking area into the stormwater system should meet this requirement for the Phase One expansion area. Also, a portion of the existing pavement (approximately 11,150 sf) will be removed as part of Phase One.

In addition, to meet channel downstream erosion requirements, the stormwater management system will be designed to new James City County requirements for the 1 year – 24 hr storm event. Attenuation of the 2 and 10 year – 24 hour storms will also be provided.

- **Existing Conditions Analysis**

References: Color Aerial Photo showing existing conditions for Phase One Area
Topographic survey showing existing conditions for Phase One Area

As shown on the map of existing conditions, an existing drainage divide splits Phase One area. Currently approximately 88,585-sf +/- of asphalt pavement drains westerly to a collection system, which conveys the stormwater runoff to an existing wet detention area adjacent to the site and ballfield area. The remaining 82,810-sf +/- of asphalt pavement drains easterly to an open-channel conveyance system that traverses along the westerly and southerly side of the existing monorail system to a point of discharge through an existing 72-inch pipe that discharges to off-site drainage areas south of the brewery. This

pipe also is the main conveyance pipe for the brewery drainage system within the boundaries of the monorail system. A sparsely wooded area separates the open-channel and the existing pavement area.

A time of concentration path is shown on the map of existing conditions which is representative of the Phase One area draining to the open-channel section along the monorail. Time of concentration for this contributing area is calculated to be approximately 24 minutes.

Using the SCS Unit Hydrograph Methodology, discharge from the Phase One area was computed for the 1, 2, 10 and 100 year return periods of 24 hour duration. These hydrographs were then used as guidelines for post-conditions design.

Reference the Stormwater Analysis – Section A for details of the existing-conditions analysis.

- **Post Conditions Analysis**

References: Topographic survey showing post-conditions for Phase One Area

As shown on the Post-Conditions map, existing drainage patterns are being maintained for Phase One site area. The existing drainage divide will be maintained "as-is" by use of asphalt leveling courses and a new wearing course of asphalt-concrete. Currently, a non-woven geotextile will be utilized as part of the pavement rehabilitation.

With respect to maintaining the existing drainage divide, the existing paved area currently draining westerly will continue to drain westerly except for a small portion of pavement (approximately 11,150 sf), which will be removed as part of demolition. Given this fact, post-condition drainage analysis of the area draining westerly will not be presented at this time since there is no additional impact to this area under Phase One re-development. (Reduction of impervious area draining westerly is approximately 12.5 percent).

Post-conditions analysis will focus on the Phase One area draining easterly.

Under post-conditions a new paved area will be provided along the East side of the existing pavement. This new paved area will provide 39 new truck storage spaces. In addition, a small triangular area of new pavement will be necessary at the southwest quadrant area of the existing paved access road connecting to Phase One. This additional pavement was necessary to provide for safe and efficient turning movements of truck-trailer maneuvering.

A wet detention pond will be provided for post-conditions. A wet detention was chosen over dry due to the existing clayey soils beneath the ground surface, the depth of the

proposed detention pond, and the fact that the existing detention pond adjacent to the project area is observed to be wet.

As shown on the post-conditions map, there are a total of four (4) drainage areas that will contribute runoff to the pond for a total of 3.2 acres.

(Please note that drainage area No. 1 is a future parking expansion area and although not constructed under Phase One, the pond has been sized to include this area)

To meet downstream channel erosion protection requirements, the new James City County requirements for routing of the 1 yr 24 hr storm event of 2.8 inches into the pond and sizing an orifice to discharge this volume over a 24 hour period was used. The "Kerplunk" method was used in this analysis. In addition, the 2 and 10-year storm events of 24-hour duration were routed through the detention pond and the weir control structure sized to control the outlet discharge at or below the discharge rates computed in the existing-condition analysis. Finally, the 100-year storm is routed to assure one (1) foot of freeboard between the top of pond and the maximum stage attained in the pond.

The SCS Unit Hydrograph methodology was used along with the adICPR program (advanced Interconnected Pond Routing). A description of this program is included in the Appendix of this report.

Due to the direct connection of the paved parking areas to the pond the initial abstraction of runoff is less than the normal abstraction used in the SCS runoff equation; therefore, all impervious areas (including the pond water surface area) are appropriately modeled as directly connected impervious area (DCIA) in the stormwater drainage model.

EM IN MODEL POST IS < PRE ?

USED ONLY IN POST DEV TO LOWER CN comp. Used IMPERV. 29 FOR POST. NEED TO REMAIN CONSISTENT BETWEEN PRE- AND POST. EXIST. PARKING ALSO IS "DIRECTLY" CONNECTED

OK SV

Although time of concentration for the system is less than 10 minutes, the flood routing analysis will use 10 minutes. ✓ Tc = 9.42 min OK

Reference the Stormwater Analysis – Section B for details of the post-conditions analysis.

To meet the 10 percent reduction in non-point source pollutant loading (as required by the Chesapeake Bay Preservation Ordinance), the following is presented:

> As noted above, under existing conditions there is approximately 82,810-sf +/- of existing paved parking area draining easterly and southerly to off-site areas. Under post-conditions the total impervious area (including new pavement) draining easterly to off- site areas without being treated is approximately 36,350-sf +/- (indicated as drainage areas 5 & 6 on post-conditions map). The impervious area being captured and directed to the proposed detention area for treatment is approximately 98,886-sf +/- (indicated as drainage areas 1, 2 & 3 on post-conditions map). Of the 98,886-sf of paved area to be treated, approximately 49,271-sf is existing paved area. Therefore, the net reduction in impervious area draining

49,615 NEW TREATED

Pre 82,810 ft² - uncontrolled - load X ⇒ 82,810

Post 98,886 ft² - after development ⇒ 98,886

Pond reduces load by 50% ⇒ 49,443

82810
- 49271
33539

easterly and southerly to off-site areas is reduced by approximately 50,460 sf or approximately 58.5 percent. This reduction should meet the 10 percent reduction required by the Chesapeake Bay Preservation Ordinance for re-developed areas.

OK

EXIST 82810
NOW 36350
46,460sf.
(56.1%)

- **Summary**

The following is a summary of results for the design of the system.

Discharge Rate Analysis:

Design Storm	Existing Conditions (cfs)	Post Conditions (cfs)
1 yr – 24 hr	3.1	0.32 @ EL. 75.03
2 yr – 24 hr	4.6	0.37 @ EL. 75.98
10 yr – 24 hr	10.1	2.17 @ EL. 76.58
100 yr	15.51	5.51 @ EL. 77.11

Minimum top of bank elevation for the detention pond = 79.0 ft

Emergency Spillway is the paved roadway fronting the pond
Elevation to top paved roadway = top of curb elevation = 77.10 ft.

100 year flood stage in pond = 77.11 ft.

Depth over EB = 77.11 - 77.10 = 0.01'

79.00
77.11
1.89' FB

OK

Riser Top 77.50

75.03 - 77.5
75.98 - 77.5
76.58 - 77.5
77.11 - 77.5

All invert elevations are above riser top

STORMWATER ANALYSIS

ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE
WILLIAMSBURG, VA

SECTION A
EXISTING CONDITIONS ANALYSIS – PHASE 1

- Color Photo of Existing Site
- Basin and Area Delineation
- Runoff Curve Number Calculation
- Time of Concentration Calculation
- Hydrograph Input Parameters for 1, 2, 10 & 100 yr Storm Events
- Results

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- Basin and Area Delineation
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- Drop Structure Detail (Modified VDOT Drop Inlet)

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- 1 yr – 24 hr Storm Event
- 2 yr – 24 hr Storm Event
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- 100 yr – 24 hr Storm Event

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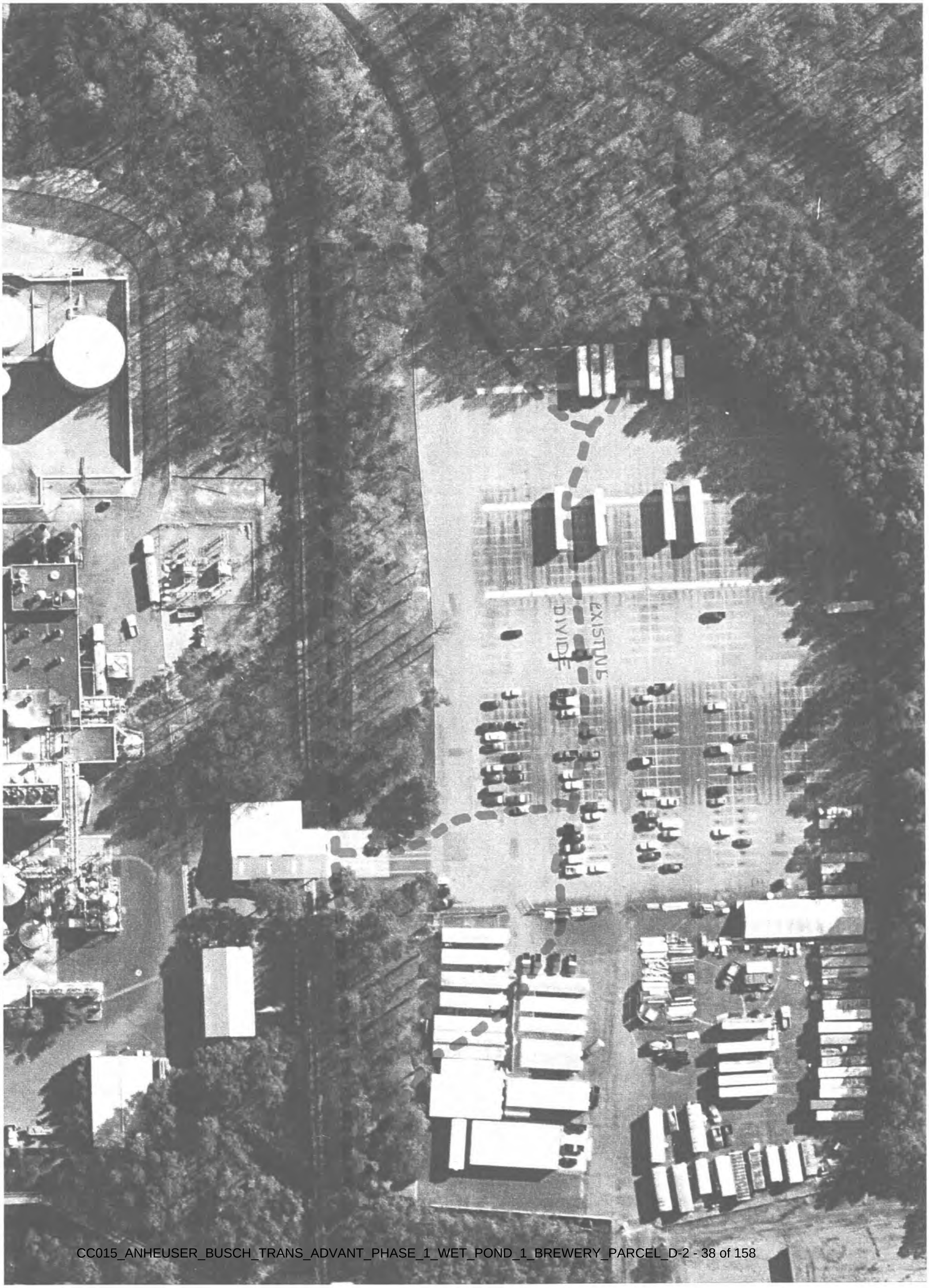
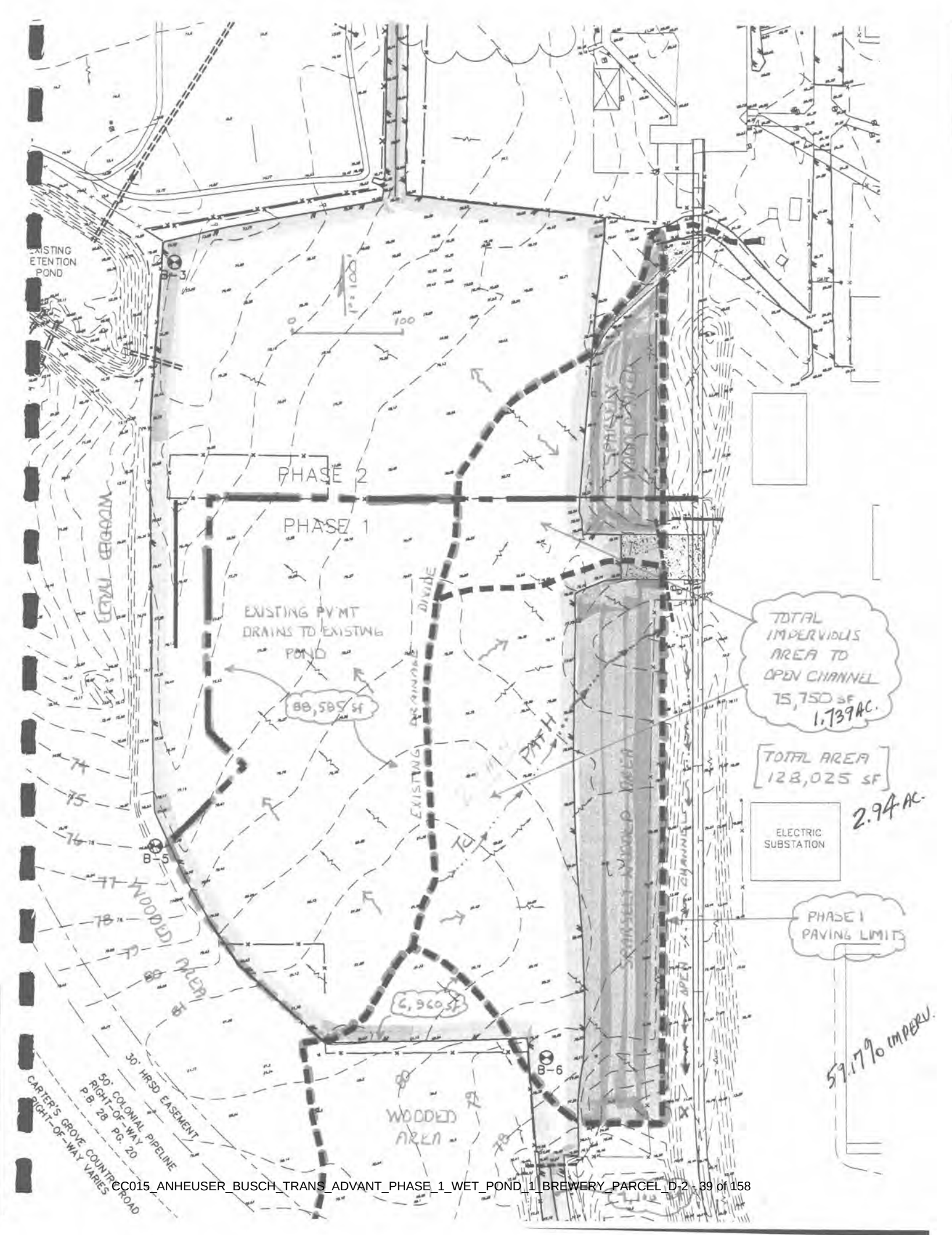
SECTION E
ORIFICE/STAGE-STORAGE/VOLUME RECOVERY CALCULATIONS

SECTION F
STORM SEWER DESIGN TABULATION – 10 YR STORM

APPENDIX
MAPS AND MISCELLANEOUS INFORMATION

SECTION A
EXISTING CONDITIONS ANALYSIS


EXISTING
DIVIDE


EXISTING ETENTION POND
B-3
PHASE 2
PHASE 1
EXISTING PVMT DRAINS TO EXISTING POND
88,585 SF
EXISTING DRAINAGE DIVIDE
PATH
TOTAL IMPERVIOUS AREA TO OPEN CHANNEL
15,750 SF
1.739AC.
[TOTAL AREA
128,025 SF]
2.94 AC.
ELECTRIC SUBSTATION
PHASE 1 PAVING LIMITS
59.17% IMPERV.
B-5
B-6
6,960 SF
WOODED AREA
30' HRSD EASEMENT
50' COLONIAL PIPELINE RIGHT-OF-WAY P.B. 28 PG. 20
CARTER'S GROVE COUNTRY ROAD RIGHT-OF-WAY VARIES

EXISTING CONDITIONS ANALYSIS - PHASE 1

TOTAL AREA = 128,025 SF (2.94 Ac. +/-)

EXISTING IMPERVIOUS AREA ~ 75,750 SF
(CONC. & ASPHALT PVMT)

REMAINING PERVIOUS AREA ~ 52,275 SF
(WOODED AREA)

FROM SCS SOIL SURVEY SOILS ARE CLASSIFIED AS NO. 37 - URBAN LAND. ADJACENT SOILS ARE SHOWN TO BE NO 19B & 29B WHICH ARE RESPECTIVELY KEMPSVILLE - EMPORIA FINE SANDY LOAM AND SLAGLE FINE SANDY LOAM.

19B HSG = B (KEMPSVILLE)
C (EMPORIA)

29B HSG = C

HSG B WILL BE USED FOR EXISTING CONDITIONS ANALYSIS DUE TO UNKNOWNS CONCERNING THE URBAN LAND CLASSIFICATION. THEREFORE, USE A WOODED AREA (GOOD CONDITION) CN = 55

COMPOSITE CN = [75,150 (98) + 52,275 (55)] / [128,025]

= 80.4

USE CN 80 ←

TIME OF CONCENTRATION

Tc PATH IS SHOWN ON ATTACHED MAP

P_2 = 3.5" ✓

T_{t_1} 200' OVERLAND SHEET FLOW (ASPHALT) @ ~ 1.9% (n = 0.012)

T_{t_2} 100' OVERLAND SHEET FLOW (WOODED) @ ~ 2.5% (n = 0.4) ✓

T_{t_3} 400' SHALLOW CONC. FLOW @ ~ 1.5%

$$T_{t_1} = \frac{0.007\,[(0.012)(200)]^{0.8}}{(3.5)^{0.5}\,(0.019)^{0.4}} = 0.037 \text{ HRS.} \quad 2.22 \text{ MIN.}$$

$$T_{t_2} = \frac{0.007\,[(0.4)(100)]^{0.8}}{(3.5)^{0.5}\,(0.025)^{0.4}} = 0.313 \text{ HRS.} \quad 18.78 \text{ MIN.}$$

T_{t_3} : $V = 16.1345\, S^{1/2} = 16.1345\,(0.015)^{1/2} = 2.0$ fps

$T_{t_3} = 400 / 2.0 / 3600 = 0.056$ Hrs ✓ 3.36 min

$T_c = 0.41$ Hrs ✓

OR 24 minutes

HYDROGRAPH PARAMETERS

SCS UNIT HYDROGRAPH METHOD ✓
SCS TYPE II RAINFALL DISTRIBUTION ✓

DESIGN STORMS:

1 YR - 24 HR	P = 2.8" ✓ (FROM JCC)
2 YR - 24 HR.	P = 3.5" ✓
10 YR - 24 HR.	P = 5.8" ✓
100 YR - 24 HR.	P = 8.0" ✓

K = 484 ✓
Tc = 24 MIN. ✓

AREA = 2.94 AC. ✓
$\overline{CN}$ = 80 ✓

RESULTS

Q_{1YR} = 3.1 CFS ✓

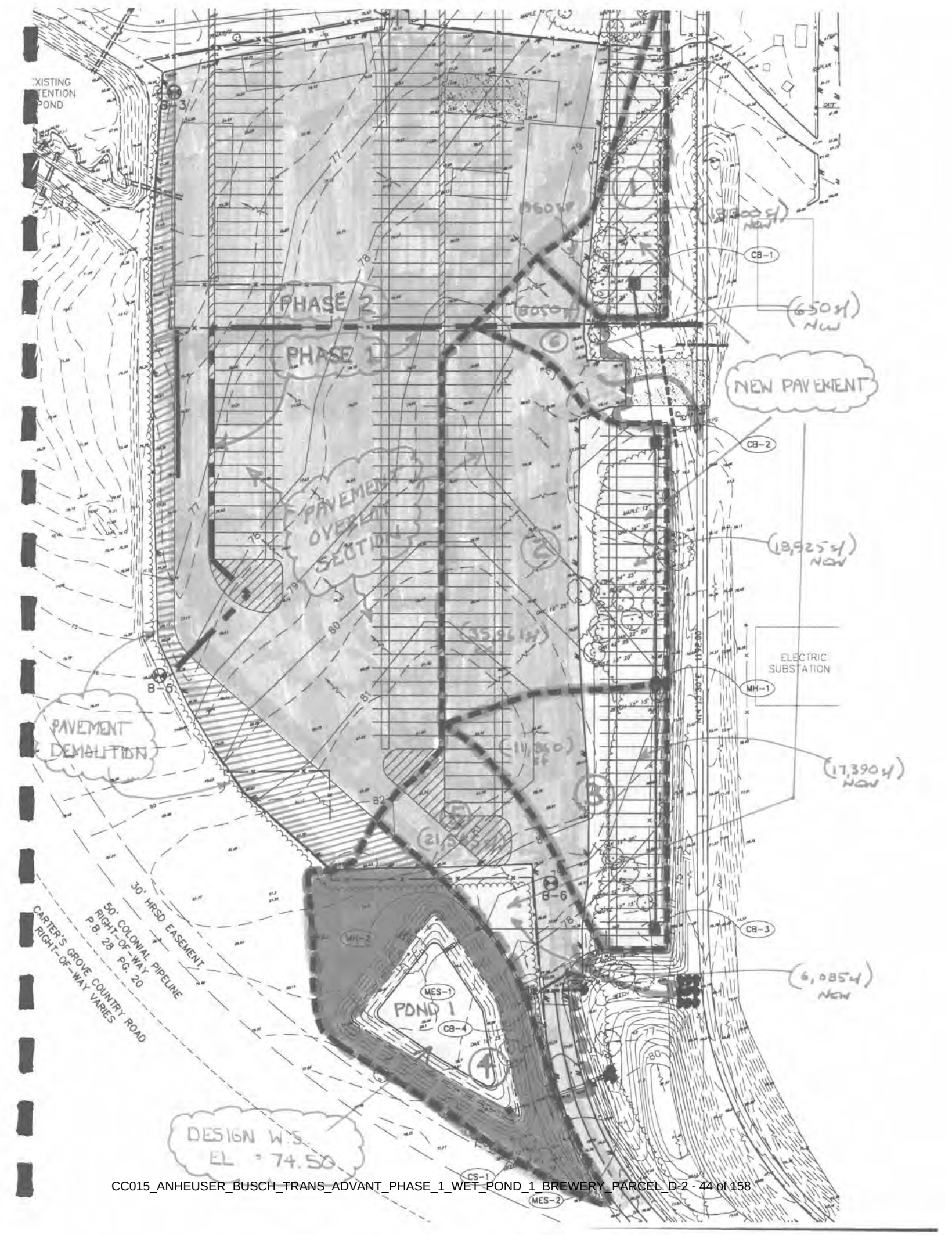
Q_{2YR} = 4.6 CFS ✓

Q_{10YR} = 10.1 CFS ✓

Q_{100YR} = 15.5 CFS ✓

(FOR COMPUTER PRINT-OUT SEE FLOOD ROUTING SECTION OF THIS REPORT)

SECTION B
POST CONDITIONS ANALYSIS


EXISTING RETENTION POND
PHASE 2
PHASE 1
NEW PAVEMENT
PAVEMENT OVERLAY SECTION
PAVEMENT DEMOLITION
ELECTRIC SUBSTATION
CB-1
CB-2
CB-3
CB-4
MH-1
MH-2
MES-1
MES-2
CS-1
POND 1
B-3
B-5
B-6
(650 SY) NEW
(18,925 SY) NEW
(17,390 SY) NEW
(6,085 SY) NEW
30' HRSD EASEMENT
50' COLONIAL PIPELINE RIGHT-OF-WAY P.B. 28 PG. 20
CARTER'S GROVE COUNTRY ROAD RIGHT-OF-WAY VARIES
DESIGN W.S. EL = 74.50

AREAS CONTRIBUTING TO NEW POND 1

DRAINAGE AREA NO 1

0.35AC.

AREA = 15,250 SF +/-
100% IMPERVIOUS AREA

EX. PVMT. = 1950 SF
NEW PVMT = 13,300 SF

0.35 AC. @ CN 98

DRAINAGE AREA No. 2

1.26AC

AREA = 54,886 SF +/-
100% IMPERVIOUS AREA

EX. PVMT. = 35,961 SF
NEW PVMT = 18,925 SF

1.26 AC. @ CN 98

DRAINAGE AREA NO. 3

0.66AC

AREA = 28,750 SF +/-
100% IMPERVIOUS AREA

EX. PVMT = 11,360 SF
NEW PVMT = 17,390 SF

DRAINAGE AREA NO. 4

0.93

AREA = 40,600 SF +/-

WATER SURFACE AREA = 14,107 SF +/-
PERVIOUS AREA = 26,493 SF +/-
NO IMPERVIOUS SURFACE

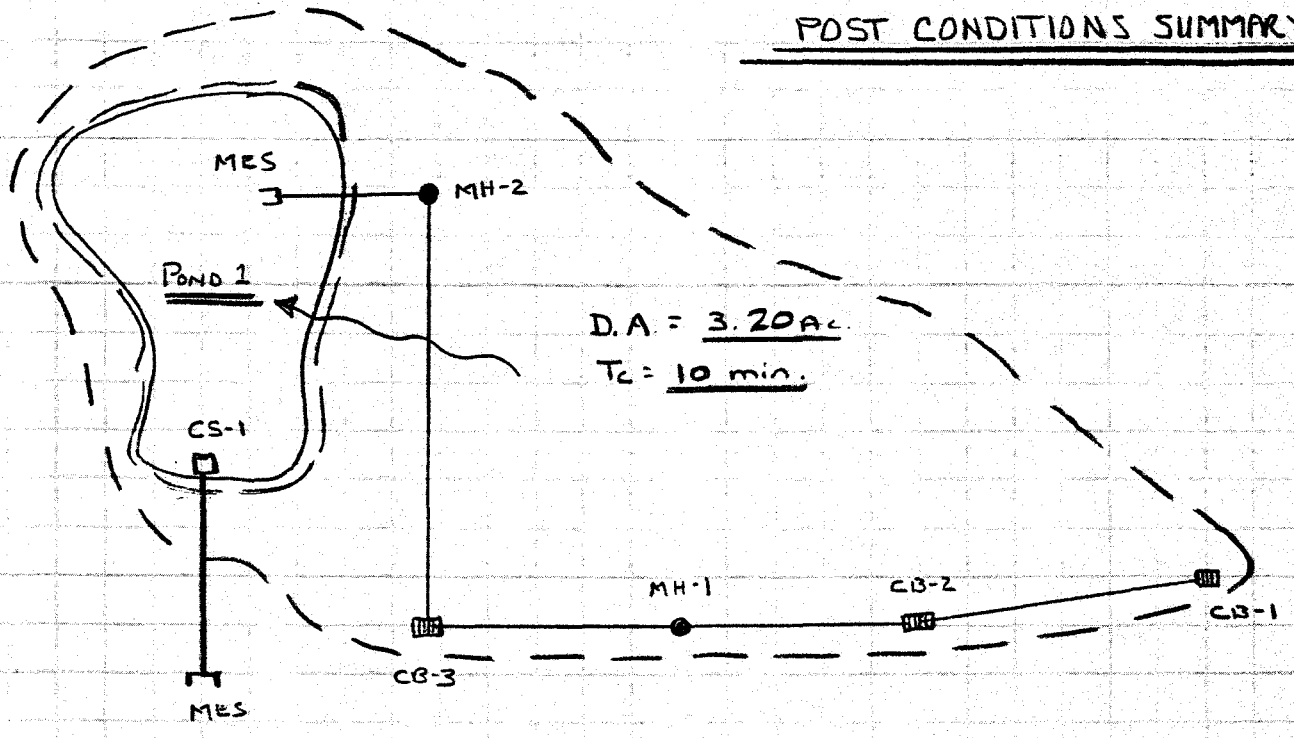
Σ Imp = 98886 SF

D.A. #5 BYPASSES POND.

