



## **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: CC016**

**DATE VERIFIED: November 15, 2017**

**QUALITY ASSURANCE TECHNICIAN: Jonathan Craig**

**LOCATION: WILLIAMSBURG, VIRGINIA**



# Stormwater Division

## MEMORANDUM

**DATE:** November 15, 2017  
**SCANNER:** Jonathan Craig, Assistant Environment Coordinator  
**RE:** Files Approved for Scanning

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

**General File ID or BMP ID:** CC016

**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: Review of electronic file prior to destruction of 2 record drawings. Notarized copy of maintenance agreement added from courthouse records.



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**BMP NUMBER:** CC016

**DATE VERIFIED:** November 16, 2012

**QUALITY ASSURANCE TECHNICIAN:** Leah Hardenbergh

*Leah Hardenbergh*

**LOCATION:** WILLIAMSBURG, VIRGINIA



## Stormwater Division

### MEMORANDUM

Date: March 28, 2012  
To: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services  
From: Leah Hardenbergh  
PO: 110426  
Re: Files Approved for Scanning

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**General File ID or BMP ID:** CC016  
**PIN:** 5130100003  
**Owner Name (if known):** BUSCH PROPERTIES (INCLUDES KINGSMILL)  
**Legal Property Description:** PARCEL D-2 25 888 AC BUSCH CORPORATE CENTER  
**Site Address:** 7801 POCAHONTAS TRAIL (ADJACENT TO)  
*(For internal use only):*  
**Box #** 2  
**Agreements (in file as of scan date):** Y **Book or Doc #:** 000001502/DB 27 p 59



# **1. Maintenance Agreement**

## DECLARATION OF COVENANTS

## INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 11 day of January, <sup>2000</sup>~~19~~,  
 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.
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.

JAN 24 8 01 25

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 11 day of January, 192000

COVENANTOR(S)

Kirk Reno  
Kirk Reno

ATTEST:

\_\_\_\_\_

COVENANTOR(S)

\_\_\_\_\_

ATTEST:

\_\_\_\_\_

COMMONWEALTH OF VIRGINIA  
CITY/COUNTY OF James City County

I hereby certify that on this 11<sup>th</sup> day of January, 192000, 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 foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 11<sup>th</sup> day of January, 192000.

James L. C. B.  
Notary Public

My Commission expires: My Commission Expires April 30, 2002

Sworn to and subscribed before me this 11<sup>th</sup> day of January, 2000  
Witness my hand and official seal:  
James L. C. B. Notary Public

Approved as to form:

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

Project Type: ☐ Residential ☐ Business ☐ Commercial ☐ Office ☐ Institutional ☒ Industrial ☐ Public ☐ Roadway ☐ Other \_\_\_\_\_

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

Brief Description of Stormwater Management/BMP Facility: Two stormwater management ponds serving separate 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 PARKING 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.

##### 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  
or Certified Land Surveyor

Michael H. Wheeler  
2-14-01

( Seal )

Virginia Registered  
Professional Engineer

**Section 4 - Professional Certifications:**

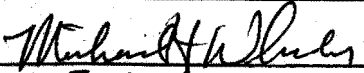
**Certifying Professionals:** ( *Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered 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

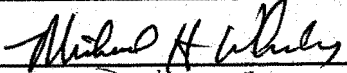
Signature:   
Date: 3-13-01

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.

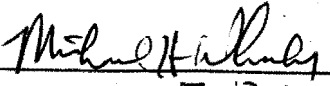
**Construction Certification**

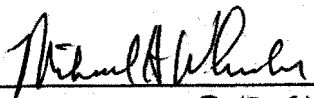
Firm Name: The Haskell Company  
Mailing Address: 111 Riverside Ave.  
Jacksonville, FL 32202  
Business Phone: (904) 791-4577  
Fax: (904) 791-4697

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

Signature:   
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.

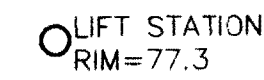
 (Seal)  
3-13-01  
Virginia Registered Professional Engineer  
or Certified Land Surveyor

 (Seal)  
3-13-01  
Virginia Registered  
Professional Engineer



# **3. As-Built Plan**

CC016



DROP INLET  
RIM=76.37  
TOP OF GRATE AT  
FLOW LINE=75.62  
INV 36" = 66.52

DROP INLET  
RIM=74.15  
TOP OF GRATE AT  
FLOW LINE=73.47  
INV 45" = 66.55  
4" = 70.90

TOP OF CONCRETE ELEV.=72.95  
12" PVC - PLUGGED  
1st STAGE WEIR INV. =70.05  
2nd STAGE WEIR INV. =70.55  
8" PVC WITH 5.25" HOLE  
INV.=66.50

END SECTION  
INV=73.36

DROP INLET  
RIM=75.57  
TOP OF GRATE AT  
FLOW LINE=74.80  
INV IN 18"=71.62  
INV OUT 24" = 71.28

**RECORD DRAWING**  
**OF**  
**STORMWATER POND NO. 2**  
**ANHEUSER BUSCH BREWERY**  
**TRANSPORTATION ADVANTAGE, PH. II**

DATE: 02/08/01      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

4029 Ironbound Road  
Suite 100  
Williamsburg, VA 23188  
Tel. (757) 253-2975  
Fax (757) 229-0049  
Email: [lmddq@landmarkdqb.com](mailto:lmddq@landmarkdqb.com)

5544 Greenwich Road  
Suite 200  
Virginia Beach, VA 23462  
Tel. (757) 473-2000  
Fax (757) 497-7933  
Email: [lmddg@andmarkdg.com](mailto:lmddg@andmarkdg.com)

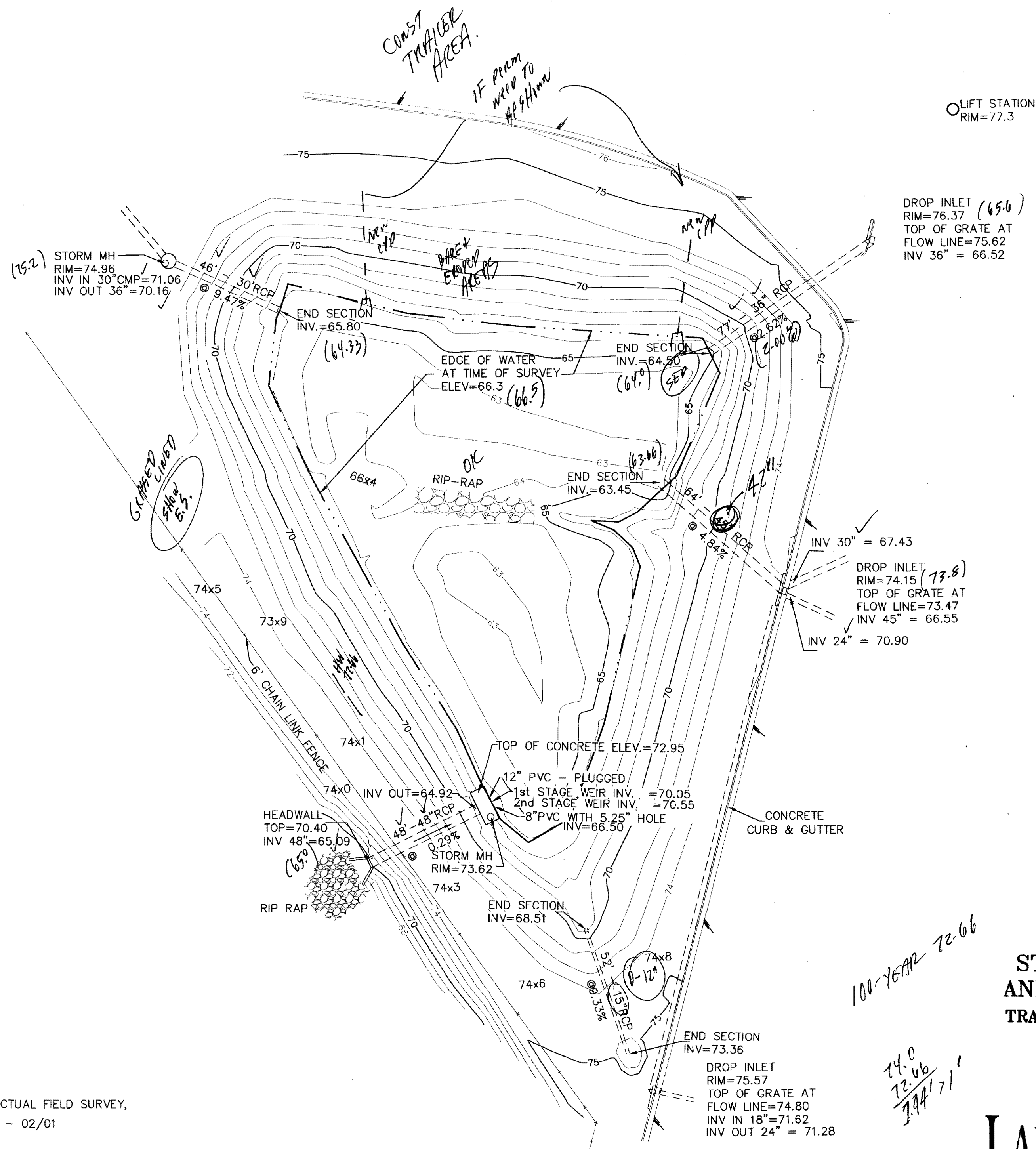
COUNTY PLAN NO. SP-13-00  
BMP ID NO. CC 016

DRAWN BY: PF

CHKD. BY : AJR

|             |                |
|-------------|----------------|
| PROJ. NO. : | 1990223-000.20 |
|-------------|----------------|

DWG. NO. : 12110 W



ADD POND 2  
CONTROL STRUCT DETAIL  
FROM SHT 215  
TO RECORD SET  
SHOWS PRINIP SPILL  
CONTROL STRUCTURE.

RECORD DRAWING  
OF  
STORMWATER POND NO. 2  
ANHEUSER BUSCH BREWERY  
TRANSPORTATION ADVANTAGE, PH. II

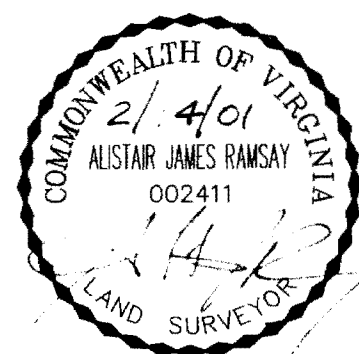
DATE: 02/14/01 SCALE: 1"=30'  
JAMES CITY COUNTY, VIRGINIA

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

4029 Ironbound Road  
Suite 100  
Williamsburg, VA 23188  
Tel. (757) 253-2975  
Fax (757) 229-0049  
Email: lmdg@landmarkdg.com

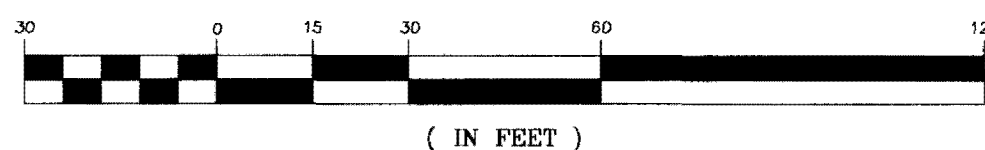
5544 Greenwich Road  
Suite 200  
Virginia Beach, VA 23462  
Tel. (757) 473-2000  
Fax (757) 497-7933  
Email: lmdg@landmarkdg.com

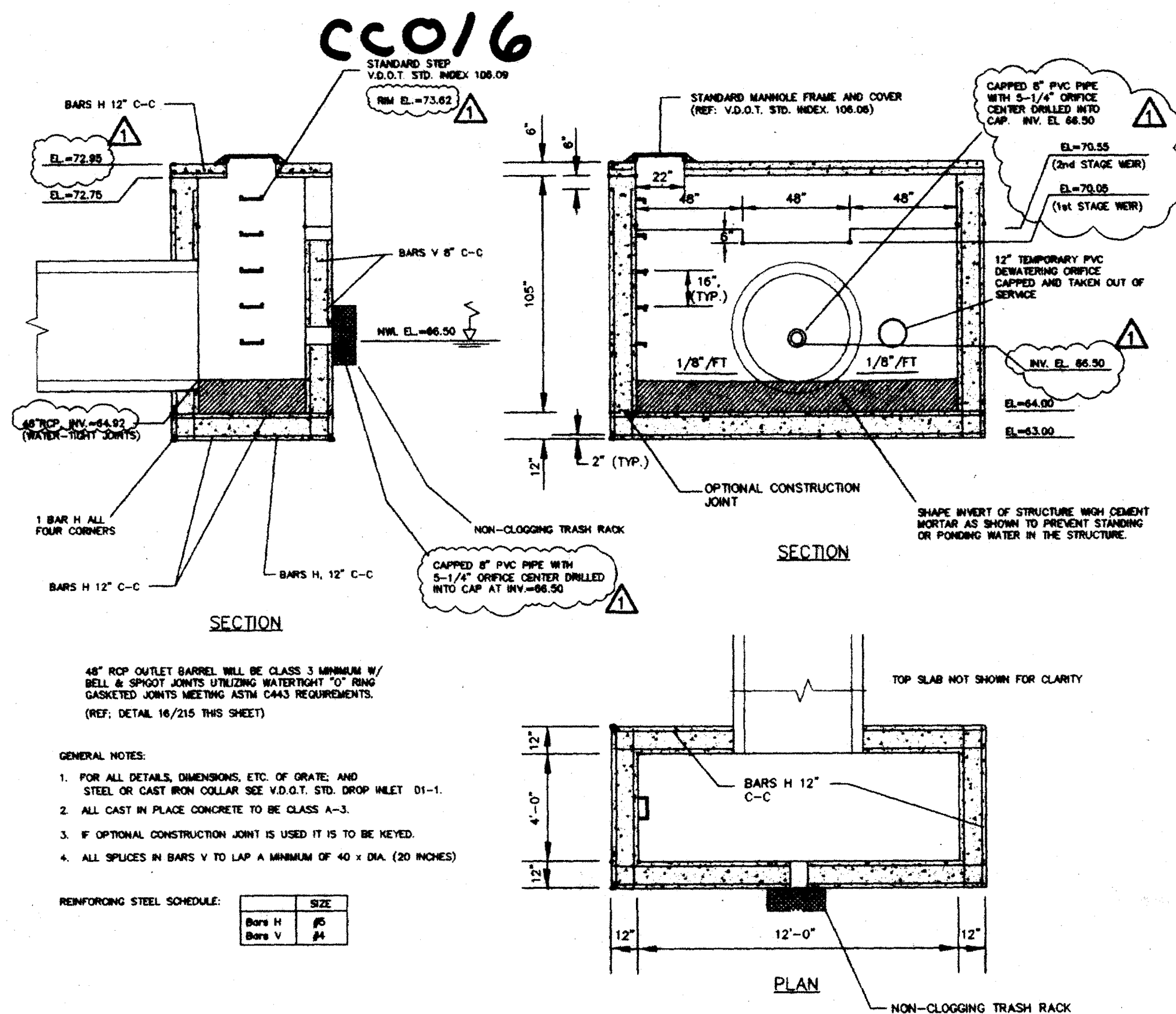
FIELD COPY - SJT



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

GRAPHIC SCALE





POND '2' CONTROL STRUCTURE (REF: V.D.O.T. STANDARD INDEX NO. 104.02)

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:

- INSPECTION OF INLETS AND OUTLETS FOR OBSTRUCTIONS AND FUNCTIONAL CAPABILITY.
- INSPECTION OF ALL STRUCTURAL COMPONENTS FOR SIGNS OF DAMAGE.
- INSPECTION OF ALL SLOPES FOR SIGNS OF EROSION OR SLOUGHING OF SIDE BANKS.
- INSPECTION FOR SEEPAGE AT DOWNSTREAM SIDE OF EARTHEN EMBANKMENTS, (\*).
- REMOVAL OF TRASH AND DEBRIS FROM ALL CONVEYANCE FACILITIES.
- REGULAR MOWING AND REMOVAL OF ACCUMULATED VEGETATION.
- 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.

- REMOVE ACCUMULATED SEDIMENTS.
- INSPECTION AND REPAIR OF ROCK BAFFLES.

#### ADDENDUM TO RECORD DRAWING

#### OF STORMWATER POND NO. 2 ANHEUSER BUSCH BREWERY TRANSPORTATION ADVANTAGE, PH. II

DATE: 03/15/01  
JAMES CITY COUNTY,

N.T.S.  
VIRGINIA

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

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

# **5. Construction Plan**





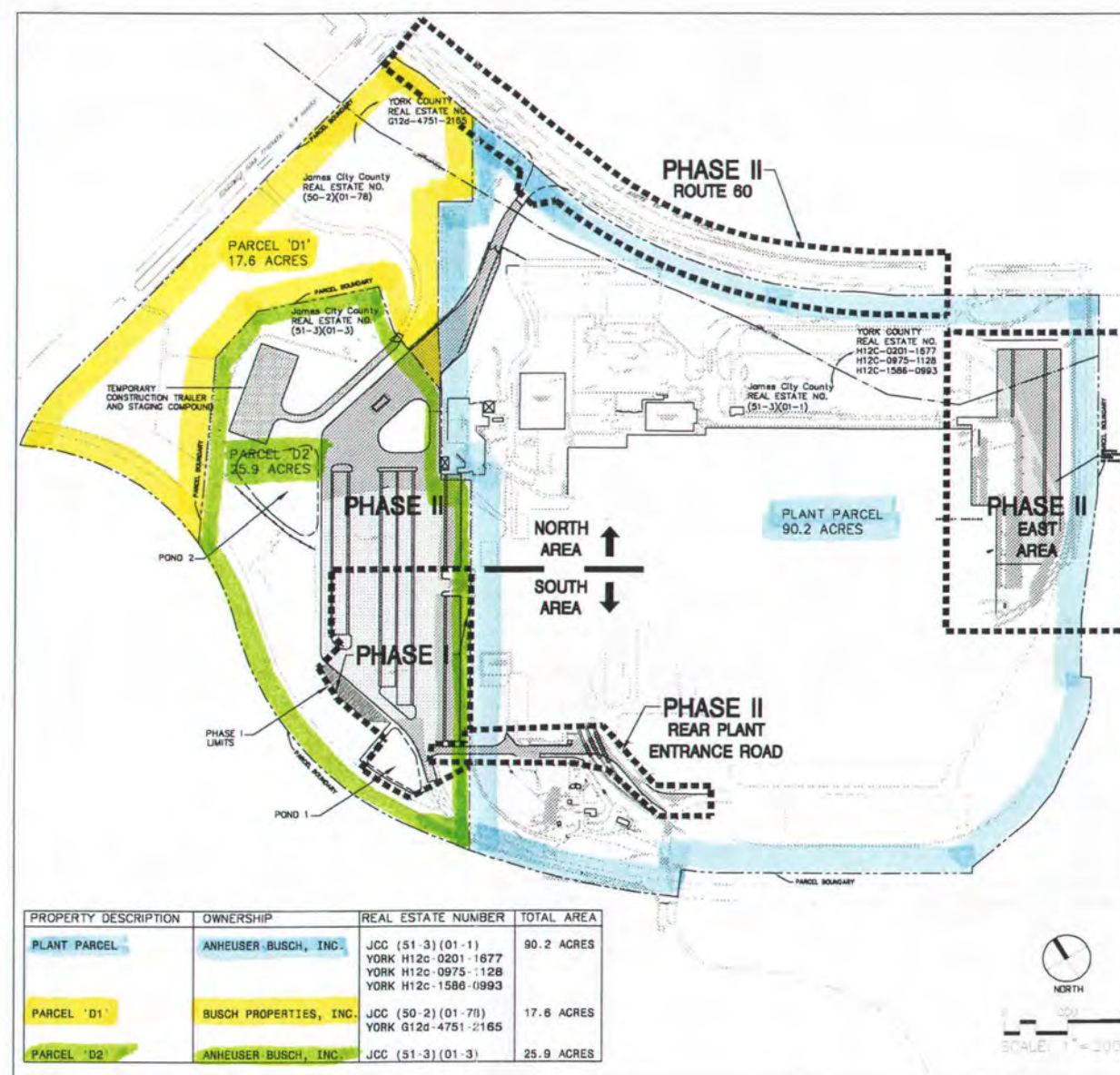
CONSTRUCTION DRAWINGS FOR  
PROPOSED SITE DEVELOPMENT  
**ANHEUSER-BUSCH, INC.**  
TRANSPORTATION ADVANTAGE  
PHASE II  
WILLIAMSBURG, VIRGINIA



| STATISTICAL INFORMATION: TOTAL PROJECT  |              |  |      |
|---|--------------|--|------|
| <b>PLANT PARCEL</b>   |              |  |      |
| IMPERVIOUS AREA   | 65.72 ACRES  |  | 73%  |
| PERVIOUS AREA   | 24.48 ACRES  |  | 27%  |
| TOTAL AREA  | 90.2 ACRES   |  | 100% |
| <b>PARCEL '01' INTERIOR TRAILER PARKING ADDITIONS &amp; DRIVEWAY IMPROVEMENTS</b> |              |  |      |
| BUILDING AREAS  | 0.000 ACRES  |  | 0%   |
| PAVEMENT AREAS  | 0.629 ACRES  |  | 4%   |
| GRASS, TREES, & OPEN AREA   | 16.955 ACRES |  | 96%  |
| POND AREAS  | 0.000 ACRES  |  | 0%   |
| TOTAL AREA  | 17.584 ACRES |  | 100% |
| <b>PARCEL '02' INTERIOR TRAILER PARKING ADDITIONS &amp; DRIVEWAY IMPROVEMENTS</b> |              |  |      |
| BUILDING AREAS  | 0.050 ACRES  |  | 0%   |
| PAVEMENT AREAS  | 12.450 ACRES |  | 48%  |
| GRASS, TREES, & OPEN AREA   | 11.670 ACRES |  | 45%  |
| POND AREAS  | 1.719 ACRES  |  | 7%   |
| TOTAL AREA  | 25.889 ACRES |  | 100% |

| CIVIL ENGINEERING LEGEND |          |                                 |
|--------------------------|----------|---------------------------------|
| EXISTING                 | PROPOSED | DESCRIPTION                     |
|                          |          | PROPERTY LINE                   |
|                          |          | RIGHT-OF-WAY LINE               |
|                          |          | CENTERLINE                      |
|                          |          | SECTION TOWNSHIP RANGE LINE     |
|                          |          | FENCE                           |
|                          |          | RETAINING WALL                  |
|                          |          | BUILDING                        |
|                          |          | PAVEMENT LINE SIDEWALK LINE     |
|                          |          | CURB CURB AND GUTTER            |
|                          |          | SPOT ELEVATIONS                 |
|                          |          | CONCRETE                        |
|                          |          | SANITARY SEWER CLEAN OUT        |
|                          |          | STORM SEWER                     |
|                          |          | DOMESTIC WATER                  |
|                          |          | FIRE MAIN                       |
|                          |          | GAS MAIN                        |
|                          |          | FORCE MAIN                      |
|                          |          | UNDERGROUND ELECTRIC            |
|                          |          | OVERHEAD ELECTRIC               |
|                          |          | UNDERGROUND TELEPHONE           |
|                          |          | OVERHEAD TELEPHONE              |
|                          |          | LANDSCAPE                       |
|                          |          | PIPE IN DITCH                   |
|                          |          | DOUBLE CHECK VALVE ASSEMBLY     |
|                          |          | RED PRESSURE BACKFLOW PREVENTER |
|                          |          | POST INDICATOR VALVE            |
|                          |          | VALVE                           |
|                          |          | VALVE & BOX                     |
|                          |          | MANHOLE                         |
|                          |          | SPRINKLER RISER                 |
|                          |          | WATER METER                     |
|                          |          | PHASE POWER POLE                |
|                          |          | INLET                           |
|                          |          | PIVOTED END                     |
|                          |          | WATERED END                     |
|                          |          | FLUME                           |
|                          |          | ENDWALLS                        |
|                          |          | CONTROL STRUCTURE               |
|                          |          | POWER POLE                      |
|                          |          | LIGHT STANDARD (LIGHT POLE)     |
|                          |          | TRANSFORMER                     |
|                          |          | VAULTS                          |
|                          |          | DRAINAGE STRUCTURE              |
|                          |          | SANITARY SEWER STRUCTURE        |
|                          |          | SECTION CUT                     |
|                          |          | DETAIL REFERENCE                |
|                          |          | CLOSE MANHOLE                   |

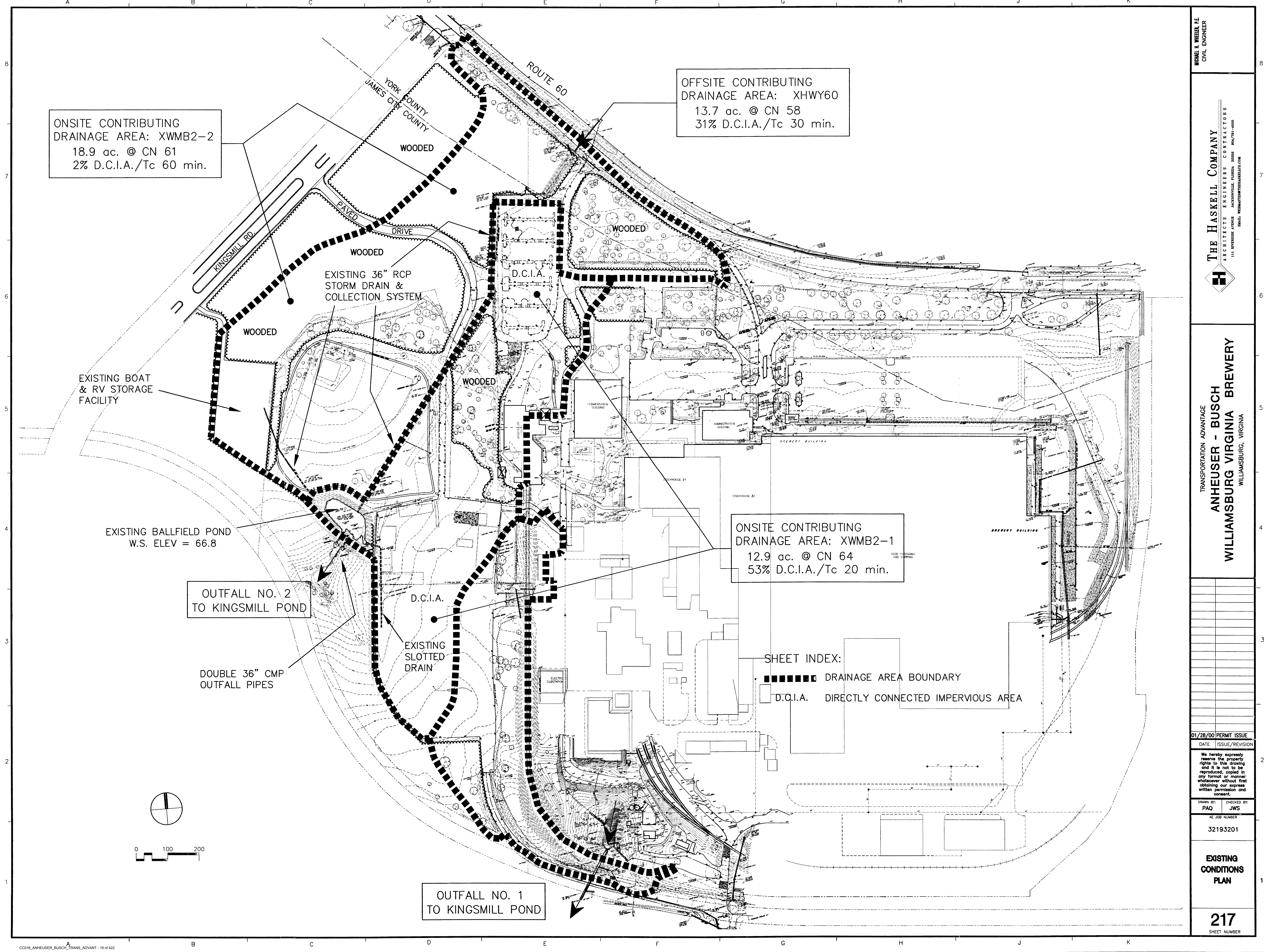
NOTE: OF THE CONTRACTOR FINDS A CONFLICT BETWEEN THE SPECIFICATIONS AND THE DRAWINGS, THEN THE CONTRACTOR SHALL CONTACT THE ARCHITECT/ENGINEER FOR A CLARIFICATION. IF THE CONTRACTOR IS UNABLE TO CONTACT THE ARCHITECT/ENGINEER THEN THE MORE STRINGENT SITUATION SHALL APPLY.



|   |                      |     |
|---|----------------------|-----|
| STATISTICAL INFORMATION:                        |                      |     |
| REAL ESTATE TAX MAP:<br>JAMES CITY COUNTY (JCC) |                      |     |
| PARCEL NUMBER: LISTED BELOW:                    |                      |     |
| PLANT PARCEL:                                   |                      |     |
| JCC(31-3) (01-3);                               | YORK(H12C-0201-1677) |     |
| YORK(H12C-0875-1128);                           | YORK(H12C-1586-0993) |     |
| PARCEL 01:                                      |                      |     |
| JCC(31-3) (01-78);                              | YORK(G12D-4751-2165) |     |
| PARCEL 02:                                      |                      |     |
| JCC(31-3) (01-3)                                |                      |     |
| ZONING DISTRICT: M-2, GENERAL INDUSTRIAL        |                      |     |
| ELECTION DISTRICT: ROBERTS                      |                      |     |
| GROSS SITE ACREAGE: 133.7 ACRES                 |                      |     |
| PROJECT AREA/PHASE ONE: 6.14 ACRES              |                      |     |
| PROJECT AREA/PHASE TWO: 17.04 ACRES             |                      |     |
| TOTAL PROJECT AREA: 23.18 ACRES                 |                      |     |
| DISTURBED AREA/PHASE ONE: 2.61 ACRES            |                      |     |
| DISTURBED AREA/PHASE TWO: 6.85 ACRES            |                      |     |
| TOTAL DISTURBED AREA: 9.46 ACRES                |                      |     |
| PARKING:  |                      |     |
| EXISTING  | 60                   | --  |
| PHASE ONE:                                      | --                   | 123 |
| PHASE TWO:                                      | --                   | 108 |
| TOTAL:  | 60                   | 228 |

| CONSTRUCTION PLAN SHEET INDEX: |  |
|--------------------------------|--|
| 200                            | COVER SHEET  |
| 201                            | SITE DEMOLITION PLAN                                 |
| 202                            | NORTH AREA GEOMETRY PLAN                             |
| 203                            | SOUTH AREA GEOMETRY PLAN                             |
| 204                            | EAST AREA GEOMETRY PLAN                              |
| 205                            | NORTH AREA UTILITY PLAN                              |
| 205A                           | EAST AREA UTILITY PLAN                               |
| 206                            | NORTH AREA GRADING & DRAINAGE PLAN                   |
| 207                            | SOUTH AREA GRADING & DRAINAGE PLAN                   |
| 208                            | EAST AREA GRADING & DRAINAGE PLAN                    |
| 208A                           | WAREHOUSE AREA GRADING & DRAINAGE PLAN               |
| 209                            | NORTH AREA EROSION & SEDIMENT CONTROL PLAN           |
| 210                            | SOUTH AREA EROSION & SEDIMENT CONTROL PLAN           |
| 211                            | EAST AREA EROSION & SEDIMENT CONTROL PLAN            |
| 212                            | EROSION OF SEDIMENT CONTROL DETAILS                  |
| 213                            | CIVIL DETAILS 1                                      |
| 214                            | CIVIL DETAILS 2                                      |
| 215                            | CIVIL DETAILS 3                                      |
| 216                            | STORMWATER POLLUTION PREVENTION PLAN                 |
| 217                            | EXISTING CONDITIONS PLAN                             |
| 218                            | POST CONDITIONS PLAN                                 |
| 220                            | V.O.D.T. ROUTE 60 CONSTRUCTION PLANS & ROAD MARKINGS |
| 221                            | V.O.D.T. ROUTE 60 CONSTRUCTION PLANS & ROAD MARKINGS |
| 222                            | V.O.D.T. ROUTE 60 CONSTRUCTION PLANS & ROAD MARKINGS |
| 223                            | V.O.D.T. ROUTE 60 CIVIL DETAILS 1                    |
| 225                            | LANDSCAPE PLANS                                      |
| 251                            | LANDSCAPE DETAILS                                    |



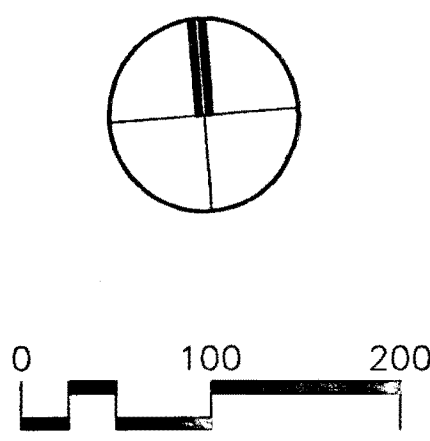


ONSITE CONTRIBUTING  
DRAINAGE AREA: XWMB2-2  
18.9 ac. @ CN 61  
2% D.C.I.A./Tc 60 min.

OFFSITE CONTRIBUTING  
DRAINAGE AREA: XHWY60  
13.7 ac. @ CN 58  
31% D.C.I.A./Tc 30 min.

ONSITE CONTRIBUTING  
DRAINAGE AREA: XWMB2-1  
12.9 ac. @ CN 64  
53% D.C.I.A./Tc 20 min.

SHEET INDEX:  
 ■■■■■■ DRAINAGE AREA BOUNDARY  
 □ D.C.I.A. DIRECTLY CONNECTED IMPERVIOUS AREA



OUTFALL NO. 1  
TO KINGSMILL POND

OUTFALL NO. 2  
TO KINGSMILL POND

DOUBLE 36" CMP  
OUTFALL PIPES

EXISTING BALLFIELD POND  
W.S. ELEV = 66.8

EXISTING BOAT  
& RV STORAGE  
FACILITY

EXISTING 36" RCP  
STORM DRAIN &  
COLLECTION SYSTEM

MICHAEL H. WHEELER, P.E.  
CIVIL ENGINEER

THE HASKELL COMPANY  
ARCHITECTS ENGINEERS CONTRACTORS  
111 RIVERSIDE AVENUE JACKSONVILLE, FLORIDA 32202  
PHONE: 904/791-4600  
FAX: 904/791-4601  
EMAIL: WHEELER@THEHASKELL.COM

TRANSPORTATION ADVANTAGE  
ANHEUSER - BUSCH  
WILLIAMSBURG VIRGINIA BREWERY  
WILLIAMSBURG, VIRGINIA

01/28/00 PERMIT ISSUE

DATE ISSUE/REVISION

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DRAWN BY: PAQ CHECKED BY: JWS

AE JOB NUMBER

32193201

EXISTING  
CONDITIONS  
PLAN

217  
SHEET NUMBER



ONSITE CONTRIBUTING  
DRAINAGE AREA: PWMB2-2  
21.5 ac. @ CN 60  
22% D.C.I.A./Tc 60 min.

OFFSITE CONTRIBUTING  
DRAINAGE AREA: PHWY60  
13.7 ac. @ CN 58  
31% D.C.I.A./Tc 30 min.

ONSITE CONTRIBUTING  
DRAINAGE AREA: PWMB2-1  
9.8 ac. @ CN 66  
73% D.C.I.A./Tc 10 min.

ONSITE CONTRIBUTING  
DRAINAGE AREA: POND1  
4.0 ac. @ CN 61  
85% D.C.I.A./Tc 10 min.

OUTFALL NO. 2  
TO KINGSMILL POND

OUTFALL NO. 1  
TO KINGSMILL POND

SHEET INDEX:  
■■■■■■■■■■ DRAINAGE AREA BOUNDARY  
■■■■■■■■■■ D.C.I.A. DIRECTLY CONNECTED IMPERVIOUS AREA

PLANT PARCEL  
90.2 ac.

PARCEL D1 (17.6 ac.)  
PARCEL D2 (25.9 ac.)

TEMPORARY  
CONST. TRAILER  
& STAGING AREA  
MAX. IMPERV. 2.5 Ac.

BOAT & RV  
STORAGE AREA  
(SEMI-IMPERVIOUS)

WOODED AREA

LANDSCAPED  
AREA

WOODED AREA

WOODED AREA

STOCKHOUSE #1

STOCKHOUSE #2

BREWERY BUILDING

BREWERY BUILDING

PRIMARY ELECTRICAL  
SUPPLY FOR ANHEUSER-BUSCH  
BREWERY AND DISTILLERY IS ADVISED TO  
CONDUCT AN EXTREME CAUTION.

MICHAEL H. WHEELER, P.E.  
CIVIL ENGINEER

THE HASKELL COMPANY  
ARCHITECTS ENGINEERS CONTRACTORS  
111 INTERSTATE AVENUE JACKSONVILLE, FLORIDA 32202  
904/791-4600  
EMAIL: WHEELER@THEHASKELL.COM

TRANSPORTATION ADVANTAGE  
ANHEUSER - BUSCH  
WILLIAMSBURG VIRGINIA BREWERY  
WILLIAMSBURG, VIRGINIA

01/28/00 PERMIT ISSUE

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CHECKED BY: JWS

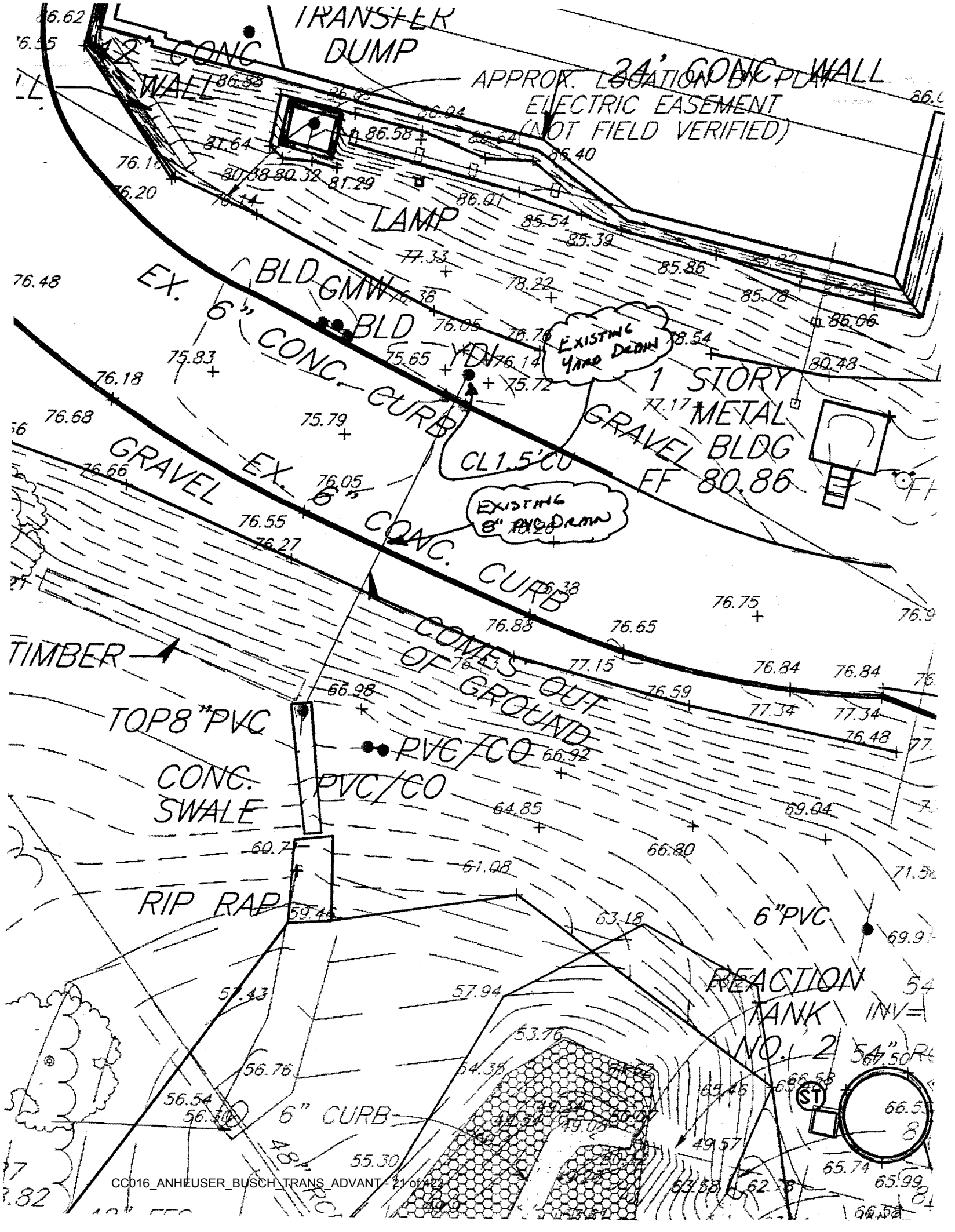
AE JOB NUMBER

32193201

POST  
DEVELOPMENT  
DRAINAGE  
MAP

218  
SHEET NUMBER





ANTICIPATED STOCKPILE AREA, SEE SHEET 209 ~28 LF 18" RCP @ 0.22%

~270 LF 36" RCP @ 2.00%

POND 2  
MIN. T.O.B. EL. 74.0  
DESIGN POOL EL. 66.50  
TOP OF ROCK BAFFLE EL. 66.0  
BOTTOM EL. 63.0

~80 LF 36" RCP @ 2.00%

SCOUR PROTECTION

INSTALL V.D.O.T. STANDARD STORM MANHOLE OVER EXISTING PIPE

ST-35

ST-36

SEDIMENT FOREBAY

ST-34

ST-33

INSTALL SUBMERGED ROCK BAFFLE, (SEE SECTION E-E THIS SHEET).

H-H 206

GRASS LINED EMERGENCY SPILLWAY CHANNEL

7 215

SEE POND TWO OUTFALL CONTROL STRUCTURE CS-2

15 215

CONSTRUCT ANTI-SEEP COLLAR

3 215

CONSTRUCT CONCRETE WINGWALL TOP H.W.=70.42

~48LF 48" RCP @ S=0.208%  
ST-37 INV = 65.10  
ST-38 INV = 65.00

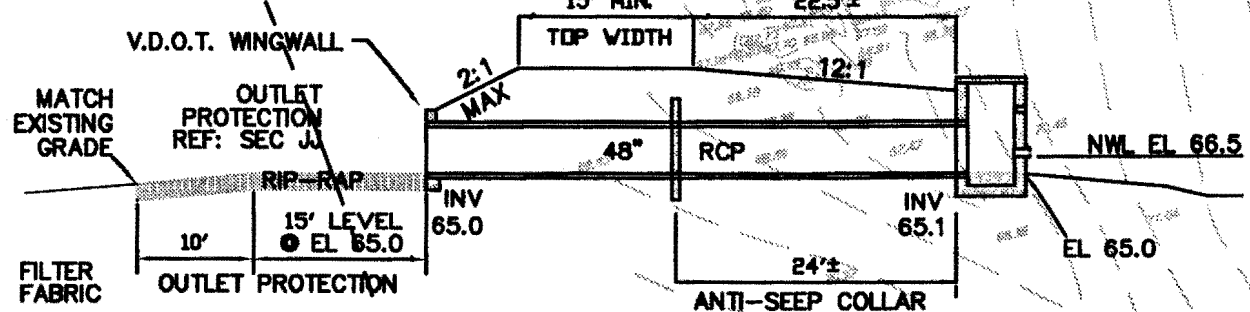
POND 2  
1YR. 24HR. EL. = 70.22  
2YR. 24HR. EL. = 70.76  
10YR. 24HR. EL. = 71.69  
100YR. 24HR. EL. = 72.66

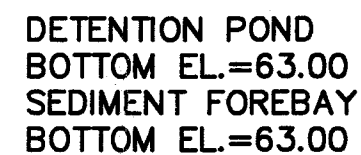
K-K 210

TEMPORARY DIVERSION DIKE

~35 LF 18" RCP @ 0.457%

~200 LF 15" RCP @ 0.790%





NATURAL GROUND  
T.O.B.=74.00

DESIGN NWL = 66.50

EL.=66.00

2:1 SIDE SLOPES

3'

2'

FOREBAY  
BOTTOM EL.=63.00

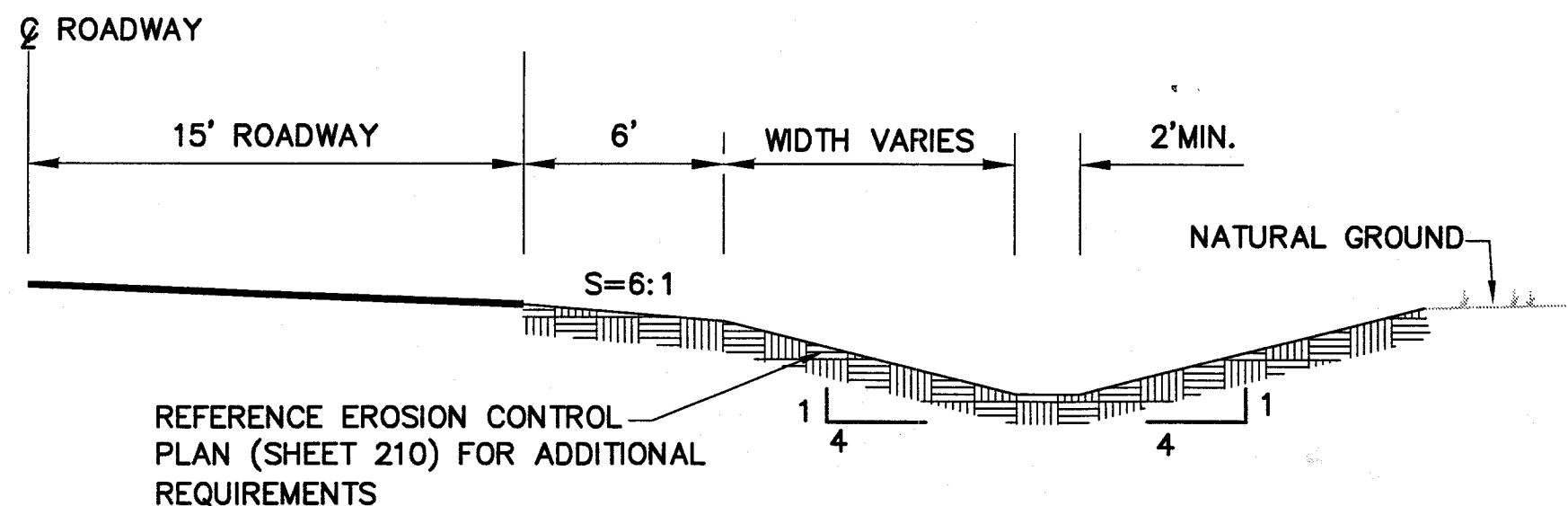
BOTTOM EL.=63.00

V.D.O.T. CLASS I  
RIP-RAP

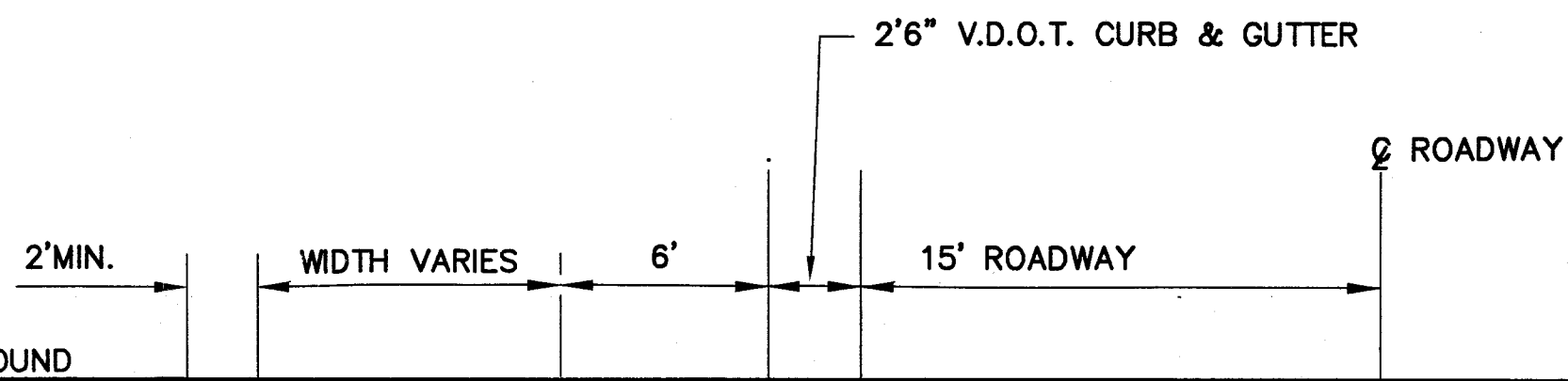
ON POND  
EL.=63.00

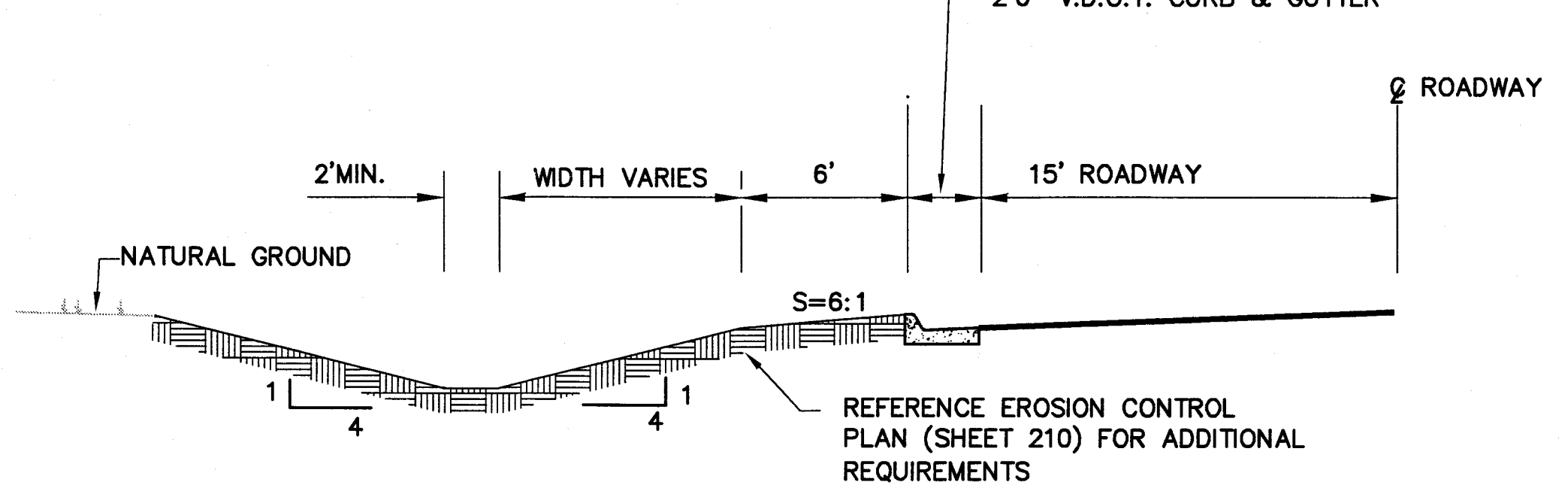
T FOREBAY  
EL.=63.00

POND 2 SECTION E-E

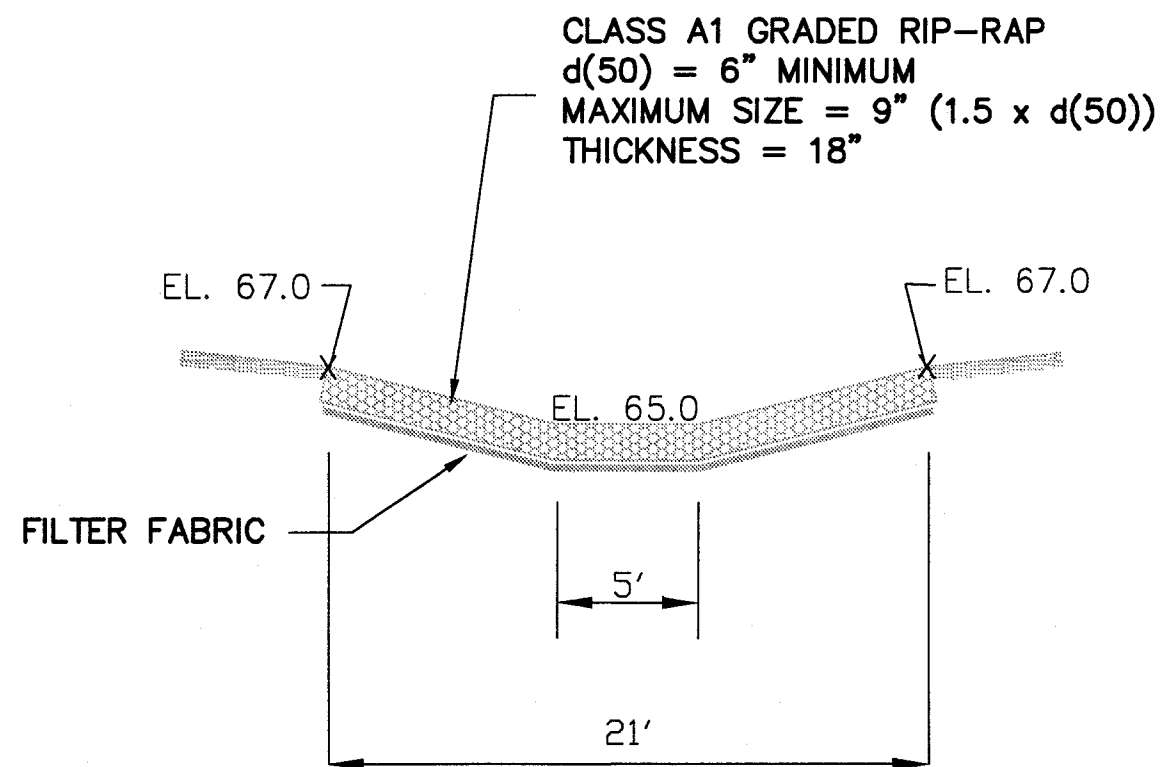


TYPICAL SWALE SECTION "F-F"



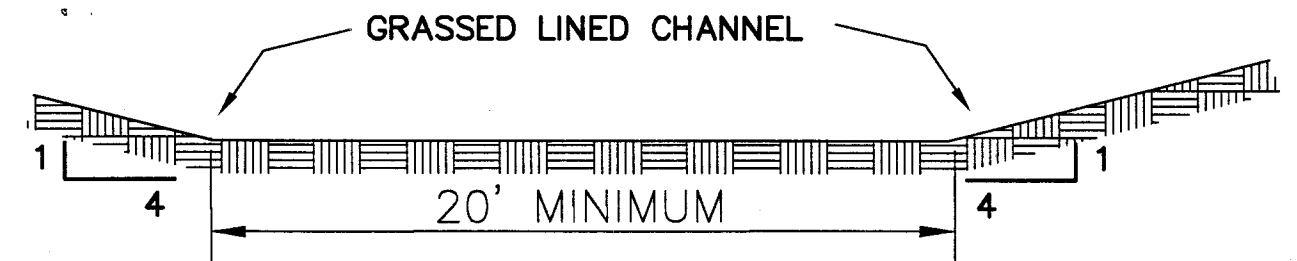


TYPICAL SWALE SECTION "G-G"



SECTION "J-J"

OUTLET PROTECTION  
AT POND 2



SECTION "H-H"  
EMERGENCY SPILLWAY

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 CONSTRUCTION "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. 48" REINFORCED CONCRETE PIPE INSTALLED FOR THE POND 2 OUTLET SHALL BE MINIMUM CLASS 3 BELL & SPIGOT JOINTS UTILIZING WATERTIGHT "O" RING GASKETED JOINTS MEETING ASTM C443

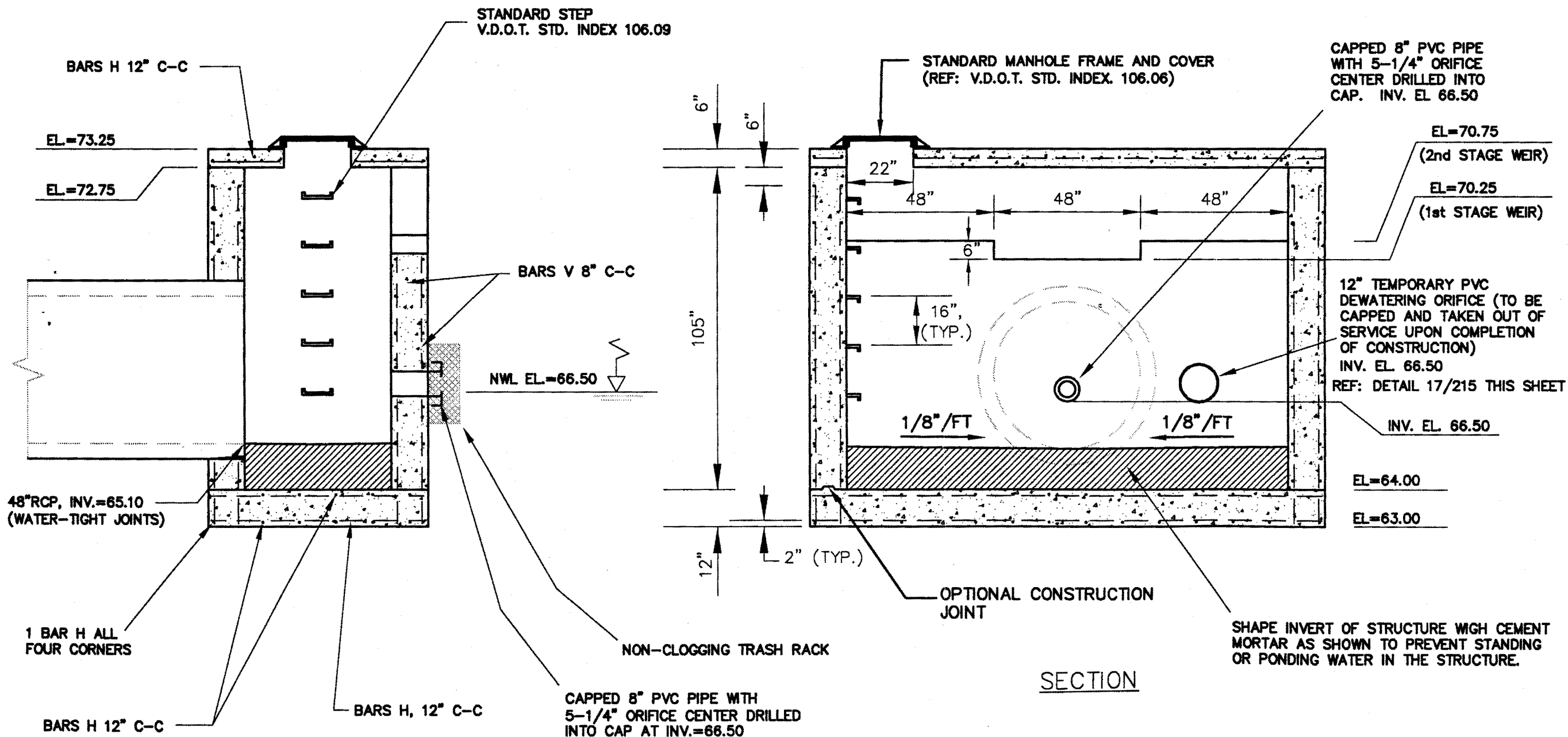
# SANITARY SEWER CLEANOUT

2

## CONCRETE ENDWALL - V.D.O.T. STANDARD

3

## DOWNSPOUT CONNECTION

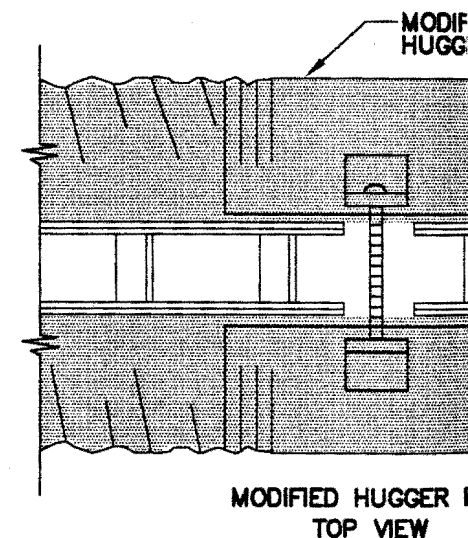
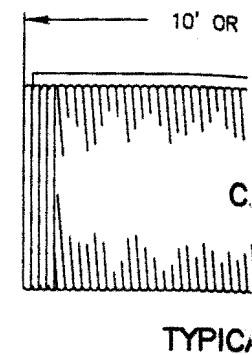


SECTION

48" RCP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/  
BELL & SPIGOT JOINTS UTILIZING WATERTIGHT "O" RING  
GASKETS MEETING ASTM C443 REQUIREMENTS.  
(REF: DETAIL 16/215 THIS SHEET)

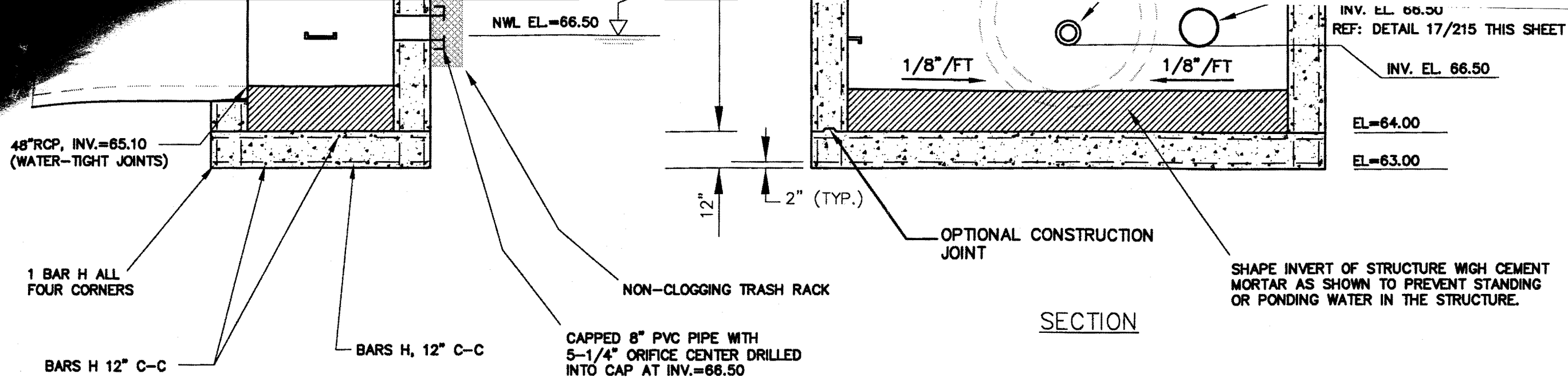
TOP SLAB NOT SHOWN FOR CLARITY

CONC. FOOT  
(SEE STRUC



SLOTTED DRAIN DETAIL





### SECTION

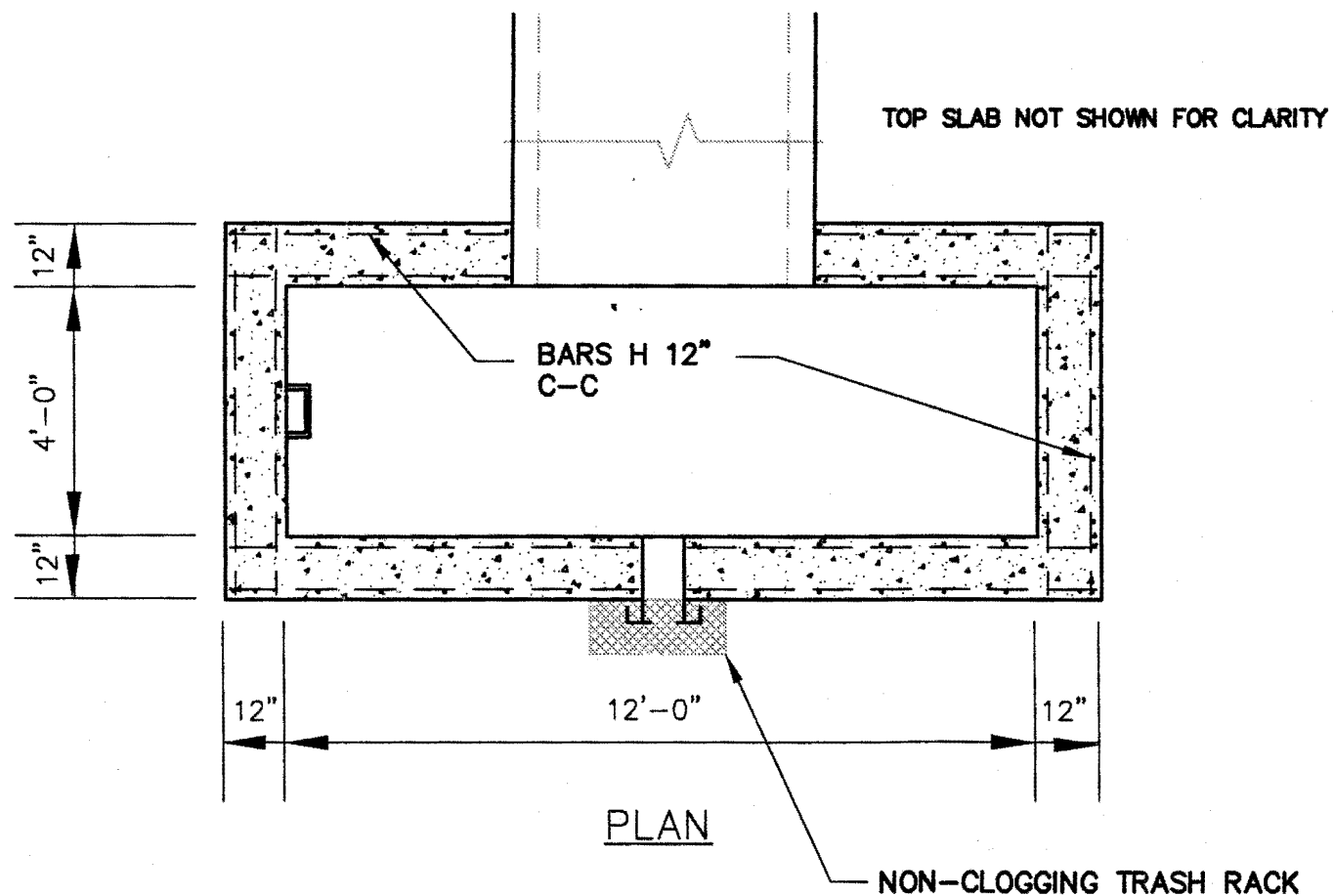
48" RCP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/ BELL & SPIGOT JOINTS UTILIZING WATERTIGHT "O" RING GASKETED JOINTS MEETING ASTM C443 REQUIREMENTS. (REF; DETAIL 16/215 THIS SHEET)

#### GENERAL NOTES:

1. FOR ALL DETAILS, DIMENSIONS, ETC. OF GRATE; AND STEEL OR CAST IRON COLLAR SEE V.D.O.T. STD. DROP INLET D1-1.
2. ALL CAST IN PLACE CONCRETE TO BE CLASS A-3.
3. IF OPTIONAL CONSTRUCTION JOINT IS USED IT IS TO BE KEYED.
4. ALL SPLICES IN BARS V TO LAP A MINIMUM OF 40 x DIA. (20 INCHES)

#### REINFORCING STEEL SCHEDULE:

|        | SIZE |
|--------|------|
| Bars H | #5   |
| Bars V | #4   |



### SLOTTED DRAIN

COILED SPRING  
BRACE RAIL  
1 5/8" x 1 1/4"

POND '2' CONTROL STRUCTURE (REF: V.D.O.T. STANDARD INDEX NO. 104.02)

7

FENCE DETAIL

## 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:

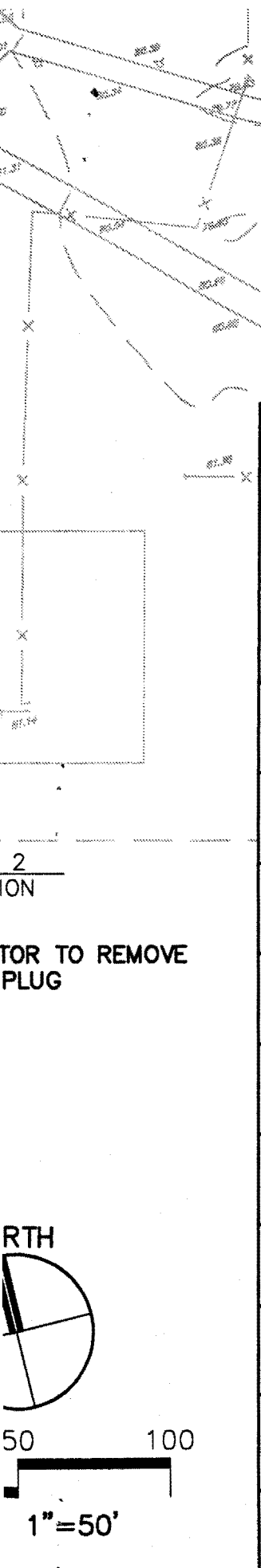
THE FOLLOWING INSPECTION AND MAINTENANCE ACTIVITIES ARE TO BE PERFORMED ON A 5-YEAR BASIS UNLESS SHORT-TERM INSPECTIONS REVEAL OTHERWISE. THIS INSPECTION WILL REQUIRE DRAINAGE POND.