TOTAL AREA CONTRIBUTING TO POND = 139,486 SF

3.20AC OR 3.20 AC.

POST CONDITIONS SUMMARY



IMPERV AREA = 98,886 sf ✓ E
W.S. AREA = 14,107 sf
} MODELED AS DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA) ?

113,993 sf (2.59 Ac.)

2.27 Ac.
0.3239
2.59 Ac.

2.59 Ac / 3.20 Ac. × 100 = 80.9 % D.C.I.A.

81% USED

CN = 61

THIS IS PREVIOUS CN NOT COMPOSITE CN
~~AREA'S TOO LOW~~
∴ CN = 98 (NORMAL METHOD)
COMP CN = CN = 91 (DCIA METHOD)
OK

POST CONDITIONS HYDROGRAPH INPUT PARAMETERS

3.20 Ac.
CN = 61
DCIA = 81 %
K = 484
Tc = 10 MIN.

SCS TYPE II STORM

CS-1 CONTROL STRUCTURE

MODIFIED V.D.O.T. STD. DROP INLET

3 5/8" DIAMETER CIRCULAR ORIFICE CENTER DRILLED IN 6" PVC PIPE. CENTER EL. OF ORIFICE = 74.65 ✓

INVERT EL. 6" PVC PIPE = 74.40 ✓

24" WEIR CREST LENGTH ON 3 SIDES @ CREST ELEV. 76.37 ✓

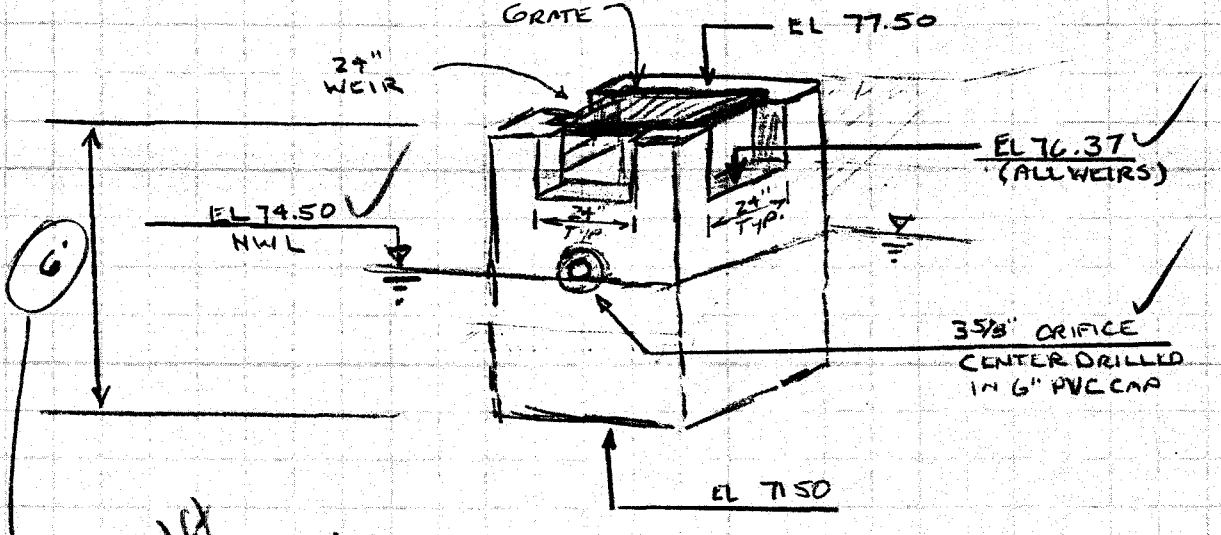
(TOTAL WEIR CREST LENGTH = 72")

15" RCP OUTLET PIPE @ INV EL 74.26 ✓

TOP OF STRUCTURE/GRATE EL = 77.50 ✓

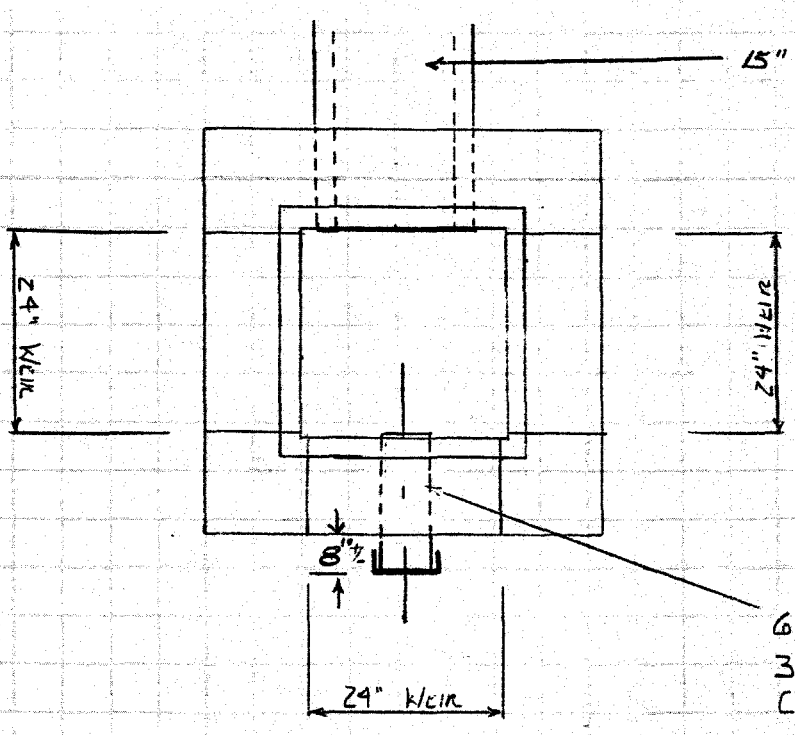
OUTSIDE BOTTOM EL. = 71.50 ✓

GROUT INSIDE TO INV. EL 15" RCP



7 4A MAPS SY-1 STAS.

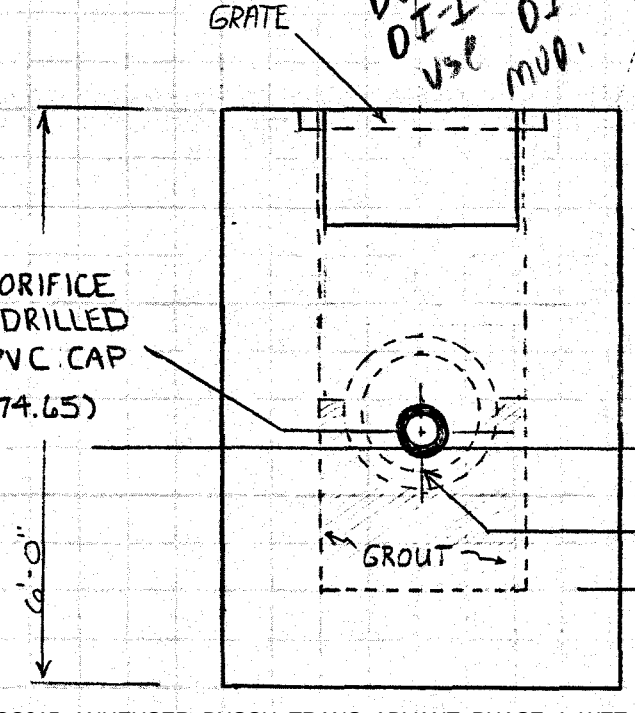
MODIFIED V.D.O.T. STD DROP INLET POND CONTROL STRUCTURE CS-1



GRATE NOT SHOWN FOR CLARITY

6" CAPPED PVC PIPE w/ 3 5/8" CIRCULAR ORIFICE CENTER DRILLED IN CAP

TOP VIEW



STR. TOP ELEV. 77.50 — 100YR.

10YR.

WEIR CREST EL. 76.37

2YR.
TYR.

DESIGN NWL = 74.50

15" RCP INV EL. 74.26

BOTTOM ELEV. 71.50

FRONT VIEW

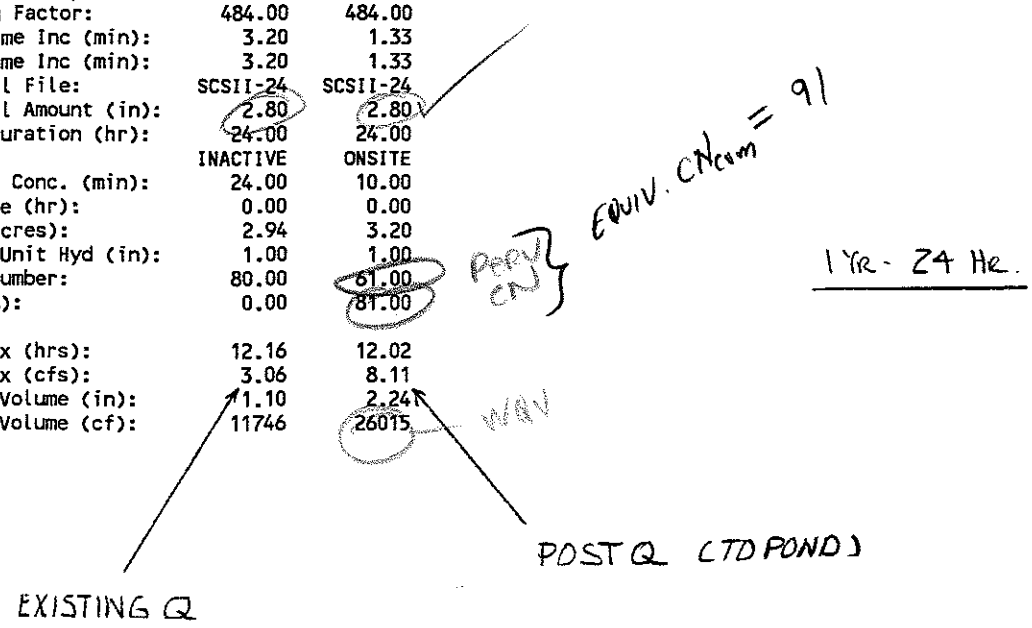
SECTION C

EXISTING AND POST CONDITIONS
BASIN INPUT SUMMARIES
AND ROUTING RESULTS

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 1 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Basin Summary - POST-1 **********

***		
Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	2.80	2.80
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.20
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	91.00
DCIA (%):	0.00	81.00
Time Max (hrs):	12.16	12.02
Flow Max (cfs):	3.06	8.11
Runoff Volume (in):	1.10	2.24
Runoff Volume (cf):	11746	26015



WHY IS CN > IN X-CONDITION COMPARED TO POST
80 ⇒ 61
PRE POST

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 1 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Node Maximum Conditions - POST-1 **********

●(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.50	74.50	0.0001	0.00	14.04	0.32	0.00	0.00
POND1	POST	14.01	75.63	78.00	0.0050	16458.39	12.00	8.06	14.04	0.32

MAX. STAGE

OUTFLOW

Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [1]
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AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 2 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Basin Summary - POST-2 **********

***

Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	3.50	3.50
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.20
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	91.00
DCIA (%):	0.00	81.00
Time Max (hrs):	12.16	12.02
Flow Max (cfs):	4.59	10.36
Runoff Volume (in):	1.63	2.86
Runoff Volume (cf):	17440	33210

2 YR. 24 HR

PROVIDED (CN EQUIV = 91)

EXISTING Q

POST Q (TO POND)

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 2 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Node Maximum Conditions - POST-2 **********

●(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.50	74.50	0.0001	0.00	14.19	0.37	0.00	0.00
POND1	POST	14.16	75.92	78.00	0.0062	17084.87	12.00	10.28	14.19	0.37

MAX. STAGE

OUTFLOW

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AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 10 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Basin Summary - POST-10 **********

***

Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	5.80	5.80
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.20
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	61.00
DCIA (%):	0.00	81.00
Time Max (hrs):	12.16	12.02
Flow Max (cfs):	10.07	18.06
Runoff Volume (in):	3.60	4.97
Runoff Volume (cf):	38382	57688

10 YR - 24 HR

$CN_{area} = 91$

EXISTING Q

POST Q CTO POND 1

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 10 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Node Maximum Conditions - POST-10 **********

●(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.50	74.50	0.0001	0.00	12.41	2.17	0.00	0.00
POND1	POST	12.41	76.58	78.00	0.0101	18547.33	12.00	17.93	12.41	2.17

MAX. STAGE

OUTFLOW

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Basin Summary - POST-100 **********

***		
Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	8.00	8.00
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.20
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	61.00
DCIA (%):	0.00	81.00
Time Max (hrs):	12.11	12.02
Flow Max (cfs):	15.54	25.66
Runoff Volume (in):	5.62	7.04
Runoff Volume (cf):	59951	81824

$CN_{PAVIU} = 91$

100 YR - 24 HR.

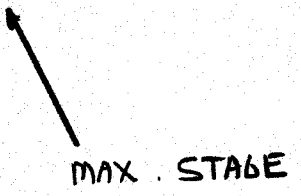
POST Q CTO POND1

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 12, 1999

********** Node Maximum Conditions - POST-100 **********

●(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.50	74.50	0.0001	0.00	12.27	5.51	0.00	0.00
POND1	POST	12.27	77.11	78.00	0.0129	19734.03	12.00	25.48	12.27	5.51



SECTION D

FLOOD ROUTING INPUT PARAMETERS

Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [1]
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AB-Wmb Transportation Advantage - Phase 1
Flood Routing Input Parameters
November 12, 1999

CONTROL STRUCTURE
CS-1

********** Input Report: Drop Structures **********

Name: POND1OUT From Node: POND1 Length(ft): 80
Group: POST To Node: OUT1 Count: 1

Outlet Cntrl Spec: Use dc or tw Inlet Cntrl Spec: Use dn
Upstream Geometry: Circular Downstream Geometry: Circular

	UPSTREAM	DOWNSTREAM
Span(in):	15	15
Rise(in):	15	15
Invert(ft):	74.26	74.1
Manning's N:	0.013	0.013
Top Clip(in):	0	0
Bottom Clip(in):	0	0

15" RCP

Entrance Loss Coef: 0.5 Flow: Both
Exit Loss Coef: 1 Equation: Aver Conveyance

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall 1 1
Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall 1 1

POND 1 OUTFALL STRUCTURE

*** Weir 1 of 2 for Drop Structure POND1OUT *** [TABLE]
Count: 1 Bottom Clip(in): 0
Type: Mavis Top Clip(in): 0
Flow: Both Weir Discharge Coef: 3
Geometry: Circular Orifice Discharge Coef: 0.6

ORIFICE

Span(in): 3.625 Invert(ft): 74.5
Rise(in): 3.625 Control Elev(ft): 74.5

*** Weir 2 of 2 for Drop Structure POND1OUT *** [TABLE]
Count: 3 Bottom Clip(in): 0
Type: Mavis Top Clip(in): 0
Flow: Both Weir Discharge Coef: 3
Geometry: Rectangular Orifice Discharge Coef: 0.6

WEIR

Span(in): 24 Invert(ft): 76.37
Rise(in): 16 Control Elev(ft): 76.37

H = 77.5 - 76.37 = 1.13' (13.56")

DIFFERENT MATH PLAN

WHERE IS TOP GRATE & RISER CREST. EL 77.50

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AB-Wmb Transportation Advantage - Phase 1
Flood Routing Input Parameters
November 12, 1999

********** Input Report: Nodes **********

Name: OUT1 Base Flow(cfs): 0 Init Stage(ft): 74
Group: POST Length(ft): 0 Warn Stage(ft): 74.5
Comment:

Time(hrs)	Stage(ft)
0	74
12	74.5
24	74

BOUNDARY CONDITIONS
STAGE - TIME ASSUMPTION

Name: POND1 Base Flow(cfs): 0 Init Stage(ft): 74.5
Group: POST Length(ft): 0 Warn Stage(ft): 78
Comment: PHASE 1 POND

Stage(ft)	Area(ac)
74.5	0.3239
75	0.3473
76	0.396
77	0.447
78	0.5002

POND 1
STAGE - AREA

SECTION E

ORIFICE/STAGE-STORAGE & VOLUME RECOVERY CALCULATIONS

Stage-Storage Calculations

Stage, ft.	*Area, sf*	*Area, acres*	*Average Area, sf*	*Depth Incr., ft*	*Volume Incr., cf*	*Volume Accum., cf*	*Volume Accum., af*
Detention Pond Attenuation Volume:							
78.0	*21,790*	*0.5002*	*20,630*	*1.00*	*20,630*	*62,488*	*1.4345*
77.0	*19,470*	*0.4470*	*18,360*	*1.00*	*18,360*	*41,858*	*0.9609*
76.0	*17,249*	*0.3960*	*16,190*	*1.00*	*16,190*	*23,499*	*0.5395*
75.0	*15,130*	*0.3473*	*14,619*	*0.50*	*7,309*	*7,309*	*0.1678*
74.5	*14,107*	*0.3239*	-	-	-	-	-
Detention Pond Permanent Pool Volume:							
74.5	*14,107*	*0.3239*	*13,592*	*0.50*	*6,796*	*41,320*	*0.9486*
74.0	*13,077*	*0.3002*	*12,104*	*1.00*	*12,104*	*34,524*	*0.7926*
73.0	*11,131*	*0.2555*	*10,236*	*1.00*	*10,236*	*22,420*	*0.5147*
72.0	*9,340*	*0.2144*	*8,522*	*1.00*	*8,522*	*12,184*	*0.2797*
71.0	*7,704*	*0.1769*	*7,324*	*0.50*	*3,662*	*3,662*	*0.0841*
70.5	*6,944*	*0.1594*	-	-	-	-	-

Water Quality & Permanent Pool Calculations:

Total Impervious Area:	*98,886*	*sf*
Water Quality Volume:	*0.50*	*inches runoff from impervious area*
Permanent Pool Volume:	*2.00*	*inches/impervious acre (JCC BMP Point System, Table 1)*

Required Water Quality Volume:	*4,120*	*cf*	*0.0946*	*ac ft*
Required Permanent Pool Volume:	*16,481*	*cf*	*0.3784*	*ac ft*

Downstream Channel Erosion Control Volume: (Kerplunk Method)

Runoff Volume from 1 yr 24 hr Storm Event:	*28,001*	*cf*
(From SCS Unit Hydrographs)	0.6428	acre feet

Orifice Configurations:

	WQ Volume		*1 yr - 24 hr Volume*	
Volume:	*4,138*	*cf*	*28,001*	*cf*
Brim Drawdown Time:	*30*	*hrs*	*24*	*hrs*
Average Rate of Discharge:	*138*	*cf/hr*	*1,167*	*cf/hr*
	0.04	*cfs*	*0.32*	*cfs*
Initial Orifice Diameter:	*1.969*	*inches*	*3.651*	*inches*
Invert Elevation:	*74.50*	*ft*	*74.50*	*ft*
Design Orifice Coefficient:	*0.60*		*0.60*	
Orifice Centerline Elevation:	*74.582*	*ft*	*74.652*	*ft*
Pond Volume at Centerline:	*1,199*	*cf*	*2,224*	*cf*
Adjusted Volume:	*5,337*	*cf*	*30,225*	*cf*
Adjusted Stage:	*74.87*	*ft*	*76.37*	*ft*
Depth:	*0.28*	*ft*	*1.71*	*ft*
Initial Elev of Water Surface:	*74.87*	*ft*	*76.37*	*ft*
Final Elev of Water Surface:	*74.58*	*ft*	*74.65*	*ft*
Average Depth:	*0.14*	*ft*	*0.86*	*ft*
Orifice Area:	*0.0212*	*sf*	*0.0727*	*sf*
Orifice Diameter:	*0.1641*	*ft*	*0.3042*	*ft*
	1.969	*inches*	*3.651*	*inches*

Orifice Diameter Used: *3.625* *inches*

SECTION F

STORM SEWER DESIGN TABULATIONS

PROJECT: **WILLIAMSBURG TRANSPORTATION ADVANTAGE**
CLIENT: **ANHEUSER BUSCH**
SHEET: 1 OF 1

JOB NUMBER: 321
BY: JW
DATE: 11/15

Need for 10-year event.

STORM SEWER DESIGN TABULATION FORM
5 YR DESIGN STORM

IMPERVIOUS 'C' : 0.95
PERVIOUS 'C' : 0.20

UPPER END	LOWER END	INCREMENTAL AREA	SUB-TOTAL OF INCREMENTAL AREAS	SUB-TOTAL 'c' x A	TOTAL 'c' x AREA	INLET TIME	SEGMENT FLOW TIME	TIME OF CONCENTRATION	RAINFALL INTENSITY	FLOW RATE	LENGTH	DIAMETER	MANNINGS 'n'	CROSS-SECTIONAL AREA	HYDRAULIC RADIUS	INLET/GRATE ELEVATION	HGL / CROWN / INVERT UPPER END	HGL / CROWN / INVERT LOWER END	FALL	SLOPE	VELOCITY	CAPACITY
		acres	acres			min.	min.	min.	in/hr	cfs	ft	inches		sf	ft	ft-msl	ft-msl	ft-msl	ft	%	fps	cfs
		0.35	0.35	0.33													77.09	76.84	0.25	0.173	1.92	2.36
1	2	0.00	0.00	0.00	0.33	5.00	1.25	5.00	7.10	2.36	144	15	0.013	1.23	0.31	78.00	74.75	74.41	0.34			
		0.00	0.00	0.00													73.50	73.16	0.34	0.236	2.56	3.14
		1.26	1.61	1.53													76.84	76.11	0.73	0.338	3.36	10.55
2	3	0.00	0.00	0.00	1.53	5.00	1.07	6.25	6.90	10.55	216	24	0.013	3.14	0.50	77.25	20.16	19.76	0.40			
		0.00	0.00	0.00													72.41	71.94	0.47	0.218	3.36	10.55
		0.00	1.61	1.53													76.61	76.11	0.49	0.228	3.16	9.94
3	4	0.00	0.00	0.00	1.53	5.00	1.14	7.32	6.50	9.94	216	24	0.013	3.14	0.50	79.10	20.04	19.76	0.28			
		0.00	0.00	0.00													71.94	71.46	0.48	0.222	3.39	10.66
		0.66	2.27	2.16													76.11	75.73	0.39	0.243	2.77	13.59
4	5	0.00	0.00	0.00	2.16	5.00	0.96	8.46	6.30	13.59	160	30	0.013	4.91	0.63	77.25	19.76	19.40	0.36			
		0.00	0.00	0.00													70.96	70.73	0.23	0.144	3.17	15.55
		0.00	2.27	2.16													75.73	75.50	0.23	0.939	2.68	13.15
5	6	0.00	0.00	0.00	2.16	5.00	0.15	9.42	6.10	13.15	24	30	0.013	4.91	0.63	79.00	73.23	73.17	0.06			
		0.00	0.00	0.00													70.73	70.67	0.06	0.250	4.18	20.51

0.23

2.27 AC TOTAL OK

TOTAL T_c = 9.42 MIN MATCH 10-YR.

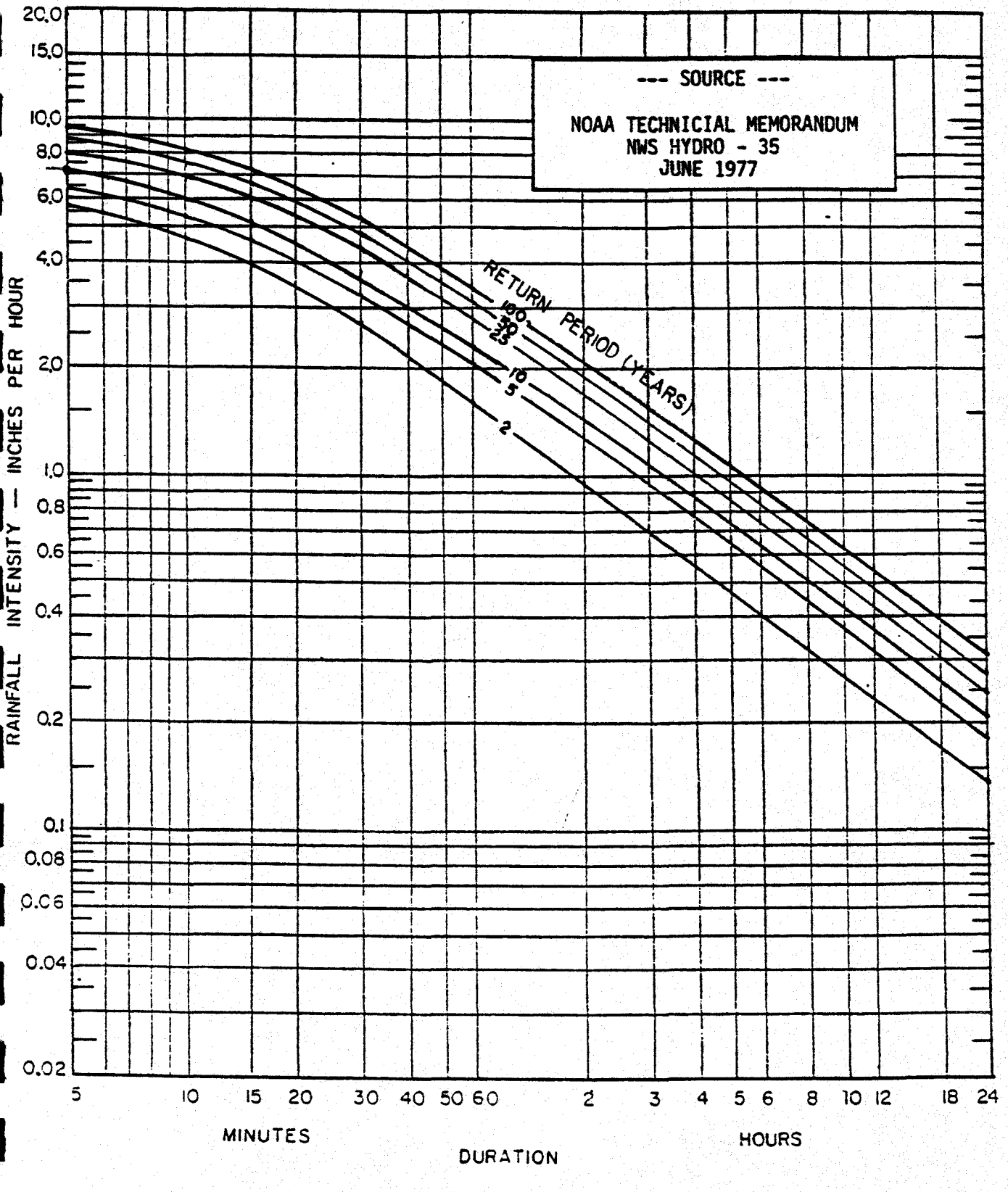
OK

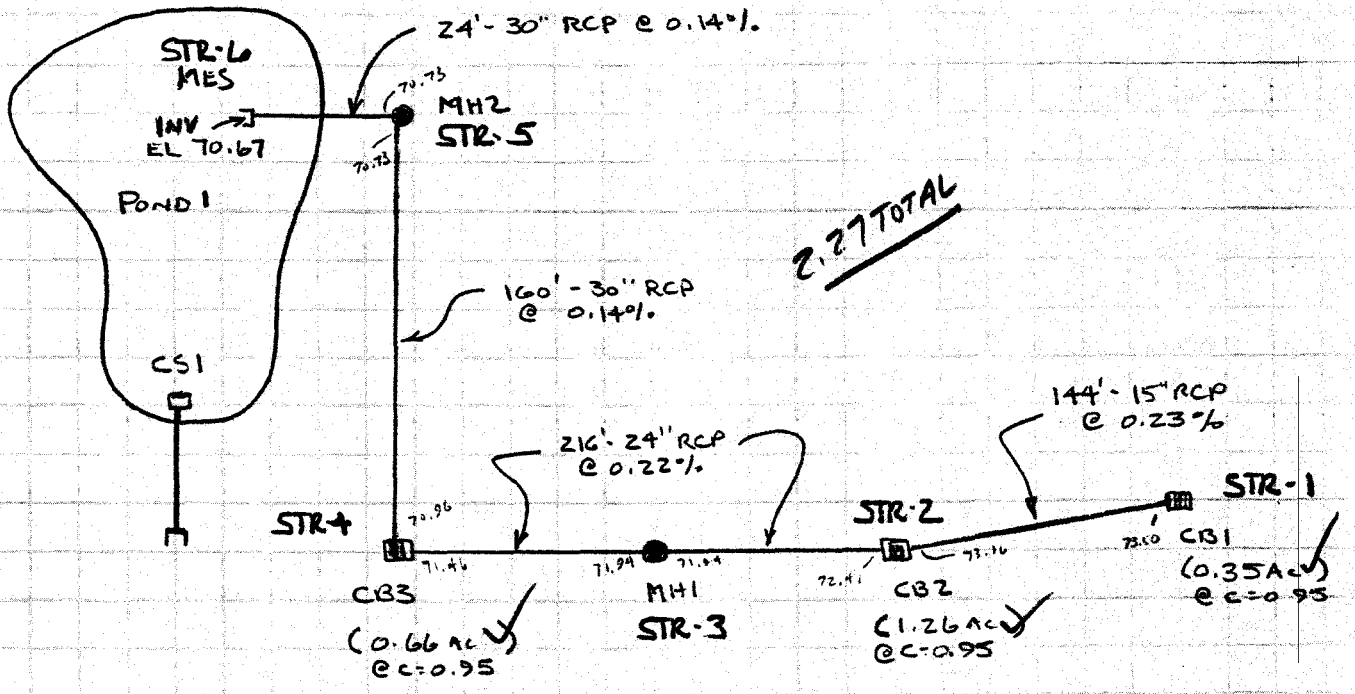
CHECK ON PLAN

STORM COMPS OK

Fig. 1.5.1.7

NORFOLK, VA.



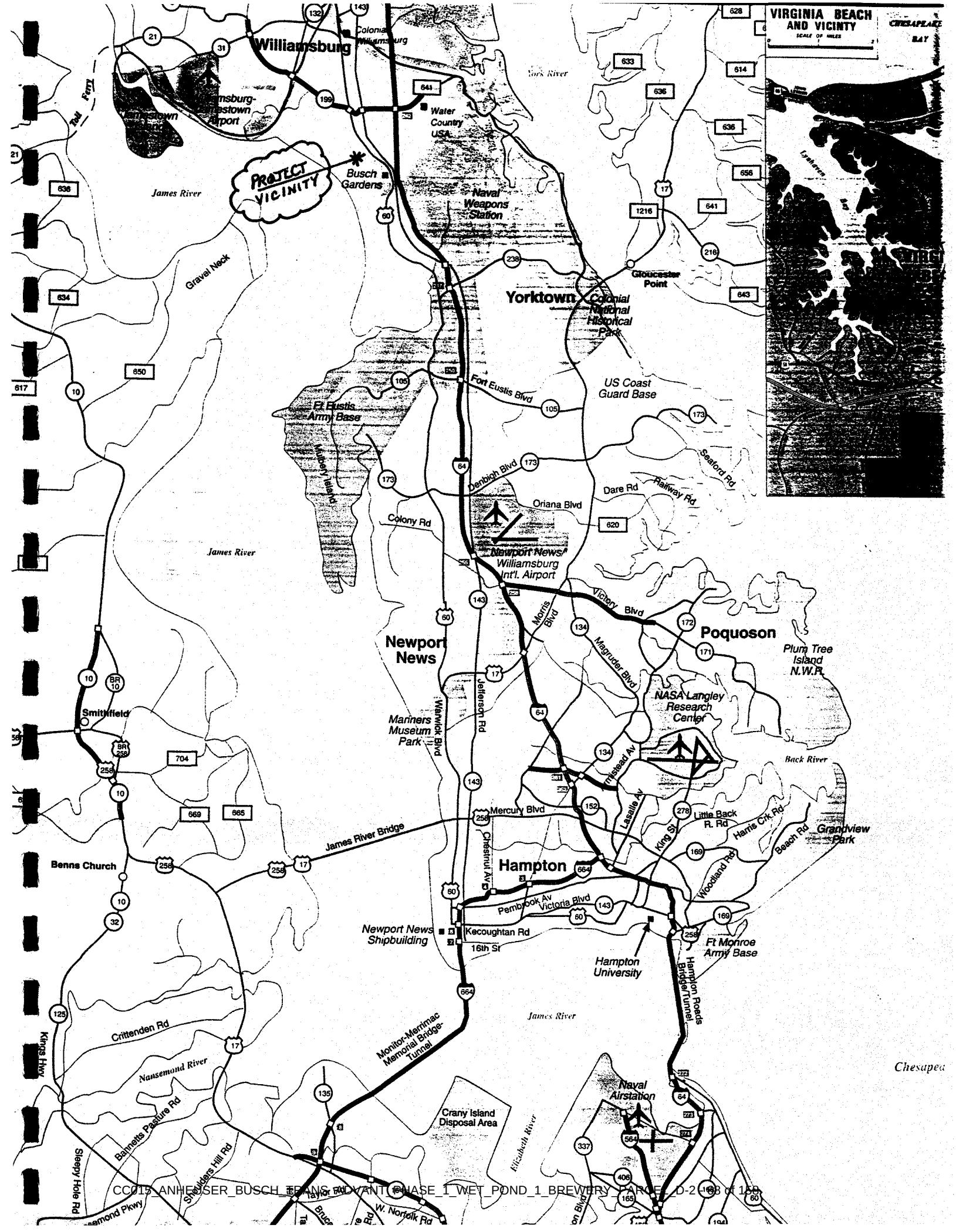


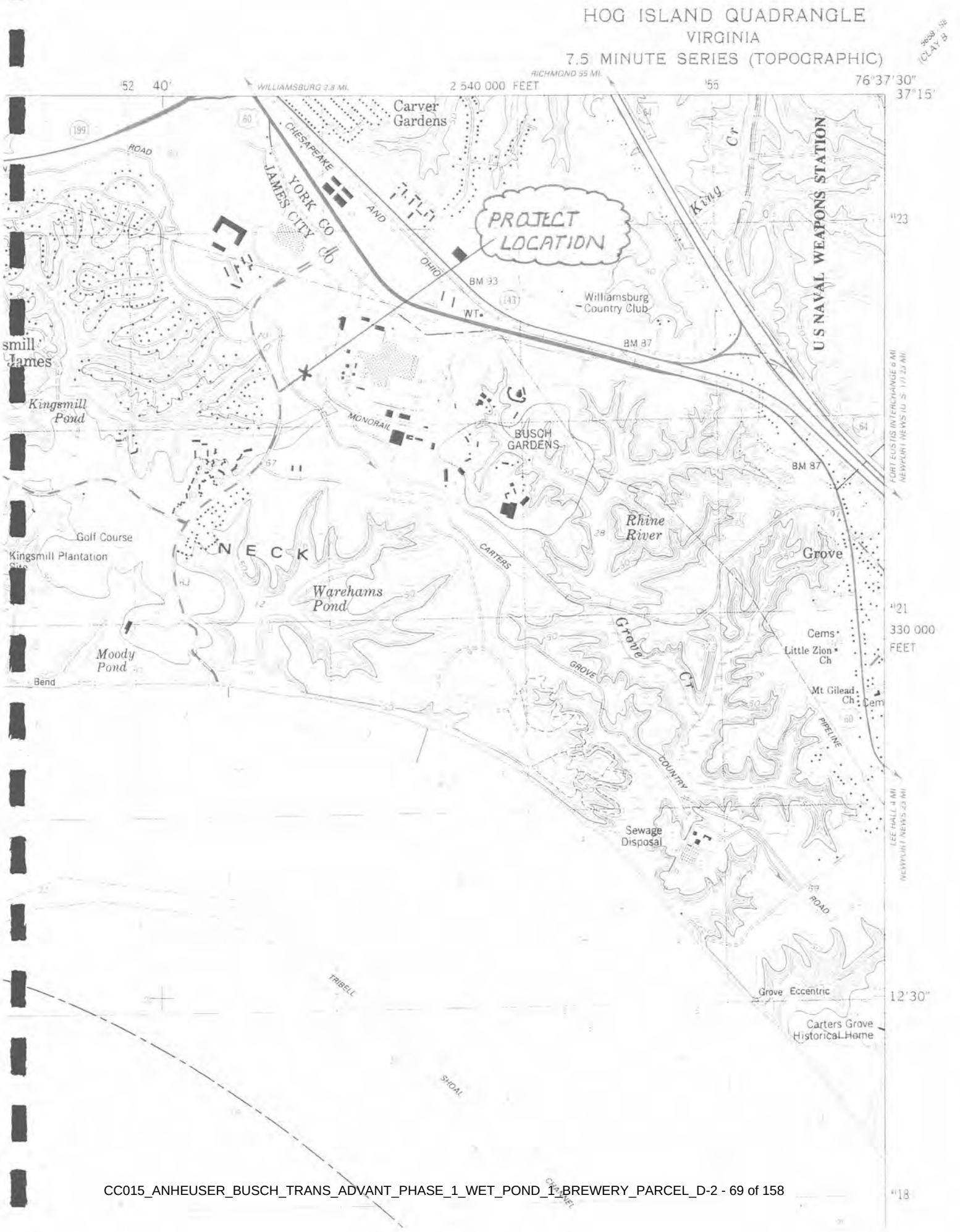
STR	DESC	TOP EL	INV. ELEV. N	S	E	W
CB1 (STR-1)	V.D.O.T. STD. DROP INLET	78.00	-	73.50	-	-
CB2 (STR-2)	V.D.O.T. STD. PRECAST TOP (CT-D1-1) W/ STD. BASE B-1 OR V.D.O.T. STD. DROP INLET.	77.25	73.16	72.41	-	-
MH1 (STR-3)	V.D.O.T STD. PRECAST MANHOLE	79.10	71.94	71.94	-	-
CB3 (STR-4)	V.D.O.T. STD. PRECAST TOP (CT-D1-1) W/ STD. BASE B-1	77.25	71.46	-	-	70.96
MH2 (STR-5)	V.D.O.T. STD. PRECAST MANHOLE	79.00	-	70.73	70.73	-

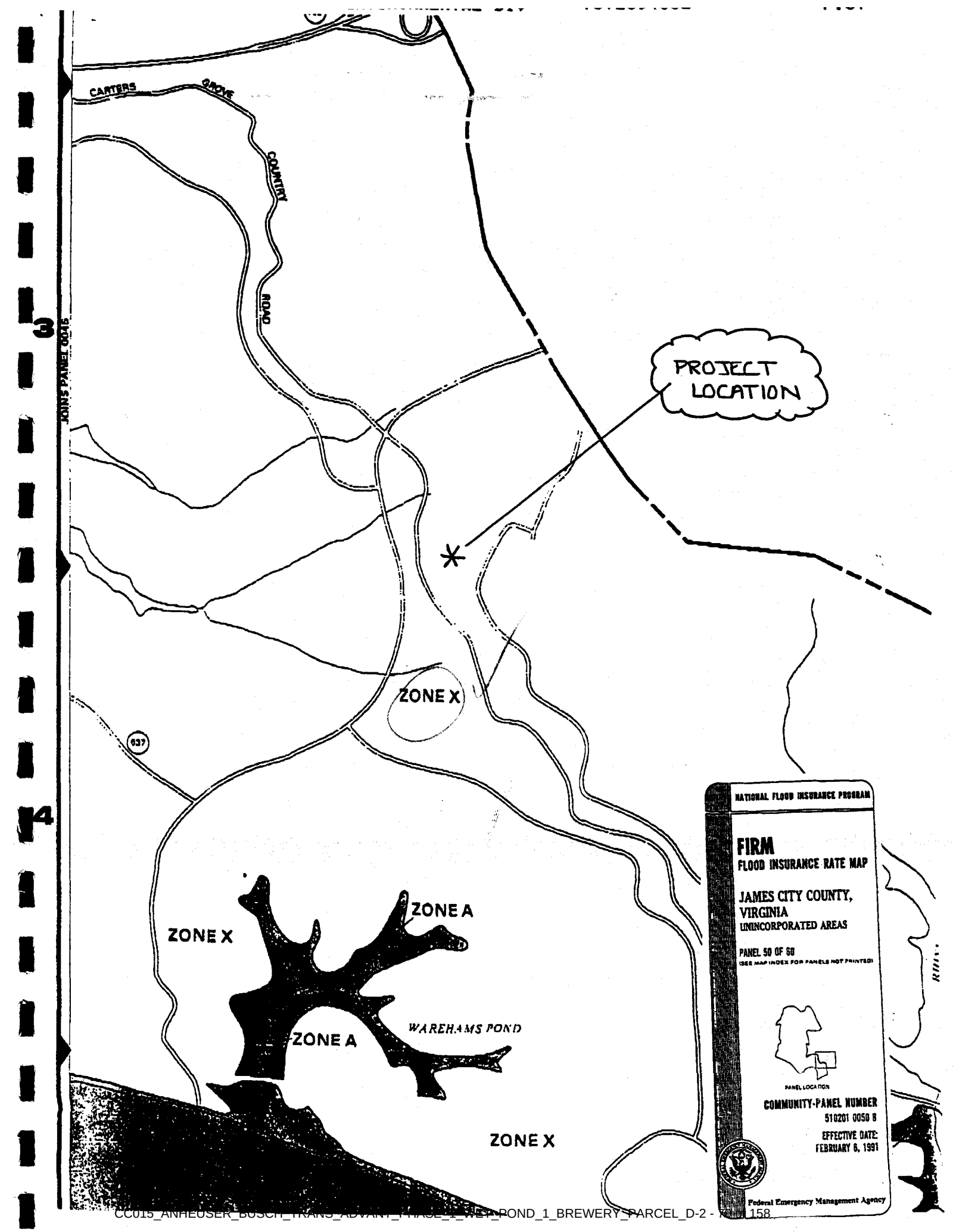
CONTENTS:

APPENDIX

STORMWATER ANALYSIS
ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE
WILLIAMSBURG, VA


VIRGINIA BEACH
AND VICINITY
SCALE OF MILES
CHESAPEAKE BAY
PROJECT VICINITY
Williamsburg
Colonial Williamsburg
Williamsburg-Jamestown Airport
Water Country USA
Busch Gardens
Naval Weapons Station
James River
York River
Gravel Neck
Yorktown
Colonial National Historical Park
Gloucester Point
Fort Eustis Blvd
Ft Eustis Army Base
US Coast Guard Base
Mulberry Island
Denbigh Blvd
Dare Rd
Railway Rd
Seaford Rd
Oriana Blvd
Colony Rd
Newport News/Williamsburg Int'l. Airport
Victory Blvd
Morris Blvd
Magruder Blvd
Newport News
Poquoson
Plum Tree Island N.W.R.
NASA Langley Research Center
Mariners Museum Park
Warwick Blvd
Jefferson Rd
Smithfield
Back River
Mercury Blvd
James River Bridge
Chestnut Av
Lasalle Av
King St
Little Back R. Rd
Harris Crk Rd
Beach Rd
Grandview Park
Benns Church
Hampton
Woodland Rd
Pembrook Av
Victoria Blvd
Newport News Shipbuilding
Kecoughtan Rd
16th St
Hampton University
Ft Monroe Army Base
Hampton Roads Bridge-Tunnel
Monitor-Merrimac Memorial Bridge-Tunnel
Crittenden Rd
Kings Hwy
Nansemond River
Bennetts Pasture Rd
Sleepy Hole Rd
Shoulders Hill Rd
Crany Island Disposal Area
Elizabeth River
Naval Airstation
W. Norfolk Rd
Chesapea


HOG ISLAND QUADRANGLE
VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
76°37'30"
37°15'
2 540 000 FEET
WILLIAMSBURG 2.3 MI.
RICHMOND 55 MI.
PROJECT LOCATION
Carver Gardens
YORK CO
JAMES CITY CO
CHESAPEAKE AND OHIO
BM 93
WT.
Williamsburg Country Club
BM 87
U S NAVAL WEAPONS STATION
King Cr
Kingsmill Pond
MONORAIL
BUSCH GARDENS
Golf Course
Kingsmill Plantation
NECK
Warehams Pond
Moody Pond
Bend
CARTERS
Rhine River
Grove
Grove Cr
GROVE
Cems
Little Zion Ch
Mt Gilead Ch
Cem
PIPELINE
COUNTRY
Sewage Disposal
ROAD
TRIBELL
SHOAL
CHANNEL
Grove Eccentric
Carters Grove Historical Home
4123
4121
330 000 FEET
12'30"
4118


CARTERS GROVE COUNTRY ROAD
JOINS PANEL 0045
PROJECT LOCATION
ZONE X
937
ZONE X
ZONE A
ZONE A
WAREHAMS POND
ZONE X
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
JAMES CITY COUNTY, VIRGINIA
UNINCORPORATED AREAS
PANEL 50 OF 60
(SEE MAP INDEX FOR PANELS NOT PRINTED)
PANEL LOCATION
COMMUNITY-PANEL NUMBER
510201 0050 B
EFFECTIVE DATE:
FEBRUARY 6, 1991
Federal Emergency Management Agency

Stepp, Joe W.

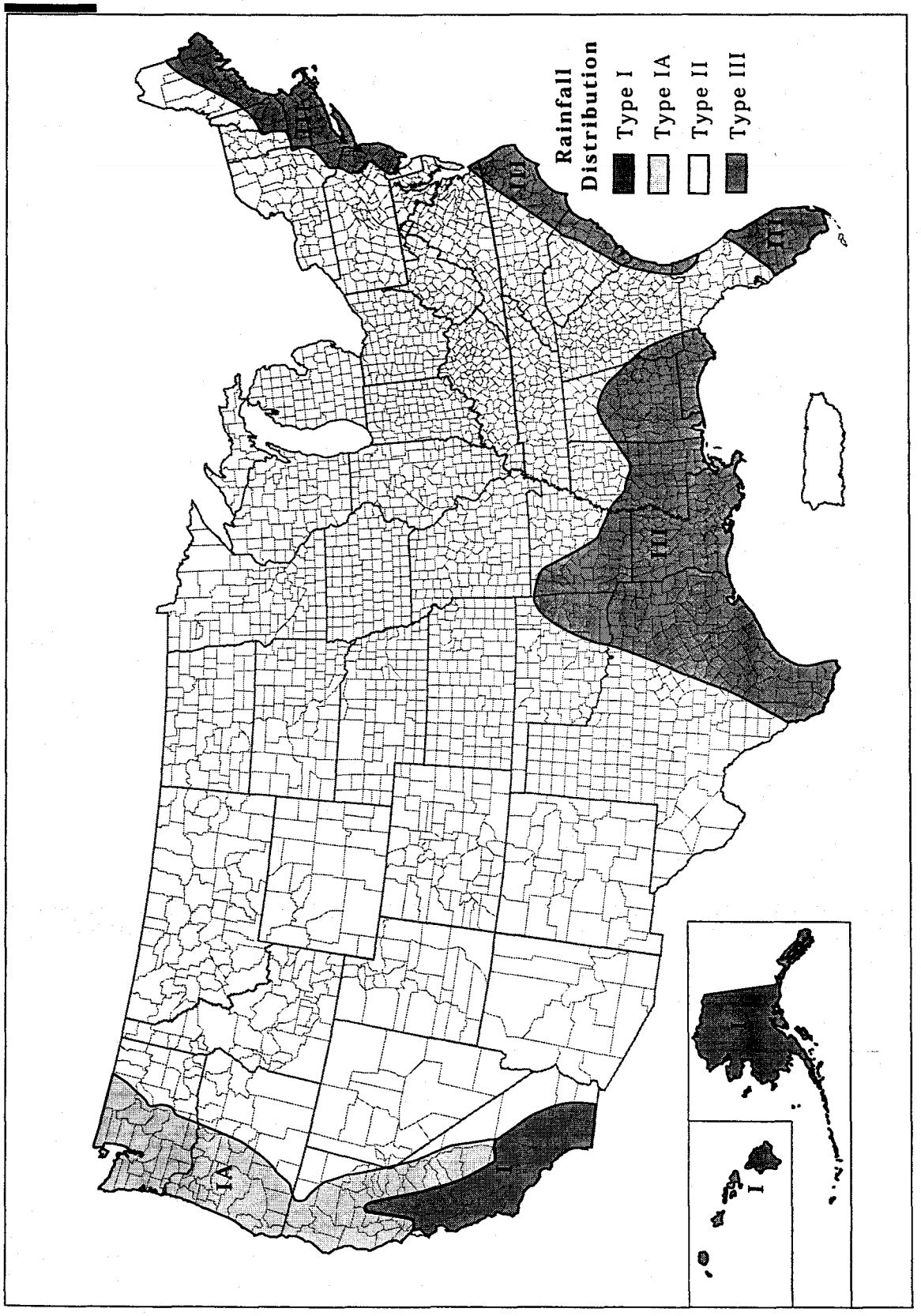
From: scottt@james-city.va.us
Sent: Tuesday, November 09, 1999 9:11 AM
To: jwstepp@thehaskellco.com
Subject: JCC 24-hour Rainfall

At your request, the following are the 24-hour rainfall depth values traditionally used for the SCS Type II, 24-hour storm duration in James City County.