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

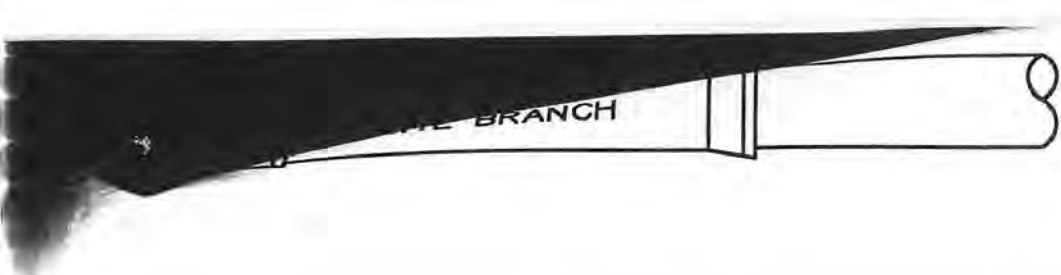
# AT POND 2

- GREATER THAN FOUR FEET.
- 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 CONSTRUCTION "AS-BUILT" DRAWINGS WILL BE PROVIDED WITH CERTIFICATION OF COMPLETION OF CONSTRUCTION.
  - ALL CONCRETE PIPE INSTALLED BENEATH TRAFFIC AREAS SHALL BE CLASS IV B-WALL PIPE.
  - 48" REINFORCED CONCRETE PIPE INSTALLED FOR THE POND 2 OUTLET SHALL BE MINIMUM CLASS 3 BELL & SPIGOT JOINTS UTILIZING WATERTIGHT "O" RING GASKETED JOINTS MEETING ASTM C443 REQUIREMENTS. (REFERENCE DETAIL 16, SHEET 215)
  - MANHOLE AND INLET INVERTS SHALL BE SHAPED IN ACCORDANCE WITH V.D.O.T. STANDARD IS-1. (SEE DETAIL NO. 17, SHEET 213).

| STORM DRAINAGE STRUCTURE TABLE |  |                       |                    |         |       |       |       |                  | STORM DRAINAGE STRUCTURE TABLE |  |                       |                    |                             |              |       |       |                  |
|--------------------------------|--|-----------------------|--------------------|---------|-------|-------|-------|------------------|--------------------------------|--|-----------------------|--------------------|-----------------------------|--------------|-------|-------|------------------|
| ST-*                           | DESCRIPTION OR TYPE  | OPENING WIDTH, L (FT) | TOP EL. (GRATE EL) | INVERTS |       |       |       | DETAIL NO.       | ST-*                           | DESCRIPTION OR TYPE  | CURB OPENING WIDTH, L | TOP EL. (GRATE EL) | INVERTS                     |              |       |       | DETAIL NO.       |
|                                |  |                       |                    | N       | S     | E     | W     |                  |                                |  |                       |                    | N                           | S            | E     | W     |                  |
| ST-17                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1   | 2.17                  | 80.37              | -       | 76.91 | -     | -     | 11/213<br>13/213 | ST-28                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2C W/ BASE UNIT B-1 | 12.00                 | 74.10              | -                           | -            | -     | 69.33 | 9/214            |
| ST-18                          | V.D.O.T. STANDARD DROP INLET DI-1 W/ GRATE                   | NA                    | 78.10              | 73.65   | -     | -     | -     | 12/213           | ST-29                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2C W/ BASE UNIT B-1 | 12.00                 | 73.80              | 66.75                       | 69.25        | 69.25 | 65.75 | 11/213<br>13/213 |
| ST-19                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1   | 2.17                  | 80.00              | 75.07   | 73.57 | -     | 73.47 | 11/213<br>13/213 | ST-30                          | CONCRETE FLARED END SECTION                                | NA                    | -                  | -                           | -            | 63.66 | -     | 15/213           |
| ST-20                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1   | 6.00                  | 79.00              | -       | 73.32 | 72.63 | 72.23 | 11/213<br>13/213 | ST-31                          | V.D.O.T. STD. DROP INLET DI-1 W/ GRATE                     | NA                    | 75.00              | -                           | -            | -     | 71.27 | 12/213           |
| ST-21                          | V.D.O.T. STANDARD PRECAST MANHOLE                            | NA                    | 79.22              | 76.22   | -     | -     | -     | 16/213           | ST-32                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1 | 6.00                  | 79.00              | 71.48±<br>(EXIST. 36" PIPE) | 71.00        | --    | 71.20 | 11/213<br>13/213 |
| ST-22                          | V.D.O.T. STANDARD DROP INLET DI-1 W/ GRATE                   | NA                    | 76.40              | 68.86   | 73.90 | -     | -     | 12/213           | ST-33                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1 | 8.00                  | -                  | 65.60                       | 65.50        | -     | -     | 11/213<br>13/213 |
| ST-23                          | V.D.O.T. STANDARD DROP INLET DI-1 W/ GRATE                   | NA                    | 76.00              | 68.58   | 68.68 | -     | -     | 12/213           | ST-34                          | CONCRETE FLARED END SECTION                                | NA                    | -                  | 64.00                       | -            | -     | -     | 15/213           |
| ST-24                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1   | 2.17                  | 78.00              | --      | 68.48 | 71.97 | 67.98 | 11/213<br>13/213 | ST-35                          | V.D.O.T. STANDARD PRECAST MANHOLE                          | NA                    | 75.20±             | MATCH EXIST.                | MATCH EXIST. | -     | -     | 16/213           |
| ST-25                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1   | 8.00                  | 76.40              | 72.94   | -     | -     | -     | 11/213<br>13/213 | ST-36                          | CONCRETE FLARED END SECTION                                | NA                    | -                  | 64.33                       | -            | -     | -     | 15/213           |
| ST-26                          | V.D.O.T. MULTI GRATE DROP INLET TYPE DI-12C W/ TYPE II GRATE | 12.00                 | 75.50              | -       | -     | -     | 71.27 | 9/214            | ST-37                          | POND 2 CONTROL STRUCTURE                                   | NA                    |                    | REFERENCE CIVIL DETAILS     |              |       |       |                  |
| ST-27                          | V.D.O.T. STD. CURB DROP INLET TOP T-DI-2B W/ BASE UNIT B-1   | 8.00                  | 75.00              | 70.61   | 71.36 | 71.11 | -     | 11/213<br>13/213 | ST-38                          | CONCRETE HEADWALL  | NA                    |                    | REFERENCE CIVIL DETAILS     |              |       |       |                  |







TABULATION BASED UPON USE OF A 48" RCP CULVERT.

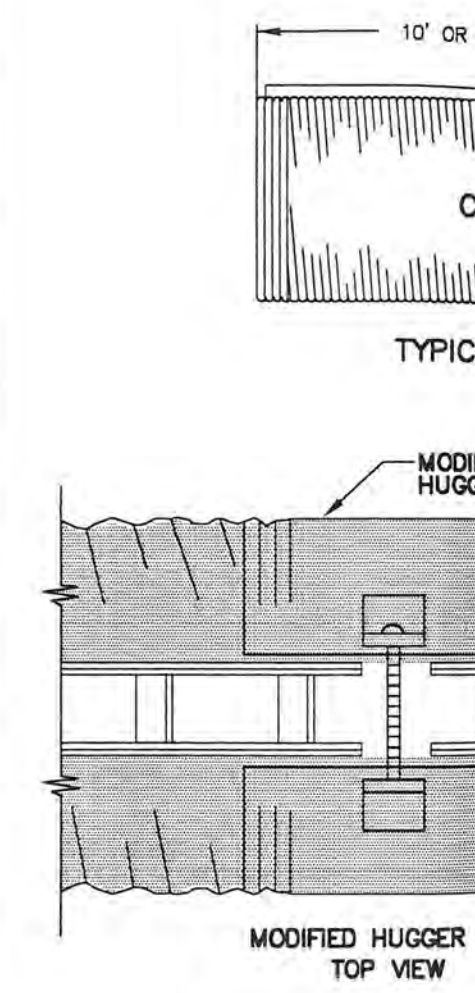
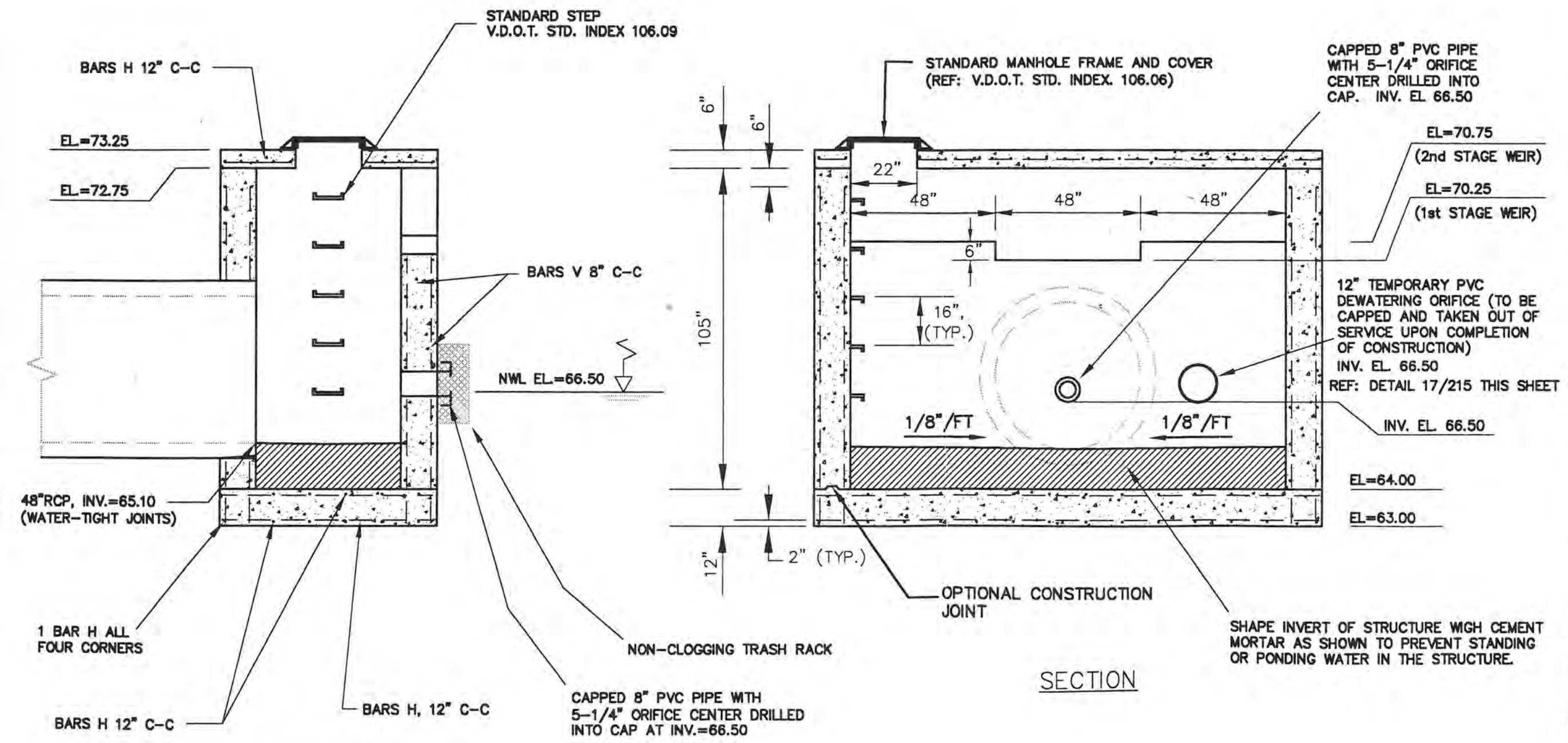
|                    |       |  |   |           |
|--------------------|-------|--|---|-----------|
| FOR 2:1 FILL SLOPE | C     | 4'-10 7/8"                               | L | 9'-9 3/4" |
|                    | F     | 0'-7"                                    | M | 1'-2"     |
|                    | G     | 4'-9"                                    | P | 8'-6"     |
|                    | I     | 2'-0 1/4"                                | R | 1'-2 1/4" |
|                    | J     | 6'-4"                                    |   |           |
|                    |       |  |   |           |
| a                  | 0'-6" | REFERENCE V.D.O.T. STD. INDEX NO. 101.04 |   |           |
| b                  | 0'-4" |  |   |           |

8" PVC DR.  
CONC. FOO  
(SEE STRUC)

# SANITARY SEWER CLEANOUT

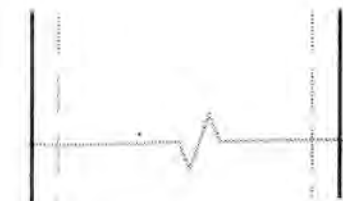
## 2 CONCRETE ENDWALL - V.D.O.T. STANDARD

## 3 DOWNSPOUT CONN

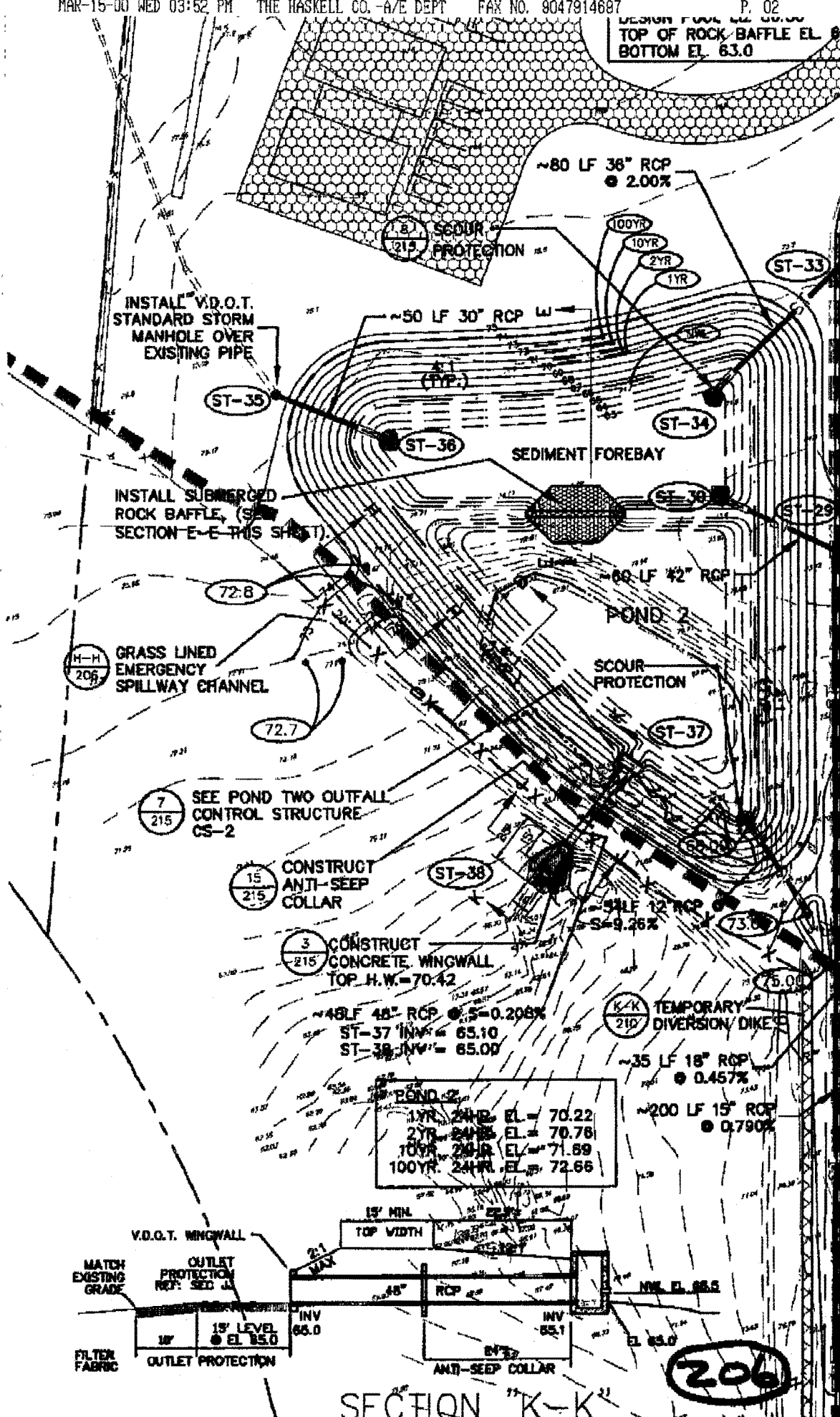


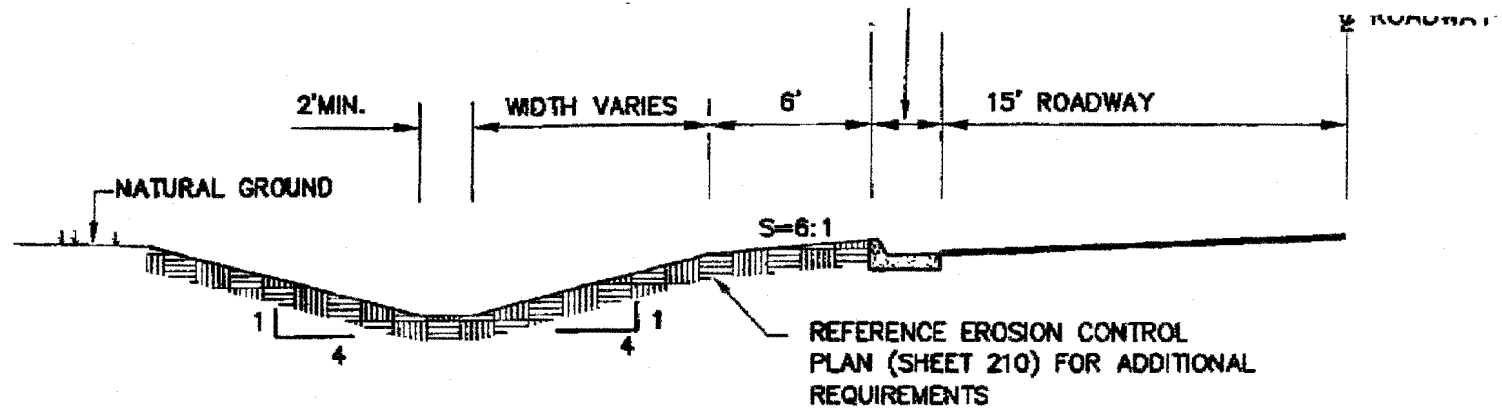
## SLOTTED DRAIN DE

48" RCP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/ BEARING JOINTS UTILIZING WATER TIGHT 220" RING GASKETED JOINTS MEETING ASTM C443 REQUIREMENTS. (REF: DETAIL 16/215 THIS SHEET)

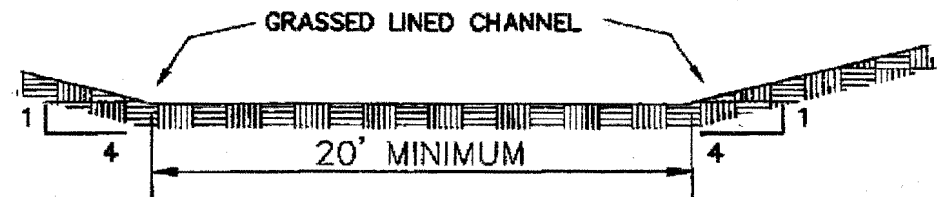
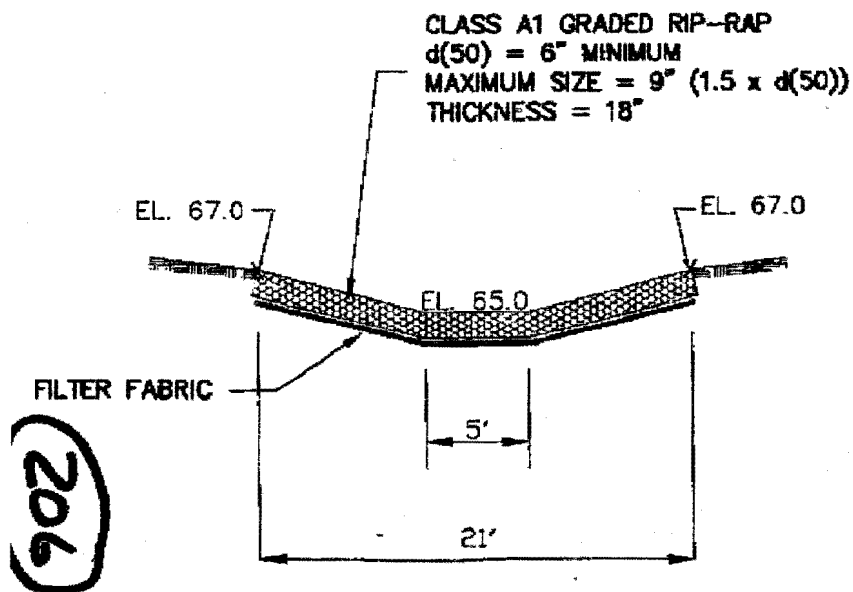


DESIGN FLOOD EL. 66.00  
TOP OF ROCK BAFFLE EL. 66.0  
BOTTOM EL. 63.0






TYPICAL SWALE SECTION "G-G"



SECTION "H-H"  
EMERGENCY SPILLWAY

NOTES:

ALL LOCATED WITHIN TRAFFIC AREAS SHALL BE RATED FOR HEAVY DUTY TRUCK TRAFFIC



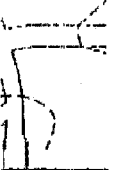
| NO. SOILS | SOILS NAME | HYDROLOGIC GROUP | AVERAGE SLOPE |
|-----------|------------|------------------|---------------|
| 37        | URBAN LAND | ---              | ~2% SLOPE     |
| 11C       | GRAVEN     | C                | OFFSITE       |
| 19B       | KEMPSVILLE | B                | OFFSITE       |
| 29A       | SLAGLE     | C                | OFFSITE       |
| 29B       | SLAGLE     | C                | OFFSITE       |

**STOCKPILE AREAS:**

ON-SITE CONTRACTOR SHALL ESTABLISH ALL TEMPORARY SOIL STOCKPILE AREAS, STAGING AND EQUIPMENT STORAGE AREAS WITHIN ESTABLISHED CLEARING LIMITS IN ACCORDANCE WITH ALL APPLICABLE EROSION AND SEDIMENT CONTROL MEASURES.


ANTICIPATED STOCKPILE AREAS ARE CONSTRUCTION TRAILER COMPOUND AREA AND HOSPITALITY HOUSE PARKING AREA, AS SHOWN.

**GENERAL NOTES:**

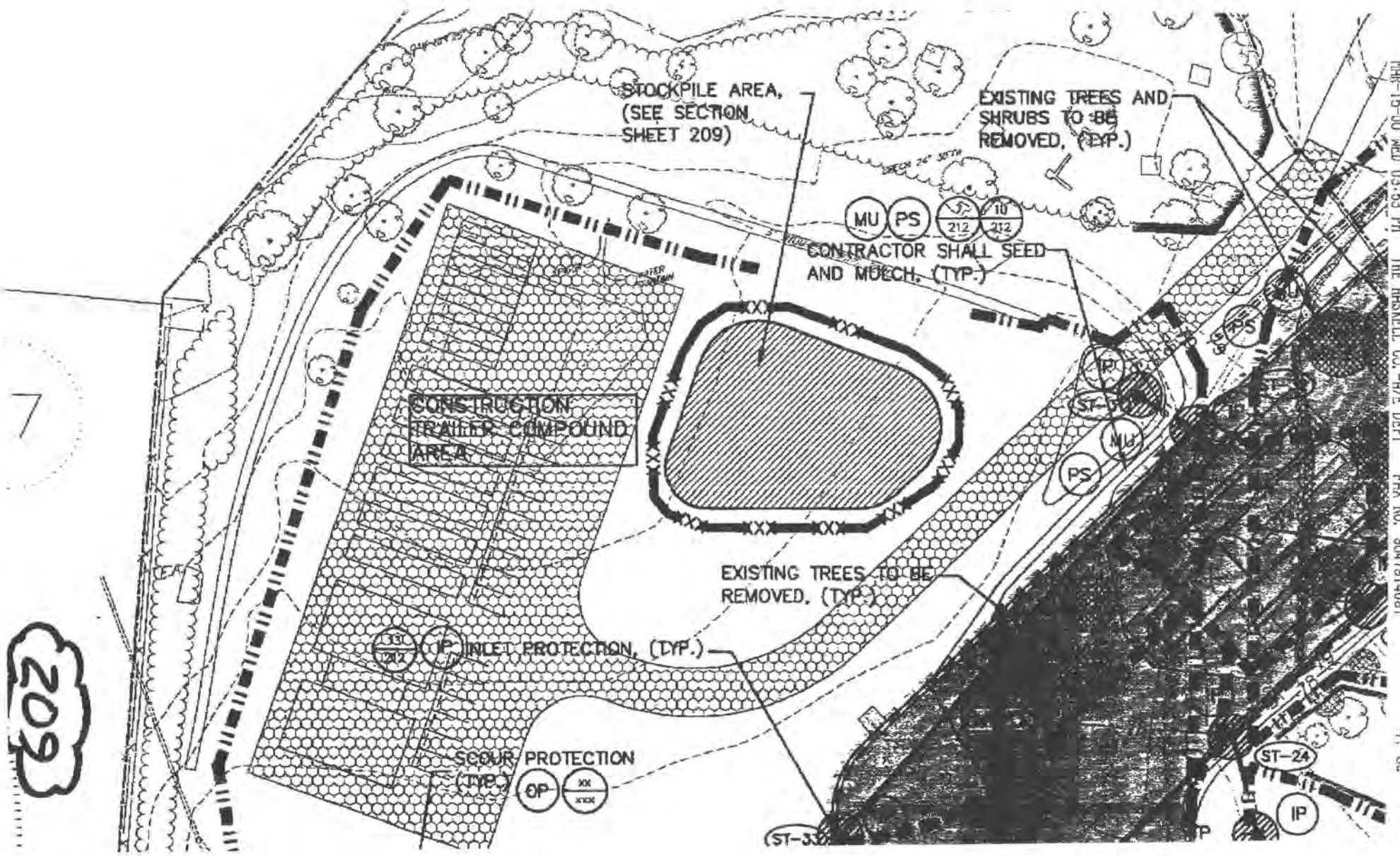
1. POND AREA TO BE SODDED TO DESIGN NORMAL WATER ELEVATION OF 67.00.
  2. REFERENCING THE FLOOD INSURANCE RATE MAP, (F.I.R.M.), FOR JAMES CITY COUNTY, VIRGINIA, UNINCORPORATED AREAS, PANEL 50 OF 60, COMMUNITY PANEL NO. 510201 0050 B, EFFECTIVE DATE 2-6-91. THE REFERENCE SITE IS LOCATED WITHIN ZONE X.
  3. CONTRACTOR SHALL DISPOSE OF CONSTRUCTION DEBRIS IN A FACILITY APPROVED FOR WASTE DISPOSAL OF THIS TYPE OF MATERIAL.
- 

**ENVIRONMENTAL INVENTORY:**

PER TOPOGRAPHIC SURVEY THE FOLLOWING ITEMS ARE NOT PRESENT WITHIN THE PROJECT LIMITS OF CONSTRUCTION:

- (A) TIDAL WETLANDS;
  - (B) TIDAL SHORES;
  - (C) NONTIDAL WETLANDS IN RPA;
  - (D) A 100-FOOT BUFFER AREA LOCATED ADJACENT TO AND LANDWARD OF THE COMPONENTS LISTED IN SUBSECTIONS A. THROUGH C. ABOVE, AND ALONG BOTH SIDES ON ANY TRIBUTARY STREAM;
  - (E) 25% OR GREATER SLOPES.
- 

209

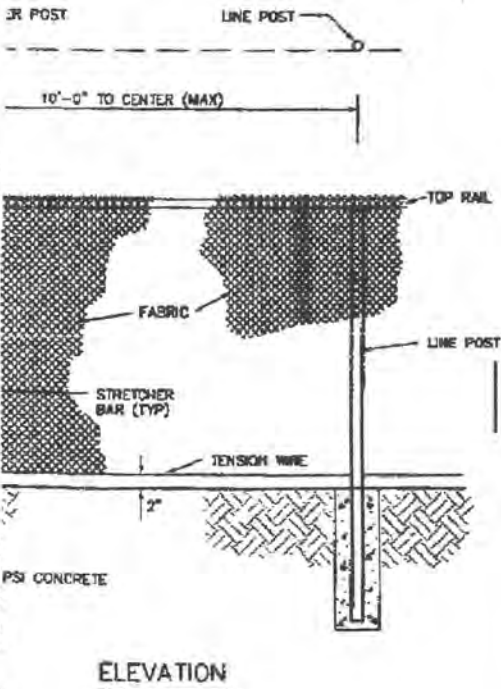




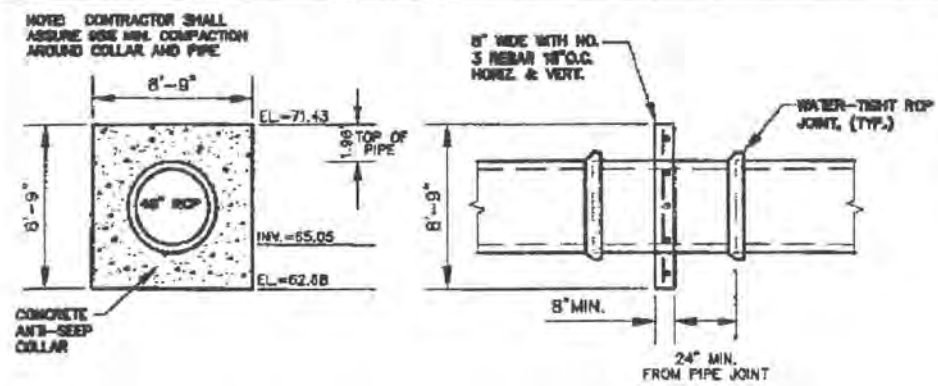




P. 08  
FAX NO. 9047914867  
THE HASSELL CO. - A/E DEPT  
MAR-15-00 WED 03:57 PM

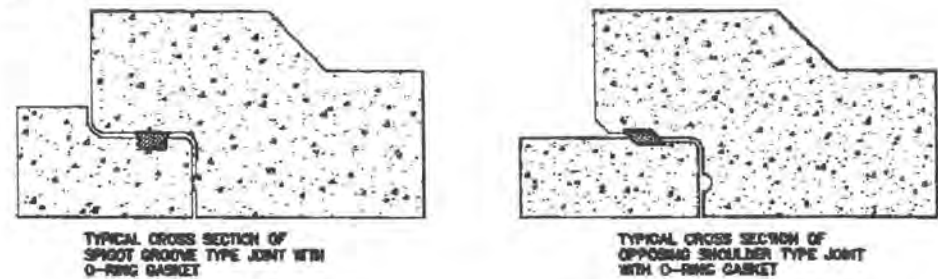


ANTI-SEEP COLLAR DETAIL



ANTI-SEEP COLLAR DETAIL

NOTE: WATER-TIGHT JOINTS REQUIRED FOR 48" RCP PIPE OUTLET AT POND NO. TWO.



RUBBER GASKET JOINT DETAIL

15

16

|          |                |
|----------|----------------|
| 3/07/00  | REV. PERMIT #5 |
| 01/28/00 | PERMIT ISSUE   |
| DATE     | ISSUE/REVISION |

We hereby expressly reserve the property rights to this drawing and it is not to be reproduced, copied in any format or manner whatsoever without first obtaining our express written permission and consent.

|           |             |
|-----------|-------------|
| DRAWN BY: | CHECKED BY: |
| PAQ       | JWS         |

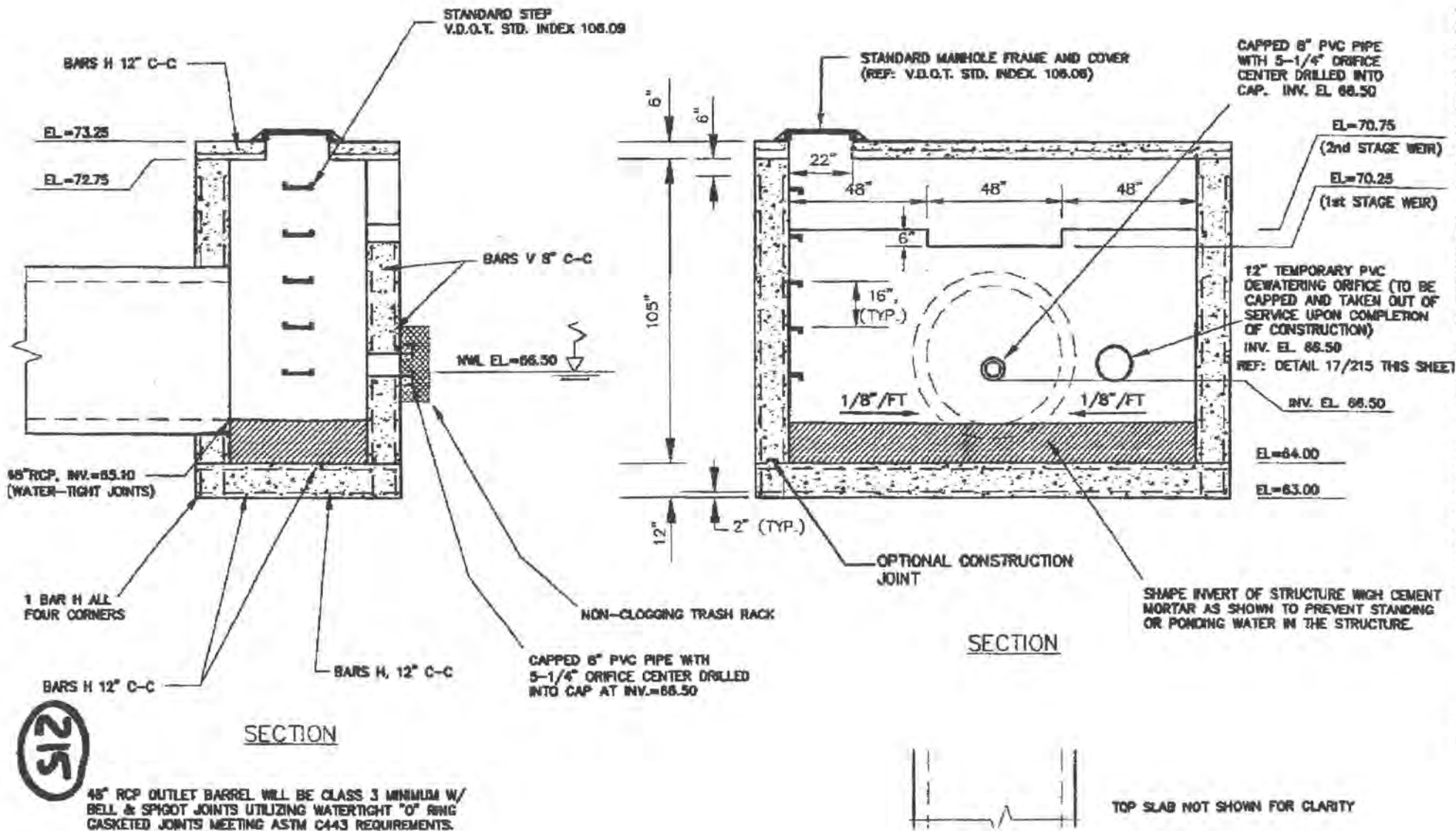
AE JOB NUMBER

32193201

CIVIL  
DETAIL  
3

215  
SHEET NUMBER







SECTION

48" RCP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/ BELL & SPIGOT JOINTS UTILIZING WATERTIGHT "O" RING GASKETED JOINTS MEETING ASTM C443 REQUIREMENTS. (REF; DETAIL 16/215 THIS SHEET)

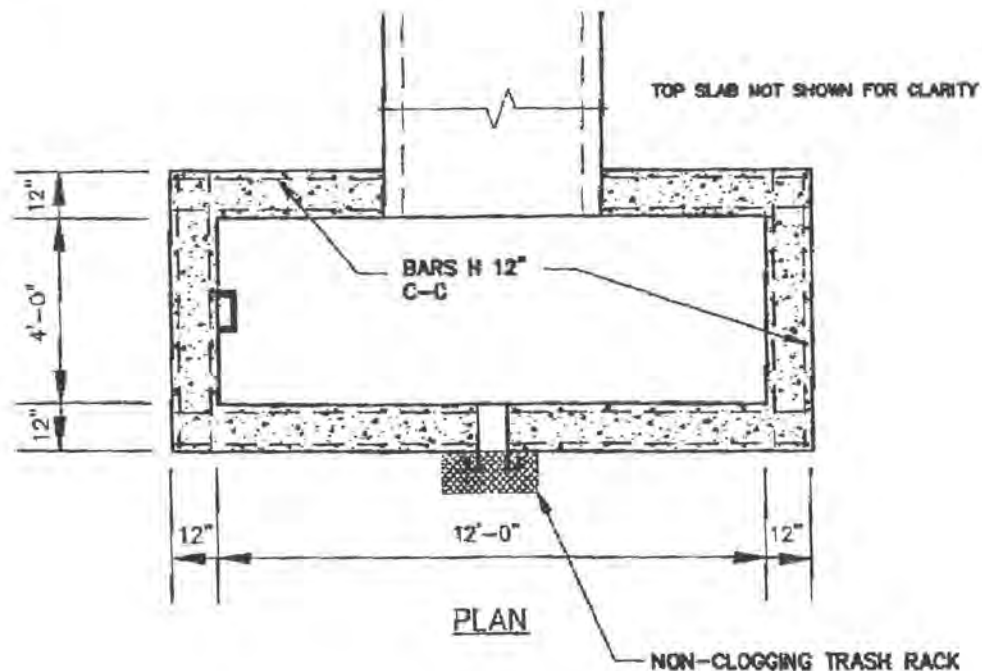
GENERAL NOTES:

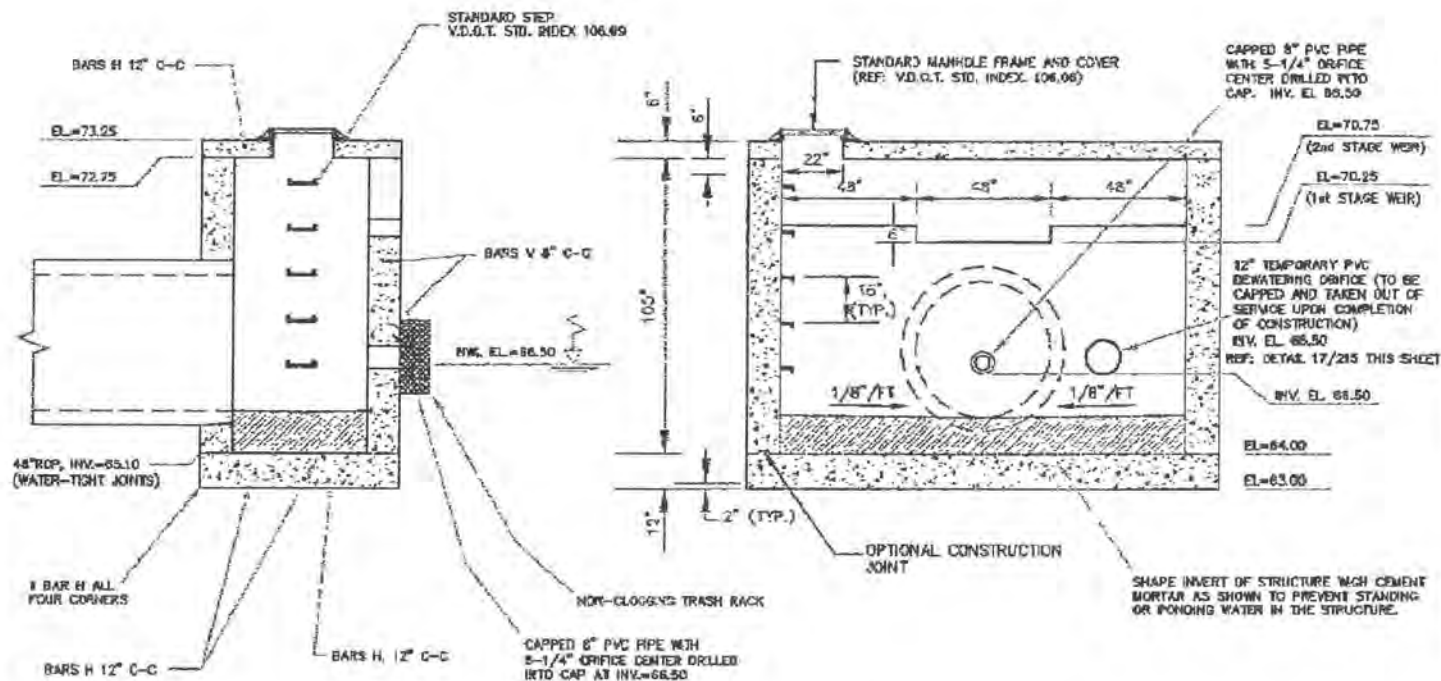
1. FOR ALL DETAILS, DIMENSIONS, ETC. OF GRATE; AND STEEL OR CAST IRON COLLAR SEE V.D.O.T. STD. DROP INLET 01-1.
2. ALL CAST IN PLACE CONCRETE TO BE CLASS A-3.
3. IF OPTIONAL CONSTRUCTION JOINT IS USED IT IS TO BE KEYED.
4. ALL SPLICES IN BARS V TO LAP A MINIMUM OF 40 x DIA. (20 INCHES)

REINFORCING STEEL SCHEDULE:

|        | SIZE |
|--------|------|
| Bars H | #5   |
| Bars V | #4   |

215





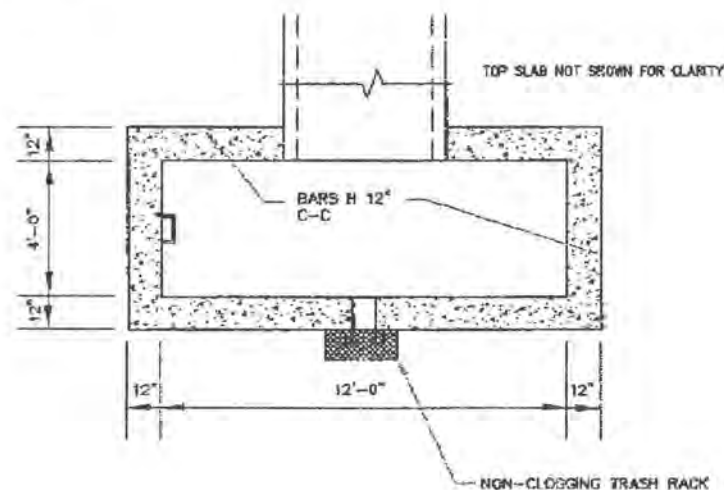
48" ROP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/ BELL & SPIGOT JOINTS UTILIZING WATER-TIGHT "O" RING GASKETED JOINTS MEETING ASTM C443 REQUIREMENTS.  
(REF. DETAIL 16/215 THIS SHEET)

GENERAL NOTES:

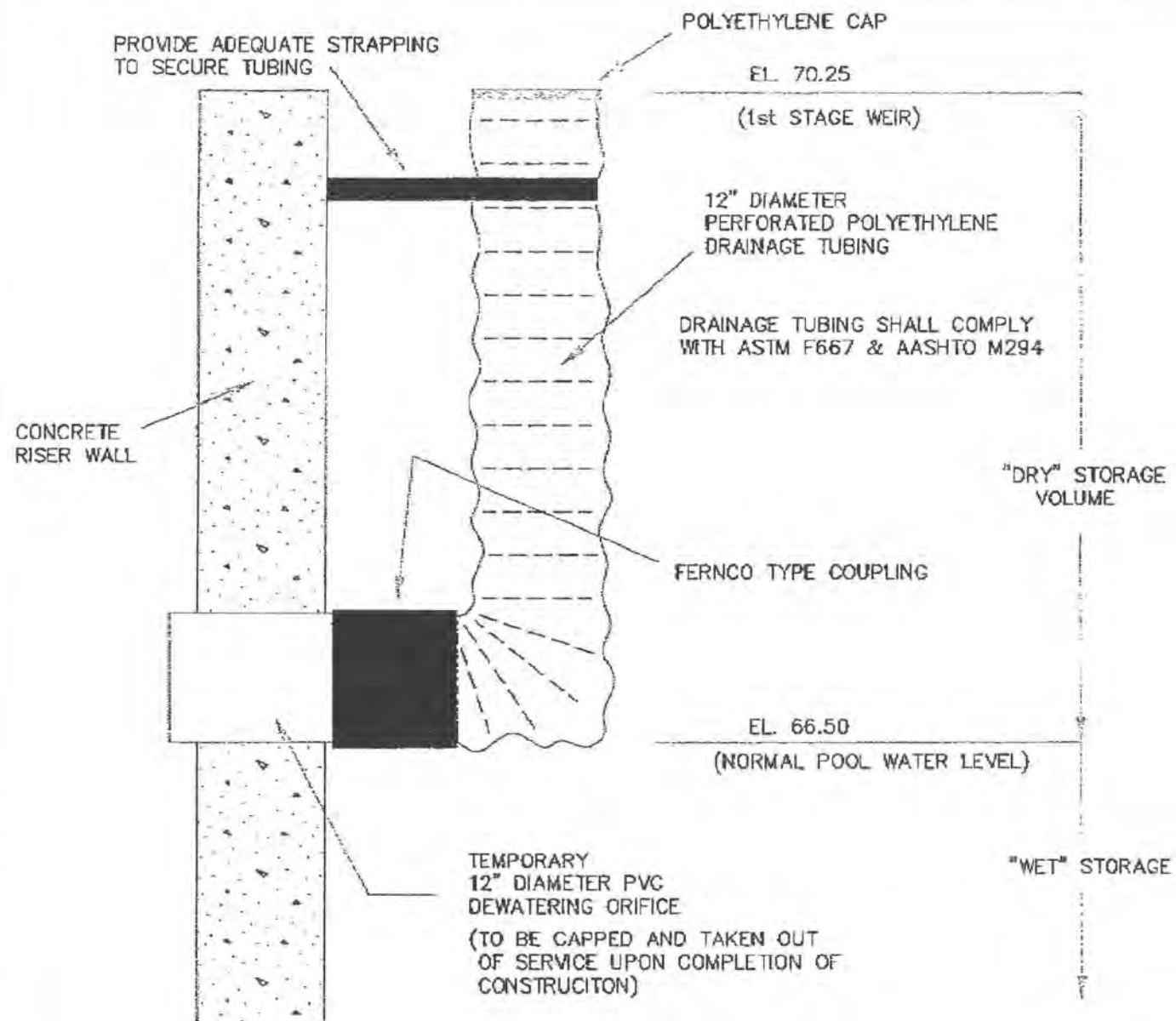
1. FOR ALL DETAILS, DIMENSIONS, ETC. OF GRATE, AND STEEL OR CAST IRON COLLAR SEE V.D.O.T. STD. DROP INLET D1-1.
2. ALL CAST IN PLACE CONCRETE TO BE CLASS A-3.
3. IF OPTIONAL CONSTRUCTION JOINT IS USED IT IS TO BE KEYS.
4. ALL SPLICES IN BARS V TO LAP A MINIMUM OF 40 x DIA. (20 INCHES)

REINFORCING STEEL SCHEDULE:

|        | SIZE |
|--------|------|
| Bars H | #5   |
| Bars V | #4   |

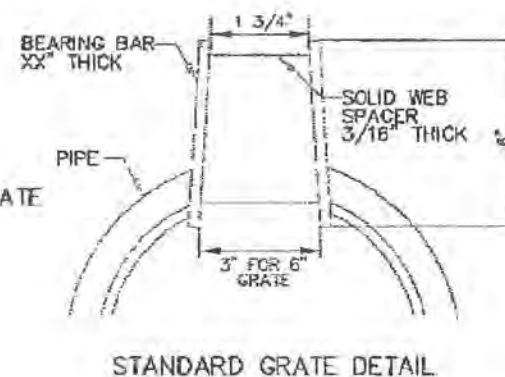
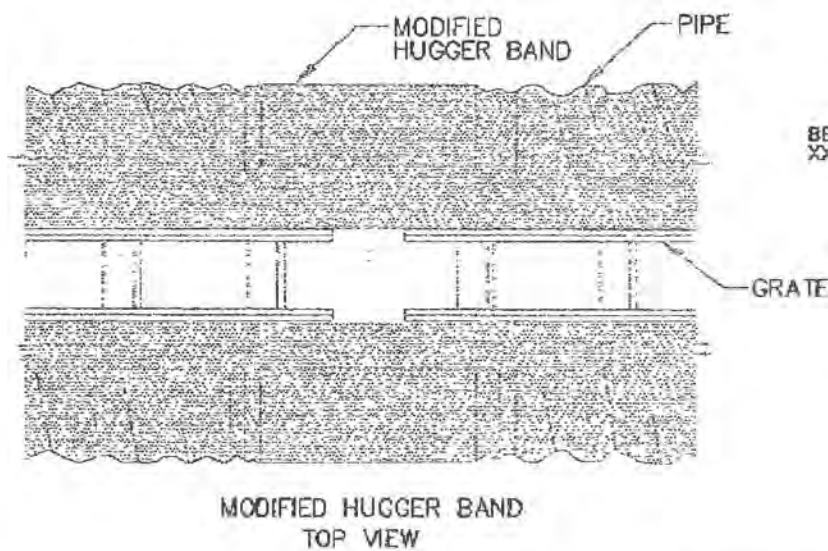
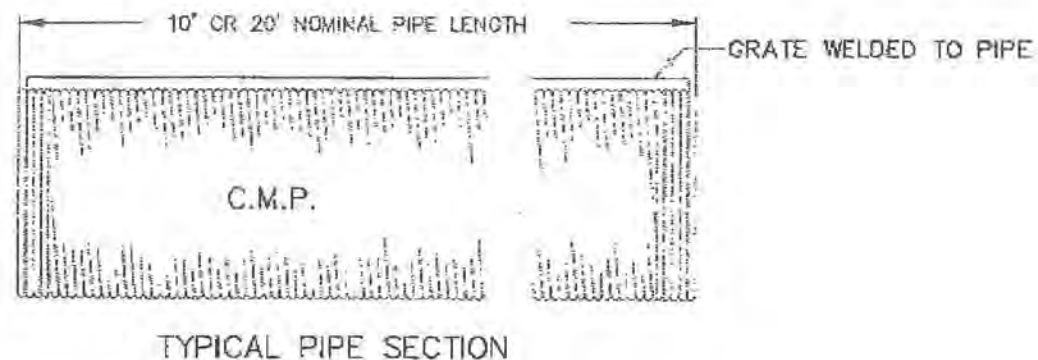


POND '2' CONTROL STRUCTURE (REF. V.D.O.T. STANDARD INDEX NO. 104.02)



## DEWATERING SYSTEM FOR SEDIMENT BASINS

17



SLOTTED DRAIN TO BE 16 GAUGE CORRUGATED  
STEEL PIPE SUCH AS THAT MANUFACTURED BY  
ARMCO (OR EQUAL)

SLOTTED DRAIN DETAIL

8

# **6. Design Calculations**

**SPECIFICATIONS**

**FOR CONSTRUCTION OF**

**ANHEUSER - BUSCH, INC.**

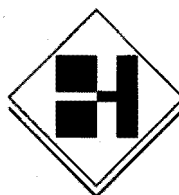
**WILLIAMSBURG BREWERY TRANSPORTATION ADVANTAGE**

**WILLIAMSBURG, VIRGINIA**

**CIVIL ISSUE**

**January 18, 2000**

*Michael H. Haskell*  
1-28-00



**T H E H A S K E L L C O M P A N Y**

**ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES**

## TABLE OF CONTENTS

Anheuser-Busch  
Williamsburg Brewery

### DIVISION 1 - GENERAL REQUIREMENTS

- Section 01000 - General Requirements
- Section 01000 - (Appendix A) Submittal Data Schedule
- Section 01000 - (Appendix B) Submittal Data Transmittal Form
- Section 01000 - (Appendix C) CAD Drawing Request Form
- Section 01400 - Quality Requirements

### DIVISION 2 - SITE WORK

- Section 02216 - Standard Penetration Tests
- Section 02230 - Site Clearing
- Section 02250 - Compaction Control and Testing
- Section 02310 - Grading
- Section 02315 - Excavation
- Section 02316 - Fill and Backfill
- Section 02317 - Trenching for Site Utilities
- Section 02370 - Erosion and Sedimentation Control
- Section 02373 - RipRap
- Section 02635 - Storm Drainage Piping
- Section 02640 - Manholes and Covers
- Section 02721 - Aggregate Base Course
- Section 02741 - Bituminous Concrete Paving
- Section 02751 - Portland Cement Concrete Paving
- Section 02821 - Chain Link Fences and Gates
- Section 02921 - Seeding
- Section 02930 - Exterior Plants



**SECTION 01000**

**GENERAL REQUIREMENTS**

**PART 1 GENERAL**

**1.01 GENERAL**

- A. Conflicts: Wherever conflicts exist between the Drawings and the Specifications, the Specifications shall govern.
- B. Definitions:
  - 1. Owner:
    - a. The Owner is: Anheuser-Busch, Inc., St. Louis, MO
    - b. The term Owner referred to throughout these Specifications means the Owner or his authorized representative.
  - 2. Project:
    - a. The Project is: Transportation Advantage, Williamsburg Brewery, Anheuser-Busch, Inc.
  - 3. Architect/ Engineer:
    - a. The Architect/Engineer is The Haskell Company, 111 Riverside Avenue, Jacksonville, Florida 32202-4950. The term Architect/Engineer referred to throughout these specifications means the Architect/Engineer or his authorized representative.
  - 4. Contractor:
    - a. The Contractor is The Haskell Company, Haskell Building, 111 Riverside Avenue, Jacksonville, Florida 32202-4950. The term Contractor referred to throughout these Specifications means the Contractor or his authorized representative.
  - 5. Tenant:
    - a. A Tenant is a person or organization having a lease agreement with the Owner to occupy space in the facility. The term Tenant referred to throughout these Specifications means the Tenant or his authorized representative.
  - 6. Subcontractor:
    - a. A Subcontractor is a person or organization who has a direct contract with the Contractor to perform any of the Work at the site. The term Subcontractor means the Subcontractor or its authorized representative.
  - 7. Sub-subcontractor:
    - a. A Sub-subcontractor is a person or organization who has a direct or indirect contract with a Subcontractor to perform any of the Work at the site. The term Sub subcontractor means a Sub-subcontractor or an authorized representative thereof.
  - 8. Vendor:
    - a. A Vendor is a person or organization having a contractual agreement with the Contractor to supply materials or equipment but not labor. The term Vendor referred to throughout these Specifications means the Vendor or his authorized representative.
  - 9. Work:
    - a. The term Work includes all labor necessary and all material and equipment incorporated or to be incorporated to produce the construction required by the Drawings and these Specifications.
  - 10. NIC:
    - a. The term NIC used throughout the Drawings and these Specifications means "not included in this Contract."
  - 11. Approved Equal and/or Acceptable:
    - a. The term Approved Equal and/or Acceptable used throughout the Drawings and these Specifications means as approved by the Architect/Engineer.
  - 12. Approved Equal and/or Acceptable:

- a. The term Approved Equal and/or Acceptable used throughout the Drawings and these Specifications means as approved by the Architect/Engineer and acceptable to the Tenant.

## 1.02 SUMMARY OF WORK

- A. Work to be performed by the Subcontractor is specifically defined in the Drawings and these Specifications.
- B. Property Insurance: The Contractor will obtain and pay for fire and windstorm insurance on the building during construction, insuring Owner, Contractor, Subcontractors and Sub-subcontractors as their interests may appear.
- C. Codes and Standards:
  1. Work shall be performed in accordance with applicable federal, state or local requirements. References to codes, specifications and standards shall mean the latest edition, amendment or revision of such reference in effect at the project location on the date of the contract.
  2. Contractor assumes no responsibility for compliance with laws and ordinances such as OSHA, EPA and others that are directed at the Owner, his operations and his employees with regard to Owner-furnished equipment design, installation and operation.
  3. All work and products shall meet the requirements of Factory Mutual Research Corporation (FMRC).
- D. Permits, Fees and Licenses:
  1. The Contractor shall obtain and pay for the "Building Permit" as well as any others that may be required and not specified to be furnished by a Subcontractor.
    - a. Building Permit
    - b. State Driveway Permit
    - c. Local Driveway Permit
    - d. Water Tap Fee
    - e. Sewer Connection Charge
    - f. Pollution Fee
    - g. Septic Tank Permit
    - h. Tree Cutting Permit
    - i. Sign Permit
    - j. Charge for Installation of Water Meter
    - k. Sidewalk Permit
    - l. Plan Review Fee
    - m. Site Development
    - n. Storm Water Discharge Permit
  2. The Subcontractor doing the work shall obtain and pay for the following:
    - a. Electrical Permit
    - b. Plumbing Permit
    - c. HVAC Permit
    - d. Elevator Permit
    - e. Well Drilling Permit
    - f. Demolition Permit
    - g. Tree Cutting Permit
    - h. Septic Tank Permit
    - i. Fire Protection-Sprinkler Permit
- E. Temporary Utilities: The Contractor shall arrange and pay for all temporary water and electricity used in the course of construction, including the use of permanent building water and electrical service, incidental to construction operations. Upon substantial completion of the work or

occupancy of the building by the Owner, the cost of all utilities shall be transferred or assigned to the Owner's account.

F. Abbreviations: References to technical societies, institutions, associations or governmental authorities are made in accordance with the following abbreviations:

1. AABC: Associated Air Balance Council
2. AASHTO: American Association of State Highway and Transportation Officials
3. ACI: American Concrete Institute
4. AGA: American Gas Association
5. AISC: American Institute of Steel Construction
6. AISI: American Iron and Steel Institute
7. AMCA: Air Movement and Control Association, Inc.
8. ANSI: American National Standards Institute, Inc.
9. APA: American Plywood Association
10. ARI: Air Conditioning & Refrigeration Institute
11. ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers
12. ASME: American Society of Mechanical Engineers
13. ASTM: American Society for Testing and Materials
14. AWI: Architectural Woodwork Institute
15. AWS: American Welding Society
16. AWWA: American Water Works Association, Inc.
17. FM: Factory Mutual Engineering and Research Corp.
18. Fed. Spec.: Federal Specification
19. IES: Illuminating Engineering Society
20. IRI: Industrial Risk Insurers Association
21. NAAMM: National Association of Architectural Metal Manufacturers
22. NBS: National Bureau of Standards
23. NEC: National Electrical Code
24. NEMA: National Electrical Manufacturers Association
25. NFPA: National Fire Protection Association
26. NRCA: National Roofing Contractor's Association
27. SDI: Steel Deck Institute or Steel Door Institute
28. SJI: Steel Joist Institute
29. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association
30. TCA: Tile Council of America, Inc.
31. UL: Underwriters Laboratories Inc.

G. SUBSTITUTIONS

1. Material Substitutions: Substitutions for the products specified in these Specifications will not be allowed unless specifically stated in the applicable technical section that substitutions will be considered, and the Architect/Engineer determines that the proposed substitution will provide acceptable satisfactory service.
2. and the substitution is acceptable to the Tenant.

H. Proposed substitutions, where permitted as described above, must be submitted with the Subcontractor's bid.

I. INDEMNIFICATION

1. Subcontractor agrees to indemnify and save the Contractor and Owner harmless against and from any and all claims arising from the conduct, management or performance of the Work, including, without limitation, any and all claims arising from any condition of the Work or arising from any breach or default on the part of the Subcontractor in the performance of any covenant or agreement on his part to be performed, pursuant to the terms of the Subcontract, or arising from any act or negligence of the Subcontractor or any of his agents, subcontractors, servants, employees or licensees, or arising from any accident, injury or damage whatsoever caused to any person, firm or corporation, and from

and against all costs, reasonable counsel fees (including counsel fees on appeal), expense and liabilities incurred in or about any such claim, action or proceeding brought thereon; and in the event any action or proceeding be brought against the Contractor, shall defend against such action or proceeding by counsel satisfactory to the Contractor and Owner, unless such action or proceeding is defended against by counsel for any carrier of public liability insurance referred to herein.

**J. SUBMITTALS**

1. Submit shop drawings and other submittal data as required by the technical sections of these Specifications to the Architect/Engineer for approval.
2. Submit shop drawings and other submittal data as scheduled in Section 01000, Appendix "A" - Submittal Data Schedule and/or as required by the technical sections of these Specifications to the Architect/Engineer for approval.
3. All submittals specified for submission by Materials Suppliers or Subcontractors to the Architect/Engineer shall be submitted to The Haskell Company, "Attention: Project Manager."
4. All submittals shall be accompanied by a duly completed copy of The Haskell Company "Submittal Data Transmittal" form as included in this section of the specifications as appendix "B".
5. Additional copies of The Haskell Company's project drawings will be provided upon receipt of duly completed copy of The Haskell Company's "CAD Drawing Request Form" form as included in this section of the specifications Appendix "C".
6. No portion of the work requiring submission of a Shop Drawing, Manufacturer's Literature, or Sample shall be commenced until the submittal has been approved by the Architect/Engineer.
7. Number of Copies:
  - a. Shop Drawings: Six copies
  - b. Catalog Data: Five copies.
  - c. Samples: Two unless specified otherwise in these Specifications.

**K. YEAR 2000 COMPATIBILITY**

1. Certify year 2000 compatibility for all computerized products or components.
2. Submit certificate of compliance for all components with computer programs, chips, microcode, embedded chips, or any computer components.
3. Compliance is defined as no action necessary by Owner or The Haskell Company when YEAR 2000 occurs, and for continued service operation thereafter.

**L. WARRANTY**

1. The Contractor and each Subcontractor shall warrant that all materials and equipment furnished for the project will be new unless otherwise specified, and that all work will be of good quality, free from faults and defects and in conformance with the contract documents. All work not so conforming to these standards may be considered defective. If required by the Architect/Engineer, Contractor or the Owner, the Subcontractor or material supplier shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The warranty provided in this paragraph and elsewhere in the contract documents shall be in addition to and not in limitation of any other warranty or remedy required by law or by the contract documents.
2. The Contractor and each Subcontractor further warrant that the work shall be free from defects in material and workmanship for a period of 2 year, or a period as may be otherwise specified in the technical sections of these specifications. Warranty period shall commence on the date of final completion or the date the Owner takes possession of the work, whichever occurs first. The Contractor and all Subcontractors shall promptly repair any defects in their work at their expense. The term "defects" shall not be construed as embracing damage arising from the Owner's misuse or negligence, Acts of God, normal wear and tear, or failure to follow operating instructions

**M. RECORD DRAWINGS**

1. During the progress of the work the Job Superintendents for each Subcontractor for the Civil, Plumbing, Air Conditioning, Heating, Ventilating and Electrical Subcontractors shall record on their field sets of drawings, the exact locations as installed of all underground and otherwise concealed pipe and duct lines which are not installed exactly as shown on the Contract Drawings. Pipe lines and ducts which are installed in furred spaces, pipe chases or other spaces which can be readily inspected by the use of access panels or other means of access will not be considered as being concealed. With reference to electrical work the exact conduit runs shall be shown on these drawings.
2. Upon completion of the work this data shall be recorded, to scale, by a competent drafter on a sepi or CAD drawing furnished by the Contractor. A separate tracing shall be prepared for electrical, plumbing, air conditioning, heating and ventilating work unless two or more divisions are shown on the same sheets of the Contract Drawings, in which case the various Subcontractors shall also show their changes on the same sheets. Each sheet shall bear the date and name of the Subcontractor who prepared the drawing.
3. Record drawings shall be submitted to the Architect/Engineer by each Subcontractor upon completion of the work and prior to final payment.
4. Record drawings are not certifiable by the Architect/Engineer.

**N. QUANTITY ALLOWANCES**

1. Quantity allowances for certain items of work are listed in the various technical sections of these Specifications and these quantities shall be included in each affected Subcontractor's bid.
2. The Contractor will keep a separate accounting of quantities chargeable to allowances and shall report them to the Owner as often as requested. Upon completion of the work, any variance from the allowance shall be adjusted by change order.

**O. SITE VISIT**

1. Visit the site of the proposed work to determine the physical limitations of access and working space and take responsibility for working within these limitations.
2. The failure to visit the site and become acquainted with existing conditions shall in no way relieve any Subcontractor from any contractual obligation.

**P. DIFFERING CONDITIONS**

1. Notify the Architect/Engineer, in writing, before disturbing any of the following or similar conditions:
  - a. Any subsurface or latent physical conditions at the site differing materially from those shown on the drawings.
  - b. Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this project.

**END OF SECTION**

**SECTION 01000**

**SUBMITTAL DATA SCHEDULE(APPENDIX A)**

Section 01000 - Appendix "A"  
Submittal Data Schedule

Anheuser-Busch  
Williamsburg Brewery

| SUBMITTALS<br>REQUIRED |   |   |  |   | ITEM  | SPEC.<br>SECT. | SUPPLIER | DATE<br>DUE |
|------------------------|---|---|--|---|-------|----------------|----------|-------------|
| CERTIFICATES           |   |   |  |   |       |                |          |             |
| SHOP<br>DRAWINGS       |   |   |  |   |       |                |          |             |
| MANUFAC.<br>DATA       |   |   |  |   |       |                |          |             |
| SAMPLE/<br>COLOR       |   |   |  |   |       |                |          |             |
| X                      |   |   |  | Storm Pipe and<br>Miscellaneous Materials | 02635 |                |          |             |
|                        | X |   |  | Precast Concrete<br>Structures            | 02640 |                |          |             |
|                        | X |   |  | Precast Concrete<br>Manholes              | 02640 |                |          |             |
| X                      |   |   |  | Paving Materials                          | 02741 |                |          |             |
|                        | X |   |  | Job Mix Formula                           | 02741 |                |          |             |
|                        | X |   |  | Concrete Mix Designs                      | 02751 |                |          |             |
|                        | X | X |  | Fencing                                   | 02821 |                |          |             |
| X                      | X |   |  | Seed, Etc.                                | 02921 |                |          |             |

**SECTION 01000**

**SUBMITTAL DATA TRANSMITTAL FORM(APPENDIX B)**





# THE HASKELL COMPANY

TOTAL FACILITY SOLUTIONS

## Submittal Data Transmittal

Shaded areas to be completed by The Haskell Company Specification Section \_\_\_\_\_ File No.: \_\_\_\_\_

Project Number: \_\_\_\_\_ Project Name: \_\_\_\_\_ Date: \_\_\_\_\_

Project Location: \_\_\_\_\_ Project Manager: \_\_\_\_\_

### TO BE COMPLETED BY SUBCONTRACTOR OR MATERIALS SUPPLIER

Submitted by (print company name): \_\_\_\_\_

| Item Number | #of Copies Sent | Submittal Type | Submittal Description |
|-------------|-----------------|----------------|-----------------------|
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |
|             |                 |                |                       |

I hereby certify this submittal data has been reviewed and approved prior to submission to The Haskell Company and the information contained within this submittal has been checked and coordinated with the requirements of the Work and the Contract Documents. Action indicated on this submittal by The Haskell Company does not relieve the signer of any contractual obligations and responsibilities.

Reviewed & Approved by: \_\_\_\_\_  
Signature Printed Name

### TO BE COMPLETED BY THE HASKELL COMPANY

Const. Review by: \_\_\_\_\_ Date submitted to A/E: \_\_\_\_\_ Date required back from A/E: \_\_\_\_\_

| SEQ. | ROUTE TO            | PERSON | DATE IN | CHECK BY | DATE OUT | *STATUS |
|------|---------------------|--------|---------|----------|----------|---------|
|      | Architectural       |        |         |          |          |         |
|      | Civil               |        |         |          |          |         |
|      | Structural          |        |         |          |          |         |
|      | Mechanical          |        |         |          |          |         |
|      | Plumbing            |        |         |          |          |         |
|      | Refrigeration       |        |         |          |          |         |
|      | Electrical          |        |         |          |          |         |
|      | Consultant          |        |         |          |          |         |
|      | Quality Assurance   |        |         |          |          |         |
|      | Resource Specialist |        |         |          |          |         |
|      | Project Leader      |        |         |          |          |         |
|      | Project Manager     |        |         |          |          |         |

Remarks \_\_\_\_\_

#### Completion by Submittal Clerk

Date rcvd \_\_\_\_\_

No. of copies rcvd \_\_\_\_\_

Date returned to PM \_\_\_\_\_

No. of copies returned \_\_\_\_\_

#### Submittal Types

AB As-Built PD Product Data  
CA Calculations SA Samples  
MC Material Certs SC Schedule  
MD Mix Designs SD Shop Drwgs  
OM O&M Manual TR Test Reports  
OT Other WA Warrantee

#### \*Status Key

1 - No Exceptions Taken  
2 - Make Corrections Noted  
3 - Revise & Resubmit

CC016\_ANHEUSER\_BUSCH\_TRANS\_ADVANT 535 of 422

**SECTION 01000**

**CAD DRAWING REQUEST FORM(APPENDIX C)**



THE HASKELL COMPANY

HASKELL BUILDING • JACKSONVILLE, FL 32231-4100 • 904/791-4500

## CAD Drawing Request

request CAD drawings on ☐ 3 1/2" Diskette  
☐ CD Rom  
☐ Zip Disk  
☐ Sepia Drawings  
(Check One)

Name of Company Requesting CAD Drawings

Name of Project

For the purpose of

Specifically, we request the following:

- |   |   |
|---|---|
| <input type="checkbox"/> Civil Drawings         | <input type="checkbox"/> Fire Protection        |
| <input type="checkbox"/> Architectural Drawings | <input type="checkbox"/> Mechanical Drawings    |
| <input type="checkbox"/> Structural Drawings    | <input type="checkbox"/> Electrical Drawings    |
| <input type="checkbox"/> Plumbing Drawings      | <input type="checkbox"/> Refrigeration Drawings |

We understand that release of these CAD files or drawings does not relieve us of our responsibility to fully coordinate all items for construction and to provide fully developed original shop drawings. It is our responsibility to convert the diagrammatic drawings into actual laid-out work by dimensioning and locating appropriate systems, equipment and all related work. We fully understand that The Haskell Company does not warrant or guarantee that the drawings are dimensionally accurate and shall refer to the Contract Documents for all information related to design intent. Further, as stated in the Contract Documents, we are responsible for verifying existing conditions and coordinating those conditions. We acknowledge our understanding of the above information by our signature below.

Name of Company Officer

Date

Title of Company Officer

**SECTION 01400**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. References and standards.
- B. Quality assurance submittals.
- C. Mock-ups.
- D. Control of installation.
- E. Tolerances.
- F. Testing and inspection services.
- G. Manufacturers' field services.

**1.02 RELATED SECTIONS**

- A. Section 01000 - General Requirements.
- B. Section 03000 - Concrete Testing
- C. Section 15000 - Mechanical General
- D. Section 16000 - Electrical, General Requirements
- E. Document 00700 - General Conditions: Inspections and approvals required by public authorities.
- F. Section 01210 - Allowances: Allowance for payment of testing services.
- G. Section 01300 - Administrative Requirements: Submittal procedures.
- H. Section 01425 - Reference Standards.
- I. Section 01600 - Product Requirements: Requirements for material and product quality.

**1.03 REFERENCES**

- A. ASTM C 802 - Standard Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction; 1994.
- B. ASTM C 1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 1997.
- C. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 1997.
- D. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Unit Masonry; 1995.

- E. ASTM D 290 - Standard Practice for Bituminous Mixing Plant Inspection; 1991a.
- F. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 1996.
- G. ASTM D 4561 - Standard Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials; 1991.
- H. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction; 1995c.
- I. ASTM E 543 - Standard Practice for Agencies Performing Nondestructive Testing; 1996.
- J. ASTM E 548 - Standard Guide for General Criteria used for Evaluating Laboratory Competence; 1994.
- K. ASTM E 699 - Standard Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E-6; 1979 (Reapproved 1991).

#### 1.04 SUBMITTALS

- A. Testing Agency Qualifications:
  - 1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time specialist and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Design Data: Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Design Data: Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- D. Test Reports: After each test/inspection, promptly submit five copies of report to Architect/Engineer and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with related contract documents
    - k. When requested by Architect/Engineer, provide interpretation of results.
  - 2. Test reports are submitted for assessing conformance with information given and the design concept expressed in the contract documents.
  - 3. Test reports are submitted for the Architect/Engineer's knowledge as contract

- administrator or for the Owner for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
4. Test Reports:
    - a. Number in-place soil density tests sequentially with exception of retests.
    - b. Number retests with original test number followed by letter i.e. Test No. 16A means first retest, etc.
    - c. Reference horizontal location of density tests.
    - d. Reference horizontal location of density tests to column lines within building areas and to gridlines in paved areas.
    - e. Reference vertical location of tests to elevation datum or to depth below finished subgrade.
  - E. Test Reports: After each test/inspection, promptly submit two copies of report to Architect/Engineer and to Contractor.
    1. Include:
      - a. Date issued.
      - b. Project title and number.
      - c. Name of inspector.
      - d. Date and time of sampling or inspection.
      - e. Identification of product and specifications section.
      - f. Location in the Project.
      - g. Type of test/inspection.
      - h. Date of test/inspection.
      - i. Results of test/inspection.
      - j. Conformance with Contract Documents.
      - k. When requested by Architect/Engineer, provide interpretation of results.
    2. Test reports are submitted for the Architect/Engineer's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
  - F. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or application subcontractor to Architect/Engineer, in quantities specified for Product Data.
    1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
    2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect/Engineer.
  - G. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
  - H. Manufacturer's Field Reports: Submit reports for the Architect/Engineer's benefit as contract administrator or for the Owner.
    1. Submit report in duplicate within 30 days of observation to Architect/Engineer for information.
    2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
  - I. Erection Drawings: Submit drawings for the Architect/Engineer's benefit as contract administrator or for the Owner.
    1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
    2. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer or Owner.