Frequency	P, rainfall (inches)
1-year	2.8
2-year	3.5
5-year	4.7
10-year	5.8
25-year	6.4
50-year	7.2
100-year	8.0

Reference the new Virginia Stormwater Management Handbook (1999), Volume II, Chapter 4, Appendix 4B

Figure B-2 Approxomate geographic boundaries for NRCS (SCS) rainfall distribitions



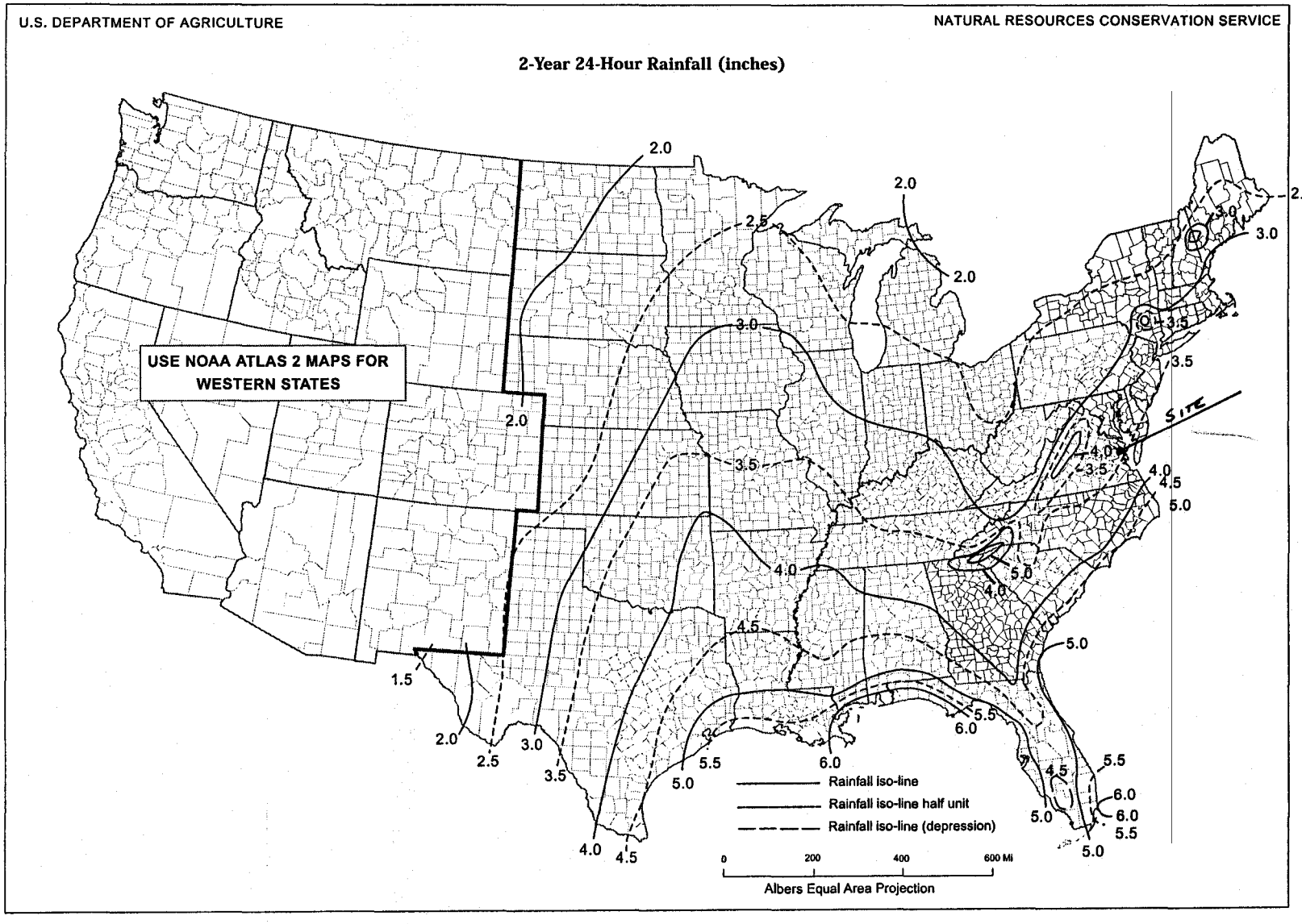


Figure B-3 Two-year, 24-hr rainfall

Figure B-5 Ten-year, 24-hr rainfall

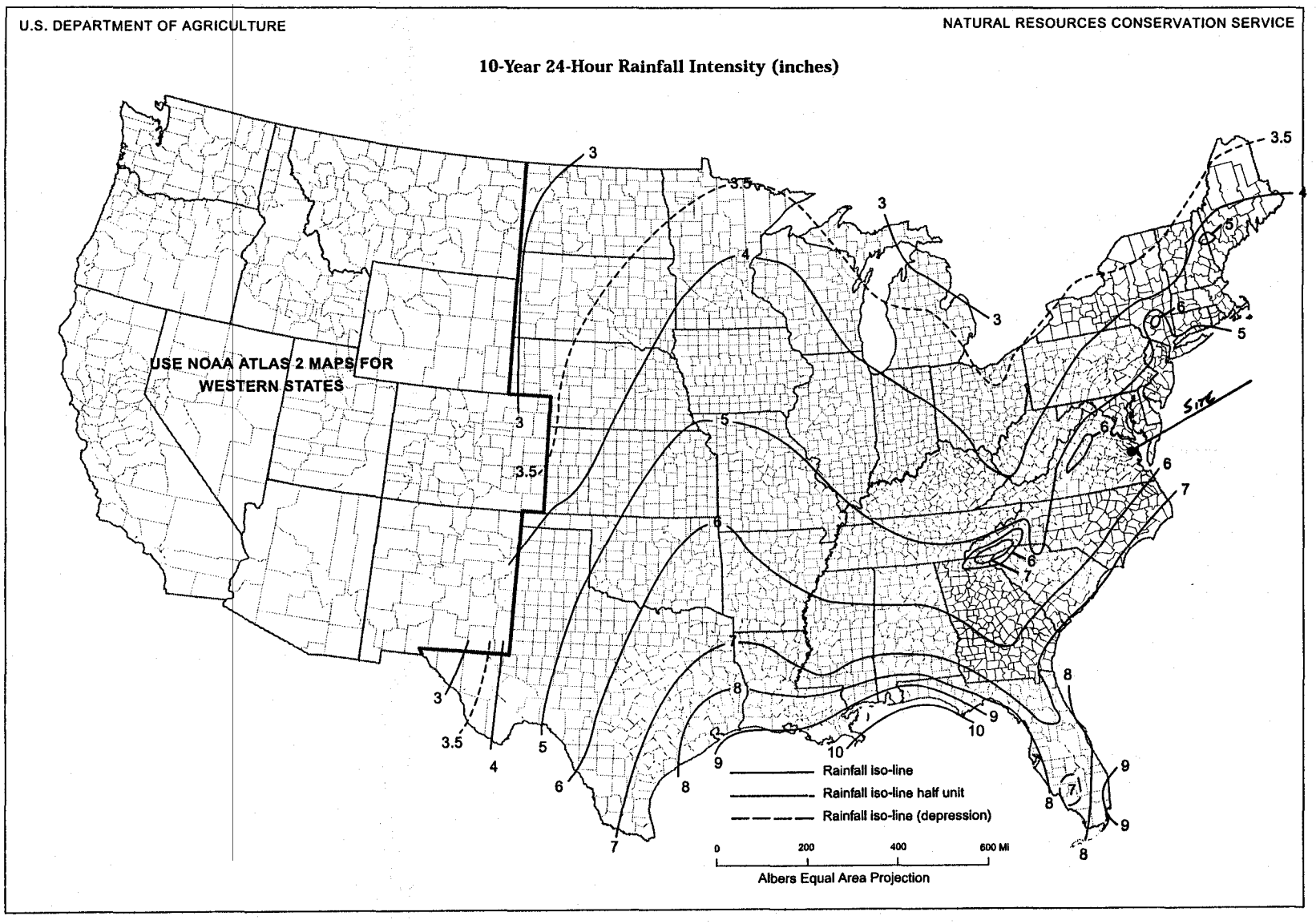


Figure B-9 One-hundred-year, 24-hr rainfall

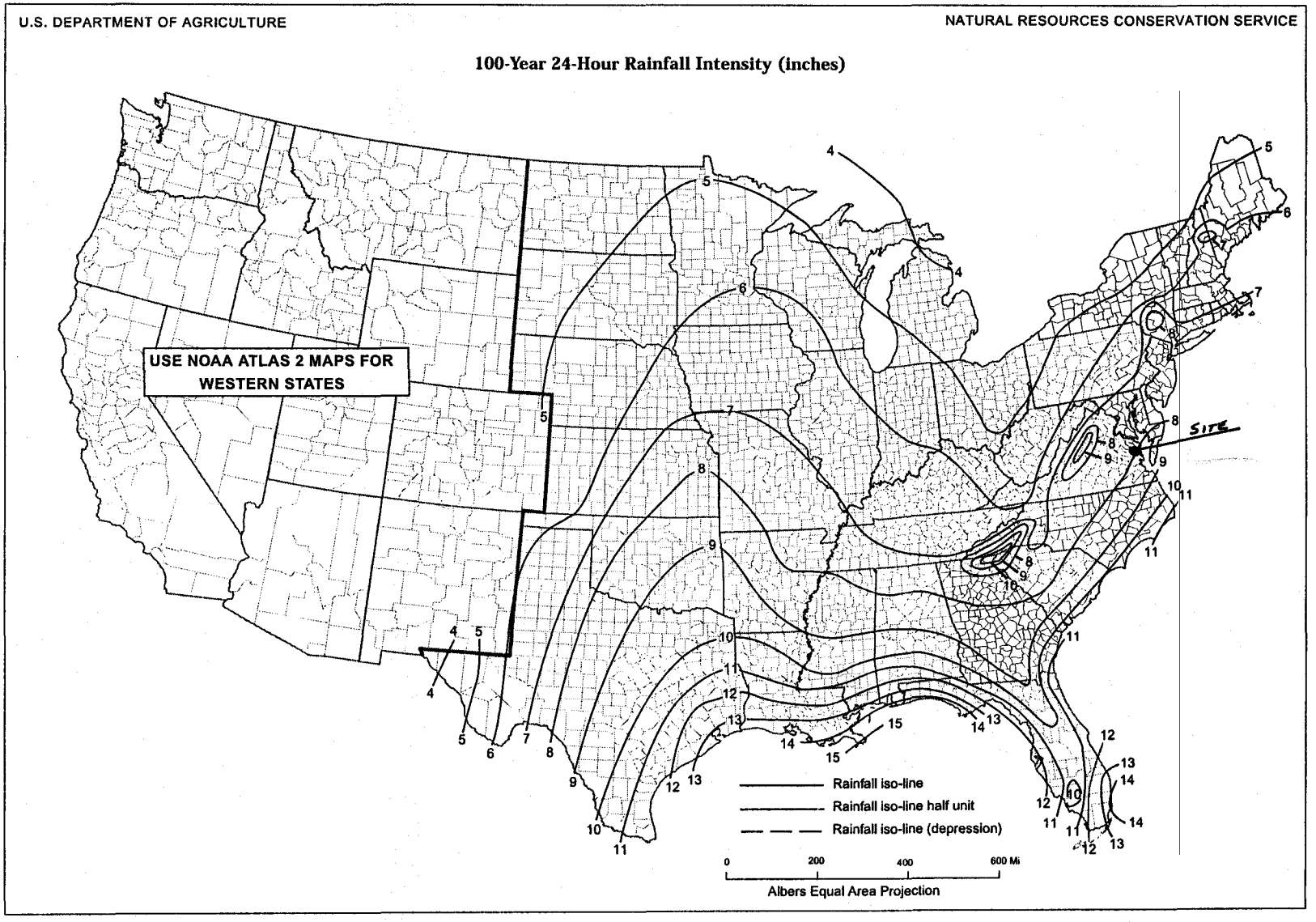


Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]	77	86	91	94	
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and I_a = 0.2S.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

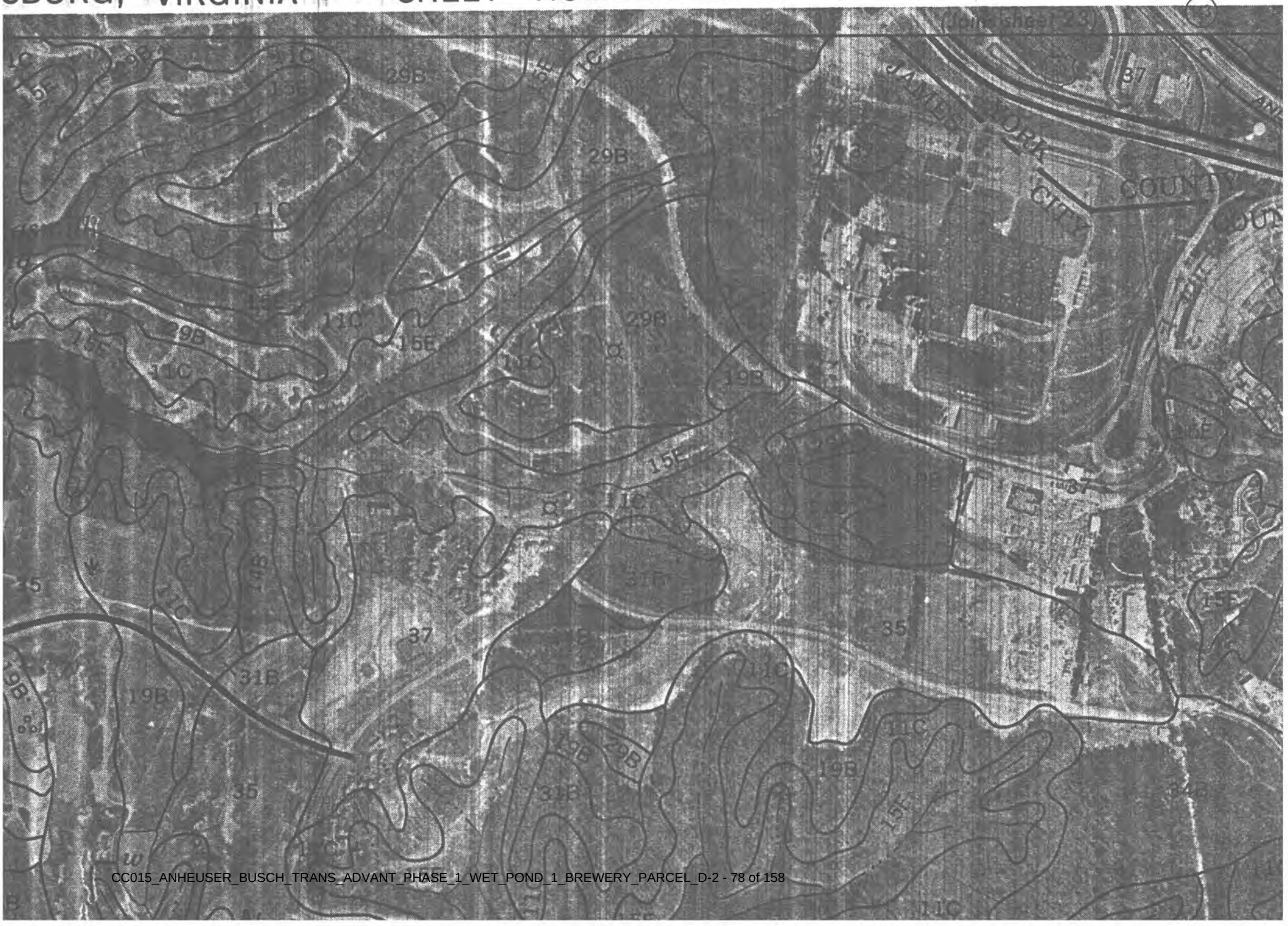
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

SBURG, VIRGINIA — SHEET NUMBER 27

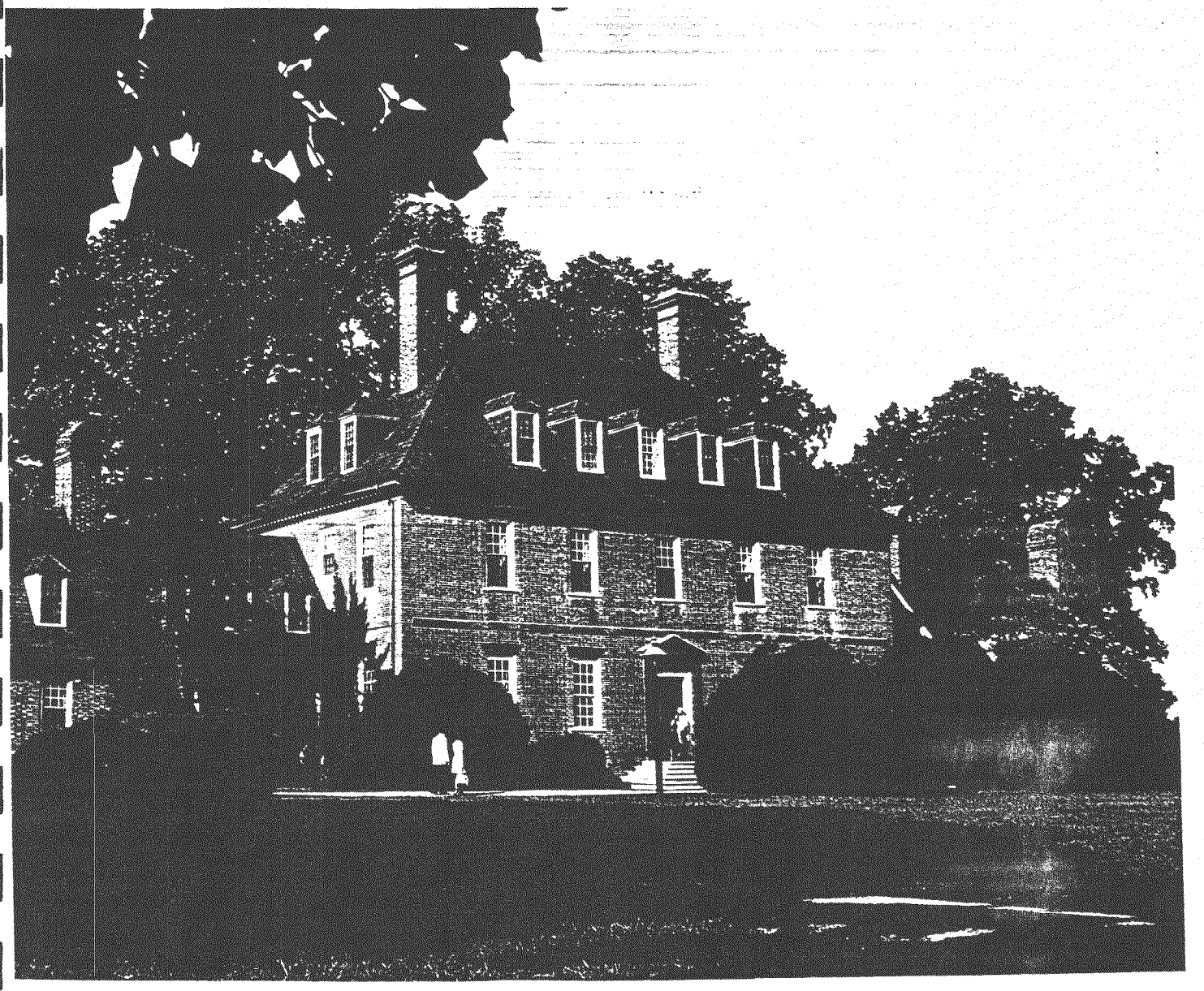


United States Department of Agriculture

Soil Conservation Service

In Cooperation with Virginia Polytechnic Institute and State University

Soil Survey of James City and York Counties and the City of Williamsburg Virginia



Slagle soils are adjacent to drainageways and in depressions. Also included are small areas of soils in York County that are east of U.S. Highway 17 and that have a seasonal high water table at a depth of 4 to 6 feet. Included soils make up about 20 percent of this unit.

The permeability of this Kempsville soil is moderate, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It is very strongly acid or strongly acid, but reaction in the surface layer varies because of local liming practices.

In most areas this soil is in woodland. In some areas it is farmed, and in some areas it is in community developments.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay crops. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes. This results in reduced yields and increased runoff and erosion.

The potential for trees on this soil is moderately high, especially for loblolly pine, yellow-poplar, sweetgum, and southern red oak. The wooded areas are managed for both pine and hardwoods. Seeds and seedlings grow well if competing vegetation is controlled.

The moderate permeability and slope are the main limitations of this soil for community development. The permeability of the subsoil and slope limit use of the soil as a site for septic tank absorption fields, sewage lagoons, and small commercial buildings.

This soil is in capability subclass IIe.

19B—Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes. This complex consists of deep, gently sloping, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. Areas of this complex are on medium to broad upland ridges and side slopes. Slopes are commonly smooth and range from 400 to 1,000 feet long. Areas commonly are elongated or irregularly oval and range from about 2 to 30 acres.

Of the total acreage of this map unit, about 50 percent is Kempsville soil, 30 percent is Emporia soil, and 20 percent is other soils.

Typically, the surface layer of this Kempsville soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 10 inches thick. The subsoil extends to a depth of 55 inches. It is yellowish brown and strong brown fine sandy loam and sandy clay loam to a depth of 32 inches. Below this, the subsoil is mottled fine sandy loam that is somewhat firm and compact over yellowish brown sandy clay loam. The substratum is yellowish brown fine sandy loam to a depth of at least 68 inches.

Typically, the surface layer of this Emporia soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is pale brown loam 9 inches thick. The subsoil extends to a depth of 58 inches. It is yellowish brown loam with mostly strong brown mottles in the upper part, yellowish brown, firm sandy clay loam with strong brown and gray mottles in the middle part, and mottled gray and brown firm sandy clay loam in the lower part. The substratum is variegated gray, brown, and red firm sandy clay loam to a depth of at least 75 inches.

Included with these soils in mapping are small areas of well drained Caroline, Kenansville, Suffolk, and Uchee soils and moderately well drained Slagle soils. The Caroline soils are in slightly lower areas; the Kenansville and Suffolk soils are on small knolls; and the Slagle soils are adjacent to drainageways and in depressions.

The permeability of the Kempsville soil is moderate. In the Emporia soil, permeability is moderate in the upper part of the subsoil and moderately slow to slow in the lower part. The available water capacity is moderate for both soils. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and is easily tilled throughout a wide range of moisture conditions. The subsoil of the Kempsville soil has low shrink-swell potential, and that of the Emporia soil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more, but is somewhat restricted in the Emporia soil by a firm, compact layer at a depth of about 37 inches. Both soils are low in organic matter content and natural fertility. Both soils are very strongly acid or strongly acid, but reaction in the surface layer varies because of local liming practices. The Emporia soil has a perched high water table at a depth of 3 to 4 1/2 feet in winter and spring.

In most areas these soils are in woodland. In some areas they are farmed, and in some areas they are in pasture. A small acreage is in urban development.

The soils in this complex are well suited to cultivated crops. Crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This complex is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and

legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

The potential for trees on this complex is moderately high, especially for loblolly pine, yellow-poplar, and oak. Seeds and seedlings grow well if competing vegetation is controlled. The surface layer of the Emporia soil is often soft during wet periods and, consequently, will not support heavy timber equipment.

The low strength, moderate shrink-swell potential, and seasonal high water table of the Emporia soil and the slow permeability of the Emporia subsoil and moderate permeability of the Kempsville subsoil are the main limitations for community development. The low strength and moderate shrink-swell potential limit use of the Emporia soil as a building site, and the seasonal perched high water table limits excavation. The slow permeability and the water table also limit use of the Emporia soil for septic tank absorption fields. The low strength of the Emporia subsoil also limits use as a subgrade material for roads and streets.

The soils in this complex are in capability subclass IIe.

20B—Kenansville loamy fine sand, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on upland ridges. Slopes are smooth and are 150 to 500 feet long. Areas commonly are long and narrow or irregularly oval. They range from about 2 to 40 acres.

Typically, the surface layer of this soil is dark grayish brown loamy fine sand about 2 inches thick. The subsurface layer is light yellowish brown loamy fine sand 23 inches thick. The subsoil is yellowish brown and strong brown fine sandy loam 18 inches thick. The substratum is yellowish brown loamy fine sand with lamellae of brown fine sandy loam to a depth of at least 78 inches.

Included with this soil in mapping are small areas of moderately well drained Slagle soils and well drained Kempsville, Suffolk, and Uchee soils. Slagle soils are in slight depressions, generally adjacent to drainageways. Suffolk, Kempsville, and Uchee soils commonly are throughout the unit. Also included in mapping are small areas that are sandy throughout. Included soils make up about 15 percent of the unit.

The permeability of this Kenansville soil is moderately rapid, and available water capacity is low. Surface runoff is slow. The hazard of water erosion is slight, but the hazard of wind erosion is moderate. The surface layer is friable and easily tilled throughout a wide range of moisture conditions. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction in the surface layer varies because of local liming practices. A high water table is at a depth of 4 to 6 feet in winter and spring.

In most areas this soil is farmed, and in a few areas it is in woodland.

This soil is well suited to cultivated crops. It is droughty during the growing season, however, and the low available water capacity limits crop response to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to maintain organic matter content and hold moisture in the soil.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the soft surface layer and damages the stands of grasses and legumes.

The potential for trees on this soil is moderately high, especially for loblolly pine, but the survival of seeds and seedlings is limited by drought during the growing season.

The moderately rapid permeability, the sandy texture, and the seasonal high water table are the main limitations for community development. Because of the moderately rapid permeability and the seasonal high water table, seepage of effluent into ground water and nearby streams is a pollution hazard if this soil is used for septic tank absorption fields and sanitary landfills. The sandy texture limits excavation, and the surface of the soil is dusty when dry. The low available water capacity of this soil limits the growth of grasses and shrubs.

This soil is in capability subclass IIs.

21—Levy silty clay. This soil is deep, nearly level, and very poorly drained. It is on tidal marshes. Areas of this soil are irregular in shape. They range from about 3 to 100 acres. Slopes are less than 1 percent.

Typically, the surface layer of this soil is dark olive gray silty clay about 18 inches thick. The substratum is very dark gray silty clay to a depth of at least 80 inches.

Included with this soil in mapping are small areas of very poorly drained Axis, Bohicket, and Johnston soils. The Axis and Bohicket soils are throughout the unit. The Johnston soils are on the flood plains of smaller streams but are not flooded by tidal waters. Also included are areas of soil, which are in tidal marshes and have sandy layers within a depth of 60 inches. Included soils make up about 15 percent of this unit.

The permeability of this Levy soil is slow, and available water capacity is high. Surface runoff is very slow. The substratum has high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is high in organic matter content and medium in natural fertility.

water table, seepage of effluent into ground water and nearby streams is a hazard in areas used for septic tank absorption fields or sanitary landfills. The sandy texture limits excavation, and the surface of the soil is dusty when dry. The low available water capacity of this soil limits the growth of grasses and shrubs.

This soil is in capability subclass IIIs.

29A—Slagle fine sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on upland terraces and broad flat uplands and in slight depressions. Areas of this soil commonly are elongated, but some smaller areas are irregularly oval or rectangular. They range from about 2 to 80 acres.

Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 5 inches thick. The subsoil extends to a depth of 50 inches. It is mostly mottled yellowish brown clay loam to a depth of 25 inches. Below this depth, it is mostly mottled clay loam and sandy clay loam. The substratum is mottled sandy clay loam to a depth of at least 60 inches.

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Uchee soils; moderately well drained Izagora and Peawick soils; somewhat poorly drained Yemassee soils; and poorly drained Bethera soils. The Emporia, Kempsville, and Uchee soils are in slightly higher areas; the Izagora and Peawick soils are in similar areas; and the Yemassee and Bethera soils are in slight depressions and around drainageways. Also included are many small areas of soils that have water on the surface for brief periods after heavy or prolonged rainfall in winter and spring and soils that are similar to this Slagle soil but have a thicker surface layer. Included soils make up about 20 percent of this unit.

In this Slagle soil, permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. The available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The surface layer is friable and easily tilled. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It ranges from extremely acid through strongly acid, but reaction in the surface layer varies because of local liming practices. A high perched water table is at a depth of 1 1/2 to 3 feet in winter and spring.

In most areas this soil is in woodland. In a few areas it is cultivated, and in a few it is in pasture.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer, but the soil is wet and cold in spring, and wetness often interferes with tillage. Drainage helps to protect crops from damage caused by wetness. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential for trees on this soil is high, especially for loblolly pine, oak, and sweetgum. Seeds and seedlings grow well if competing vegetation is controlled. When the soil is wet, it is soft, thus limiting the use of heavy timber equipment.

The seasonal high water table and the low strength and slow permeability of the subsoil are the main limitations of the soil for community development. The high water table and slow permeability of the subsoil limit the use of the soil as a building site or site for sanitary landfills or septic tank absorption fields and for most types of recreation. The low strength limits its use as a subgrade material for roads and streets.

This soil is in capability subclass IIw.

29B—Slagle fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on terraces and side slopes on the uplands. Slopes range from about 200 to 1,000 feet long. Areas of this soil commonly are elongated, but some smaller areas are irregularly oval or rectangular. They range from about 2 to 80 acres.

Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 5 inches thick. The subsoil extends to a depth of 50 inches. It is mostly mottled yellowish brown clay loam to a depth of 25 inches. Below this depth, the subsoil is mostly mottled clay loam and sandy clay loam. The substratum is mottled sandy clay loam to a depth of at least 60 inches.

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Uchee soils and moderately well drained Izagora and Peawick soils. The Emporia, Kempsville, and Uchee soils are in slightly higher areas, and the Izagora and Peawick soils are in similar areas throughout the unit. Also included are small areas that are ponded for brief periods after heavy or prolonged rainfall during winter and spring. Included soils make up about 20 percent of this unit.

In this Slagle soil, permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. The available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled. The subsoil has moderate shrink-swell potential. The

root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It ranges from extremely acid through strongly acid, but reaction in the surface layer varies because of local liming practices. A high perched water table is at a depth of 1 1/2 to 3 feet in winter and spring.

In most areas this soil is in woodland. In a few areas it is cultivated, and in a few it is in pasture.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer, but the soil is wet and cold in spring, and wetness often interferes with tillage. Drainage helps to protect crops from damage caused by wetness. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to maintain organic matter content and tilth, reduce surface crusting, increase water infiltration, and reduce erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential for trees on this soil is high, especially for loblolly pine, oak, and sweetgum. Seeds and seedlings grow well if competing vegetation is controlled. When the soil is wet, it is soft, thus limiting the use of heavy timber equipment.

The seasonal high water table and the low strength and slow permeability of the subsoil are the main limitations of the soil for community development. The high water table and slow permeability of the subsoil limit the use of the soil as a building site or site for sanitary landfills or septic tank absorption fields and for most types of recreation. The low strength limits its use as a subgrade material for roads and streets.

This soil is in capability subclass IIe.

30—State fine sandy loam. This soil is deep, nearly level, and well drained. It is on low-lying terraces. Areas range from about 3 to 25 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer of this soil is very dark grayish brown fine sandy loam about 5 inches thick. The subsoil is mostly dark yellowish brown fine sandy loam and dark brown loam, clay loam, and sandy clay loam 47 inches thick. The substratum is dark brown fine sandy loam to a depth of at least 97 inches.

Included with this soil in mapping are small areas of well drained Pamunkey soils, moderately well drained Altavista, Dogue, and Tetotum soils, and somewhat poorly drained Augusta soils. The Pamunkey soils are in slightly higher areas, the Altavista, Dogue, and Tetotum soils are in similar areas, and the Augusta soils are in slightly lower areas and in slight depressions throughout the unit. Included soils make up about 15 percent of the unit.

The permeability of this State soil is moderate, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is slight. The surface layer is friable and easily tilled throughout a wide range of moisture conditions. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid in the surface layer and subsoil, but reaction in the surface layer varies because of local liming practices. The substratum ranges from very strongly acid through medium acid. A high water table is at a depth of 4 to 6 feet in winter and spring.

In most areas this soil is farmed, but in some areas it is in woodland.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to maintain organic matter content, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay crops. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and reduces the stands of grasses and legumes.

The productivity for trees on this soil is very high, especially for loblolly pine, yellow-poplar, sweetgum, and oak. Seeds and seedlings grow well if competing vegetation is controlled.

Moderate permeability and the seasonal high water table are the main limitations if the soil is used for community development. The moderate permeability may cause effluent to seep into the ground water and nearby streams if this soil is used for septic tank absorption fields or sanitary landfills.

This soil is in capability class I.

31B—Suffolk fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is in long, narrow areas on broad uplands and on side slopes next to drainageways. Areas range from about 3 to 50 acres.

Typically, the surface layer of this soil is very dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown fine sandy loam 10 inches thick. The subsoil is strong brown fine sandy loam and sandy clay loam 26 inches thick. The substratum is brown loamy fine sand to a depth of at least 64 inches.

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Kenansville soils and moderately well drained Slagle soils. The Kempsville and Kenansville soils are throughout the unit. The

Udorthents generally are not suited to farming because the topsoil has been removed. The potential for trees on this soil material is low. These soils are limited for most types of community development and recreation uses. An onsite investigation is needed to determine the suitability and limitations of the soils for any given use.

The soils in this map unit are not assigned to a capability subclass.

36—Udorthents-Dumps complex. This complex consists of shallow to deep, excessively drained to moderately well drained soil material in areas that were disturbed during excavation. The excavations are partly filled with garbage, trees, stumps, metal, fly ash, or dredgings. Udorthents and Dumps are so intermingled that it is not practical to separate them at the scale used in mapping. Areas of this complex are rectangular or irregularly oval and range from 3 to 80 acres. Slopes range from 0 to 25 percent.

Of the total acreage of this map unit, about 50 percent is Udorthents, 25 percent is Dumps, and 25 percent is other soils.

Included in mapping are small areas of undisturbed well drained Caroline, Kempsville, Suffolk, and Uchee soils; moderately well drained Slagle and Izagora soils; and poorly drained Bethera soils. Also included are small bodies of water, sanitary landfills, and quarries where the soil material is neutral to moderately alkaline.

The permeability of the Udorthents in this complex ranges from moderately rapid to slow. The available water capacity ranges from low to high, depending on texture and gravel content of the material. Surface runoff ranges from very slow to rapid. The erosion hazard is slight to severe. The soil materials commonly range from extremely acid through strongly acid.

The soils in this complex are generally not suited to farming because the topsoil has been removed and they contain miscellaneous nonsoil materials. The potential for trees on this soil material is low.

The soils in this complex are limited for most types of community development and recreation. Onsite investigation is needed to determine the suitability and limitations of the unit for any given use.

The soils in this map unit are not assigned to a capability subclass.

37—Urban land. This map unit consists of areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. Examples are parking lots, shopping centers, and industrial parks. These areas are throughout the survey area, but the largest are near downtown business districts and along main roads. The areas range from about 2 to 100 acres. Slopes range from 0 to 15 percent.

Included with this unit in mapping are areas of undisturbed soils, commonly well drained Emporia soils, and moderately well drained Slagle soils. Also included in this unit are small areas of most soils in the survey area. These soils are between streets and sidewalks, in yards, and in traffic islands. These areas generally are less than an acre. They make up about 15 percent of the unit.

Onsite investigation is needed to determine the suitability and limitations of the soils in this unit for any use.

The soils in this map unit are not assigned to a capability subclass.

38—Yemassee fine sandy loam. This soil is deep, nearly level, and somewhat poorly drained. It is on broad low-lying uplands. Areas of this soil are elongated or irregularly oval. They range from about 2 to 30 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 7 inches thick. The subsoil extends to a depth of 51 inches. It is mottled light yellowish brown and light olive brown sandy clay loam to a depth of 20 inches; mottled gray, yellowish brown, and strong brown sandy clay loam to a depth of 30 inches; and gray sandy clay loam to a depth of 51 inches. The substratum is gray fine sandy loam with yellowish brown mottles from 51 to at least 63 inches.

Included with this soil in mapping are small areas of moderately well drained Izagora and Slagle soils that are in slightly higher areas and poorly drained Bethera soils in lower areas and slight depressions. Included soils make up about 15 percent of the unit.

The permeability of this Yemassee soil is moderate, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The surface layer is friable and easily tilled. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly ranges from extremely acid through strongly acid, but reaction in the surface layer varies because of local liming practices. A high water table is at a depth of 1 foot to 1 1/2 feet in winter and early in spring.

In most areas this soil is in woodland. In a few areas it is cultivated, and in a few areas it is used for pasture and hay crops.

If adequately drained, this soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. The soil is wet and cold in the spring, and wetness often interferes with tillage. Drainage helps to protect crops from damage caused by wetness. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

If adequately drained, this soil is well suited to pasture

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
15F*---------- Emporia	0-6	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	6-37	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	37-45	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	45-75	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
16---------- Izagora	0-13	Loam----------	CL, CL-ML, ML	A-4	0	95-100	95-100	85-100	60-90	<30	NP-10
	13-36	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	95-100	95-100	85-100	60-95	25-45	8-25
	36-78	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	95-100	90-100	70-95	35-60	20-40
17*---------- Johnston	0-8	Silt loam--------	ML, SM	A-2, A-4	0	100	100	60-100	18-65	<35	NP-10
	8-49	Stratified fine sandy loam to silty clay loam.	SM, ML	A-2, A-3	0	100	100	60-100	18-65	<35	NP-10
	49-60	Stratified sand to sandy clay loam.	SM, ML	A-2, A-4	0	100	100	50-100	25-49	<35	NP-10
18B---------- Kempsville	0-14	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	14-20	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	80-100	50-90	30-70	<22	NP-10
	20-55	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-2, A-6	0-2	90-100	80-100	55-95	30-75	25-40	10-20
	55-68	Stratified loamy sand to sandy clay loam.	SC, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	85-100	75-100	35-85	15-50	<30	NP-15
19B*: Kempsville------	0-14	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	14-20	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	80-100	50-90	30-70	<22	NP-10
	20-55	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-2, A-6	0-2	90-100	80-100	55-95	30-75	25-40	10-20
	55-68	Stratified loamy sand to sandy clay loam.	SC, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	85-100	75-100	35-85	15-50	<30	NP-15
Emporia---------	0-13	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	13-37	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	37-58	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	58-75	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
20B---------- Kenansville	0-25	Loamy fine sand	SM	A-1, A-2	0	100	95-100	45-60	10-25	<25	NP-3
	25-43	Sandy loam, fine sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4	0	100	95-100	50-75	20-40	<30	NP-10
	43-78	Sand, loamy sand	SP-SM, SM, SP	A-1, A-2, A-3	0	100	95-100	40-60	5-30	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21---------- Levy	0-18	Silty clay-------	CL, CH, ML, MH	A-6, A-7	0	100	100	98-100	85-100	30-65	12-35
	18-80	Silty clay, clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	98-100	85-100	35-65	15-35
22---------- Munden	0-11	Loamy fine sand	SM, SM-SC	A-2, A-4	0	100	98-100	55-85	15-45	<18	NP-7
	11-48	Sandy loam, loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	100	98-100	60-95	30-75	<30	NP-15
	48-80	Loamy sand, fine sand, sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	98-100	50-90	5-35	<18	NP-7
23---------- Newflat	0-8	Silt loam--------	SM, SC, CL-ML	A-4	0	95-100	90-100	75-95	45-90	<25	NP-8
	8-11	Loam, clay loam, silty clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	85-100	65-90	30-55	12-30
	11-80	Clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	90-100	85-100	70-90	40-75	15-45
24---------- Nimmo	0-11	Fine sandy loam	SM, SC, SM-SC, ML	A-4	0	100	95-100	60-85	36-60	<22	NP-10
	11-36	Loam, fine sandy loam, sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	60-95	30-75	<30	NP-15
	36-60	Loamy sand, fine sand, sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	95-100	50-80	5-35	<18	NP-7
25B---------- Norfolk	0-17	Fine sandy loam	SM, SM-SC, SC	A-2	0	95-100	95-100	50-91	15-33	<25	NP-14
	17-39	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-55	20-38	4-15
	39-72	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	0	100	98-100	65-98	36-72	20-45	4-22
26B*---------- Pamunkey	0-14	Sandy loam-------	SM, ML, SP-SM, SM-SC	A-2, A-4	0	80-100	75-100	50-85	12-55	<20	NP-7
	14-43	Sandy clay loam, clay loam, loam.	CL, SC	A-2, A-6	0-2	80-100	75-100	70-95	30-75	30-40	10-20
	43-75	Stratified sandy loam to sand.	SW, SM, SW-SM, SM-SC	A-1, A-2, A-3	0-5	50-100	50-95	25-70	2-35	<20	NP-6
27---------- Peawick	0-7	Silt loam--------	SM, SC, CL-ML	A-4	0	90-100	75-100	50-100	40-90	15-30	NP-8
	7-99	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	70-95	35-80	12-50
28---------- Seabrook	0-9	Loamy fine sand	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-99	5-25	---	NP
	9-72	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-100	5-25	---	NP
29A, 29B---------- Slagle	0-9	Fine sandy loam	SM, SC, ML, CL	A-2, A-4, A-6	0-3	95-100	90-100	55-95	30-75	<35	NP-15
	9-25	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	25-60	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
30---------- State	0-11	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	95-100	95-100	65-100	40-85	<28	NP-7
	11-52	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	75-100	35-80	24-40	8-22
	52-97	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	0	85-100	75-100	40-90	5-50	<25	NP-7

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm				Pct
15D*----------	0-11	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low----------	0.28	4	.5-2
Emporia	11-37	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-5.5	<2	Low----------	0.28		
	37-54	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	<2	Moderate-----	0.20		
	54-75	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	<2	Moderate-----	0.20		
15E*----------	0-9	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low----------	0.28	4	.5-2
Emporia	9-37	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-5.5	<2	Low----------	0.28		
	37-50	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	<2	Moderate-----	0.20		
	50-75	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	<2	Moderate-----	0.20		
15F*----------	0-6	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low----------	0.28	4	.5-2
Emporia	6-37	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-5.5	<2	Low----------	0.28		
	37-45	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	<2	Moderate-----	0.20		
	45-75	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	<2	Moderate-----	0.20		
16----------	0-13	10-20	1.30-1.40	2.0-6.0	0.16-0.22	4.5-5.5	<2	Low----------	0.37	3	.5-2
Izagora	13-36	18-30	1.30-1.50	0.6-2.0	0.12-0.20	4.5-5.5	<2	Low----------	0.32		
	36-78	35-55	1.30-1.50	0.06-0.2	0.16-0.20	4.5-5.5	<2	Moderate-----	0.32		
17*----------	0-8	5-18	1.30-1.55	2.0-6.0	0.10-0.20	4.5-5.5	<2	Low----------	0.20	5	4-8
Johnston	8-49	2-12	1.55-1.75	0.6-2.0	0.02-0.07	4.5-5.5	<2	Low----------	0.17		
	49-60	5-20	1.45-1.65	0.6-2.0	0.06-0.12	4.5-5.5	<2	Low----------	0.17		
18B----------	0-14	5-18	1.30-1.40	2.0-6.0	0.10-0.16	4.5-5.5	<2	Low----------	0.32	3	.5-2
Kempsville	14-20	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	<2	Low----------	0.24		
	20-55	18-35	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low----------	0.24		
	55-68	5-30	1.30-1.60	0.6-2.0	0.08-0.15	4.5-5.5	<2	Low----------	0.24		
19B*:											
Kempsville------	0-14	5-18	1.30-1.40	2.0-6.0	0.10-0.16	4.5-5.5	<2	Low----------	0.32	3	.5-2
	14-20	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	<2	Low----------	0.24		
	20-55	18-35	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low----------	0.24		
	55-68	5-30	1.30-1.60	0.6-2.0	0.08-0.15	4.5-5.5	<2	Low----------	0.24		
Emporia---------	0-13	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low----------	0.28	4	.5-2
	13-37	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-5.5	<2	Low----------	0.28		
	37-58	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	<2	Moderate-----	0.20		
	58-75	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	<2	Moderate-----	0.20		
20B----------	0-25	3-10	1.50-1.70	6.0-20	0.04-0.10	4.5-5.5	<2	Low----------	0.15	5	.5-2
Kenansville	25-43	5-18	1.30-1.50	2.0-6.0	0.10-0.15	4.5-5.5	<2	Low----------	0.15		
	43-78	1-10	1.50-1.70	6.0-20	<0.05	4.5-5.5	<2	Low----------	0.10		
21----------	0-18	27-50	0.50-1.00	0.06-0.2	0.16-0.22	4.5-5.5	<2	High---------	0.32	5	3-15
Levy	18-80	35-60	0.25-1.10	0.06-0.2	0.16-0.22	4.5-6.0	<2	High---------	0.32		
22----------	0-11	3-12	1.20-1.35	2.0-6.0	0.06-0.10	4.5-5.5	<2	Low----------	0.20	4	.5-1
Munden	11-48	8-18	1.20-1.35	0.6-2.0	0.08-0.17	4.5-5.5	<2	Low----------	0.17		
	48-80	2-12	1.35-1.55	>2.0	0.04-0.08	4.5-5.5	<2	Low----------	0.17		
23----------	0-8	10-25	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.0	<2	Low----------	0.37	4	.5-1
Newflat	8-11	25-40	1.25-1.35	0.2-0.6	0.12-0.19	3.6-5.0	<2	Moderate-----	0.37		
	11-80	35-60	1.30-1.50	<0.06	0.10-0.19	3.6-5.0	<2	High---------	0.24		
24----------	0-11	4-14	1.20-1.35	2.0-6.0	0.06-0.15	3.6-5.5	<2	Low----------	0.17	4	2-3
Nimmo	11-36	8-18	1.20-1.35	0.6-2.0	0.08-0.17	3.6-5.5	<2	Low----------	0.17		
	36-60	1-8	1.35-1.55	>2.0	0.04-0.08	3.6-5.5	<2	Low----------	0.17		
25B----------	0-17	5-18	1.45-1.65	2.0-6.0	0.10-0.15	4.5-5.5	<2	Low----------	0.17	5	.5-2
Norfolk	17-39	18-35	1.35-1.45	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low----------	0.24		
	39-72	20-40	1.30-1.40	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low----------	0.24		
26B*----------	0-14	3-10	1.35-1.55	2.0-20	0.06-0.15	4.5-6.5	<2	Low----------	0.28	4	.5-2
Pamunkey	14-43	20-35	1.35-1.65	0.6-2.0	0.13-0.19	4.5-7.3	<2	Low----------	0.28		
	43-75	4-18	1.40-1.65	2.0-20	0.04-0.12	4.5-7.3	<2	Low----------	0.28		
27----------	0-7	10-25	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.0	<2	Low----------	0.37	4	.5-2
Peawick	7-99	35-60	1.30-1.50	<0.06	0.10-0.17	3.6-5.0	<2	High---------	0.24		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm				Pct
28----------	0-9	2-12	1.30-1.60	6.0-20	0.05-0.11	4.5-5.5	<2	Low----------	0.10	5	.5-2
Seabrook	9-72	2-12	1.30-1.60	6.0-20	0.02-0.09	4.5-6.0	<2	Low----------	0.10		
29A, 29B----------	0-9	8-22	1.30-1.45	2.0-6.0	0.10-0.17	3.6-5.5	<2	Low----------	0.24	3	.5-1
Slagle	9-25	12-35	1.30-1.45	0.6-2.0	0.10-0.18	3.6-5.5	<2	Low----------	0.24		
	25-60	18-40	1.35-1.60	0.06-0.6	0.12-0.18	3.6-5.5	<2	Moderate-----	0.24		
30----------	0-11	5-15	1.25-1.40	0.6-6.0	0.10-0.20	4.5-5.5	<2	Low----------	0.28	4	.5-2
State	11-52	18-34	1.35-1.50	0.6-2.0	0.14-0.19	4.5-5.5	<2	Low----------	0.28		
	52-97	2-15	1.35-1.50	>2.0	0.02-0.10	4.5-6.0	<2	Low----------	0.17		
31B----------	0-14	6-18	1.35-1.45	2.0-6.0	0.12-0.15	3.6-5.5	<2	Low----------	0.28	4	.5-2
Suffolk	14-40	10-33	1.40-1.50	0.6-2.0	0.12-0.20	3.6-5.5	<2	Low----------	0.28		
	40-64	4-10	1.40-1.50	2.0-20	0.04-0.10	3.6-6.0	<2	Low----------	0.17		
32----------	0-10	10-22	1.20-1.35	0.6-2.0	0.14-0.19	3.6-5.5	<2	Low----------	0.32	4	.5-2
Tetotum	10-51	18-35	1.25-1.45	0.6-2.0	0.14-0.19	3.6-5.5	<2	Low----------	0.32		
	51-65	5-30	1.25-1.45	0.6-20	0.06-0.15	3.6-5.5	<2	Low----------	0.24		
33----------	0-8	5-20	1.30-1.60	2.0-6.0	0.10-0.15	3.6-5.5	<2	Low----------	0.20	5	1-2
Tomotley	8-50	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	<2	Low----------	0.20		
	50-68	2-15	1.35-1.50	>2.0	0.04-0.10	3.6-5.5	<2	Low----------	0.17		
34B, 34C----------	0-24	3-10	1.30-1.60	6.0-20	0.05-0.10	4.5-5.5	<2	Low----------	0.20	5	.5-1
Uchee	24-36	8-30	1.30-1.45	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low----------	0.24		
	36-56	25-50	1.30-1.50	0.2-0.6	0.10-0.16	4.5-5.5	<2	Moderate-----	0.28		
	56-65	15-40	1.30-1.50	0.2-2.0	0.10-0.16	4.5-5.5	<2	Moderate-----	0.28		
35. Udorthents											
36*: Udorthents.											
Dumps.											
37*. Urban land											
38----------	0-11	10-20	1.30-1.60	2.0-6.0	0.10-0.15	3.6-5.5	<2	Low----------	0.20	5	.5-2
Yemassee	11-51	18-35	1.30-1.50	0.6-2.0	0.11-0.18	3.6-5.5	<2	Low----------	0.20		
	51-63	12-40	1.30-1.50	0.6-2.0	0.11-0.17	3.6-5.5	<2	Low----------	0.20		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth*	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1---------- Altavista	C	None--------	---	---	1.5-2.5	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
2---------- Augusta	C	None--------	---	---	1.0-2.0	Apparent	Jan-May	>60	---	High-----	Moderate.
3---------- Axis	D	Frequent----	Very brief	Jan-Dec	+1-1.0	Apparent	Jan-Dec	>60	---	High-----	High.
4**. Beaches											
5---------- Bethera	D	None--------	---	---	+1-1.5	Apparent	Dec-Apr	>60	---	High-----	High.
6---------- Bohicket	D	Frequent----	Very brief	Jan-Dec	+2-0	Apparent	Jan-Dec	>60	---	High-----	High.
7---------- Bojac	B	None--------	---	---	>4.0	Apparent	Nov-Apr	>60	---	Low------	High.
8B---------- Caroline	C	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
9---------- Chickahominy	D	None--------	---	---	0-0.5	Apparent	Nov-Apr	>60	---	High-----	High.
10B, 10C---------- Craven	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	---	High-----	High.
11B**, 11C**: Craven----------	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	---	High-----	High.
Uchee----------	A	None--------	---	---	3.5-5.0	Perched	Jan-Apr	>60	---	Low------	High.
12---------- Dogue	C	None--------	---	---	1.5-3.0	Apparent	Jan-Mar	>60	---	High-----	High.
13---------- Dragston	C	None--------	---	---	1.0-2.5	Apparent	Nov-Apr	>60	---	Low------	High.
14B, 14C, 15D**, 15E**, 15F**----- Emporia	C	None--------	---	---	3.0-4.5	Perched	Nov-Apr	>60	---	Moderate	High.
16---------- Izagora	C	None--------	---	---	2.0-3.0	Apparent	Dec-Mar	>60	---	Moderate	High.
17**---------- Johnston	D	Frequent----	Brief to long.	Nov-Jul	+1-1.5	Apparent	Nov-Jun	>60	---	High-----	High.
18B---------- Kempsville	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
19B**: Kempsville-------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Emporia----------	C	None--------	---	---	3.0-4.5	Perched	Nov-Apr	>60	---	Moderate	High.
20B---------- Kenansville	A	None--------	---	---	4.0-6.0	Apparent	Dec-Apr	>60	---	Low------	High.
21---------- Levy	D	Frequent----	Very long	Jan-Dec	+2-+1	Apparent	Jan-Dec	>60	---	High-----	High.

See footnotes at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth*	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
22---- Munden	B	None	---	---	1.5-2.5	Apparent	Dec-Apr	>60	---	Low	High.
23---- Newflat	D	None	---	---	0.5-1.5	Apparent	Nov-Apr	>60	---	High	High.
24---- Nimmo	D	None	---	---	0-0.5	Apparent	Dec-Apr	>60	---	Low	High.
25B---- Norfolk	B	None	---	---	4.0-6.0	Perched	Jan-Mar	>60	---	Moderate	High.
26B**---- Pamunkey	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
27---- Peawick	D	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High	High.
28---- Seabrook	C	None	---	---	2.0-4.0	Apparent	Dec-Mar	>60	---	Low	Moderate.
29A, 29B---- Slagle	C	None	---	---	1.5-3.0	Perched	Nov-Apr	>60	---	Moderate	High.
30---- State	B	None	---	---	4.0-6.0	Apparent	Dec-Jun	>60	---	Moderate	High.
31B---- Suffolk	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
32---- Tetotum	C	None	---	---	1.5-2.5	Apparent	Dec-Apr	>60	---	High	High.
33---- Tomotley	B/D	None	---	---	0-1.0	Apparent	Dec-Mar	>60	---	High	High.
34B, 34C---- Uchee	A	None	---	---	3.5-5.0	Perched	Jan-Apr	>60	---	Low	High.
35**. Udorthents											
36**: Udorthents.											
Dumps.											
37**. Urban land											
38---- Yemassee	C	None	---	---	1.0-1.5	Apparent	Dec-Mar	>60	---	High	High.

* A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

** See description of the map unit for composition and behavior characteristics of the map unit.

TEST BORING LOG

SHEET 1 OF 1

PROJ. NO.

DATE: 8/16/99

PROJECT NAME: PROPOSED ACCESS ROAD

PROJECT LOCATION: WILLIAMSBURG, VA.

DRILLING CONTR.: FROEHLING & ROBERTSON

B-99-3

WATER LEVEL INFORMATION (DEPTH/ELEV.):
ATD: None
AD:

LOGGED BY: WAD

DEPTH (ft.)	SAMPLE TYPE	SAMPLE REC	SAMPLE RES	SURF. ELE. / DATUM / DESCRIPTION OF MATERIALS	USC	FIELD NOTES
0			BLOWS/6"	Asphalt - 3-inches 8.5 inches GRAVEL FILL, BROWN, SILTY CLAY with GRAVEL FILL VERY STIFF, TAN REDDISH BROWN, SILTY clay	FILL CL	Boring advanced with CME-55 and 6 inch diameter HSA
	1 S	10/24	4 20 16			
	2 S	18/24	8 7 8			
5	3 S	13/24	10 5 7 8 9	Becoming medium dense, clayey SAND	SC	
				6.5 Bottom of Boring		
10				PRELIM.		
15						

WOODWARD-CLYDE CONSULTANTS

FIG NO.