## 1.05 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

## 1.06 TESTING AND INSPECTION AGENCIES

- A. Contractor shall employ and pay for services of an independent testing agency to perform specified testing and inspection.
- B. Employment of agency in no way relieves Subcontractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
  - 1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 548, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, ASTM D 290, and ASTM D 3740.
  - 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E548.
  - 3. Laboratory: Authorized to operate in State in which Project is located.
  - 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
  - 5. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.



- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

### 3.02 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

### 3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### 3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
  - 1. Test samples of mixes submitted by Subcontractor.
  - 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests and inspections required by Architect/Engineer.
  - 7. Attend preconstruction meetings and progress meetings.
  - 8. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.

3. Agency may not assume any duties of Subcontractor.
  4. Agency has no authority to stop the Work.
- D. Subcontractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Subcontractor beyond specified requirements.
  6. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Subcontractor beyond specified requirements.
  7. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the Architect/Engineer. Payment for re-testing will be charged to the Subcontractor.
- F. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the Architect/Engineer. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.

### 3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.
  1. Observer subject to approval of Architect/Engineer.
  2. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

### 3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct an appropriate remedy.

**END OF SECTION**

**SECTION 02216**

**STANDARD PENETRATION TESTS**

**PART 1 GENERAL**

**1.01 GEOTECHNICAL INFORMATION**

- ? WHERE
- A. Boring Logs from a Geotechnical Exploration Report shall be provided for the subcontractors use. The report is provided for the Subcontractor's information only.
  - B. The entire Geotechnical Exploration Report is available for Subcontractors' review thru the Contractor. However, portions of the Report other than the Boring Logs attached to this Section are not a part of the Contract Documents.

**1.02 UNDERSTANDINGS**

- A. It is to be expressly understood that the Owner, Contractor, and Architect/Engineer will not be responsible for any interpretation or conclusion drawn from the Geotechnical Information provided herein.
- B. Investigations have been made for purposes of design only and neither Architect/Engineer, Contractor, Owner, or persons conducting investigations guarantee adequacy of data, or that data are representative of all conditions to be encountered.

**END OF SECTION**

**SECTION 02230**

**SITE CLEARING**

**PART 1 GENERAL**

**1.01 DEFINITIONS**

- A. Utility Companies: See Section 01000 - General Requirements.

**1.02 SECTION INCLUDES**

- A. Removal of surface debris.
- B. Removal of trees, shrubs, and other plants indicated.
- C. Removal of sod.
- D. Removal of existing fences as indicated.
- E. Removal of paving, curbs, and dolly pads.
- F. Removal of existing curb & gutter, header curb, pavement, and aprons as indicated.
- G. Removal/abandonment of existing storm drains.
- H. Removal/abandonment of existing underground utilities as indicated.
- I. Disposal of all cleared and grubbed materials.

**1.03 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 02231: Tree Protection and Trimming.
- C. Section 02310 - Grading: Topsoil removal.
- D. Section 02370 - Erosion and Sedimentation Control.

**1.04 PROJECT CONDITIONS**

- A. Conform to applicable regulations relating to environmental requirements, disposal of debris, burning debris on site, and use of herbicides. Burning of debris on site also requires the approval of the Contractor.
- B. Coordinate clearing work with utility companies.
- C. Protect utilities to remain from damage.
- D. Protect trees, plants, and other features designated to remain as final landscaping.
- E. Protect bench marks, survey control points, and existing structures from damage or displacement.

- F. Protect adjacent property, streets, roads, and other facilities to remain.
- G. Subcontractor shall be responsible for repair/replacement of above to remain items damaged in the course of its work.

### 1.05 SUBMITTALS

- A. Permit(s) for burning on site if such a partial disposal option is selected.
- B. Herbicides proposed for use.

## PART 2 PRODUCTS

### 2.01 NOT USED

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Locate and identify utilities to remain prior to beginning clearing operations as follows:
  - 1. Subcontractor shall locate all utility company maintained utilities in work areas on and adjacent to the project site.
  - 2. Owner shall at the Contractor's request, locate all on site above ground and underground existing utilities maintained by the Owner, prior to construction in any project area. Owner's location of underground utilities shall include the excavation down to and exposing of the utilities at points of intersection in horizontal alignment.
  - 3. Contractor shall furnish to the Subcontractor location information on privately maintained underground utilities located on work and work interface areas adjacent to the Site. The Subcontractor shall then be responsible for the location/protection of such utilities, using caution to not damage them in their locating.
- B. Verify that existing plants designated to remain are tagged or identified.
- C. Tag existing plants designated to remain.
- D. Identify a salvage area for placing removed materials and obtain Contractor's approval on same.

### 3.02 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees, shrubs, and stumps indicated.
- C. Clear undergrowth and deadwood without disturbing subsoil.
- D. Remove existing sod.

### 3.03 REMOVAL

- A. Remove surface rock and boulders.
- B. Remove paving, curbs, paving, culverts, storm sewers and piping as indicated. Neatly saw cut edges at right angle to surface.

- C. Remove existing buildings as indicated.
- D. Remove debris from site.

### **3.04 STRIPPING TOPSOIL**

- A. Remove all topsoil from areas of proposed building, pavement and earthwork construction.
- B. Remove all top soil from stormwater pond excavation areas.
- C. Remove topsoil to stockpile on site as directed by Contractor.

### **3.05 GRUBBING**

- A. Remove all stumps, roots over one inch in diameter, and matted roots to the depths indicated below. Additionally in areas to be paved or to have building construction, after initial removal of roots to the depths shown below, plow the surface to a depth of at least 6" and then remove all roots exposed again to the depths indicated below.
  - 1. Footings, slabs on grade, bottom slabs of structures: 18 inches.
  - 2. Walks: 12 inches.
  - 3. Roads and parking areas: 18 inches.
  - 4. Areas to be grassed or landscaped: 8 inches.
  - 5. Areas to be filled: 12 inches.
- B. Footings, slabs on grade, bottom slabs of structures, roads and parking areas, or other construction on fills, use greater depth.
- C. Unless further cut is required, fill depressions made by grubbing and compact until subsidence of fill is not visible detectable.

### **3.06 CLEAN-UP**

- A. Debris and Rubbish: Remove and transport debris and rubbish in manner that will prevent spillage on streets or adjacent areas.
  - 1. Clean up spillage from streets and adjacent areas.
  - 2. Comply with Federal, state and local hauling and disposal regulations.
  - 3. Do not burn materials on site without approval of Contractor and local regulatory agencies.

**END OF SECTION**

**SECTION 02250**

**COMPACTION CONTROL AND TESTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES:**

- A. Summary of Site Work material characteristics and in-place property requirements. In the case of conflict between the requirements of this Section and those of other sections, the later shall govern.
- B. Laboratory testing of soil samples.
- C. Inspection of site stripping and grubbing operations in areas to receive pavement or concrete slabs.
- D. Inspection/comparison of existing soils in pavement and footing areas with Geotechnical Exploration Report boring logs.
- E. Witnessing of proof rolling of existing soil surfaces under building slab and pavement areas.
- F. Testing of stabilized subgrade.
- G. In-place field density testing of compacted soil.
- H. Testing of asphaltic pavement subgrade.
- I. Testing of asphaltic pavement base.
- J. Testing of asphaltic concrete pavement surface course.
- K. Testing of portland cement concrete pavement subgrade.
- L. Testing of portland cement concrete pavement materials.

**1.02 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 01400 - Quality Requirements: Testing Agency Qualifications:
- C. Section 02230 - Site Clearing
- D. Section 02310 - Grading
- E. Section 02315 - Excavation
- F. Section 02316 - Fill and Backfill: Backfill for piping and electrical work; Compaction of subsoils.
- G. Section 02317 - Trenching for Site Utilities: Trench excavation for piping and electrical work.
- H. Section 02741 - Bituminous Concrete Paving: Asphaltic concrete surface course.
- I. Section 02751 - Portland Cement Concrete Paving



### 1.03 SUBSURFACE SOIL INVESTIGATIONS

- A. Subsurface soil investigations have been made at site and the Consultant's standard penetration borings are included in Specifications section referenced above.
- B. Project specification requirements have precedence over any recommendations contained in subsurface soil investigation report.

### 1.04 TESTING AGENCY

- A. As selected and directed by Architect/Engineer and paid by Contractor.
- B. Requests for Testing Services: Scheduled by Contractor.
- C. Qualifications:
  - 1. Independent testing agency qualified in soil testing and geotechnical engineering.
  - 2. Testing and Inspection: By competent soils engineering technicians and/or soils engineers whose work is directed and reviewed by Geotechnical Engineer registered in State of Virginia.
  - 3. Meet the Testing Agency Qualifications stated in Section 01400 - Quality Requirements.
- D. Duties:
  - 1. Perform all Testing and Inspection services specified herein. Watch for variations in construction soils, materials, and operations indicating the need for testing beyond the frequency specified herein, immediately reporting same to Architect/Engineer and Contractor, and perform such additional testing/inspection authorized by Architect/Engineer.
  - 2. Perform testing in strict accordance with specified ASTM and AASHTO test procedures using calibrated testing equipment.
  - 3. Perform the specified inspections and tests in accordance with methods widely recognized in geotechnical engineering industry, and as approved by Architect/Engineer.
  - 4. Immediately inform Contractor of (a) test/inspection results not meeting Specification requirements, and (b) the work areas represented by such tests.
  - 5. Testing Agency and its representatives are not authorized to revoke, alter, relax, enlarge, or release any requirement of contract documents, nor to approve or accept any portion of work.
  - 6. Issue testing and inspection reports as directed by Architect/Engineer.
  - 7. Geotechnical technician will provide field copy of field run test results to Job Superintendent prior to leaving job site each day. Test results not meeting specification requirements shall be flagged by the technician.

## PART 2 PRODUCTS

### 2.01 NOT USED

## PART 3 EXECUTION

### 3.01 EARTHWORK INSPECTION AND TESTING

- A. Sampling:
  - 1. At appropriate times during construction operations, obtain representative bag samples of soils and materials to be tested per attached Table 02250 - Site Work Material Characteristics, In Place Properties, Testing & Inspection Requirements.

2. Obtain and transport samples to testing laboratory for required laboratory tests well in advance of on-site compaction operations.
- B. Laboratory/Field Testing/Inspection Services: Perform the testing and inspection services stipulated in attached Table 02250 - Appendix A - Testing Summary
- C. Test Reporting:
1. Number in-place field density tests/inspection reports sequentially with exception of retests/reinspections.
  2. Number retests with original test number followed by letter (i.e. Test No. 16A means first retest, etc.).
  3. Clearly label all tests on test reports and specifically note questionable area or areas.
  4. Reference horizontal location of density tests to column lines within building areas and to easily identified reference points in paved areas.
  5. Reference horizontal location of field tests/inspections distances North and East of the 0' North, 0' East Origin of the coordinate system on the Drawings.
  6. Reference vertical location of tests to elevation datum or to depth below finished subgrade.
  7. Retests/Reinspections:
    - a. Identify areas represented by failing field tests/inspections to Contractor.
    - b. After designated area has been re-worked, retest/reinspected area at locations selected by Testing Agency on random basis.
    - c. Communicate all failing test/inspection and all retest/reinspection results to Contractor and Architect/Engineer within 24 hours.

### 3.02 ASPHALTIC CONCRETE PAVING TESTS

- A. At start of paving operations, obtain one sample of each type of asphalt delivered to job in accordance with ASTM D 979.
- B. Perform extraction (ASTM D 2172) and gradation (ASTM C 136) analyses upon each bulk sample obtained at start of paving.
- C. As paving operations progress, determine in-place density of each course of asphalt mix construction by use of Nuclear Method, ASTM D 2950, as directed by Contractor, using bulk specific gravity of laboratory compacted specimen, shown on approved mix design, as compaction standard.
- D. For purposes of determining percent of laboratory density, develop correction factor for each nuclear testing device used as directed by Contractor.
- E. Cores:
  1. Take random 4 inch diameter cores through asphaltic concrete as directed by Contractor at various density locations for determining thickness of asphalt.
  2. When required by Contractor, test these cores for bulk specific gravity for correlation of nuclear device as specified in this section.
  3. Fill core holes with asphaltic concrete after core removal.
- F. Immediately notify Contractor of deficient density or thickness.
- G. Include Site Plan in report showing all test locations.

### 3.03 FOOTING INSPECTION

- A. Verification of Soil Type: Inspect bearing elevation of soil-supported footings to assure that soil type and relative, in-place density compares with boring log data upon which design bearing pressure was based.

- B. If unacceptable soft or dissimilar soils are encountered, advise Architect/Engineer and Contractor promptly.

**END OF SECTION**

SECTION 02250 - APPENDIX A  
TESTING SUMMARY

Transportation Advantage  
Williamsburg Brewery  
Anheuser-Busch, Inc.

**Compaction and Testing Methods**

|                          |   |
|--------------------------|---|
| Soil Compaction Standard | Modified Proctor (ASTM D 1557)  |
| Gradation Test           | One for each soil type (ASTM D 422)   |
| Atterberg Limits         | One for each soil type (ASTM D 4318)  |
| Organic content          | Only if soil sample appears to contain a significant amount of organic matter.                  |
| Plasticity Index         | One for each soil type (ASTM D 4318)  |
| Field Density Test       | Nuclear (ASTM D 2922), Drive Sleeve (ASTM D 2937) and Sandcone method (ASTM D 1556) acceptable. |

**Material Definitions**

**Structural Fill:** Unified Soils Classification (ASTM D-2487) of SW, SP, SM, SC, CL or combinations thereof (ie: SW-SM, SP-SM, etc.). Structural Fill materials will be predominantly granular, non-expansive, free of organic matter with a maximum particle size of 2-inches. Additionally, the Structural Fill material is to possess a plasticity index less than 15, a liquid limit less than 35, not more than 70% passing the #200 sieve, and be conditioned to within 2-percent of optimum moisture content. Material shall be imported.

✓ **General Fill:** Unified Soils Classification (ASTM D-2487) of SW, SP, SM, SC, CL, CH, MH or combinations thereof (ie: SW-SM, SP-SM, etc.). General Fill materials will be on-site sandy clays, clays, and clay loams.

**Granular Fill:** Unified Soils Classification (ASTM D 2487) of SW, SP, SM, SC or combinations thereof (ie: SW-SP, SW-SM, etc.). Granular Fill material shall be natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter. Material shall be imported.

### Compaction and Testing Requirements

| <u>Location</u>                                   | <u>Frequency</u>                  | <u>%Comp.</u> |
|---|-----------------------------------|---------------|
| Profrolled Existing Soil                          | All Areas                         | NA (1)        |
| Structural Fill<br>(Building)                     | 1 Test/10,000 sq. ft. per 8" lift | 95 (2)        |
| General Fill<br>(Lawn Area)                       | 1 Test/25,000 sq. ft. per 8" lift | 95 (2)        |
| (Pavement Area)                                   | 1 Test/10,000 sq. ft. per 8" lift | 95 (2)        |
| Granular Fill<br>(Pipe Trench)                    | 1 Test/1000 lin. ft. per 8" lift  | 95 (2)        |
| Compacted Subgrade<br>Material<br>(Pavement Area) | 1 Test/10,000 sq. ft.             | 95 (2)        |

#### Notes:

- (1) Proof roll the upper exposed stripped soils with a fully loaded axle dump truck or other heavy rubber tired construction vehicle to identify any loose, soft, yielding, or unstable subgrade conditions.

Scarify and moisture condition the upper 6-inches of the stripped surface to within 3-percent of the optimum moisture content.

- (2) Adjust material to within 3-percent of optimum moisture content and test in accordance with the Modified Proctor (ASTM D 1557)

## **SECTION 02310**

### **GRADING**

#### **PART 1 GENERAL**

##### **1.01 DEFINITIONS**

- A. Utility Companies: See Section 01000 - General Requirements.

##### **1.02 SECTION INCLUDES**

- A. Removal and storage of topsoil.
- B. Rough grading the site.
- C. Rough grading for landscaping areas.
- D. Rough and finish grading of drainage swales and ditches.
- E. Replacement of topsoil and finish grading.
- F. Placement of top soil in lawn and planting areas.
- G. Finish grading of all soil areas to be cleared, seeded, sodded.
- H. Removal of unused stockpiled excavated top soils and subsoils from site.

##### **1.03 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 02230 - Site Clearing: Top soil removal/stockpiling and removal of unused stockpiled top soil from site.
- C. Section 02315 - Excavation.
- D. Section 02316 - Fill and Backfill: Filling and compaction.
- E. Section 02317 - Trenching for Site Utilities: Trenching and Backfilling for Utilities.
- F. Section 02921 - Seeding: Finish ground cover.
- G. Section 02930 - Exterior Plants: Topsoil in beds and pits.

##### **1.04 SUBMITTALS**

- A. Project Record Documents: Accurately record by horizontal dimensions, elevations or inverts, and slope gradients the actual locations of existing utilities and drainage pipe that are to remain, differing from that indicated on the Drawings.

##### **1.05 REFERENCE STANDARDS**

- A. Perform Work in accordance with James City County and State of Virginia standards.

## **1.06 PROJECT CONDITIONS**

- A. Protect above and below grade utilities that are to remain.
- B. Protect plants, lawns, and other features to remain as a portion of final landscaping.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic. Subcontractor shall be responsible for the cost of repair/replacement of said damage/displacement of these items.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Topsoil: See Section 02316.
- B. Other Fill Materials: See Section 02316 - Fill and Backfill.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work relate as indicated.

### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Locate and identify utilities to remain prior to beginning clearing operations as follows:
  - 1. Subcontractor shall locate all utility company maintained utilities in work areas on and adjacent to the project site.
  - 2. Owner shall at the Contractor's request, locate all on site above ground and underground existing utilities maintained by the Owner, prior to construction in any project area. Owner's location of underground utilities shall include the excavation down to and exposing of the utilities at points of intersection in horizontal alignment.
  - 3. Contractor shall furnish to the Subcontractor location information on privately maintained underground utilities located on work and work interface areas outside the Site. The Subcontractor shall then be responsible for the location/protection of such utilities, using caution to not damage them in their locating.
- C. Stake and flag locations of known utilities.
- D. Locate, identify, and protect utilities that are to remain, from damage.

### **3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further landscaped or graded

- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. See Section 02316 for fill requirements, filling procedures and compaction of fill.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- H. Do not disturb existing soil structure beyond drawing excavation limits. Do not excavate triangular and short bottom width swales with self loading scraper beyond drawing excavation limits.

### 3.04 SOIL REMOVAL AND STOCKPILING

- A. Stockpile excavated topsoil on site.
- B. Stockpile excavated subsoil on site.
- C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

### 3.05 FINISH GRADING

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. Where topsoil is to be placed, scarify surface to depth of 3 inches.
- D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.
- E. Top soil:
  - 1. Placement shall be during dry weather.
  - 2. Shall be placed in areas where seeding, sodding, and planting are indicated.
  - 3. Where required shall be placed to uniform finish grade.
  - 4. Shall be placed to the following compacted thicknesses:
    - a. Areas to be Seeded with Grass: 6 inches.
    - b. Shrub Beds: 18 inches.
    - c. Flower Beds: 12 inches.
  - 5. Shall have roots, weeds, rocks, and foreign material removed while spreading.
  - 6. Shall be spread manually near plants and buildings to prevent damage.
  - 7. Shall be finish graded to eliminate uneven areas and low spots, ready for hand rake smoothing for seeding, sodding or planting. Maintain profiles and contour of subgrade.
  - 8. Shall be fine graded to eliminate uneven areas and low spots, maintaining profiles and contour of subgrade.
  - 9. Shall be lightly compacted after placement.

### 3.06 TOLERANCES

- A. Finished surfaces - 0.1 feet
- B. Areas under topsoil or sod - 0.2 feet



- C. Areas under concrete slabs - Minus 0.05 or Plus 0.02 feet.
- D. Areas under paving (subgrade) - 0.05 feet.
- E. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.
- F. Top Surface of Finish Grade: Plus or minus 1/2 inch.

### **3.07 FIELD QUALITY CONTROL**

- A. See Section 02316 for compaction density testing.

### **3.08 CLEANING AND PROTECTION**

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water. Do not stockpile excess material as landscape berms in parking area landscaping islands
- B. Leave site clean and raked, ready to receive landscaping.

**END OF SECTION**

**SECTION 02315**

**EXCAVATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of unsuitable subsoils.
- B. Excavating for building volume below grade, footings, grade beams, detention ponds, swales, overexcavation for engineered fill, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.
- C. Excavation in the bottom and sides of existing ditches to be filled in, to remove silt, trash and debris.
- D. Stockpiling of excavated subsoils on site in a location designated by Contrator.
- E. Removal of excavation debris and unusable excavated subsoils and materials to stockpile areas.
- F. Groundwater level control during excavation and until backfilling is started.
- G. Removal of unsuitable subsoils beneath structures and pavement.

**1.02 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 01400 - Quality Requirements.
- C. Section 02216 - Standard Penetration Tests
- D. Section 02250 - Compaction Control and Testing: Proof rolling of existing soils.
- E. Section 02310 - Grading: Soil removal from surface of site.
- F. Section 02316 - Fill and Backfill: Fill materials, filling, and compacting.
- G. Section 02317 - Trenching for Site Utilities: Excavating for utility trenches.
- H. Section 02370 - Erosion and Sedimentation Control
- I. Section 02373 - Riprap.

**1.03 PROJECT CONDITIONS**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Protect plants, lawns, rock outcroppings, and other features to remain.

- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic. Subcontractor shall be responsible for the repair/replacement of damage/displacement to said facilities.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 02310 for additional requirements.
- C. Identification of utilities to remain prior to beginning excavation operations:
  - 1. Contractor shall locate all utility company maintained utilities in work areas on and off the project site.
  - 2. The Owner shall at the Contractor's request, locate all on-site aboveground and underground existing utilities maintained by the Owner, prior to construction in any project area. Owner's location of underground utilities shall include the excavation down to and exposing of the utilities points of intersection in horizontal alignment.
  - 3. Contractor shall furnish to the Subcontractor location information on privately maintained underground utilities located on work and work interface areas outside the Site. The Subcontractor shall then be responsible for the location/protection of such utilities, using caution to not damage them in their locating.
- D. Protect existing utilities to remain from damage.
- E. Locate, identify, and protect utilities that remain and protect from damage.
- F. Control groundwater elevation:
  - 1. As required for control of excavation limits and stability until backfilling is completed.
  - 2. In building footing excavation areas to not less than 1 foot below bottom of footing excavation during excavation and until footing concrete has cured, to maintain bearing level soil integrity.

### **3.02 EXCAVATING**

- A. Underpin adjacent structures which may be damaged by excavating work.
- B. Protection of nearby structures and facilities:
  - 1. Take precautions to protect nearby structures and facilities from erosion of their soil support from caused by adjacent footing excavation operations.
- C. Excavate and remove unsuitable existing soils identified under Section 02316 - Fill & Backfill.
- D. Excavate to accommodate new structures and construction operations.
- E. Notify Architect/Engineer of subsurface conditions at variance with the soil boring logs, and discontinue affected Work in area until notified to resume work.
- F. Side slopes of excavations:
  - 1. Shall be no steeper than permitted by OSHA Standards. Deeper excavation shall have trench walls supported by shoring and sheet piling in accordance with OSHA Standards.

- G. Slope banks of excavations no deeper than 3 feet to angle of repose or less until shored.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. Cut utility trenches wide enough to allow inspection of installed utilities.
- J. Hand trim excavations. Remove loose matter.
- K. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- L. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 02316.
- M. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- N. Remove excavated material that is unsuitable for re-use from site.
- O. Stockpile excavated material to be re-used in area designated on site.
- P. Remove excess excavated material to stockpile.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01000 - General Requirements, for general requirements for field inspection and testing.
- B. See Section 02250 - Compaction Control and Testing, for identification of deleterious subsoil characteristics and proof rolling of existing soils to identify soft spots requiring additional subsoil removal.
- C. Provide for visual inspection of excavated surfaces.

### **3.04 PROTECTION**

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

**END OF SECTION**

**SECTION 02316**  
**FILL AND BACKFILL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Compaction of subsoils.
- B. Filling, backfilling, and compacting for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, utilities within the building, building volume below grade, footings, paving, concrete aprons, and site structures.
- C. Backfilling and compacting for storm drains and storm manholes outside the building.
- D. Filling and compaction for areas outside of building.
- E. Groundwater level control during backfilling.

**1.02 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 02216 - Standard Penetration Tests.
- C. Section 02230 - Site Clearing.
- D. Section 02250 - Compaction Control and Testing
- E. Section 02310 - Grading: Removal and handling of soil to be re-used.
- F. Section 02310 - Grading: Site grading.
- G. Section 02315 - Excavation: Removal and handling of soil to be re-used.
- H. Section 02317 - Trenching for Site Utilities: Excavating for utility trenches.
- I. Section 02273 - Riprap.
- J. Section 02370 - Slop protection and erosion control.
- K. Section 03300 - Cast-In-Place Concrete.

**1.03 REFERENCES**

- A. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 1996a.
- B. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 1991.
- C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 1990 (Reapproved 1996).

- D. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 1991.
- E. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994.
- F. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System); 1993.
- G. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 1991.
- H. ASTM D 2937 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Drive Sleeve Methods; 1993.
- I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 1988 (Reapproved 1993).
- J. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 1995a.

#### 1.04 DEFINITIONS

- A. Finish Grade Elevations: Indicated on drawings.
- B. Subgrade Elevations: Indicated on drawings.

#### 1.05 SUBMITTALS

- A. See Section 01000 - General Requirements for submittal procedures.
- B. Samples: The Contractor shall coordinate the the testing laboratory's obtaining of a 10 lb sample of each type of fill in air-tight containers from the proposed fill source.
- C. Materials Sources: Submit name and location of imported materials source(s), for Laboratory sampling of such materials stockpile.
- D. Test Reports in accord with Section 02250 - Compaction Control & Testing:
  - 1. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
  - 2. Compaction Density Test Reports.

#### 1.06 PROJECT CONDITIONS

- A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.

## **PART 2 PRODUCTS**

### **2.01 FILL MATERIALS**

- A. General Fill: Unified Soils Classification (ASTM D-2487) of GW, GP, GM, GC, SW, SP, SM, SC, CL, ML or combination thereof (ie: GW-GP, GW-WM, SW-SM, SP-SM, SP-CL, etc.). General Fill Materials will be predominantly granular, non-expansive, free of organic matter with a maximum particle size of 6-inches. Additionally, the General Fill material is to possess a plasticity index less than 20 and be conditioned to within 2-percent of optimum moisture content.
- B. Structural Fill: Unified Soils Classification (ASTM D-2478) of GW, GP, GM, GC, SW, SP, SM, SC, or combination thereof (ie: GW-GP, GW-GM, SW\_SM, SP-SM, etc.). Structural Fill Materials will be predominantly granular, non-expansive, free of organic matter with a maximum particle size of 2-inches. Additionally, the Structural Fill material is to possess a plasticity index less than 15 and be conditioned to within 2-percent of optimum moisture content.
- C. Topsoil: See Section 02310.

### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 01400 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. See Section 02250 - Compaction Control & Testing for specific quality requirements.
- C. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- D. Where fill materials are specified by reference to a specific standard, testing of source samples for compliance will be provided before delivery to site.
- E. If tests indicate proposed source materials do not meet specified requirements, change material source and retest.
- F. Provide materials of each type from passing test sources throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 02310 - Grading for additional requirements.
- C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- D. Verify structural ability of unsupported walls to support imposed loads by the fill.
- E. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

### **3.02 PREPARATION**

- A. Remove topsoil to stockpile. Then proofroll the subgrade surface to identify soft spots.

- B. Grub and proof roll subgrade surface to depth as stated in Section 2230 - Site Clearing. Then proof-roll the subgrade surface to identify soft spots.
- C. Cut out soft areas of subgrade that visibly yield under proof-rolling action or are not capable of compaction in place. Backfill cut areas with general fill.
- D. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- E. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.
- F. Control ground water level in areas requiring the placement of structural fill. Ground water level shall be controlled as required for fill/backfill moisture content to not lessen effectiveness of compaction efforts.
- G. Protection of nearby structures and facilities. Take precautions to protect nearby structures and facilities from being adversely impacted by:
  - 1. Site compaction operations.
  - 2. Footing excavation/compaction/construction operations.

### 3.03 FILLING

- A. Fill up to subgrade elevations unless otherwise indicated.
- B. Employ a placement method that does not disturb or damage other work.
- C. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. General Fill: Place and compact materials in equal continuous layers not exceeding 12 inches depth.
- G. Structural Fill: Place and compact material in equal continuous layers not exceeding 8 inches depth.
- H. Make gradual grade changes. Bend slope into level areas.
- I. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- J. Correct areas that are over-excavated.
  - 1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 98 percent of maximum dry density as for footing contact soil.
  - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- K. Compaction Density shall be as stated in Section 02250 - Compaction Control & Testing.
- L. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.



- M. Reshape and re-compact fills subjected to vehicular traffic.

### 3.04 FILL AT SPECIFIC LOCATIONS

- A. General Fill: Fill type used in building volume, pavement areas to controlled elevations, embankments and grassed areas. Fill type to include pipe trenches above an elevation of structural fill which is 18" above the top of pipe for pipe not under pavement.
- B. Structural Fill: Fill type for placement directly under slab, within building volume, under foundations, under/around/over storm drains under pavement, and under/around/18" above the top of storm drains not under pavement.
- C. Top Soil: Fill Type used as a top of fill dressing in landscaping areas, i.e. planter areas and areas to receive sod or grassing.

### 3.05 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1/2 inch from required elevations.
- B. Top Surface of Filling Under Paved Areas and Structural Filling: Plus or minus 1/2 inch from required elevations.

### 3.06 FIELD QUALITY CONTROL

- A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.
- B. See Section 02250 - Site Work Materials for specific requirements for field inspection and testing.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- D. Proof roll compacted fill at surfaces that will be under slabs-on-grade, pavers, and paving.

### 3.07 CLEAN-UP

- A. Leave unused materials in a neat, compact stockpile.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

**END OF SECTION**

**SECTION 02317**

**TRENCHING FOR SITE UTILITIES**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

**1.02 SECTION INCLUDES**

- A. Backfilling and compacting for utilities outside the building to utility main connections.

**1.03 RELATED SECTIONS**

- A. Section 02310 - Grading: Site grading.
- B. Section 02315 - Excavation: Building and foundation excavating.
- C. Section 02316 - Fill and Backfill: Backfilling at building and foundations.

**1.04 REFERENCES**

- A. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 1996a.
- B. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 1991.
- C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 1990 (Reapproved 1996).
- D. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System); 1993.
- E. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 1991.
- F. ASRM D 2937 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Drive Sleeve Methods; 1993.
- G. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 1988 (Reapproved 1993).
- H. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 1995a.

**1.05 PROJECT CONDITIONS**

- A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.

- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.
- D. Protect plants, lawns, rock outcroppings, and other features to remain.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

## **PART 2 PRODUCTS**

### **2.01 FILL MATERIALS**

- A. General Fill: Unified Soils Classification (ASTM D-2487) of GW, GP, GM, GC, SW, SP, SM, SC, CL, ML or combination thereof (ie: GW-GP, GW-WM, SW-SM, SP-SM, SP-CL, etc.). General Fill Materials will be predominantly granular, non-expansive, free of organic matter with a maximum particle size of 6-inches. Additionally, the General Fill material is to possess a plasticity index less than 20 and be conditioned to within 2-percent of optimum moisture content.
- B. Structural Fill: Unified Soils Classification (ASTM D-2487) of GW, GP, GM, GC, SW, SP, SM, SC, or combination thereof (ie: GW-GP, GW-GM, SW-SM, SP-SM, etc.). Structural Fill materials will be predominantly granular, non-expansive, free of organic matter with a maximum particle size of 2-inches. Additionally, the Structural Fill material is to possess a plasticity index less than 15 and be conditioned to within 2-percent of optimum moisture content.

### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 01400 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. See Section 02310 for additional requirements.

### 3.02 TRENCHING

- A. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 3 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter which could damage piping or impede consistent backfilling or compaction.
- G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Stockpile excavated material to be re-used in area designated on site in accordance with Section 02310.
- J. Remove excess excavated material from site.

### 3.03 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

### 3.04 BACKFILLING

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Structural Fill: Place and compact materials in equal continuous layers not exceeding 12 inches depth.
- G. General Fill: Place and compact material in equal continuous layers not exceeding 8 inches depth.
- H. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

- I. Correct areas that are over-excavated.
  - 1. Thrust bearing surfaces: Fill with concrete.
  - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- J. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 95 percent of maximum dry density.
- K. Reshape and re-compact fills subjected to vehicular traffic.

### 3.05 BEDDING AND FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Utility Piping, Conduits, and Duct Bank:
  - 1. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.
- C. At Pipe Culverts:
  - 1. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

### 3.06 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

### 3.07 FIELD QUALITY CONTROL

- A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2922, or ASTM D2937.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Frequency of Tests: One test per each 100 lineal feet per each 8 inch lift.

### 3.08 CLEAN-UP

- A. Leave unused materials in a neat, compact stockpile.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

**END OF SECTION**

**SECTION 02370**

**EROSION AND SEDIMENTATION CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Erosion and turbidity control measures to prevent discharge of turbid waters off-site.
- B. Grassing
- C. Eathern berms
- D. Rock filter outlets
- E. Inlet protection
- F. Temporary ditching and diking
- G. Sedimentation basins.
- H. Off-site vehicle tracking control (Rock construction entrance).

**1.02 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 02230 - Site Clearing.
- C. Section 02310 - Grading.
- D. Section 02316 - Fill and Backfill.

**1.03 RELATED DOCUMENTS**

- A. The Storm Water Pollution Prevention Plan is presented in the drawings as the Erosion Control Plan.
- B. Erosion and Sediment Control Details are presented in the drawings.
- C. Monitoring and reporting documents are presented in the drawings.

**1.04 REGULATORY REQUIREMENTS**

- A. Perform work in accordance with the requirements of The United States Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges From Construction Activities. The NPDES General Permit specifies monitoring, reporting, and control requirements for construction sites.
- B. The Erosion Control Plan and Details included in the Drawings are conceptual in nature due to the difficulty in predicting the specific manner and sequence in which the Subcontractor will need to pursue the work for minimum cost. The Subcontractor shall implement a specific erosion control plan that will accomplish the required results.

- C. Perform work in accordance with the requirements of the James City County Erosion and Sediment Pollution Control Ordinance.

## 1.05 SUBMITTALS

- A. Dewatering discharge plan showing how the Subcontractor proposes to control turbidity in water discharged off-site from dewatering operations. Such plan must produce discharge waters of a quality complying with the requirements of the NPDES General Permit for Storm Water Discharges from Construction Activities and the James City County Erosion and Sediment Control Ordinance as referenced above.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Seed:
  - 1. Grass Seed:
    - a. Fresh, clean, new crop seed.
    - b. Provide certified grass seed mixture suitable for location, soil conditions, and acceptable to Architect/Engineer.
  - 2. Fertilizer:
    - a. Commercial or organic type, uniform in composition, free flowing and suitable for soil conditions of areas to be grassed.
    - b. Conform to state and Federal laws.
- B. Earth Berm:
  - 1. Provide a continuous earthen berm along the site perimeter to divert runoff to controlled discharge points.
  - 2. Provide a minimum effective berm height 24" above natural grade on the downgrade side of the berm.
  - 3. Provide a continuous sloping channel in the working face of the berm to carry storm water runoff parallel to the run of berm.
- C. Rock Filter Outlets:
  - 1. Provide a rock filter outlet to control runoff collected along the earthen berms. The structures shall function to release stormwater discharge to adjacent properties without transporting sediments.
  - 2. Provide a structure composed of R-3 rock and AASHTO #57 rock as detailed in the drawings.
- D. Inlet Protection:
  - 1. Shall consist of hay bales, screening, filter fabric, and gravel.
- E. Sedimentation Basins:
  - 1. Sedimentation basins shall be earthen basins constructed on site with sodded/seeded erosion control perimeters, and high level outlet pipes discharging to approved conveyances.
- F. Stabilized Construction Entrance:
  - 1. Shall consist of large aggregate gravel for minimum 6" depth and sufficient length to collect soils from passing vehicle tires.

### **PART 3 EXECUTION**

#### **3.01 GENERAL REQUIREMENTS**

- A. It is the Subcontractor's responsibility to implement the erosion and turbidity controls as shown on the Erosion and Sediment Pollution Control Plan. It is also the Subcontractor's responsibility to insure these controls are installed, maintained and functioning to prevent turbid/polluted water/materials from leaving the project site.
- B. The Subcontractor will adjust the erosion and turbidity controls shown on the Erosion and Sediment Pollution Control Plan and add additional control measures, as required, to insure the site meets all federal, state and local erosion and turbidity control requirements.
- C. Best management practices will be implemented by the Subcontractor as required by the Erosion and Sediment Pollution Control Plan and as required to meet the erosion and sediment control requirements imposed on the project site by the regulatory agencies.

#### **3.02 INSTALLATION OF EROSION AND SEDIMENT CONTROLS**

- A. Seed:
  - 1. Seed all flat and gently sloping site areas that are not being worked.
  - 2. Seed short steeper sloping areas having runoff generated only from their own surfaces, if weather permits development of a stand of grass before erosion occurs
- B. Sod:
  - 1. Sod steeper slopes, areas subject to concentrated runoff of stormwater, and seeded areas that have not resulted in a stand of grass sufficient to prevent erosion, all on area surfaces that are not being actively worked.
- C. Earthen Berm:
  - 1. Install as required to prevent erosion into off-site areas.
  - 2. Earthen berm barriers can be used below disturbed areas subject to sheet and rill erosion with the following limitations:
    - a. Where the maximum slope behind the barrier is 33 percent.
    - b. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 30 acres.
- D. Rock Filter Outlets:
  - 1. Outlets which discharge directly off-site shall be constructed and maintained to prevent sedimentation until the completion of all construction operations that may contribute sediment to the outlet.
- E. Inlet Protection:
  - 1. Inlets and catch basins which discharge directly off-site shall be protected from sediment-laden storm runoff until the completion of all construction operations that may contribute sediment to the inlet.
- F. Sedimentation Basins:
  - 1. Will be constructed at the common drainage locations that serve an area with 10 or more disturbed acres at one time, the proposed storm water ponds (or temporary ponds) will be constructed for use as sediment basins.
  - 2. These sediment basins must provide a minimum of 3,600 cubic feet of storage per acre drained until final stabilization of the site.
  - 3. The 3,600 cubic feet of storage area per acre drained does not apply to flows from off-site areas and flows from on-site areas that are either undisturbed or have undergone final



- stabilization where such flows are diverted around both the disturbed area and the sediment basin.
4. Any temporary sediment basins constructed must be backfilled and compacted in accordance with the specifications for structural fill.
  5. All sediment collected in permanent or temporary sediment traps must be removed upon final stabilization.
- G. Stabilized Construction Entrance:
1. A stabilized construction entrance will be provided to help reduce vehicle tracking of sediments.
  2. The paved street adjacent to the site entrance will be swept daily to remove any excess mud, dirt or rock tracked from the site.
  3. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

### 3.03 OPERATION, MAINTENANCE AND INSPECTION

- A. No more than 10 acres of the site will be denuded at one time without written permission from the Engineer.
- B. All control measures will be inspected by the Subcontractor's Superintendent, the person responsible for the day to day site operation or someone appointed by the Superintendent, at least once a week and following a storm event of 0.25 inches or greater.
- C. All turbidity control measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- D. Built-up sediment will be removed from silt fence when it has reached one-third the height of the fence.
- E. Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground
- F. The sediment basins will be inspected for the depth of sediment, and built-up sediment will be removed when it reaches 10 percent of the design capacity or at the end of the job, whichever comes first.
- G. Diversion dikes/swales will be inspected and any breaches promptly repaired.
- H. Temporary and permanent seeding and planting will be inspected for bare spots, washouts and healthy growth
- I. A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.
- J. The reports will be kept on site during construction and available upon request to the owner, engineer or any federal, state or local agency approving sediment and erosion plans or storm water management plans.
- K. The reports shall be made and retained as part of the storm water pollution prevention plan for at least three years from the date that the site is finally stabilized and the notice of termination is submitted. The reports shall identify any incidents of non-compliance.
- L. The site superintendent will select up to three individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.

- M. Personnel selected for inspection and maintenance responsibilities will receive training from the site superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used on-site in good working order.

**END OF SECTION**

## **SECTION 02373**

### **RIPRAP**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

##### **1.02 SECTION INCLUDES**

- A. Riprap.

##### **1.03 RELATED SECTIONS**

- A. Section 02316 - Fill and Backfill: Aggregate requirements.

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. Riprap: 12 inch, 6 inch minimum size, 12 inch maximum size; solid and nonfriable.
- B. Geotextile Fabric: Non-biodegradable, non-woven.

#### **PART 3 EXECUTION**

##### **3.01 EXAMINATION**

- A. Do not place riprap bags over frozen or spongy subgrade surfaces.

##### **3.02 PLACEMENT**

- A. Place geotextile fabric over substrate, lap edges and ends.
- B. Place riprap at culvert pipe ends, at embankment slopes, and as indicated.
- C. Place rock rip-rap into position. Knead, ram, or pack material to conform to contour of adjacent material and other material previously placed.
- D. Place bags in a staggered pattern. Remove foreign matter from bag surfaces.
- E. Installed Thickness: As indicated on drawing details.
- F. Place rock evenly and carefully to minimize voids, place rock in one consistent operation to preclude disturbance or displacement of substrate.

**END OF SECTION**

**SECTION 02635**

**STORM DRAINAGE PIPING**

**PART 1 GENERAL**

**1.01 DEFINITIONS**

- A. Storm Drainage System: The underground piping/inlet system that moves to disposal storm water:
  - 1. Falling on ground and pavement, and
  - 2. From the roof drain plumbing stub-outs outside of the buildings.

**1.02 SECTION INCLUDES**

- A. Construction of the underground storm drainage piping/inlet system.
- B. Excavation for storm drainage piping installation.
- C. Storm drainage piping, fittings, and accessories.
- D. Connection of drainage system to detention pond outlets.
- E. Catch basins, yard area drains, paved area drainage, site surface drainage, detention basins. Detention basin outlet control structures.
- F. Groundwater control, fill and backfill.

**1.03 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 02250 - Compaction Control and Testing: Fill and backfill character and compaction requirements.
- C. Section 02315 - Excavation: Excavating of trenches.
- D. Section 02316 - Fill and Backfill: Bedding and backfilling.
- E. Section 02640 - Manholes and Covers.
- F. Section 03300 - Cast-in-Place Concrete: Concrete for base pad construction.

**1.04 REFERENCES**

- A. ASTM C 76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 1995a.
- B. ASTM C 443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets; 1994.
- C. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 1996.
- D. ASTM D 3350 - Standard Specification for high density polyethylene (HDPE) Pipe and Fittings.

## 1.05 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

## 1.06 SUBMITTALS

- A. See Section 01000 - General Requirements.
- B. Product Data: Provide data indicating pipe, pipe accessories, pipe fittings, pipe joint materials, catch basins, yard drains, and detention outlet control structures.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
  - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

## 1.07 PROJECT CONDITIONS

- A. Coordinate the Work with inlet locations to receive piping connections from the underground Roof Drainage System

## PART 2 PRODUCTS

### 2.01 PIPE MATERIALS

- A. Type of pipe materials to be used shall be as called for on the Drawings.
- B. Roof Drain Service Piping (building stub-out to first downstream inlet):
  - 1. Plastic PVC Pipe SDR 35: ASTM D 3034, Type PSM, PolyVinyl Chloride (PVC) Sewer Pipe and Fittings; inside nominal diameter of 8 inches or larger, bell and spigot style with Flexible Elastometric Seals, with the following accessories:
    - a. Pipe Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- C. Storm Drain Main Piping: ✓
  - 1. Concrete Pipe: Reinforced, ASTM C 76, Class III, IV, or V as indicated on drawings with wall type B, mesh reinforcement; bell and spigot end joints with accessories as follows:
    - a. Reinforced Concrete Pipe Joint Device: ASTM C 443, rubber compression gasket joint.

### 2.02 CATCH BASIN, CLEANOUT, AND AREA DRAIN COMPONENTS

- A. Lids and Drain Covers: Cast iron, hinged to cast iron frame.
  - 1. Catch Basin:
    - a. Lid Design: Linear grill.
    - b. Lid and frame sizes shall be as shown on drawings
    - c. All grates shall meet Pennsylvania Department of Transportation Specification for

Road and Bridge Construction requirements, and be Traffic Type: Heavy duty, AASHTO HS20 loading.

2. Cleanouts:
  - a. As shown on drawings..
3. Area Drain:
  - a. As shown on drawings..
- B. Shaft Construction Cone Top Section: Reinforced Precast concrete pipe section, Lipped male/female joints, minimum nominal shaft diameter of 48 inches.
- C. Base Pad: Cast-in-place concrete of type specified in Section 03300, levelled top surface to receive concrete shaft sections, sleeved to receive storm sewer pipe sections.
- D. Detention basin outlet control structures:

## **2.03 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 02316.
- B. Cover: As specified in Section 02316.

## **PART 3 EXECUTION**

### **3.01 TRENCH EXCAVATION**

- A. Excavate trench for storm drain installation in accord with Section 02315 - Excavation.
- B. See Sections 02315 and 02316 for additional requirements.
- C. Remove rock or boulders below pipe and storm piping structures a minimum of 24-inches.
- D. Hand trim excavation for accurate placement of pipe to elevations indicated.
- E. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

### **3.02 INSTALLATION - PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
- C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 20 feet.

### **3.03 INSTALLATION - CATCH BASINS AND CLEANOUTS**

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Construct cast-in-place concrete base sections or set precast concrete base sections sleeved to receive storm sewer pipe sections., with levelled top surface to plan grades to receive brick height adjustment course to support frame and grate.

- C. Form and place cast-in-place concrete base pad, or place precast base section, both with provision for storm sewer pipe end sections.
- D. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- E. Establish elevations and pipe inverts for inlets and outlets as indicated.
- F. Mount lid and frame level in grout, secured to top section to elevation indicated.

#### **3.04 TRENCH BACKFILLING**

- A. Fill and backfill for storm drain shall be in accord with Section 02316 - Fill and Backfill and its referenced Section 02250 - Compaction Control and Testing.
  - 1. Bed pipe to 18" above top of pipe with Structural Fill.
  - 2. Compact trench backfill as required in Section 02316 - Fill and Backfill

#### **3.05 FIELD QUALITY CONTROL**

- A. Perform field inspection in accordance with Section 01400.
- B. Backfill compaction testing shall be in accord with Section 02250 - Compaction Control and Testing.

#### **3.06 PROTECTION**

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

#### **3.07 CLEAN-UP**

- A. Leave work and surrounding surfaces clean and free of mortar droppings.

**END OF SECTION**

**SECTION 02640**  
**MANHOLES AND COVERS**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

**1.02 SECTION INCLUDES**

- A. Monolithic concrete manholes with transition to lid frame, covers, anchorage, and accessories.
- B. Modular precast concrete manhole sections with tongue-and-groove joints and with masonry transition to lid frame, covers, anchorage, and accessories.
- C. Masonry manhole sections with masonry transition to lid frame, covers, anchorage, and accessories.

**1.03 RELATED SECTIONS**

- A. Section 03300 - Cast-In-Place Concrete.
- B. Section 04065 - Mortar and Masonry Grout.
- C. Section 04810 - Unit Masonry Assemblies: Masonry units.

**1.04 REFERENCES**

- A. ASTM A 48 - Standard Specification for Gray Iron Castings; 1994a.
- B. ASTM C 55 - Standard Specification for Concrete Brick; 1996a.
- C. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 1996.

**1.05 SUBMITTALS**

- A. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum documented experience.

**1.07 ENVIRONMENTAL REQUIREMENTS**

- A. Special arrangements for masonry work below 50 degrees F must be preapproved by the superintendent.



## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C 478, with gaskets in accordance with ASTM C 923.
- B. Concrete: As specified in Section 03300.
- C. Concrete Brick Units: ASTM C 55,; normal weight.
- D. Mortar and Grout: As specified in Section 04810, Type S.

### **2.02 COMPONENTS**

- A. Lid and Frame: ASTM A 48, Class 30B Cast iron construction, machined flat bearing surface, removable lid, closed lid design.

### **2.03 CONFIGURATION**

- A. Shaft Construction: Concentric with concentric cone top section; lipped male/female joints; sleeved to receive pipe sections.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: As indicated.
- D. Design Depth: As indicated.
- E. Clear Lid Opening: 26 inches diameter.
- F. Pipe Entry: Provide openings as required.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.
- C. Verify excavation for manholes is correct.

### **3.02 PREPARATION**

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

### **3.03 MANHOLES**

- A. Place concrete base pad, trowel top surface level.
- B. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.
- C. Form and place manhole cylinder plumb and level, to correct dimensions and elevations. As work progresses.

- D. Cut and fit for pipe.
- E. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- F. Set cover frames and covers level without tipping, to correct elevations.
- G. Coordinate with other sections of work to provide correct size, shape, and location.

#### **3.04 MASONRY WORK**

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches.
- C. Form flush mortar joints.
- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

**END OF SECTION**

**SECTION 02721**

**AGGREGATE BASE COURSE**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

**1.02 SECTION INCLUDES**

- A. Base course for asphaltic concrete paving.
- B. Stabilized subgrade.

**1.03 RELATED SECTIONS**

- A. Section 02310 - Grading: Preparation of site for base course.
- B. Section 02316 - Fill and Backfill: Compacted fill under base course.
- C. Section 02640 - Manholes and Covers: Manholes including frames.
- D. Section 02741 - Bituminous Concrete Paving: finish asphalt paving courses.
- E. Section 02751 - Portland Cement Concrete Paving: Finish concrete surface course.
- F. Section 02310 - Grading: Topsoil fill at areas adjacent to aggregate base course.

**1.04 REFERENCES**

- A. State of Virginia, Department of Transportation - Construction Specifications.
- B. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; American Association of State Highway and Transportation Officials; 1965 (1996).
- C. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 1997.
- D. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 1993.
- E. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 1991.
- F. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 1990 (Reapproved 1996).
- G. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 1991.

- H. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System); 1993.
- I. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 1991.
- J. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 1988.

#### 1.05 SUBMITTALS

- A. See Section 01000 - General Requirements.
- B. Samples: 20 lb sample of each type of aggregate; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- E. Laboratory Compaction Test Reports.

#### 1.06 PROJECT CONDITIONS

- A. Provide sufficient quantities of aggregate to meet project schedule and requirements. When necessary, store materials on site in advance of need.
- B. When aggregate materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Coarse Aggregate: Coarse aggregate, conforming to State of Virginia Highway Department specifications.

#### 2.02 SOURCE QUALITY CONTROL

- A. See Section 01400 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.
- B. Test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.
- B. Verify subgrade does not vary from established grades more than 0.05 feet as specified in Section 02310 - Grading.
- C. Notify Contractor of any variations beyond this tolerance before commencing any work of this project.
- D. Notify Architect/Engineer of any variation beyond this tolerance before commencing any work of this project.

### **3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

### **3.03 INSTALLATION**

- A. Spread aggregate over prepared substrate to a total compacted thickness as indicated on the drawing details.
- B. Place aggregate in maximum 8 layers and roller compact to specified density.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

### **3.04 TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation From Design Elevation: Within 1/2 inch.

### **3.05 FIELD QUALITY CONTROL**

- A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted aggregate base course in accordance with ASTM D1556.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("Standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

- E. Frequency of Tests: One per 25,000 square foot per lift.
- F. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade and paving.

**3.06 CLEAN-UP**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**

**SECTION 02741**

**BITUMINOUS CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

**1.02 SECTION INCLUDES**

- A. Multiple course bituminous concrete paving.

**1.03 RELATED SECTIONS**

- A. Section 02310 - Grading: Preparation of site for paving and base.
- B. Section 02316 - Fill and Backfill: Compacted subgrade for paving.
- C. Section 02721 - Aggregate Base Course: Aggregate base course.
- D. Section 02640 - Manholes and Covers: Manholes, Drains, and Clean Outs, including frames.
- E. Section 02751 - Portland Cement Concrete Paving: Concrete sidewalks, stair steps, integral curbs, gutters, median barriers, parking areas, roads, aprons, and concrete pavement.
- F. Section 09900 - Paints and Coatings: Pavement markings.

**1.04 REFERENCES**

- A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; The Asphalt Institute; 1994, Sixth Edition.
- B. AI MS-19 - A Basic Asphalt Emulsion Manual; The Asphalt Institute; Second Edition.
- C. ASTM D 946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 1982 (Reapproved 1993).

**1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Virginia Highways standard.
- B. Mixing Plant: Conform to State of Virginia Highways standard.
- C. Obtain materials from same source throughout.

**1.06 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for paving work on public property.

## **1.07 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 25 F degrees below bitumen supplier's bill of lading and not more than 325 F degrees.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Asphalt Cement: In accordance with State of Virginia Highways standards.
- B. Aggregate for Binder Course: In accordance with State of Virginia Highways standards.
- C. Aggregate for Wearing Course: In accordance with State of Virginia Highways standards.
- D. Fine Aggregate: In accordance with State of Virginia Highways standards.
- E. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.
- F. Primer: In accordance with State of Virginia Highways standards.
- G. Tack Coat: In accordance with State of Virginia Highways standards.

### **2.02 ASPHALT MIX DESIGN**

- A. Submit proposed mix design of each class of mix for review prior to beginning of work.

### **2.03 SOURCE QUALITY CONTROL**

- A. Test mix design and samples in accordance with AI MS-2 or The Haskell Company "Asphalt Testing Program".

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that compacted subgrade, granular base, and stabilized soil is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 BASE COURSE**

- A. Place and compact base course.
- B. Section 02721 - Aggregate Base Course forms the base construction for work of this section.

### **3.03 PREPARATION - PRIMER**

- A. Apply primer in accordance with State of Virginia Highways standards.



- B. Apply primer to contact surfaces of curbs, gutters, and milled surfaces.
- C. Use clean sand to blot excess primer.

### **3.04 PREPARATION - TACK COAT**

- A. Apply tack coat in accordance with State of Virginia Highways standards.
- B. Apply tack coat to contact surfaces of curbs, gutters and milled surfaces.
- C. Coat surfaces of manhole, catch basin, and inlet frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

### **3.05 PLACING ASPHALT PAVEMENT - MULTIPLE COURSES**

- A. Place binder courses to thickness identified in drawing schedule.
- B. Place wearing course to thickness identified in drawing schedule.
- C. Install gutter drainage grilles and frames, manhole frames, and inlet frames in correct position and elevation.
- D. Compact pavement by rolling to a field density of not less than 95 percent of laboratory compacted density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

### **3.06 TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness with average of all checks equal to or greater than specified thickness.
- C. Variation from True Elevation: Within 1/4 inch.

### **3.07 FIELD QUALITY CONTROL**

- A. See Section 01400 - Quality Requirements, for general requirements for quality control.
- B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2 or The Haskell Company "Asphalt Testing Program."

### **3.08 PROTECTION**

- A. Immediately after placement, protect pavement from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F.

**END OF SECTION**

**SECTION 02751**

**PORTLAND CEMENT CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete sidewalks, stair steps, integral curbs, gutters, median barriers, parking areas, roads, dolly pads and truck aprons.

**1.02 RELATED SECTIONS**

- A. Section 01000 - General Requirements
- B. Section 02310 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- C. Section 02316 - Fill and Backfill: Compacted subgrade for portland cement concrete pavement.
- D. Section 02721 - Aggregate Base Course: Base course.
- E. Section 02741 - Bituminous Concrete Paving: Asphalt wearing course.
- F. Section 02640 - Manholes and Covers: Manholes, Drains, and Clean Outs including frames.
- G. Section 03100 - Concrete Forms and Accessories.
- H. Section 03200 - Concrete Reinforcement.
- I. Section 03300 - Cast-In-Place Concrete.
- J. Section 07900 - Joint Sealers: Sealant for joints.
- K. Section 09900 - Painting: Pavement markings.

**1.03 REFERENCES**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991.
- B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 1996.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 1989.
- D. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988.
- E. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 1996a.
- F. ASTM C 33 - Standard Specification for Concrete Aggregates; 1993.

- G. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 1996.
- H. ASTM C 94 - Standard Specification for Ready-Mixed Concrete; 1996.
- I. ASTM C 150 - Standard Specification for Portland Cement; 1996.
- J. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 1994a.
- K. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 1995.
- L. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 1997.
- M. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete; 1992.
- N. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete; 1996a.
- O. ASTM C 685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 1995a.
- P. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 1983 (Reapproved 1991).
- Q. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; 1984 (Reapproved 1996).

#### 1.04 SUBMITTALS

- A. See Section 01000 - General Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.

#### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

#### 1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

### PART 2 PRODUCTS

#### 2.01 FORM MATERIALS

- A. Form Materials: Conform to ACI 301.

- B. Expansion Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751) or sponge rubber or cork (ASTM D 1752).
  - 1. Thickness: 3/8 inch.

## 2.02 REINFORCEMENT

- A. Dowels: ASTM A 615/A 615M Grade 60 ; plain billet steel bars; unfinished finish.

## 2.03 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03300.

## 2.04 ACCESSORIES

- A. Curing Compound: ASTM C 309, Type 1 or 1-D, Class B.
- B. Joint Sealer: Type as specified in Section 07900.

## 2.05 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Architect/Engineer for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- D. Concrete Properties:
  - 1. Compressive Strength, per ASTM C 39 at 28 days: As indicated on drawings.

## 2.06 MIXING

- A. Transit Mixers: Comply with ASTM C 94.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify compacted subgrade and granular base are acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

## 3.02 SUBBASE

- A. See Section 02721 - Aggregate Base Course for construction of base course for work of this Section.
- B. Prepare subbase in accordance with State of Virginia Highways standards.

### 3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole, catch basin, and inlet frames with oil to prevent bond with concrete pavement.
- C. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

### 3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### 3.05 REINFORCEMENT

- A. Place dowels to achieve pavement and curb alignment as detailed.
- B. Provide doweled joints at all contraction joints with dowel grease to allow longitudinal movement..

### 3.06 PLACING CONCRETE

- A. Coordinate installation of snow melting components.
- B. Place concrete in accordance with ACI 304R.
- C. Place concrete using the slip form technique with regular placement of contraction joints throughout.
- D. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- E. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- F. Place concrete to pattern indicated.
- G. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

### 3.07 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch wide contraction joints at 15 foot intervals and to separate paving from vertical surfaces and other components.
- C. Provide sawn joints at locations shown on drawings:
  - 1. At 15 feet maximum intervals in all pavements.
  - 2. Between sidewalks and curbs.
  - 3. Between curbs and pavement.

- D. Provide doweled joints in all traffic bearing pavements.
- E. Saw cut contraction joints 3/8 inch wide within 6 hours after finishing. cut 1/3 into depth of slab..

### 3.08 FINISHING

- A. AreaPad Paving: Light broom texture perpendicular to pavement direction..
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel and radiused edge 1/4 inch radius.
- C. Median Barrier: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- D. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- E. Inclined Vehicular Ramps: V-jointed perpendicular to slope.
- F. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### 3.09 JOINT SEALING

- A. See Section 07900 for joint sealer requirements.

### 3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

### 3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01400.
  - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete for review prior to commencement of concrete operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM C 39. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 75 cu yd or less of each class of concrete placed.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### 3.12 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

**END OF SECTION**

**SECTION 02821**

**CHAIN LINK FENCES AND GATES**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

**1.02 SECTION INCLUDES**

- A. Fence framework, fabric, and accessories.
- B. Excavation for post bases; concrete foundation for posts.
- C. Manual gates and related hardware.

**1.03 RELATED SECTIONS**

- A. Section 03300 - Cast-In-Place Concrete: Concrete anchorage for posts.

**1.04 REFERENCES**

- A. ASTM A 116 - Standard Specification for Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric; 1995.
- B. ASTM A 121 - Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire; 1992a.
- C. ASTM A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1989a.
- D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1995.
- E. ASTM A 392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 1996.
- F. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1996.
- G. ASTM C 94 - Standard Specification for Ready-Mixed Concrete; 1996.
- H. ASTM F 567 - Standard Practice for Installation of Chain-Link Fence; 1993.
- I. ASTM F 1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 1996.

**1.05 SUBMITTALS**

- A. See Section 01000 - General Requirements.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.



- C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- D. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates, and attachment installation requirements.
- E. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

## 1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than two years of experience.
- B. Unless indicated or specified otherwise, comply with standard specifications of Chain Link Fence Manufacturers Institute (CLFMI).

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Posts: ASTM F 1083 Schedule 40 hot-dipped galvanized steel pipe, welded construction, minimum yield strength of 25 ksi.
- B. Rails, and Frames: Members formed from steel complying with ASTM A 653/A 653M, HSLAS Type A, Grade 50, G90 zinc coating.
- C. Wire Fabric: ASTM A 392 zinc coated steel chain link fabric.
- D. Barbed Wire: ASTM A 121 galvanized steel; 12 gage thick wire, 2 strands, 4 points at 5 inch on center.
- E. Barbed Tape: Stainless steel, 0.025 inch thick x 1 inch wide, coil diameter of 24 inch, die stamped to produce 4 barbed points at 4 inch on center; cold clench over stainless steel core.
- F. Concrete: ASTM C 94; Normal Portland Cement, 2,500 psi strength at 28 days, 3 inch slump.

### 2.02 COMPONENTS

- A. Line Posts: 1.9 inch diameter.
- B. Corner and Terminal Posts: 2.38 inch.
- C. Gate Posts: 3.5 inch diameter.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- E. Gate Frame: 1.66 inch diameter for welded fabrication.
- F. Fabric: 2 inch diamond mesh interwoven wire, 6 gage thick, top selvage knuckle end closed, bottom selvage twisted tight.
- G. Tension Wire: 6 gage thick steel, single strand.
- H. Tension Band: 1/4 inch thick steel.

- I. Tension Strap: 1/4 inch thick steel.
- J. Tie Wire: Aluminum alloy steel wire.

## **2.03 ACCESSORIES**

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.
- C. Extension Arms: Cast steel galvanized, to accommodate 3 strands of barbed wire, single arm, vertical.
- D. Gate Hardware: Fork latch with gravity drop; two 180 degree gate hinges per leaf and hardware for padlock.

## **2.04 FINISHES**

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A 123, at 1.8 oz/sq ft.
- B. Hardware: Galvanized to ASTM A 153/A 153M, 1.8 oz/sq ft coating.
- C. Accessories: Same finish as framing.

# **PART 3 EXECUTION**

## **3.01 INSTALLATION**

- A. Install framework, fabric, accessories and gates in accordance with ASTM F 567.
- B. Place fabric on outside of posts and rails.
- C. Set intermediate posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- D. Line Post Footing Depth Below Finish Grade: ASTM F 567.
- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F 567.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- H. Install center and bottom brace rail on corner gate leaves.
- I. Do not stretch fabric until concrete foundation has cured 28 days.
- J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- K. Position bottom of fabric 2 inches above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire stretched taut between terminal posts.
- O. Install support arms sloped inward and attach barbed wire; tension and secure.
- P. Do not attach the hinged side of gate to building wall; provide gate posts.
- Q. Install gate with fabric and barbed wire overhang to match fence. Install three hinges per leaf, latch, catches, drop bolt.
- R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

### 3.02 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.
- C. Components shall not infringe adjacent property lines.

**END OF SECTION**

**SECTION 02921**

**SEEDING**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein.

**1.02 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer.
- D. Maintenance.

**1.03 RELATED SECTIONS**

- A. Section 02310 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

**1.04 SUBMITTALS**

- A. See Section 01000 - General Requirements.
- B. Seed producers certification that seed meets specification requirements.
- C. Certification that all other materials meet specification requirements.

**PART 2 PRODUCTS**

**2.01 SEED MIXTURE**

- A. Seed mixture is as identified in the drawings.

**2.02 SOIL MATERIALS**

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.
- B. Topsoil: Excavated from site and free of weeds.

**2.03 ACCESSORIES**

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

- B. Fertilizer: ; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.
- C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

#### 2.04 TESTS

- A. Analyze existing topsoil to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Submit minimum 10 oz sample of proposed imported topsoil. Forward sample to approved testing laboratory in sealed containers to prevent contamination. Provide analysis as required for existing soil.
- C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. Determine location of all underground utilities and surface and subsurface conditions.

#### 3.02 PREPARATION

- A. Prepare subgrade in accordance with Section 02310.
- B. Place topsoil in accordance with Section 02310.
- C. Install edging at periphery of seeded areas in straight lines to consistent depth.
- D. Spread topsoil to depth of 6 inches over areas to be seeded.
- E. Rototill fertilizer and other solid amendments into top 6 inches of soil at rate recommended by manufacturer.
- F. Adjust soil acidity as required to achieve pH level of 5.0 to 7.0.
- G. Water dry topsoil to depth of 4 inches at least 48 hours prior to seeding to obtain loose friable seed bed

#### 3.03 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.

- E. Lightly water to aid the dissipation of fertilizer.

### 3.04 SEEDING

- A. Apply seed at a uniform rate evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Immediately following seeding, apply mulch to a thickness of 1 inches over entire seeded area. Maintain clear of shrubs and trees.
- E. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

### 3.05 HYDROSEEDING

- A. Apply seeded slurry with a hydraulic seeder evenly in two intersecting directions.
- B. Do not hydroseed area in excess of that which can be mulched on same day.
- C. Immediately following seeding, apply mulch to a thickness of 1 inches. Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

### 3.06 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing cycle.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- F. Immediately reseed areas which show bare spots.
- G. Protect seeded areas with warning signs during maintenance period.

**END OF SECTION**

**SECTION 02930**  
**EXTERIOR PLANTS**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. The General Requirements, Section 01000, are made a part of this section as fully as if repeated herein

**1.02 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Topsoil bedding.
- C. New and Relocated trees, plants, and ground cover.
- D. Mulch and Fertilizer.
- E. Maintenance.
- F. Tree Pruning.

**1.03 RELATED SECTIONS**

- A. Section 02310 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- B. Section 02316 - Fill and Backfill: Topsoil material.

**1.04 REFERENCES**

- A. ANSI Z60.1 - American Standard for Nursery Stock; 1996.
- B. NAA (STDS) - Pruning Standards for Shade Trees; National Arborist Association; current edition.
- C. Grades and Standards for Nursery Stock.

**1.05 SUBMITTALS**

- A. See Section 01000 - General Requirements.
- B. Maintenance Data: Include cutting and trimming method; types, application frequency, and recommended coverage of fertilizer.
- C. Submit list of plant material sources.

**1.06 QUALITY ASSURANCE**

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.

- B. Installer Qualifications: Company specializing in installing and planting the plants with 5 years experience.
- C. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.
- D. Tree Pruning: NAA - Pruning Standards for Shade Trees.
- E. Maintenance Services: Performed by installer.
- F. Maintenance Contract:
  - 1. Include with landscaping proposal provision to continue maintenance of all work specified for consideration of acceptance or rejection by Owner.
  - 2. Time Period: One calendar year beginning at termination of landscaping maintenance period as specified herein.

#### **1.07 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.
- C. Plant Materials: Certified by State Department of Agriculture; free of disease or hazardous insects.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- B. Protect and maintain plant material until planted.
- C. Deliver plant materials immediately prior to placement. Keep plants moist.

#### **1.09 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install plant material when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

#### **1.10 WARRANTY**

- A. Provide one year warranty on all trees. Provide 90 day warranty for all shrubs and ground covers.
- B. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.
- C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

#### **1.11 MAINTENANCE SERVICE**

- A. Maintain plant life for three months after Date of Substantial Completion.



- B. Maintain plant life immediately after placement and until plants are well established and exhibit a vigorous growing condition. Continue maintenance until termination of warranty period.
- C. Maintenance to include:
  - 1. Cultivation and weeding plant beds and tree pits.
  - 2. Applying herbicides for weed control in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
  - 3. Remedy damage from use of insecticides.
  - 4. Irrigating sufficient to saturate root system.
  - 5. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
  - 6. Disease control.
  - 7. Maintaining wrapping, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.
  - 8. Replacement of mulch.

## **PART 2 PRODUCTS**

### **2.01 TREES, PLANTS, AND GROUND COVER**

- A. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

### **2.02 SOIL MATERIALS**

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.

### **2.03 SOIL AMENDMENT MATERIALS**

- A. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis.
- B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.
- C. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- D. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.
- E. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

### **2.04 MULCH MATERIALS**

- A. Mulching Material: Hardwood species wood shavings, free of growth or germination inhibiting ingredients.
- B. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

## 2.05 ACCESSORIES

- A. Wrapping Materials: Burlap.
- B. Stakes: Softwood lumber, pointed end.
- C. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant material.
- D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.
- E. Membrane: 20 mil thick, clear polyethylene.
- F. Wrapping: Waterproof fabric.
- G. Tree Protectors: Metal with galvanized rings.

## 2.06 PLANT SOIL MIX

- A. A uniform mixture of 1 part peat and \_\_\_\_ parts topsoil by volume.

## 2.07 SOURCE QUALITY CONTROL AND TESTS

- A. Provide testing and analysis of imported topsoil.
- B. Analyze existing topsoil to ascertain percentage of nitrogen, phosphorus, potash, soluble salt, organic matter; and pH value.
- C. Submit minimum 10 oz sample of proposed imported topsoil. Forward sample to testing laboratory in sealed containers to prevent contamination. Provide analysis as required for existing topsoil.
- D. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that prepared subsoil and planters are ready to receive work.
- B. Saturate soil with water to test drainage.
- C. Verify that required underground utilities are available, in proper location, and ready for use.

### 3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

- C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds 6 inches larger than plant root system.

### 3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 6 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

### 3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 4 inches of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

### 3.05 PLANTING

- A. Place plants as indicated for review and final orientation by Architect/Engineer.
- B. Set plants vertical.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth as indicated on drawings under each plant. Loosen burlap, ropes, and wires, from the root ball.
- E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.
- F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

### 3.06 PLANT RELOCATION AND RE-PLANTING

- A. Relocate plants as directed by Architect/Engineer.
- B. Replant plants in pits or beds, partly filled with prepared topsoil mixture, at a minimum depth as indicated on drawings under each plant. Remove burlap, ropes, and wires, from the root ball.
- C. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant materials in vertical position.
- D. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

### **3.07 INSTALLATION OF ACCESSORIES**

- A. Place decorative cover and membrane, where indicated on drawings.
- B. Place grates at base of trees where indicated on drawings.
- C. Wrap deciduous shade and flowering tree trunks and place tree protectors.

### **3.08 PLANT SUPPORT**

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:
  - 1. Tree Caliper: 1 inch; Tree Support Method: 1 stake with one tie
  - 2. Tree Caliper: 1 - 2 inches; Tree Support Method: 2 stakes with two ties
  - 3. Tree Caliper: 2 - 4 inches; Tree Support Method: 3 guy wires with eye bolts and turn buckles
  - 4. Tree Caliper: Over 4 inches; Tree Support Method: 4 guy wires with eye bolts and turn buckles

### **3.09 TREE PRUNING**

- A. Prune trees to NAA Class 1 - Fine Pruning.

### **3.10 FIELD QUALITY CONTROL**

- A. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

### **3.11 MAINTENANCE**

- A. Neatly trim plants where necessary.
- B. Immediately remove clippings after trimming.
- C. Water to prevent soil from drying out.
- D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- E. Apply pesticides in accordance with manufacturers instructions.

**END OF SECTION**

**ADDENDUM NO. 2**

**TO**

**STORMWATER MANAGEMENT PLAN**

**for**

**TRANSPORTATION ADVANTAGE – PHASE II  
ANHEUSER-BUSCH, INC.**

*Williamsburg, Virginia*

**THE HASKELL COMPANY**

Haskell Building  
Jacksonville, Florida

Project 32193

Revised Issue: January 27, 2000  
Addendum #1 Issue: December 15, 1999  
Original Issue: November 16, 1999

*Michael Haskell*  
1-28-00



**T H E H A S K E L L C O M P A N Y**

**ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES**

## TABLE OF CONTENTS

January 26, 2000

|                    |  |
|--------------------|--|
| <b>Section One</b> | <b>Detention Pond 1 Analysis</b>   |
| 1.1                | Narrative  |
| 1.2-1.3            | 1 yr. - 24 hour Storm Analysis <ul style="list-style-type: none"><li>• Existing Conditions Input Hydrographs</li><li>• Post Conditions Input Hydrographs</li><li>• Flood Routing "Maximum Conditions" Summary</li></ul>                            |
| 1.4-1.5            | 2 yr. - 24 hour Storm Analysis <ul style="list-style-type: none"><li>• Existing Conditions Input Hydrographs</li><li>• Post Conditions Input Hydrographs</li><li>• Flood Routing "Maximum Conditions" Summary</li></ul>                            |
| 1.6-1.7            | 10 yr - 24 hr Storm Analysis <ul style="list-style-type: none"><li>• Existing Conditions Input Hydrographs</li><li>• Post Conditions Input Hydrographs</li><li>• Flood Routing "Maximum Conditions" Summary</li></ul>                              |
| 1.8-1.9            | 100 yr - 24 hr Storm Analysis <ul style="list-style-type: none"><li>• Post Conditions Input Hydrographs</li><li>• Flood Routing "Maximum Conditions" Summary</li></ul>   |
| 1.10-1.11          | Pond 1 Data <ul style="list-style-type: none"><li>• Stage-Storage Computation Worksheet</li><li>• Downstream Channel Erosion Control Volume</li><li>• Water Quality &amp; Permanent Pool Volume Calculations</li><li>• Orifice Worksheet</li></ul> |
| 1.12-1.13          | Existing Conditions Input Summaries <ul style="list-style-type: none"><li>• Contributing Areas/DCIA/CN Worksheet Summary</li><li>• adICPR Flood Routing Input Summary</li></ul>  |
| <b>Section Two</b> | <b>Detention Pond 2 Analysis</b>   |
| 2.1-2.2            | Narrative  |
| 2.3-2.5            | 1 yr - 24 hr Storm Analysis <ul style="list-style-type: none"><li>• Existing Conditions Input Hydrographs</li><li>• Post Conditions Input Hydrographs</li><li>• Flood Routing "Maximum Conditions" Summary</li></ul>                               |

- 2.6-2.8      2 yr - 24 hr Storm Analysis
  - Existing Conditions Input Hydrographs
  - Post Conditions Input Hydrographs
  - Flood Routing "Maximum Conditions" Summary
- 2.9-2.11     10 yr - 24 hr Storm Analysis
  - Existing Conditions Input Hydrographs
  - Post Conditions Input Hydrographs
  - Flood Routing "Maximum Conditions" Summary
- 2.12-2.13    10 yr - 24 hr Storm Analysis
  - Post Conditions Input Hydrographs
  - Flood Routing "Maximum Conditions" Summary
- 2.14-2.15    Pond 2 Data
  - Stage-Storage Computation Worksheet
  - Downstream Channel Erosion Control Volume
  - Water Quality & Permanent Pool Volume Calculations
  - Orifice Worksheet
- 2.16-2.23    Existing Conditions Input Summaries
  - Contributing Areas/DCIA/CN Worksheet Summary
  - AdICPR Flood Routing Input Summary
- 2.24-2.28    Post Conditions Input Summaries
  - Contributing Area/DCIA/CN Summary
  - AdICPR Flood Routing Input Summary
  - Aerial Photo - Route 60 Contributing Area

### Section Three

#### Plant Area Stormwater Management Plan

- 3.1-3.3      Narrative
  - Plant Area Property Description
  - Transportation Advantage relative to Plant Area
  - Plant Area - VPDES General Permit
  - Pre-Post Impervious Areas
- 3.4           Transportation Advantage - Land Use Summary
  - Sheet 200 (11" x 17")
- 3.5           Pre-Development Pervious Area
  - Sheet 200B (11" x 17")
- 3.6           Post Development Pervious Area
  - Sheet 200C (11" x 17")

**Section Four                      Storm Sewer Tabulations**

4.1                      Storm Sewer Tabulations

**Appendix                      VPDES Permit Documents**

A.1                      VPDES General Permit for Storm Water Discharges Associated  
with Industrial Activity (dated October 14, 1999)

A.2                      Storm Water Pollution Prevention Plan  
Anheuser-Busch, Inc.  
Williamsburg Brewery  
May 1999

A.3                      Intercept Gate Operation  
Williamsburg Brewery Operating Procedures

Sheet 217 - Existing Conditions Plan

Sheet 218 - Post Conditioning Plan

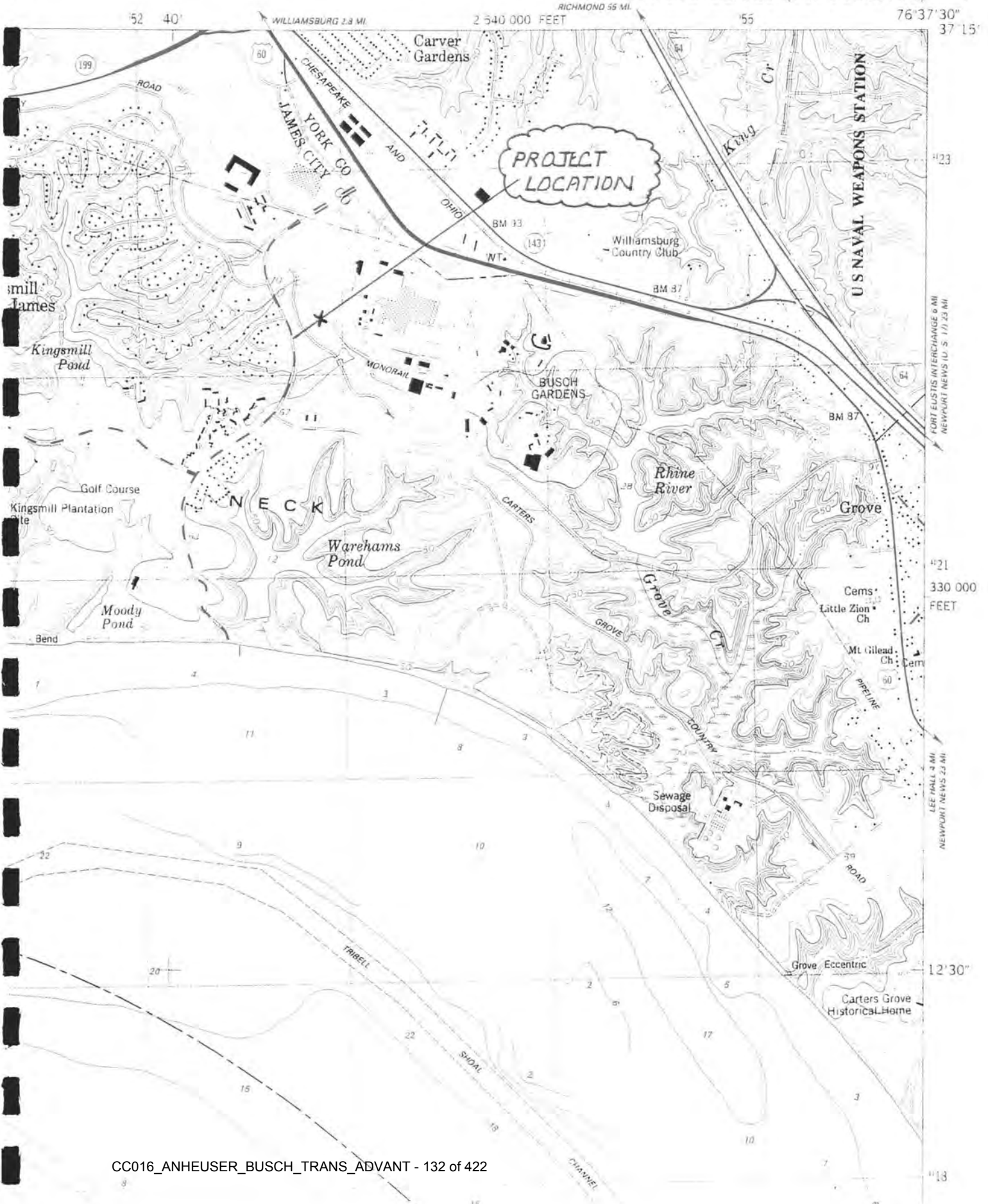




HOG ISLAND QUADRANGLE  
VIRGINIA

7.5 MINUTE SERIES (TOPOGRAPHIC)

Scale 1:50,000  
CLAY 8



## **SECTION 1: DETENTION POND 1 ANALYSIS**

Modification to the previously approved Phase I of the Transportation Advantage project is presented within this section. Included in this section is a re-analysis of the Phase I Stormwater Detention Pond No. 1 which has been updated in accordance with the new construction drawings to include the following:

1. Inclusion of an additional 0.1 acre of asphalt pavement area from the newly proposed rear entrance road.
2. Adjustment of the Pond 1 discharge control structure to meet new loading and outlet conditions.

AB-WMB TRANSPORTATION ADVANTAGE  
 POST-CONDITIONS 1 YR 24 HR SIMULATION (PHASE 1)  
 NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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     | 4.04     |
| Vol of Unit Hyd (in): | 1.00     | 1.00     |
| Curve Number:         | 80.00    | 61.00    |
| DCIA (%):             | 0.00     | 85.00    |

1 yr - 24 hr STORM

|                     |       |       |
|---------------------|-------|-------|
| Time Max (hrs):     | 12.16 | 12.02 |
| Flow Max (cfs):     | 3.06  | 10.70 |
| Runoff Volume (in): | 1.10  | 2.34  |
| Runoff Volume (cf): | 11746 | 34254 |

ALLOWABLE Q<sub>OUT</sub>

DOWNSTREAM CHANNEL  
 EROSION CONTROL VOLUME

AB-WMB TRANSPORTATION ADVANTAGE  
 POST-CONDITIONS 1 YR 24 HR SIMULATION (PHASE 1)  
 NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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                  | 14.11           | 0.43             | 0.00             | 0.00              |
| POND1     | POST       | 14.00               | 75.96          | 78.00              | 0.0064               | 17168.56              | 12.00           | 10.64            | 14.11            | 0.43              |

POST CONDITIONS  
 POND STAGE

POST CONDITIONS Q<sub>OUT</sub>

0.43 cfs < 3.06 cfs OK

1 yr - 24 hr STORM

AB-WMB TRANSPORTATION ADVANTAGE  
POST-CONDITIONS 2 YR 24 HR SIMULATION (PHASE 1)  
NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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     | 4.04     |
| 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  | 13.59 |
| Runoff Volume (in): | 1.63  | 2.97  |
| Runoff Volume (cf): | 17440 | 43584 |

2 yr - 24 hr STORM

ALLOWABLE Q<sub>OUT</sub>

AB-WMB TRANSPORTATION ADVANTAGE  
 POST-CONDITIONS 2 YR 24 HR SIMULATION (PHASE 1)  
 NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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                  | 12.47           | 1.46             | 0.00             | 0.00              |
| POND1     | POST       | 12.46               | 76.15          | 78.00              | 0.0079               | 17584.13              | 12.00           | 13.51            | 12.47            | 1.46              |

POST CONDITIONS  
 POND STAGE

POST CONDITIONS Q<sub>OUT</sub>

1.46 cfs < 4.59 cfs OK

2 yr - 24 hr STORM

1.5

AB-WMB TRANSPORTATION ADVANTAGE  
 POST-CONDITIONS 10 YR 24 HR SIMULATION (PHASE 1)  
 NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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     | 4.04     |
| 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 | 23.42 |
| Runoff Volume (in): | 13.60 | 5.12  |
| Runoff Volume (cf): | 38382 | 75073 |

10 yr - 24 hr STORM

ALLOWABLE Q<sub>OUT</sub>



AB-WMB TRANSPORTATION ADVANTAGE  
 POST-CONDITIONS 10 YR 24 HR SIMULATION (PHASE 1)  
 NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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                  | 12.22           | 6.55             | 0.00             | 0.00              |
| POND1     | POST       | 12.22               | 76.81          | 78.00              | 0.0109               | 19058.98              | 12.00           | 23.27            | 12.22            | 6.55              |

POST CONDITIONS  
 POND STAGE

POST CONDITIONS Q<sub>out</sub>

6.55 cfs < 10.07 cfs OK

10 yr - 24 hr STORM

AB-WMB TRANSPORTATION ADVANTAGE  
POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)  
NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

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

\*\*\*

Basin Name: POND1  
Group Name: POST  
Node Name: POND1  
Hydrograph Type: UH

Unit Hydrograph: UH484  
Peaking Factor: 484.00  
Spec Time Inc (min): 1.33  
Comp Time Inc (min): 1.33  
Rainfall File: SCSII-24  
Rainfall Amount (in): 8.00  
Storm Duration (hr): 24.00  
Status: ONSITE  
Time of Conc. (min): 10.00  
Lag Time (hr): 0.00  
Area (acres): 4.04  
Vol of Unit Hyd (in): 1.00  
Curve Number: 61.00  
DCIA (%): 85.00

100 yr - 24 hr STORM

Time Max (hrs): 12.02  
Flow Max (cfs): 33.05  
Runoff Volume (in): 7.22  
Runoff Volume (cf): 105913

1.8

AB-WMB TRANSPORTATION ADVANTAGE  
 POST-CONDITIONS 100 YR 24 HR SIMULATION (PHASE 1)  
 NOVEMBER 11, 1999 (Revised 12/10/99, 01/24/00)

\*\*\*\*\* 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                  | 12.24           | 8.22             | 0.00             | 0.00              |
| POND1     | POST       | 12.24               | <u>77.52</u>   | 78.00              | 0.0133               | 20675.07              | 12.00           | 32.85            | 12.24            | 8.22              |

*POST CONDITIONS  
 POND STAGE*

*REQ'D FREEBOARD = 1 FE.  
 FREEBOARD PROVIDED = 1.48 FE. <sup>OK</sup>*

*100 yr - 24 hr STORM*

## 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:          | 136,211 | sf   | 3.127 Ac. |         |
| 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:  | 5,675   | cf   | 0.1303    | ac ft ✓ |
| Required Permanent Pool Volume: | 22,702  | cf   | 0.5212    | ac ft   |

## Downstream Channel Erosion Control Volume:

(Kerplunk Method)

|   |        |           |   |
|---|--------|-----------|---|
| Runoff Volume from 1 yr 24 hr Storm Event:          | 34,254 | cf        | ✓ |
| (From 1 yr 24 hr SCS Unit Hydrograph)               | 0.7864 | acre feet |   |
| Initial Weir Stage:                                 | 76.59  |           |   |
| Final Weir Stage (Based on Flood Routing Analysis): | 76.00  |           |   |

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1.10

**Orifice Configurations:**

*Above  
Perm Pool*

|                                | <u>WO Volume</u>                |        | <u>1 yr - 24 hr Volume</u> |        |
|--------------------------------|---------------------------------|--------|----------------------------|--------|
| Volume:                        | 5,675                           | cf ✓   | 34,254                     | cf ✓   |
| Brim Drawdown Time:            | 30                              | hrs    | 24                         | hrs OK |
| Average Rate of Discharge:     | 189                             | cf/hr  | 1,427                      | cf/hr  |
|                                | 0.05                            | cfs    | 0.40                       | cfs    |
| Initial Orifice Diameter:      | 2.1273                          | inches | 3.8453                     | 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     | 2,342                      | cf     |
| Adjusted Volume:               | 6,971                           | cf     | 36,596                     | cf     |
| Adjusted Stage:                | 74.98                           | ft     | 76.74                      | ft     |
| Depth:                         | 0.39                            | ft     | 2.08                       | ft     |
| Initial Elev of Water Surface: | 74.98                           | ft     | 76.74                      | ft     |
| Final Elev of Water Surface:   | 74.59                           | ft     | 74.66                      | ft     |
| Average Depth:                 | 0.19                            | ft     | 1.04                       | ft     |
| Orifice Area:                  | 0.0248                          | sf     | 0.0806                     | sf     |
| Orifice Diameter:              | 0.1776                          | ft     | 0.3204                     | ft     |
| Orifice Diameter:              | 2.1311                          | inches | 3.8453                     | inches |
| Orifice Diameter Used:         | 3.8125 inches ✓<br>(~ 3 13/16") |        |                            |        |

AB-Wmb Transportation Advantage - Phase 1  
POST CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* 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   |

POND STAGE-AREA

-----Class: Drop Structure-----  
Name: POND1OUT From Node: POND1 Length(ft): 81  
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 |
| Span(in): 15                    | 15                            |
| Rise(in): 15                    | 15                            |
| Invert(ft): 73                  | 71.74                         |
| Manning's N: 0.013              | 0.013                         |
| Top Clip(in): 0                 | 0                             |
| Bottom Clip(in): 0              | 0                             |

15" OUTLET

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

DW TW?

AB-Wmb Transportation Advantage - Phase 1  
POST CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* Input Report \*\*\*\*\*

\*\*\* Weir 1 of 2 for Drop Structure POND1OUT \*\*\*  
Count: 1 Bottom Clip(in): 0 [TABLE]  
Type: Mavis Top Clip(in): 0  
Flow: Both Weir Discharge Coef: 3  
Geometry: Circular Orifice Discharge Coef: 0.6  
  
Span(in): 3.8125 Invert(ft): 74.5  
Rise(in): 3.8125 Control Elev(ft): 74.5

3 1 3/16" ORIFICE

\*\*\* Weir 2 of 2 for Drop Structure POND1OUT \*\*\*  
Count: 3 Bottom Clip(in): 0 [TABLE]  
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

3 - 24" WIDE WEIRS  
@ CREST EL = 76.00

## **SECTION 2: DETENTION POND 2 ANALYSIS**

Section 2 includes an "Existing" and "Post" Conditions analysis of the Transportation Advantage westerly parking expansion area.

### **EXISTING CONDITIONS:**

As shown on the included "Existing Conditions" Map (Plan Sheet 217), the contributing drainage area to the "Ballfield" Pond is approximately 45.5 acres which is further characterized into two (2) contributing "on-site" drainage sub-areas and one (1) contributing "off-site" drainage area. The drainage boundary between the "on-site" drainage sub-areas is the result of an existing storm drain and collection system which divides the "on-site" areas into a generally "developed" area category and a generally "undeveloped" area category which have very different drainage characteristics. As shown on the included aerial photo, the "off-site" drainage sub-area is specific to Route 60 drainage contribution only. The pond, as it exists today, is a wet pond with three (3) 36" inflow pipes and a dual 36" outlet riser/barrel passing through a filled embankment. Based on the USGS quad map, discharge from the pond traverses through a downstream golf course community where the ultimate disposal point is the "Kingsmill" Pond.

With respect to the outlet control structure of the "Ballfield" Pond, information obtained through topographic surveys and field observation show that the riser sections are unstable, broken and completely detached from the outlet pipes. The outlet pipe inverts are severely corroded at the downstream end. Insufficient outlet protection results in moderate downstream erosion problems and undermining of the root systems of adjacent trees.

Because research efforts with James City County, the Virginia Department of Transportation, and Anheuser-Busch concerning specific design information for the existing pond resulted in no available design information an attempt was made to re-construct the design conditions using dual 36" perforated pipe risers and information available from the topographic survey. Results of this analysis indicates that the pond (based on the re-constructed riser conditions) would be highly questionable in its ability to handle a storm of 10 year – 24 hour magnitude using an NRCS (SCS) Type II rainfall distribution. (EXISTING POND)

### **POST CONDITIONS:**

As shown on the included "Post Conditions" Map (Plan Sheet 218), the "Ballfield" Pond will be updated and expanded to meet current James City County requirements. The existing discharge control structure will be completely removed in the Phase II construction and replaced with a single (or possibly dual) concrete riser structure utilizing a 12 foot weir (total length) and dual 36 inch reinforced concrete outlet pipes. Outlet protection will be provided to control downstream erosion and sediment problems.

Under "Post Conditions" the contributing drainage area remains approximately the same at 45.0 acres, which again is further characterized into three (3) contributing drainage sub-areas. The small difference between "Existing Conditions" and "Post Conditions" drainage areas is the result of



a pavement demolition and re-defining of the Phase I contributing drainage area. Design criteria are based on complete detention of the 1 year, 24 hour storm with 24-hour volume recovery.

In addition, attenuation of the 2 and 10 year, 24 hour duration storm events is provided. The 100 year, 24-hour duration storm event is also provided to assure that minimum "freeboard" conditions are met. Design limits for discharge is based on the re-constructed riser conditions as discussed under "Existing Conditions" above.

As part of the "Post Conditions" design, a portion of the existing storm drain and collection system will be removed and re-configured to "fit-in" with the new design. Due to the lack of available design information on the existing storm drain and collection system, the "Post Conditions" design includes a new and totally separate parallel storm drain and collection system. The result is a reduced impact (in both contributing area and hydraulic losses) to the existing storm drain and collection system.

Results of the "Post Conditions" analysis show that Pond 2 meets James City County regulatory requirements.

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 1 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-1 \*\*\*\*\*

\*\*\*

|                       | XWMB2-1  | XWMB2-2  | XHWY60   |
|-----------------------|----------|----------|----------|
| Basin Name:           | EX-COND  | EX-COND  | EX-COND  |
| Group Name:           | XPOND2   | XPOND2   | XPOND2   |
| Node Name:            | UH       | UH       | UH       |
| Hydrograph Type:      |          |          |          |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 2.80     | 2.80     | 2.80     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 20.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 12.90    | 18.90    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 64.00    | 61.00    | 58.00    |
| DCIA (%):             | 53.00    | 2.00     | 31.00    |
| Time Max (hrs):       | 12.09    | 12.67    | 12.20    |
| Flow Max (cfs):       | 18.56    | 2.00     | 9.05     |
| Runoff Volume (in):   | 1.61     | 0.34     | 0.98     |
| Runoff Volume (cf):   | 75367    | 23334    | 48856    |

} 1 yr-24 hr STORM  
 EXISTING CONDITIONS

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 1 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-1 \*\*\*\*\*

\*\*\*

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Basin Name:           | PWMB2-1  | PWMB2-2  | PHWY60   |
| Group Name:           | PST-COND | PST-COND | PST-COND |
| Node Name:            | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type:      | UH       | UH       | UH       |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 2.80     | 2.80     | 2.80     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |

} 1 yr - 24 hr STORM  
 POST CONDITIONS

|                     |       |       |       |
|---------------------|-------|-------|-------|
| Time Max (hrs):     | 12.02 | 12.53 | 12.20 |
| Flow Max (cfs):     | 23.39 | 7.18  | 9.02  |
| Runoff Volume (in): | 2.09  | 0.81  | 0.98  |
| Runoff Volume (cf): | 74466 | 62759 | 48688 |

← TOTAL VOLUME = 185,913 CF  
 (4.268 Ac.Ft.)

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 1 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-1 \*\*\*\*\*

•(Time units - hours)

| Node<br>Name | Group<br>Name | Max Time<br>Conditions | Max Stage<br>(ft) | Warning<br>Stage (ft) | Max Delta<br>Stage (ft) | Max Surface<br>Area (sf) | Max Time<br>Inflow | Max Inflow<br>(cfs) | Max Time<br>Outflow | Max Outflow<br>(cfs) |
|--------------|---------------|------------------------|-------------------|-----------------------|-------------------------|--------------------------|--------------------|---------------------|---------------------|----------------------|
| XPOND2       | EX-COND       | 12.74                  | 71.95             | 74.00                 | 0.0157                  | 17358.08                 | 12.13              | 27.48               | 12.74               | 7.31                 |
| PPOND2       | PST-COND      | 14.63                  | 70.18             | 74.00                 | 0.0090                  | 40007.05                 | 12.03              | 33.21               | 14.63               | 2.37                 |

POST CONDITIONS  
 MAX. POND STAGE

POST Q OUT

2.37 cfs < 7.31 cfs OK

1 yr - 24 hr STORM  
(P=2.8")

2.5

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 2 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-2 \*\*\*\*\*

\*\*\*

|                  |         |         |         |
|------------------|---------|---------|---------|
| Basin Name:      | XWMB2-1 | XWMB2-2 | XHWY60  |
| Group Name:      | EX-COND | EX-COND | EX-COND |
| Node Name:       | XPOND2  | XPOND2  | XPOND2  |
| Hydrograph Type: | UH      | UH      | UH      |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 3.50     | 3.50     | 3.50     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 20.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 12.90    | 18.90    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 64.00    | 61.00    | 58.00    |
| DCIA (%):             | 53.00    | 2.00     | 31.00    |

2 yr - 24 hr  
 EXISTING CONDITIONS

|                     |       |       |       |
|---------------------|-------|-------|-------|
| Time Max (hrs):     | 12.09 | 12.67 | 12.20 |
| Flow Max (cfs):     | 24.95 | 4.53  | 12.77 |
| Runoff Volume (in): | 2.13  | 0.63  | 1.36  |
| Runoff Volume (cf): | 99767 | 43117 | 67869 |

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 2 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-2 \*\*\*\*\*

\*\*\*

|                  |          |          |          |
|------------------|----------|----------|----------|
| Basin Name:      | PWM82-1  | PWM82-2  | PHWY60   |
| Group Name:      | PST-COND | PST-COND | PST-COND |
| Node Name:       | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type: | UH       | UH       | UH       |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 3.50     | 3.50     | 3.50     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |

|                     |       |       |       |
|---------------------|-------|-------|-------|
| Time Max (hrs):     | 12.02 | 12.53 | 12.20 |
| Flow Max (cfs):     | 30.27 | 10.78 | 12.70 |
| Runoff Volume (in): | 2.70  | 1.17  | 1.36  |
| Runoff Volume (cf): | 95996 | 91183 | 67611 |

} 2 yr - 24hr  
 POST CONDITIONS

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 2 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-2 \*\*\*\*\*

•(Time units - hours)

| Node<br>Name | Group<br>Name | Max Time<br>Conditions | Max Stage<br>(ft) | Warning<br>Stage (ft) | Max Delta<br>Stage (ft) | Max Surface<br>Area (sf) | Max Time<br>Inflow | Max Inflow<br>(cfs) | Max Time<br>Outflow | Max Outflow<br>(cfs) |
|--------------|---------------|------------------------|-------------------|-----------------------|-------------------------|--------------------------|--------------------|---------------------|---------------------|----------------------|
| XPOND2       | EX-COND       | 12.70                  | 73.07             | 74.00                 | 0.0194                  | 19189.07                 | 12.13              | 38.12               | 12.70               | 12.39                |
| PPOND2       | PST-COND      | 13.39                  | 70.78             | 74.00                 | 0.0115                  | 41964.75                 | 12.03              | 43.52               | 13.39               | 7.52                 |

POST CONDITIONS  
 MAX. POND STAGE

POST Q OUT

7.52 cfs < 12.39 cfs OK

2 yr 24 hr STORM  
 (P = 3.5")

2.8

AB-WMB TRANSPORTATION ADVANTAGE  
PRE-POST 10 YR ANALYSIS - POND 2  
JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-10 \*\*\*\*\*

\*\*\*

|                  |         |         |         |
|------------------|---------|---------|---------|
| Basin Name:      | XWMB2-1 | XWMB2-2 | XHWY60  |
| Group Name:      | EX-COND | EX-COND | EX-COND |
| Node Name:       | XPOND2  | XPOND2  | XPOND2  |
| Hydrograph Type: | UH      | UH      | UH      |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 5.80     | 5.80     | 5.80     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 20.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 12.90    | 18.90    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 64.00    | 61.00    | 58.00    |
| DCIA (%):             | 53.00    | 2.00     | 31.00    |

|                     |        |        |        |
|---------------------|--------|--------|--------|
| Time Max (hrs):     | 12.09  | 12.53  | 12.20  |
| Flow Max (cfs):     | 48.52  | 17.92  | 29.49  |
| Runoff Volume (in): | 4.01   | 1.95   | 2.89   |
| Runoff Volume (cf): | 187913 | 133566 | 143736 |

} 10 yr - 24 hr  
EXISTING CONDITIONS



AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 10 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-10 \*\*\*\*\*

\*\*\*

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Basin Name:           | PWMB2-1  | PWMB2-2  | PHWY60   |
| Group Name:           | PST-COND | PST-COND | PST-COND |
| Node Name:            | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type:      | UH       | UH       | UH       |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 5.80     | 5.80     | 5.80     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |
| Time Max (hrs):       | 12.02    | 12.53    | 12.20    |
| Flow Max (cfs):       | 54.01    | 27.20    | 29.34    |
| Runoff Volume (in):   | 4.78     | 2.67     | 2.88     |
| Runoff Volume (cf):   | 170072   | 207762   | 143201   |

} 10 yr - 24 hr  
 POST CONDITIONS

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 10 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-10 \*\*\*\*\*

•(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) |
|-----------|------------|---------------------|----------------|--------------------|----------------------|-----------------------|-----------------|------------------|------------------|-------------------|
| XPOND2    | EX-COND    | 12.25               | 74.03          | 74.00              | 0.0323               | 21520.48              | 12.13           | 84.00            | 12.25            | 73.71             |
| PPOND2    | PST-COND   | 12.53               | 71.77          | 74.00              | 0.0199               | 45267.74              | 12.03           | 85.12            | 12.53            | 46.66             |

POST CONDITIONS  
 MAX. POND STAGE

POST Q OUT

46.66 cfs < 73.71 cfs

10 yr - 24 hr STORM  
 (P = 5.8")

2.11

AB-WMB TRANSPORTATION ADVANTAGE  
POST 100 YR ANALYSIS - POND 2  
JANUARY 24, 2000

\*\*\*\*\* Basin Summary - WMB2-100 \*\*\*\*\*

\*\*\*

|                  |          |          |          |
|------------------|----------|----------|----------|
| Basin Name:      | PWMB2-1  | PWMB2-2  | PHWY60   |
| Group Name:      | PST-COND | PST-COND | PST-COND |
| Node Name:       | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type: | UH       | UH       | UH       |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 8.00     | 8.00     | 8.00     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |

|                     |        |        |        |
|---------------------|--------|--------|--------|
| Time Max (hrs):     | 12.02  | 12.53  | 12.20  |
| Flow Max (cfs):     | 77.54  | 46.20  | 48.33  |
| Runoff Volume (in): | 6.85   | 4.36   | 4.58   |
| Runoff Volume (cf): | 243650 | 339502 | 227520 |

} 100 yr - 24hr STORM

100-year  
PE?

AB-WMB TRANSPORTATION ADVANTAGE  
 POST 100 YR ANALYSIS - POND 2  
 JANUARY 24, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-100 \*\*\*\*\*

•(Time units - hours)

| Node<br>Name | Group<br>Name | Max Time<br>Conditions | Max Stage<br>(ft) | Warning<br>Stage (ft) | Max Delta<br>Stage (ft) | Max Surface<br>Area (sf) | Max Time<br>Inflow | Max Inflow<br>(cfs) | Max Time<br>Outflow | Max Outflow<br>(cfs) |
|--------------|---------------|------------------------|-------------------|-----------------------|-------------------------|--------------------------|--------------------|---------------------|---------------------|----------------------|
| PPOND2       | PST-COND      | 12.34                  | 72.46             | 74.00                 | 0.0216                  | 47653.19                 | 12.07              | 131.21              | 12.34               | 93.68                |

POST CONDITIONS  
 MAX. POND STAGE

REQ'D FREEBOARD = 1 Ft.

1.54 Ft. > 1 Ft. OK

100 yr - 24hr STORM EVENT

### Proposed Pond Stage-Storage Computations:

| Stage, ft.                           | Area, sf | Area, acres | Average Area, sf | Depth Incr., ft | Volume Incr., cf | Volume Accum., cf | Volume Accum., af |
|--------------------------------------|----------|-------------|------------------|-----------------|------------------|-------------------|-------------------|
| <b>Design Attenuation Volume:</b>    |          |             |                  |                 |                  |                   |                   |
| 74.0                                 | 53,075   | 1.2184      | 51,293           | 1.00            | 51,293           | 288,783           | 6.6295            |
| 73.0                                 | 49,510   | 1.1366      | 47,780           | 1.00            | 47,780           | 237,490           | 5.4520            |
| 72.0                                 | 46,050   | 1.0572      | 44,368           | 1.00            | 44,368           | 189,710           | 4.3551            |
| 71.0                                 | 42,685   | 0.9799      | 41,053           | 1.00            | 41,053           | 145,343           | 3.3366            |
| 70.0                                 | 39,420   | 0.9050      | 37,840           | 1.00            | 37,840           | 104,290           | 2.3942            |
| 69.0                                 | 36,260   | 0.8324      | 34,730           | 1.00            | 34,730           | 66,450            | 1.5255            |
| 68.0                                 | 33,200   | 0.7622      | 31,720           | 1.00            | 31,720           | 31,720            | 0.7282            |
| 67.0                                 | 30,240   | 0.6942      | -                | -               | -                | -                 | -                 |
| <b>Design Permanent Pool Volume:</b> |          |             |                  |                 |                  |                   |                   |
| 67.0                                 | 30,240   | 0.6942      | 28,813           | 1.00            | 28,813           | 133,255           | 3.0591            |
| 66.0                                 | 27,385   | 0.6287      | 26,013           | 1.00            | 26,013           | 104,443           | 2.3977            |
| 65.0                                 | 24,640   | 0.5657      | 23,325           | 1.00            | 23,325           | 78,430            | 1.8005            |
| 64.0                                 | 22,010   | 0.5053      | 20,760           | 1.00            | 20,760           | 55,105            | 1.2650            |
| 63.0                                 | 19,510   | 0.4479      | 18,325           | 1.00            | 18,325           | 34,345            | 0.7885            |
| 62.0                                 | 17,140   | 0.3935      | 16,020           | 1.00            | 16,020           | 16,020            | 0.3678            |
| 61.0                                 | 14,900   | 0.3421      | -                | -               | -                | -                 | -                 |

**Downstream Channel Erosion Control Volume:** 185,913 cf 4.268 ac ft  
(From 1 yr 24 hr storm hydrograph)

### Water Quality & Permanent Pool Calculations:

Total Impervious Area: 749,232 sf  
Water Quality Volume: 0.50 inches runoff per impervious acre  
Permanent Pool Volume: 2.00 inches runoff per impervious acre  
(JCC BMP Point System, Table 1)

Required Water Quality Volume: 31,218 cf 0.7167 ac ft  
Required Permanent Pool Volume: 124,872 cf 2.8667 ac ft

# Orifice Configurations:

ABOVE DEEM  
 POOL

|                                | <u>WQ Volume</u> |        | <u>1 yr - 24 hr Volume</u> |          |
|--------------------------------|------------------|--------|----------------------------|----------|
| Volume:                        | 31,218           | cf     | 185,913                    | cf       |
| Brim Drawdown Time:            | 30               | hrs    | 24                         | hrs ✓ OK |
| Average Rate of Discharge:     | 1,041            | cf/hr  | 7,746                      | cf/hr    |
|                                | 0.29             | cfs    | 2.15                       | cfs      |
| Initial Orifice Diameter:      | 4.157            | inches | 7.317                      | inches   |
| Invert Elevation:              | 67.00            | ft     | 67.00                      | ft       |
| Design Orifice Coefficient:    | 0.60             |        | 0.60                       |          |
| Orifice Centerline Elevation:  | 67.17            | ft     | 67.30                      | ft       |
| Pond Volume at Centerline:     | -                | cf     | -                          | cf       |
| Adjusted Volume:               | 31,218           | cf     | 185,913                    | cf       |
| Adjusted Stage:                | 67.98            | ft     | 71.99                      | ft       |
| Depth:                         | 0.81             | ft     | 4.68                       | ft       |
| Initial Elev of Water Surface: | 67.98            | ft     | 71.99                      | ft       |
| Final Elev of Water Surface:   | 67.17            | ft     | 67.30                      | ft       |
| Average Depth:                 | 0.41             | ft     | 2.34                       | ft       |
| Orifice Area:                  | 0.0943           | sf     | 0.2920                     | sf       |
| Orifice Diameter:              | 0.3465           | ft     | 0.6098                     | ft       |
|                                | 4.158            | inches | 7.317                      | inches   |
| Orifice Diameter Used:         | 7.313            |        | inches                     |          |
|                                |                  |        | 7 5/16 inches              |          |

2.15

# **EXISTING CONDITIONS CONTRIBUTING AREA SUMMARY PHASE II**

01/24/00  
1:27 PM

| Drainage Basin: <b>XWMB2-1</b>              |                                | Contributing<br>Drainage Area<br>(acres)      CN |         |
|---|--------------------------------|--|---------|
|   | DCIA:                          | 6.82   | -       |
|   | Non-DCIA:                      | 0.75   | 98      |
|   | Semi-Impervious Areas:         | 0.00   | 82      |
|   | Open/Landscaped/Planted Areas: | 3.45   | 61      |
|   | Wooded Area:                   | 1.88   | 55      |
| Total Drainage Area Contributing to Pond 2: |                                | 12.90  | acres   |
|   | Time of Concentration:         | 20   | minutes |
|   | Composite CN:                  | 64   |         |
|   | % DCIA:                        | 53%  |         |

| Drainage Basin: <b>XWMB2-2</b>              |                                | Contributing<br>Drainage Area<br>(acres)      CN |         |
|---|--------------------------------|--|---------|
|   | DCIA (includes W.S. Area):     | 0.37   | -       |
|   | Non-DCIA:                      | 1.06   | 98      |
|   | Semi-Impervious Areas:         | 1.31   | 82      |
|   | Open/Landscaped/Planted Areas: | 6.23   | 61      |
|   | Wooded Area:                   | 9.97   | 55      |
| Total Drainage Area Contributing to Pond 2: |                                | 18.94  | acres   |
|   | Time of Concentration:         | 60   | minutes |
|   | Composite CN:                  | 61   |         |
|   | % DCIA:                        | 2%   |         |

| Drainage Basin: <b>XHWY60</b>               |                                | Contributing<br>Drainage Area<br>(acres)      CN |         |
|---|--------------------------------|--|---------|
|   | DCIA:                          | 4.2  | -       |
|   | Non-DCIA:                      | 0.0  | 98      |
|   | Semi-Impervious Areas:         | 0.0  | 82      |
|   | Open/Landscaped/Planted Areas: | 4.5  | 61      |
|   | Wooded Area:                   | 5.0  | 55      |
| Total Drainage Area Contributing to Pond 2: |                                | 13.7   | acres   |
|   | Time of Concentration:         | 30   | minutes |
|   | Composite CN:                  | 58   |         |
|   | % DCIA:                        | 31%  |         |

$$12.9 + 18.94 + 13.7 = 45.54 \text{ AC}$$

2.16

EQW ENR 61

**Existing Pond Stage-Storage Computations:**

| Stage, ft.                                  | Area, sf | Area, acres | Average Area, sf | Depth Incr., ft | Volume Incr., cf | Volume Accum., cf | Volume Accum., af |
|---|----------|-------------|------------------|-----------------|------------------|-------------------|-------------------|
| <b>Detention Pond Attenuation Volume:</b>   |          |             |                  |                 |                  |                   |                   |
| 74.0  | 21,440   | 0.4922      | 20,230           | 1.00            | 20,230           | 109,203           | 2.5070            |
| 73.0  | 19,020   | 0.4366      | 18,228           | 1.00            | 18,228           | 88,973            | 2.0425            |
| 72.0  | 17,435   | 0.4003      | 16,692           | 1.00            | 16,692           | 70,746            | 1.6241            |
| 71.0  | 15,949   | 0.3661      | 15,220           | 1.00            | 15,220           | 54,054            | 1.2409            |
| 70.0  | 14,490   | 0.3326      | 13,778           | 1.00            | 13,778           | 38,834            | 0.8915            |
| 69.0  | 13,066   | 0.3000      | 12,370           | 1.00            | 12,370           | 25,056            | 0.5752            |
| 68.0  | 11,674   | 0.2680      | 10,752           | 1.00            | 10,752           | 12,686            | 0.2912            |
| 67.0  | 9,830    | 0.2257      | 9,671            | 0.20            | 1,934            | 1,934             | 0.0444            |
| 66.8  | 9,512    | 0.2184      | -                | -               | -                | -                 | -                 |
| <b>Existing Pond Permanent Pool Volume:</b> |          |             |                  |                 |                  |                   |                   |
| 66.8  | 9,512    | 0.2184      | 8,706            | 0.80            | 6,965            | 11,869            | 0.2725            |
| 66.0  | 7,900    | 0.1814      | 7,006            | 0.70            | 4,904            | 4,904             | 0.1126            |
| 65.3  | 6,112    | 0.1403      | -                | -               | -                | -                 | -                 |
|   |          |             |                  |                 |                  |                   |                   |



AB-Wmb Transportation Advantage - Phase 2  
EXISTING CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

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

-----  
Name: XOUT2      Base Flow(cfs): 0      Init Stage(ft): 65  
Group: EX-COND      Length(ft): 0      Warn Stage(ft): 66  
Comment: OUTFALL BOUNDARY NODE FOR XPOND2

Time(hrs)      Stage(ft)  
0      65  
12      66  
24      65

-----  
Name: XPOND2      Base Flow(cfs): 0      Init Stage(ft): 66.8  
Group: EX-COND      Length(ft): 0      Warn Stage(ft): 74  
Comment: EXISTING CONDITIONS ANALYSIS - BALLFIELD POND

Stage(ft)      Area(ac)  
66.8      0.2184  
67      0.2257  
68      0.268  
69      0.3  
70      0.3326  
71      0.3661  
72      0.4003  
73      0.4366  
74      0.4922

AB-Wmb Transportation Advantage - Phase 2  
EXISTING CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* Input Report \*\*\*\*\*

-----Class: Drop Structure-----

Name: XOUT2A      From Node: XPOND2      Length(ft): 40  
Group: EX-COND      To Node: XOUT2      Count: 1

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

|                  | UPSTREAM | DOWNSTREAM |
|------------------|----------|------------|
| Span(in):        | 36       | 36         |
| Rise(in):        | 36       | 36         |
| Invert(ft):      | 66.91    | 66.82      |
| Manning's N:     | 0.024    | 0.024      |
| 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 CMP: Headwall      2      1  
Downstream FHWA Inlet Edge Description:  
Circular CMP: Headwall      2      1

EXISTING CONDITIONS ANALYSIS OF BALLFIELD POND

\*\*\* Weir 1 of 1 for Drop Structure XOUT2A \*\*\* [TABLE]

Count: 1      Bottom Clip(in): 0  
Type: Horiz      Top Clip(in): 0  
Flow: Both      Weir Discharge Coef: 3.2  
Geometry: Circular      Orifice Discharge Coef: 0.6

Span(in): 36      Invert(ft): 73  
Rise(in): 36      Control Elev(ft): 73

*dc or Tw  
used.*

AB-Wmb Transportation Advantage - Phase 2  
EXISTING CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* Input Report \*\*\*\*\*

-----Class: Drop Structure-----

Name: XOUT2B      From Node: XPOND2      Length(ft): 40  
Group: EX-COND      To Node: XOUT2      Count: 1

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

|                  | UPSTREAM | DOWNSTREAM |
|------------------|----------|------------|
| Span(in):        | 36       | 36         |
| Rise(in):        | 36       | 36         |
| Invert(ft):      | 65.15    | 67.07      |
| Manning's N:     | 0.024    | 0.024      |
| 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 CMP: Headwall                  | 2 | 1 |
| Downstream FHWA Inlet Edge Description: |   |   |
| Circular CMP: Headwall                  | 2 | 1 |

EXISTING CONDITIONS ANALYSIS OF BALLFIELD POND

\*\*\* Weir 1 of 1 for Drop Structure XOUT2B \*\*\* [TABLE]

Count: 1      Bottom Clip(in): 0  
Type: Horiz      Top Clip(in): 0  
Flow: Both      Weir Discharge Coef: 3.2  
Geometry: Circular      Orifice Discharge Coef: 0.6

Span(in): 36      Invert(ft): 73  
Rise(in): 36      Control Elev(ft): 73

AB-Wmb Transportation Advantage - Phase 2  
EXISTING CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* Input Report: Rating Curves \*\*\*\*\*

Name: XPERF-A Count: 1 From Node: XPOND2  
Group: EX-COND Flow: Both To Node: XOUT2

|     | NAME   | ELEV ON(ft) | ELEV OFF(ft) |
|-----|--------|-------------|--------------|
| #1: | PERF-A | 69          | 69           |
| #2: |        | 0           | 0            |
| #3: |        | 0           | 0            |
| #4: |        | 0           | 0            |

36" DIA CMP PERF PIPE RISER "A" (EXISTING COND.)

Name: XPERF-B Count: 1 From Node: XPOND2  
Group: EX-COND Flow: Both To Node: XOUT2

|     | NAME   | ELEV ON(ft) | ELEV OFF(ft) |
|-----|--------|-------------|--------------|
| #1: | PERF-B | 69          | 69           |
| #2: |        | 0           | 0            |
| #3: |        | 0           | 0            |
| #4: |        | 0           | 0            |

36" DIA CMP PERF PIPE RISER "B" (EXISTING COND.)

AB-Wmb Transportation Advantage - Phase 2  
EXISTING CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* Input Report \*\*\*\*\*

-----Class: Operating Table-----

Name: PERF-A      Type: Rating Curve  
Comment: PERFORATED PIPE RISER DISCHARGE RATING CURVE - A

| U/S Stage(ft) | Discharge(cfs) |
|---------------|----------------|
| 69            | 0              |
| 69.48         | 0.271          |
| 70.01         | 0.762          |
| 70.54         | 1.398          |
| 71.07         | 2.151          |
| 71.6          | 3.006          |
| 72.01         | 3.775          |
| 72.55         | 4.766          |
| 72.98         | 5.631          |

-----Class: Operating Table-----

Name: PERF-B      Type: Rating Curve  
Comment: PERFORATED PIPE RISER DISCHARGE RATING CURVE - B

| U/S Stage(ft) | Discharge(cfs) |
|---------------|----------------|
| 69            | 0              |
| 69.48         | 0.271          |
| 70.01         | 0.762          |
| 70.54         | 1.398          |
| 71.07         | 2.151          |
| 71.6          | 3.006          |
| 72.01         | 3.775          |
| 72.55         | 4.766          |
| 72.98         | 5.631          |

| Slot Level | Head (inches) | Head (Feet) |                          |  |  |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | Slot Level | Head (feet) | Weir (cfs) |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |
|------------|---------------|-------------|--------------------------|--|--|--|-----------------------------------|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-------|-------|-------|-------|------------|-------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|
| 38         | 47.75         | 3.98        | Pipe Information:        |  | Material: cmp  |  | Orifice Equation: cA sqrt(2gh)    |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       | 0.026 | 38    | 3.98       | 5.51        |            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |
| 37         | 46.47         | 3.87        |                          |  | Diameter: 36 inches                                    |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.026 | 0.044 | 0.044 | 37    | 3.87       | 5.29        |            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |
| 36         | 45.20         | 3.77        |                          |  | Circumference: 113 inches                              |  | Slot Height: 0.031 ft             |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       | 0.026 | 0.044 | 0.057      | 36          | 3.77       | 5.07  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |
| 35         | 43.93         | 3.66        |                          |  | X-Sectional Area: 1,018 sq. in.                        |  | Slot Width: 0.736 ft              |  | Area: 0.023 sq. ft.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 35    | 3.66  | 4.86  |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |
| 34         | 42.65         | 3.55        |                          |  |  |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 34    | 3.55  | 4.65  |       |       |       |       |       |       |       |       |       |       |       |      |      |      |
| 33         | 41.38         | 3.45        | Perforation Information: |  | Diameter: 0.38 inches                                  |  | 0.031 ft                          |  | Assumption: Slot height is so small that weir flow is negligible on an individual slot basis. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 33    | 3.45  | 4.44  |       |       |       |       |       |       |       |       |       |       |      |      |      |
| 32         | 40.11         | 3.34        |                          |  | X-Sectional Area: 0.11 sq. in.                         |  |                                   |  | All slots will act under orifice flow.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 32    | 3.34  | 4.24  |       |       |       |       |       |       |       |       |       |      |      |      |
| 31         | 38.83         | 3.24        |                          |  | # holes per sf of pipe surface: 30                     |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 31    | 3.24  | 4.04  |       |       |       |       |       |       |       |       |      |      |      |
| 30         | 37.56         | 3.13        |                          |  |  |  |                                   |  | Orifice Coefficient: 0.60   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 30    | 3.13  | 3.84  |       |       |       |       |       |       |       |      |      |      |
| 29         | 36.29         | 3.02        |                          |  | Hole area per sf of pipe surface: 3.31 sq. in.         |  | 0.023 sq. ft.                     |  | Gravity Constant: 32.20   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 29    | 3.02  | 3.65  |       |       |       |       |       |       |      |      |      |
| 28         | 35.01         | 2.92        |                          |  | Length of Perforated Riser: 48 inches                  |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 28    | 2.92  | 3.46  |       |       |       |       |       |      |      |      |
| 27         | 33.74         | 2.81        |                          |  | Surface Area of Riser: 5,429 sq. in.                   |  | 37.70 sq. ft.                     |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 27    | 2.81  | 3.27  |       |       |       |       |      |      |      |
| 26         | 32.47         | 2.71        |                          |  |  |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 26    | 2.71  | 3.09  |       |       |       |       |      |      |      |
| 25         | 31.19         | 2.60        |                          |  | Hole area for riser section: 125 sq. in.               |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 0.127 | 0.132 | 25    | 2.60  | 2.91  |       |       |      |      |      |
| 24         | 29.92         | 2.49        |                          |  | Equivalent Rectangular Section: 2.60 inch crest length |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 0.127 | 0.132 | 0.137 | 24    | 2.49  | 2.73  |       |      |      |      |
| 23         | 28.65         | 2.39        |                          |  | Weir Coefficient: 3.20                                 |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 0.127 | 0.132 | 0.137 | 0.142 | 23    | 2.39  | 2.56  |      |      |      |
| 22         | 27.37         | 2.28        |                          |  |  |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 0.127 | 0.132 | 0.137 | 0.142 | 0.146 | 22    | 2.28  | 2.39 |      |      |
| 21         | 26.10         | 2.18        |                          |  | Length of riser section for 1 sf: 1.27 inches          |  | (assume as vertical hole spacing) |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 0.127 | 0.132 | 0.137 | 0.142 | 0.146 | 0.151 | 21    | 2.18 | 2.23 |      |
| 20         | 24.83         | 2.07        |                          |  | # rows for riser length: 37.70                         |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 | 0.076 | 0.085 | 0.092 | 0.099 | 0.105 | 0.111 | 0.117 | 0.122 | 0.127 | 0.132 | 0.137 | 0.142 | 0.146 | 0.151 | 0.155 | 20   | 2.07 | 2.07 |
| 19         | 23.55         | 1.96        |                          |  |  |  |                                   |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |       |       |       |       | 0.026      | 0.044       | 0.057      | 0.067 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |

|                         |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Slot Level:             | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    | 24    | 25    | 26    | 27    | 28    | 29    | 30    | 31    | 32    | 33    | 34    | 35    | 36    | 37    | 38    |
| Head, ft.               | 0.05  | 0.16  | 0.27  | 0.37  | 0.48  | 0.58  | 0.69  | 0.80  | 0.90  | 1.01  | 1.11  | 1.22  | 1.33  | 1.43  | 1.54  | 1.64  | 1.75  | 1.86  | 1.96  | 2.07  | 2.18  | 2.28  | 2.39  | 2.49  | 2.60  | 2.71  | 2.81  | 2.92  | 3.02  | 3.13  | 3.24  | 3.34  | 3.45  | 3.55  | 3.66  | 3.77  | 3.87  | 3.98  |
| Orifice Discharge, cfs: | 0.026 | 0.070 | 0.127 | 0.194 | 0.271 | 0.355 | 0.447 | 0.546 | 0.651 | 0.762 | 0.879 | 1.001 | 1.128 | 1.261 | 1.398 | 1.540 | 1.686 | 1.837 | 1.992 | 2.151 | 2.314 | 2.482 | 2.653 | 2.827 | 3.006 | 3.188 | 3.373 | 3.562 | 3.755 | 3.950 | 4.149 | 4.352 | 4.557 | 4.766 | 4.977 | 5.192 | 5.410 | 5.631 |

# POST CONDITIONS CONTRIBUTING AREA SUMMARY POND 2

01/24/00  
1:12 PM

| Drainage Basin: <b>PWMB2-1</b>              | Contributing<br>Drainage Area<br>(acres) | CN      |
|---|--|---------|
| DCIA (includes Building & Pavement Areas):  | 7.20                                     | -       |
| Non-DCIA:                                   | 0.50                                     | 98      |
| Semi-Impervious Areas:                      | 0.00                                     | 82      |
| Open/Landscaped/Planted Areas:              | 1.30                                     | 61      |
| Wooded Area:                                | 0.80                                     | 55      |
| Total Drainage Area Contributing to Pond 2: | 9.80                                     | acres   |
| Time of Concentration:                      | 10                                       | minutes |
| Composite CN:                               | 66.3                                     |         |
| % DCIA:                                     | 73%                                      |         |

| Drainage Basin: <b>PWMB2-2</b>                             | Contributing<br>Drainage Area<br>(acres) | CN      |
|--|--|---------|
| DCIA (includes Pond W.S., Pavement & Const. Staging Area): | 4.80                                     | -       |
| Non-DCIA:  | 0.50                                     | 98      |
| Semi-Impervious Areas:                                     | 1.30                                     | 82      |
| Open/Landscaped/Planted Areas:                             | 5.20                                     | 61      |
| Wooded Area:   | 9.60                                     | 55      |
| Total Drainage Area Contributing to Pond 2:                | 21.40                                    | acres   |
| Time of Concentration:                                     | 60                                       | minutes |
| Composite CN:  | 60.3                                     |         |
| % DCIA:  | 22%                                      |         |

| Drainage Basin: <b>PHWY60</b>               | Contributing<br>Drainage Area<br>(acres) | CN      |
|---|--|---------|
| DCIA:                                       | 4.20                                     | -       |
| Non-DCIA:                                   | 0.00                                     | 98      |
| Semi-Impervious Areas:                      | 0.00                                     | 82      |
| Open/Landscaped/Planted Areas:              | 4.50                                     | 61      |
| Wooded Area:                                | 5.00                                     | 55      |
| Total Drainage Area Contributing to Pond 2: | 13.70                                    | acres   |
| Time of Concentration:                      | 30                                       | minutes |
| Composite CN:                               | 57.8                                     |         |
| % DCIA:                                     | 31%                                      |         |

$$9.8 + 21.4 + 13.7 = 44.9 \text{ ac.}$$

2.24

AB-Wmb Transportation Advantage - Phase 2  
POST CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

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

Name: POUT2 Base Flow(cfs): 0 Init Stage(ft): 65  
Group: PST-COND Length(ft): 0 Warn Stage(ft): 66  
Comment: OUTFALL BOUNDARY NODE FOR PPOND2

| Time(hrs) | Stage(ft) |
|-----------|-----------|
| 0         | 65        |
| 12        | 66        |
| 24        | 65        |

Name: PPOND2 Base Flow(cfs): 0 Init Stage(ft): 67  
Group: PST-COND Length(ft): 0 Warn Stage(ft): 74  
Comment: POST CONDITIONS ANALYSIS OF POND 2

| Stage(ft) | Area(ac) |
|-----------|----------|
| 67        | 0.6942   |
| 68        | 0.7622   |
| 69        | 0.8324   |
| 70        | 0.905    |
| 71        | 0.9799   |
| 72        | 1.0572   |
| 73        | 1.1366   |
| 74        | 1.2184   |

POND 2 STAGE VS AREA



AB-Wmb Transportation Advantage - Phase 2  
POST CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000

\*\*\*\*\* Input Report \*\*\*\*\*

-----Class: Drop Structure-----

Name: POUT2CS      From Node: PPOND2      Length(ft): 60  
Group: PST-COND      To Node: POUT2      Count: 2

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

|                  | UPSTREAM | DOWNSTREAM |
|------------------|----------|------------|
| Span(in):        | 36       | 36         |
| Rise(in):        | 36       | 36         |
| Invert(ft):      | 64       | 63         |
| Manning's N:     | 0.013    | 0.013      |
| Top Clip(in):    | 0        | 0          |
| Bottom Clip(in): | 0        | 0          |

36" OUTLET PIPES

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

|   |   |   |
|---|---|---|
| Upstream FHWA Inlet Edge Description:   |   |   |
| Circular CMP: Headwall                  | 2 | 1 |
| Downstream FHWA Inlet Edge Description: |   |   |
| Circular CMP: Headwall                  | 2 | 1 |

POST CONDITIONS ANALYSIS OF POND 2

\*\*\* Weir 1 of 3 for Drop Structure POUT2CS \*\*\* [TABLE]

Count: 1      Bottom Clip(in): 0  
Type: Mavis      Top Clip(in): 0  
Flow: Both      Weir Discharge Coef: 3.2  
Geometry: Rectangular      Orifice Discharge Coef: 0.6

LOW FLOW WEIR  
(22r Storm)

Span(in): 48      Invert(ft): 70.25  
Rise(in): 28      Control Elev(ft): 70.25

$8'7" + 10.9' = 18.9'$   
 $8' + 18' = 26'$

\*\*\* Weir 2 of 3 for Drop Structure POUT2CS \*\*\* [TABLE]

Count: 1      Bottom Clip(in): 0  
Type: Mavis      Top Clip(in): 0  
Flow: Both      Weir Discharge Coef: 3.2  
Geometry: Circular      Orifice Discharge Coef: 0.6

VOLUME RECOVERY  
ORIFICE

Span(in): 7.3125      Invert(ft): 67  
Rise(in): 7.3125      Control Elev(ft): 67

AB-Wmb Transportation Advantage - Phase 2  
 POST CONDITIONS ROUTING PARAMETERS  
 JANUARY 24, 2000

\*\*\*\*\* Input Report \*\*\*\*\*

\*\*\* Weir 3 of 3 for Drop Structure POUT2CS \*\*\* [TABLE]

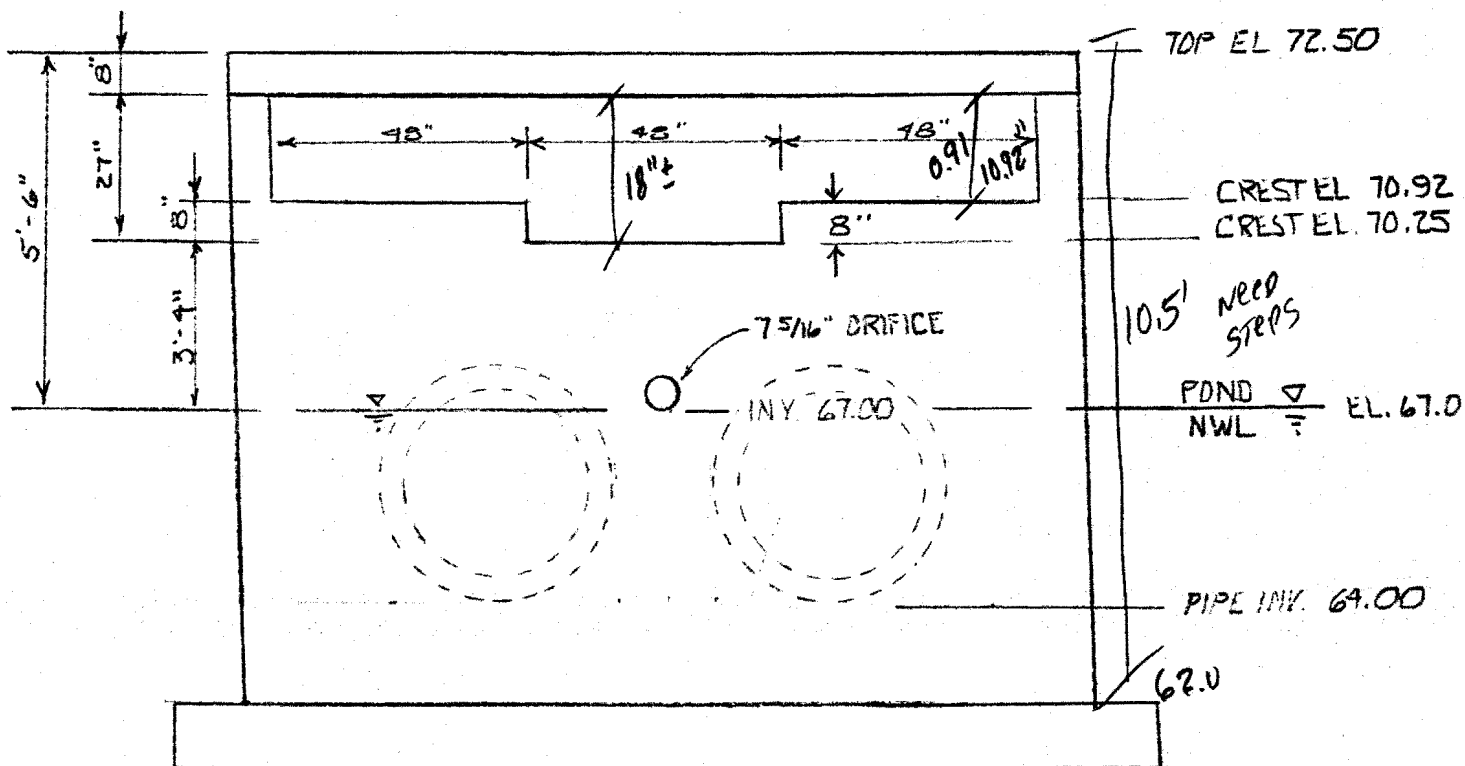
Count: 2 Bottom Clip(in): 0  
 Type: Mavis Top Clip(in): 0  
 Flow: Both Weir Discharge Coef: 3.2  
 Geometry: Rectangular Orifice Discharge Coef: 0.6

Span(in): 48  
 Rise(in): 18

Invert(ft): 70.92  
 Control Elev(ft): 70.92

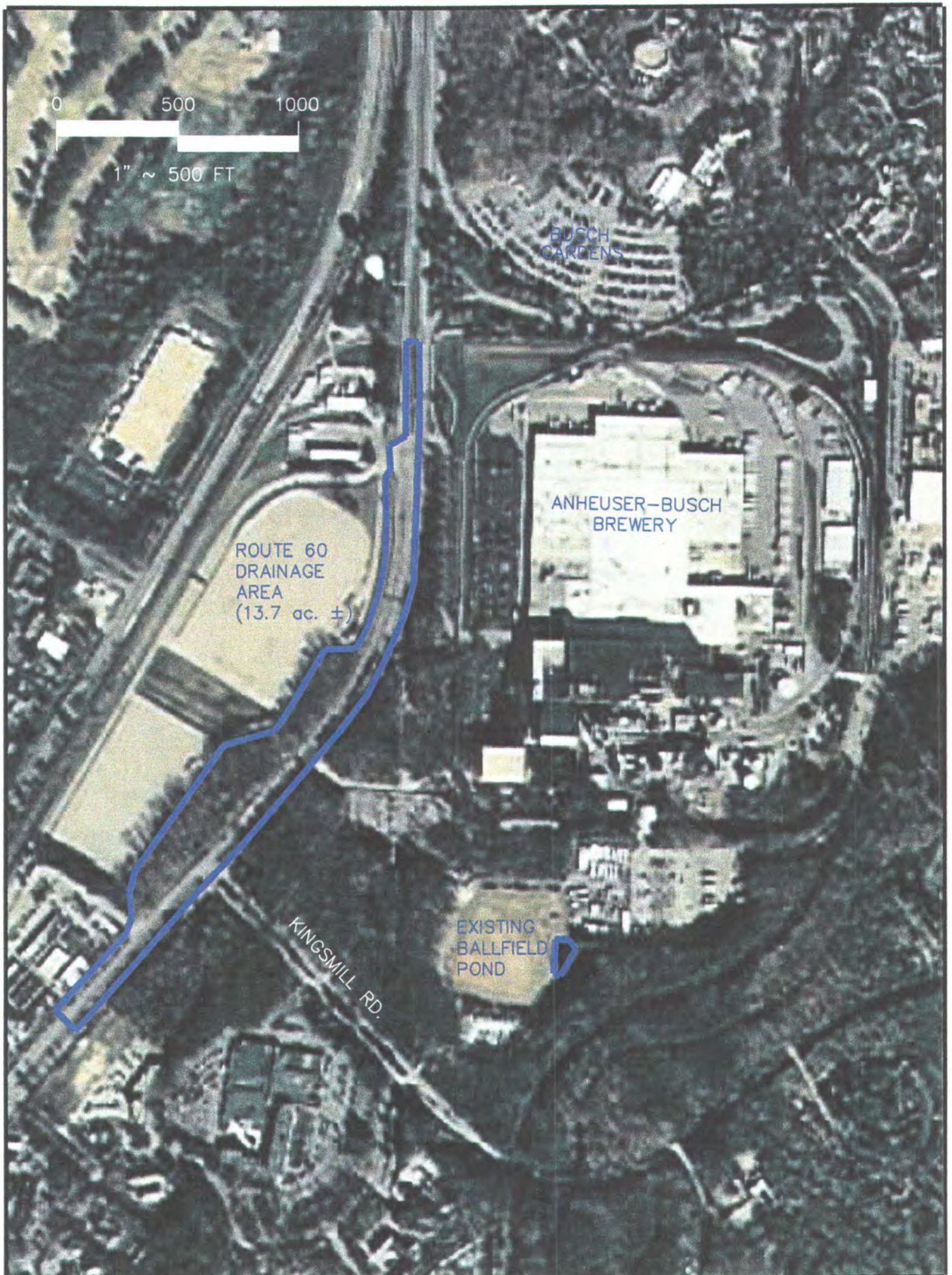
HIGH FLOW WEIR  
 > 2 YR STORM

MIN. TOP OF BANK EL = 74.0



NO DETAILS  
 FOR BASE  
 ON SHEET 215!





## **SECTION 3: PLANT AREA STORMWATER MANAGEMENT PLAN**

### **PLANT AREA PROPERTY DESCRIPTION:**

The Anheuser-Busch, Inc. Williamsburg Brewery is located at 7801 Pocahontas Trail. The brewery is at the core of a very large tract of land, which is owned by three separate companies as follows:

- Anheuser-Busch, Inc. - Williamsburg Brewery
- Busch Properties, Inc. - Kingsmill Developments
- Busch Entertainment Corporation - Busch Gardens

The Williamsburg Brewery Plant Parcel is a legally subdivided property owned by Anheuser-Busch Inc., containing approximately 90.2 acres. The Plant Parcel is located predominantly in James City County (Real Estate Number (51-3), (01-1) and partly in York County (Real Estate Numbers H12c-0201-1677, H12c-0975-1128, and H12c-1586-0993). The Plant Parcel is clearly depicted on the Overall Site Plan Sheet 200 (see Appendix document).

### **TRANSPORTATION ADVANTAGE - LAND USE SUMMARY:**

The Transportation Advantage project shall affect three parcels in the Anheuser-Busch tract. The core of the project will be located outside of the brewery parcel on a parcel referred to as Parcel "D2" which is the name given on the recorded plat subdivision. A very small portion of the project will be located across parcel "D1" of the same plat. And finally, several elements of the project will be located within the Plant Parcel.

The Land Use Summary is clearly depicted on Sheet 200 and includes detailed statistics on the land use.

The proposed activities that will affect the Plant Parcel are generally associated with a relocation of the existing tractor trailer entrance and scale house. The development activities are as follows:

1. The existing scale house operation shall be shifted from the Plant Parcel to the newly developed facility on Parcel 'D2'.
2. The truck entrance from Pocahontas Trail (US Route 60) will shift west from its current location.
3. A new rear truck entrance road will be constructed in the southwest corner of the Plant Parcel providing truck access from the rear rather than from the front of the plant.
4. The existing scale house area shall be converted to additional trailer storage area.
5. Some interior road paving shall occur at the southeast corner of the existing warehouse to facilitate the rear entrance.



In order to mitigate the development needs of the Transportation Advantage project impact on the Plant Parcel, areas which are currently paved shall be converted to landscaped or forested ground. The mitigation activities area as follows:

- A. Demolish the existing Hospitality House parking lot in the northwest area of the Plant Parcel. The area shall be planted with trees and understory to blend with the adjoining Kingsmill Road buffer area.
- B. Demolish the existing truck entrance road in the north area of the Plant Parcel. The area will be landscaped to blend with existing lawns and shrubbery.
- C. Remove an existing area of gravel pavement in the southeast area of the plant parcel and convert the area to a tree planted buffer.

The net affect of the Transportation Advantage development and mitigation activities will be that the POST DEVELOPMENT impervious area shall be the same as the PRE-DEVELOPMENT impervious area within the 90.2 acre Plant Parcel.

#### **PLANT AREA - VPDES GENERAL PERMIT**

The Williamsburg Brewery has obtained a VPDES General permit For Storm Water Discharges Associated with Industrial Activity (VPDES Permit No. VAR550169) from the Commonwealth of Virginia Department of Environmental Quality. The effective date of the permit is October 14, 1999. The permit expiration date is June 29, 2004.

The storm water general permit has four parts. Part I authorizes the discharge, lists the effluent limitations and compliance monitoring requirements, analytical monitoring requirements and special conditions. ~~THE~~ facility does not have effluent limitations or analytical monitoring requirements, however, the special conditions to apply. Part II lists conditions applicable to all VPDES permits. Part III is the Storm Water Pollution Prevention Plan. Part IV has the sector specific permit requirements for your facility.

The management and staff at the Williamsburg Brewery are committed to the responsible operation of the facility, within the 90.2 acre Plant Parcel to ensure permit compliance and affirmative action to prevent stormwater pollution. The means of compliance are two-fold, capturing potential contaminants at the source location and a stormwater pump-back system, which captures dry weather flow and first flush flow and transfers the stormwater to the wastewater disposal system. The systems are described in detail in the Stormwater Pollution Prevention Plan, which is included in the Appendix of this report.