TEST BORING LOG

SHEET 1 OF 1

PROJECT NAME: PROPOSED ACCESS ROAD

PROJ. NO.

PROJECT LOCATION: WILLIAMSBURG, VA.

DATE: 8/19/99

B-99-4

DRILLING CONTR.: FROEHLING & ROBERTSON

WATER LEVEL INFORMATION (DEPTH/ELEV.):
ATD:
AD:

LOGGED BY: MP

DEPTH (ft.)	SAMPLE TYPE	SAMPLE REC	SAMPLE RES	SURF. ELE. DATUM / DESCRIPTION OF MATERIALS	USC	FIELD NOTES
0			Blows	5.0" Asphalt - No stone		Boring advanced with CME-55 and 6 inch diameter HSA
	1 / S	18/24	6 11 8 6	Medium dense, yellow-tan, sandy clay with trace fine gravel	FILL	
	2 / S	12/24	4 6 5 5	Stiff, red-tan, silty clay	CL	patches nearby
5	3 / S	17/24	3 3 3 4			
				6.5		Bottom of Boring
10				PRELIM.		
15						

WARD-CLYDE CONSULTANTS

FIG NO.

TEST BORING LOG

SHEET 1 OF 1

PROJECT NAME: PROPOSED ACCESS ROAD

PROJ. NO.

PROJECT LOCATION: WILLIAMSBURG, VA.

DATE: 8/18/99

B-99-5

DRILLING CONTR.: FROEHLING & ROBERTSON

WATER LEVEL INFORMATION (DEPTH/ELEV.):
ATD: NONE
AD:

LOGGED BY: WP

SURF. ELE. DATUM

DEPTH (ft.)	SAMPLE TYPE	SAMPLE REC	SAMPLE RES (blows)	DESCRIPTION OF MATERIALS	USC	FIELD NOTES
0				2.5 inches asphalt 6 in gravel	F,11	Boring advanced with CME-55 and 6 inch diameter HSA
	1	18/24	6 12 7 8	very stiff, tan, yellow, very silty clay.	CL	
	2	17/24	10 8 9	- blooming gray, stiff, very silty clay	ML-SC	
	3	16/24	3 5 7	- blooming very stiff, very - yellow - tan very silty clay	CL	
6.5						Bottom of Boring
5						
10						
15						

PRELIM.

WOODWARD-CLYDE CONSULTANTS

FIG NO.

TEST BORING LOG

SHEET 1 OF 1

PROJECT NAME: PROPOSED ACCESS ROAD

PROJ. NO.

PROJECT LOCATION: WILLIAMSBURG, VA.

DATE: 8/18/99

B-99-6

DRILLING CONTR.: FROEHLING & ROBERTSON

WATER LEVEL INFORMATION (DEPTH/ELEV.): ATD: None AD:

LOGGED BY: MP

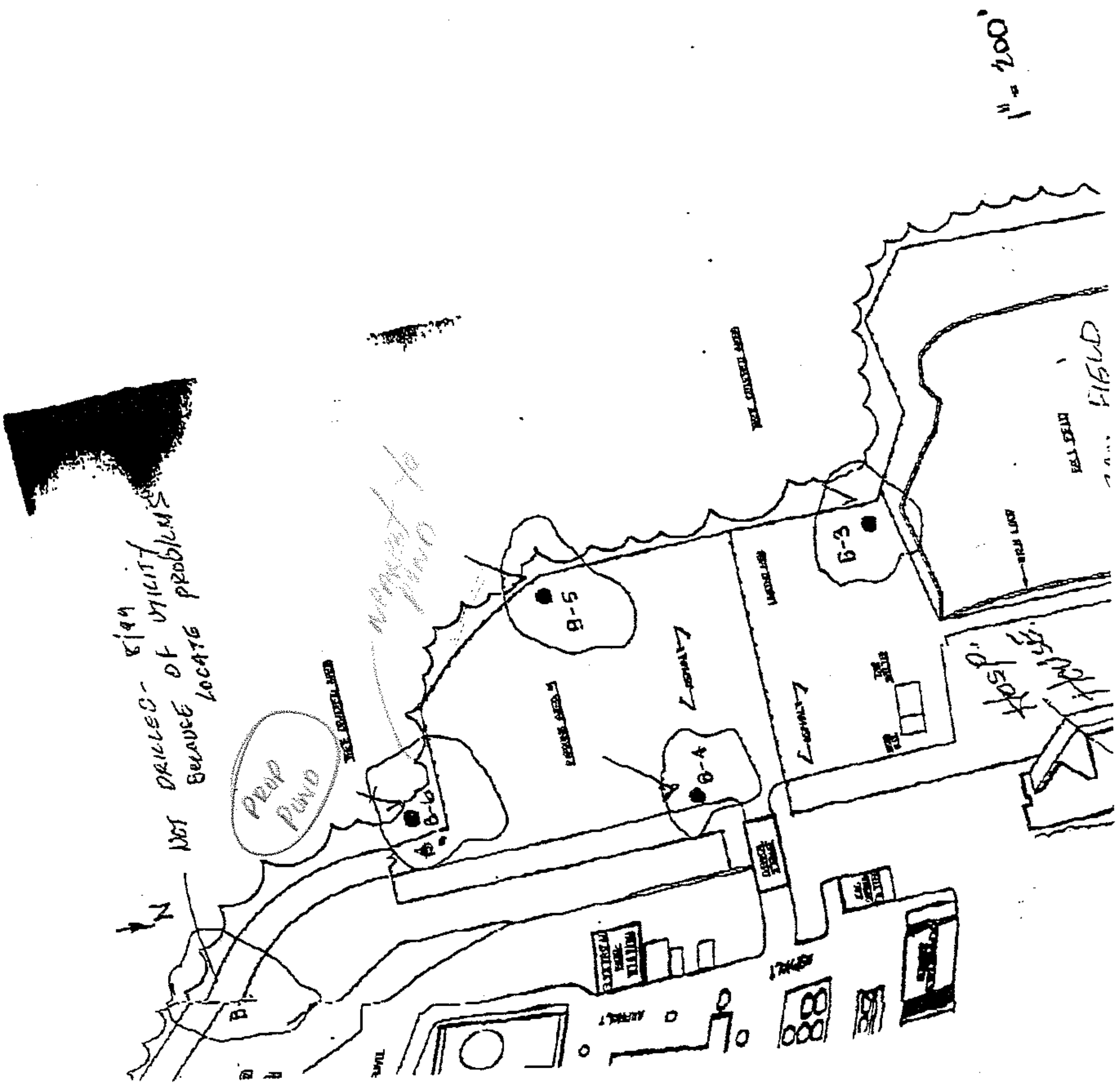
SURF. ELE. DATUM

DEPTH (ft.)	SAMPLE TYPE	SAMPLE REC	SAMPLE RES	DESCRIPTION OF MATERIALS	USC	FIELD NOTES
0			Blows 6"	3.5" Asphalt 6.5" STONE		Boring advanced with CME-55 and 6 inch diameter HSA
	1	16/24	4 3 5 4	STIFF, Yellow-TAN, SANDY SILTY CLAY, with SAND LENSES	CL w/ SC	NO FILL.
	2	12/24	4 6 6 8	Becoming very STIFF, REDDISH-TAN, SILTY CLAY	CL	Bottom of Boring
5	3	12/24	4 6 8	Becoming hard.		
10						
15						
20						

PRELIM.

WOODWARD-CLYDE CONSULTANTS

FIG NO.


1" = 200'
NOT DRILLED - 8/99
BECAUSE OF UTILITY
LOCATE PROBLEMS
PROP POND
B-6
B-5
B-4
B-3
N
HOSP.
FIELD

SP-121-99

ADDENDUM NO. 1

TO

STORMWATER MANAGEMENT PLAN

for

TRANSPORTATION ADVANTAGE – PHASE 1
ANHEUSER BUSCH

Williamsburg, Virginia

THE HASKELL COMPANY
Haskell Building
Jacksonville, Florida

CC015

Project 32193

NEED BOTH SWM REPORTS. THIS IS AN ADDENDUM OF CHANGES.

Revised Issue: December 15, 1999
Original Issue: November 16, 1999
Prepared By: Joseph W. Stepp, P.E.

THE HASKELL COMPANY
ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES

12/15/99

ADDENDUM NO. 1
STORMWATER MANAGEMENT PLAN

Anheuser-Busch Brewery
Transportation Advantage - Phase I
Williamsburg, VA

The following addendum is presented to update portions of the original issue Stormwater Management Plan as submitted on November 16, 1999. Below is a summary of changes made to each section of the original Stormwater Management Plan. Also included is an updated and revised "DESIGN NARRATIVE", which was presented in the original issue.

SECTION A
EXISTING CONDITIONS ANALYSIS

No Changes to this section are necessary
Reference

SECTION B
POST CONDITIONS ANALYSIS

(a) New stormwater analysis includes area 5 and a majority of area 6 as shown on the original issue color map. A new color map will not be issued under this addendum.

(b) The contributing drainage area to POND1 has been updated to include an additional 0.74 acres of existing paved area. Included herewith is a new breakdown of the contributing drainage areas to POND1.

(c) No other updates or changes are included herewith. Details of the control structure as shown on the re-submitted plans (Revised Permit Issue, 12/15/99) will take precedence over the original permit issue.

SECTION C
EXISTING AND POST CONDITIONS
BASIN INPUT SUMMARIES
AND ROUTING RESULTS

(a) Hydrograph and Flood Routing simulations were updated to reflect additional contributing drainage area and the directly connected impervious area (DCIA). Included are new simulations for 1, 2, 10, and 100 year 24 hour design events.

SECTION D

(a) Updated flood routing input parameters to reflect changes in the riser structure orifice diameter and the weir crest elevation.

SECTION E
ORIFICE/STAGE-STORAGE
& VOLUME RECOVERY
CALCULATIONS

(a) Revised Water Quality Volume to reflect additional paved area.

(b) Revised Permanent Pool Volume calculations to reflect loss in permanent pool volume due to submerged rock barrier and sedimentation of pond.

(c) Revised Downstream Channel Erosion Control Volume (1 yr, 24-hr storm) to reflect volume indicated on Post Development Hydrograph.

(d) Revised Orifice Configuration calculations to reflect changes in volume.

SECTION F
STORM SEWER DESIGN TABULATIONS

(a) Corrected mis-labeling of Original Issue title to indicate use 10 year Design Storm

(b) Revised storm sewer tabulations to reflect new configuration of storm sewer as shown on revised Permit Issue Construction Drawings 12/15/99.

(c) Revised inlet times to utilize inlet flow time of 10 minutes from previously used 5 minutes. Industry standard is to use a minimum of 10 minutes.

APPENDIX

No Changes to this section are necessary

STORMWATER MANAGEMENT PLAN

Anheuseur-Busch
Transportation Advantage – Phase I
Williamsburg, VA

November 16, 1999 (Revised December 15, 1999)

DESIGN NARRATIVE

❑ Introduction

Anheuser-Busch is proposing to expand their truck and trailer staging and storage areas through the "Transportation Advantage" project. Phase One of the Transportation Advantage project will consist of an expansion of existing parking facility to accommodate 123 truck and trailer storage spaces.

❑ Project Description

Phase One expansion will include construction of 39 new paved truck storage spaces along the east side of the existing facility west of the Brewery including addition of new stormwater facilities to serve the new construction. In addition, existing paved areas will be revitalized and new asphalt overlay provided. Re-striping of the area and provision of curbing and/or curb & gutter will be provided where necessary for stormwater control.

❑ Project Location

Phase One is located in the southwest area of the existing brewery.

❑ Existing Land Use

Currently, Phase One project area is used as a construction staging area. Access to the area is from an existing guarded paved roadway from the south.

❑ Flood Zone

Based on the Flood Insurance Rate Map (Panel Number 510201 0050 B, Effective Date February 6, 1991), the site and surrounding areas are located in Zone X. This zone is outside of the 500-year flood plain. Maps and related information are included in the appendix of this report.

❑ Soil Conditions

References: Original Permit Issue of November 16, 1999
SCS Soil Survey Map and Related Information
URS Griner Woodward Clyde Soil Boring Logs

Based on the SCS Soil Survey, the project is located within an area designated Urban Land (#37). With reference to the survey narrative, included with this mapping unit are areas of undisturbed soils, commonly well-drained Emporia soils (19A), and moderately well drained Slagle soils (#29B).

In addition to the soil survey, test borings were provided by URS Greiner Woodward Clyde. A comparison of the boring logs with the Engineering Index Properties (Table 13) of the above-mentioned survey shows a close resemblance between Emporia and Slagle soil units and the existing soils on site.

The above referenced information is contained in the Appendix of the original permit issue.

❑ Design Concept

In designing the grading scheme for the newly paved areas (and, in an effort to match existing drainage patterns of the site) collection of stormwater runoff from the newly paved areas would also include the existing paved parking area which was not previously collected but allowed to drain to off-site areas to the south. Since, the Chesapeake Bay Preservation Ordinance requires a 10 percent reduction in non-point source pollution load for re-development sites, inclusion of the existing paved parking area into the stormwater system should meet this requirement for the Phase One expansion area. Also, a portion of the existing pavement (approximately 11,150 sf) will be removed as part of Phase One.

In addition, to meet channel downstream erosion requirements, the stormwater management system will be designed to new James City County requirements for the 1 year – 24 hr storm event. Attenuation of the 2 and 10 year – 24 hour storms will also be provided.

❑ Existing Conditions Analysis

References: Original Permit Issue of November 16, 1999-
Color Aerial Photo showing existing conditions for Phase One Area
Topographic survey showing existing conditions for Phase One Area

As shown on the map of existing conditions, an existing drainage divide splits Phase One area. Currently approximately 88,585-sf +/- of asphalt pavement drains westerly to a collection system, which conveys the stormwater runoff to an existing wet detention area adjacent to the site and ballfield area. The remaining 82,810-sf +/- of asphalt pavement drains easterly to an open-channel conveyance system that traverses along the westerly and southerly side of the existing monorail system to a point of discharge through an existing 72-inch pipe that discharges

to off-site drainage areas south of the brewery. This pipe also is the main conveyance pipe for the brewery drainage system within the boundaries of the monorail system. A sparsely wooded area separates the open-channel and the existing pavement area.

A time of concentration path is shown on the map of existing conditions which is representative of the Phase One area draining to the open-channel section along the monorail. Time of concentration for this contributing area is calculated to be approximately 24 minutes.

Using the SCS Unit Hydrograph Methodology, discharge from the Phase One area was computed for the 1, 2, 10 and 100 year return periods of 24 hour duration. These hydrographs were then used as guidelines for post-conditions design.

Reference the Stormwater Analysis – Section A for details of the existing-conditions analysis.

- **Post Conditions Analysis**

References: Original Permit Issue -
Topographic survey showing post-conditions for Phase One Area

As shown on the Post-Conditions map, existing drainage patterns are being maintained for Phase One site area. The existing drainage divide will be maintained "as-is" by use of asphalt leveling courses and a new wearing course of asphalt-concrete. Currently, a non-woven geotextile will be utilized as part of the pavement rehabilitation.

With respect to maintaining the existing drainage divide, the existing paved area currently draining westerly will continue to drain westerly except for a small portion of pavement (approximately 11,150 sf), which will be removed as part of demolition. Given this fact, post-condition drainage analysis of the area draining westerly will not be presented at this time since there is no additional impact to this area under Phase I re-development.

Post-conditions analysis will focus on the Phase One area draining easterly.

Under post-conditions a new paved area will be provided along the East side of the existing pavement. This new paved area will provide 39 new truck storage spaces. In addition, a small triangular area of new pavement will be necessary at the southwest quadrant area of the existing paved access road connecting to Phase One. This additional pavement was necessary to provide for safe and efficient turning movements of truck-trailer maneuvering.

A wet detention pond will be provided for post-conditions. A wet detention was chosen over dry due to the existing clayey soils beneath the ground surface, the depth of the proposed detention pond, and the fact that the existing detention pond adjacent to the project area (Ballfield Pond) is observed to be wet.

As shown on the post-conditions map, there are a total of four (5) drainage areas that will contribute runoff directly to the pond for a total of 3.95 acres.

(Please note that drainage area DA-1 is a future parking expansion area and although not constructed under Phase One, the pond has been sized to include this area)

To meet downstream channel erosion protection requirements, the new James City County requirements for routing of the 1 yr 24 hr storm event of 2.8 inches into the pond and sizing an orifice to discharge this volume over a 24 hour period was used. The "Kerplunk" method was used in this analysis to set the initial weir crest elevation (which was later adjusted to the maximum stage obtained in the pond utilizing orifice flow only). In addition, the 2 and 10-year storm events of 24-hour duration were routed through the detention pond and the weir control structure sized to control the outlet discharge at or below the discharge rates computed in the existing-condition analysis. Finally, the 100-year storm is routed to assure one (1) foot of freeboard between the top of pond and the maximum stage attained in the pond.

The SCS Unit Hydrograph methodology was used along with the adICPR program (advanced Interconnected Pond Routing). A description of this program is included in the Appendix of this report.

Due to the direct connection of the paved parking areas to the pond the initial abstraction of runoff is less than the normal abstraction used in the SCS runoff equation; therefore, all impervious areas (including the pond water surface area) are appropriately modeled as directly connected impervious area (DCIA) in the stormwater drainage model.

Although time of concentration for the system is less than 10 minutes, the flood routing analysis will use the industry standard minimum value of 10 minutes.

Reference the Stormwater Analysis – Section B for details of the post-conditions analysis.

To meet the 10 percent reduction in non-point source pollutant loading (as required by the Chesapeake Bay Preservation Ordinance), existing paved areas draining easterly and southerly to off-site areas will be collected and conveyed to the new storm water management system prior to being released.

> As noted above, under existing conditions there is approximately 82,810-sf +/- of existing paved parking area draining easterly and southerly to off-site areas. Under post-conditions the total impervious area (including new pavement) draining easterly to off- site areas without being treated is approximately 4,120 sf +/- (a portion of drainage area 6 as shown on the Post-Conditions Map) (reference construction drawing sheet 207 for grading details). The impervious area being captured and directed to the proposed detention area for treatment is approximately 131,856-sf +/- (indicated as drainage areas 1, 2, 3, and 4 on construction plan sheet 207. Of the 131,856-sf of paved area to be treated, approximately 78,690-sf is existing paved area. Therefore, the net reduction in impervious area draining easterly and southerly to off-site areas is reduced by approximately 95 percent. This reduction should meet the 10 percent reduction required by the Chesapeake Bay Preservation Ordinance for re-developed areas.

❑ Summary

The following is a summary of results for the design of the system.

Discharge Rate Analysis:

Design Storm	Existing Conditions (cfs)	Post Conditions (cfs)	WSEL
1 yr – 24 hr	3.06	0.42	EL. 75.93
2 yr – 24 hr	4.59	1.26	EL. 76.13
10 yr – 24 hr	10.07	5.36	EL. 76.82
100 YR - 24 hr	15.54	7.30	EL. 77.53

Minimum top of bank elevation for the detention pond = 79.0 ft

Emergency Spillway is the paved roadway fronting the pond
100 year flood stage in pond = 77.53 ft.

Minimum elevation of pond bank adjacent to roadway = 77.60 ft. (TOP DAM)

Roadway to be used as emergency spillway if overtopping occurs

NORMAL POOL = 74.50
RISER CREST = 77.75
WEIR CREST = 76.00
WQ ORIFICE = 74.65

FB 79.00
77.53
1.47' > 1.0 OK

STORMWATER ANALYSIS

ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE

WILLIAMSBURG, VA

SECTION A
EXISTING CONDITIONS ANALYSIS

REFERENCE THE ORIGINAL PERMIT ISSUE
STORMWATER MANAGEMENT PLAN
NOVEMBER 16, 1999

SECTION B
POST CONDITIONS ANALYSIS

POND 1
CONTRIBUTING AREA BREAKDOWN

Drainage Area	Contributing Area, Acres	Impervious Area, Acres	Impervious Runoff CN	Pervious Area, Acres	Pervious Runoff CN
DA-1	0.484	0.484	98	-	61
DA-2	1.326	1.326	98	-	61
DA-3	0.640	0.640	98	-	61
DA-4	0.577	0.577	98	-	61
DA-POND (1)	0.912	0.324	100	0.588	61

Total Contributing Drainage Area:	3.94	acres
Directly Connected Impervious Area:	3.35	acres
% DCIA:	85%	

General Notes:

1 Pond water surface assumed to be DCIA

3 If DCIA methodology is not used for analysis, use a composite runoff CN for contributing area = 92.6

4 Time of concentration for area is 10 minutes

5 SCS Unit Hydrograph Method (Design K = 484)

SECTION C

EXISTING AND POST CONDITIONS BASIN INPUT PARAMETERS AND ROUTING RESULTS

Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [1]
Copyright 1995, Streamline Technologies, Inc.

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 1 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Basin Summary - POST-1 **********

***

Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	2.80	2.80
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.94
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	61.00
DCIA (%):	0.00	85.00
Time Max (hrs):	12.16	12.02
Flow Max (cfs):	3.06	10.44
Runoff Volume (in):	1.10	2.34
Runoff Volume (cf):	11746	33406

1 yr - 24 hr

EXISTING Q

POST Q (TO POND)

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 1 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Node Maximum Conditions - POST-1 **********

⊕(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.80	75.00	0.0002	0.00	14.08	0.42	0.00	0.00
POND1	POST	13.95	75.93	78.00	0.0062	17096.99	12.00	10.37	14.08	0.42

MAX. STAGE
1 YR · 24 HR

MAX. OUTFLOW
ORIFICE FLOW ONLY

0.42 < 3.06 ∴ OK

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 2 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Basin Summary - POST-2 **********

Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	3.50	3.50
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.94
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	61.00
DCIA (%):	0.00	85.00
Time Max (hrs):	12.16	12.02
Flow Max (cfs):	4.59	13.26
Runoff Volume (in):	1.63	2.97
Runoff Volume (cf):	17440	42505

2 yr - 24 hr

EXISTING Q

POST Q (TO POND)

Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [1]
Copyright 1995, Streamline Technologies, Inc.

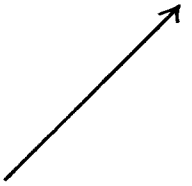
AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 2 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Node Maximum Conditions - POST-2 **********

⊛(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.80	75.00	0.0002	0.00	12.63	1.26	0.00	0.00
POND1	POST	12.62	76.13	78.00	0.0077	17543.65	12.00	13.17	12.63	1.26

MAX. STAGE
2 YR - 24 HR



MAX. OUTFLOW
ORIFICE & WEIR
1.26 < 4.59 ∴ OK

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 10 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Basin Summary - POST-10 **********

***

Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	5.80	5.80
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.94
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	61.00
DCIA (%):	0.00	85.00
Time Max (hrs):	12.16	12.02
Flow Max (cfs):	10.07	22.84
Runoff Volume (in):	3.60	5.12
Runoff Volume (cf):	38382	73215

10 Yr - 24 Hr

EXISTING Q

POST Q (To POND)

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 10 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Node Maximum Conditions - POST-10 **********

*(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.80	75.00	0.0002	0.00	12.25	5.36	0.00	0.00
POND1	POST	12.25	76.82	78.00	0.0108	19080.44	12.00	22.69	12.25	5.36

MAX. STAGE
10 YR - 24 HR.

MAX. OUTFLOW
ORIFICE & WEIR

5.36 < 10.07 ∴ OK

Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [1]
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AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Basin Summary - POST-100 **********

***

Basin Name:	XPH1	POND1
Group Name:	X-COND	POST
Node Name:	OUT1	POND1
Hydrograph Type:	UH	UH
Unit Hydrograph:	UH484	UH484
Peaking Factor:	484.00	484.00
Spec Time Inc (min):	3.20	1.33
Comp Time Inc (min):	3.20	1.33
Rainfall File:	SCSII-24	SCSII-24
Rainfall Amount (in):	8.00	8.00
Storm Duration (hr):	24.00	24.00
Status:	INACTIVE	ONSITE
Time of Conc. (min):	24.00	10.00
Lag Time (hr):	0.00	0.00
Area (acres):	2.94	3.94
Vol of Unit Hyd (in):	1.00	1.00
Curve Number:	80.00	61.00
DCIA (%):	0.00	85.00
Time Max (hrs):	12.11	12.02
Flow Max (cfs):	15.54	32.23
Runoff Volume (in):	5.62	7.22
Runoff Volume (cf):	59951	103292

100 yr - 24 hr

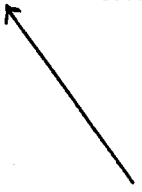
POST Q (TO POND)

AB-WMB TRANSPORTATION ADVANTAGE
POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)
NOVEMBER 11, 1999 (Revised 12/10/99)

********** Node Maximum Conditions - POST-100 **********

(Time units - hours)

Node Name	Group Name	Max Time Conditions	Max Stage (ft)	Warning Stage (ft)	Max Delta Stage (ft)	Max Surface Area (sf)	Max Time Inflow	Max Inflow (cfs)	Max Time Outflow	Max Outflow (cfs)
OUT1	POST	12.00	74.80	75.00	0.0002	0.00	12.26	7.30	0.00	0.00
POND1	POST	12.26	77.53	78.00	0.0135	20697.74	12.00	32.03	12.26	7.30



MAX. STAGE
100 YR. 24 HR.