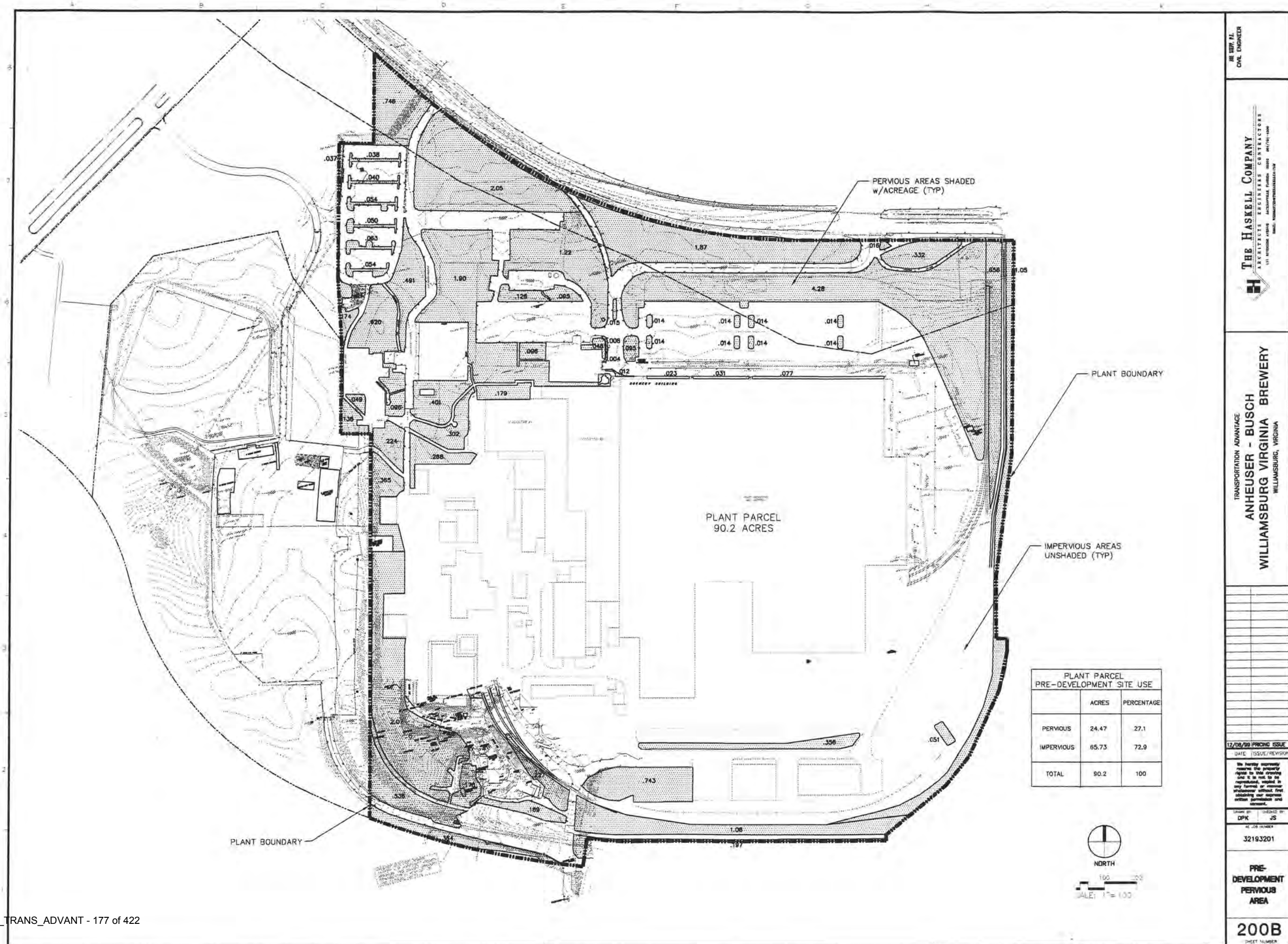
## **PRE-POST IMPERVIOUS AREAS**

The actual pervious-impervious quantities are presented on Sheet 200B and 200C included in this report. The quantities are summarized as follows:

| <b>PRE-DEVELOPMENT SITE USE</b> |                   |             |
|---------------------------------|-------------------|-------------|
| Pervious Area                   | 24.47 acres       | 27.1%       |
| Impervious Area                 | 65.73 acres       | 72.9%       |
| <b>TOTAL</b>                    | <b>90.2 acres</b> | <b>100%</b> |

| <b>POST DEVELOPMENT SITE USE</b> |                   |             |
|----------------------------------|-------------------|-------------|
| Pervious Area                    | 24.48 acres       | 27.1%       |
| Impervious Area                  | 65.72 acres       | 72.9%       |
| <b>TOTAL</b>                     | <b>90.2 acres</b> | <b>100%</b> |

Therefore, the net effect of the project will be that no new impervious area would be added to the Plant Parcel.





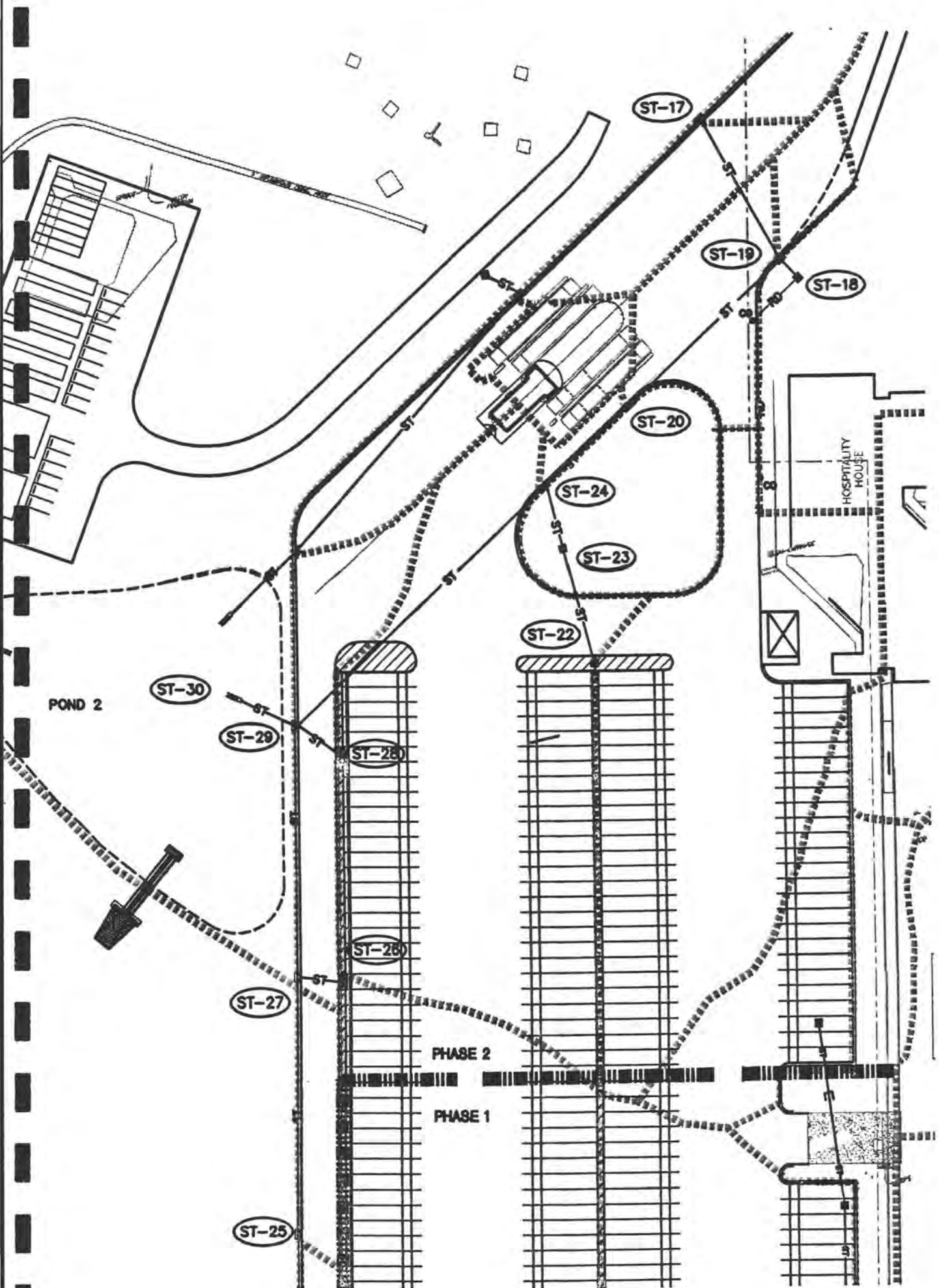


PROJECT: **WILLIAMSBURG TRANSPORTATION ADVANTAGE**  
 CLIENT: **ANHEUSER BUSCH**  
 SHEET: **1 OF 1**

JOB NUMBER: **32193**  
 BY: **DPK/JWS**  
 DATE: **1/10/00**

|           |           | IMPERVIOUS 'C': 0.95 |                                |                   |                  | STORM SEWER DESIGN TABULATION FORM |                   |                       |                    |           |        |          |              |                      |                  |                 |           | HGL       |      |       |          |          |                    |                     |            |      |  |
|-----------|-----------|----------------------|--------------------------------|-------------------|------------------|------------------------------------|-------------------|-----------------------|--------------------|-----------|--------|----------|--------------|----------------------|------------------|-----------------|-----------|-----------|------|-------|----------|----------|--------------------|---------------------|------------|------|--|
|           |           | PERVIOUS 'C': 0.20   |                                |                   |                  | 10 YR DESIGN STORM                 |                   |                       |                    |           |        |          |              |                      |                  |                 |           | CROWN     |      |       |          |          |                    |                     |            |      |  |
|           |           |                      |                                |                   |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 |           | INVERT    |      |       |          |          |                    |                     |            |      |  |
| 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 ELEVATION | UPPER END | LOWER END | FALL | SLOPE | VELOCITY | CAPACITY | TOTAL MINOR LOSSES | TOTAL FRICTION LOSS | TOTAL LOSS |      |  |
|           |           | acres                | acres                          |                   |                  | min.                               | min.              | min                   | in/hr              | cfs       | ft     | inches   |              | sf                   | ft               | ft-msl          | ft-msl    | ft-msl    | ft   | %     | fps      | cfs      | ft                 | ft                  | ft         |      |  |
| 17        | 19        | 0.15                 | 0.15                           | 0.14              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 78.35     | 76.32     | 0.03 | 0.025 | 0.71     | 0.87     |                    |                     |            |      |  |
|           |           | 0.00                 | 0.00                           | 0.00              | 0.14             | 10.00                              | 2.90              | 10.00                 | 6.13               | 0.87      | 124    | 15       | 0.013        | 1.23                 | 0.31             | 80.37           | 78.16     | 76.32     | 1.84 |       |          |          |                    | 0.01                | 0.02       | 0.03 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 76.91     | 75.07     | 1.84 | 1.484 | 6.41     | 7.87     |                    |                     |            |      |  |
| 18        | 19        | 0.76                 | 0.76                           | 0.72              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 75.27     | 75.07     | 0.20 | 1.009 | 3.09     | 5.46     |                    |                     |            |      |  |
|           |           | 1.54                 | 1.54                           | 0.31              | 1.03             | 10.00                              | 0.11              | 15.00                 | 5.31               | 5.46      | 20     | 18       | 0.013        | 1.77                 | 0.38             | 78.10           | 75.15     | 75.07     | 0.08 |       |          |          |                    | 0.15                | 0.05       | 0.20 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 73.65     | 73.57     | 0.08 | 0.400 | 3.76     | 6.64     |                    |                     |            |      |  |
| 19        | 20        | 0.11                 | 1.02                           | 0.97              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 75.22     | 74.15     | 1.07 | 0.646 | 3.83     | 6.76     |                    |                     |            |      |  |
|           |           | 0.00                 | 1.54                           | 0.31              | 1.28             | 10.00                              | 0.72              | 15.11                 | 5.30               | 6.76      | 165    | 18       | 0.013        | 1.77                 | 0.38             | 80.00           | 74.97     | 74.13     | 0.84 |       |          |          |                    | 0.39                | 0.68       | 1.07 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 73.47     | 72.63     | 0.84 | 0.509 | 4.24     | 7.49     |                    |                     |            |      |  |
| 20        | 24        | 0.34                 | 1.36                           | 1.29              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 74.15     | 73.97     | 0.18 | 0.191 | 2.65     | 8.31     |                    |                     |            |      |  |
|           |           | 0.00                 | 1.54                           | 0.31              | 1.60             | 10.00                              | 0.60              | 15.83                 | 5.20               | 8.31      | 96     | 24       | 0.013        | 3.14                 | 0.50             | 79.00           | 74.23     | 73.97     | 0.26 |       |          |          |                    | 0.05                | 0.13       | 0.18 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 72.23     | 71.97     | 0.26 | 0.271 | 3.75     | 11.77    |                    |                     |            |      |  |
| 22        | 23        | 1.51                 | 1.51                           | 1.43              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 71.05     | 70.68     | 0.37 | 0.378 | 2.85     | 8.96     |                    |                     |            |      |  |
|           |           | 0.14                 | 0.14                           | 0.03              | 1.46             | 10.00                              | 0.57              | 10.00                 | 6.13               | 8.96      | 97     | 24       | 0.013        | 3.14                 | 0.50             | 76.40           | 70.86     | 70.68     | 0.18 |       |          |          |                    | 0.21                | 0.16       | 0.37 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 68.86     | 68.68     | 0.18 | 0.186 | 3.10     | 9.75     |                    |                     |            |      |  |
| 23        | 24        | 0.00                 | 1.51                           | 1.43              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 70.78     | 70.48     | 0.30 | 0.579 | 2.99     | 9.39     |                    |                     |            |      |  |
|           |           | 0.48                 | 0.62                           | 0.12              | 1.56             | 10.00                              | 0.28              | 10.57                 | 6.03               | 9.39      | 51     | 24       | 0.013        | 3.14                 | 0.50             | 76.00           | 70.58     | 70.48     | 0.10 |       |          |          |                    | 0.21                | 0.09       | 0.30 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 68.58     | 68.48     | 0.10 | 0.196 | 3.19     | 10.02    |                    |                     |            |      |  |
| 24        | 29        | 0.25                 | 3.12                           | 2.96              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 70.07     | 69.25     | 0.82 | 0.299 | 3.54     | 17.38    |                    |                     |            |      |  |
|           |           | 0.00                 | 2.16                           | 0.43              | 3.39             | 10.00                              | 1.29              | 16.43                 | 5.12               | 17.38     | 274    | 30       | 0.013        | 4.91                 | 0.63             | 78.00           | 70.48     | 69.25     | 1.23 |       |          |          |                    | 0.33                | 0.49       | 0.82 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 67.98     | 66.75     | 1.23 | 0.449 | 5.60     | 27.48    |                    |                     |            |      |  |
| 25        | 27        | 0.76                 | 0.76                           | 0.72              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 74.34     | 73.21     | 1.14 | 0.668 | 3.61     | 4.43     |                    |                     |            |      |  |
|           |           | 0.00                 | 0.00                           | 0.00              | 0.72             | 10.00                              | 0.92              | 10.00                 | 6.13               | 4.43      | 200    | 15       | 0.013        | 1.23                 | 0.31             | 76.40           | 74.19     | 72.61     | 1.58 |       |          |          |                    | 0.20                | 0.93       | 1.14 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 72.94     | 71.36     | 1.58 | 0.790 | 4.68     | 5.74     |                    |                     |            |      |  |
| 26        | 27        | 1.47                 | 1.47                           | 1.40              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 73.21     | 72.61     | 0.60 | 1.703 | 4.85     | 8.56     |                    |                     |            |      |  |
|           |           | 0.00                 | 0.00                           | 0.00              | 1.40             | 10.00                              | 0.12              | 10.00                 | 6.13               | 8.56      | 35     | 18       | 0.013        | 1.77                 | 0.38             | 75.50           | 72.77     | 72.61     | 0.16 |       |          |          |                    | 0.36                | 0.23       | 0.60 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 71.27     | 71.11     | 0.16 | 0.457 | 4.02     | 7.10     |                    |                     |            |      |  |
| 27        | 29        | 0.15                 | 2.38                           | 2.26              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 72.44     | 71.25     | 1.19 | 0.596 | 4.29     | 13.48    |                    |                     |            |      |  |
|           |           | 0.00                 | 0.00                           | 0.00              | 2.26             | 10.00                              | 0.78              | 10.92                 | 5.96               | 13.48     | 200    | 24       | 0.013        | 3.14                 | 0.50             | 75.00           | 72.61     | 71.25     | 1.36 |       |          |          |                    | 0.49                | 0.71       | 1.19 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 70.61     | 69.25     | 1.36 | 0.680 | 5.94     | 18.65    |                    |                     |            |      |  |
| 28        | 29        | 1.83                 | 1.83                           | 1.74              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 71.52     | 71.25     | 0.27 | 0.668 | 3.39     | 10.66    |                    |                     |            |      |  |
|           |           | 0.00                 | 0.00                           | 0.00              | 1.74             | 10.00                              | 0.20              | 10.00                 | 6.13               | 10.66     | 40     | 24       | 0.013        | 3.14                 | 0.50             | 74.10           | 71.33     | 71.25     | 0.08 |       |          |          |                    | 0.18                | 0.09       | 0.27 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 69.33     | 69.25     | 0.08 | 0.200 | 3.22     | 10.12    |                    |                     |            |      |  |
| 29        | 30        | 0.40                 | 7.73                           | 7.34              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 66.76     | 66.00     | 0.76 | 1.266 | 4.00     | 38.53    |                    |                     |            |      |  |
|           |           | 0.00                 | 2.16                           | 0.43              | 7.77             | 10.00                              | 0.25              | 17.72                 | 4.96               | 38.53     | 60     | 42       | 0.013        | 9.62                 | 0.88             | 73.65           | 69.25     | 67.16     | 2.09 |       |          |          |                    | 0.67                | 0.09       | 0.76 |  |
|           |           | 0.00                 | 0.00                           | 0.00              |                  |                                    |                   |                       |                    |           |        |          |              |                      |                  |                 | 65.75     | 63.66     | 2.09 | 3.483 | 19.52    | 187.77   |                    |                     |            |      |  |

OKV





*Robert P. Goode*

WB  
DN

# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

James S. Gilmore, III  
Governor

John Paul Woodley, Jr.  
Secretary of Natural Resources

5636 Southern Boulevard  
Virginia Beach, VA 23462  
Tel# (757) 518-2000  
<http://www.deq.state.va.us>  
October 14, 1999

Dennis H. Treacy  
Director

Francis L. Daniel  
Tidewater Regional Director

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

Mr. William R. Ohlendorf  
Plant Manager  
Anheuser-Busch Companies, Inc.  
7801 Pocahontas Trail  
Williamsburg, VA 23185

RE: VPDES Permit No. VAR550169, VPDES Storm Water General Permit  
Coverage for Anheuser-Busch Companies, Inc., Williamsburg, VA

Dear Mr. Ohlendorf:

The staff has reviewed your registration and determined this facility is eligible for coverage under the VPDES General Permit for Storm Water Discharges Associated with Industrial Activity. A copy of this permit is enclosed. The permit's effective date is June 30, 1999, and the permit's expiration date is June 29, 2004. The effective date of your coverage under this permit is October 14, 1999.

The storm water general permit has four parts. Part I authorizes the discharge, lists the effluent limitations and compliance monitoring requirements, analytical monitoring requirements and special conditions. Your facility does not have effluent limitations or analytical monitoring requirements, however, the special conditions do apply. Part II lists conditions applicable to all VPDES permits. Part III is the Storm Water Pollution Prevention Plan. Part IV has the sector specific permit requirements for your facility. Please read the entire permit carefully for you are responsible for compliance with all applicable permit conditions, especially the Stormwater Pollution Prevention Plan.

Should you have any questions, please do not hesitate to contact Carolyn Putnam at (757) 518-2146.

**RECEIVED**

OCT 25 1999

**EHS DEPARTMENT**

Enclosure: Permit

cc: DEQ-TRO File  
Anheuser-Busch Companies, Inc., One Busch Place, St. Louis, MO  
63118-1852

Sincerely,

*Robert P. Goode*

Robert P. Goode  
Water Permit Manager



# COMMONWEALTH of VIRGINIA

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Tidewater Regional Director

General Permit No.: VAR550169  
Effective Date: June 30, 1999  
Expiration Date: June 29, 2004

GENERAL PERMIT FOR STORM WATER DISCHARGES  
ASSOCIATED WITH INDUSTRIAL ACTIVITY  
AUTHORIZATION TO DISCHARGE UNDER THE  
VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM  
AND  
THE VIRGINIA STATE WATER CONTROL LAW

In compliance with the provisions of the Clean Water Act, as amended and pursuant to the State Water Control Law and regulations adopted pursuant thereto, owners of facilities with storm water discharges associated with industrial activity are authorized to discharge to surface waters within the boundaries of the Commonwealth of Virginia, except those waters specifically named in Board regulation or policies which prohibit such discharges.

The authorized discharge shall be in accordance with this cover page, Part I - Effluent Limitations and Monitoring Requirements, Part II - Conditions Applicable to All VPDES Permits, Part III - Storm Water Pollution Prevention Plan and Part IV - Sector Specific Permit Requirements, as set forth herein.

A. AUTHORIZATION TO DISCHARGE

1. The permittee is hereby authorized to discharge storm water associated with industrial activity to surface waters of the Commonwealth during the period beginning with the permittee's coverage under this general permit and lasting until the permit's expiration date.
2. Those permittees with facilities conducting activities specifically identified in Part B, Effluent Limitations and Compliance Monitoring Requirements, or Part C, Analytical Monitoring Requirements, are required to conduct sampling of their storm water discharges associated with industrial activity. Monitoring requirements under the permit are additive. Permittees with discharges or activities described in more than one monitoring section are subject to all applicable monitoring requirements from each section on an outfall-by-outfall basis.
3. There shall be no discharge of floating solids or visible foam in other than trace amounts.

**B. EFFLUENT LIMITATIONS AND COMPLIANCE MONITORING REQUIREMENTS****1. COAL PILE RUNOFF**

During the period beginning with the permittee's coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall serial number \_\_\_\_\_ storm water runoff from coal piles.

Such discharges shall be limited and monitored by the permittee as specified below:

| <u>EFFLUENT CHARACTERISTICS</u> | <u>DISCHARGE LIMITATIONS</u> |                |                | <u>MONITORING REQUIREMENTS</u> |                    |
|---------------------------------|------------------------------|----------------|----------------|--------------------------------|--------------------|
|                                 | <u>Monthly<br/>Average</u>   | <u>Minimum</u> | <u>Maximum</u> | <u>Frequency</u>               | <u>Sample Type</u> |
| Total Suspended Solids (mg/l)   | NA                           | NA             | 50             | 1/Year                         | Grab*              |
| pH (standard units)             | NA                           | 6.0            | 9.0            | 1/Year                         | Grab*              |

NA = Not Applicable

\* See Part I D 1 for sampling requirement.

In addition to the parameters listed above, the permittee shall also provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sampled.

Any untreated overflow from facilities designed, constructed and operated to treat the volume of material storage pile runoff that is associated with a 10-year, 24-hour rainfall event shall not be subject to the TSS limitation.

Runoff from coal piles located at steam electric generating facilities and at facilities with previous coverage under a general permit for storm water shall be in compliance with these limits upon submittal of the registration statement. Runoff from coal piles at all other types of facilities shall comply with these limitations as expeditiously as practicable, but in no case later than March 26, 2000.

## B. EFFLUENT LIMITATIONS AND COMPLIANCE MONITORING REQUIREMENTS

## 2. WET DECK LOG STORAGE AREA RUNOFF AT TIMBER PRODUCTS FACILITIES

During the period beginning with the permittee's coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall serial number \_\_\_\_\_ storm water runoff from areas used for the storage of logs where water without chemical additives is intentionally sprayed or deposited on logs to deter decay or infestation by insects.

Such discharges shall be limited and monitored by the permittee as specified below:

| <u>EFFLUENT CHARACTERISTICS</u> | <u>DISCHARGE LIMITATIONS</u> |                |                | <u>MONITORING REQUIREMENTS</u> |                    |
|---------------------------------|------------------------------|----------------|----------------|--------------------------------|--------------------|
|                                 | <u>Monthly<br/>Average</u>   | <u>Minimum</u> | <u>Maximum</u> | <u>Frequency</u>               | <u>Sample Type</u> |
| pH (standard units)             | NA                           | 6.0            | 9.0            | 1/Year                         | Grab*              |

THERE SHALL BE NO DISCHARGE OF DEBRIS FROM THIS OUTFALL. DEBRIS IS DEFINED AS WOODY MATERIAL SUCH AS BARK, TWIGS, BRANCHES, HEARTWOOD OR SAPWOOD THAT WILL NOT PASS THROUGH A 1 INCH DIAMETER ROUND OPENING.

NA = Not Applicable

\* See Part I D 1 for sampling requirement.

In addition to the parameters listed above, the permittee shall also provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sampled.



## B. EFFLUENT LIMITATIONS AND COMPLIANCE MONITORING REQUIREMENTS

## 3. PHOSPHATE FERTILIZER MANUFACTURING FACILITIES

During the period beginning with the permittee's coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall serial number \_\_\_\_\_ storm water runoff from phosphate fertilizer manufacturing areas.

Such discharges shall be limited and monitored by the permittee as specified below:

| <u>EFFLUENT CHARACTERISTICS</u> | <u>DISCHARGE LIMITATIONS</u> |                |                | <u>MONITORING REQUIREMENTS</u> |                    |
|---------------------------------|------------------------------|----------------|----------------|--------------------------------|--------------------|
|                                 | <u>Monthly<br/>Average</u>   | <u>Minimum</u> | <u>Maximum</u> | <u>Frequency</u>               | <u>Sample Type</u> |
| Total Phosphorus (mg/l)         | 35                           | NA             | 105            | 1/Year                         | Grab*              |
| Fluoride (mg/l)                 | 25                           | NA             | 75             | 1/Year                         | Grab*              |

NA = Not Applicable

\* See Part I D 1 for sampling requirement.

In addition to the parameters listed above, the permittee shall also provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sampled.



## B. EFFLUENT LIMITATIONS AND COMPLIANCE MONITORING REQUIREMENTS

## 4. ASPHALT PAVING AND ROOFING EMULSION MANUFACTURING FACILITIES

During the period beginning with the permittee's coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall serial number \_\_\_\_\_ storm water runoff from areas where production of asphalt paving and roofing emulsions occurs.

Such discharges shall be limited and monitored by the permittee as specified below:

| <u>EFFLUENT CHARACTERISTICS</u> | <u>DISCHARGE LIMITATIONS</u> |                |                | <u>MONITORING REQUIREMENTS</u> |                    |
|---------------------------------|------------------------------|----------------|----------------|--------------------------------|--------------------|
|                                 | <u>Monthly<br/>Average</u>   | <u>Minimum</u> | <u>Maximum</u> | <u>Frequency</u>               | <u>Sample Type</u> |
| Total Suspended Solids (mg/l)   | 15                           | NA             | 23             | 1/Year                         | Grab*              |
| Oil and Grease (mg/l)           | 10                           | NA             | 15             | 1/Year                         | Grab*              |
| pH (standard units)             | NA                           | 6.0            | 9.0            | 1/Year                         | Grab*              |

NA = Not Applicable

\* See Part I D 1 for sampling requirement.

In addition to the parameters listed above, the permittee shall also provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sampled.

## B. EFFLUENT LIMITATIONS AND COMPLIANCE MONITORING REQUIREMENTS

## 5. CEMENT MANUFACTURING FACILITIES

During the period beginning with the permittee's coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall serial number \_\_\_\_\_ storm water runoff from areas where materials that are used in or derived from the manufacture of cement are stored, including raw materials, intermediate products finished products and waste materials.

Such discharges shall be limited and monitored by the permittee as specified below:

| <u>EFFLUENT CHARACTERISTICS</u> | <u>DISCHARGE LIMITATIONS</u> |                |                | <u>MONITORING REQUIREMENTS</u> |                    |
|---------------------------------|------------------------------|----------------|----------------|--------------------------------|--------------------|
|                                 | <u>Monthly<br/>Average</u>   | <u>Minimum</u> | <u>Maximum</u> | <u>Frequency</u>               | <u>Sample Type</u> |
| Total Suspended Solids (mg/l)   | NA                           | NA             | 50             | 1/Year                         | Grab*              |
| pH (standard units)             | NA                           | 6.0            | 9.0            | 1/Year                         | Grab*              |

NA = Not Applicable

\* See Part I D 1 for sampling requirement.

In addition to the parameters listed above, the permittee shall also provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sampled.

Runoff from the storage piles shall not be diluted with other storm water runoff or flows to meet these limitations. Any untreated overflow from facilities designed, constructed and operated to treat the volume of material storage pile runoff that is associated with a 10-year, 24-hour rainfall event shall not be subject to the TSS or pH limitations.

**C. ANALYTICAL MONITORING REQUIREMENTS**

Permittees with discharges of storm water from the industrial activities listed in Tables 1 through 32 below are required to monitor their discharges for the pollutants of concern listed in all applicable tables. Permittees must monitor their storm water discharges associated with industrial activity at least semi-annually (2 times per year) during the second and fourth years of coverage under the general permit, except as provided in the waiver provisions of Part D, paragraphs 2 - 5. The second year is the period beginning one year after the date of coverage under the general permit lasting through two years after the date of coverage under the general permit and the fourth year is the period beginning three years after the date of coverage under the general permit lasting through four years after the date of coverage under the general permit. Permittees required to perform monitoring shall monitor samples collected during the sampling periods of: January through June, and July through December. See Part I D 3 for an explanation of monitoring cut-off concentration.

In addition to the parameters listed in Tables 1 through 32, the permittee shall provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sampled.

**Table 1.****Monitoring Requirements for General Sawmills and Planing Mills Facilities**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Suspended Solids | 100 mg/L                         |
| Total Recoverable Zinc | 120 ug/L                         |

**Table 2.****Monitoring Requirements for Wood Preserving Facilities**

| Pollutant of Concern       | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Recoverable Arsenic  | 50 ug/L                          |
| Total Recoverable Chromium | 16 ug/L                          |
| Total Recoverable Copper   | 18 ug/L                          |

Table 3.

**Monitoring Requirements for Log Storage and Handling Facilities**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Suspended Solids | 100 mg/L                         |

Table 4.

**Monitoring Requirements for Hardwood Dimension and Flooring Mills; Special Products Sawmills, not elsewhere classified; Millwork, Veneer, Plywood and Structural Wood; Wood Containers; Wood Buildings and Mobile Homes; Reconstituted Wood Products; and Wood Products Facilities not elsewhere classified**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Suspended Solids | 100 mg/L                         |

Table 5.

**Monitoring Requirements for Paperboard Mills**

| Pollutants of Concern                         | Monitoring Cut-Off Concentration |
|---|----------------------------------|
| Biochemical Oxygen Demand (BOD <sub>5</sub> ) | 30 mg/L                          |

Table 6.

**Monitoring Requirements for Agricultural Chemicals Manufacturing Facilities**

| Pollutants of Concern         | Monitoring Cut-Off Concentration |
|-------------------------------|----------------------------------|
| Nitrate plus Nitrite Nitrogen | 0.68 mg/L                        |
| Total Kjeldahl Nitrogen       | 1.5 mg/L                         |
| Total Recoverable Iron        | 1 mg/L                           |
| Total Recoverable Zinc        | 120 ug/L                         |
| Phosphorus                    | 2 mg/L                           |

**Table 7.**  
**Monitoring Requirements for Industrial Inorganic Chemicals Manufacturing Facilities**

| Pollutants of Concern         | Monitoring Cut-Off Concentration |
|-------------------------------|----------------------------------|
| Total Recoverable Aluminum    | 750 ug/L                         |
| Total Recoverable Iron        | 1 mg/L                           |
| Total Kjeldahl Nitrogen       | 1.5 mg/L                         |
| Nitrate plus Nitrite Nitrogen | 0.68 mg/L                        |

**Table 8.**  
**Monitoring Requirements for Soaps, Detergents, Cosmetics, and Perfumes Manufacturing Facilities**

| Pollutants of Concern         | Monitoring Cut-Off Concentration |
|-------------------------------|----------------------------------|
| Total Kjeldahl Nitrogen       | 1.5 mg/L                         |
| Nitrate plus Nitrite Nitrogen | 0.68 mg/L                        |
| Total Recoverable Zinc        | 120 ug/L                         |

**Table 9.**  
**Monitoring Requirements for Plastics, Synthetics, and Resins Manufacturing Facilities**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Recoverable Zinc | 120 ug/L                         |

**Table 10.**  
**Monitoring Requirements for Asphalt Paving and Roofing Materials Manufacturing Facilities**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Suspended Solids | 100 mg/L                         |

**Table 11.**  
**Monitoring Requirements for Clay Product Manufacturers**

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Recoverable Aluminum | 750 ug/L                         |

Clay product manufacturers include: brick and structural clay tile manufacturers (SIC code 3251); ceramic wall and floor tile manufacturers (SIC code 3253); clay refractories (SIC code 3255); manufacturers of structural clay products, not elsewhere classified (SIC code 3259);

manufacturers of vitreous china table and kitchen articles (SIC code 3232); manufacturers of vitreous china plumbing fixtures, and china and earthenware fittings and bathroom accessories (SIC code 3261); manufacturers of fine earthen ware table and kitchen articles (SIC code 3263); manufacturers of porcelain electrical supplies (SIC code 3264); manufacturers of pottery products (SIC code 3269); and manufacturers of nonclay refractories (3297).

Table 12.

**Monitoring Requirements for Concrete and Gypsum Product Manufacturers**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Suspended Solids | 100 mg/L                         |
| pH                     | within the range 6.0 - 9.0 su    |
| Total Recoverable Iron | 1 mg/L                           |

Concrete and gypsum product manufacturers include: concrete block and brick manufacturers (SIC code 3271); concrete products manufacturers (SIC code 3272); lime manufacturers (3274); gypsum product manufacturers (SIC 3275); and manufacturers of mineral and earth products (SIC 3295).

Table 13.

**Monitoring Requirements for Steel Works, Blast Furnaces, and Rolling and Finishing Mills (SIC 331)**

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Recoverable Aluminum | 750 ug/L                         |
| Total Recoverable Zinc     | - 120 ug/L                       |

Table 14.

**Monitoring Requirements for Iron and Steel Foundries (SIC 332)**

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Recoverable Aluminum | 750 ug/L                         |
| Total Suspended Solids     | 100 mg/L                         |
| Total Recoverable Copper   | 18 ug/L                          |
| Total Recoverable Iron     | 1 mg/L                           |
| Total Recoverable Zinc     | 120 ug/L                         |

**Table 15.**  
**Monitoring Requirements for Rolling, Drawing,**  
**and Extruding of Nonferrous Metals (SIC 335)**

| <b>Pollutants of Concern</b> | <b>Monitoring Cut-Off<br/>Concentration</b> |
|------------------------------|---|
| Total Recoverable Copper     | 18 ug/L                                     |
| Total Recoverable Zinc       | 120 ug/L                                    |

**Table 16.**  
**Monitoring Requirements for Nonferrous Foundries (SIC 336)**

| <b>Pollutants of Concern</b> | <b>Monitoring Cut-Off<br/>Concentration</b> |
|------------------------------|---|
| Total Recoverable Copper     | 18 ug/L                                     |
| Total Recoverable Zinc       | 120 ug/L                                    |

**Table 17.**  
**Monitoring Requirements for Active Copper Mining Facilities**

| <b>Pollutants of Concern</b> | <b>Monitoring Cut-Off<br/>Concentration</b> |
|------------------------------|---|
| Total Suspended Solids       | 100 mg/L                                    |

**Table 18.**  
**Monitoring Requirements for Coal Mining and Related Facilities**

| <b>Pollutants of Concern</b> | <b>Monitoring Cut-Off<br/>Concentration</b> |
|------------------------------|---|
| Total Recoverable Aluminum   | 750 ug/L                                    |
| Total Recoverable Iron       | 1 mg/L                                      |
| Total Suspended Solids       | 100 mg/L                                    |

Table 19.

**Monitoring Requirements for Hazardous Waste Treatment, Storage, or Disposal Facilities**

(TSDFs under RCRA subtitle C)

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Kjeldahl Nitrogen    | 1.5 mg/L                         |
| Total Suspended Solids     | 100 mg/L                         |
| Total Organic Carbon       | 110 mg/L                         |
| Total Recoverable Arsenic  | 50 ug/L                          |
| Total Recoverable Cadmium  | 3.9 ug/L                         |
| Total Cyanide              | 22 ug/L                          |
| Total Recoverable Lead     | 120 ug/L                         |
| Total Recoverable Mercury  | 2.4 ug/L                         |
| Total Recoverable Selenium | 20 ug/L                          |
| Total Recoverable Silver   | 4.1 ug/L                         |

Table 20.

**Monitoring Requirements for Landfills, Land Application Sites and Open Dump Sites**

(RCRA subtitle D)

| Pollutants of Concern                | Monitoring Cut-Off Concentration |
|--------------------------------------|----------------------------------|
| Total Suspended Solids <sup>i</sup>  | 100 mg/L                         |
| Total Recoverable Iron <sup>ii</sup> | 1 mg/L                           |

<sup>i</sup> Applicable to all landfill, open dump, and land application sites.<sup>ii</sup> Applicable to all facilities except MSWLF areas closed in accordance with Virginia Solid Waste Management Regulation, 9 VAC 20-80-10 et seq. requirements.

Table 21.

**Monitoring Requirements for Automobile Salvage Yards**

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Suspended Solids     | 100 mg/L                         |
| Total Recoverable Aluminum | 750 ug/L                         |
| Total Recoverable Iron     | 1 mg/L                           |
| Total Recoverable Lead     | 120 ug/L                         |



Table 22.

Monitoring Requirements for Scrap Recycling and Waste Recycling Facilities (except facilities that only receive source separated recycling materials)

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Suspended Solids     | 100 mg/L                         |
| Total Recoverable Aluminum | 750 ug/L                         |
| Total Recoverable Cadmium  | 3.9 ug/L                         |
| Total Recoverable Chromium | 16 ug/L                          |
| Total Recoverable Copper   | 18 ug/L                          |
| Total Recoverable Iron     | 1 mg/L                           |
| Total Recoverable Lead     | 120 ug/L                         |
| Total Recoverable Zinc     | 120 ug/L                         |

Table 23.

Monitoring Requirements for  
Steam Electric Power Generating Facilities

| Pollutant of Concern   | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Recoverable Iron | 1 mg/L                           |

Table 24.

Monitoring Requirements For Water Transportation Facilities

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Recoverable Aluminum | 750 ug/L                         |
| Total Recoverable Iron     | 1 mg/L                           |
| Total Recoverable Zinc     | 120 ug/L                         |

Table 25.

Monitoring Requirements for Airports That Use More Than 100,000 Gallons of Glycol-based Deicing/Anti-icing Chemicals and/or 100 Tons or More of Urea on an Average Annual Basis

| Pollutants of Concern                         | Monitoring Cut-Off Concentration |
|---|----------------------------------|
| Biochemical Oxygen Demand (BOD <sub>5</sub> ) | 30 mg/L                          |
| Total Kjeldahl Nitrogen (TKN)                 | 1.5 mg/L                         |
| pH  | within the range 6.0 to 9 s.u.   |

The alternative certification provision of Part I D 5 is not applicable to discharges covered under this section. Outfalls must be monitored for all parameters listed.

Table 26.

Monitoring Requirements for Grain Mills

| Pollutant of Concern    | Monitoring Cut-Off Concentration |
|-------------------------|----------------------------------|
| Total Kjeldahl Nitrogen | 1.5 mg/L                         |
| Total Suspended Solids  | 100 mg/L                         |

Table 27.

Monitoring Requirements for Fats and Oils Products Facilities

| Pollutant of Concern                          | Monitoring Cut-Off Concentration |
|---|----------------------------------|
| Biochemical Oxygen Demand (BOD <sub>5</sub> ) | 30 mg/L                          |
| Total Kjeldahl Nitrogen                       | 1.5 mg/L                         |
| Nitrate Plus Nitrite Nitrogen                 | 0.68 mg/L                        |
| Total Suspended Solids                        | 100 mg/L                         |

Table 28.

Monitoring Requirements for Rubber Product Manufacturing Facilities

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Recoverable Zinc | 120 ug/L                         |

Table 29.

**Monitoring Requirements for Leather Tanning and Finishing Facilities**

| Pollutants of Concern   | Monitoring Cut-Off Concentration |
|-------------------------|----------------------------------|
| Total Kjeldahl Nitrogen | 1.5 mg/L                         |

Table 30.

**Monitoring Requirements for Fabricated Metal Products Facilities, Except Coating**

| Pollutants of Concern      | Monitoring Cut-Off Concentration |
|----------------------------|----------------------------------|
| Total Recoverable Aluminum | 750 ug/L                         |
| Total Recoverable Iron     | 1 mg/L                           |
| Total Recoverable Zinc     | 120 ug/L                         |

Table 31.

**Monitoring Requirements for Fabricated Metal Coating and Engraving Facilities**

| Pollutants of Concern  | Monitoring Cut-Off Concentration |
|------------------------|----------------------------------|
| Total Recoverable Zinc | 120 ug/L                         |

## D. SPECIAL CONDITIONS

## 1. Sample Type

For all monitoring required in Part I B and Part I C of this permit, a minimum of one grab sample shall be taken. Unless otherwise specified, all such samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. The required 72-hour storm event interval is waived where the preceding measurable storm event did not result in a measurable discharge from the facility. The required 72-hour storm event interval may also be waived where the permittee documents that less than a 72-hour interval is representative for local storm events during the season when sampling is being conducted. The grab sample shall be taken during the first 30 minutes of the discharge. If the collection of a grab sample during the first 30 minutes is impracticable, a grab sample can be taken during the first hour of the discharge, and the permittee shall submit with the monitoring report a description of why a grab sample during the first 30 minutes was impracticable. If storm water discharges associated with industrial activity commingle with process or nonprocess water, then where practicable permittees must attempt to sample the storm water discharge before it mixes with the nonstorm water discharge.

## 2. Sampling Waiver

- a. Adverse Conditions. When a permittee is unable to collect samples required in Part I B or Part I C within a specified sampling period due to adverse climatic conditions, the permittee shall collect a substitute sample from a separate qualifying event in the next period and submit these data along with the data for the routine sample in that period. Adverse weather conditions that may prohibit the collection of samples include weather conditions that create dangerous conditions for personnel (such as local flooding, high winds, hurricane, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).
- b. Inactive and Unstaffed Facilities. When a permittee is unable to conduct the chemical storm water sampling required in Part I B or Part I C at an inactive and unstaffed facility, the permittee may exercise a waiver of the monitoring requirements as long as the facility remains inactive and unstaffed. The permittee must submit to the Department, in lieu of monitoring data, a certification statement on the discharge monitoring report stating that the facility is inactive and unstaffed so that collecting a sample during a qualifying event is not possible.

### 3. Low Concentration Waiver

When the average concentration for a pollutant calculated from all monitoring data collected from an outfall during the monitoring period for the second year after coverage under this general permit is less than or equal to the corresponding value for that pollutant listed in the applicable tables in Part I C under the column Monitoring Cut-Off Concentration, a permittee may waive the Part I C monitoring and reporting requirements in the monitoring period beginning in the fourth year after coverage under this general permit. Values for pH monitoring must be within the range of 6.0 to 9.0 standard units. The exclusion from monitoring in the fourth year of the permit is conditional on the facility maintaining industrial operations and best management practices that will ensure a quality of storm water discharges consistent with the average concentrations recorded during the second year of coverage under the permit. Permittees who monitored their storm water discharges under another VPDES permit may submit data from that monitoring with their registration statement for coverage under this general permit, provided the data are from samples collected no more than 3 years prior to the date the registration statement is submitted. If the average concentration for a pollutant calculated from this earlier monitoring data is at or below the applicable monitoring cut-off concentration, the permittee may waive monitoring for that pollutant in both the second and fourth years after coverage under the general permit. For any low concentration waiver, the permittee must submit to the Department, in lieu of the monitoring data, a certification that there has not been a significant change in industrial activity or the pollution prevention measures in the area of the facility that drains to the outfall for which sampling was waived. **The low concentration waiver is not applicable to the compliance monitoring requirements of Part I B.**

### 4. Representative Discharge

When a facility has two or more outfalls that, based on a consideration of the industrial activity, significant materials, and management practices and activities within the area drained by the outfall, the permittee reasonably believes substantially identical effluents are discharged, the permittee may test the effluent of one of such outfalls and report that the quantitative data also applies to the substantially identical outfall(s) provided that the permittee includes in the storm water pollution prevention plan a description of the location of the outfalls and explains in detail why the outfalls are expected to discharge substantially identical effluents. In addition, for each outfall that the permittee believes is representative, an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (i.e., low (under 40 percent), medium (40 to 65 percent) or high (above 65 percent)) shall be provided in the plan. Permittees required to submit

monitoring information under this permit shall include the description of the location of the outfalls, an explanation of why outfalls are expected to discharge substantially identical effluents, and an estimate of the size of the drainage area and runoff coefficient with the discharge monitoring report. **The representative discharge provision is not applicable to compliance monitoring requirements under Part I B.**

5. Alternative Certification

A permittee is not subject to the analytical monitoring requirements of Part I C of this permit provided the permittee makes a certification for a given outfall, on a pollutant-by-pollutant basis, in lieu of the monitoring required under Part I C, under penalty of law, signed in accordance with Part II K, that material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, industrial machinery or operations, or significant materials from past industrial activity that are located in areas of the facility within the drainage area of the outfall are not presently exposed to storm water and are not expected to be exposed to storm water for the certification period. Such certification must be retained with the storm water pollution prevention plan, and submitted to the Department in accordance with Part II C. In the case of certifying that a pollutant is not present, the permittee must submit the certification along with the monitoring reports required under Part II C. If the permittee cannot certify for an entire period, they must submit the date exposure was eliminated and any monitoring required up until that date. **This certification option is not applicable to compliance monitoring requirements associated with effluent limitations in Part I B or analytical monitoring requirements for facilities listed on Table 25 of Part I C.**

6. Reporting Monitoring Results.

- a. Reporting to the Department. Permittees shall submit monitoring results for each outfall associated with industrial activity, or a certification in accordance with Part I D, paragraphs 2 through 5, according to the requirements of Part II C. For each outfall, one signed discharge monitoring report form must be submitted to the Department per storm event sampled.
- b. Additional Reporting. In addition to filing copies of discharge monitoring reports in accordance with Part II C, permittees with at least one storm water discharge associated with industrial activity through a large or medium municipal separate storm sewer system (systems serving a population of 100,000 or more) or a municipal system designated by the Director must submit signed copies of discharge monitoring reports to the operator of the municipal separate storm sewer

system at the same time. Permittees not required to report monitoring data and permittees that are not otherwise required to monitor their discharges, need not comply with this provision.

7. Quarterly Visual Examination of Storm Water Quality.

All permittees shall perform and document a visual examination of a storm water discharge associated with industrial activity from each outfall, except discharges exempted below. Unless another schedule is established in applicable sections of Part IV, the examination(s) must be made at least once in each of the following three-month periods: January through March, April through June, July through September, and October through December.

- a. Examinations shall be made of samples collected within the first 30 minutes (or as soon thereafter as practical, but not to exceed 1 hour) of when the runoff or snowmelt begins discharging. The examination shall document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution. The examination must be conducted in a well lit area. No analytical tests are required to be performed on the samples. All such samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previous measurable (greater than 0.1 inch rainfall) storm event. The required 72-hour storm event interval is waived where the preceding measurable storm event did not result in a measurable discharge from the facility. The required 72-hour storm event interval may also be waived where the permittee documents that less than a 72-hour interval is representative for local storm events during the season when sampling is being conducted. Where practicable, the same individual should carry out the collection and examination of discharges for the entire permit term.
- b. Visual examination reports must be maintained onsite with the pollution prevention plan. The report shall include the outfall location, the examination date and time, examination personnel, the nature of the discharge (i.e., runoff or snow melt), visual quality of the storm water discharge (including observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution), and probable sources of any observed storm water contamination.
- c. When a facility has two or more outfalls that, based on a consideration of industrial activity, significant materials, and management practices and activities within the area drained by the outfall, the permittee reasonably believes discharge substantially identical effluents, the permittee

may collect a sample of effluent of one of such outfalls and report that the examination data also applies to the substantially identical outfall(s) provided that the permittee includes in the storm water pollution prevention plan a description of the location of the outfalls and explains in detail why the outfalls are expected to discharge substantially identical effluents. In addition, for each outfall that the permittee believes is representative, an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (i.e., low (under 40 percent), medium (40 to 65 percent), or high (above 65 percent)) shall be provided in the plan.

- d. When a permittee is unable to conduct the visual examination due to adverse climatic conditions, the permittee must document the reason for not performing the visual examination and retain this documentation onsite with the records of the visual examinations. Adverse weather conditions that may prohibit the collection of samples include weather conditions that create dangerous conditions for personnel (such as local flooding, high winds, hurricane, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).
  - e. When a permittee is unable to conduct visual storm water examinations at an inactive and unstaffed site, the owner of the facility may exercise a waiver of the monitoring requirement as long as the facility remains inactive and unstaffed. The facility must maintain a certification with the pollution prevention plan stating that the site is inactive and unstaffed so that performing visual examinations during a qualifying event is not feasible.
8. Prohibition of Nonstorm Water Discharges. Except as provided in this paragraph or in Part IV, all discharges covered by this permit shall be composed entirely of storm water. The following nonstorm water discharges may be authorized by this permit provided the nonstorm water component of the discharge is in compliance with this general permit:
- a. discharges from fire fighting activities;
  - b. fire hydrant flushings;
  - c. potable water sources including waterline flushings;
  - d. uncontaminated compressor condensate;
  - e. irrigation drainage;
  - f. lawn watering;



- g. routine external building washdown that does not use detergents or other compounds;
- h. pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
- i. air conditioning condensate;
- j. uncontaminated springs;
- k. uncontaminated ground water; and
- l. foundation or footing drains where flows are not contaminated with process materials such as solvents.

All other nonstorm water discharges must be in compliance with a VPDES permit (other than this permit) issued for the discharge.

9. Releases of Hazardous Substances or Oil in Excess of Reportable Quantities.

The discharge of hazardous substances or oil in the storm water discharge(s) from a facility shall be prevented or minimized in accordance with the applicable storm water pollution prevention plan for the facility. This permit does not authorize the discharge of hazardous substances or oil resulting from an onsite spill. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110 (1998), 40 CFR 117 (1998) or 40 CFR 302 (1998) occurs during a 24 hour period, the permittee is required to notify the Department in accordance with the requirements of Part II G as soon as he or she has knowledge of the discharge. In addition, the storm water pollution prevention plan required under Part III must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the plan must be modified where appropriate. This permit does not relieve the permittee of the reporting requirements of 40 CFR 110 (1998), 40 CFR 117 (1998) and 40 CFR 302 (1998) or § 62.1-44.34:19 of the Code of Virginia.

10. Co-located Industrial Activity.

In the case where a facility has industrial activities occurring onsite which are described by any of the activities in Part IV, those industrial activities are considered to be co-located industrial activities. Storm water discharges from co-located industrial activities are authorized by this permit, provided that the permittee complies with any and all additional pollution prevention plan and monitoring requirements from Part I and Part IV applicable to the co-located industrial activity. The permittee shall determine which additional pollution prevention plan and

monitoring requirements are applicable to that particular co-located industrial activity by examining the narrative descriptions of each coverage section (Discharges Covered Under This Section).

11. The storm water discharges authorized by this permit may be combined with other sources of storm water which are not required to be covered under a VPDES permit, so long as the combined discharge is in compliance with this permit.

PART II  
CONDITIONS APPLICABLE TO ALL VPDES PERMITS

A. Monitoring.

1. Samples and measurements taken as required by this permit shall be representative of the monitored activity.
2. Monitoring shall be conducted according to procedures approved under 40 CFR Part 136 (1998) or alternative methods approved by the U.S. Environmental Protection Agency, unless other procedures have been specified in this permit.
3. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will insure accuracy of measurements.

B. Records.

1. Records of monitoring information shall include:
  - a. The date, exact place, and time of sampling or measurements;
  - b. The individual(s) who performed the sampling or measurements;
  - c. The date(s) and time(s) analyses were performed;
  - d. The individual(s) who performed the analyses;
  - e. The analytical techniques or methods used; and
  - f. The results of such analyses.
2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years, the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the registration statement for this permit, for a period of at least 3 years from the date of the sample, measurement, report or request for coverage. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Board.

C. Reporting Monitoring Results.

1. The permittee shall submit the results of the monitoring required by this permit not later than the 10th day of the month after

monitoring takes place, unless another reporting schedule is specified elsewhere in this permit. Monitoring results shall be submitted to the Department's regional office.

2. Monitoring results shall be reported on a Discharge Monitoring Report (DMR) or on forms provided, approved or specified by the Department.
3. If the permittee monitors any pollutant specifically addressed by this permit more frequently than required by this permit using test procedures approved under 40 CFR Part 136 (1998) or using other test procedures approved by the U.S. Environmental Protection Agency or using procedures specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted on the DMR or reporting form specified by the Department.
4. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

D. Duty to Provide Information.

The permittee shall furnish to the Department, within a reasonable time, any information which the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Board may require the permittee to furnish, upon request, such plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from his discharge on the quality of state waters, or such other information as may be necessary to accomplish the purposes of the State Water Control Law. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

E. Compliance Schedule Reports.

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Unauthorized Discharges.

Except in compliance with this permit, or another permit issued by the Board, it shall be unlawful for any person to:

1. Discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances; or
2. Otherwise alter the physical, chemical or biological properties of such state waters and make them detrimental to the public health,

or to animal or aquatic life, or to the use of such waters for domestic or industrial consumption, or for recreation, or for other uses.

G. Reports of Unauthorized Discharges.

Any permittee who discharges or causes or allows a discharge of sewage, industrial waste, other wastes or any noxious or deleterious substance into or upon state waters in violation of Part II F; or who discharges or causes or allows a discharge that may reasonably be expected to enter state waters in violation of Part II F, shall notify the Department of the discharge immediately upon discovery of the discharge, but in no case later than 24 hours after said discovery. A written report of the unauthorized discharge shall be submitted to the Department, within five days of discovery of the discharge. The written report shall contain:

1. A description of the nature and location of the discharge;
2. The cause of the discharge;
3. The date on which the discharge occurred;
4. The length of time that the discharge continued;
5. The volume of the discharge;
6. If the discharge is continuing, how long it is expected to continue;
7. If the discharge is continuing, what the expected total volume of the discharge will be; and
8. Any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by this permit.

Discharges reportable to the Department under the immediate reporting requirements of other regulations are exempted from this requirement.

H. Reports of Unusual or Extraordinary Discharges.

If any unusual or extraordinary discharge including a bypass or upset should occur from a treatment works and the discharge enters or could be expected to enter state waters, the permittee shall promptly notify, in no case later than 24 hours, the Department by telephone after the discovery of the discharge. This notification shall provide all available details of the incident, including any adverse affects on aquatic life and the known number of fish killed. The permittee shall reduce the report to writing and shall submit it to the Department within five days of discovery of the discharge in accordance with Part II I b. Unusual and extraordinary discharges include but are not limited to any discharge resulting from:

1. Unusual spillage of materials resulting directly or indirectly from processing operations;
2. Breakdown of processing or accessory equipment;
3. Failure or taking out of service some or all of the treatment works; and
4. Flooding or other acts of nature.

I. Reports of Noncompliance

The permittee shall report any noncompliance which may adversely affect state waters or may endanger public health.

1. An oral report shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which shall be reported within 24 hours under this paragraph:
  - a. Any unanticipated bypass; and
  - b. Any upset which causes a discharge to surface waters.
2. A written report shall be submitted within 5 days and shall contain:
  - a. A description of the noncompliance and its cause;
  - b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
  - c. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Board may waive the written report on a case-by-case basis for reports of noncompliance under Part II I 1 if the oral report has been received within 24 hours and no adverse impact on state waters has been reported.

3. The permittee shall report all instances of noncompliance not reported under Part II I 1 or 2, in writing, at the time the next monitoring reports are submitted. The reports shall contain the information listed in Part II I 2.

NOTE: The immediate (within 24 hours) reports required in Parts II G, H and I may be made to the Department's Regional Office. Reports may be made by telephone or by fax. For reports outside normal working hours, leave a message and this shall fulfill the immediate reporting requirement. For emergencies, the Virginia Department of Emergency Services maintains a 24 hour telephone service at 1-800-468-8892.

J. Notice of Planned Changes.

1. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
  - a. The permittee plans alteration or addition to any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:
    - (1) After promulgation of standards of performance under Section 306 of Clean Water Act which are applicable to such source; or
    - (2) After proposal of standards of performance in accordance with Section 306 of Clean Water Act which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal;
  - b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations nor to notification requirements specified elsewhere in this permit; or
  - c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.
2. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

K. Signatory Requirements.

1. Registration Statement. All registration statements shall be signed as follows:
  - a. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or

having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

- b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
  - c. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a public agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.
2. Reports, etc. All reports required by permits, and other information requested by the Board shall be signed by a person described in Part II K 1 or by a duly authorized representative of that person. A person is a duly authorized representative only if:
- a. The authorization is made in writing by a person described in Part II K 1;
  - b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
  - c. The written authorization is submitted to the Department.
3. Changes to authorization. If an authorization under Part II K 2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part II K 2 shall be submitted to the Department prior to or together with any reports, or information to be signed by an authorized representative.
4. Certification. Any person signing a document under Part II K 1 or 2 shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my



knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

L. Duty to Comply.

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the State Water Control Law and the Clean Water Act, except that noncompliance with certain provisions of this permit may constitute a violation of the State Water Control Law but not the Clean Water Act. Permit noncompliance is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

M. Duty to Reapply.

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall submit a new registration statement at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Board. The Board shall not grant permission for registration statements to be submitted later than the expiration date of the existing permit.

N. Effect of a Permit.

This permit does not convey any property rights in either real or personal property or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, or any infringement of federal, state or local law or regulations.

O. State Law.

Nothing in this permit shall be construed to preclude the institution of any legal action under, or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any other state law or regulation or under authority preserved by Section 510 of the Clean Water Act. Except as provided in permit conditions on "bypassing" (Part II U), and "upset" (Part II V) nothing in this permit shall be construed to relieve the permittee from civil and criminal penalties for noncompliance.

P. Oil and Hazardous Substance Liability.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject, under Sections 62.1-44.34:14 through 62.1-44.34:23 of the State Water Control Law.

Q. Proper Operation and Maintenance.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective plant performance, adequate funding, adequate staffing, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

R. Disposal of solids or sludges.

Solids, sludges or other pollutants removed in the course of treatment or management of pollutants shall be disposed of in a manner so as to prevent any pollutant from such materials from entering state waters.

S. Duty to Mitigate.

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

T. Need to Halt or Reduce Activity not a Defense.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

U. Bypass.

1. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts II U b and c.

2. Notice

a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, prior notice shall be submitted, if possible at least ten days before the date of the bypass.

- b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part II I.

3. Prohibition of bypass.

- a. Bypass is prohibited, and the Board may take enforcement action against a permittee for bypass, unless:

- (1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- (3) The permittee submitted notices as required under Part II U 2.

- (b) The Board may approve an anticipated bypass, after considering its adverse effects, if the Board determines that it will meet the three conditions listed above in Part II U 3 a.

V. Upset.

- 1. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of Part II V 2 are met. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.
- 2. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
  - a. An upset occurred and that the permittee can identify the cause(s) of the upset;
  - b. The permitted facility was at the time being properly operated;
  - c. The permittee submitted notice of the upset as required in Part II I; and
  - d. The permittee complied with any remedial measures required under Part II S.

3. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

W. Inspection and Entry.

The permittee shall allow the Director, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act and the State Water Control Law, any substances or parameters at any location.

For purposes of this section, the time for inspection shall be deemed reasonable during regular business hours, and whenever the facility is discharging. Nothing contained herein shall make an inspection unreasonable during an emergency.

X. Permit Actions.

Permits may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Y. Transfer of permits.

1. Permits are not transferable to any person except after notice to the Department. Except as provided in Part II Y 2, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued, or a minor modification made, to identify the new permittee and incorporate such other requirements as may be necessary under the State Water Control Law and the Clean Water Act.
2. As an alternative to transfers under Part II Y 1, this permit may be automatically transferred to a new permittee if:
  - a. The current permittee notifies the Department at least 30 days in advance of the proposed transfer of the title to the facility or property;

- b. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and
- c. The Board does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Part II Y 2 b.

Z. Severability.

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

PART III  
STORM WATER POLLUTION PREVENTION PLANS

A storm water pollution prevention plan shall be developed for each facility covered by this permit. Storm water pollution prevention plans shall be prepared in accordance with good engineering practices. The plan shall identify potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges associated with industrial activity from the facility. In addition, the plan shall describe and ensure the implementation of practices that are to be used to reduce the pollutants in storm water discharges associated with industrial activity at the facility and to assure compliance with the terms and conditions of this permit. Permittees must implement the provisions of the storm water pollution prevention plan as a condition of this permit.

The storm water pollution prevention plan requirements of this general permit may be fulfilled by incorporating by reference other plans or documents such as an erosion and sediment control plan, a spill prevention control and countermeasure (SPCC) plan developed for the facility under Section 311 of the Clean Water Act or best management practices (BMP) programs otherwise required for the facility provided that the incorporated plan meets or exceeds the plan requirements of Part III D. If an erosion and sediment control plan is being incorporated by reference, it shall have been approved by the locality in which the activity is to occur or by another appropriate plan approving authority authorized under the Virginia Erosion and Sediment Control Regulation 4 VAC 50-30-10 et seq. All plans incorporated by reference into the storm water pollution prevention plan become enforceable under this permit.

A. Deadlines for Plan Preparation and Compliance.

1. Existing Facilities. Except as provided in Part III A 3, 4, and 5, all existing facilities and new facilities that begin operation on or before June 30, 1999 shall prepare and implement the plan as expeditiously as practicable, but not later than March 26, 2000.
2. New Facilities. Facilities that begin operation after June 30, 1999 shall prepare and implement the plan prior to submitting the registration statement.
3. Oil and Gas Facilities. Oil and gas exploration, production, processing or treatment facilities that are not required to submit a registration statement but which have a discharge of a reportable quantity of oil or a hazardous substance for which notification is required pursuant to either 40 CFR 110.6 (1998) or 40 CFR 302.6 (1998), shall prepare and implement the plan on or before the date 60 calendar days after first knowledge of such discharge.
4. Measures That Require Construction. In cases where construction is necessary to implement measures required by the plan, the plan shall contain a schedule that provides compliance with the plan as expeditiously as practicable, but no later than 3 years after the date of coverage under the general permit. Where a construction

compliance schedule is included in the plan, the schedule shall include appropriate nonstructural and/or temporary controls to be implemented in the affected portion(s) of the facility prior to completion of the permanent control measure.

5. Extensions. Upon a showing of good cause, the Director may establish a later date in writing for preparing and compliance with a plan for a storm water discharge associated with industrial activity.

B. Signature and Plan Review.

1. Signature/Location. The plan shall be signed in accordance with Part II K, and be retained onsite at the facility that generates the storm water discharge in accordance with Part II B 2. For inactive facilities, the plan may be kept at the nearest office of the permittee.
2. Availability. The permittee shall make the storm water pollution prevention plan, annual site compliance inspection report, or other information available to the Department upon request.
3. Required Modifications. The Director, or authorized representative, may notify the permittee at any time that the plan does not meet one or more of the minimum requirements of this permit. Such notification shall identify those provisions of the permit that are not being met by the plan, and identify which provisions of the plan requires modifications in order to meet the minimum requirements of this permit. Within 60 days of such notification from the Director, (or as otherwise provided by the Director), or authorized representative, the permittee shall make the required changes to the plan and shall submit to the Director a written certification that the requested changes have been made.

C. Keeping Plans Current.

The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance, that has a significant effect on the potential for the discharge of pollutants to surface waters or if the storm water pollution prevention plan proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified under Part III D of this permit, or in otherwise achieving the general objectives of controlling pollutants in storm water discharges associated with industrial activity. New owners shall review the existing plan and make appropriate changes. Amendments to the plan may be reviewed by the Department in the same manner as Part III B.

D. Contents of the Plan.

The contents of the pollution prevention plan shall comply with the requirements listed below and those in the appropriate section of Part IV. These requirements are cumulative. If a facility has co-located activities that are covered in more than one section of Part IV,

that facility's pollution prevention plan must comply with the requirements listed in all applicable sections. The following requirements are applicable to all storm water pollution prevention plans developed under this general permit. The plan shall include, at a minimum, the following items.

1. Pollution Prevention Team. Each plan shall identify a specific individual or individuals within the facility organization as members of a storm water Pollution Prevention Team that are responsible for developing the storm water pollution prevention plan and assisting the facility or plant manager in its implementation, maintenance, and revision. The plan shall clearly identify the responsibilities of each team member. The activities and responsibilities of the team shall address all aspects of the facility's storm water pollution prevention plan.
2. Description of Potential Pollutant Sources. Each plan shall provide a description of potential sources that may reasonably be expected to add significant amounts of pollutants to storm water discharges or that may result in the discharge of pollutants during dry weather from separate storm sewers draining the facility. Each plan shall identify all activities and significant materials that may potentially be significant pollutant sources. Each plan shall include, at a minimum:
  - a. Drainage.
    - (1) A site map indicating an outline of the portions of the drainage area of each storm water outfall that are within the facility boundaries, each existing structural control measure to reduce pollutants in storm water runoff, surface water bodies, locations where significant materials are exposed to precipitation, locations where major spills or leaks identified under Part III D 2 c have occurred, and the locations of the following activities where such activities are exposed to precipitation: fueling stations, vehicle and equipment maintenance and/or cleaning areas, loading/unloading areas, locations used for the treatment, storage or disposal of wastes and wastewaters, locations used for the treatment, filtration, or storage of water supplies, liquid storage tanks, processing areas, and storage areas. The map must indicate the outfall locations and the types of discharges contained in the drainage areas of the outfalls;
    - (2) For each area of the facility that generates storm water discharges associated with industrial activity with a reasonable potential for containing significant amounts of pollutants, a prediction of the direction of flow, and an identification of the types of pollutants that are likely to be present in storm water discharges



associated with industrial activity. Factors to consider include the toxicity of chemical; quantity of chemicals used, produced or discharged; the likelihood of contact with storm water; and history of significant leaks or spills of toxic or hazardous pollutants. Flows with a significant potential for causing erosion shall be identified;

- b. **Inventory of Exposed Materials.** An inventory of the types of materials handled at the site that potentially may be exposed to precipitation. Such inventory shall include a narrative description of significant materials that have been handled, treated, stored or disposed in a manner to allow exposure to storm water between the time of 3 years prior to the date of submission of a registration statement to be covered under this permit and the present; method and location of onsite storage or disposal; materials management practices employed to minimize contact of materials with storm water runoff between the time of 3 years prior to the date of the submission of a registration statement to be covered under this permit and the present; the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of any treatment the storm water receives;
- c. **Spills and Leaks.** A list of significant spills and significant leaks of toxic or hazardous pollutants that occurred at areas that are exposed to precipitation or that otherwise drain to a storm water conveyance at the facility within the 3 year period immediately prior to the date of submission of a registration statement to be covered under this permit. Such list shall be updated as appropriate during the term of the permit;
- d. **Sampling Data.** A summary of existing discharge sampling data describing pollutants in storm water discharges from the facility, including a summary of sampling data collected during the term of this permit; and
- e. **Risk Identification and Summary of Potential Pollutant Sources.** A narrative description of the potential pollutant sources from the following activities: loading and unloading operations; outdoor storage activities; outdoor manufacturing or processing activities; significant dust or particulate generating processes; and onsite waste disposal practices, and wastewater treatment activities to include sludge drying, storage, application or disposal activities. The description shall specifically list any significant potential source of pollutants at the site and for each potential source, any pollutant or pollutant parameter (e.g., biochemical oxygen demand, total suspended solids, etc.) of concern shall be identified.

3. Measures and Controls. Each facility covered by this permit shall develop a description of storm water management controls appropriate for the facility and implement such controls. The appropriateness and priorities of controls in a plan shall reflect identified potential sources of pollutants at the facility. The description of storm water management controls shall address the following minimum components, including a schedule for implementing such controls.
- a. Good Housekeeping. Good housekeeping requires the clean and orderly maintenance of areas that may contribute pollutants to storm water discharges. The plan shall describe procedures performed to minimize contact of materials with storm water runoff. Particular attention should be paid to areas where raw materials are stockpiled, material handling areas, storage areas, liquid storage tanks, material handling areas, and loading/unloading areas.
  - b. Preventive Maintenance. A preventive maintenance program shall involve: timely inspection and maintenance of storm water management devices (e.g., cleaning oil/water separators, catch basins); inspection and testing of facility equipment and systems to uncover conditions that could cause breakdowns or failures which could result in discharges of pollutants to surface waters; and appropriate maintenance of such equipment and systems.
  - c. Spill Prevention and Response Procedures. Areas where potential spills that can contribute pollutants to storm water discharges can occur, and their accompanying drainage points, shall be identified clearly in the storm water pollution prevention plan. Where appropriate, specifying material handling procedures, storage requirements, and use of equipment such as diversion valves in the plan should be considered. Procedures for cleaning up spills shall be identified in the plan and made available to the appropriate personnel. The necessary equipment to implement a clean up should be available to personnel.
  - d. Inspections. Facility personnel who are familiar with the industrial activity, the BMPs and the storm water pollution prevention plan shall be identified to inspect designated equipment and areas of the facility. The inspection frequency shall be specified in the plan based upon a consideration of the level of industrial activity at the facility, but shall be a minimum of quarterly unless more frequent intervals are specified elsewhere in the permit. A set of tracking or follow-up procedures shall be used to ensure that appropriate actions are taken in response to the inspections. Records of inspections shall be maintained.
  - e. Employee Training. Employee training programs shall inform personnel responsible for implementing activities identified

in the storm water pollution prevention plan or otherwise responsible for storm water management at all levels of responsibility of the components and goals of the storm water pollution prevention plan. Training should address topics such as spill response, good housekeeping and material management practices. The pollution prevention plan shall identify periodic dates for such training.

- f. Recordkeeping and Internal Reporting Procedures. A description of incidents (such as spills, or other discharges), along with other information describing the quality and quantity of storm water discharges shall be included in the plan. Inspections and maintenance activities shall be documented and records of such activities shall be incorporated into the plan.
- g. Nonstorm Water Discharges.
  - (1) The plan shall include a certification that the discharge has been tested or evaluated for the presence of nonstorm water discharges. The certification shall include the identification of potential significant sources of nonstorm water at the site, a description of the results of any test and/or evaluation for the presence of nonstorm water discharges, the evaluation criteria or testing method used, the date of any testing and/or evaluation, and the onsite drainage points that were directly observed during the test. Certifications shall be signed in accordance with Part II K. Such certification may not be feasible if the facility operating the storm water discharge associated with industrial activity does not have access to an outfall, manhole, or other point of access to the ultimate conduit that receives the discharge. In such cases, the source identification section of the storm water pollution prevention plan shall indicate why the certification required was not feasible, along with the identification of potential significant sources of nonstorm water at the site. A permittee that is unable to provide the certification required by this paragraph must notify the Department in accordance with Part III D 3 g (3).
  - (2) Except for flows from fire fighting activities, sources of nonstorm water listed in Part I D 8 that are combined with storm water discharges associated with industrial activity must be identified in the plan. The plan shall identify and ensure the implementation of appropriate pollution prevention measures for the nonstorm water component(s) of the discharge.
  - (3) Failure to Certify. Any permittee that is unable to provide the certification required (testing for nonstorm

water discharges), must notify the Department within 270 days after the date of coverage under this general permit. If the failure to certify is caused by the inability to perform adequate tests or evaluations, such notification shall describe: the procedure of any test conducted for the presence of nonstorm water discharges; the results of such test or other relevant observations; potential sources of nonstorm water discharges to the storm sewer; and why adequate tests for such storm sewers were not feasible.

- (4) If the facility discharges wastewater, other than storm water, via an existing VPDES permit, the VPDES permit authorizing the discharge must be referenced in the plan. Nonstorm water discharges to surface waters that are not authorized by a VPDES permit are unlawful, and must be terminated.
- h. Sediment and Erosion Control. The plan shall identify areas that, due to topography, activities, or other factors, have a high potential for significant soil erosion, and identify structural, vegetative, and/or stabilization measures to be used to limit erosion.
  - i. Management of Runoff. The plan shall contain a narrative consideration of the appropriateness of traditional storm water management practices (practices other than those that control the generation or source(s) of pollutants) used to divert, infiltrate, reuse, or otherwise manage storm water runoff in a manner that reduces pollutants in storm water discharges from the site. The plan shall provide that measures that the permittee determines to be reasonable and appropriate shall be implemented and maintained. The potential of various sources at the facility to contribute pollutants to storm water discharges associated with industrial activity shall be considered when determining reasonable and appropriate measures. Appropriate measures may include: vegetative swales and practices; reuse of collected storm water (such as for a process or as an irrigation source); inlet controls (such as oil/water separators); snow management activities; infiltration devices and wet detention/retention devices; or other equivalent measures.
4. Comprehensive Site Compliance Evaluation. Personnel who are familiar with the industrial activity, the BMPs and the storm water pollution prevention plan shall conduct site compliance evaluations at appropriate intervals specified in the plan, but in no case less than once a year. Such evaluations shall include the following:
    - a. Areas contributing to a storm water discharge associated with industrial activity such as material storage, handling, and disposal activities shall be visually inspected for evidence

of, or the potential for, pollutants entering the drainage system. Measures to reduce pollutant loadings shall be evaluated to determine whether they are adequate and properly implemented in accordance with the terms of the permit or whether additional control measures are needed. Structural storm water management measures, sediment and erosion control measures, and other structural pollution prevention measures identified in the plan shall be observed to ensure that they are operating correctly. A visual inspection of equipment needed to implement the plan, such as spill response equipment, shall be made;

- b. Based on the results of the evaluation, the description of potential pollutant sources identified in the plan in accordance with Part III D 2 and pollution prevention measures and controls identified in the plan in accordance with Part III D 3 shall be revised as appropriate within 2 weeks of such evaluation and shall provide for implementation of any changes to the plan in a timely manner, but in no case more than 12 weeks after the evaluation;
- c. A report summarizing the scope of the evaluation, personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the storm water pollution prevention plan, and actions taken in accordance with Part III D 4 b shall be made and retained as part of the storm water pollution prevention plan for at least 3 years from the date of the evaluation. The report shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the storm water pollution prevention plan and this permit. The report shall be signed in accordance with Part II K; and
- d. Where compliance evaluation schedules overlap with inspections required under Part III D 3 d, the compliance evaluation may be conducted in place of one such inspection.

E. Special Pollution Prevention Plan Requirements.

In addition to the minimum standards listed in Part III D and Part IV, the storm water pollution prevention plan shall include a complete discussion of measures taken to conform with the following applicable guidelines.

- 1. Additional Requirements for Storm Water Discharges Associated With Industrial Activity that Discharge Into or Through Municipal Separate Storm Sewer Systems Serving a Population of 100,000 or More.

- a. In addition to the applicable requirements of this permit, facilities covered by this permit must comply with applicable

requirements in municipal storm water management programs developed under VPDES permits issued for the discharge of the municipal separate storm sewer system that receives the facility's discharge, provided the permittee has been notified of such conditions.

- b. Permittees that discharge storm water associated with industrial activity through a municipal separate storm sewer system serving a population of 100,000 or more, or a municipal system designated by the Director shall make plans available to the municipal operator of the system upon request.
2. Additional Requirements for Storm Water Discharges Associated With Industrial Activity From Facilities Subject to EPCRA Section 313 Requirements. In addition to the requirements of Part IV and other applicable conditions of this permit, storm water pollution prevention plans for facilities subject to reporting requirements under EPCRA Section 313, prior to May 1, 1997, for chemicals that are classified as Section 313 water priority chemicals, except as provided in Part III E 2 b (2), and where there is the potential for these chemicals to mix with storm water discharges, shall describe and ensure the implementation of practices that are necessary to provide for conformance with the following guidelines.
  - a. In areas where Section 313 water priority chemicals are stored, processed or otherwise handled, appropriate containment, drainage control and/or diversionary structures shall be provided unless otherwise exempted under Part III E 2 c. At a minimum, one of the following preventive systems or its equivalent shall be used:
    - (1) Curbing, culverting, gutters, sewers, or other forms of drainage control to prevent or minimize the potential for storm water runoff to come into contact with significant sources of pollutants; or
    - (2) Roofs, covers or other forms of appropriate protection to prevent storage piles from exposure to storm water and wind.
  - b. In addition to the minimum standards listed under Part III E 2 a, and except as otherwise exempted under Part III E 2 c, the storm water pollution prevention plan shall include a complete discussion of measures taken to conform with other effective storm water pollution prevention procedures, and applicable state rules, regulations, and guidelines.
    - (1) Liquid Storage Areas Where Storm Water Comes Into Contact With Any Equipment, Tank, Container, or Other Vessel Used for Section 313 Water Priority Chemicals.

- (a) No tank or container shall be used for the storage of a Section 313 water priority chemical unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature, etc.
- (b) Liquid storage areas for Section 313 water priority chemicals shall be operated to minimize discharges of Section 313 chemicals. Appropriate measures to minimize discharges of Section 313 chemicals may include secondary containment provided for at least the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation, a strong spill contingency and integrity testing plan, and/or other equivalent measures.
- (2) Material Storage Areas for Section 313 Water Priority Chemicals Other Than Liquids. Material storage areas for Section 313 water priority chemicals other than liquids that are subject to runoff, leaching, or wind shall incorporate drainage or other control features that will minimize the discharge of Section 313 water priority chemicals by reducing storm water contact with those chemicals.
- (3) Truck and Rail Car Loading and Unloading Areas for Liquid Section 313 Water Priority Chemicals. Truck and rail car loading and unloading areas for liquid Section 313 water priority chemicals shall be operated to minimize discharges of those chemicals. Protection such as overhangs or door skirts to enclose trailer ends at truck loading/unloading docks shall be provided as appropriate. Appropriate measures to minimize discharges of Section 313 chemicals may include: the placement and maintenance of drip pans (including the proper disposal of materials collected in the drip pans) where spillage may occur (such as hose connections, hose reels and filler nozzles) for use when making and breaking hose connections; a strong spill contingency and integrity testing plan; and/or other equivalent measures.
- (4) Areas Where Section 313 Water Priority Chemicals Are Transferred, Processed, or Otherwise Handled. Processing equipment and materials handling equipment shall be operated so as to minimize discharges of Section 313 water priority chemicals. Materials used in piping and equipment shall be compatible with the substances handled. Drainage from process and materials handling areas shall minimize storm water contact with Section 313 water priority chemicals. Additional protection such as covers or guards to prevent exposure

to wind, spraying or releases from pressure relief vents from causing a discharge of Section 313 water priority chemicals to the drainage system shall be provided as appropriate. Visual inspections or leak tests shall be provided for overhead piping conveying Section 313 water priority chemicals without secondary containment.

- (5) Discharges From Areas Covered by Paragraphs (1), (2), (3), or (4) of Part III E 2 b.
  - (a) Drainage from areas covered by paragraphs (1), (2), (3), or (4) of Part III E 2 b should be restrained by valves or other positive means to prevent the discharge of a spill or other excessive leakage of Section 313 water priority chemicals. Where containment units are employed, such units may be emptied by pumps or ejectors; however, these shall be manually activated.
  - (b) Flapper-type drain valves shall not be used to drain containment areas. Valves used for the drainage of containment areas should, as far as is practical, be of manual, open-and-closed design.
  - (c) If facility drainage is not engineered as above, the final discharge of all in-facility storm sewers shall be equipped to be equivalent with a diversion system that could, in the event of an uncontrolled spill of Section 313 water priority chemicals, return the spilled material to the facility.
  - (d) Records shall be kept of the frequency and estimated volume (in gallons) of discharges from containment areas.
- (6) Facility Site Runoff Other Than From Areas Covered By paragraphs (1), (2), (3), or (4) of Part III E 2 b. Other areas of the facility (those not addressed in paragraphs (1), (2), (3), or (4) of Part III E 2 b), from which runoff that may contain Section 313 water priority chemicals or spills of Section 313 water priority chemicals could cause a discharge shall incorporate the necessary drainage or other control features to prevent discharge of spilled or improperly disposed material and ensure the mitigation of pollutants in runoff or leachate.
- (7) Preventive Maintenance and Housekeeping. All areas of the facility shall be inspected at specific intervals identified in the plan for leaks or conditions that could lead to discharges of Section 313 water priority chemicals or direct contact of storm water with raw



materials, intermediate materials, waste materials or products. In particular, facility piping, pumps, storage tanks and bins, pressure vessels, process and material handling equipment, and material bulk storage areas shall be examined for any conditions or failures that could cause a discharge. Inspection shall include examination for leaks, wind blowing, corrosion, support or foundation failure, or other forms of deterioration or noncontainment. Inspection intervals shall be specified in the plan and shall be based on design and operational experience. Different areas may require different inspection intervals. Where a leak or other condition is discovered that may result in significant releases of Section 313 water priority chemicals to waters of the United States, action to stop the leak or otherwise prevent the significant release of Section 313 water priority chemicals to waters of the United States shall be immediately taken or the unit or process shut down until such action can be taken. When a leak or noncontainment of a Section 313 water priority chemical has occurred, contaminated soil, debris, or other material must be promptly removed and disposed in accordance with Federal, State, and local requirements and as described in the plan.

- (8) Facility Security. Facilities shall have the necessary security systems to prevent accidental or intentional entry that could cause a discharge. Security systems described in the plan shall address fencing, lighting, vehicular traffic control, and securing of equipment and buildings.
- (9) Training. Facility employees and contractor personnel that work in areas where Section 313 water priority chemicals are used or stored shall be trained in and informed of preventive measures at the facility. Employee training shall be conducted at intervals specified in the plan, but not less than once per year. Training shall address pollution control laws and regulations, the storm water pollution prevention plan and the particular features of the facility and its operation that are designed to minimize discharges of Section 313 water priority chemicals. The plan shall designate a person who is accountable for spill prevention at the facility and who will set up the necessary spill emergency procedures and reporting requirements so that spills and emergency releases of Section 313 water priority chemicals can be isolated and contained before a discharge of those chemicals can occur. Contractor or temporary personnel shall be informed of facility operation and design features in order to prevent discharges or spills from occurring.

- c. Facilities subject to reporting requirements under EPCRA Section 313 for chemicals that are classified as Section 313 water priority chemicals that are handled and stored onsite only in gaseous or nonsoluble liquid or solid (at atmospheric pressure and temperature) forms may provide a certification as such in the pollution prevention plan in lieu of the additional requirements in Part III E 2. Such certification shall include a narrative description of all water priority chemicals and the form in which they are handled and stored, and shall be signed in accordance with Part II K.
  - d. The storm water pollution prevention plan shall be certified in accordance with Part II K.
- 3. Additional Requirements for Salt Storage. Storage piles of salt used for deicing or other commercial or industrial purposes and that generate a storm water discharge associated with industrial activity that is discharged to surface waters shall be enclosed or covered to prevent exposure to precipitation, except for exposure resulting from adding or removing materials from the pile. Permittees shall demonstrate compliance with this provision as expeditiously as practicable, but in no event later than 3 years after the date of coverage under this general permit. Permittees with previous coverage under a VPDES general permit for storm water shall be compliant with this provision upon submittal of the registration statement. Piles do not need to be enclosed or covered where storm water from the pile is not discharged to surface waters.

PART IV  
SECTOR-SPECIFIC PERMIT REQUIREMENTS

**Food and Kindred Products Facilities.**

**A. Discharges Covered Under This Section.**

This section covers all storm water discharges from food and kindred products processing facilities (commonly identified by Standard Industrial Classification (SIC) code 20), including: meat products; dairy products; canned, frozen and preserved fruits, vegetables, and food specialties; grain mill products; bakery products; sugar and confectionery products; fats and oils; beverages; and miscellaneous food preparations and kindred products and tobacco products manufacturing (SIC Code 21). Sources of storm water include industrial plant yards; material handling sites; refuse sites; sites used for application or disposal of process wastewaters; sites used for storage and maintenance of material handling equipment; sites used for residential treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; and storage areas where raw material and intermediate and finished products are exposed to storm water and areas where industrial activity has taken place in the past and significant materials remain. For the purposes of this paragraph, material handling activities include the storage, loading, and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product, or waste product.

**B. Special Conditions.**

Prohibition of Nonstorm Water Discharges.- In addition to the requirement of Part I.D.8., discharges of nonstorm water, including boiler blowdown, cooling tower overflow and blowdown, ammonia refrigeration purging, and vehicle washing/clean-out operations, to surface waters, or through municipal separate storm sewer systems, are not authorized by this permit. The owners of such discharges must obtain coverage under a separate VPDES wastewater discharge permit.

**C. Storm Water Pollution Prevention Plan Requirements.**

In addition to the requirements of Part III.D., the plan shall include, at a minimum, the following items.

**1. Description of Potential Pollutant Sources.**

- a. Drainage. A site map indicating the locations of vents and stacks from cooking, drying, and similar operations, dry product vacuum transfer lines; animal holding pens; and spoiled product and broken product container storage areas.
- b. Summary of Potential Pollutant Sources. In addition to food and kindred products processing-related industrial activities, the plan must also describe application/storage

of pest control chemicals (e.g., rodenticides, insecticides, fungicides, and others) used on plant grounds, including a description of pest control application and chemical storage practices.

2. Measures and Controls.

Inspections. At a minimum, the following areas, where the potential for exposure to storm water exists, must be inspected: loading and unloading areas for all significant materials; storage areas, including associated containment areas; waste management units; vents and stacks emanating from industrial activities; spoiled product and broken product container holding areas; animal holding pens; staging areas; and air pollution control equipment.

D. Numeric Effluent Limitations.

There are no additional numeric effluent limitations beyond those described in Part I.B.

E. Monitoring and Reporting Requirements.

Analytical Monitoring Requirements. Grain mill and fats and oils products facilities are required to monitor their storm water discharges for the pollutants of concern listed in Tables 26 or 27.

# **STORMWATER POLLUTION PREVENTION PLAN**

Anheuser-Busch, Inc.  
Williamsburg Brewery  
Williamsburg, Virginia  
May 1999

## GENERAL INFORMATION

### Facility Information

Name of Facility           Anheuser-Busch, Inc.  
Type of Facility           Brewery  
Location of Facility       7801 Pocahontas Trail  
                                  Williamsburg, Virginia 23185  
Name and Address of  
Owner or Operator       Anheuser-Busch, Inc.  
                                  One Busch Place  
                                  St. Louis, Missouri 63118  
Designated person       Manager, Environmental, Health & Safety  
accountable for storm   Mr. Scott Randall  
water pollution prevention  
at the facility

### Certification and Approval

**Facility Management**   This SWPP Plan will be fully implemented as herein described. Compliance with the elements of this plan is required either by law or by Corporate Policy. The spill response coordinator has the authority to implement the necessary procedures to reduce the pollutants in stormwater discharges associated with industrial activities at the facility and to assure compliance with the terms and conditions of this permit.

William R. Ohlendorf  
Signature of Authorized Representative  
William R. Ohlendorf, Plant Manager

**Professional Engineer**   I hereby certify that I am familiar with the requirements of 40 CFR 122.26 and VPDES general stormwater permit requirements; that I have visited and examined the facility; the Plan has been prepared in accordance with good engineering practice and with the requirements of 40 CFR 122.26 and VPDES general stormwater permit conditions; that the required testing has been completed and that the Plan is adequate for the facility.

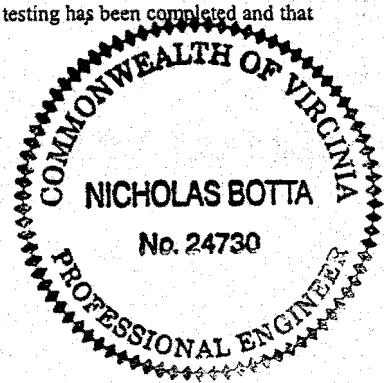
NICHOLAS BOTTA  
Printed Name of Registered Professional Engineer

Nicholas Botta  
Signature of Registered Professional Engineer

5-28-99  
Date

24730  
Registration No.

VIRGINIA  
State



## TABLE OF CONTENTS

| <u>Section</u>   | <u>Page</u> |
|--|-------------|
| 1.0 <u>INTRODUCTION</u>  | 1           |
| 1.1 PURPOSE  | 1           |
| 1.2 FACILITY LOCATION AND DESCRIPTION                              | 1           |
| 2.0 <u>POLLUTION PREVENTION TEAM</u>                               | 2           |
| 3.0 <u>POTENTIAL SOURCES OF STORM WATER CONTAMINATION</u>          | 4           |
| 3.1 POTENTIAL STORM WATER POLLUTANT SOURCES AND DISCHARGE OUTFALLS | 4           |
| 3.2 SPILL HISTORY  | 4           |
| 3.3 RISK EVALUATION OF POTENTIAL SOURCES                           | 4           |
| 4.0 <u>EXISTING MONITORING DATA</u>                                | 4           |
| 5.0 <u>STORM WATER MANAGEMENT CONTROLS</u>                         | 15          |
| 5.1 MANAGEMENT OF RUNOFF   | 15          |
| 5.2 STRUCTURAL CONTROLS  | 15          |
| 5.2.1 <u>Secondary Containment</u>                                 | 15          |
| 5.2.2 <u>Dry Weather Pumpback System</u>                           | 15          |
| 5.2.3 <u>Pest Control Chemicals</u>                                | 15          |
| 5.3 PREVENTIVE MAINTENANCE   | 16          |
| 5.3.1 <u>Sediment/Erosion Prevention</u>                           | 16          |
| 5.3.2 <u>Good Housekeeping Practices</u>                           | 16          |
| 5.4 SPILL PREVENTION AND RESPONSE                                  | 16          |
| 5.5 TRAINING PROGRAM   | 17          |
| 5.5.1 <u>Employee Training Program</u>                             | 17          |
| 5.5.2 <u>Contractors and Vendors Training</u>                      | 17          |

## TABLE OF CONTENTS (Continued)

| <u>Section</u>  | <u>Page</u> |
|---|-------------|
| 5.6 INSPECTION PROGRAM  | 17          |
| 5.7 RECORD KEEPING AND INTERNAL REPORTING<br>PROCEDURES               | 18          |
| 6.0 <u>NON-STORM WATER DISCHARGES</u>                                 | 18          |
| 7.0 <u>COMPARISON WITH OTHER ENVIRONMENTAL MANAGEMENT<br/>PLANS</u>   | 19          |
| 8.0 <u>DISCHARGE TO MUNICIPAL SEPARATE STORM SEWERS</u>               | 20          |
| 9.0 <u>EPCRA SECTION 313 WATER PRIORITY CHEMICAL<br/>REQUIREMENTS</u> | 20          |
| 9.1 MATERIAL STORAGE AREA - LIQUID                                    | 20          |
| 9.2 MATERIAL STORAGE AREA - NONLIQUIDS                                | 21          |
| 9.3 TRUCK AND RAIL CAR LOADING/UNLOADING AREA                         | 21          |
| 9.4 PIPING AND EQUIPMENT  | 21          |
| 9.5 DISCHARGES  | 21          |
| 9.6 INSPECTIONS   | 21          |
| 9.7 FACILITY SECURITY   | 22          |
| 9.8 TRAINING  | 22          |
| 9.9 PLAN CERTIFICATION  | 22          |
| 10.0 <u>CERTIFICATION</u>   | 23          |
| 10.1 ANHEUSER-BUSCH, INC. CERTIFICATION                               | 23          |

## APPENDICES

- A. Inspection Forms
- B. Site Drainage Map
- C. Sampling Data
- D. Stormwater Pollutant Evaluation and Certification



LIST OF TABLES

| <u>Table</u> |                                | <u>Page</u> |
|--------------|--------------------------------|-------------|
| 2-1          | Pollution Prevention Team      | 3           |
| 3-1          | Significant Material Inventory | 5           |

LIST OF FIGURES

| <u>Figure</u> |   | <u>Page</u> |
|---------------|---|-------------|
| 1-1           | Site Map, Anheuser-Busch, Inc. Williamsburg Brewery | Map Pocket  |

## 1.0 INTRODUCTION

### 1.1 PURPOSE

This Storm Water Pollution Prevention Plan (SWP3) has been prepared for the Anheuser-Busch, Inc. (ABI) Williamsburg. The SWP3 is designed to meet the requirements of the State of National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit).

The principal objectives of this SWP3 are to:

- Evaluate potential sources of storm water contamination;
- Describe current storm water management and pollution prevention practices;
- Identify potential non-storm water discharges to storm water lines; and
- Provide recommendations for changes to existing storm water management practices (procedures or structures) to reduce storm water pollution.

This SWP3 will be made available to the USEPA Director or the operator of the applicable municipal storm water sewer system upon request. Should the director or an authorized representative require changes in the SWP3, ABI will make the necessary changes to the plan within 30 days of notification. ABI will submit to the director a written certification to verify that the requested changes were made.

ABI will amend the SWP3 whenever there is a change in facility design, construction, operation or maintenance which could significantly impact the quality of storm water discharged from the site. In addition, the plan will also be modified should it prove to not adequately address storm water pollution prevention. All records associated with compliance with this plan shall be retained for three years from the date of the sample, measurement, report or application, or until at least 1 year after coverage under this permit terminates, whichever is later.

### 1.2 FACILITY LOCATION AND DESCRIPTION

The Anheuser-Busch, Inc. Williamsburg Brewery is located at 7801 Pocahontas Trail. The 180-acre tract is bounded on the North by US Route 60, on the South by Kingsmill residential subdivision, by Busch Gardens on the East, and Kingsmill road on the West. The brewery is accessed by US Route 60, 3 miles east of Route 199. (Figure 1-1, Appendix B).

The brewery manufacturers malt beverages. The facility operates 24 hours per day, 7 days a week, and is manned continuously by both security and production personnel. The site operations consist of beer brewing, bottling, packaging, shipping, steam production, and raw material receiving.

Nearly all of the brewery site is runoff drains through a single stormwater culvert which exits the brewery from the Southwest corner of the facility. This line captures all of the storm water that is "associated with industrial activity" on the site.

A small portion of the westmost parking area flows into a separate stormwater retention basis and then westward from the brewery property. During typical brewery operations, no stormwater discharges associated with industrial activities occur in the areas that flow into this outfall. However, from time to time construction material may be stored in this area, construction contractors may use this area for staging equipment and material and grain trailers may be stored on this parking lot.

## **2.0 POLLUTION PREVENTION TEAM**

A Pollution Prevention Team has been established to oversee implementation, maintenance, and revision of the SWP3. The team will meet annually to review and evaluate the effectiveness of the plan and suggest revisions. In addition, the group will meet after spills to identify practical corrective actions to prevent a reoccurrence.

The team shall consist of plant personnel from areas of the plant with significant storm water management responsibilities. Table 2-1 outlines the team, detailing members and responsibilities.

Topics to be discussed during team meetings can include, but not be limited to the following:

- Spills;
- Problems with storm water management devices (roof tubs, diking, DWPS);
- Problems with any other inspection items;
- Completed or planned modifications;
- Future process changes with storm water impact;
- Regulatory changes that impact the SWP3;
- Review/plan further non-storm water discharge investigations;
- Procedural concerns (inspections, equipment operation); and
- Review changes to SWP3 made since last meeting.

Table 2-1. Pollution  
Prevention Team

**Note:** For the sake of clarity, members of the Pollution Prevention Team are described by Job Title rather than by name. The person in that particular job function is responsible for participation on the team.

| Member/Title*   | Responsibilities   |
|---|--|
| <u>Team Leader</u><br><br><u>Manager, Environmental,</u><br><u>Health &amp; Safety</u><br><u>253-2136</u><br><u>(1-888-590-0010)</u>              | Coordinate all aspects of plan implementation and maintenance, coordinate employee training, maintain all records, ensure follow-up measures are taken, ensure reports are submitted |
| <u>Utility Superintendent</u><br><u>253-3677</u><br><u>(152-677)</u>  | Provide technical assistance for plan implementation and maintenance and evaluation. Assist with selection of storm water management options and plan revisions.                     |
| <u>Safety Manager</u><br><u>253-3836</u><br><u>(1-800-609-9481)</u>   | Provide input regarding spill response measures and coordination of response efforts.  |
| <u>Asst. Res. Engineer</u><br><u>253-3692</u><br><u>(988-7001)</u>  | Note any process changes. Assist with selection of storm water management options and plan revisions.  |
| <u>William Ohlendorf</u><br><u>Plant Manager</u><br><u>253-3610</u><br><u>Assistant Plant Manager</u><br><u>Dennis Nesbitt</u><br><u>253-3609</u> | Signatory authority. Oversee selection of storm water management options.  |
| <u>Resident Brewmaster</u><br><u>253-3660</u><br><u>Assistant Resident</u><br><u>Brewmaster</u><br><u>253-3658</u>                                | Note any process changes. Assist with selection of storm water management options and plan revisions.  |

### **3.0 POTENTIAL SOURCES OF STORM WATER CONTAMINATION**

#### **3.1 POTENTIAL STORM WATER POLLUTANT SOURCES**

The ABI Williamsburg Brewery uses a wide variety of chemicals and raw materials. Chemicals typically associated with the brewing process or ancillary activities include materials such as grains, waste beer, yeast, sulfuric and phosphoric acid, sodium hydroxide and fuel oil. The related potential pollutant parameters would be expected to be Biological Oxygen Demand (BOD), oil and grease, pH, total suspended solids, and chemical oxygen demand (COD). Those stored and/or unloaded outdoors are listed in the "Significant Material Inventory" (Table 3-1). Significant Material locations are shown on the site map following table 3-1. In addition, several areas of potential pollution could occur from trash containers and temporary outside material storage. These areas will be addressed by management systems and weekly inspections.

All industrial activities areas drain to the process sewer (all inside drains and exterior drains are painted Green) which are treated at the Hampton Roads Sanitation District Williamsburg Plant located on Ron Springs Road. Effluent from the treatment plant discharges into the James River. For ease of identification by plant personnel, entrances to stormsewers are painted orange.

#### **3.2 SPILL HISTORY AND LOCATION**

The ABI Williamsburg Brewery has recorded no spills of toxic or hazardous pollutants to the stormwater system since October 1, 1989. Should any reportable spills occur during the life of this general permit, the SWP3 will be amended to summarize these events.

#### **3.3 RISK EVALUATION OF POTENTIAL SOURCES**

All outdoor storage and unloading areas have dikes or secondary containment structures. Many of the storage areas are drained to the process sewer. Those areas without process sewer drains can be manually pumped out from either the bermed area or from nearby catch basins. Unloading and storage areas have not been the site of releases to the storm sewer. Due to the structural and operational controls in these areas, the spill risk is low. Based on an evaluation of material handling practices, structural controls and the facility spill history, it is unlikely that any of the materials identified in Table 3-1 would be present in storm water in significant quantities under normal operating conditions.

A dry weather flow pumpback systems has been installed on the main storm water outfall line. The dry weather pumpback system is designed to catch any accidental releases prior to discharge into the municipal storm sewers. Therefore, the potential for leakage of contaminants offsite is expected to be very low.

The risk presented by the small area of parking lot on the far western portion of the property is very low. Typically, no industrial activity occurs in this area. Occasionally, on-site contractors may stage construction trailers, materials and equipment in this area as part of their projects at the plant.

### **4.0 EXISTING DATA**

Data for storm water from the collection system is filed in Appendix C. The SWP3 will be updated to summarize any stormwater discharge evaluations and/or analytical data collected during the term of the permit. Data generated to conform with the conditions of the Virginia General VPDES Permit will be kept on file in the Environmental, Health & Safety Manager's office.

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description | Stormwater Protection Description |
|--|---|------------------------------|-----------------------------------|
|--|---|------------------------------|-----------------------------------|

**DIKED SECONDARY CONTAINMENT**

|                     |               |                                     |                     |
|---------------------|---------------|-------------------------------------|---------------------|
| Alcohol             | Bldg 14       | Tank 1; 12000 Gal<br>Eq. #33-328-1  | 22,500 Sq. Ft. dike |
|                     | Bldg 14       | Tank 2; 12000 Gal<br>Eq. #33-328-2  | 22,500 Sq. Ft. dike |
|                     | Bldg 14       | Tank 3; 2000 Gal<br>Eq. #33-346-1   | 22,500 Sq. Ft. dike |
|                     | Bldg 14       | Tank 4; 2000 Gal<br>Eq. #33-346-2   | 22,500 Sq. Ft. dike |
|                     | Bldg 14       | Tank 5; 3200 Gal<br>Eq. #33-347-1   | 22,500 Sq. Ft. dike |
|                     | Bldg 14       | Tank 6; 3200 Gal<br>Eq. #33-347-2   | 22,500 Sq. Ft. dike |
| Reject Liquor       | Bldg 12 North | Tank 7; 45000 Gal<br>Eq. #33-229-1  | Irreg. size dike    |
| Distil. Feed        | Bldg 14       | Tank 8; 25000 Gal<br>Eq. #33-325    | 22,500 Sq. Ft. dike |
| Waste Beer          | Bldg 14       | Tank 9; 25000 Gal<br>Eq. #33-337    | 22,500 Sq. Ft. dike |
| Chip Yeast          | Bldg 14       | Tank 10; 25000 Gal<br>Eq. #33-341   | 22,500 Sq. Ft. dike |
| Evap Feed           | Bldg 14       | Tank 11; 225000 Gal<br>Eq. #33-300  | 2077 Gal. dike      |
| Schoene Sludge      | Bldg 14       | Tank 12; 93000 Gal<br>Eq. #33-351   | 22,500 Sq. Ft. dike |
| Distil. Overflow    | Bldg 14       | Tank 13; 14800 Gal<br>Eq. #33-356   | 22,500 Sq. Ft. dike |
| Evap. Feed Overflow | Bldg 14       | Tank 14; 58700 Gal<br>Eq. #33-357-1 | 22,500 Sq. Ft. dike |
|                     | Bldg 14       | Tank 15; 58700 Gal<br>Eq. #33-357-2 | 22,500 Sq. Ft. dike |
| Not in Use          | Bldg 14       | Tank 16; 150 Gal<br>Eq. #33-357-3   | 22,500 Sq. Ft. dike |
| Waste DE            | Bldg 14       | Tank 21; 24000 Gal<br>Eq. #33-110-1 | 18 x 25 dike        |

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description       | Stormwater Protection Description |
|--|---|------------------------------------|-----------------------------------|
| Sulfuric Acid 93%                            | Neutralization                          | Tank 22; 5000 Gal Eq. #17-028-1    | 10,433 Gal dike                   |
| NAOH 20%                                     | Neutralization                          | Tank 23; 15000 Gal Eq. #17-030-1   | 26,856 Gal dike                   |
| Sodium Benzoate                              | Bldg 12 West                            | Tank 24; 7000 Gal Eq. #33-368      | 18 x 18 x 3 dike                  |
| Fuel Oil                                     | Bldg 12 South                           | Tank 25; 88000 Gal Eq. #28-224-1   | 205,638 CF dike                   |
|  | Bldg 12 South                           | Tank 26; 88000 Gal Eq. #28-224-2   | 205,638 CF dike                   |
|  | Bldg 12 South                           | Tank 27; 400000 Gal Eq. #28-224-3  | 205,638 CF dike                   |
|  | Bldg 12 South                           | Tank 28; 1000000 Gal Eq. #28-224-4 | 205,638 CF dike                   |
| Spent Grain                                  | Bldg 12 East                            | Tank 29; 400000 Gal Eq. #33-116    | Irreg. size dike                  |
| Used Oil                                     | Bldg 7 West                             | Tank 35; 500 Gal                   | 5400 Gal dike                     |
|  | Bldg 7 West                             | Tank 36; 500 Gal                   | 5400 Gal dike                     |
|  | Bldg 7 West                             | Tank 37; 500 Gal Screen            | 5400 Gal dike                     |
|  | Bldg 7 West                             | Item 38; 10 @ 55 Gal Drums         | 1346 Gal dike                     |
| PCB Containing Oil                           | Bldg 7 SE                               | Item 45; 3 VEPCO Transformers      | 19 x 16 dike                      |
| Propylene Glycol                             | Bldg 2 South                            | Tank 53; 43000 Gal Eq. #20-209-3   | 69 x 25 x 0.5 dike                |
|  | Bldg 2 South                            | Tank 54; 43000 Gal Eq. #20-209-4   | 69 x 25 x 0.5 dike                |
|  | Bldg 3 South                            | Tank 68; 40000 Gal Eq. #20-209-1   | 75 x 20 x 0.67 dike               |
|  | Bldg 3 South                            | Tank 69; 40000 Gal Eq. #20-209-2   | 75 x 20 x 0.67 dike               |

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description         | Stormwater Protection Description |
|--|---|--------------------------------------|-----------------------------------|
| Propylene Glycol & Ammonia                   | Bldg 2 South                            | Tank 55; 2 @ 1300 Gal, Eq. #20-208-2 | 69 x 25 x 0.5 dike                |
|  | Bldg 3 South                            | Tank 70; 2 @ 1100 Gal, Eq. #20-208-1 | 75 x 20 x 0.67 dike               |
| Ammonia                                      | Bldg 2 South                            | Tank 56; 1000 Gal NH3 Surge Tank     | 69 x 25 x 0.5 dike                |
|  | Bldg 3 South                            | Tank 71; 700 Gal NH3 Surge Tank      | 75 x 20 x 0.67 dike               |
| Salt Brine                                   | Bldg 7 West                             | Tank 66; 8000 Gal Eq. #28-228-1      | 28 x 20 x 2 dike                  |
|  | Bldg 7 West                             | Item 67; 375 Gal Brine Surge Tank    | 28 x 20 x 2 dike                  |
| Diesel Fuel                                  | Bldg 6 East                             | Tank 73; 500 Gal Rail Door           | 12 x 4 x 2 dike                   |
|  | Bldg 10A East                           | Tank 74; 280 Gal Jockey Trailer      | 6.5 x 6 x 2 dike                  |
| Brewers Condensed Solids (BCS) Overflow      | Bldg 14                                 | Tank 17; 20000 Gal Eq. #19-208-1     | Process Sewer                     |
| Brewers Condensed Solids (BCS) Overflow      | Bldg 14                                 | Tank 18; 20000 Gal Eq. #19-208-2     | Process Sewer                     |
| Brewers Condensed Solids (BCS) Overflow      | Bldg 14                                 | Tank 19; 20000 Gal Eq. #19-208-3     | Process Sewer                     |
| Brewers Condensed Solids (BCS) Overflow      | Bldg 14                                 | Tank 20; 20000 Gal Eq. #19-208-4     | Process Sewer                     |
| Diesel Fuel                                  | Bldg 13 South Fire Pump House           | Tank 44; 280 Gal Inside Bldg         | Dike Around Perimeter of Bldg     |
| Propylene Glycol & Ammonia                   | Bldg 7 North                            | Tank 47; 2 @ 1000 Gal Eq. #22-409-1  | No Dike                           |
| Ammonia                                      | Bldg 7 North                            | Tank 48; 1000 Gal Eq. #22-409-1      | No Dike                           |
| Propylene Glycol & Ammonia                   | Bldg 7 North                            | Tank 49; 2 @ 1000 Gal Eq. #22-409-2  | No Dike                           |
| Ammonia                                      | Bldg 7 North                            | Tank 50; 1000 Gal Eq. #22-409-2      | No Dike                           |



| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description | Stormwater Protection Description |
|--|---|------------------------------|-----------------------------------|
| NAOH 50% (Caustic)                           | Bldg 6 West                             | Tank 72; 280 Gal             | Process Sewer                     |
| Sodium Hypochlorite                          | Recycling Dock                          | Tank **; 3,000 Gal           | 12 x 32 x 1.33 dike               |
| ChemTreat CL-1467                            | Recycling Dock                          | Tank **; 1,000 Gal           | 12 x 32 x 1.33 dike               |
| ChemTreat CL-40                              | Recycling Dock                          | Tank **; 1,000 Gal           | 12 x 32 x 1.33 dike               |

### BERMED UNLOADING FACILITIES

|   |                                     |   |  |
|---|-------------------------------------|---|--|
| BP&S Conveyor Lube                            | Bldg 6 East                         | Inside Storage Tanks<br>Outside Loading Hookup  | Rollover Containment<br>Dike (valve closed during unloading)   |
| BP&S Caustic 50%                              | Bldg 6                              | Inside Storage Tanks<br>Outside Loading Hookup  | Rollover Containment<br>For Delivery Truck<br>(valve closed during unloading)                            |
| Utilities NALCO Products<br>(Water Treatment) | Bldg 7                              | Inside Storage Tanks<br>Outside Loading Hookup  | Rollover Containment<br>Dike (valve closed during unloading)   |
| Fuel Oil                                      | Bldg 12 SE or East<br>Side of Tanks | Outside Storage Tanks<br>Outside Loading Hookup | Rollover Containment<br>For Delivery Truck<br>And<br>Below Grade Dike<br>(valve closed during unloading) |
| Wastewater Neutralization<br>Chemicals        | Bldg 12 SE                          | Outside Storage Tanks<br>Outside Loading Hookup | Containment Dike<br>(valve closed during unloading)  |
| Brewing Caustic 50% &<br>Sulfuric Acid        | Bldg 4 SW                           | Inside Storage Tanks<br>Outside Loading Hookup  | Rollover Containment<br>For Delivery Truck<br>(valve closed during unloading)                            |
| Alcohol                                       | Area 14                             | Outside Storage Tanks<br>Outside Loading Hookup | Rollover Containment<br>For Delivery Truck   |
| Brewers Condensed Solids (BCS)                | Bldg 12                             | Outside Storage Tanks<br>Outside Loading Hookup | Process Sewer  |
| Sulfuric Acid 93%                             | Wastewater<br>Neutralization        | Outside Unloading<br>Hookup                     | Containment Dike   |

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description | Stormwater Protection Description |
|--|---|------------------------------|-----------------------------------|
| NAOH 20%                                     | Wastewater Neutralization               | Outside Unloading Hookup     | Containment Dike                  |

### TRASH PROTECTION DIKES

|                |                |                |  |
|----------------|----------------|----------------|--|
| Celite & Grain | Bldg 12 East   | 40 CY Dumpster | Rollover Containment With Process Sewer        |
| Chips & Trash  | Bldg 6 South   | 40 CY Dumpster | Rollover Containment With Process Sewer        |
| Grain Dust     | Bldg 3 South   | 8 CY Dumpster  | Dike   |
| Trash          | Bldg 6 South   | 8 CY Dumpster  | Dike & Rollover Containment With Process Sewer |
| Glass Cullet   | Recycling Dock | 40 CY Dumpster | Rollover Containment With Process Sewer        |

### CHEMICAL PROTECTION PROCESS

|                          |                       |               |                  |
|--------------------------|-----------------------|---------------|------------------|
| Brewing Chemicals        | Brewing Chemical Cage | Storage       | Containment dike |
| BP&S Chemicals           | BP&S Chemical Cage    | Storage       | Portable dikes   |
| BP&S Maint. Lubricants   | Bldg 6                | Storage Drums | Portable dikes   |
| Utilities Lubricants     | Bldg 7                | Storage Drums | Diked            |
| Utilities NALCO Products | Bldg 7, 1st Floor     | Storage       | Diked            |
| Used Oil                 | Bldg 7 West           | Storage Drums | Diked            |
| Hazardous Waste          | Bldg 7 SE             | Storage Drums | Containment dike |
| Conveyor Lube            | Bldg 6                | Totes         | Spill Pallets    |

# SWPP Plan

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description               | Stormwater Protection Description |
|--|---|--|-----------------------------------|
| NAOH 50% (Caustic)                           | Bldg 12, 1st Floor                      | Inside Tank 1<br>5800 Gal<br>Eq. #33-130-1 | Irreg. size dike                  |
|  | Bldg 6, Storeroom                       | Inside Tank 31<br>6330 Gal                 | 18 x 16 x 6 dike                  |
|  | Bldg 4A, 1st Floor                      | Inside Tank 71<br>51000 Gal                | 135 CF dike                       |
| Not In Use                                   | Bldg 12, 1st Floor                      | Inside Tank 2<br>3500 Gal<br>Eq. #33-131-1 | Irreg. size dike                  |
| NAOH 14% (Caustic)                           | Bldg 12, 1st Floor                      | Inside Tank 3<br>18000 Gal<br>Eq. #33-311  | Process Sewer                     |
| NALCO 8306                                   | Bldg 12, 1st Floor                      | Inside Tank 5<br>400 Gal                   | 9 x 12 dike                       |
|  | Bldg 7 SW                               | Inside Tank 12<br>1000 Gal                 | 201 CF dike                       |
| NALCO 8301D                                  | Bldg 12, 1st Floor                      | Inside Tank 6<br>400 Gal                   | 9 x 12 dike                       |
|  | Bldg 7 SE                               | Inside Tank 8<br>1000 Gal                  | 153 CF dike                       |
| NALCO 7348                                   | Bldg 7 SE                               | Inside Tank 7<br>1000 Gal                  | 153 CF dike                       |
| NALCO 7203                                   | Bldg 7 SW                               | Inside Tank 9<br>1000 Gal                  | 201 CF dike                       |
|  | Bldg 7 SW                               | Inside Tank 10<br>1000 Gal                 | 201 CF dike                       |
| NALCO 350                                    | Bldg 7 SW                               | Inside Tank 11<br>1000 Gal                 | 201 CF dike                       |
| NALCO 7408                                   | Bldg 7, West Wall                       | Inside Tank 13<br>400 Gal                  | Process Sewer                     |
| NAOH 20% (Caustic)                           | Bldg 7, West Wall                       | Inside Tank 14<br>400 Gal                  | Process Sewer                     |
|  | Bldg 4A, 2nd Floor                      | Inside Tank 72<br>2530 Gal                 | Process Sewer                     |
| Sulfite                                      | Bldg 7 East                             | Inside Tank 20<br>100 Gal Total            | Process Sewer                     |

# SWPP Plan

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description                        | Stormwater Protection Description |
|--|---|---|-----------------------------------|
| Phosphoric Acid 50%                          | Bldg 6, Line 10                         | Inside Tank 25<br>400 Gal                           | 6 x 2 x 1 dike                    |
|  | Bldg 6, Line 70                         | Inside Tank 44<br>480 Gal                           | 9 x 6 x 1 dike                    |
| NAOH 28% Rayon (Caustic)                     | Bldg 6, Line 10                         | Inside Tank 26<br>220 Gal                           | 6 x 2 x 1 dike                    |
|  | Bldg 6, Line 70                         | Inside Tank 47<br>220 Gal                           | 4 x 4 x 1.5 dike                  |
| Dicolube CT                                  | Bldg 6, Line 10                         | Inside Tank 27<br>250 Gal                           | 4 x 4 x 1 dike                    |
| Diverfoam Plus                               | Bldg 6, Line 20                         | Inside Tank 29<br>220 Gal                           | 4 x 4 x 1 dike                    |
|  | Bldg 6, Line 60                         | Inside Tank 51<br>220 Gal                           | 4 x 4 x 1 dike                    |
| Not In Use                                   | Bldg 6, Line 70                         | Inside Tank 48<br>300 Gal                           | 12 x 6.5 x 9.5 dike               |
| Klenzade S                                   | Bldg 6, Line 70                         | Inside Tank 49<br>250 Gal                           | 4 x 4 x 1.5 dike                  |
|  | Warehouse Area 9                        | Inside Tank 53<br>3000 Gal                          | 27 x 16.5 x 2 dike                |
| Conveyor Lube                                | Warehouse Area 9                        | Inside Tank 52<br>7450 Gal                          | 27 x 16.5 x 2 dike                |
| NAOH 3% (Caustic)                            | Bldg 3B, 1st Floor                      | Inside Tank 54-70<br>Various Sizes<br>Eq. #CIP 1-19 | Process Sewer                     |
| Sulfuric Acid 93%                            | Bldg 4A, 1st Floor                      | Inside Tank 73<br>4000 Gal                          | Process Sewer                     |
| Chemtreat CL 206                             | BP&S Chemical Cage                      | Inside Tank 21<br>300Gal                            | 22 x 8 x 0.75 dike                |
| Chlorinated TSP Solution                     | Bldg 6, Line 20                         | Inside Tank 28<br>750 Gal                           | Process Sewer                     |
|  | Bldg 6, Line 60                         | Inside Tank 50<br>750 Gal                           | Process Sewer                     |
| Potash Liquid 45%                            | Bldg 6, Line 95                         | Inside Tank 35<br>330 Gal                           | 4 x 4 x 1 dike                    |

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description | Stormwater Protection Description |
|--|---|------------------------------|-----------------------------------|
| NAOH (Caustic)                               | Bldg 6, Line 95                         | Inside Tank 43<br>880 Gal    | 4 x 4 x 1 dike                    |

## OTHER OUTSIDE PROCESS AREAS

| source   | location   | contaminant                            | comment   |
|--|--|--|---|
| roof top corn day bins   | on top of grains handling  | grain                                  | maintained via periodic aggressive dry sweep of roof  |
| DE silo and unloading operation                                    | west of grain storage tanks - includes the DE exhaust  | DE                                     | maintained via periodic aggressive dry sweep of the area  |
| reject liquor tank containment area                                | residuals  | process                                | valve normally open, but closed in instances of upset or for cleaning   |
| spent grain loadout area   | spent grain area at residuals  | spent grain                            | incidental spillage and blowing of spent grain may occur during truck   |
| brewing roofs  | roofs on brewing buildings;<br>vertical fermenter buildings;<br>stockhouses;<br>alpha cellars;<br>lauter tub buildings;<br>brewhouse;<br>grains handling;<br>track shed; | brewing products and by products       | maintained via periodic roof inspections, process containment tubs on roofs, piping certain areas to the process sewer, good housekeeping, etc. |
| powerhouse roof  | roof of powerhouse area  | equipment                              |   |
| residuals building and process area                                | residuals area   | spent grain, DE and residuals products | impact minimized via good housekeeping and periodic inspections   |
| cooling towers   | south of utilities   | cooling tower drift                    |   |
| recycle dumpster storage area                                      | across from recycle dock   | recyclables and garbage                | normally maintained inside of containment area which is directed to process sewer   |
| wheeled spent grain hopper storage area (includes grain dumpsters) | west of residuals area   | incidental spent grain                 | occasionally, spent grain may migrate beyond the bermed area (which is directed to the perocess sewer)  |

| Description of Exposed Significant Materials  | Location (as indicated on the site map)                                    | Material Storage Description  | Stormwater Protection Description  |
|---|--|---|--|
| A-yard hoppers (BP&S dumpsters)   | adjacent to the recycle dock   | garbage   | dumpsters may be located on paved area outside of the containment berm   |
| BP&S roof   | roof of BP&S   | incidental exposure of exhaust components from soakers, pasteurizers, CIPs, etc.              |  |
| scrap metal dumpsters   | near yard building and at other locations in plant during special projects | dirty metal parts   |  |
| trash dumpsters   | at various locations in plant during special projects                      | trash and garbage   |  |
| construction and demolition debris dumpsters  | at various locations in plant during special projects                      | construction and demolition debris  |  |
| railroad tie storage  | south side of brewery  | treated railroad ties   |  |
| contractor area trash cans  | contractor area  | trash and garbage   | good housekeeping practices are typically exercised  |
| contractor activities: cutting, welding, fabrication, pipe threading, painting, surface preparation, cleaning, etc. | contractor area  | construction debris   | construction activities are minimized and good housekeeping practices are typically exercised.                         |
| contractor activities: cutting, welding, fabrication, pipe threading, painting, surface preparation, cleaning, etc. | Yards Buildings I and II (Bldgs 10 and 10A)                                | construction and maintenance debris   | outdoor maintenance and construction activities are minimized and good housekeeping practices are typically exercised. |
| spotting tractor and car mover fueling  | fueling areas:<br>- east of building 10A and<br>- east of building 6       | diesel fuel   | operation continuously manned during fueling and good housekeeping practices exercised                                 |
| #6 oil unloading area   | east of large fuel tanks   | fuel oil  | containment area closed and operation continuously manned during transfer operations                                   |
| landscaping material storage  | landscaping building   | landscaping materials that include but are not limited to mulch, yard waste, fertilizer, etc. | good housekeeping practices are typically exercised  |
| empty drum storage area   | empty barrel/hazwaste storage area   | empty drums   | valve normally open - closed as protection during spill events   |

## SWPP Plan

| Description of Exposed Significant Materials | Location (as indicated on the site map) | Material Storage Description | Stormwater Protection Description  |
|--|---|------------------------------|--|
| wastewater neutralization pit                | south of fuel tanks                     | wastewater                   | pits are connected to process sewers and do not impact stormwater runoff quality |

## **5.0 STORM WATER MANAGEMENT CONTROLS**

### **5.1 MANAGEMENT OF RUNOFF**

This ABI facility uses a number of storm water management controls to prevent non-storm water materials from entering the storm water system. Measures include structural controls, such as secondary containments and the dry weather flow pumpback system. Non-structural controls are also utilized, including preventive maintenance, good house-keeping practices, employee, contractor and vendor training, and facility inspections.

### **5.2 STRUCTURAL CONTROLS**

The structural controls employed by the brewery are described below.

#### **5.2.1 Secondary Containment**

Berms surround all outdoor chemical storage and loading/unloading areas. Grate-covered sumps surround many such locations and drain directly into the process sewer. Collection tubs have been installed on roof vents with the potential to discharge beer or other materials. The tubs drain to the process sewer. Please refer to Figure 5-1 for a diagram of tub construction. The larger storage areas are surrounded by secondary containment structures of sufficient volume to contain the largest tank's contents.

The dry weather pumpback system is designed to capture spills or other non-storm flows and pump them to the process sewer. The system is described in more detail in the following section.

#### **5.2.2 Dry Weather Pumpback System**

Throughout ABI breweries, automated dry weather flow pumpback (DWFP) systems have been installed on storm sewer systems that exhibit a significant spill risk due to activities in the areas drained. These systems are designed to collect spills or other non-storm flows and contain accidental spills on-site. Compatible wastes are then pumped to the process sewer upstream of the brewery's pH neutralization system. These systems enhance ABI's best management practices program by assuring that all non-storm water flows are directed to the process sewers.

The key components of each system are:

- Intercept pit or sump--2,200 gallon capacity below the sewer invert elevation;
- Two submersible pumps with 50 gallons per minute (gpm) pumping capacity;
- Level control instrumentation;
- pH monitoring probe;
- Motorized slide gate which can be manually operated;
- Rain gauge; and
- Programmable logic control for local and remote automatic control and monitoring capability.

The system is normally operated in closed position and opened during rain events.

#### **5.2.3 Pest Control Chemicals**

All Pesticides are used and stored in accordance with label instructions. Rodenticide bait stations are located along the outside of the plant buildings in closed boxes. No insecticides or rodenticides are stored on-site. Landscaping contractors may use certain herbicides and insecticides during the course of their normal work. Cooling towers and other water treatment systems utilize certain biocides and slimicides. The discharge from these process streams is to the process sewer.



### 5.3 PREVENTIVE MAINTENANCE

ABI has a preventive maintenance and repair program which includes regularly scheduled maintenance of storm water-related equipment. Components of the dry weather flow pumpback system receive maintenance on a monthly, quarterly, or annual basis depending on the component. Plant maintenance personnel inspect valves and piping once a shift as part of their routine rounds.

#### 5.3.1 Sediment/Erosion Prevention

The brewery is 20 percent paved and the remainder is landscaped. Erosion is therefore not a concern. Sedimentation of solids such as grains, yeast or celite is not normally expected due to best management practices controlling the release of these materials.

#### 5.3.2 Good Housekeeping Practices

Good housekeeping measures are important in preventing storm water contamination. The designated, well-defined material storage and unloading areas help to prevent releases when materials are transferred. Paved areas in the facility are continually cleaned with a mechanical street sweeper. Dry cleanup is performed prior to site washdowns. In addition, catch basins are periodically cleaned and oil and water separators are pumped out.

### 5.4 SPILL PREVENTION AND RESPONSE

Based on the facility evaluation, potential spills of chemical storage sites were modified with either secondary containment or bermed loading/unloading protection. Full risk assessments are kept on file in the Storm Water file of the environmental engineer's office..

The ABI Williamsburg Brewery has a Spill Prevention and Response program in place. The program entails employee training to prevent and respond to spills. In addition, appropriate spill control equipment is stocked throughout the plant. The Spill Prevention, Control, and Countermeasure Plan (SPCC) contains detailed information regarding the brewery's response program. Training and awareness is an integral part of the program. New and present employees are trained in spill prevention and cleanup methods. Each department has personnel familiar with the SPCC. In addition, people are on duty each shift who are qualified to manage a spill response, including cleanup supervision and agency notification.

In the event of a spill, immediate notification to plant security will initiate the telephone matrix for chemical and oil spills. SPCC and Oil Spill Procedures will be followed by the appropriate trained personnel. Every effort will be made to keep the spill from entering the storm water system. Dikes and absorbent material will be used to contain the release. Spill control equipment is located throughout the facility in potential spill areas. the facility in potential spill areas.

## 5.5 TRAINING PROGRAM

### 5.5.1 Employee Training

Employees in the following areas will receive classroom training in storm water pollution prevention:

- Brewing,
- Engineering/Maintenance,
- Utilities/Powerhouse,
- Bottling/Packaging and Shipping, and
- Security.

Training will be conducted annually as part of the OSHA and HAZWOPER Awareness level training. New and present employees will receive training in good housekeeping procedures, spill prevention and response, and materials handling and storage. Additional on-the-job training may be necessary for some employees depending on their position and responsibilities. Topics would include:

- Draining secondary containment structures,
- Sampling/monitoring storm water,
- Containment of leaks and spills,
- Storm water-related equipment/structures inspection, and
- Protective equipment/clothing.

### 5.5.2 Contractor/Vendor Training

Contractors and vendors are made aware of ABI's storm water pollution prevention program. Contract language typically explains and requires compliance with the program. In some instances, contractors receive training booklets or instructions.

The facility has two sewer systems: a storm water system indicated by orange drain covers and a process system indicated by green drain covers. Contractors are notified of this system and shall not release any material to any sewer without prior authorization from an Environmental, Health and Safety Manager. In the event of a spill, a contractor/vendor shall immediately contact plant Security at extension 5000.

## 5.6 INSPECTION PROGRAM

The facility maintenance personnel regularly inspect drums, bags, tanks, piping, valves, pumps, and unloading areas as part of their inspection rounds. The head of the Storm Water Pollution Prevention Committee will review all inspection forms submitted by plant personnel (forms Appendix A.A tracking procedure is in place to ensure that follow-up actions are performed. All records associated with compliance with this plan shall be retained for three years from the date of the sample, measurement, report or application, or until at least 1 year after coverage under this permit terminates, whichever is later.

A comprehensive inspection is conducted monthly by Environmental, Health and Safety Manager as part of the SPCC plan. This inspection checks condition, berms, foundation, and valves of bulk storage tanks, electrical transformers and drum storage areas, storm water interceptor operation and integrity, roof vent conditions, signs of releases, and catch pan integrity, and spill response equipment. The SWPP Plan will be revised within 2 weeks, and implement any plan changes in 12 weeks or less following significant modifications to the Brewery's potential to discharge.

A quarterly visual examination of Stormwater Quality will be performed and documented of all stormwater discharges associated with industrial activity from each outfall (i.e., the flow from the DWFP and from the pond on the west edge of the facility). The examinations will be made at least once in each of the following three-month periods: January through March, April through June, July through September, and October through December. The examination will be made during daylight hours unless there is insufficient rainfall or snow melt to produce a runoff event. The inspections will be documented on the form shown in Appendix A, and will be filed with the SWPP Plan Book. A tracking procedure is in place to ensure that follow-up actions are performed.

Qualified personnel will conduct a comprehensive site compliance evaluation at least once a year and a summary report will be generated. The report will document the scope of the inspections, the date, personnel conducting the inspection and major observations. Areas of non-compliance and the associated corrective measures implemented will be reported. If no areas of non-compliance are found, the report will contain a certification that the facility is in compliance with the SWP3 and the permit. In addition, the report will be signed by an authorized ABI representative with the certification statement. Reports will be filed with the SWPP Plan Book.

### 5.7 RECORD KEEPING AND INTERNAL REPORTING PROCEDURES

The storm water regulations require that all records associated with compliance with this plan shall be retained for three years from the date of the sample, measurement, report or application, or until at least 1 year after coverage under this permit terminates, whichever is later. Those records document storm water-related spills, inspections, maintenance activities, and information regarding the quality and quantity of storm water discharges. Review of these records can provide an effective way to track the progress of the pollution prevention efforts and the effectiveness of best management practices. Training attendance is recorded in the Skills Tracking Program.

### 6.0 NON-STORM WATER DISCHARGES

The brewery has two separate sewer systems for the collection, transportation, and discharge of process wastewater and storm water, respectively. The process wastewater sewer system collects and directs process wastewater to the Hampton Roads Sanitation District's Williamsburg plant. Industrial process wastewater enters this system at various locations throughout the facility, either through floor drains or by direct piping into the sewer. The segregation of process wastewater and storm water is the primary mechanism of ensuring that non-storm water discharges do not enter the storm water system.

The brewery will evaluate potential sources of non-storm water discharges to the storm water drainage system. The evaluation will include a visual inspection of the system. Dye testing, television inspection and sampling may be conducted if needed. The results of these studies will be used to identify and correct physical problems with the system which could allow non-storm water flow to enter the storm sewer.

Elimination of non-storm water flow is an ongoing maintenance activity of the overall storm water management program.

Corrections to the facility as a result of these investigations may include:

- Re-routing non-storm water sewer lines to the appropriate process sewer system;
- Repairing damaged sewer lines, storm drains, or manholes to prevent non-storm water discharges such as groundwater infiltration;
- Adding surface berms or drainage divides to direct non-storm water discharges to the appropriate process sewer system; and
- Installing various devices to roof vents to prevent condensates from entering the roof drains.

Anheuser-Busch has identified several non-storm water discharges that are currently entering the storm sewer system. During normal operation of the facility, the following essentially innocent and unavoidable non-storm water discharges may occur intermittently in or to the storm sewer inlets:

- Groundwater infiltration (\*);
- Landscape/lawn irrigation runoff (\*);
- Lawn sprinkler, wind-driven sprinkler, or fountain overspray (\*);
- Uncontaminated ground water from basement foundation drainage sump pumps and other foundation drainage (\*);
- Air conditioning and other refrigeration system non-contact condensate water drippage from non-contact cooling water (\*) or evaporative cooling water (\*);
- Intermittent exterior buildings and window washing activities; and
- Discharges of potable water such as pavement washdown water where the facility has conducted prior dry clean-up housekeeping methods.
- Fire hydrant testing.

A number of these periodic discharges are likely to only occur during dry weather when the dry weather pumpback system will intercept the waters and direct them to the process sewer. Items marked with an asterisk (\*) can unavoidably occur during rain.

## **7.0 COMPARISON WITH OTHER ENVIRONMENTAL MANAGEMENT PLANS**

This plan has been developed to be consistent with other pollution prevention and waste management plans and procedures which have been implemented at the brewery. Storm water management is only one aspect of the overall facility pollution prevention and environmental protection program. Other environmental programs at the facility include the management of process wastewater, hazardous materials and hazardous waste, oil storage and oil-containing equipment, and air quality control.

Storm water management has been integrated with these other programs where necessary or required. Specifically, this plan incorporates by reference the SPCC Plan which has been developed to manage spills of oil at the facility in accordance with the requirements of 40 CFR 112. The SPCC plan, in conjunction with this overall storm water pollution prevention plan, constitutes the facility's comprehensive management plan for the protection, prevention, and response to spills of oil, waste, or other materials which could potentially contribute to pollution of storm water discharges. Storm Water Pollution Prevention training will be conducted jointly with the HAZWOPER awareness level, OSHA, and SPCC training.

This storm water pollution prevention plan incorporates portions of and is designed to be consistent with the following existing brewery plans:

- SPCC;
- Hazardous Waste Contingency Plan;
- Oil Discharge Contingency Plan;
- OPA 90 Response plan.

## 8.0 DISCHARGES TO MUNICIPAL SEPARATE STORM SEWERS

Anheuser-Busch, Inc. will comply with applicable requirements in municipal storm water management programs if ABI is notified of such conditions. Upon request, ABI will make copies of the SWPP available to the operator of the municipal separate storm sewer system.

## 9.0 EPCRA SECTION 313 REQUIREMENTS

The Section 313 water priority chemicals at this facility are Ammonia, Chlorine, Phosphoric Acid and Sulfuric Acid. They are stored and/or handled in the following locations:

|                 |   |
|-----------------|---|
| Ammonia         | Indigenous to plant. All areas of refrigeration - mainly brewing cellars, utility plant and keg storage facilities.   |
| Chlorine        | Water treatment chemical used in the carbon filter building as well as at each cooling tower.   |
| Phosphoric Acid | Purchased as both Phosphoric Acid and is primary component of most acidic cleansers such as AB 50/10. These chemicals are stored in the plant chemical storage cages located in Brewing and Packaging, and are used throughout the process. |

Appropriate containment, drainage control and or diversionary structures are provided. Specifically, storm water contact is minimized at the bulk storage facilities by the use of secondary containment dikes for outside storage and loadout spill containment for inside bulk storage tanks. Anheuser-Busch, Inc. complies with the following general permit requirements for areas where Section 313 water priority chemicals are stored, processed or handled and are exposed to storm water.

### 9.1 STORAGE AREAS - LIQUID

The Section 313 water priority chemicals which are used by ABI are Ammonia, Chlorine, and Phosphoric Acid. They are stored in containers, equipment and vessels which are compatible, both in terms of construction and material, with the material stored. The containers are also appropriate for the conditions of storage such as pressure and temperature.

Liquid storage areas are operated to minimize discharges of Section 313 chemicals. Where necessary, secondary containment provided for at least the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation. ABI has instituted a strong spill contingency plan and provides annual training to appropriate plant personnel. Tanks containing liquid Section 313 chemicals are not subjected to integrity tested but are visually inspected for signs of failure on a daily basis.

## **9.2 MATERIAL STORAGE AREAS - NON LIQUIDS**

Non-liquid Section 313 chemicals are protected from wind or storm water contact by the use of appropriate drainage or structural measures.

## **9.3 TRUCK AND RAIL CAR LOADING/UNLOADING AREAS**

Liquid Chemical and Oil unloading and loading areas are operated to minimize discharge of chemicals. Truck docks are equipped with overhangs or door skirts. Material loading and unloading connections are located within secondary containments.

## **9.4 PIPING AND EQUIPMENT**

Processing equipment and materials handling equipment are operated to minimize discharges of Oil and Chemicals. Piping and equipment are compatible with the substances handled. ABI has taken measures to minimize releases of Section 313 chemicals from structures such as pressure relief valves. In accordance with the general permit requirements, visual inspections or leak tests are performed for overhead piping without secondary containment.

## **9.5 DISCHARGES**

Discharges of Section 313 water priority chemicals will be controlled by the use of manually operated open-and-closed design valves. In addition a dry weather flow pump back system is in place to capture uncontrolled spills. Records of all spills are kept in the Environmental, Health and Safety Manager's office. The spill coordinator for this facility is the Environmental, Health and Safety Manager. The coordinator is responsible for spill prevention training and spill plans and outside notification of releases. Spill emergency procedures are initiated by calling ext. 5000 so that substances including oil, chemicals and Section 313 chemicals can be contained before an off site discharge occurs.

## **9.6 INSPECTIONS**

All areas of the facility shall be inspected for conditions which could lead to discharges of oil and chemicals or contact of storm water with significant materials. Inspections of these areas are conducted daily by utility operators. Log sheets are filed in the EHS Manager's "Waste Oil and Hazardous Waste" book. The following areas will be inspected outdoor facility piping, pumps, storage tanks, and process and material handling equipment. The inspections include examination for leaks, wind blowing, corrosion, support or foundation failure or other forms of deterioration or noncontainment. Monthly inspections conducted by the Environmental, Health and Safety Manager are kept in the spill prevention inspection logsheet book. Weekly inspection sheets required by Virginia's Aboveground Storage Tank regulations are kept in the Powerhouse Superintendent's office. See appendix A.

### **9.7 FACILITY SECURITY**

The ABI facility is continuously manned by security personnel 24 hours a day. The site is fenced on all sides with access limited through a security gate. The plant is adequately lighted to provide for security and spill observation. Vehicular traffic is limited to designated roadways.

### **9.8 TRAINING**

Employees and contractors who work in areas where Section 313 water priority chemicals are used and stored are trained in storm water management procedures. Training is conducted at least annually and includes pollution control laws and regulations, review of the storm water pollution prevention plan and site specific controls designed to minimize discharges of Oil and Chemicals. All employees are trained to recognize spills and make the proper reporting requirements, however, the EHS Manager is the primary person responsible for spill response and emergency notification of SARA 313 chemicals.

### **9.9 PLAN CERTIFICATION**

Due to the presence of Section 313 chemicals, this plan will be reviewed and certified by a Registered Professional Engineer. A Registered Professional Engineer will recertify the plan every 3 years or as soon as is practical after significant facility modifications. The certification will attest that the plan has been prepared in accordance with good engineering judgment.