SECTION D

FLOOD ROUTING INPUT PARAMETERS

```
Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [1]
Copyright 1995, Streamline Technologies, Inc.

AB-Wmb Transportation Advantage - Phase 1
POND1 Flood Routing Input Parameters
November 11, 1999 (Revised 12/11/99)

********** Input Report ************************************************************
--------Class: Node-----------------------------------------------------------------
   Name: OUT1       Base Flow(cfs): 0          Init Stage(ft): 74
  Group: POST           Length(ft): 0          Warn Stage(ft): 75
Comment: Transportation Advantage - Phase 1 Pond

Time(hrs)    Stage(ft)
0            74
12           74.8
24           74
--------Class: Node-----------------------------------------------------------------
   Name: POND1      Base Flow(cfs): 0          Init Stage(ft): 74.5
  Group: POST           Length(ft): 0          Warn Stage(ft): 78
Comment: Transportation Advantage - Phase 1 Pond

Stage(ft)    Area(ac)
74.5         0.3239
75           0.3473
76           0.396
77           0.447
78           0.5002
--------Class: Drop Structure-------------------------------------------------------
     Name: POND1OUT      From Node: POND1         Length(ft): 80
    Group: POST            To Node: OUT1              Count: 1

    Outlet Cntrl Spec: Use dc or tw     Inlet Cntrl Spec: Use dn
    Upstream Geometry: Circular      Downstream Geometry: Circular
                           UPSTREAM             DOWNSTREAM
              Span(in): 15                   15
              Rise(in): 15                   15
            Invert(ft): 74.26                74.1
          Manning's N: 0.013                 0.013
         Top Clip(in): 0                     0
      Bottom Clip(in): 0                     0

     Entrance Loss Coef: 0.5                  Flow: Both
         Exit Loss Coef: 1                Equation: Aver Conveyance

      Upstream FHWA Inlet Edge Description:
      Circular Concrete: Square edge w/ headwall              1     1
      Downstream FHWA Inlet Edge Description:
      Circular Concrete: Square edge w/ headwall              1     1

               POND 1 OUTFALL STRUCTURE
```

STAGE vs TIME BOUNDARY RELATIONSHIP

STAGE vs AREA RELATIONSHIP - POND 1

15" RCP OUTLET

```
Advanced Interconnected Channel & Pond Routing (ICPR Ver 2.11) [2]
Copyright 1995, Streamline Technologies, Inc.

AB-Wmb Transportation Advantage - Phase 1
POND1 Flood Routing Input Parameters
November 11, 1999 (Revised 12/11/99)

********** Input Report ************************************************************
 *** Weir 1 of 2 for Drop Structure POND1OUT ***                [TABLE]
   Count: 1                      Bottom Clip(in): 0
    Type: Mavis                     Top Clip(in): 0
    Flow: Both               Weir Discharge Coef: 3
Geometry: Circular       Orifice Discharge Coef: 0.6
      Span(in): 3.825                    Invert(ft): 74.5
      Rise(in): 3.825          Control Elev(ft): 74.5

 *** Weir 2 of 2 for Drop Structure POND1OUT ***                [TABLE]
   Count: 3                      Bottom Clip(in): 0
    Type: Mavis                     Top Clip(in): 0
    Flow: Both               Weir Discharge Coef: 3
Geometry: Rectangular    Orifice Discharge Coef: 0.6
      Span(in): 24                       Invert(ft): 76
      Rise(in): 20             Control Elev(ft): 76

--------Class: Simulation-------------------------------------------------------
G:\ICPR2\IND\32193\32193PH1\POST-100
Execution: Both
   Header: AB-WMB TRANSPORTATION ADVANTAGE
           POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)
           NOVEMBER 11, 1999 (Revised 12/10/99)
---------HYDRAULICS-----------------------------HYDROLOGY--------------------
       Max Delta Z (ft): 1
         Delta Z Factor: 0.05          Override Defaults: Yes
    Time Step Optimizer: 1                Storm Dur(hrs): 24
Drop Structure Optimizer: 1              Rain Amount(in): 8
    Sim Start Time(hrs): 0                 Rainfall File: SCSII-24
      Sim End Time(hrs): 24
     Min Calc Time(sec): 0.5
     Max Calc Time(sec): 10
       To Hour:   PInc(min):              To Hour:   PInc(min):
       8          60                      8          60
       10         15                      10         15
       11         6                       14         2
       14         2                       16         15
       18         6                       20         30
       20         15                      24         60
       24         30
---------GROUP SELECTIONS-----------------------------------------------------
- BASE     [ NO RUN ]       + X-COND   [12/15/99]       + POST     [12/15/99]
```

DIA.

ORIFICE

WEIR

SECTION E

ORIFICE/STAGE-STORAGE & VOLUME RECOVERY CALCULATIONS

Anheuser-Busch
Transportation Advantage
Williamsburg, VA

12/15/99
10:29 AM

Stage-Storage Calculations

Stage, ft.	Area, sf	Area, acres	Average Area, sf	Depth Incr., ft	Volume Incr., cf	Volume Accum., cf	Volume Accum., af
Detention Pond Attenuation Volume:							
78.0	21,790	0.5002	20,630	1.00	20,630	62,488	1.4345
77.0	19,470	0.4470	18,360	1.00	18,360	41,858	0.9609
76.0	17,249	0.3960	16,190	1.00	16,190	23,499	0.5395
75.0	15,130	0.3473	14,619	0.50	7,309	7,309	0.1678
74.5	14,107	0.3239	-	-	-	-	-
Detention Pond Permanent Pool Volume:							
74.5	14,107	0.3239	13,592	0.50	6,796	34,778	0.7984
74.0	13,077	0.3002	12,104	1.00	12,104	30,862	0.7085
73.0	11,131	0.2555	10,236	1.00	10,236	18,758	0.4306
72.0	9,340	0.2144	8,522	1.00	8,522	8,522	0.1956
71.0	7,704	0.1769	-	-	-	-	-

For simplicity PPV at elevation 74.5 has been adjusted to reflect volume lost due to the Rock Barrier using a conservative estimate of 20% voids. In addition, volume below elevation 71 was not included to account for volume lost due to siltation.

Water Quality & Permanent Pool Calculations:

Total Impervious Area:	131,856	sf	
Water Quality Volume:	0.50	inches runoff from impervious area	
Permanent Pool Volume:	2.00	inches/impervious acre (JCC BMP Point System, Table 1)	
Required Water Quality Volume:	5,494	cf	0.1261 ac ft
Required Permanent Pool Volume:	21,976	cf	0.5045 ac ft

Downstream Channel Erosion Control Volume: (Kerplunk Method)

Runoff Volume from 1 yr 24 hr Storm Event:	33,406	cf
(From SCS Unit Hydrographs)	0.7669	acre feet
Initial Weir Stage:	76.54	
Final Weir Stage (Based on Flood Routing Analysis):	76.00	(Maximum Pond Stage for 1 yr Storm)

Orifice Configurations:

	WQ Volume		1 yr - 24 hr Volume	
Volume:	5,494	cf	33,406	cf
Brim Drawdown Time:	30	hrs	24	hrs
Average Rate of Discharge:	183	cf/hr	1,392	cf/hr
	0.05	cfs	0.39	cfs
Initial Orifice Diameter:	2.1273	inches	3.8162	inches
Invert Elevation:	74.50	ft	74.50	ft
Design Orifice Coefficient:	0.60		0.60	
Orifice Centerline Elevation:	74.59	ft	74.66	ft
Pond Volume at Centerline:	1,296	cf	2,324	cf
Adjusted Volume:	6,790	cf	35,730	cf
Adjusted Stage:	74.96	ft	76.70	ft
Depth:	0.38	ft	2.04	ft
Initial Elev of Water Surface:	74.96	ft	76.70	ft
Final Elev of Water Surface:	74.59	ft	74.66	ft
Average Depth:	0.19	ft	1.02	ft
Orifice Area:	0.0244	sf	0.0794	sf
Orifice Diameter:	0.1762	ft	0.3180	ft
Orifice Diameter:	2.1139	inches	3.8162	inches

Orifice Diameter Used: 3.8125 inches
(~ 3 13/16")

The Haskell Company
111 Riverside Avenue
Jacksonville, FL 32231-4100

SECTION F

STORM SEWER DESIGN TABULATIONS

PROJECT: **WILLIAMSBURG TRANSPORTATION ADVANTAGE**
CLIENT: **ANHEUSER BUSCH**
SHEET: 1 OF 1

JOB NUMBER: 32193
BY: JWS
DATE: 11/15/99
(Revised 12/10/99)

STORM SEWER DESIGN TABULATION FORM
10 YR DESIGN STORM

IMPERVIOUS 'C' :	0.95
PERVIOUS 'C' :	0.20

UPPER END	LOWER END	INCREMENTAL AREA	SUB-TOTAL OF INCREMENTAL AREAS	SUB-TOTAL 'c' x A	TOTAL 'c' x AREA	INLET TIME	SEGMENT FLOW TIME	TIME OF CONCENTRATION	RAINFALL INTENSITY	FLOW RATE	LENGTH	DIAMETER	MANNINGS 'n'	CROSS-SECTIONAL AREA	HYDRAULIC RADIUS	INLET/GRATE ELEVATION	HGL / CROWN / INVERT UPPER END	HGL / CROWN / INVERT LOWER END	FALL	SLOPE	VELOCITY	CAPACITY
		acres	acres			min.	min.	min.	in/hr	cfs	ft	inches		sf	ft	ft-msl	ft-msl	ft-msl	ft	%	fps	cfs
		0.48	0.48	0.46													77.76	77.43	0.33	0.232	2.23	2.74
ST1	ST2	0.00	0.00	0.00	0.46	10.00	1.08	10.00	6.00	2.74	144	15	0.013	1.23	0.31	78.00	74.28	73.95	0.33			
KIM EL'S → 78.0	77.25	0.00	0.00	0.00													73.03	72.70	0.33	0.229	2.52	3.09
		1.33	1.81	1.72													77.43	76.84	0.59	0.275	3.23	10.15
ST2	ST3	0.00	0.00	0.00	1.72	10.00	1.11	11.08	5.90	10.15	216	24	0.013	3.14	0.50	77.25	73.95	73.45	0.50			
77.25	79.10	0.00	0.00	0.00													71.95	71.45	0.50	0.231	3.46	10.88
		0.00	1.81	1.72													76.84	76.42	0.42	0.218	3.07	9.63
ST3	ST4	0.00	0.00	0.00	1.72	10.00	1.04	12.19	5.60	9.63	192	24	0.013	3.14	0.50	79.10	73.45	73.00	0.45			
79.10	77.25	0.00	0.00	0.00													71.45	71.00	0.45	0.234	3.49	10.95
		0.66	2.47	2.35													76.42	76.18	0.24	0.148	2.49	12.20
ST4	ST5	0.00	0.00	0.00	2.35	10.00	1.07	13.24	5.20	12.20	160	30	0.013	4.91	0.63	77.25	73.00	72.84	0.16			
77.25	79.0	0.00	0.00	0.00													70.50	70.34	0.16	0.100	2.64	12.97
		0.57	0.57	0.54													76.38	76.18	0.20	0.288	2.23	2.73
ST9	ST5	0.00	0.00	0.00	0.54	10.00	0.52	14.31	5.05	2.73	70	15	0.013	1.23	0.31	76.40	73.00	72.84	0.16			
76.40	79.0	0.00	0.00	0.00													71.75	71.59	0.16	0.229	2.52	3.09
		0.00	3.04	2.89													76.18	76.00	0.18	0.450	2.91	14.30
ST5	ST6	0.00	0.00	0.00	2.89	10.00	0.23	14.83	4.95	14.30	40	30	0.013	4.91	0.63	na	72.84	72.80	0.04			
79.0	—	0.00	0.00	0.00													70.34	70.30	0.04	0.100	2.64	12.97

INLET TIMES CHANGED FROM 5 MIN. IN IEI SUBMISSION. PIPE SIZES STILL THE SAME. OK

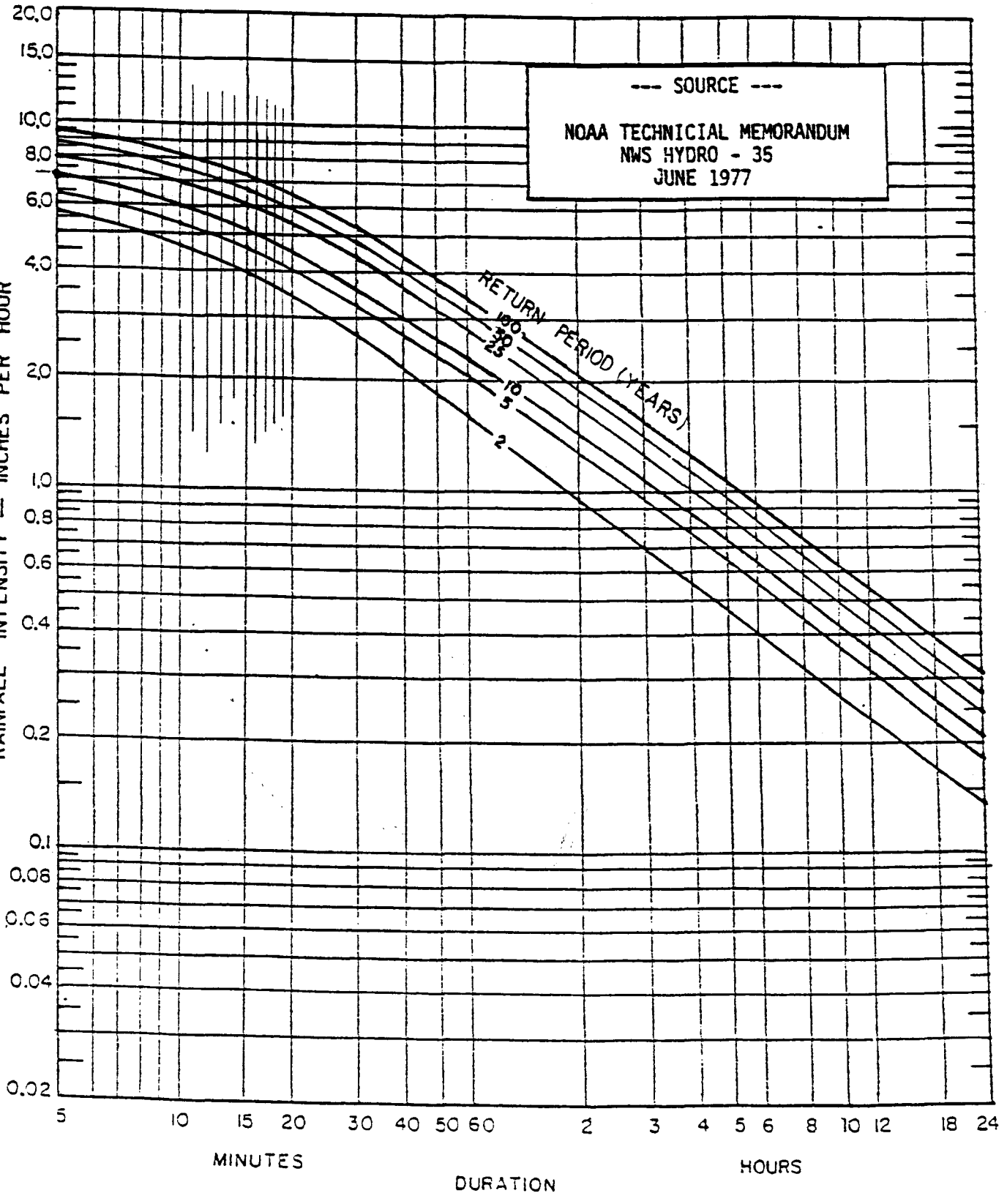
INLET 2 SURCHARGES 0.18'

OK

STORM COMPS OK.

Fig. 1.5.1.7

NORFOLK, VA.



APPENDIX

STORMWATER ANALYSIS
ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE
WILLIAMSBURG, VA

REFERENCE THE ORIGINAL PERMIT ISSUE STORMWATER MANAGEMENT PLAN NOVEMBER 16, 1999

7. Geotechnical Reports

psi Information To Build On
Engineering • Consulting • Testing

RECEIVED
OCT 2 0 2000
JOBSITE

REPORT OF FIELD COMPACTION TESTS

TESTED FOR: MR. KIRK RENO
ANHEUSER-BUSCH CONSTRUCTION
7801 POCAHONTAS TRAIL
WILLIAMSBURG, VA 23187

PROJECT: TRANSPORTATION ADVANTAGE
WILLIAMSBURG, VA

DATE: October 11, 2000

OUR REPORT NO.: 884-00005-386

TEST DATA: (265) BROWN CLAYEY SAND W/SOME GRAVEL- SC OPT. MOIST. = 10.5%

TEST NO.	TEST DEPTH	ELEVATION	SOIL ID NUMBER	MAXIMUM LAB DRY * DENSITY	WATER CONTENT	WET DENSITY	DENSITY	PERCENT COMPACTION	COMMENTS* Spec. 95% Min
1	12	0 (FG)	265	122.5	12.9	132.1	117.0	95.5	1 - A

TEST LOCATION: BMP 2 EMBANKMENT

1	25' SOUTHWEST OF ST-37

NOTES: TESTS PERFORMED PER ASTM D2922-96 & ASTM D3017-96
DENSITIES SHOWN: Lbs. per cubic foot
WATER CONTENT: Percent of dry weight
PERCENT COMPACTION: Based on maximum dry density obtained on sample indicated by soil ID number.

*COMMENTS: 1. FILL MATERIAL 2. BACKFILL 3. BASE COURSE 4. SUBBASE 5. SOIL CEMENT 6. OTHER

A. TEST RESULTS COMPLY WITH SPECIFICATIONS
B. PERCENT COMPACTION DOES NOT COMPLY WITH SPECIFICATIONS
C. RETEST OF PREVIOUS TEST
D. MOISTURE IN EXCESS OF SPECIFICATIONS
E. MOISTURE BELOW SPECIFICATIONS

* (265) ASTM D 1557-91 - PROCEDURE C MODIFIED

TEST INSTRUMENT: TROXLER, 3430, 23213

STANDARD COUNT M: 666 D: 2749
ADJUSTMENT DATA M: D:

REMARKS:

TECHNICIAN: ANDREI RAMNICEANU

cc: THE HASKELL COMPANY - WILLIAM CLAYTOR, KEVIN KETT
MIKE HOTTINGER, HERNANDO ANGEL, JCC - JOE BASILONE

Respectfully submitted,
Professional Service Industries, Inc.

KARL A. HIGGINS, III, PE
BRANCH MANAGER

Professional Service Industries, Inc. • 900 Ed Wright Lane, Suite 1 • Newport News, VA 23606 • Phone 757-249-3841 • Fax 757-249-3812

8. Correspondence With Owners

Darryl Cook

From: Stepp, Joe W. [JWSTEPP@thehaskellco.com]
Sent: Thursday, October 28, 1999 10:06 AM
To: 'decook@james-city.va.us'
Cc: Wheeler, Mike; Skirbst, Peter
Subject: Anheuse-Busch Transportation Advantage project

Call back about SW Pool Criteria -

Darryl,

With regard to the above project, I need your assistance and input into the proposed drainage design - especially since new drainage standards have been adopted for James City County. It is imperative that a strong working relationship be developed between myself and James City County as well as my client. AB has indicated a need to expedite the Transportation Advantage project and in order to do this, I need to be able to provide you with a design that will accomplish James City County goals and AB's goals in the least amount of time as possible and with as few submittals to your agency as possible. To accomplish these objectives within the time frames given to me, I am asking for your assistance in providing me with some answers to the following questions.

1. What are the required storm events (return period and duration) that are required for flow attenuation to off-site/downstream systems?

1-yr 24 hour storm. 10-yr thru principle spwy., 100-year w/ 1' freeboard

2. Do you accept the SCS Unit Hydrograph methodology or do you prefer another methodology (such as the Santa Barbara Urban Hydrograph methodology)?

Yes - SCS

3. Due to the existing features and topography of the site, I will have to take in some impervious areas that previously discharged off-site without any type of attenuation or pollution abatement treatment provided. Do you allow any credit for taking these areas into the proposed stormwater management system? If so, what credits are allowed?

Yes- essentially 1 for 1 for areas controlled.

4. I have been told that downstream development may have accounted for the pollution abatement volume from the total AB site. Is this so? Is the pollution abatement volume required for this site? Are there any options? What are the pollution abatement requirements (i.e. - the initial first flush of 1/2" runoff, the mean annual storm event?)

5. In past conversations, the 1 year - 24 hour storm was mentioned (2.8 inches/24 hours). I have been told that James City County has been requiring retention/detention basins to hold the runoff generated by this storm event for 24 hours. Does this mean that no portion of this volume can be released during the 24 hour event or is this a "Pre-Post" situation where the post conditions runoff must be held to existing conditions rate?

Released over 24 hours.

6. I have been told that downstream channels from the brewery have been designed to account for runoff from the AB site and are lined either by "rip-rap" or concrete for erosion protection? If this is so, and "Pre-Post" attenuation from the site has been met, is there a need for downstream improvements?

Not all have been protected.

7. Does James City County regulate design of internal storm conveyance systems? Do you accept the rational method for these systems? What "Design Storm" do you require if these systems are regulated by James City County?

Require 10-year control - rational ok

Stepp, Joe W.

From: scottt@james-city.va.us
Sent: Tuesday, November 09, 1999 9:11 AM
To: jwstepp@thehaskellco.com
Subject: JCC 24-hour Rainfall

At your request, the following are the 24-hour rainfall depth values traditionally used for the SCS Type II, 24-hour storm duration in James City County.

Frequency	P, rainfall (inches)
1-year	2.8
2-year	3.5
5-year	4.7
10-year	5.8
25-year	6.4
50-year	7.2
100-year	8.0

Reference the new Virginia Stormwater Management Handbook (1999), Volume II, Chapter 4, Appendix 4B

Scott Thomas

Modified: Tue 11/23/99 3:29 PM

SP-121-99 Anheuser Busch Transportation Advantage Phase I
Field Investigation (Scott Thomas, Mark Eversole, James City County- Andy Dufresne, Haskell Company)

Visited project site. Looked at Phase I and future phase areas. Phase I area existing vegetated areas are large trees with sparse to moderate ground covers. All drainage from Ph 1 ends up at the 72 inch pipe just south of the onsite SW pumping station. The culvert had a drop inlet with a stainless steel metal cover. The cover did not fully seal the inlet opening. The pipe was skewed across the road and the pipe outlet had some sideslope riprap. The drainage channel along the old monorail line was heavily wooded with good cover. The proposed Ph 1 pond area was heavily wooded.

The existing pond just west of the existing/proposed Ph 1 parking area was located. The pond had an existing pool with stagnant water. The two pond risers were perforated and galvanized CMP. Although the riser pipes were not corroded and were in generally good condition, several joints were separated and the riser section were separated from the outlet barrel. The two outlet barrels appeared to be in similarly good condition; however, no outlet rock/riprap protection was present and the natural stream channel downstream of the outlets was moderately eroded. Two large inflow storm drains were present to the existing pond. The outlets at southern inlet pipe had a concrete flume pad. The flume pad was intact but severely eroded around the sides.

Based on the field investigation:

1. A large rock check dam at the southern limit of the Ph 1 work area would work well for E&SC control.
2. In Phase II, some work at the 72 inch culvert should be performed including: inlet/grate repair, riprap around the inlet sag, and evaluation of the pipes outlet structure.
3. In Phase II, if the existing pond west of the Phase I parking lot is utilized for BMP control, the existing riser/barrel system needs repaired or replaced and pond inlet pipes will require energy dissipators for high velocities. Also evaluation to control erosion of the natural downstream channel is necessary.

cc: Mark Eversole
Chris Johnson
Environmental File

COMMONWEALTH of VIRGINIA

James S. Gilmore, III
Governor

John Paul Woodley, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY

5636 Southern Boulevard
Virginia Beach, VA 23462
Tel# (757) 518-2000
http://www.deq.state.va.us

Dennis H. Treacy
Director

Francis L. Daniel
Tidewater Regional Director

October 5, 2000

Mr. Tim Good
Vice President
The Haskell Company
111 Riverside Avenue
Jacksonville, FL 32202

RE: Change of Ownership for VPDES General Permit No. VAR450583

Dear Mr. :Good:

The State intends to process a change of ownership for the referenced permit as noted below:

Existing Owner: The Haskell Company

New Owner: Anheuser-Busch, Inc.

If you agree with the proposed change of ownership, please sign and date the attached form in the spaces provided and return it to this office within 14 days.

If you have any questions in this regard, please contact this office for clarification.

Sincerely,

Carolyn E. Putnam

Carolyn E. Putnam
Environmental Specialist Field

Enclosure: Agreement Form

cc: DEQ - File

TRANSFER OF OWNERSHIP
AGREEMENT FORM

SUBJECT: CHANGE OF OWNERSHIP OF VPDES GENERAL Permit No. VAR450583

TO: DEQ - TIDEWATER REGIONAL OFFICE
5636 SOUTHERN BOULEVARD
VIRGINIA BEACH, VA 23462
ATTN: C. E. Putnam

CURRENT: The Haskell Company
OWNER 111 Riverside Avenue
Jacksonville, FL 32202

NEW Anheuser Busch, Inc.
OWNER 7801 Pocahontas Trail
Williamsburg, VA 23185

I hereby agree to the change of ownership to General Permit No. VAR550 in accordance with your letter dated October 5, 2000. The effective date of the transfer of ownership is _____

*NAME: Mr. Tim Good
PRINTED/TYPED

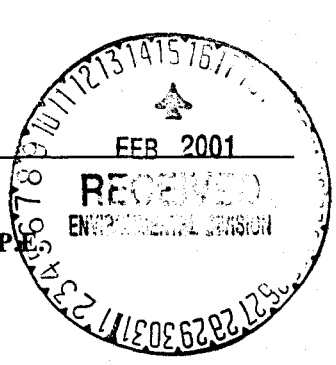
*SIGNED: Timothy A. Good

TITLE: VP

DATE: 10/18/00

*Must be signed by either the owner, a partner, an executive officer (President/Vice President), or a ranking elected official.

THE HASKELL COMPANY
TOTAL FACILITY SOLUTIONS



Michael H. Wheeler, P.E.
Chief Civil Engineer

February 14, 2001

Re: Transportation Advantage
Williamsburg Brewery
Anheuser-Busch, Inc.

Mr. Scott Thomas
James City County
101-E Mounts Bay Road
Williamsburg, VA 23187-8784

Dear Scott:

We hereby submit Record Drawings and Construction Certification Forms for the above referenced project. The information includes the following documents:

- Record Drawing of Pond No. 1 (Landmark Design Group) CC015; SP-121-99
- Record Drawing of Pond No. 2 (Landmark Design Group) CC 016; SP-13-00
- Stormwater Management / BMP Facilities Record Drawing and Certification Forms (Pages 1,2, and 3 of 16)

If you have any questions or desire additional information, please feel free to contact us at (904) 791-4500.

Sincerely,

Michael H. Wheeler, P.E.

Enclosures

cc w/enc: Mr. Roy Quillen
Mr. Chris Johnson
Mr. Peter H. Skirbst
Mr. Bill Claytor

HASKELL BUILDING • JACKSONVILLE, FLORIDA 32231-4100 • 904/791-4500 FAX 791-4699
AAC000281 IB0000849 QB-0011795

DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671 Fax: (757) 253-6850 E-MAIL: devtman@james-city.va.us

CODE COMPLIANCE
(757) 253-6626
codecomp@james-city.va.us

ENVIRONMENTAL DIVISION
(757) 253-6670
environ@james-city.va.us

PLANNING
(757) 253-6685
planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 259-4116

March 1, 2001

The Haskell Company
111 Riverside Avenue
Jacksonville, FL 32202
Attn: Mr. Michael H. Wheeler, P.E.
Chief Civil Engineer

Re: Anheuser Busch Brewery
Transportation Advantage Phase I & II
Stormwater Management Ponds No. 1 and 2
JCC BMP ID Nos. CC 015 and CC 016

Dear Mike:

The Environmental Division has reviewed record drawings and construction certifications as submitted to our office on February 14th 2001 for the above referenced facilities. The items submitted provide as-built information for the wet ponds and their associated storm drainage systems, which are situated in the southwest corner of brewery Parcel D-2.