10.0 CERTIFICATION

10.1 ANHEUSER-BUSCH, INC. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

William R. Ohlendorf - Plant Manager  
Name/Title

William R. Ohlendorf  
Signature

6/3/99  
Date



*Appendix A*

*Inspection Forms*

# **ANHEUSER BUSCH INC., WILLIAMSBURG BEWERY**

## **SPCC MONTHLY INSPECTION LOG**

**INSPECTOR:** \_\_\_\_\_  
**TIME & DATE:** \_\_\_\_\_

| LOCATION & EQUIPMENT   | INSPECTION* |      | COMMENTS |
|--|-------------|------|----------|
|  | PASS        | FAIL |          |
| Check storage area for visible signs of oil leakage or spillage                                  |             |      |          |
| Check exposed piping, valves, pumps and heat tracing for leakage or spillage                     |             |      |          |
| Check tanker truck loadout area for visible signs of oil leakage or spillage                     |             |      |          |
| Check dike walls and condition   |             |      |          |
| Check the outside of storage tanks for signs of deterioration and leaks                          |             |      |          |
| Check manual pump operation to ensure rainwater pumpout cannot inadvertently start-up            |             |      |          |
| Check proper position of valves  |             |      |          |
| Check lawn near rainwater pumpout discharge to ensure there is no sign of past oil contamination |             |      |          |
| Check area lighting  |             |      |          |
| Check and record approximate rainwater level within dike area                                    |             |      |          |
| Check condensate blow off line for possible product contamination thru internal heating coils    |             |      |          |
| Any other significant events   |             |      |          |

\*This is in addition to daily routine inspection of area and equipment by Powerhouse personnel on their operating rounds.  
 COMPLETED COPY OF THIS INSPECTION IS TO BE FILED WITH POWERHOUSE SPCC PLAN AND A COPY SHOULD BE SENT TO THE ENVIRONMENTAL ENGINEER

## SPILL CONTAINMENT AND COUNTERMEASURE DAILY CHECK SHEET - TANKS

[illegible]

**Anheuser – Busch, Inc.**  
**Williamsburg, Virginia**  
**Storm Water Comprehensive Site Inspection Form**

| ID#  | Area Inspected                                      | Date Inspection Completed | Is there evidence of pollution entering the storm water drainage system? If yes, provide details in comment sections. | Is there a previously unidentified potential for pollutants entering the storm water drainage system? If yes, provide details in comments section. | Are all existing pollution control measures and BMPs adequate and properly implemented? If no, provide details in comments section. |
|------|---|---------------------------|---|--|---|
| 1.   | BP&S Bulk Chemical Unloading Area                   |                           |   |  |   |
| 2.   | BP&S Loading Docks and Outdoor Eating Area          |                           |   |  |   |
| 3.   | One (1) 500 - Gallon Diesel Fuel Tank (Trackmobile) |                           |   |  |   |
| 4.   | Fuel Oil Transfer                                   |                           |   |  |   |
| 5.   | Loading Docks and Truck and Trailer Parking (BP&S)  |                           |   |  |   |
| 6.   | Various Outdoor Storage                             |                           |   |  |   |
| 7.   | Bulk Caustic Receiving (Storeroom)                  |                           |   |  |   |
| 8.   | Trailer Parking                                     |                           |   |  |   |
| 9.   | Dumpster Staging                                    |                           |   |  |   |
| 10.  | Waste Beer (3,300 Gallons)                          |                           |   |  |   |
| 11.  | Can/Bottle Trash Dock                               |                           |   |  |   |
| 11A. | Potassium Hydroxide Tank (1,000 gallon)             |                           |   |  |   |
| 11B. | ChemTreat CL-40 Tank (1,000 gallon)                 |                           |   |  |   |
| 11C. | Sodium Hypochlorite Tank (3,000 gallon)             |                           |   |  |   |
| 12.  | One 16,000 – Gallon BP&S Cooling Tower Water Tank   |                           |   |  |   |
| 13.  | One (1) 4,100 – Gallon Reclaimed Water Tank         |                           |   |  |   |
| 14.  | Chip & Trash Dock                                   |                           |   |  |   |
| 14A. | NAOH 50% Tank                                       |                           |   |  |   |
| 15.  | Transformers (13.8 kV)                              |                           |   |  |   |

**Anheuser – Busch, Inc.**  
**Williamsburg, Virginia**  
**Storm Water Comprehensive Site Inspection Form**

| ID#  | Area Inspected  | Date Inspection Completed | Is there evidence of pollution entering the storm water drainage system? If yes, provide details in comment sections. | Is there a previously unidentified potential for pollutants entering the storm water drainage system? If yes, provide details in comments section. | Are all existing pollution control measures and BMPs adequate and properly implemented? If no, provide details in comments section. |
|------|---|---------------------------|---|--|---|
| 16.  | Liquid Chlorine - South of Powerhouse                   |                           |   |  |   |
| 17.  | Hazardous Waste Storage Area                            |                           |   |  |   |
| 18.  | Mixed Paper Compactor (30 gallon hydraulic reservoir)   |                           |   |  |   |
| 19.  | Hazardous Material Storage Area (Paint Shop)            |                           |   |  |   |
| 20.  | One 750,000 – Gallon Diversion Tank                     |                           |   |  |   |
| 21.  | Screening Loadout                                       |                           |   |  |   |
| 22.  | Utilities Bulk Chemical Unloading                       |                           |   |  |   |
| 23.  | Three (3) 500 – Gallon Used Oil Tanks                   |                           |   |  |   |
| 23A. | Ten (10) 55 – Gallon Oil Drums                          |                           |   |  |   |
| 24.  | One (1) 280 - Gallon Diesel House Fuel Tank (Inside)    |                           |   |  |   |
| 25.  | Salt Tank & Bulk Unloading                              |                           |   |  |   |
| 26.  | Six (6) Liquid CO2 Tanks                                |                           |   |  |   |
| 27.  | Two (2) 1,000 – Gallon Propylene Glycol & Ammonia Tanks |                           |   |  |   |
| 28.  | One (1) 1,000 - Gallon Ammonia Tank                     |                           |   |  |   |
| 29.  | Two (2) 1,000 – Gallon Propylene Glycol & Ammonia Tanks |                           |   |  |   |
| 30.  | One (1) 1,000 – Gallon Ammonia Tank                     |                           |   |  |   |
| 31.  | Bulk Receiving – Caustic                                |                           |   |  |   |

**Anheuser – Busch, Inc.**  
**Williamsburg, Virginia**  
**Storm Water Comprehensive Site Inspection Form**

| ID# | Area Inspected | Date Inspection Completed | Is there evidence of pollution entering the storm water drainage system? If yes, provide details in comment sections. | Is there a previously unidentified potential for pollutants entering the storm water drainage system? If yes, provide details in comments section. | Are all existing pollution control measures and BMPs adequate and properly implemented? If no, provide details in comments section. |
|-----|----------------|---------------------------|---|--|---|
|-----|----------------|---------------------------|---|--|---|

|      |   |  |  |  |  |
|------|---|--|--|--|--|
| 32.  | Bulk Receiving – Sulfuric Acid                          |  |  |  |  |
| 33.  | Waste Grain Dumpster                                    |  |  |  |  |
| 34.  | Used Oil Storage  |  |  |  |  |
| 35.  | Two (2) 43,000 – Gallon Propylene Glycol Tanks          |  |  |  |  |
| 35A. | Two (2) 1,300 – Gallon Propylene Glycol & Ammonia Tanks |  |  |  |  |
| 35B. | One (1) 1,000 - Gallon Ammonia Tank                     |  |  |  |  |
| 36.  | Two (2) 40,000 – Gallon Propylene Glycol Tanks          |  |  |  |  |
| 36A. | Two (2) 1,100 – Gallon Propylene Glycol & Ammonia Tanks |  |  |  |  |
| 36B. | One (1) 700 - Gallon Ammonia Tank                       |  |  |  |  |
| 37.  | Dumpster Staging  |  |  |  |  |
| 38.  | Used Oil Storage  |  |  |  |  |
| 39.  | Spent Grain (400,000 Gallons) & Unloading Area          |  |  |  |  |
| 40.  | DE Loadout  |  |  |  |  |
| 41.  | Residuals Tank Farm                                     |  |  |  |  |
| 42.  | Four (4) 20,000 – Gallon BCS Overflow Tanks             |  |  |  |  |
| 43.  | Three (3) 2,000# Cylinders of Liquid Chlorine           |  |  |  |  |
| 44.  | Alcohol Tank Farm                                       |  |  |  |  |

**Anheuser – Busch, Inc.**  
**Williamsburg, Virginia**  
**Storm Water Comprehensive Site Inspection Form**

| ID# | Area Inspected  | Date Inspection Completed | Is there evidence of pollution entering the storm water drainage system? If yes, provide details in comment sections. | Is there a previously unidentified potential for pollutants entering the storm water drainage system? If yes, provide details in comments section. | Are all existing pollution control measures and BMPs adequate and properly implemented? If no, provide details in comments section. |
|-----|---|---------------------------|---|--|---|
| 45. | Alcohol Loadout   |                           |   |  |   |
| 46. | Containerized Chemical Unloading Area(Brewing)  |                           |   |  |   |
| 47. | Contractor Area – Outdoor Storage   |                           |   |  |   |
| OUT | Outfall #2  |                           |   |  |   |
| 48. | Hospitality Transformers (2)  |                           |   |  |   |
| 49. | Contractor Area – Outdoor Storage (Trailers)  |                           |   |  |   |
| 50. | One (1) 45,000 – Gallon Reject Liquor Tank  |                           |   |  |   |
| 51. | Waste DE (24,000 Gallons)   |                           |   |  |   |
| 52. | DE Loadout  |                           |   |  |   |
| 53. | One (1) 7,000 – Gallon Sodium Benzoate Tank   |                           |   |  |   |
| 54. | BCS Loadout   |                           |   |  |   |
| 55. | Dumpster Staging Area   |                           |   |  |   |
| 56. | Main Substation - 2 VEPCO Transformers  |                           |   |  |   |
| 57. | One (1) 86,000 – Gallon Oil Tank  |                           |   |  |   |
| 58. | Three (3) Oil Tanks -<br>One (1) 1,000,000 Gal<br>One (1) 400,000 Gal<br>One (1) 86,000 Gal |                           |   |  |   |
| 59. | Fuel Oil Transfer   |                           |   |  |   |
| 60. | Sulfuric Acid & Caustic Bulk Loading - Neutralization Area                                  |                           |   |  |   |
| 61. | Wastewater Treatment Area - Neutralization  |                           |   |  |   |

**Anheuser – Busch, Inc.**  
**Williamsburg, Virginia**  
**Storm Water Comprehensive Site Inspection Form**

| ID# | Area Inspected                                      | Date Inspection Completed | Is there evidence of pollution entering the storm water drainage system? If yes, provide details in comment sections. | Is there a previously unidentified potential for pollutants entering the storm water drainage system? If yes, provide details in comments section. | Are all existing pollution control measures and BMPs adequate and properly implemented? If no, provide details in comments section. |
|-----|---|---------------------------|---|--|---|
| 62. | One (1) 6,000 – Gallon Sulfuric Acid Tank           |                           |   |  |   |
| 63. | One (1) 15,000 – Gallon Caustic Tank                |                           |   |  |   |
| Out | Dry Weather Flow Pump Back System & Outfall #1      |                           |   |  |   |
| 64. | Two (2) Transformers (West of Nature's Way)         |                           |   |  |   |
| 65. | Outdoor Landscape Equipment - Nature's Way Building |                           |   |  |   |
| 66. | Bldg 10 - Outdoor Storage (Various Equipment)       |                           |   |  |   |
| 67. | Bldg 10A -Outdoor Storage (Various Equipment)       |                           |   |  |   |
| 68. | Bldg 10A - Used Oil Storage                         |                           |   |  |   |
| 69. | Bldg 10A - Outdoor Storage (Various Equipment)      |                           |   |  |   |
| 70. | One (1) 280 – Gallon Diesel Fuel Tank (Bldg 10A)    |                           |   |  |   |
| 71. | Diesel Fuel Transfer (Bldg 10A)                     |                           |   |  |   |
| 72. | Building 2 Roof Grains Handling                     |                           |   |  |   |
| 73. | Building 3 Roof Brew House                          |                           |   |  |   |
| 74. | Building 4 Roof Stockhouse #1                       |                           |   |  |   |
| 75. | Building 5 Roof Stockhouse #2                       |                           |   |  |   |
| 76. | Building 6 Roof BP&S                                |                           |   |  |   |
| 77. | Building 7 Roof Powerhouse                          |                           |   |  |   |



**Anheuser – Busch, Inc.**  
**Williamsburg, Virginia**  
**Storm Water Comprehensive Site Inspection Form**

| ID# | Area Inspected | Date Inspection Completed | Is there evidence of pollution entering the storm water drainage system? If yes, provide details in comment sections. | Is there a previously unidentified potential for pollutants entering the storm water drainage system? If yes, provide details in comments section. | Are all existing pollution control measures and BMPs adequate and properly implemented? If no, provide details in comments section. |
|-----|----------------|---------------------------|---|--|---|
|-----|----------------|---------------------------|---|--|---|

|     |  |  |  |  |  |
|-----|--|--|--|--|--|
| 78. | Building 12 Roof Grain Drying                |  |  |  |  |
| 79. | Building 14 Roof Distillation                |  |  |  |  |
| 80. | Brewing Chemical Spill Control Materials     |  |  |  |  |
| 81. | Landscape Spill Control Materials            |  |  |  |  |
| 82. | HAZWOPER Spill Control Equipment             |  |  |  |  |
| 83. | Hazardous Waste Spill Control Materials      |  |  |  |  |
| 84. | BP&S Chemical Storage Spill Control Material |  |  |  |  |
| 85. | Utilities Spill Control Materials            |  |  |  |  |
| 86. | Building 10 Spill Control Materials          |  |  |  |  |
| 87. | EHS Storage Spill Control Materials          |  |  |  |  |
| 88. | Security Spill Control Materials             |  |  |  |  |

***Appendix B***

***Site Drainage Map***

**Anheuser-Busch, Inc.**  
**Williamsburg, VA**  
**Outside Liquid Chemical Storage Tanks/Areas**

| Site Inspection<br>Form ID # | Map Tank<br>No. | Item In Storage            | Tank Capacity     |
|------------------------------|-----------------|----------------------------|-------------------|
| 44                           | 1               | Alcohol                    | 12,000 gallon     |
| 44                           | 2               | Alcohol                    | 12,000 gallon     |
| 44                           | 3               | Alcohol                    | 2,000 gallon      |
| 44                           | 4               | Alcohol                    | 2,000 gallon      |
| 44                           | 5               | Alcohol                    | 3,200 gallon      |
| 44                           | 6               | Alcohol                    | 3,200 gallon      |
| 50                           | 7               | Reject Liquor              | 45,000 gallon     |
| 41                           | 8               | Distill Feed               | 25,000 gallon     |
| 41                           | 9               | Waste Beer                 | 25,000 gallon     |
| 41                           | 10              | Chip Yeast                 | 25,000 gallon     |
| 41                           | 11              | Evaporator Feed            | 225,000 gallon    |
| 41                           | 12              | Schoene Sludge             | 93,000 gallon     |
| 41                           | 13              | Distill Overflow           | 14,800 gallon     |
| 41                           | 14              | Evap Feed Overflow         | 58,700 gallon     |
| 41                           | 15              | Evap Feed Overflow         | 58,700 gallon     |
| 42                           | 17              | BCS Overflow               | 20,000 gallon     |
| 42                           | 18              | BCS Overflow               | 20,000 gallon     |
| 42                           | 19              | BCS Overflow               | 20,000 gallon     |
| 42                           | 20              | BCS Overflow               | 20,000 gallon     |
| 51                           | 21              | Waste DE                   | 24,000 gallon     |
| 62                           | 22              | Sulfuric Acid 93%          | 6,000 gallon      |
| 63                           | 23              | NAOH 20%                   | 15,000 gallon     |
| 53                           | 24              | Sodium Benzoate            | 7,000 gallon      |
| 57                           | 25              | Oil                        | 86,000 gallon     |
| 58                           | 26              | Oil                        | 86,000 gallon     |
| 58                           | 27              | Oil                        | 400,000 gallon    |
| 58                           | 28              | Oil                        | 1,000,000 gallon  |
| 39                           | 29              | Spent Grain                | 400,000 gallon    |
| 23                           | 35              | Waste Oil                  | 500 gallon        |
| 23                           | 36              | Waste Oil                  | 500 gallon        |
| 23                           | 37              | Waste Oil                  | 500 gallon        |
| 24                           | 38              | Waste Oil                  | 10 @ 55 gallon    |
| 10                           | 39              | Waste Beer                 | 3,300 gallon      |
|                              | 40              | Chilled Water              | 25,000 gallon     |
| 13                           | 41              | Reclaimed Water            | 4,100 gallon      |
| 12                           | 42              | BP&S Cooling Tower Water   | 16,000 gallon     |
|                              | 43              | Fire Water                 | 350,000 gallon    |
| 24                           | 44              | Diesel Storage             | 280 gallon        |
| 56                           | 45              | VEPCO Transformer (Oil)    | 2,330 gallon each |
| 20                           | 46              | Diversion Tank             | 750,000 gallon    |
| 27                           | 47              | Propylene Glycol & Ammonia | 2 @ 1,000 gallon  |
| 22                           | 48              | Ammonia                    | 1,000 gallon      |
| 29                           | 49              | Propylene Glycol & Ammonia | 2 @ 1,000 gallon  |
| 30                           | 50              | Ammonia                    | 1,000 gallon      |
|                              | 51              | Chilled Water              | 10,000 gallon     |

**Anheuser-Busch, Inc.**  
**Williamsburg, VA**  
**Outside Liquid Chemical Storage Tanks/Areas**

| Site Inspection<br>Form ID.# | Map Tank<br>No. | Item In Storage                       | Tank Capacity    |
|------------------------------|-----------------|---------------------------------------|------------------|
|                              | 52              | Chilled Water                         | 16,000 gallon    |
| 35                           | 53              | Propylene Glycol                      | 43,000 gallon    |
| 35                           | 54              | Propylene Glycol                      | 43,000 gallon    |
| 35A                          | 55              | Propylene Glycol & Ammonia            | 2 @ 1,300 gallon |
| 35B                          | 56              | Ammonia                               | 1,000 gallon     |
| 43                           | 58              | Liquid Chlorine                       | 3 @ 2,000 lbs.   |
| 26                           | 60              | Liquid CO2                            | 8,300 gallon     |
| 26                           | 61              | Liquid CO2                            | 8,300 gallon     |
| 26                           | 62              | Liquid CO2                            | 8,600 gallon     |
| 26                           | 63              | Liquid CO2                            | 8,600 gallon     |
| 26                           | 64              | Liquid CO2                            | 11,000 gallon    |
| 26                           | 65              | Liquid CO2                            | 8,300 gallon     |
| 25                           | 66              | Salt Brine                            | 8,000 gallon     |
| 25                           | 67              | Salt Brine                            | 375 gallon       |
| 36                           | 68              | Propylene Glycol                      | 40,000 gallon    |
| 36                           | 69              | Propylene Glycol                      | 40,000 gallon    |
| 36A                          | 70              | Glycol & Ammonia                      | 2 @ 1,100 gallon |
| 36B                          | 71              | Ammonia                               | 700 gallon       |
| 14A                          | 72              | NAOH 50%                              | 700 gallon       |
| 3                            | 73              | Diesel Fuel                           | 500 gallon       |
| 64                           | 74              | Diesel Fuel                           | 280 gallon       |
| 14                           | 75              | Chip Loadout                          |                  |
| 40/52                        | 77              | DE Loadout                            |                  |
| 44                           | 79              | Alcohol Loadout (Tanks/Still)         |                  |
| 21                           | 80              | Screenings Loadout                    |                  |
| 9                            | 81              | Dumpster Staging (2 areas)            |                  |
| 11                           | 82              | Can/Bottle Trash Dock                 |                  |
| 04/70                        | 83              | Fuel Oil Transfer                     |                  |
| 31/60                        | 84              | Caustic Receiving                     |                  |
| 17                           | 85              | Hazardous Waste Storage               |                  |
| 54                           | 86              | BCS Loadout                           |                  |
| 22                           | 87              | Ammonia Loading                       |                  |
| 60/32                        | 88              | Sulfuric Acid Loading/Loadout         |                  |
| 67/34/38                     | 89              | Used Oil Storage                      |                  |
| 33                           | 90              | Waste Grain Dumpster                  |                  |
| 18                           | 91              | Trash Compactor                       |                  |
| 55                           | 92              | Waste Dumpster/Roll-Off Staging Area  |                  |
| 1                            | 93              | Biocide, Conveyor Lube Bulk Unloading |                  |
| 25                           | 94              | Salt Tank Unloading                   |                  |
| 46                           | 95              | Containerized Chemical Unloading Area |                  |
| 61                           | 96              | Wastewater Treatment                  |                  |
| 11C                          | 97              | Sodium Hypochlorite                   | 3,000 gallon     |
| 11B                          | 98              | ChemTreat CL-40                       | 1,000 gallon     |
| 11A                          | 99              | Potassium Hydroxide                   | 1,000 gallon     |

*Appendix C*

*Sampling Data*

#### 4.2 ZONE 2--WILLIAMSBURG BREWERY

Group Organizer - Anheuser-Busch, Inc.  
Brewery Group Application Part 2  
EPA Group Application Code No. 0125

Sampling Facility - Anheuser-Busch, Inc.  
Williamsburg Brewery  
7801 Pocahontas Trail  
Williamsburg, Virginia  
Sampler No. 2

Facility Contact - Ms. Kathryn Aston  
Phone: 804/253-2136

#### 4.2 ZONE 2--WILLIAMSBURG BREWERY (continued)

##### Drainage Area 001 (81 acres)

At the Williamsburg Brewery, one outfall (001) is associated with industrial activity. This outfall is located in the southwest corner of the site and combines storm water surface and subsurface flows from the entire Anheuser-Busch Brewery facility. Approximately 2,000 feet to the southwest of the brewery property discharges from the storm system combine with storm water from Busch Gardens in a pond. The pond then discharges to Kingsmill Creek, which eventually flows to the James River.

In conjunction with numerous secondary containment structures, a dry weather flow pumpback (DWFP) system has been installed prior to the discharge point from the brewery. The pumpback system is located in the storm water system to capture liquid flow from the facility during dry weather conditions and to serve as a spill protection device. The DWFP pump back to the process sewer and is normally operated in a closed position.

The site drawing presents drainage areas, surface and subsurface flows, and the attached table identifies roof drainage, material handling, and storage area discharge points and storm water management measures.

Continued from Page 2

0125

**VII. Discharge Information**

A, B, C, &amp; D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided.

Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E: Potential discharges not covered by analysis - Is any pollutant listed in Table 2F-2 a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☒ Yes (list all such pollutants below)☐ No (go to Section IX)

Ammonia

Sulfuric Acid

Chlorine

Phosphoric Acid

**VIII. Biological Toxicity Testing Data**

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ Yes (list all such pollutants below)☒ No (go to Section IX)**IX. Contract Analysis Information**

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☒ Yes (list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)☐ No (go to Section X)

| A. Name  | B. Address                                       | C. Area Code & Phone No. | D. Pollutants Analyzed   |
|--|--|--------------------------|--|
| Environmental Science & Engineering, Inc.<br>Peoria Laboratory | 8901 N. Industrial Rd.<br>Peoria, Illinois 61615 | 800-234-1239             | Oil & Grease<br>BOD<br>COD<br>TSS<br>Nitrogen (TKN)<br>Nitrogen<br>(NO <sub>2</sub> & NO <sub>3</sub> )<br>Phosphorous<br>pH |

**X. Certification**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name & Official Title (type or print)  
John L. Carmichael; Plant ManagerE. Area Code and Phone No.  
(804) 253-3600

C. Signature

John L. Carmichael

D. Date Signed

9/29/92



VII. Discharge Information (Continued from page 3 of Form 2F)

Part A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each run. See instructions for additional details.

| Pollutant<br>and<br>CAS Number<br>(if available) | Maximum Values<br>(include units)                  |                            | Average values<br>(include units)                  |                            | Number<br>of<br>Storm<br>Events<br>Sampled | Sources of Pollutants                 |
|--|--|----------------------------|--|----------------------------|--|---------------------------------------|
|  | Grab Sample<br>Taken During<br>First 30<br>Minutes | Flow-weighted<br>Composite | Grab Sample<br>Taken During<br>First 30<br>Minutes | Flow-weighted<br>Composite |  |                                       |
| Oil and Grease                                   | 2 mg/L   | NRQ                        | 2 mg/L   | NRQ                        | 1  | Shipping - load in<br>load out        |
| Biological Oxygen<br>Demand (BOD5)               | 4 mg/L   | 4 mg/L                     | 4 mg/L   | 4 mg/L                     | 1  | Grains, yeast, waste<br>beer, alcohol |
| Chemical Oxygen<br>Demand (COD)                  | 64 mg/L  | 53 mg/L                    | 64 mg/L  | 53 mg/L                    | 1  | Grains, yeast, waste<br>beer, alcohol |
| Total Suspended<br>Solids (TSS)                  | 12 mg/L  | 3 mg/L                     | 12 mg/L  | 3 mg/L                     | 1  | Grain, residual<br>material           |
| Total Kjeldahl<br>Nitrogen                       | 3.40 mg/L  | 2.02 mg/L                  | 3.40 mg/L  | 2.02 mg/L                  | 1  | Waste beer/grain                      |
| Nitrate plus<br>Nitrite Nitrogen                 | 1.32 mg/L  | 1.01 mg/L                  | 1.32 mg/L  | 1.01 mg/L                  | 1  | Waste beer/grain                      |
| Total<br>Phosphorus                              | 0.30 mg/L  | 0.15 mg/L                  | 0.30 mg/L  | 0.15 mg/L                  | 1  | Washdown                              |
| CR   | Maximum 6.45                                       | Maximum NRQ                | Maximum 6.45                                       | Maximum NRQ                | Beer washdown-caustics/acid                |                                       |

Part B - List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each class. See the instructions for additional details and requirements.

[illegible]

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

3. Provide a description of the method of flow measurement or estimate.

Flow measurements were derived by delineating the site into pervious and impervious surfaces and utilizing the rational method for calculation of storm water runoff.

Williamsburg Brewery Drainage Area 001

c-cc

0/wb.1  
9/25/92

| Outside Areas                 | Process/Sanitary<br>Sewer | Storm Sewer | Covered  | Containment | Comments  |
|-------------------------------|---------------------------|-------------|--|-------------|---|
| Chip Loadout                  | X                         |             |  | X           | Secondary containment drains to process sewer           |
| Spent Grains Loadout          | X                         | X           | X  |             | Secondary containment drains to process sewer           |
| DE Loadout                    | X                         |             | X  |             | DE interior drains to process sewer 25 feet away        |
| Yeast Loadout                 |                           |             |  | X           |   |
| Alcohol Loadout (tanks/still) | X                         | X           |  |             | Secondary containment drains to process sewer           |
| Screenings Loadout            | X                         |             |  | X           | Diking--valves in closed position during loadin/loadout |
| Dumpster Staging (2 areas)    |                           | X           |  | Diked       | Swept by automatic sweep/scrubber truck                 |
| Can/Bottle Trash Dock         | X                         |             | Partial  | X           | Secondary containment drains to process sewer           |
| Fuel Oil Storage              |                           | X           |  | X           | Secondary containment on outside bulk storage           |
| Fuel Oil Transfer             |                           | X           |  | Pit         | Diking--valves in closed position during loadin/loadout |
| Caustic Receiving             |                           | X           |  | X           | Diking--valves in closed position during loadin/loadout |
| Hazardous Waste Storage       |                           | X           | X  | X           | Secondary containment on outside bulk storage           |
| Empty Drum Storage Area       |                           | X           |  | X           | Secondary containment on outside bulk storage           |
| Others (please specify)       |                           |             |  |             |   |
| BCS Loadout                   | X                         | X           |  |             |   |
| Track Area                    |                           | X           |  |             |   |
| Ammonia Loading               | X                         | X           |  | X           | Diking--valves in closed position during loadin/loadout |
| Sulfuric Acid Loadin/Loadout  |                           | X           |  | X           | Diking--valves in closed position during loadin/loadout |
| Brewery Roofs                 | Process/Sanitary<br>Sewer | Storm Sewer | Comments   |             |   |
| Brewhouse                     | X                         |             | Entire roof goes to sanitary   |             |   |
| Stockhouses                   |                           | X           | Relief overflow from vents to roof tubs; tub drains to process sewers                |             |   |
| Ferm. Cellars                 |                           | X           | Tubs located on vents  |             |   |
| Chip Cellars                  |                           | X           |  |             |   |
| Schoene Cellars               |                           | X           |  |             |   |
| Filter Cellar                 |                           | X           |  |             |   |
| BP&S                          |                           | X           | Cooling tower overflow goes to sanitary  |             |   |
| Powerhouse                    |                           | X           |  |             |   |
| Residuals                     |                           | X           | Cooling tower overflow goes to sanitary  |             |   |
| Others (please specify)       |                           |             |  |             |   |
| Leaping Wiers                 | X                         | X           | Small volume flow from main BP&S plus brewing  |             |   |
|                               |                           |             | Brewery storm water is diverted into the process sewer                               |             |   |
| Dry Weather Pumpback          | X                         | X           | Small volume flow to pond gets pumped back into sanitary sewer 5-foot x 5-foot pumps |             |   |

*Appendix D*

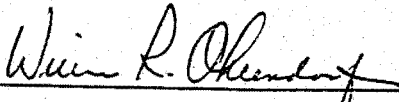
*Stormwater Pollutant  
Evaluation & Certification*

Nonstormwater discharges:

The facility's Stormwater discharge has been evaluated for the presence of nonstormwater discharges and is described here as required by 9 VAC 25.151-80 D. 2. g.

1. Potential significant sources of stormwater at the site have been identified on the attached EPA Form 3510-2F (11-90)
2. A description of the results of any evaluation for the presence of nonstormwater discharge is on the attached EPA Form 3510-2F (11-90)
3. The evaluation criteria used was oil and grease, BOD5, COD, TSS, total Kjeldahl nitrogen, nitrate plus nitrite, total phosphorous, and pH as shown on the attached EPA Form 3510-2F (11-90)
4. The testing was performed on 4-Jun-92.
5. Facility Outfall 001 was tested.

*"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*



William R. Ohlendorf - Plant Manager

6/20/99

Date

## Quarterly Visual Examination of Stormwater Quality

Sample Location: \_\_\_\_\_

Examination Date/ Time: \_\_\_\_\_

Examination Personnel: \_\_\_\_\_

Quarter of Evaluation: 1st Qtr 2nd Qtr 3rd Qtr 4th Qtr

| Requirements for sample collection: |   |
|-------------------------------------|---|
| 1.                                  | Examinations made during daylight hours   |
| 2.                                  | Examination must be conducted in a well lit area  |
| 3.                                  | Collect samples within the first 30 minutes (or as soon as practical) but not exceeding one hour, of when the runoff of snowmelt begins discharging     |
| 4.                                  | The storm event must be greater than 0.1" in magnitude and that occurs at least 72 hours (3 full days) from a previously measurable (>0.1" storm event) |
| 5.                                  | Where practicable, the same individual should carry out the collection and examination of discharges for the entire permit term.                        |

Document the following for each sample taken:

| 1. nature of the discharge<br>(circle one)              | Runoff or<br>Snowmelt | Comments |
|---|-----------------------|----------|
| 2. color  | Yes / No              |          |
| 3. odor   | Yes / No              |          |
| 4. clarity  | Yes / No              |          |
| 5. floating solids                                      | Yes / No              |          |
| 6. settled solids                                       | Yes / No              |          |
| 7. suspended solids                                     | Yes / No              |          |
| 8. foam   | Yes / No              |          |
| 9. oil sheen  | Yes / No              |          |
| 10. other obvious indicators of<br>stormwater pollution | Yes / No              |          |
| 11. probable sources of stormwater<br>contamination     | Yes / No              |          |

Further Comments: \_\_\_\_\_

## **Certification**

### **Quarterly Examination of Stormwater Quality**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

\_\_\_\_\_  
William R. Ohlendorf - Plant Manager

\_\_\_\_\_  
Date

**ADDENDUM NO. 3**

**TO**

**STORMWATER MANAGEMENT PLAN**

**for**

**TRANSPORTATION ADVANTAGE – PHASE II  
ANHEUSER-BUSCH, INC.**

*Williamsburg, Virginia*

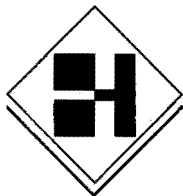
**THE HASKELL COMPANY**

Haskell Building  
Jacksonville, Florida

Project 32193

Revised Issue: March 8, 2000  
Revised Issue: January 27, 2000  
Addendum #1 Issue: December 15, 1999  
Original Issue: November 16, 1999

*Michael H. Haskell*  
3-7-00



**T H E H A S K E L L C O M P A N Y**

**ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES**



## **TABLE OF CONTENTS**

March 8, 2000

|                      |  |
|----------------------|--|
| <b>Introduction</b>  | <b>JCC Review Comments and Responses</b>     |
| <b>Section One</b>   | <b>Temporary Sediment Basin</b>              |
| <b>Section Two</b>   | <b>Channel Flows</b>                         |
| <b>Section Three</b> | <b>Pre-Post One year Stormwater Analysis</b> |
| <b>Section Four</b>  | <b>Phase I and Phase II Combined</b>         |
| <b>Section Five</b>  | <b>Flotation Calculations</b>                |
| <b>Section Six</b>   | <b>Storm Drain Data for Structure ST-15</b>  |
| <b>Section Seven</b> | <b>Pipe Report</b>                           |

March 8, 2000

Re: Environmental Division Review Comments  
Anheuser-Busch Transportation Advantage  
Phase 2  
Plan No. SP-13-00

**GENERAL COMMENTS:**

1. *A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.*

The Land Disturbance application is resubmitted with this response. The Siltation Agreement with surety will be presented under separate cover.

2. *An Inspection/Maintenance Agreement shall be executed with the County for both BMP facilities associated with this project.*

The agreement will be presented under separate cover.

3. *As-built drawings must be provided for both wet extended detention basins on completion. Also, a note shall be provided on the plan stating that upon completion, the construction of the dam will be certified by a professional engineer who has inspected the structure during construction.*

"As-built" drawings will be submitted upon completion of both extended detention basins. See Note 4, Sheet 207 for requested note.

4. *Environmental Inventory: County maps show an isolated pocket of Resource Management Area (RMA-H) near the site entrance at the northern corner of the main plant parcel. The environmental inventory provided on Sheets 209 indicates that no hydric soils are present within the project construction limits and the area is not delineated on the plan. Although the location of US Route 60 may have disrupted native soils along the corridor, the RMA-H classification is indicative of potentially hydric soils or wetlands in the vicinity. Further assessment at this location is necessary to satisfy the environmental inventory.*

The RMA-H area has been added to the plans and the inventory on sheet 209 has been revised to reflect the addition.

**EROSION & SEDIMENT CONTROL PLAN:**

5. *Offsite Land Disturbing Areas: Sheet 201 (Demolition Plan ) indicates a widespread amount of demolition associated with Phase II including removal of various material (pavement, curb & gutter, walls, concrete, storm drain, fencing, utilities, structures, etc.). Provide further information and identify the location of the waste (disposal) area for these materials, whether onsite or offsite. If*

*anticipated locations are offsite, indicate if additional land disturbance is to occur and if erosion and sediment control measures are required.*

Asphalt, concrete, and any other salvageable materials will be transferred to recycling facilities owned by the site contractor. All other demolished material will be disposed of by the site contractor in facilities approved for acceptance of construction debris of the nature removed. No additional land disturbance is anticipated off-site.

6. *Limits of Work: Limits of work should be clearly defined on the erosion and sediment control plan and should match the outer limits of the demolition plan, especially at the existing large pavement removal area (existing parking lot) just south of the entrance and around temporary stockpile area (construction trailer compound).*

Limits of work have been added to the plan as requested.

7. *Rock Construction Entrances: Provide rock construction entrances as required off of existing pavement areas for Phase II activities. Include one at the Phase II Rear Plant Entrance Road work area (sheet 210) and one at the Phase II East work area (Sheet 211).*

Existing paved areas access both areas mentioned above. A rock construction entrance is not necessary. All earthwork activities are confined to areas within the site with access from the rear of the plant being an existing paved road.

8. *Temporary Sediment Basins: Show modifications and computations in accordance with the VESCH, Minimum Standard 3.14, as required, to utilize BMP Pond 2 as temporary sediment basin during construction. Assess the ability of the sediment forebay, normal pool and riser/outlet structure, as proposed, to handle a 25-year design storm event for existing onsite/offsite areas in combination with disturbed work zones (Note: Pond 2 total drainage area is 45 acres). Ensure established pre-developed allowable discharges at the BMP are not exceeded under "disturbed" conditions, which in this case may be considerably different than a post-developed stabilized/landscaped condition. Provided details, sequences or maintenance requirements for the forebays, normal pool and outlet structure as necessary.*

#### **Reference Tab 1:**

Item 1: Based on the VESCH MS 3.14, the BMP Pond 2 (with some minor revisions per this permit issue) meets volume requirements to be used as a temporary sediment basin (67 cy/Acre of storage for permanent

pool and 67 cy/Acre of storage for the dry storage volume above the permanent pool volume. Required PPV is 81,405 cf of storage (84,147 cf is provided) and required dry storage volume above the PPV is 81,405 cf of storage (129,316 cf of storage is provided below the first stage weir).

Item 2: Pond 2 can handle a 25 year storm event ( $P=6.4$  inches/24 hours) during the construction period with a conservative maximum pond stage of 72.13 feet. Peak discharge at this elevation is approximately 65.5 cfs. Under the initial January permit issue, the existing conditions analysis shows the existing pond (modeled with risers in place) incapable of handling storms in excess of a 10-year event. Assuming that this was not the case and allowing the pond to stage above the top of berm, the allowable discharge rate (modeled with risers in place) was determined to be 82.9 cfs. To simplify the analysis and save time, the same post-developed hydrograph input values were used for the 25-year construction period analysis except that runoff curve numbers (CN's) for the open/landscaped/planted areas were revised to a newly graded area category with no vegetation (CN 86). The result is an overly conservative analysis, which assumes that existing pervious areas that are to be disturbed for construction of new pavement are impervious (CN 98). Results of this analysis are included herewith.

Item 3: Details utilizing Pond 2 as a temporary sedimentation basin have been added to the plan set. A temporary de-watering orifice (12" diameter) will be installed. Once construction is finished this orifice will be capped and taken out of use. Cleanout of the pond will be required once the sediment reaches approximately 1.9 feet thick or a distance of 1.6 feet below the dewatering orifice. with construction sequences and maintenance requirements as requested.

9. *Diversion Dike: On Sheet 209 and 210, provide diversion dikes around the temporary stockpile area extending south to Pond 2 and from the Phase I/II boundary extending in a north direction (along the west edge of work) to Pond 2. Show grading associated with the temporary stockpile, if required. If diversion dikes are utilized for control during construction, provide a stable channel or outlet protection where the dikes enter side slopes of the BMP.*

Item 1: A diversion dike has been added along the west side of the Phase 1/Phase 2 parking area extending northerly to Pond 2. A dike should not be necessary for the temporary stockpile area since surface flows are naturally towards the Pond 2.

Item 2: A typical grading detail has been added for stockpile areas.

Item 3: A stabilized channel with a temporary drop pipe and outlet protection has been added to the plan set.

10. *Silt Fence: On Sheet 210, provide silt fence at the toe of grading on the south side of the Phase II Rear Plant Entrance Road. Since a rock check dam is specified below ST-11, silt fence is only required for grading areas east of the abandoned monorail embankment.*

Silt fence has been added as requested.

11. *Culvert Inlet Protection: Provide culvert inlet protection at structures ST-40 on Sheet 211.*

Culvert inlet protection has been added to ST-40 on Sheet 211 as requested.

12. *Warehouse Area: No erosion control plan sheet was provided to match the grading and drainage plan sheet for the Warehouse Area (Sheet 208-A). Please specify if erosion and sediment control measures are necessary, or if work is mainly limited to minor demolition and resurfacing, then indicate on the plan that no erosion and sediment control measures are required for this portion of the Phase II work.*

Work in this area includes minor demolition and resurfacing, and does include modification of an existing manhole to a catch basin. Because the work is minor, a reference to inlet protection has been added to Sheet "208-A" to cover erosion and sediment control measures.

13. *Outlet Protection ST-13: Provide a grouted stone scour protection pad, as typically presented for the entire project on detail 9 Sheet 215, a pipe outfall ST-13 and Sheet 207.*

Protection has been added as requested.

14. *Channel Adequacy: There are 3 areas associated with the reconfigured Phase I and Phase II development plan which discharge into existing natural drainage channels or existing storm sewers. These areas are as follows: 1) on Sheet 207 at the outfall side of the 18 inch storm drain at ST-11; 2) the bypass 18 inch storm drain at ST-13, which is under VPDES jurisdiction; and 3) in the Phase II East area where structure ST-39 discharges into an existing 18 inch drain. Even though the outfall at ST-11 is from Pond 1 (with incorporated stream channel protection), there is an uncontrolled connection coming from ST-10, which combines with the pond discharge. Using VESCH MS-19 procedure, verify that the natural channels are adequate for velocity and capacity using the 2-year design storm event and*

man-made (storm) drains are adequate for velocity based on the 2-year event and for capacity based on the 10-year event.

**Reference Tab 2:**

Item No. 1 & Item No. 2:

Calculations are submitted herewith which demonstrate the adequacy of downstream natural channels and storm drains for both a 2-yr & 10-yr design storm event.

Item No. 3:

ST-39 is connected to an existing 18" RCP that is an upper arm of the Plant Parcel collection system. The overall Plant Parcel collection system includes mitigating pervious/impervious areas. In this plan existing impervious areas shall be converted to pervious areas in direct compensation for pavement additions such as the contributing pavement to structure ST-39. Locally, the conveyance from ST-39 to the collection system is limited by the capacity of the existing collection system. To compensate for any backup at this location a significant swale is proposed at structure ST-40. This swale will detain any excess runoff during peak occurrences until the downstream collection system has recovered. This area is designed to allow localized flooding within the swale and to recover rapidly after the storm event.

**STORMWATER MANAGEMENT/DRAINAGE:**

15. *BMP/Water Quality Points: A standard Worksheet for the BMP Point System or pollutant load calculations were not provided to show Phase II water quality compliance. In accordance with the JCC BMP manual, Pond 2 would only qualify as an 8-point facility wetpond (A-2). A 10 point wet extended detention pond (A-3) requires a total 2.0 inch per impervious acre WQv, typically split with at least 1.0 inch per impervious acre to the permanent pool (PP) and 1.0 inch per impervious acre to the extended detention (ExDet) pool. As to not change the design significantly, we suggest reconfiguration of Pond 2 to split the 2.0 inch per impervious acres as follows: 1) 1.5 PP/ 1.0 ExDet pools; or 2) 1.0 PP and 1.0 ExDet pools. Also, similar to that presented for the approved Phase I (Pond 1), provide calculations demonstrating that Phase I and II, in combination, achieve a desired 10 percent reduction for redevelopment activities in accordance with the County Chesapeake Bay Preservation Ordinance (Chapter 23, Section 23-9). Although Pond 1 was slightly reconfigured, it appears that percent reduction assumptions made in the Addendum No. 1 report dated December 15, 1999 will*

*remain unchanged; pollutant load calculations are required for Pond 2. Also, be sure to address Phase II impervious area associated with the East and Rear Plant Entrance Road areas that are tributary to the VPDES jurisdictional area.*

**Reference Tab 3:**

Item 1: Adjustments to the pond design have been made to comply with the requirements of a "Wet - Extended Detention Pond" and to meet the 10 point requirements per James City County requirements. Calculations are presented herewith showing 2 inches of runoff per impervious acre split 1.0" PPV & 1.0" Extended Detention Volume. The orifice has been downsized to 5 ¼ inches in diameter to meet a 24-hour extended detention requirement. In addition, adjustments have been made to the pond bottom elevation to cut down on the amount of excavated material.

In addition to the above a new routing analysis is included for the 1-yr, 2-yr, 10-yr and 100-yr design storm events of 24 hour duration.

**Reference Tab 4:**

Item 2: Based on the 10% reduction requirement of the James City County Chesapeake Bay Preservation Ordinance for "Redevelopment Areas", new calculations are provided herewith which covers both Pond 1 and Pond 2 drainage areas. Results of the calculations show that the proposed ponds provide almost twice the required loading removal to meet the 10 percent reduction requirement. (63.4 lbs/yr required, 118.6 lbs/yr)

Item 3: The east and rear plant entrance road areas were addressed in section 3 of the initial January permit issue.

16. *Sediment Forebay Pond 2: the top of the proposed rock baffle for the Pond 2 sediment forebay is shown at El. 66.0 on Sheet 206, but at El. 67.0 on the section on the same sheet. Please confirm and correct the elevation.*

Based on the re-design of Pond 2 to meet requirements of JCC Comment No. 15 above, revised elevations have been added to the plan set as follows:

The new design elevation of the permanent pool water level is 66.5 with the pond bottom set at 63.0 feet. The crest of the rock baffle is set at elevation 66.0 which is approximately 0.5 feet below the design normal water level of the pond. These changes are reflected on Plan Sheet 206.

17. *Emergency Spillway: In order to meet criteria for use of 1 foot as freeboard requirement (1.54 feet provided), an emergency spillway is required for Pond 2. Without an emergency spillway, 2 feet of freeboard is recommended based on the Virginia Stormwater Management Handbook. However, since the Pond 2 design 100-year WSEL (El. 72.46) is not anticipated to reach the principal spillway crest at El. 72.5, a "token" emergency spillway can be provided for secondary release and if clogging of lower level orifices should occur. Use of a token emergency spillway can be set at or above the riser crest and design 100-year elevation as to not impact pond hydraulics and can be simple in nature such as minimum 8 ft width with 2H:1V sideslopes. A reasonable location is in natural ground in the southeast corner of the BMP.*

Based on the revised pond 2 configuration herewith, the 100-year WSEL in the pond is approximately 72.66, which provides approximately 1.34 feet of freeboard (slightly less than in the initial January permit submittal). A 20-foot wide "grass lined" emergency spillway with 4:1 side slopes has been located at the southwest area of Pond 2 – just outside of the embankment area.

18. *Pond 2 WSEL's: Show the design 1-, 2-, 10- and 100-year design water surface elevations at the pond on Sheets 206 and 209 along with intended pond excavated sideslopes (3H:1V, etc).*

The design water surface elevations have been added to the plans as requested.

19. *Pond 2 Riser: On the CS-2 outfall structure detail on Sheet 215, include provisions for access (steps, etc.) since the structure is approximately 10 ft in depth. Show the required inlet box thickness or reference appropriate VDOT standards. Provide a non-clogging, cage-type trash rack or grille for the 7 ± inch circular orifice provided at El. 67.0.*

Item 1: A detail of the riser steps has been added to the plan set.

Item 2: Construction details have been added showing the box wall, base, and top construction. The wall thickness is 12 inches. The design is similar to the VDOT standard drop inlet detail DI-1A.

Item 3: A trash rack has been added to the plan detail as requested. Also, to meet extended detention requirements, the orifice has been reduced in size to a diameter of 5 ¼ inches.



20. *Riser Base: Provide information as to whether the riser box structure requires a concrete or extended base to prevent flotation (i.e. Buoyancy computation). If so, provide dimensions for the size, thickness or extension of the base including the required embedment depth of the riser into the base. Include details and dimensions as required on the CS-2 outfall structure detail on Sheet 215.*

**Reference Tab 5:**

Item 1: Buoyancy calculations are included herewith.

Item 2: Base & riser construction details have been added to the plan set.

21. *Pond 1 and 2 Tailwater: Please specify if tailwater conditions downstream of the pond barrels were considered in both Pond 1 and 2 routings. This is especially true for Pond 1, which previously discharged into an open channel but was since reconfigured and now discharges into drop inlet ST-14. Please evaluate subsequent effects, if any, to design outlet discharges and WSEL's for both facilities.*

Tailwater conditions were factored in for analysis of both Pond 1 and Pond 2. With respect to Pond 1, analysis of the pipe system from ST-10 through ST-11 was based on a tailwater depth of 1 foot, which is very close to the calculated flow depth downstream of ST-11. Although a 1-foot tailwater depth was used for Pond 2 routing, staging and discharge results are unaffected due to the elevational differences between the weir crest, pipe invert elevations, and downstream elevations.

22. *Anti-Seep Collars: Provide details for the anti-seep collar referenced on Sheet 206. Use of concrete collars is recommended.*

**Reference Tab 5:**

A detail of the concrete anti-seep collar has been added to the plans. In addition, calculations based on the VESCH are provided herewith.

23. *Pond 2 Outlet Barrel: On Sheet 206, specify the size, class, length, and slope required for the dual 36 inch barrels. Watertight reinforced concrete pipe meeting the requirements of ASTM C361 is recommended. Specify the concrete headwall type required at the dual pipe outlet (VDOT EW-6, EW-7, etc.) and provide an appropriate detail.*

Item 1: The dual 36 inch outlet barrels have been revised to a single 48 inch RCP barrel approximately 48 feet in length. The pipe will be Class 3

"Bell & Spigot" RCP pipe utilizing a watertight "Rubber Gasket" joint meeting requirements of ASTM C443.

Item 2: A VDOT Standard Endwall for Pipe Culverts (EW-2) detail has been added to the Civil Drawings. Note that the outfall barrel from Pond 2 has been revised from a dual 36-inch barrel to a single 48-inch barrel.

24. *Pond 2 Outlet Protection: On sheets 206 and 209, specify whether a large single or two smaller outlet protections are required at the Pond 2 dual 36 inch outlet barrels and show riprap quantities.*

Since the outlet barrel of Pond 2 has been changed to a single 48-inch rcp, a single outlet protection will be constructed. The civil drawings now include additional details with dimensions, quantities, and riprap type.

25. *Pond Drain: Provide a pond drain and valve system that is capable of completely or partially draining the entire facility within 24 hours, if future maintenance is required.*

Due to the depth of the pond (below design invert elevations of the outlet pipes) of the control structure, the pond cannot be fully drained without the use of pumps; therefore, we request pumping be allowed for drawdown maintenance.

26. *Maintenance Plan: Add a maintenance plan specific to BMP Pond 2 on the grading and drainage plan. BMP Pond 2 may have different operations and maintenance requirements than Pond 1.*

The maintenance of Pond 2 is identical to Pond 1. Notes have been added to Sheet 206 as requested.

27. *Pond 2 Design data: In the lower right hand corner of Sheet 206, there is text information pertaining to Pond 2 which appears incorrect (top elevation, orifice invert, etc.) compared to the design report and details on Sheet 215. Please remove or correct.*

This information has been removed from the plan set.

28. *Inlet ST-15: On Sheet 207, clarify the purpose of and provide associated storm drain data for structure ST-15.*

Reference Tab 6:

ST-15 is a relocation of an existing yard drain as shown on the topographic survey included herewith. This yard drain served a small paved and graveled drainage area. The pipe serving the drainage area appears to be an 8-inch PVC drain pipe which outlets to the concrete swale down grade of the existing paved road. This area has a number of underground utility lines (many of which are unknown in their locations) which makes replacing the 8-inch drain impossible; therefore, due to the small area draining to the new ST-15, the existing 8-inch drain was utilized.

29. *Slotted Drain: On plan Sheet 206 and detail Sheet 215, specify material type for the 24 inch slotted storm drain in the Phase II parking area.*

The slotted drain, as shown on the referenced sheet is to be 16 gauge corrugated steel pipe such as that manufactured by Armco. A reference to the material type has been added to the plan set.

30. *4 inch PVC: Explain the origin and purpose of the existing 4 inch PVC drains near the Hospitality House that are to be connected to the storm drain system at drop inlet ST-18. Provide a detail for the PVC clean outs.*

The 4-inch PVC drains were picked up as part of the original survey. They are believed to be stormwater drains originating from the Hospitality House. The Hospitality House has been demolished since the initial Phase II submittal; therefore, the connection is no longer needed and has been removed from the plans.

31. *18 Inch Culverts: Provide headwater computations for the dual 18 inch culverts across the Phase II roadway between structures ST-10 to ST-11 and ST-12 to ST-13 on Sheet 207. Also the drainage configuration east of the pond (outlet barrel, inlets, storm drain, etc.) changed significantly from the Phase I plan. Verify the system from the Pond 1 outlet structure (ST-7) to ST-11 is adequate for the 10-year design storm.*

Reference Tab 7:

The 18 inch culverts under the Phase II rear entrance road have been downsized to 15 inch RCP culverts to meet minimum velocity constraints of 2.5 fps. An

analysis using Haestad Methods "StormCad" has been used for the system on the west side of the roadway. Results of the analysis shows minimal headwater as the majority of the pipe system does not flow full. Also, results indicate adequate clean-out velocities for both the 2-yr and the 10-yr design event. In addition, a separate hand analysis was performed on the east side culvert (ST-12 to ST-13). Results of this analysis are included herewith and show that the culvert does not flow full under the design constraints and has adequate clean-out velocity for both the 2-yr and 10-yr design events.

32. *Construction Specification: Reference VDOT instead of PennDOT standards in construction specification Section 02635 (Storm Drainage Piping) for catch basin lids.*

This has been corrected.

33. *Geotechnical: Reference was made in the County detention basin checklist and section 02216 of the construction specification to a geotechnical report; however, none was found in the plans or associated attachments. Please provide a copy of the report or information (logs, test results, reports, etc.) as necessary to substantiate that existing soils beneath Pond 2 are adequate to sustain a permanent water pool for a County A-3 wet extended detention pond.*

Boring logs were included in the initial Phase I permit issue of November 16, 1999. The closest boring log to the Pond 2 is identified as B-3 which shows medium dense clayey sand (SC) at a depth of 6.5 feet below the surface. In addition, the existing pond that is being expanded to serve the Transportation Advantage project has approximately 1.5 feet of standing water at the bottom.

**U.S. ROUTE 60 ROAD IMPROVEMENT PLAN:**

34. *Culvert Inlet Protection: Provide a culvert inlet protection at structure FES-5 (Inv. 80.0) as shown on Sheet 220.*

Culvert inlet protection has been added to structure FES-5.

35. *Silt Fence: Provide silt fence at the southern limit of clearing on Sheet 221, beginning at the match line for Sheet 220, and continuing east for approximately 300 feet, to existing contour El. 85.0.*

Additional silt fence is shown along the clearing limits of Sheet 221

36. *Rock Check Drain: On Sheet 200, install a rock check dam in the existing channel (15-ft easement) just downstream of proposed FES 5 (invert 73.5). The rock check will provide for effective primary erosion and sediment control for runoff associated with initial clearing and first grading operations until entrance inlets/storm drains are installed. Since the rock check is in a channel which may see a considerable amount of drainage due to the 24 inch pipe across the highway, it is also recommended to remove the measure once inlets, storm drains and inlet protections are in place and functional. Once the inlets/storms are installed the device could remain as a primary site control, if no backwater problems exist from behind the rock check toward US Route 60.*

A rock check dam has been added to the existing ditch downstream of the new FES. Removal schedule will be determined from field performance.

37. *Dust Control: If not required by VDOT, implement temporary dust control measures in accordance with methods in VESCH, Minimum Standard 3.39, for construction activities along US Route 60.*

A dust control note has been added to sheet 220

38. *Match Lines. Label all road plans and pavement marking schematic match lines on Sheets 220 through 222.*

Sheet references have been added to match lines.



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Job ANHEUSER BUSCH TRANS. ADV.

Job No. 32193 By JWS Date 3/01/00 Sheet      of     

## TEMPORARY SEDIMENT BASIN

PERMANENT POOL VOL. REQD = 67 cys / Acre C.D.A.

DRY STORAGE ABOVE PPV = 67 cys / Acre C.D.A.

C.D.A. = CONTRIBUTING  
DRAINAGE AREA)

C.D.A. = 45 Ac. (45 < 100 A.C.K)

$$\therefore PPV = 45 \text{ Ac.} \times 67 \text{ cys/Ac} \times 27 \text{ cf/cy} = \underline{\underline{81,405 \text{ cf}}}$$

PPV PROVIDED = 84,47 CF

84,47 > 81,405  $\therefore$  OK

DRY STORAGE VOLUME ABOVE PPV. = 81,405 CF

STORAGE VOLUME BETWEEN PPV  
AND 1<sup>ST</sup> STAGE WEIR OVERFLOW  $\approx$  129,316 CF

129,316 > 81,405  $\therefore$  OK



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Job AB-Wmb TRANS. ADV.

Job No. 32193 By JWS Date 3/6/00 Sheet      of     

## DEWATERING ORIFICE

$$A = \frac{Q}{(64.32 \times h/2)^{1/2} \cdot 0.6}$$

6 hour Drawdown Req'd

$$V = 81,405 \text{ CF}$$

$$81,405 / 6 \text{ hrs} \times \frac{1 \text{ hr}}{3600 \text{ sec/hr}} = \underline{\underline{3.77 \text{ CFS}}}$$

FROM STAGE STORAGE WORKSHEET,  $h \sim 69 - 66.5 = \underline{\underline{2.5 \text{ ft.}}}$

$$\therefore A = \frac{3.77}{(64.32 \times 2.5/2)^{1/2} \cdot 0.6} = \underline{\underline{0.70 \text{ SF}}}$$

$$\text{AND. } d = 2 \times \left( \frac{A}{\pi} \right)^{1/2} = 0.94 \text{ ft. (11.33")}$$

YESCH REQUIRES 12" MIN. ?

CLEAN-OUT REQ'D WHEN SEDIMENT ACCUMULATION

= 1/2 WET STORAGE VOLUME OR 34 CY/AC.

$$45 \text{ ac.} \times 34 \text{ CY/ac} = 1530 \text{ CY}$$

OR 11,310 CF

$$\text{CORRESPONDING DEPTH: } (41310 - 20760) / (44085 - 20760) \times 1$$

$$\text{ELEV.} = \frac{+ 64.0}{64.88}$$

USE 64.9

SEDIMENT DEPTH = 1.9 FT.

DEPTH BELOW ORIFICE = 1.6 FT.

**Pond 2 Stage-Storage Computations:**

| Stage, ft.                           | Area, sf | Area, acres | Average Area, sf | Depth Incr., ft | Volume Incr., cf | Volume Accum., cf | Volume Accum., af |
|--------------------------------------|----------|-------------|------------------|-----------------|------------------|-------------------|-------------------|
| <b>Design Attenuation Volume:</b>    |          |             |                  |                 |                  |                   |                   |
| 74.0                                 | 53,075   | 1.2184      | 51,293           | 1.00            | 51,293           | 303,546           | 6.9685            |
| 73.0                                 | 49,510   | 1.1366      | 47,780           | 1.00            | 47,780           | 252,253           | 5.7909            |
| 72.0                                 | 46,050   | 1.0572      | 44,368           | 1.00            | 44,368           | 204,473           | 4.6941            |
| 71.0                                 | 42,685   | 0.9799      | 41,053           | 1.00            | 41,053           | 160,106           | 3.6755            |
| 70.0                                 | 39,420   | 0.9050      | 37,840           | 1.00            | 37,840           | 119,053           | 2.7331            |
| 69.0                                 | 36,260   | 0.8324      | 34,730           | 1.00            | 34,730           | 81,213            | 1.8644            |
| 68.0                                 | 33,200   | 0.7622      | 31,720           | 1.00            | 31,720           | 46,483            | 1.0671            |
| 67.0                                 | 30,240   | 0.6942      | 29,527           | 0.50            | 14,763           | 14,763            | 0.3389            |
| 66.5                                 | 28,813   | 0.6615      | -                | -               | -                | -                 | -                 |
| <b>Design Permanent Pool Volume:</b> |          |             |                  |                 |                  |                   |                   |
| -                                    | -        | -           | -                | -               | -                | -                 | -                 |
| 66.5                                 | 28,813   | 0.6615      | 28,099           | 0.50            | 14,050           | 84,147            | 1.9317            |
| 66.0                                 | 27,385   | 0.6287      | 26,013           | 1.00            | 26,013           | 70,098            | 1.6092            |
| 65.0                                 | 24,640   | 0.5657      | 23,325           | 1.00            | 23,325           | 44,085            | 1.0121            |
| 64.0                                 | 22,010   | 0.5053      | 20,760           | 1.00            | 20,760           | 20,760            | 0.4766            |
| 63.0                                 | 19,510   | 0.4479      | 9,755            | -               | -                | -                 | -                 |
|                                      |          | -           | -                | -               | -                | -                 | -                 |
|                                      |          | -           | -                | -               | -                | -                 | -                 |
|                                      |          |             |                  |                 |                  |                   |                   |

**Water Quality Calculations:**

Total Impervious Area:

749,232

sf

17.2 AC.

Extended Detention Pool Volume:

1.00

inches

62,436

cf

Stage:

1.4333

ac ft

68.46

ft

Permanent Pool Volume:

1.00

inches

62,436

cf

1.4333

ac ft



**CONSTRUCTION CONDITIONS**  
~~POST CONDITIONS~~  
**CONTRIBUTING AREA SUMMARY**  
**POND 2**

01/24/00  
1:12 PM

| Drainage Basin:                             | PWMB2-1 | Contributing<br>Drainage Area<br>(acres) | CN              |
|---|---------|--|-----------------|
| DCIA (includes Building & Pavement Areas):  |         | 7.20                                     | -               |
| Non-DCIA:                                   |         | 0.50                                     | 98              |
| <del>Semi-Impervious Areas:</del>           |         | 0.00                                     | 82              |
| Open/Landscaped/Planted Areas:              |         | 1.30                                     | <del>X</del> 86 |
| Wooded Area:                                |         | 0.80                                     | 55              |
| Total Drainage Area Contributing to Pond 2: |         | 9.80 ✓                                   | acres           |
| Time of Concentration:                      |         | 10 ✓                                     | minutes         |
| Composite CN:                               |         | <del>55.1</del> 73.8                     |                 |
| % DCIA:                                     |         | 73%                                      | USE 73          |

| Drainage Basin:  | PWMB2-2 | Contributing<br>Drainage Area<br>(acres) | CN              |
|--|---------|--|-----------------|
| DCIA (includes Pond W.S., Pavement & Const. Staging Area): |         | 4.80                                     | -               |
| Non-DCIA:  |         | 0.50                                     | 98              |
| <del>Semi-Impervious Areas:</del>                          |         | 1.30                                     | 82              |
| Open/Landscaped/Planted Areas:                             |         | 5.20                                     | <del>X</del> 86 |
| Wooded Area:   |         | 9.60                                     | 55              |
| Total Drainage Area Contributing to Pond 2:                |         | 21.40                                    | acres           |
| Time of Concentration:                                     |         | 60                                       | minutes         |
| Composite CN:  |         | <del>55.1</del> 62.1                     |                 |
| % DCIA:  |         | 22%                                      | USE 69          |

| Drainage Basin:                             | PHWY60 | Contributing<br>Drainage Area<br>(acres) | CN      |
|---|--------|--|---------|
| <b>NO APPRECIABLE<br/>CHANGE NEEDED</b>     |        |  |         |
| DCIA:                                       |        | 4.20                                     | -       |
| Non-DCIA:                                   |        | 0.00                                     | 98      |
| Semi-Impervious Areas:                      |        | 0.00                                     | 82      |
| Open/Landscaped/Planted Areas:              |        | 4.50                                     | 61      |
| Wooded Area:                                |        | 5.00                                     | 55      |
| Total Drainage Area Contributing to Pond 2: |        | 13.70                                    | acres   |
| Time of Concentration:                      |        | 30                                       | minutes |
| Composite CN:                               |        | 57.8                                     |         |
| % DCIA:                                     |        | 31%                                      |         |

AB-WMB TRANSPORTATION ADVANTAGE  
25 YR ANALYSIS - POND 2 - CONSTRUCTION CONDITIONS  
MARCH 1, 2000

\*\*\*\*\* Basin Summary - WMB2-25C \*\*\*\*\*

\*\*\*

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Basin Name:           | XWMB2-1  | XWMB2-2  | XHWY60   |
| Group Name:           | EX-COND  | EX-COND  | EX-COND  |
| Node Name:            | XPOND2   | XPOND2   | XPOND2   |
| Hydrograph Type:      | UH       | UH       | UH       |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 2.67     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 6.40     | 6.40     | 6.40     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 20.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 12.90    | 18.90    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 64.00    | 61.00    | 58.00    |
| DCIA (%):             | 53.00    | 2.00     | 31.00    |
| Time Max (hrs):       | 12.09    | 12.53    | 12.20    |
| Flow Max (cfs):       | 55.04    | 22.16    | 34.48    |
| Runoff Volume (in):   | 4.53     | 2.36     | 3.34     |
| Runoff Volume (cf):   | 212255   | 161573   | 165907   |

AB-WMB TRANSPORTATION ADVANTAGE  
25 YR ANALYSIS - POND 2 - CONSTRUCTION CONDITIONS  
MARCH 1, 2000

\*\*\*\*\* Basin Summary - WMB2-25C \*\*\*\*\*

\*\*\*

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Basin Name:           | PWMB2-1  | PWMB2-2  | PHWY60   |
| Group Name:           | PST-COND | PST-COND | PST-COND |
| Node Name:            | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type:      | UH       | UH       | UH       |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 6.40     | 6.40     | 6.40     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 79.00    | 69.00    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |
| Time Max (hrs):       | 12.02    | 12.53    | 12.20    |
| Flow Max (cfs):       | 64.64    | 40.22    | 34.32    |
| Runoff Volume (in):   | 5.68     | 3.74     | 3.32     |
| Runoff Volume (cf):   | 202128   | 291587   | 165308   |

AB-WMB TRANSPORTATION ADVANTAGE  
 25 YR ANALYSIS - POND 2 - CONSTRUCTION CONDITIONS  
 MARCH 1, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-25C \*\*\*\*\*

o(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) |
|-----------|------------|---------------------|----------------|--------------------|----------------------|-----------------------|-----------------|------------------|------------------|-------------------|
| XPOND2    | EX-COND    | 12.27               | 74.30          | 74.00              | 0.0326               | 22172.53              | 12.13           | 97.64            | 12.27            | 82.89             |
| PPOND2    | PST-COND   | 12.48               | 72.13          | 74.00              | 0.0222               | 46486.20              | 12.03           | 105.72           | 12.48            | 65.47             |

MAX. 25 yr POND STAGE  
 DURING CONSTRUCTION PERIOD

79.00  
 72.13  
 -----  
 6.87' FB

MAX. Q<sub>out</sub> FOR 25 yr  
 STORM DURING CONST.  
 PERIOD

65.47 < 82.89 OK

SEE RESPONSE TO JCC  
COMMENT NO. 8



# THE HASKELL COMPANY

ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES

Job AB-Wmb - TRANS. ADV.

Job No. 32193 By JWS Date 3/26/10 Sheet      of     

## CHANNEL FLOWS

### DOWNSTREAM OF ST-11 :

2YR ... POND 1 OUTFLOW ~ 1.5 cfs  
CONTRIBUTION TO ST-14 ~ 0.3 cfs  
CONTRIBUTION TO ST-10 ~ 1.8 cfs  
TOTAL ~ 3.6 cfs

BASED ON "n" ~ 0.05 VERY POOR  
NATURAL CHANNEL 0.04

d = 0.7 ft.

V = 1.9 FPS ✓

10YR ... POND 1 OUTFLOW ~ 4.6 cfs  
ST-14 ~ 0.4 cfs  
ST-10 ~ 2.3 cfs  
TOTAL ~ 9.3 cfs

BASED ON "n" ~ 0.05 VERY POOR  
NATURAL CHANNEL

d = 1.0 FT ± ✓

V = 1.7 FPS

7.8 FT. DEEP



## CHANNEL FLOWS

DOWN STREAM OF ST-13 :

2 yr...  $Q \sim \underline{1.0 \text{ CFS}}$

$d = \underline{0.45 \text{ FT.}}$   $V \sim \underline{1 \text{ FPS}}$  ✓

10 yr...  $Q \sim \underline{1.3 \text{ CFS}}$

$d = \underline{0.5 \text{ FT.}}$  ✓  $V \sim \underline{1.1 \text{ FPS}}$

> 7 FT. DEEP.

"TRAPEZOIDAL" CHANNEL WORKSHEET

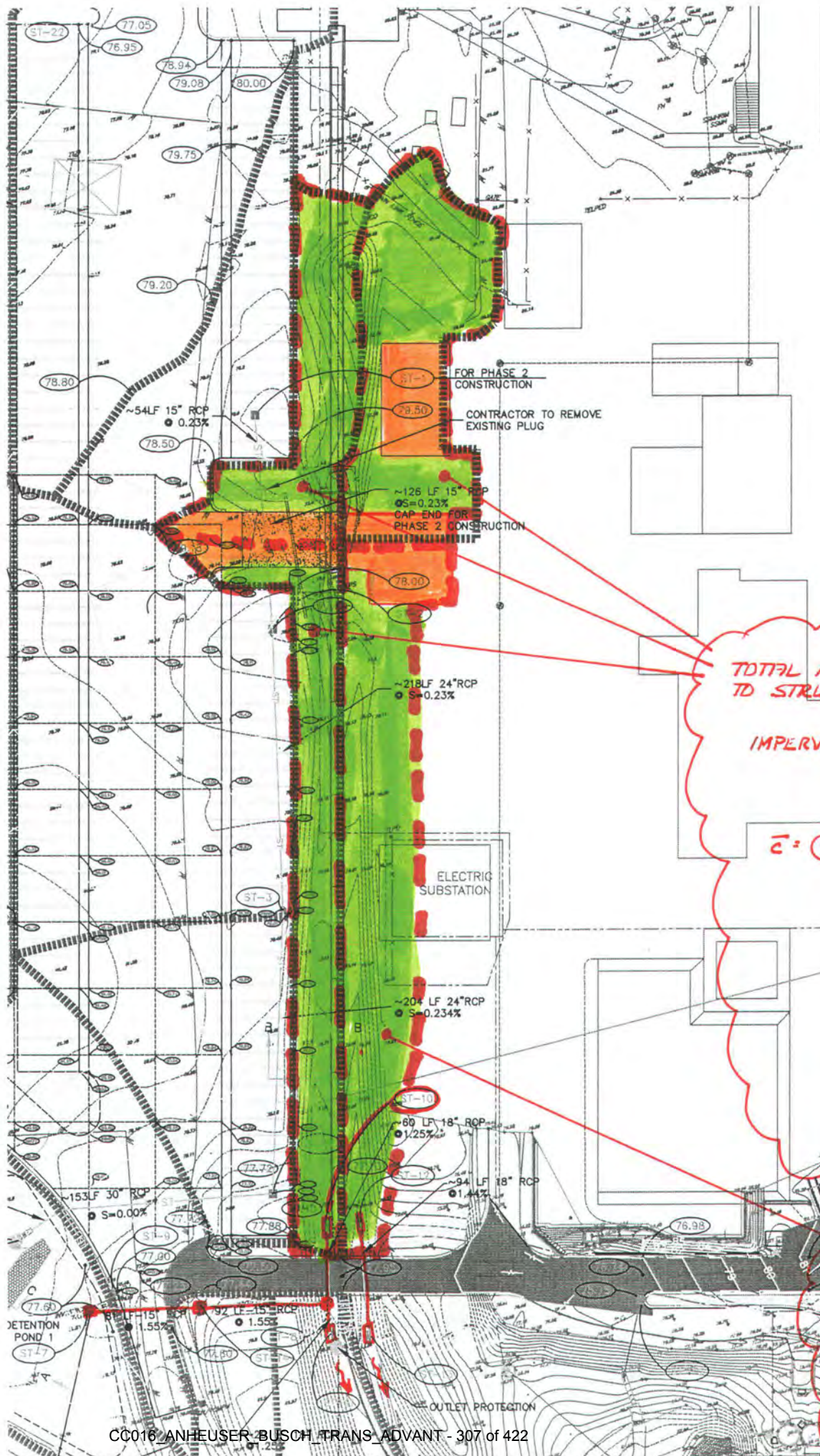
| Left SS (H:1) |                      | Right SS (H:1)        |           | Bottom Width     |                  | Channel Slope (%) |                    | Depth Increment, ft |  | Manning's "n" |  |       |  |
|---------------|----------------------|-----------------------|-----------|------------------|------------------|-------------------|--------------------|---------------------|--|---------------|--|-------|--|
| Input:        |                      | 8.00                  |           | 3.00             |                  | 0.00              |                    | 2.00                |  | 0.05          |  | 0.075 |  |
|               |                      |                       |           |                  |                  |                   |                    |                     |  |               |  |       |  |
| Depth         | Left Horiz. Distance | Right Horiz. Distance | Top Width | Wetted Perimeter | X-Sectional Area | Hydraulic Radius  | Manning's Eq. Vel. | Flow Rate (Q=VA)    |  |               |  |       |  |
| (ft)          | (ft)                 | (ft)                  | (ft)      | (ft)             | (sf)             | (ft)              | (fps)              | (cfs)               |  |               |  |       |  |
| 0.00          | 0.00                 | 0.00                  | 0.00      | 0.00             | 0.00             | 0.00              | 0.00               | 0.00                |  |               |  |       |  |
| 0.05          | 0.40                 | 0.15                  | 0.55      | 0.56             | 0.01             | 0.02              | 0.24               | 0.00                |  |               |  |       |  |
| 0.10          | 0.80                 | 0.30                  | 1.10      | 1.12             | 0.06             | 0.05              | 0.38               | 0.02                |  |               |  |       |  |
| 0.15          | 1.20                 | 0.45                  | 1.65      | 1.68             | 0.12             | 0.07              | 0.49               | 0.06                |  |               |  |       |  |
| 0.20          | 1.60                 | 0.60                  | 2.20      | 2.24             | 0.22             | 0.10              | 0.60               | 0.13                |  |               |  |       |  |
| 0.25          | 2.00                 | 0.75                  | 2.75      | 2.81             | 0.34             | 0.12              | 0.69               | 0.24                |  |               |  |       |  |
| 0.30          | 2.40                 | 0.90                  | 3.30      | 3.37             | 0.50             | 0.15              | 0.78               | 0.39                |  |               |  |       |  |
| 0.35          | 2.80                 | 1.05                  | 3.85      | 3.93             | 0.67             | 0.17              | 0.86               | 0.58                |  |               |  |       |  |
| 0.40          | 3.20                 | 1.20                  | 4.40      | 4.49             | 0.88             | 0.20              | 0.95               | 0.83                |  |               |  |       |  |
| 0.45          | 3.60                 | 1.35                  | 4.95      | 5.05             | 1.11             | 0.22              | 1.02               | 1.14                |  |               |  |       |  |
| 0.50          | 4.00                 | 1.50                  | 5.50      | 5.61             | 1.38             | 0.24              | 1.10               | 1.51                |  |               |  |       |  |
| 0.55          | 4.40                 | 1.65                  | 6.05      | 6.17             | 1.66             | 0.27              | 1.17               | 1.95                |  |               |  |       |  |
| 0.60          | 4.80                 | 1.80                  | 6.60      | 6.73             | 1.98             | 0.29              | 1.24               | 2.45                |  |               |  |       |  |
| 0.65          | 5.20                 | 1.95                  | 7.15      | 7.30             | 2.32             | 0.32              | 1.31               | 3.04                |  |               |  |       |  |
| 0.70          | 5.60                 | 2.10                  | 7.70      | 7.86             | 2.70             | 0.34              | 1.37               | 3.70                |  |               |  |       |  |
| 0.75          | 6.00                 | 2.25                  | 8.25      | 8.42             | 3.09             | 0.37              | 1.44               | 4.45                |  |               |  |       |  |
| 0.80          | 6.40                 | 2.40                  | 8.80      | 8.98             | 3.52             | 0.39              | 1.50               | 5.28                |  |               |  |       |  |
| 0.85          | 6.80                 | 2.55                  | 9.35      | 9.54             | 3.97             | 0.42              | 1.56               | 6.21                |  |               |  |       |  |
| 0.90          | 7.20                 | 2.70                  | 9.90      | 10.10            | 4.46             | 0.44              | 1.62               | 7.23                |  |               |  |       |  |
| 0.95          | 7.60                 | 2.85                  | 10.45     | 10.66            | 4.96             | 0.47              | 1.68               | 8.35                |  |               |  |       |  |
| 1.00          | 8.00                 | 3.00                  | 11.00     | 11.22            | 5.50             | 0.49              | 1.74               | 9.58                |  |               |  |       |  |
| 1.05          | 8.40                 | 3.15                  | 11.55     | 11.79            | 6.06             | 0.51              | 1.80               | 10.91               |  |               |  |       |  |
| 1.10          | 8.80                 | 3.30                  | 12.10     | 12.35            | 6.66             | 0.54              | 1.86               | 12.35               |  |               |  |       |  |
| 1.15          | 9.20                 | 3.45                  | 12.65     | 12.91            | 7.27             | 0.56              | 1.91               | 13.90               |  |               |  |       |  |
| 1.20          | 9.60                 | 3.60                  | 13.20     | 13.47            | 7.92             | 0.59              | 1.97               | 15.58               |  |               |  |       |  |
| 1.25          | 10.00                | 3.75                  | 13.75     | 14.03            | 8.59             | 0.61              | 2.02               | 17.37               |  |               |  |       |  |







JCC # 14



TOTAL AREA CONTRIBUTING  
TO STRUCTURE ST-10 : 1.30 AC

IMPERV. AREA ~ 0.24 AC.  
OR 18.5%

$$\bar{C} = (0.105)(0.95) + (0.815)(0.2) \\ = \underline{0.34}$$

$T_c \sim 15 \text{ min.}$

$$i_{2yr} \sim 4" / \text{hr}$$

$$i_{10yr} \sim 5.1" / \text{hr}$$

$$\therefore Q_{2yr} \sim 1.77 \text{ cfs}$$

$$Q_{10yr} \sim 2.25 \text{ cfs}$$

CONTRIBUTING AREA  
TO ST-12 : 0.68 AC.