Based on our review of the information submitted and a concurrent field observations performed on February 28th 2001, the following items must be addressed prior to release of the developer's surety instrument for the project:

Pond 1 (Transportation Advantage Phase 1); CC 015:

Record Drawing:

1. Add the control structure detail from Sheet 207 of the approved design plan, annotated as necessary to show as-built conditions, to the record drawing. This detail shows specific information relative to principal control structure CS-1.

2. Include the maintenance plan, taken from the approved plan on the record drawing.

3. If possible, add the following County identifiers to the lower right hand corner of the record drawing sheet: County Plan Number SP-121-99 and BMP ID No. CC 015.

Construction - Related Items:

4. Clean and remove all debris in the vicinity of the riser (PVC pipe, wood, etc.) and seed and mulch bare soil areas directly around the riser

5. Seed and mulch areas around Inlet Structure ST-14. Straw bale barriers around inlets should be removed once contributing areas are adequately stabilized.

6. Restore the riprap outlet protection at the outfall end of the Pond 1 barrel at drainage structure ST-11. The outlet protection should be restored to the size and dimensions per approved plan Sheet 215 and be at level grade.

7. Ensure the pond riser is at its final design plan configuration, especially related to the 3-13/16" center drilled low flow orifice.

8. There is an area of impounded drainage along the west side the access road just south of Pond 1. Install a small diameter drain to properly convey this drainage to Pond 1. It is our understanding that this issue was raised and was supposed to be taken care of during construction.

9. Seed and mulch or landscape disturbed soil areas along the entrance road just west of the truck scale station in accordance with the approved plan.

Pond 2 (Transportation Advantage Phase 2); CC 016:

Record Drawing:

1. Add the control structure detail from Sheet 215 of the approved design plan, annotated as necessary to show as-built conditions, to the record drawing. This detail shows specific information relative to the principal control structure.

2. Show the location of and label construction information as required for the emergency spillway on the record plan sheet.

3. Correct the pipe size for the storm drain on the east side of the facility. The label of 45' is incorrect for pipe size.

4. Two additional corrugated polyethylene pipe drains were observed on the north (construction trailer) pond slope that were not shown on the approved plan. It appears these pipes were installed to convey drainage from the construction trailer area to prevent slope erosion in the pond. If the drains are to remain as permanent conveyances, their locations and relative construction information should be shown on the record drawing plan sheet.

5. Include the maintenance plan, taken from the approved plan on the record drawing.

6. If possible, add the following County identifiers to the lower right hand corner of the record drawing sheet: County Plan Number SP-13-00 and BMP ID No. CC 016.

Construction - Related Items:

7. Fill erosion gullies and seed and mulch bare soil areas present on the north (construction trailer) slope of the pond.

8. Clean and remove sediment accumulations in the vicinity of the two storm drain outfalls located in the northeast corner of the pond. This is at the outfall of the 36 inch RCP and one of the new corrugated polyethylene storm drains which are just south of the entrance to the construction trailer area. Sediment depth is considerable at these pipe outfalls and requires removal.

9. Ensure the low flow orifices on the pond's principal spillway structure are at their final design plan configuration. The small diameter (east) orifice should be a 5-1/4" diameter orifice drilled into an 8-inch PVC cap. Based on field observation, a tee or turndown connection was still present at this location. Also, clean and remove debris which was present in the same pipe opening and on the concrete box weir openings. Ensure the larger (west) 12 inch orifice is properly capped and taken out of service per the design plan.

10. Remove silt fence downstream of the outlet protection/embankment .

11. Clean and remove trash and wood debris present in the corner of the pond to the east of the principal control structure.

One reproducible and one blue/black line set of the record drawings are requested once the above items are adequately addressed. Please contact me at 757-253-6639 if you have any further comments or questions.

Sincerely,

Scott J. Thomas, P.E.
Civil Engineer
Environmental Division

cc: R.J. Glidden, Anheuser Busch Resident Construction Engineer

G:\SWMProg\AsBuilts\SP-93-00cc016

THE HASKELL COMPANY
TOTAL FACILITY SOLUTIONS

Michael H. Wheeler, P.E.
Chief Civil Engineer

March 13, 2001

Re: Response to Letter
of March 01, 2001

Mr. Scott J. Thomas, P.E.
Civil Engineer
James City County Development Management
101-E Mounts Bay Road
Williamsburg, VA 23187-8784

Dear Mr. Thomas:

Transmitted herewith are our responses to your letter of March 01, 2001.

POND 1 (TRANSPORTATION ADVANTAGE PHASE 1) CC015:

Record Drawings:

COMMENT 1: Add the control structure detail from Sheet 207 of the approved design plan, annotated as necessary to show as-built conditions, to the record drawing. This detail shows specific information relative to principal control structure CS-1.
RESPONSE: *Not within scope of requirements. Construction drawings include details necessary for constructability. This level of detail is not necessary for, nor required for record drawings.*

COMMENT 2: Include the maintenance plan, taken from the approved plan on the record drawing.
RESPONSE: *Not within scope of requirements. Plan was previously provided with the permit application.*

COMMENT 3: If possible, add the following County identifiers to the lower right hand corner of the record drawing sheet: County Plan Number SP-121-99 and BMP ID No. CC 015.
RESPONSE: *The information has been added.*

Construction - Related Items:

COMMENT 4: Clean and remove all debris in the vicinity of the riser (PVC pipe, wood, etc.) and seed and mulch bare soil areas directly around the riser.
RESPONSE: *Completed 3/9/01.*

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COMMENT 3: Correct the pipe size for the storm drain on the east side of the facility. The label of 45' is incorrect for pipe size.
RESPONSE: *Corrections have been made.*

COMMENT 4: Two additional corrugated polyethylene pipe drains were observed on the north (construction trailer) pond slope that was not shown on the approved plan. It appears these pipes were installed to convey drainage from the construction trailer area to prevent slope erosion in the pond. If the drains are to remain as permanent conveyances, their locations and relative construction information should be shown on the record drawing plan sheet.
RESPONSE: *Corrections have been made to the record drawings.*

COMMENT 5: Include the maintenance plan, taken from the approved plan on the record drawing.
RESPONSE: *Not within scope of requirements. Plan was previously provided with the permit application.*

COMMENT 6: If possible, add the following County identifiers to the lower right hand corner of the record drawing sheet: County Plan Number SP-13-00 and BMP ID No. CC 016.
RESPONSE: *Information has been added.*

Construction - Related Items

COMMENT 7: Fill erosion gullies and seed and mulch bare soil areas present on the north (construction trailer) slope of the pond.
RESPONSE: *Completed 3/9/01.*

COMMENT 8: Clean and remove sediment accumulations in the vicinity of the two storm drain outfalls located in the northeast corner of the pond. This is at the outfall of the 36-inch RCP and one of the new corrugated polyethylene storm drains which are just south of the entrance to the construction trailer areas. Sediment depth is considerable at these pipe outfalls and requires removal.
RESPONSE: *Completed 3/9/01.*

COMMENT 9: Ensure the low flow orifices on the pond's principal spillway structure are at their final design plan configuration. The small diameter (east) orifice should be a 5-1/4" diameter orifice drilled into an 8-inch PVC cap. Based on field observation, a tee or turndown connection was still present at this location. Also, clean and remove debris which was present in the same pipe opening and on the concrete box weir openings. Ensure the larger (west) 12-inch orifice is properly capped and taken out of service per the design plan.
RESPONSE: *These features have been confirmed and certified by the engineer.*

COMMENT 5: Seed and mulch areas around Inlet Structure ST-14. Straw bale barriers around inlets should be removed once contributing areas are adequately stabilized.
RESPONSE: *Completed 3/9/01.*

COMMENT 6: Restore the riprap outlet protection at the outfall end of the Pond 1 barrel at drainage structure ST-11. The outlet protection should be restored to the size and dimensions per approved plan Sheet 215 and be at level grade.
RESPONSE: *Completed 3/9/01.*

COMMENT 7: Ensure the pond riser is at its final plan configuration, especially related to the 3-13/16" center drilled low flow orifice.
RESPONSE: *This has been confirmed and certified by the engineer.*

COMMENT 8: There is an area of impounded drainage along the west side of the access road just south of Pond 1. Install a small diameter drain to properly convey this drainage to Pond 1. It is our understanding that this issue was raised and was supposed to be taken care of during construction.
RESPONSE: *A drainpipe cannot be installed at this location. Doing so would introduce storm water into the clean side of the pond. All inlets are above the forebay baffle. It is intended that this shoulder run-off be introduced into the gutter flow and collected at Inlet ST-9.*

COMMENT 9: Seed and mulch or landscape disturbed soil areas along the entrance road just west of the truck scale station in accordance with the approved plan.
RESPONSE: *Completed 3/9/01.*

POND 2 (TRANSPORTATION ADVANTAGE PHASE 2) CC 016:

Record Drawing:

COMMENT 1: Add the control structure detail from Sheet 215 of the approved design plan, annotated as necessary to show as-built conditions, to the record drawings. This detail shows specific information relative to the principal control structure.
RESPONSE: *Not within scope of requirements. Construction drawings include details necessary for constructability. This level of detail is not necessary for, nor required for record drawings.*

COMMENT 2: Show the location of and label construction information as required for the emergency spillway on the record plan sheet.
RESPONSE: *The earthen berm west of the outlet structure serves as the emergency spillway (see design). The feature is indicated on the record plan.*

COMMENT 10: Remove silt fence downstream of the outlet protection/embankment.
RESPONSE: *Completed 3/9/01.*

COMMENT 11: Clean and remove trash and wood debris present in the corner of the pond to the east of the principal control structure.
RESPONSE: *Completed 3/9/01.*

If you have any questions or desire additional information please feel free to call me at (904) 791-4577 or e-mail mhwheele@thehaskellco.com.

Sincerely,

Michael H. Wheeler, P.E.
Chief Civil Engineer

LANDMARK DESIGN GROUP
TRANSMITTAL

To: Mr. Scott Thomas

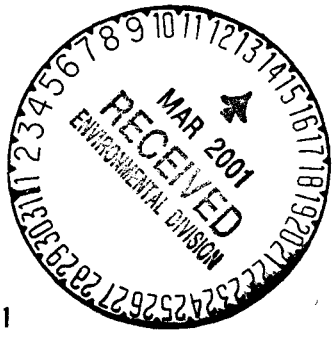
Company: James City County

From: Al Ramsay

Date: March 14, 2001

Subject: Anheuser Busch Brewery Stormwater Pond No. 1

LMDG Job No.: 1990223-000.20



Attached please find:
- ☒ Prints
- ☐ Plans
- ☐ Specifications
- ☐ Drawings
- ☐ Report
- ☒ Letter
- ☒ Original Mylar

Transmitted as checked below:
- ☒ For your use
- ☐ As requested
- ☐ For review and comment
- ☐ For approval
- ☐ Approved
- ☐

Copies	Date	Drawing No.	Description
1	2/14/01	12109-12110W	Original Mylar
1	2/14/01	12109-12110W	Record Drawing
1	3/13/01		Letter from Haskell Company

Notes:

Copies	Enclosures
1. File:	☐
2. Mike Wheeler - 1 copy print	☒
3.	☐
4.	☐
5.	☐

LandMark Design Group, Inc.

By: AJR/cjp

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants
4029 Ironbound Road, Suite 100, Williamsburg, VA 23188 (757) 253-2975 FAX: (757) 229-0049 lmdg@landmarkdgwb.com

LANDMARK DESIGN GROUP
TRANSMITTAL

To: SCOTT THOMAS

Company: JAMES CITY COUNTY, ENVIRONMENTAL

From: PETER FARRELL, L.S.

Date: 03/15/01

Subject: ANHEUSER BUSCH POND RECORD DRAWINGS

LMDG Job No.: 1990223-000.20

Attached please find:
- X Prints
- ☐ Plans
- ☐ Specifications
- ☐ Drawings
- ☐ Report
- ☐ Letter
- X MYLARS

Transmitted as checked below:
- X For your use
- X As requested
- For review and comment
- ☐ For approval
- ☐ Approved
- ☐

Copies	Date	Drawing No.	Description
1	02/08/01	12109AW	ADDENDUM TO RECORD DRAWING POND 1
1	02/08/01	12110AW	ADDENDUM TO RECORD DRAWING POND 2

Notes:

Copies
1. File: ☐
2. _____ ☐
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By: PF

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9. Inspection Records (Construction Phase)

James City County Environmental Division
Stormwater Management / BMP Inspection Report
Detention and Retention Pond Facilities

CC015 COUNTY PLAN: SP-121-99

FINAL CONSTRUCTION INSPECTION

Database Inventory No. (if known): _____

Name of Facility: ANHEUSER BUSCH TRANSPORT ADVANTAGE PH1 BMP No.: 1 of 2 Date: 2/28/01

Location: WET POND #1 - Southwest Corner of Site PARCEL D-2

Name of Owner: ANHEUSER-BUSCH

Inspector: SV Thomas, Mike Woolson

Type of Facility: Wet Extended Detention FACILITY

Weather Conditions: P. Cloudy, High 40's

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory.
Routine - The item checked requires attention, but does not present an immediate threat to the function of the BMP.
Urgent - The item checked requires immediate attention to keep the BMP operational and prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes: POND EXCAVATED TYPE				
Grass Height	X			SEED + MULCHED, SIDESLOPES.
Vegetation Condition	X			OK.
Tree Growth	X			NONE.
Erosion	X			NONE
Trash & Debris	X			MINOR WOODDEBRIS & LEAVES.
Seepage	X			None Observed.
Fencing or Benches				N/A. SIDESLOPES 3H:1V OR FLATTER.
Interior Landscaping/Planted Areas: ☒ None ☐ Constructed Wetland/Shallow Marsh ☐ Naturally Established Vegetation				
Vegetated Conditions	X			WET POOL WITH INTERIOR
Trash & Debris				3H:1V OR FLATTER SIDESLOPES.
Floating Material				
Erosion				
Sediment				
Dead Plant				
Aesthetics				
Other				

SERVICES PARKING LOT & TRUCK SCALE AREA. SOME ADJACENT WOODED AREA.

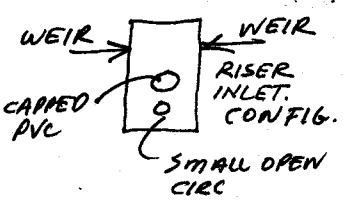
Facility Item	O.K.	Routine	Urgent	Comments
Water Pools	☒ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☐ None (Detention Basin)			
Shoreline Erosion	X			MINOR @ POOL/SHORE INTERFACE.
Algae	X			NONE.
Trash & Debris	X			NONE.
Sediment	X			< 6" @ RISER.
Aesthetics	X			LOOK CLEAN.
Other				ROCK FOREBAY WITHIN POND. OK
Inflow Stuctures (Describe Locations):	1 PIPE (RCP) INFLOW (SUBMERGED) NORTH NEAR ROAD			
Condition of Structure	X			RCP W/ END SECT.
Erosion	X			CLEAN.
Trash and Debris	X			None.
Sediment	X			Minimal.
Aesthetics	X			OK.
Other				
Principal Flow Control Structure - Intake, Riser, etc. (Describe Location):	BOX W/ SKIMMERS.			
Condition of Structure	X			NEW STRUCTURE.
Corrosion	X			
Trash and Debris	X			
Sediment	X			< 6" @ RISER
Aesthetics	X			
Other				6" PVC ? 3-4" OPEN ORIFICE. SMALL DIA CIRC; DRAIN & WEIRS.
Principal Outlet Structure - Barrel, Conduit, etc. :	O/S RCP TO INLETS TO OUTFALL (15") STRUCTURE CS-1			
Condition of Structure	X			
Settlement	X			
Trash & Debris	X			
Sediment	X			MH LID PULLED. MINIMAL SEDIMENT.
Erosion		X		OP @ OUTFALL NEEDS RE-ESTAB.
Other				
Emergency Spillway (Overflow):	NONE. ROADWAY IS OVERTOP DEVICE			
Vegetation	X			ASPHALT ROAD.
Lining	X			N/A
Erosion	X			
Trash & Debris	X			
Other				

OP @ OUTFALL TO SIZE, DIMENSION OF PLAN. OP @ LEVEL GRADE.

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	X			
Animal Burrows	X			
Graffiti	X			
Other	X			
Surrounding Perimeter Conditions:				
Land Uses	X			PARKING, TRAVELWAY & WOODS.
Vegetation	X			
Trash & Debris	X			
Aesthetics	X			
Access /Maintenance Roads or Paths	X	ADEQUATE		THRU TRUCK SCALE. CALL SCOTT RANDALL @ 253-2136 FOR ACCESS.
Other				

Remarks:

- SEED & MULCH AT RISER; REMOVE DEBRIS NEAR RISER (PVC PIPE, WOOD DEBRIS)
- NEED SMALL SIZE INLET DRAIN. WATER IMPOUNDED @ SOUTH CORNER OF POND.
- SEED + MULCH AREA ACROSS ROADWAY. REMOVE SBB AT INLET (FIRST O/S INLET)
- RESTORE OP @ SIZE DIMENSION PER PLAN AT LEVEL GRADE.
- ENSURE 3-13/16" LOW FLOW ORIFICE PROVIDED



Overall Environmental Division Internal Rating: 4

Signature: Scott J. Thomas, P.E. **Date:** 02/28/01

Title: Civil Engineer, Env. Div JCC

SWMProg\BMP\CoInspProg\DetRet.wpd

11. Miscellaneous

WATERSHED	CC	MAINTENANCE PLAN	Yes	CTRL STRUC DESC	Conc. Riser
BMP ID NO	015	SITE AREA acre	23.18	CTRL STRUC SIZE inches	4.2' x 4.
PLAN NO	SP-121-99	LAND USE	Gen Industrial	OTLT BARRL DESC	RCP
TAX PARCEL	(51-03)(01-01)	old BMP TYP		OTLT BARRL SIZE inch	15
PIN NO	5130100003	JCC BMP CODE	A3 Wet ED Pond		
CONSTRUCTION DATE	12/28/2000	POINT VALUE	10	EMERG SPILLWAY	Yes
PROJECT NAME	Anheuser Busch Trans Advant Phase I			DESIGN HW ELEV	77.53
FACILITY LOCATION	Pond # 1 - Brewery Parcel D-2			PERM POOL ELEV	74.5
CITY-STATE	Williamsburg, Va. 23185	SVC DRAIN AREA acres	3.95	2-YR OUTFLOW cfs	1.26
CURRENT OWNER	Anheuser Busch Inc.			10-YR OUTFLOW cfs	5.36
OWNER ADDRESS	One Busch Place			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Parking & Truck Scale Area		
CITY-STATE-ZIP CODE	St. Louis, MO 63188	IMPERV AREA acres	3	CONSTR CERTI	Yes
OWNER PHONE		RECV STREAM	UT of Halfway Creek		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	2/28/2001
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	0.126	INTERNAL RATING	4
		CHAN PROT CTRL	Yes	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0.7669	Also refer to CC 016. Riser has trash rack & skimmer. Call 253-2136 for access.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	Yes		

Get Last BMP No

Return to Menu

CC015

Contents for Stormwater Management Facilities As-built Files

Each file is to contain:

1. As-built plan
2. Completed construction certification
3. Construction Plan
4. Design Calculations
5. Watershed Map
6. Maintenance Agreement
7. Correspondence with owners
8. Inspection Records
9. Enforcement Actions

JAMES CITY COUNTY
STORMWATER DETENTION BASIN DESIGN CHECKLIST

I. STORMWATER MANAGEMENT COMPUTATIONS

A. HYDROLOGY - An SCS-based methodology is required for stormwater detention structures with watersheds exceeding 20 acres. Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. See Chapter 5, VESCH for more information.

✓ RCN determinations: predeveloped and ultimate development land use scenarios.

✓ Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components.

✓ Hydrograph generation: predevelopment and ultimate development peak flows for 2-, 10-, and 100-year design storms.

B. RESERVOIR ROUTING

✓ Storage indication routing of ultimate development hydrographs for 2-, 10-, and 100-year design storms. Structure must discharge up to 10-year storm through principal spillway and pass the 100-year storm with 1 foot of freeboard through a combination of the principal and emergency spillways.

N/A Downstream hydrographs at established study points (if required).

C. HYDRAULIC COMPUTATIONS

✓ Elevation-Storage (curve)

✓ Weir/Orifice control - extended detention control.

N/A Weir/Orifice control - ~~riser 2 year control.~~ 1 YR

N/A Weir/Orifice control - ~~riser 10 year control.~~ 2, 10, 100 YR

N/A Inlet/Outlet (barrel) control - (all storms).

N/A Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.

N/A Emergency spillway capacity.

N/A Elevation-Discharge (provide supporting calculations and/or design assumptions).

HANDLED WITHIN FLOOD ROUTING PROGRAM

D. MISCELLANEOUS COMPUTATIONS

✓ Water quality volume for permanent pool.

✓ Water quality volume for extended detention with drawdown computations.

N/A Anti-seep collar design.
N/A Filter diaphragm design (or alternative method of controlling seepage).
____ Riser structure flotation analysis (factor of safety = 1.2 min.).
N/A Danger reach study (if required).
N/A 100 year floodplain impacts (if required).

II. SOILS INVESTIGATION

✓ Geotechnical report.
✓ Minimum boring locations: borrow area; pool area; principal spillway; top of dam near one abutment or emergency spillway if provided.
✓ Boring logs with Unified Soil Classification, and soil description, with depth to bedrock, seasonal water table.

III. STORMWATER MANAGEMENT PLAN

A. PLAN VIEW 1"=50' or less (40', 30', etc.)

1. GENERAL TERMS

✓ North arrow.
✓ Sealed by P.E.
✓ Existing and proposed contours (1' or 2' interval).
✓ Existing and proposed improvements.
✓ Delineation of permanent/extended detention, 2, 10, and 100-year pools.
✓ Locations of test borings.
✓ Outflow pipe, outlet protection (detail required), and outfall channel.
N/A Emergency spillway level section and outlet channel.
N/A Existing and proposed utility location/protection.

B. MAINTENANCE ITEMS

✓ Person or organization responsible for maintenance.
____ Inspection and maintenance agreement.
To Be Determined
N/A Maintenance access from public right-of-way or publicly traveled road.
✓ Maintenance easement, minimum 15 feet around 100-year pool elevation.
N/A Forebay (if proposed).
✓ Temporary erosion and sediment control measures for pond construction.
N/A Fence, or minimum 6' wide safety shelf for public safety.
N/A Provisions for use as a temporary sediment basin with cleanout schedule and instructions for conversion to permanent facility.

C. PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS

1. EXISTING GROUND AND PROPOSED GRADE

Not Applicable

____ Dam side slopes labeled.

____ Top width labeled (per VESCH).

____ Removal of unsuitable material under proposed dam (per geotechnical report).

2. CORE TRENCH

NOT APPLICABLE

____ Materials (per construction specifications)

____ Bottom width (4' minimum or greater as dictated by geotechnical report)

____ Side slopes (1:1 maximum steepness)

____ Depth (4' minimum or greater as dictated by the geotechnical report)

3. RISER OR SIMILAR STRUCTURE (DETAIL REQUIRED)

✓ Materials (as required)

✓ All structure dimensions

✓ Control orifice dimensions

✓ Trash rack - removable - for each release (detail as required for construction)

N/A Anti-vortex device (detail as required for construction) ←

✓ Proper structure footing

✓ Maintenance access

4. BARREL

N/A Materials (ASTM C-361 or as required)

N/A Support for concrete barrels-concrete cradles, etc. (detail required)

N/A Gauge and corrugation size for metal barrels

5. SEEPAGE CONTROL

N/A Phreatic line (4:1 slope measured from the intersection of the dam and the principal spillway design high water.

a. ANTI-SEEP COLLAR

N/A Anti-seep collar (detail required)

N/A Size - 15% increase in length of saturation using outside pipe diameter

_____ Spacing and location on barrel (located at least 2' from a pipe joint)

b. FILTER DIAPHRAGM

✓ Design based on latest SCS methods and certified by a professional geotechnical engineer

6. OUTFALL PROTECTION

✓ Size for maximum barrel release (but not greater than 10 year storm)
✓ Cross-section at end of barrel in accordance with receiving channel section
✓ Endsection with footer
✓ Outfall dimensions
✓ Slope - 0%
✓ Rip-rap size, VDOT Classification
✓ Thickness (1.5 Times Maximum Stone Diameter)
✓ Approved filter fabric (nonwoven)

7. ELEVATIONS

N/A Top of dam - construction height and settled height (10% settlement)
N/A Crest of emergency spillway
✓ Crest of riser structure
✓ Inverts of control release orifice/weirs
✓ Pools: permanent; extended detention; 2-year; 10-year; 100-year; and appropriate safety storms
✓ Appropriate freeboard per SCS National Engineering Handbook, provide minimum one foot of free board above the 100-year design highwater.
✓ Inlet and outlet inverts of pipes (with slopes in %)

D. CROSS SECTION THROUGH DAM ALONG CENTERLINE
NOT APPLICABLE

_____ Existing ground
_____ Proposed grade
_____ Top of dam - 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

E. EMERGENCY SPILLWAY PROFILE

NOT APPLICABLE

_____ Existing ground

_____ Inlet, level (control), and outlet sections per SCS

_____ Spillway and crest elevations

F. CONSTRUCTION SPECIFICATIONS

TO BE PROVIDED IN THE NEAR FUTURE

_____ Sequence of construction (generally by contractor)

_____ Care of base flow during construction (if necessary)

_____ Site preparation

_____ Earthfill: _____ Material, _____ Placement,
_____ Compaction, _____ Core trench

_____ Structural backfill

_____ Pipe conduits

_____ Concrete

_____ Rip-Rap and slope protection

_____ Fencing

_____ Stabilization

_____ Inspection and Certification by Engineer

COMMENTS:

BY: _____

DATE: _____

sdbdc.txt

Anheuser Busch Transportation
Advantage Phase I & II
Stormwater Management Facilities