IMPERV. : 9.5% @ C = 0.95

SEMI IMPERV. : 10.0% @ C = 0.1

PERV. : 80.5% @ C = 0.20

$$\bar{C} = \underline{0.30}$$

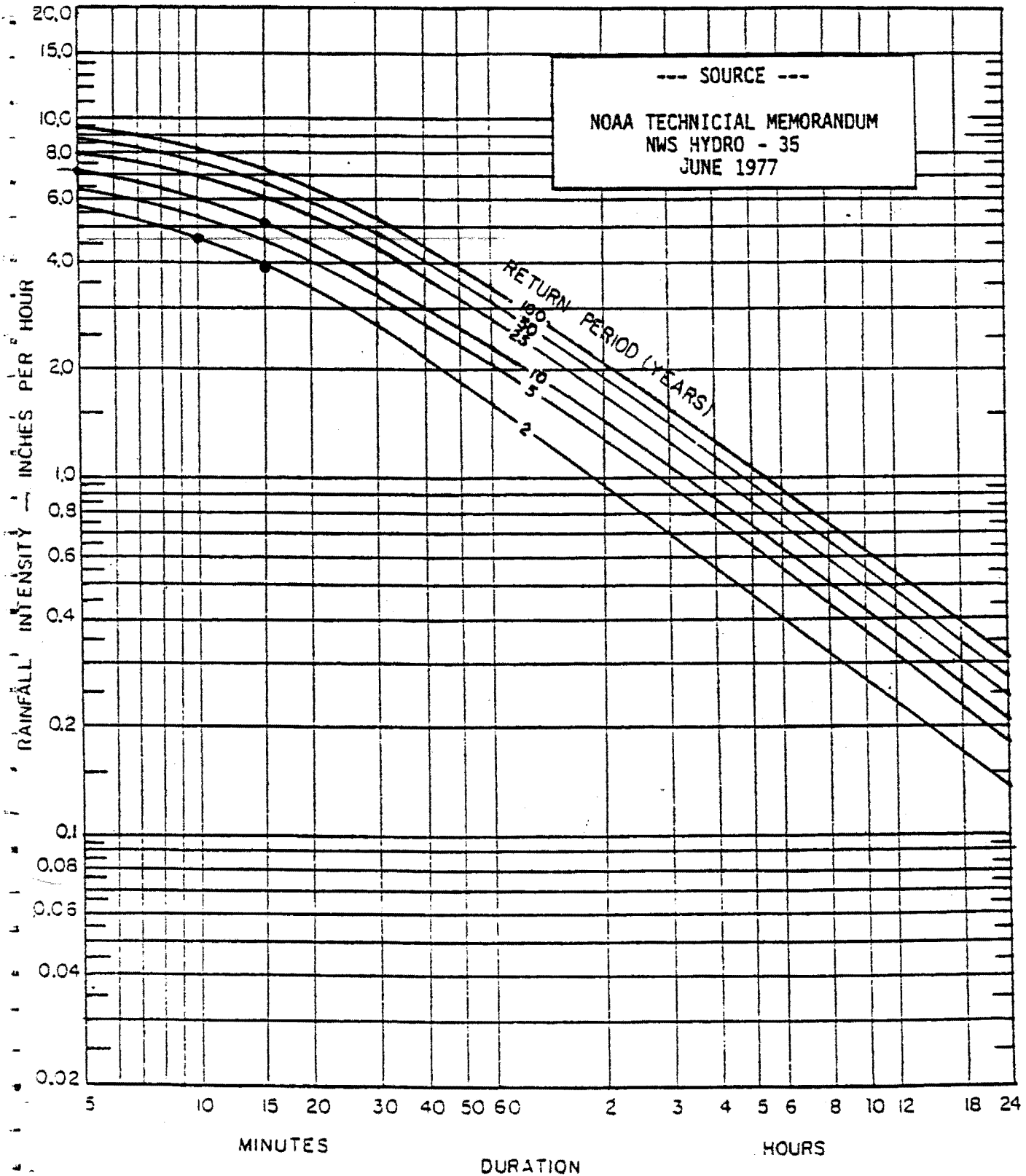
$T_c \sim 10 \text{ min.}$

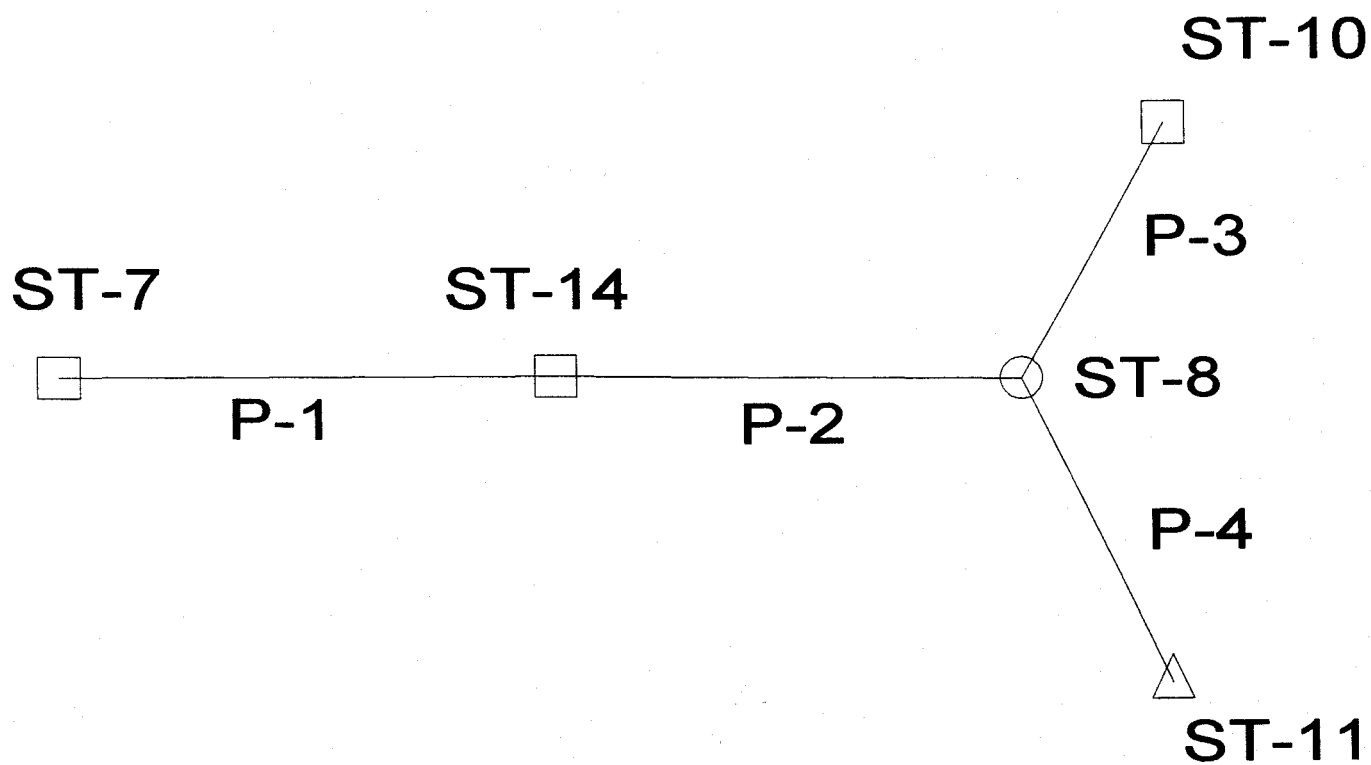
$$Q_2 : 0.97 \text{ cfs } C_i : 4.75'$$

$$Q_{10} : 1.22 \text{ cfs } C_i : 6.00'$$

Fig. 1.5.1.7

NORFOLK, VA.





2-1

# Pipe Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Section Size | Constructed Slope (ft/ft) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream HGL (ft) | Downstream HGL (ft) | Average Velocity (ft/s) | Discharge (cfs) |
|------|---------------|-----------------|-------------|--------------|---------------------------|--------------------------------|----------------------------------|-------------------|---------------------|-------------------------|-----------------|
| P-3  | ST-10         | ST-8            | 60.00       | 15 inch      | 0.020000                  | 71.26                          | 70.06                            | 71.87             | 71.54               | 2.89                    | 2.30            |
| P-1  | ST-7          | ST-14           | 81.00       | 15 inch      | 0.015556                  | 73.00                          | 71.74                            | 74.03             | 72.60               | 6.68                    | 6.55            |
| P-2  | ST-14         | ST-8            | 60.00       | 15 inch      | 0.015500                  | 70.74                          | 69.81                            | 72.15             | 71.54               | 5.34                    | 6.55            |
| P-4  | ST-8          | ST-11           | 32.00       | 18 inch      | 0.010000                  | 69.81                          | 69.49                            | 70.96             | 70.55               | 6.36                    | 8.85            |

10 YR STORM

FLOW DEPTH @ ST-10 ~ 71.87  
 - 71.26  
0.61 FL. ←

2.8



# Pipe Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Section Size | Constructed Slope (ft/ft) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream HGL (ft) | Downstream HGL (ft) | Average Velocity (ft/s) | Discharge (cfs) |
|------|---------------|-----------------|-------------|--------------|---------------------------|--------------------------------|----------------------------------|-------------------|---------------------|-------------------------|-----------------|
| P-3  | ST-10         | ST-8            | 60.00       | 15 inch      | 0.020000                  | 71.26                          | 70.06                            | 71.79             | 70.77               | 3.06                    | 1.80            |
| P-1  | ST-7          | ST-14           | 81.00       | 15 inch      | 0.015556                  | 73.00                          | 71.74                            | 73.49             | 72.11               | 4.22                    | 1.50            |
| P-2  | ST-14         | ST-8            | 60.00       | 15 inch      | 0.015500                  | 70.74                          | 69.81                            | 71.23             | 70.77               | 2.45                    | 1.50            |
| P-4  | ST-8          | ST-11           | 32.00       | 18 inch      | 0.010000                  | 69.81                          | 69.49                            | 70.50             | 70.29               | 3.79                    | 3.30            |

2 YR STORM

FLOW DEPTH @ ST-10 ~ 71.79  
 - 71.26  
0.53 ft. ←

2-9

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 1 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Basin Summary - WMB2-1 \*\*\*\*\*

\*\*\*

|                  |          |          |          |
|------------------|----------|----------|----------|
| Basin Name:      | PWMB2-1  | PWMB2-2  | PHWY60   |
| Group Name:      | PST-COND | PST-COND | PST-COND |
| Node Name:       | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type: | UH       | UH       | UH       |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 2.80     | 2.80     | 2.80     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |

|                     |       |       |       |
|---------------------|-------|-------|-------|
| Time Max (hrs):     | 12.02 | 12.53 | 12.20 |
| Flow Max (cfs):     | 23.39 | 7.18  | 9.02  |
| Runoff Volume (in): | 2.09  | 0.81  | 0.98  |
| Runoff Volume (cf): | 74466 | 62759 | 48688 |

1 yr - 24 hr STORM

TOTAL RUNOFF VOLUME = 185,913 CF

DOWNSTREAM EROSION CONTROL VOLUME

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 1 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-1 \*\*\*\*\*

•(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) |
|-----------|------------|---------------------|----------------|--------------------|----------------------|-----------------------|-----------------|------------------|------------------|-------------------|
| XPOND2    | EX-COND    | 12.74               | 71.95          | 74.00              | 0.0157               | 17358.08              | 12.13           | 27.48            | 12.74            | 7.31              |
| PPOND2    | PST-COND   | 17.75               | 70.22          | 74.00              | 0.0095               | 40175.23              | 12.03           | 33.21            | 17.78            | 1.34              |

1 yr MAX. POND STAGE  
 POST-CONDITIONS  
 POND 2

MAX. Q OUT

1.34 < 7.31 cfs OK

1 yr - 24 hr STORM  
(P = 2.8")

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 2 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Basin Summary - WMB2-2 \*\*\*\*\*

\*\*\*

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Basin Name:           | PWMB2-1  | PWMB2-2  | PHWY60   |
| Group Name:           | PST-COND | PST-COND | PST-COND |
| Node Name:            | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type:      | UH       | UH       | UH       |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 3.50     | 3.50     | 3.50     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |
| Time Max (hrs):       | 12.02    | 12.53    | 12.20    |
| Flow Max (cfs):       | 30.27    | 10.78    | 12.70    |
| Runoff Volume (in):   | 2.70     | 1.17     | 1.36     |
| Runoff Volume (cf):   | 95996    | 91183    | 67611    |

2 yr. 24 hr STORM



AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 2 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-2 \*\*\*\*\*

•(Time units - hours)

| Node<br>Name | Group<br>Name | Max Time<br>Conditions | Max Stage<br>(ft) | Warning<br>Stage (ft) | Max Delta<br>Stage (ft) | Max Surface<br>Area (sf) | Max Time<br>Inflow | Max Inflow<br>(cfs) | Max Time<br>Outflow | Max Outflow<br>(cfs) |
|--------------|---------------|------------------------|-------------------|-----------------------|-------------------------|--------------------------|--------------------|---------------------|---------------------|----------------------|
| XPOND2       | EX-COND       | 12.70                  | 73.07             | 74.00                 | 0.0194                  | 19189.07                 | 12.13              | 38.12               | 12.70               | 12.39                |
| PPOND2       | PST-COND      | 13.64                  | 70.76             | 74.00                 | 0.0120                  | 41927.06                 | 12.03              | 43.52               | 13.64               | 6.10                 |

2 yr. Max Pond Stage  
 POST-CONDITIONS  
 POND 2

MAX. Q OUT

6.10 < 12.39 OK

2 yr. 24 hr STORM  
 CP: 3.5"

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 10 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Basin Summary - WMB2-10 \*\*\*\*\*

\*\*\*

|                  |          |          |          |
|------------------|----------|----------|----------|
| Basin Name:      | PWMB2-1  | PWMB2-2  | PHMY60   |
| Group Name:      | PST-COND | PST-COND | PST-COND |
| Node Name:       | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type: | UH       | UH       | UH       |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 5.80     | 5.80     | 5.80     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |

|                     |        |        |        |
|---------------------|--------|--------|--------|
| Time Max (hrs):     | 12.02  | 12.53  | 12.20  |
| Flow Max (cfs):     | 54.01  | 27.20  | 29.34  |
| Runoff Volume (in): | 4.78   | 2.67   | 2.88   |
| Runoff Volume (cf): | 170072 | 207762 | 143201 |

} 10yr 24hr STORM

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 10 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-10 \*\*\*\*\*

•(Time units - hours)

| Node<br>Name | Group<br>Name | Max Time<br>Conditions | Max Stage<br>(ft) | Warning<br>Stage (ft) | Max Delta<br>Stage (ft) | Max Surface<br>Area (sf) | Max Time<br>Inflow | Max Inflow<br>(cfs) | Max Time<br>Outflow | Max Outflow<br>(cfs) |
|--------------|---------------|------------------------|-------------------|-----------------------|-------------------------|--------------------------|--------------------|---------------------|---------------------|----------------------|
| XPOND2       | EX-COND       | 12.25                  | 74.03             | 74.00                 | 0.0323                  | 21520.48                 | 12.13              | 84.00               | 12.25               | 73.71                |
| PPOND2       | PST-COND      | 12.53                  | 71.69             | 74.00                 | 0.0205                  | 45032.61                 | 12.03              | 85.12               | 12.53               | 46.70                |

10 yr. MAX. POND STAGE  
 POST-CONDITIONS  
 POND 2

MAX. Q<sub>out</sub>

46.70 < 73.71 cfs OK

10 yr - 24 Hr STORM  
 (P = 5.8")

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 100 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Basin Summary - WMB2-100 \*\*\*\*\*

\*\*\*

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Basin Name:           | PWMB2-1  | PWMB2-2  | PWMB60   |
| Group Name:           | PST-COND | PST-COND | PST-COND |
| Node Name:            | PPOND2   | PPOND2   | PPOND2   |
| Hydrograph Type:      | UH       | UH       | UH       |
| Unit Hydrograph:      | UH484    | UH484    | UH484    |
| Peaking Factor:       | 484.00   | 484.00   | 484.00   |
| Spec Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Comp Time Inc (min):  | 1.33     | 8.00     | 4.00     |
| Rainfall File:        | SCSII-24 | SCSII-24 | SCSII-24 |
| Rainfall Amount (in): | 8.00     | 8.00     | 8.00     |
| Storm Duration (hr):  | 24.00    | 24.00    | 24.00    |
| Status:               | ONSITE   | ONSITE   | ONSITE   |
| Time of Conc. (min):  | 10.00    | 60.00    | 30.00    |
| Lag Time (hr):        | 0.00     | 0.00     | 0.00     |
| Area (acres):         | 9.80     | 21.46    | 13.70    |
| Vol of Unit Hyd (in): | 1.00     | 1.00     | 1.00     |
| Curve Number:         | 66.30    | 60.30    | 57.80    |
| DCIA (%):             | 73.00    | 22.00    | 31.00    |
| Time Max (hrs):       | 12.02    | 12.53    | 12.20    |
| Flow Max (cfs):       | 77.54    | 46.20    | 48.33    |
| Runoff Volume (in):   | 6.85     | 4.36     | 4.58     |
| Runoff Volume (cf):   | 243650   | 339502   | 227520   |

} 100 yr - 24 hr STORM

AB-WMB TRANSPORTATION ADVANTAGE  
 PRE-POST 100 YR STORMWATER ANALYSIS  
 MARCH 3, 2000

\*\*\*\*\* Node Maximum Conditions - WMB2-100 \*\*\*\*\*

•(Time units - hours)

| Node<br>Name | Group<br>Name | Max Time<br>Conditions | Max Stage<br>(ft) | Warning<br>Stage (ft) | Max Delta<br>Stage (ft) | Max Surface<br>Area (sf) | Max Time<br>Inflow | Max Inflow<br>(cfs) | Max Time<br>Outflow | Max Outflow<br>(cfs) |
|--------------|---------------|------------------------|-------------------|-----------------------|-------------------------|--------------------------|--------------------|---------------------|---------------------|----------------------|
| PPOND2       | PST-COND      | 12.44                  | 72.66             | 74.00                 | 0.0214                  | 48367.36                 | 12.07              | 131.21              | 12.44               | 84.24                |

100 YR MAX. POND STAGE  
 POST-CONDITIONS  
 POND 2

REQ'D FREEBOARD = 1 FL.  
 FREEBOARD PROVIDED = 1.34 FL.

1.34 > 1.00 OK

72.66  
 1.34  
 74.00  
 TOP  
 DAM

100 YR - 24 hr STORM  
 (P = 8.0")

ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE - WILLIAMSBURG, VA  
POST-CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000 (REVISED 03/01/00)

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

Name: POUT2 Base Flow(cfs): 0 Init Stage(ft): 65  
Group: PST-COND Length(ft): 0 Warn Stage(ft): 69  
Comment: OUTFALL BOUNDARY NODE FOR PPOND2

| Time(hrs) | Stage(ft) |
|-----------|-----------|
| 0         | 65        |
| 12        | 66        |
| 24        | 65        |

Name: PPOND2 Base Flow(cfs): 0 Init Stage(ft): 66.5  
Group: PST-COND Length(ft): 0 Warn Stage(ft): 74  
Comment: POST CONDITIONS ANALYSIS OF POND 2

| Stage(ft) | Area(ac) |
|-----------|----------|
| 66        | 0.6287   |
| 67        | 0.6942   |
| 68        | 0.7622   |
| 69        | 0.8324   |
| 70        | 0.905    |
| 71        | 0.9799   |
| 72        | 1.0572   |
| 73        | 1.1366   |
| 74        | 1.2184   |

STAGE VS. AREA  
RELATIONSHIP

PERMANENT POOL  
DESIGN WATER LEVEL

ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE - WILLIAMSBURG, VA  
POST CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000 (REVISED 03/01/00)

\*\*\*\*\* Input Report \*\*\*\*\*

-----Class: Drop Structure-----

Name: POUT2CS      From Node: PPOND2      Length(ft): 48  
Group: PST-COND      To Node: POUT2      Count: 1

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

UPSTREAM      DOWNSTREAM  
Span(in): 48 ✓      48  
Rise(in): 48 ✓      48  
Invert(ft): 65.1 ✓      65  
Manning's N: 0.013 ✓      0.013  
Top Clip(in): 0      0  
Bottom Clip(in): 0      0

48" SINGLE BARREL OUTLET  
S = 0.20%

Entrance Loss Coef: 0.5 ✓      Flow: Both  
Exit Loss Coef: 1      Equation: Aver Frict Slope

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end w/ headwall      1      2  
Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall      1      1

POST CONDITIONS ANALYSIS OF POND 2

\*\*\* Weir 1 of 3 for Drop Structure POUT2CS \*\*\*      [TABLE]

Count: 1      Bottom Clip(in): 0  
Type: Mavis      Top Clip(in): 0  
Flow: Both      Weir Discharge Coef: 3.2  
Geometry: Rectangular ✓      Orifice Discharge Coef: 0.6

Span(in): 48 ✓      Invert(ft): 70.25  
Rise(in): 30 ✓      Control Elev(ft): 70.25

← 1<sup>st</sup> STAGE WEIR



\*\*\* Weir 2 of 3 for Drop Structure POUT2CS \*\*\*      [TABLE]

Count: 1      Bottom Clip(in): 0  
Type: Mavis      Top Clip(in): 0  
Flow: Both      Weir Discharge Coef: 3.2  
Geometry: Circular      Orifice Discharge Coef: 0.6

Span(in): 5.25 ✓      Invert(ft): 66.5 ✓  
Rise(in): 5.25 ✓      Control Elev(ft): 66.5 ✓

← 5/4" ORIFICE



27

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

ANHEUSER-BUSCH TRANSPORTATION ADVANTAGE - WILLIAMSBURG, VA  
POST CONDITIONS ROUTING PARAMETERS  
JANUARY 24, 2000 (REVISED 03/01/00)

\*\*\*\*\* Input Report \*\*\*\*\*

\*\*\* Weir 3 of 3 for Drop Structure POUT2CS \*\*\* [TABLE]

Count: 2 ✓ Bottom Clip(in): 0  
Type: Mavis Top Clip(in): 0  
Flow: Both Weir Discharge Coef: 3.2  
Geometry: Rectangular Orifice Discharge Coef: 0.6



Span(in): 48 ✓  
Rise(in): 24 ✓

Invert(ft): 70.75 ✓  
Control Elev(ft): 70.75

← Z<sup>NO</sup> STABLE WEIR

-----Class: Simulation-----

G:\ICPR2\IND\32193\32193PH2\WMB2-100

Execution: Both

Header: AB-WMB TRANSPORTATION ADVANTAGE  
PRE-POST 100 YR STORMWATER ANALYSIS  
MARCH 3, 2000

-----HYDRAULICS-----

-----HYDROLOGY-----

|                             |                         |
|-----------------------------|-------------------------|
| Max Delta Z (ft): 1         | Override Defaults: Yes  |
| Delta Z Factor: 0.05        | Storm Dur(hrs): 24      |
| Time Step Optimizer: 1      | Rain Amount(in): 8      |
| Drop Structure Optimizer: 1 | Rainfall File: SCSII-24 |
| Sim Start Time(hrs): 0      |                         |
| Sim End Time(hrs): 24       |                         |
| Min Calc Time(sec): 1       |                         |
| 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 [12/02/99] + EX-COND [03/06/00] + PST-COND [03/06/00]



**Pond 2 Stage-Storage Computations:**

| Stage, ft.                           | Area, sf | Area, acres | Average Area, sf | Depth Incr., ft | Volume Incr., cf | Volume Accum., cf | Volume Accum., af |
|--------------------------------------|----------|-------------|------------------|-----------------|------------------|-------------------|-------------------|
| <b>Design Attenuation Volume:</b>    |          |             |                  |                 |                  |                   |                   |
| 74.0                                 | 53,075   | 1.2184      | 51,293           | 1.00            | 51,293           | 303,546           | 6.9685            |
| 73.0                                 | 49,510   | 1.1366      | 47,780           | 1.00            | 47,780           | 252,253           | 5.7909            |
| 72.0                                 | 46,050   | 1.0572      | 44,368           | 1.00            | 44,368           | 204,473           | 4.6941            |
| 71.0                                 | 42,685   | 0.9799      | 41,053           | 1.00            | 41,053           | 160,106           | 3.6755            |
| 70.0                                 | 39,420   | 0.9050      | 37,840           | 1.00            | 37,840           | 119,053           | 2.7331            |
| 69.0                                 | 36,260   | 0.8324      | 34,730           | 1.00            | 34,730           | 81,213            | 1.8644            |
| 68.0                                 | 33,200   | 0.7622      | 31,720           | 1.00            | 31,720           | 46,483            | 1.0671            |
| 67.0                                 | 30,240   | 0.6942      | 29,527           | 0.50            | 14,763           | 14,763            | 0.3389            |
| 66.5                                 | 28,813   | 0.6615      | -                | -               | -                | -                 | -                 |
| <b>Design Permanent Pool Volume:</b> |          |             |                  |                 |                  |                   |                   |
| -                                    | -        | -           | -                | -               | -                | -                 | -                 |
| 66.5                                 | 28,813   | 0.6615      | 28,099           | 0.50            | 14,050           | 84,147            | 1.9317            |
| 66.0                                 | 27,385   | 0.6287      | 26,013           | 1.00            | 26,013           | 70,098            | 1.6092            |
| 65.0                                 | 24,640   | 0.5657      | 23,325           | 1.00            | 23,325           | 44,085            | 1.0121            |
| 64.0                                 | 22,010   | 0.5053      | 20,760           | 1.00            | 20,760           | 20,760            | 0.4766            |
| 63.0                                 | 19,510   | 0.4479      | 9,755            | -               | -                | -                 | -                 |
|                                      |          | -           | -                | -               | -                | -                 | -                 |
|                                      |          | -           | -                | -               | -                | -                 | -                 |
|                                      |          |             |                  |                 |                  |                   |                   |

**Water Quality Calculations:**

Total Impervious Area: 749,232 sf

Extended Detention Pool Volume: 1.00 inches 62,436 cf

Stage: 1.4333 ac ft  
68.46 ft

Permanent Pool Volume: 1.00 inches 62,436 cf

1.4333 ac ft

## Orifice Configuration:

### WO Volume

|                               |        |     |
|-------------------------------|--------|-----|
| Extended Detention Volume:    | 62,436 | cf  |
| Minimum Volume Recovery Time: | 24     | hrs |

|                            |       |       |
|----------------------------|-------|-------|
| Average Rate of Discharge: | 2,602 | cf/hr |
|                            | 0.72  | cfs   |

|                             |        |        |
|-----------------------------|--------|--------|
| Initial Orifice Diameter:   | 5.2951 | inches |
| Invert Elevation:           | 66.50  | ft     |
| Design Orifice Coefficient: | 0.60   |        |

|                                    |       |    |
|------------------------------------|-------|----|
| Orifice Centerline Elevation:      | 66.72 | ft |
| Pond Volume at Orifice Centerline: | 6,514 | cf |

|                     |        |    |
|---------------------|--------|----|
| Adjusted Volume:    | 68,950 | cf |
| Adjusted WQv Stage: | 68.65  | ft |

|        |      |    |
|--------|------|----|
| Depth: | 1.93 | ft |
|--------|------|----|

|                                |       |    |
|--------------------------------|-------|----|
| Initial Elev of Water Surface: | 68.65 | ft |
| Final Elev of Water Surface:   | 66.72 | ft |
| Average Depth:                 | 0.96  | ft |

|                   |        |        |
|-------------------|--------|--------|
| Orifice Area:     | 0.1529 | sf     |
| Orifice Diameter: | 0.4413 | ft     |
|                   | 5.2951 | inches |

|                        |        |        |
|------------------------|--------|--------|
| Orifice Diameter Used: | 5.2500 | inches |
| or                     | 5 1/4  | inches |



# THE HASKELL COMPANY

ARCHITECTURE • ENGINEERING • CONSTRUCTION • REAL ESTATE SERVICES

Job ANHEUSER-BUSCH TRANS. ADV.

Job No. 32193 By JMS Date 2/29/00 Sheet      of     

## DOWNSTREAM EROSION CONTROL VOLUME

FROM 1 yr - 24 hr HYDROGRAPH Vol. = 185,913 CF RUNOFF

FROM FLOOD ROUTING RESULTS MAX. POND STAGE FOR  
1 yr STORM = 70.22 FE.

VOL. @ EL 70.22 FE ~ 128,085 (FROM STAGE-STORAGE)

(57,828 CF IS DISCHARGED VIA 5'1/4" ORIFICE  
DURING STORM EVENT)

TIME TO RECOVER REMAINING 128,085 c

$$X\text{-SECT. AREA OF ORIFICE} = \pi (5.25/12)^2 / 4 = 0.1503 \text{ FE.}$$

$$\text{CENTERLINE EL OF ORIFICE} = (5.25/12) / 2 + 66.5 = \underline{66.72 \text{ FE.}}$$

$$\text{AVG. EL.} = (70.22 + 66.72) / 2 = 68.47 \text{ FE.}$$

$$\therefore H = (68.47 - 66.72) = \underline{1.75 \text{ FE.}}$$

$$\begin{aligned} Q &= c A \sqrt{2gh} = (0.60)(0.1503) \sqrt{(2)(32.2)(1.75)} \\ &= \underline{0.257 \text{ CFS}} \end{aligned}$$

$$\sim \text{TIME} = (128085 \text{ CF}) / (0.257 \text{ CFS}) / (3600 \text{ Sec/hr}) \approx \underline{37.2 \text{ hrs}}$$

MINIMUM REQ'D TIME = 24 hrs

$$\therefore \underline{37.2 \text{ hrs} > 24 \text{ hrs}} \quad \text{OK}$$



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Job ANHEUSER-BUSCH TRANS. ADV.

Job No. 32193 By WS Date 3/02/00 Sheet 1 of 5

## PHASE I + PHASE II COMBINED

$$\text{EXISTING DRAINAGE AREA} = 6.3 \text{ Ac.} + 45.5 \text{ Ac.} = \underline{51.8 \text{ Ac.}}$$

$$\text{IMPERVIOUS ACREAGE} = \underline{15.6 \text{ Ac.}}$$

$$\text{OR } \underline{30.1 \%} \checkmark$$

$$\text{POST CONDITIONS DRAINAGE AREA} = 6.8 \text{ Ac.} + 44.9 \text{ Ac.} = \underline{51.7 \text{ Ac.}}$$

$$\text{IMPERVIOUS ACREAGE} = \underline{21.0 \text{ Ac.}}$$

$$\text{OR } \underline{40.6 \%}$$

$$L_{\text{PRE}} = P \times P_i \times [0.05 + 0.009 (I_{\text{site PRE}})] \times C \times A \times 2.72 / 12$$

$$= \{ (45)(0.9) [0.05 + 0.009 (30.1)] (1.06)(51.8)(2.72) \} / 12$$

$$= \underline{161.75 \text{ lbs./yr}} \checkmark$$

$$L_{\text{POST}} = P \times P_i \times [0.05 + 0.009 (I_{\text{site POST}})] \times C \times A \times 2.72 / 12$$

$$= \{ (45)(0.9) [0.05 + 0.009 (40.6)] (1.06)(51.7)(2.72) \} / 12$$

$$= \underline{208.98 \text{ lbs./yr}} \checkmark$$

$$\text{FOR RE-DEVELOPMENT: RELATIVE REMOVAL (RR)} = L_{\text{POST}} - 0.9 (L_{\text{PRE}})$$

$$\therefore \text{RR} = 208.98 - 0.9 (161.75 \text{ lbs}) = \underline{63.41 \text{ lbs/yr}} \leftarrow$$

$$\% \text{RR} = \frac{63.41}{208.98} \times 100 = \underline{30.3 \%} \checkmark$$

30.3% RAD.



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Job ANHEUSER-BUSCH TRANS. ADV.

Job No. 32193 By JWS Date 3/02/00 Sheet 2 of 5

FROM TABLE 1 - JAMES CITY COUNTY BMP GUIDELINES

WET "ED" POND @ 2"/IMP. ACRE = 60% Avg. Total P Removal Efficiency ✓

OR  $\frac{\text{REMOVAL EFF \%}}{100} \times \frac{\text{FRACTION OF CBPA DRAINAGE AREA SERVED BY POND 1 + POND 2}}{1} \times L_{\text{POT}} = \text{LOAD REMOVED}$

$$60\%/100 \times \left[ \frac{4.0 \text{ AC} + 44.9 \text{ AC}}{51.7 \text{ AC}} \right] \times 208.98 \text{ lb/yr.}$$

$$0.60 \times 0.946 \times 208.98 = \underline{118.6 \text{ lb/yr}}$$

$$\underline{118.6 > 63.4 \therefore \text{OK}}$$

REDEVELOPMENT REMOVAL EFFICIENCIES MET.



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Job ANHEUSER-BUSCH TRANS. ADV.

Job No. 32193 By JWS Date 3/02/00 Sheet 3 of 5

## DRAINAGE AREA / IMPERVIOUS AREA BREAKDOWN

EXISTING CONDITIONS - PHASE I (REF. CONST. PLAN SHEET 217)

TOTAL CONTRIBUTUTARY DRAINAGE AREA = 6.3 AC.

IMPERVIOUS AREA = 2.3 AC.

POST CONDITIONS - PHASE I (REF. ATTACHED DWG)

TOTAL CONTRIBUTUTARY DRAINAGE AREA = 6.8 AC.

IMPERVIOUS AREA = 3.9 AC.

POND 1 D.A. = 4.0 AC. (58.8% OF TOTAL)

IMPERV. AREA = 3.1 AC. (79.5% OF TOTAL)

EXISTING CONDITIONS - PHASE II (REF. CONST. PLAN SHEET 217)

TOTAL CONTRIBUTUTARY AREA = 45.5 AC.

IMPERVIOUS AREA = (0.53)(12.9 AC.) DCIA + 0.75 AC. Non-DCIA  
+ (0.027)(18.9 AC.) DCIA + 1.06 AC. Non-DCIA  
+ (0.31)(13.7 AC.) DCIA + 0.00 AC. Non-DCIA  
13.3 AC. or 29.2%

POST CONDITIONS - PHASE II (REF. CONST. PLAN SHEET 218)

TOTAL CONTRIBUTUTARY AREA = 44.9 AC.

IMPERVIOUS AREA = (0.73)(9.8 AC.) DCIA + 0.5 AC. Non-DCIA  
+ (0.22)(21.4 AC.) DCIA + 0.5 AC. Non-DCIA  
+ (0.31)(13.7 AC.) DCIA + 0.0 AC. Non-DCIA  
17.1 AC. or 38.1%

1" = 200 FE.

### POST-CONDITIONS

PHASE I TOTAL CONTRIBUTING  
DRAINAGE AREA = 6.8 Ac.

TOTAL IMPERVIOUS = 3.9 Ac.

N/E ANHEUSE  
D.B. 125  
D.B. 224  
D.B. 233 PC

### POST-CONDITIONS

PHASE I AREA  
CONTRIBUTING TO POND 1  
= 4.0 Ac.

IMPERVIOUS = 3.1 Ac.





## James City County BMP Guidelines

ie. 4x WQV EQUIVALENT  
WHERE WQV BY STATE  
DEFINITION = 0.5 INCH OF RUNOFF  
FROM IMPERV. COVER

**Table 1: BMP Point System for evaluating acceptable water quality BMPs and preservation of open space**

| BMP  | Treatment Volume (WQ <sub>v</sub> ) | Average Total P Removal Efficiency | Points |
|--|-------------------------------------|------------------------------------|--------|
| <b>A. WET POND</b>   |                                     |                                    |        |
| 1. Small Wet Pond  | 1.5 in / imp acre                   | 40%                                | 6      |
| 2. Wet Pond  | 2.0 in / imp acre                   | 50%                                | 8      |
| 3. Wet ED Pond   | 2.0 in / imp acre                   | 60%                                | 10     |
| <b>B. WETLANDS</b>   |                                     |                                    |        |
| 1. Shallow Marsh   | 1.0 in / imp acre                   | 40%                                | 6      |
| 2. ED Shallow Wetland  | 1.0 in / imp acre                   | 40%                                | 6      |
| 3. Pond/Wetland System   | 1.0 in / imp acre                   | 60%                                | 10     |
| 4. Pocket Wetland  | 1.0 in / imp acre                   | 40%                                | 6      |
| <b>C. INFILTRATION (TRENCH OR BASIN)</b>   |                                     |                                    |        |
| 1. Infiltration Trench   | 0.5 in / imp acre                   | 50%                                | 8      |
| 2. Infiltration Trench   | 1.0 in / imp acre                   | 60%                                | 10     |
| 3. Infiltration Basin  | 0.5 in / imp acre                   | 50%                                | 8      |
| 4. Infiltration Basin  | 1.0 in / imp acre                   | 60%                                | 10     |
| <b>D. FILTERING SYSTEMS</b>  |                                     |                                    |        |
| 1. Bioretention  | 1.0 in / imp acre                   | 50%                                | 8      |
| 2. Surface Sand Filter   | 1.0 in / imp acre                   | 50%                                | 8      |
| 3. Underground Sand Filter   | 1.0 in / imp acre                   | 50%                                | 8      |
| 4. Perimeter Sand Filter   | 1.0 in / imp acre                   | 50%                                | 8      |
| 5. Organic Filter  | 1.0 in / imp acre                   | 50%                                | 8      |
| 6. Pocket Sand Filter  | 1.0 in / imp acre                   | 40%                                | 6      |
| <b>E. OPEN CHANNEL SYSTEMS</b>   |                                     |                                    |        |
| 1. Wet Swale (check dams)  | 1.0 in / imp acre                   | 30%                                | 4      |
| 2. Dry Swale   | 1.0 in / imp acre                   | 60%                                | 10     |
| 3. Biofilters  | 1.0 in / imp acre                   | 30%                                | 4      |
| <b>F. EXTENDED DRY DETENTION</b>   |                                     |                                    |        |
| 1. Timber Walls  | 1.0 in / imp acre                   | 30%                                | 4      |
| 2. Dry ED with forebay   | 1.0 in / imp acre                   | 30%                                | 4      |
| <b>G. OPEN SPACE CONSERVATION EASEMENTS</b>  |                                     |                                    |        |
| 1. Accepts and treats stormwater runoff from the development site per design specification | 0.15 per 1% of site area            |                                    |        |
| 2. Adjacent to a wetland, mature forest, or RPA  | 0.15 per 1% of site area            |                                    |        |
| 3. All other open space  | 0.10 per 1% of site area            |                                    |        |





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Job ANHEUSER-BUSCH TRANS. ADV.

Job No. 32193 By JWS Date 3/01/00 Sheet      of     

## FLOTATION CALCULATIONS

$$\begin{aligned}\text{BASE: } (14')(6')(1')(150 \text{ lb/cf}) &= 12,600 \text{ lb.} \\ \text{TOP: } (14')(6')(0.5')(150 \text{ lb/cf}) &= 6,300 \text{ lb.} \\ \text{END WALLS: } (8.75')(6')(1')(150 \text{ lb/cf}) \times 2 &= 15,750 \text{ lb.} \\ \text{REAR WALL: } (8.75')(12')(1')(150 \text{ lb/cf}) &= 15,750 \text{ lb.} \\ \text{FRONT WALL: } (6.25')(12')(1')(150 \text{ lb/cf}) &= 11,850 \text{ lb.} \\ \text{BOTTOM SLABING: } (4')(12')(1.1')(150 \text{ lb/cf}) &= 7,920 \text{ lb.}\end{aligned}$$

$$\text{TOTAL} = \underline{70,170 \text{ lb.}} \checkmark$$

VOLUME OF WATER DISPLACED

By STRUCTURE:

$$\begin{aligned}(6')(14')(10.25') &= 861 \text{ CF} \\ &\times 62.4 \text{ lb/cf} \\ &= \underline{53,727 \text{ lb.}}\end{aligned}$$

$$\begin{aligned}\frac{\text{DOWNWARD FORCE}}{\text{UPWARD FORCE}} &= \frac{70,170}{53,727} \\ &= \underline{1.31} \quad (1.31 > 1.25)\end{aligned}$$

$$\text{SOIL LOAD: } 70,170 / [(6)(14)] = \underline{835 \text{ lb/sf}} \text{ OK}$$

FLOTATION CALCS ASSUMES ONLY WEIGHT OF STRUCTURE  
AND DISREGARDS PIPE & INFLOWING WATER.

REFERENCE STRUCTURE CONSTRUCTION DETAIL  
FOR ANCHORAGE OF BASE AND RISER SECTIONS.



# THE HASKELL COMPANY

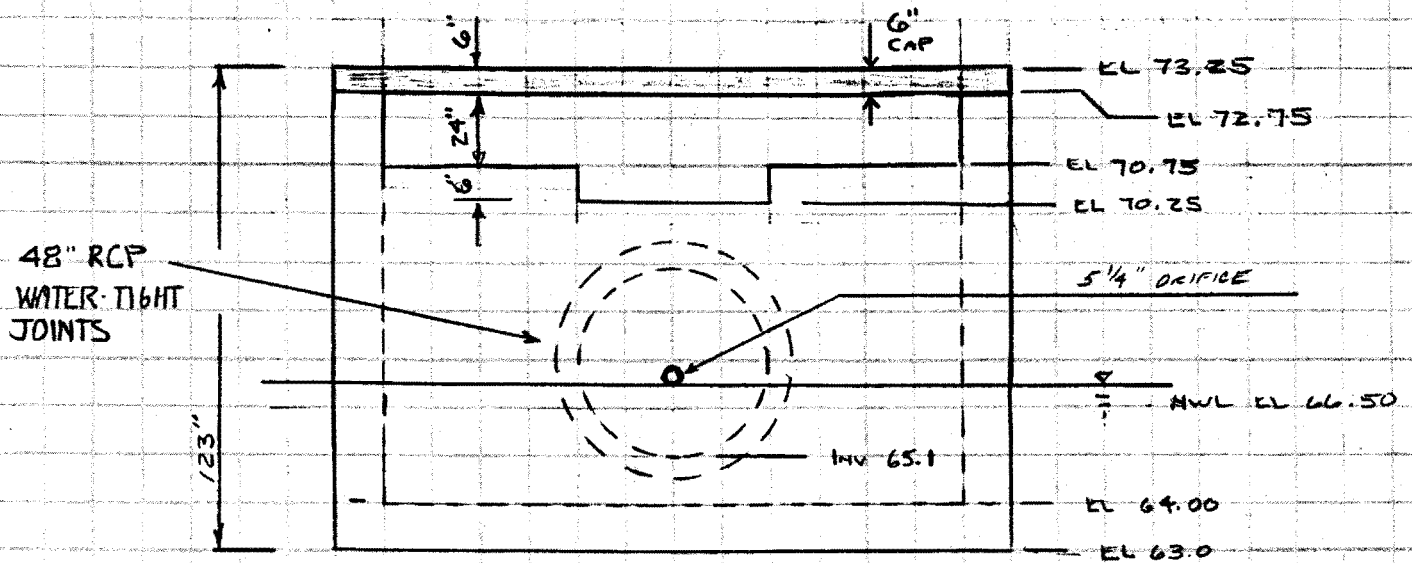
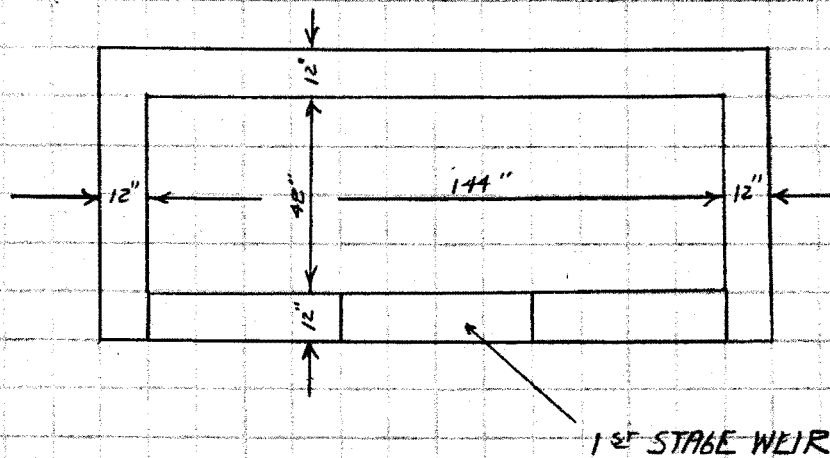
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Job ANHEUSE BUSCH TRANS ADV.

Job No. 32193 By JWS Date 3/1/00 Sheet      of     

## POND 2 CONTROL STRUCTURE

(REVISED 3/01/00)



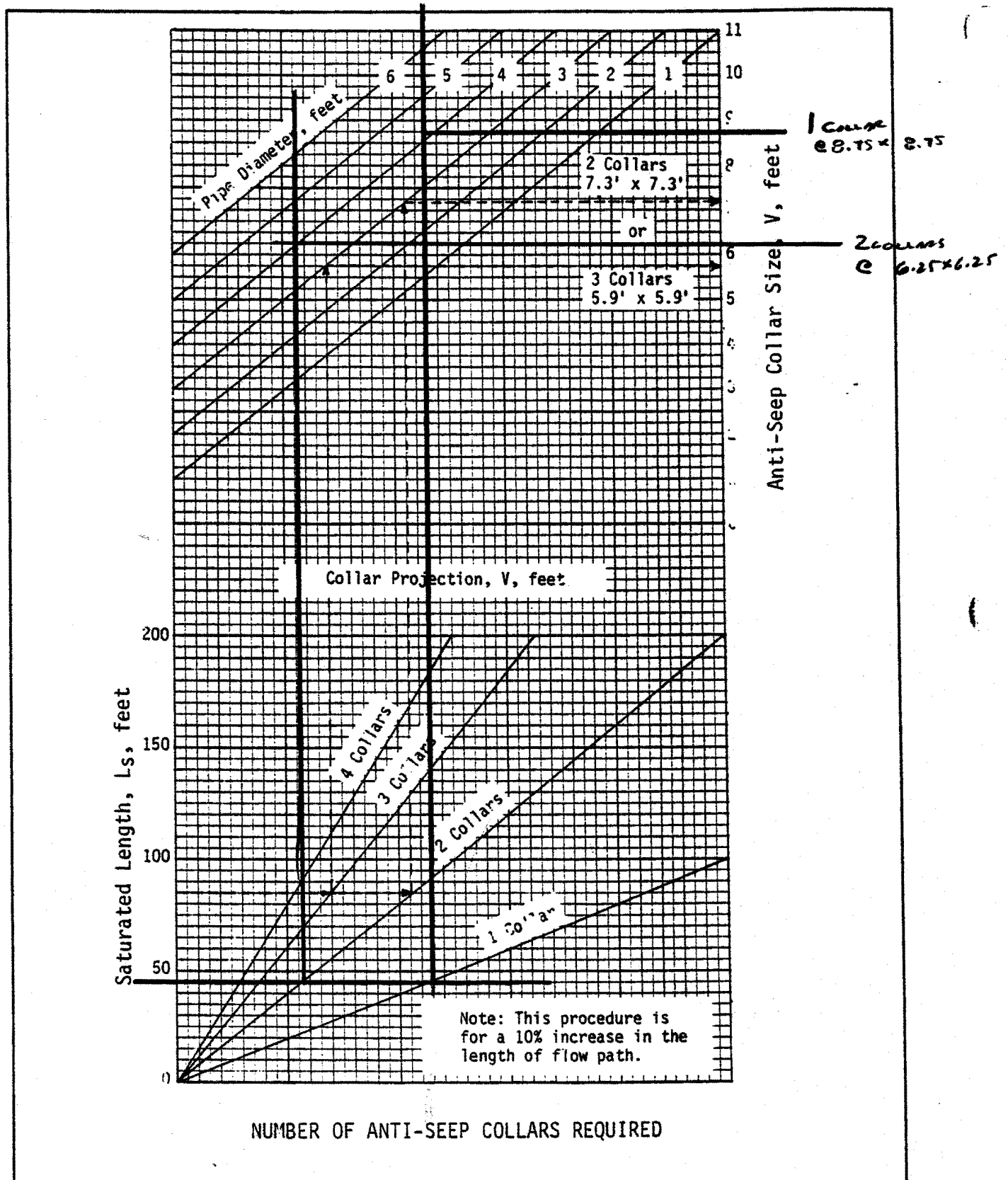


Job No. 32193 By JWS Date 3/16/00 Sheet      of



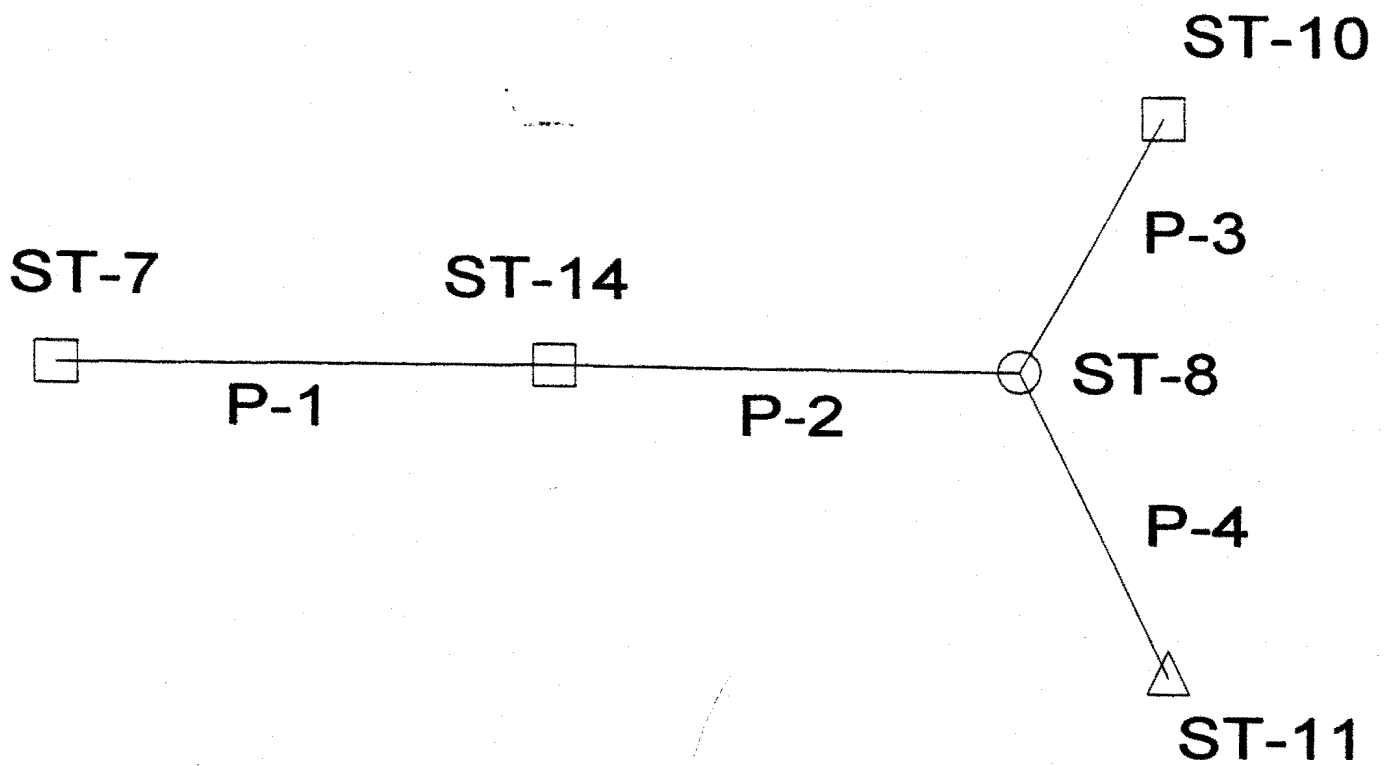
Job No. 32193 By JWS Date 3/06/00 Sheet      of     

CC016\_ANHEUSER\_BUSCH\_TRANS\_ADVANT - 334 of 422



Source: USDA-SCS

Plate 3.14-12



2-7

# Pipe Report

7806 HW

| Pipe | Upstream Node | Downstream Node | Length (ft) | Section Size | Constructed Slope (ft/ft) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream HGL (ft) | Downstream HGL (ft) | Average Velocity (ft/s) | Discharge (cfs) |
|------|---------------|-----------------|-------------|--------------|---------------------------|--------------------------------|----------------------------------|-------------------|---------------------|-------------------------|-----------------|
| P-3  | ST-10         | ST-8            | 60.00       | 15 inch      | 0.020000                  | 71.26                          | 70.06                            | 71.87             | 71.54               | 2.89                    | 2.30            |
| P-1  | ST-7          | ST-14           | 81.00       | 15 inch      | 0.015556                  | 73.00                          | 71.74                            | 74.03             | 72.60               | 6.68                    | 6.55            |
| P-2  | ST-14         | ST-8            | 60.00       | 15 inch      | 0.015500                  | 70.74                          | 69.81                            | 72.15             | 71.54               | 5.34                    | 6.55            |
| P-4  | ST-8          | ST-11           | 32.00       | 18 inch      | 0.010000                  | 69.81                          | 69.49                            | 70.96             | 70.55               | 6.36                    | 8.85            |

10 YR STORM

FLOW DEPTH @ ST-10 ~ 71.87

- 71.26

0.61 FL. ←

2.8

# Pipe Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Section Size | Constructed Slope (ft/ft) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream HGL (ft) | Downstream HGL (ft) | Average Velocity (ft/s) | Discharge (cfs) |
|------|---------------|-----------------|-------------|--------------|---------------------------|--------------------------------|----------------------------------|-------------------|---------------------|-------------------------|-----------------|
| P-3  | ST-10         | ST-8            | 60.00       | 15 inch      | 0.020000                  | 71.26                          | 70.06                            | 71.79             | 70.77               | 3.06                    | 1.80            |
| P-1  | ST-7          | ST-14           | 81.00       | 15 inch      | 0.015556                  | 73.00                          | 71.74                            | 73.49             | 72.11               | 4.22                    | 1.50            |
| P-2  | ST-14         | ST-8            | 60.00       | 15 inch      | 0.015500                  | 70.74                          | 69.81                            | 71.23             | 70.77               | 2.45                    | 1.50            |
| P-4  | ST-8          | ST-11           | 32.00       | 18 inch      | 0.010000                  | 69.81                          | 69.49                            | 70.50             | 70.29               | 3.79                    | 3.30            |

2 yr STORM

FLOW DEPTH @ ST-10 - 71.79  
 - 71.26  
0.53 ft. →

2-9





## CULVERT ST-12 TO ST-13

$Q_2 \sim 1.0 \text{ cfs}$  (FROM TRAPEZOIDAL CHANNEL SAKARSMET  $TW \sim 0.4'$ )  
 $Q_{10} \sim 1.3 \text{ cfs}$  ( $TW \sim 0.4 \text{ FE}$ )

15" RCP @ 2.00%,  $n = 0.013$ , 94.4 +/-

$$K_{P_2} = Q_n / D^{8/3} S^{1/2} = (1.0)(0.013) / (1.25)^{8/3} (0.02)^{1/2} = \underline{0.0507}$$

From Fig 7-9,  $d/D = 0.223^{+/-}$   $\therefore d = (0.223)(1.25) = \underline{0.28 \text{ FE.}}$

From Fig 7-10  $d/D = 0.223^{+/-}$   $K_v \approx 0.386^{+/-}$

AND,  $V = \frac{K_v D^{2/3} S^{1/2}}{n} = \frac{(0.386)(1.25)^{2/3} (0.02)^{1/2}}{0.013} = \underline{4.9 \text{ FPS}} \text{ OK}$

HW < Crown of Pipe OK ✓

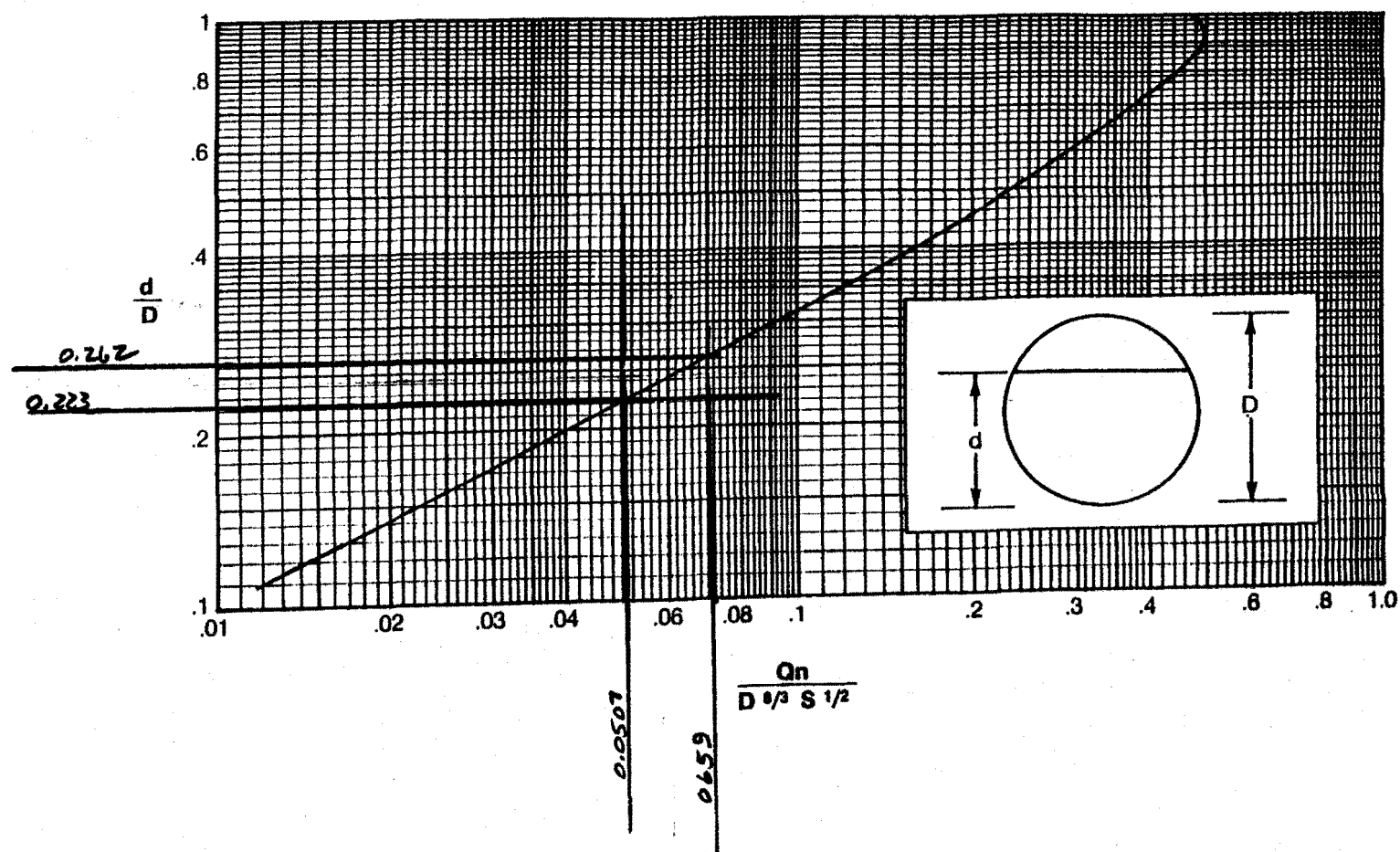
$$K_{P_n} = (1.3)(0.013) / (1.25)^{8/3} (0.02)^{1/2} = \underline{0.0659}$$

From Fig 7-9,  $d/D \sim 0.262$   $\therefore d = (0.262)(1.25) = \underline{0.33 \text{ FE.}}$

From Fig 7-10  $d/D = 0.262^{+/-}$   $K_v \approx 0.425^{+/-}$

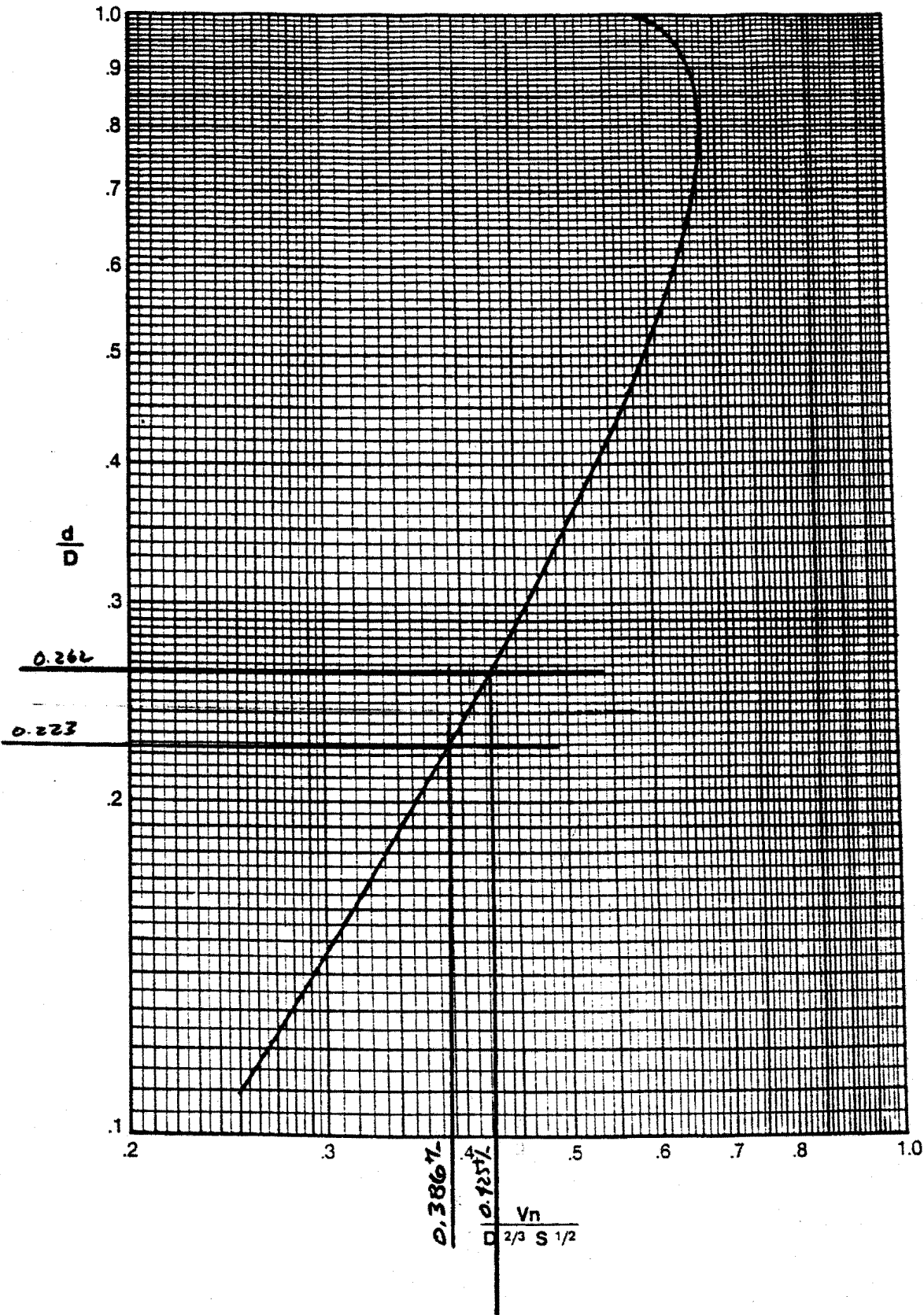
AND,  $V = \frac{(0.425)(1.25)^{2/3} (0.02)^{1/2}}{0.013} \approx \underline{5.4 \text{ FPS}} \text{ OK}$

HW < Crown of Pipe OK ✓



**FIGURE 7-9**  
**Circular Pipe Partial Flow Capacity Chart**

CC016 ANHEUSER BUSCH TRANS. ADVANT. 340 of 422



**FIGURE 7-10**  
Circular Pipe Partial Flow Velocity Chart

"TRAPEZOIDAL" CHANNEL WORKSHEET

| <div> <div> <div>Left SS (H:1)</div> <div>Right SS (H:1)</div> <div>Bottom Width</div> <div>Channel Slope (%)</div> <div>Depth Increment, ft</div> <div>Manning's "n"</div> </div> <div> <div>Input:</div> <div> <div>2.00</div> <div>12.00</div> <div>0.00</div> <div>2.00</div> <div>0.02</div> <div>0.075</div> </div> </div> </div> |                              |                               |                   |                          |                          |                          |                             |                           |
|---|------------------------------|-------------------------------|-------------------|--------------------------|--------------------------|--------------------------|-----------------------------|---------------------------|
| Very Poor Natural Channel   |                              |                               |                   |                          |                          |                          |                             |                           |
| Depth<br>(ft)   | Left Horiz. Distance<br>(ft) | Right Horiz. Distance<br>(ft) | Top Width<br>(ft) | Wetted Perimeter<br>(ft) | X-Sectional Area<br>(sf) | Hydraulic Radius<br>(ft) | Manning's Eq. Vel.<br>(fps) | Flow Rate (Q=VA)<br>(cfs) |
| 0.00  | 0.00                         | 0.00                          | 0.00              | 0.00                     | 0.00                     | 0.00                     | 0.00                        | 0.00                      |
| 0.02  | 0.04                         | 0.24                          | 0.28              | 0.29                     | 0.00                     | 0.01                     | 0.13                        | 0.00                      |
| 0.04  | 0.08                         | 0.48                          | 0.56              | 0.57                     | 0.01                     | 0.02                     | 0.20                        | 0.00                      |
| 0.06  | 0.12                         | 0.72                          | 0.84              | 0.86                     | 0.03                     | 0.03                     | 0.27                        | 0.01                      |
| 0.08  | 0.16                         | 0.96                          | 1.12              | 1.14                     | 0.04                     | 0.04                     | 0.32                        | 0.01                      |
| 0.10  | 0.20                         | 1.20                          | 1.40              | 1.43                     | 0.07                     | 0.05                     | 0.38                        | 0.03                      |
| 0.12  | 0.24                         | 1.44                          | 1.68              | 1.71                     | 0.10                     | 0.06                     | 0.42                        | 0.04                      |
| 0.14  | 0.28                         | 1.68                          | 1.96              | 2.00                     | 0.14                     | 0.07                     | 0.47                        | 0.06                      |
| 0.16  | 0.32                         | 1.92                          | 2.24              | 2.28                     | 0.18                     | 0.08                     | 0.51                        | 0.09                      |
| 0.18  | 0.36                         | 2.16                          | 2.52              | 2.57                     | 0.23                     | 0.09                     | 0.56                        | 0.13                      |
| 0.20  | 0.40                         | 2.40                          | 2.80              | 2.86                     | 0.28                     | 0.10                     | 0.60                        | 0.17                      |
| 0.22  | 0.44                         | 2.64                          | 3.08              | 3.14                     | 0.34                     | 0.11                     | 0.63                        | 0.22                      |
| 0.24  | 0.48                         | 2.88                          | 3.36              | 3.43                     | 0.40                     | 0.12                     | 0.67                        | 0.27                      |
| 0.26  | 0.52                         | 3.12                          | 3.64              | 3.71                     | 0.47                     | 0.13                     | 0.71                        | 0.34                      |
| 0.28  | 0.56                         | 3.36                          | 3.92              | 4.00                     | 0.55                     | 0.14                     | 0.75                        | 0.41                      |
| 0.30  | 0.60                         | 3.60                          | 4.20              | 4.28                     | 0.63                     | 0.15                     | 0.78                        | 0.49                      |
| 0.32  | 0.64                         | 3.84                          | 4.48              | 4.57                     | 0.72                     | 0.16                     | 0.82                        | 0.58                      |
| 0.34  | 0.68                         | 4.08                          | 4.76              | 4.85                     | 0.81                     | 0.17                     | 0.85                        | 0.69                      |
| 0.36  | 0.72                         | 4.32                          | 5.04              | 5.14                     | 0.91                     | 0.18                     | 0.88                        | 0.80                      |
| 0.38  | 0.76                         | 4.56                          | 5.32              | 5.43                     | 1.01                     | 0.19                     | 0.91                        | 0.92                      |
| 0.40  | 0.80                         | 4.80                          | 5.60              | 5.71                     | 1.12                     | 0.20                     | 0.95                        | 1.06                      |
| 0.42  | 0.84                         | 5.04                          | 5.88              | 6.00                     | 1.23                     | 0.21                     | 0.98                        | 1.21                      |
| 0.44  | 0.88                         | 5.28                          | 6.16              | 6.28                     | 1.36                     | 0.22                     | 1.01                        | 1.37                      |
| 0.46  | 0.92                         | 5.52                          | 6.44              | 6.57                     | 1.48                     | 0.23                     | 1.04                        | 1.54                      |
| 0.48  | 0.96                         | 5.76                          | 6.72              | 6.85                     | 1.61                     | 0.24                     | 1.07                        | 1.72                      |
| 0.50  | 1.00                         | 6.00                          | 7.00              | 7.14                     | 1.75                     | 0.25                     | 1.10                        | 1.92                      |

**ADDENDUM NO. 4**

**TO**

**STORMWATER MANAGEMENT PLAN**

**for**

**TRANSPORTATION ADVANTAGE – PHASE II  
ANHEUSER-BUSCH, INC.**

*Williamsburg, Virginia*



**SP-88-00  
(AMEND. SP-13-00)**

**THE HASKELL COMPANY**

Haskell Building  
Jacksonville, Florida

Project 32193

Revised Issue: July 14, 2000

Revised Issue: March 8, 2000

Revised Issue: January 27, 2000

Addendum #1 Issue: December 15, 1999

Original Issue: November 16, 1999

*Michael H. Haskell*  
**7-14-00**



**T H E H A S K E L L C O M P A N Y**

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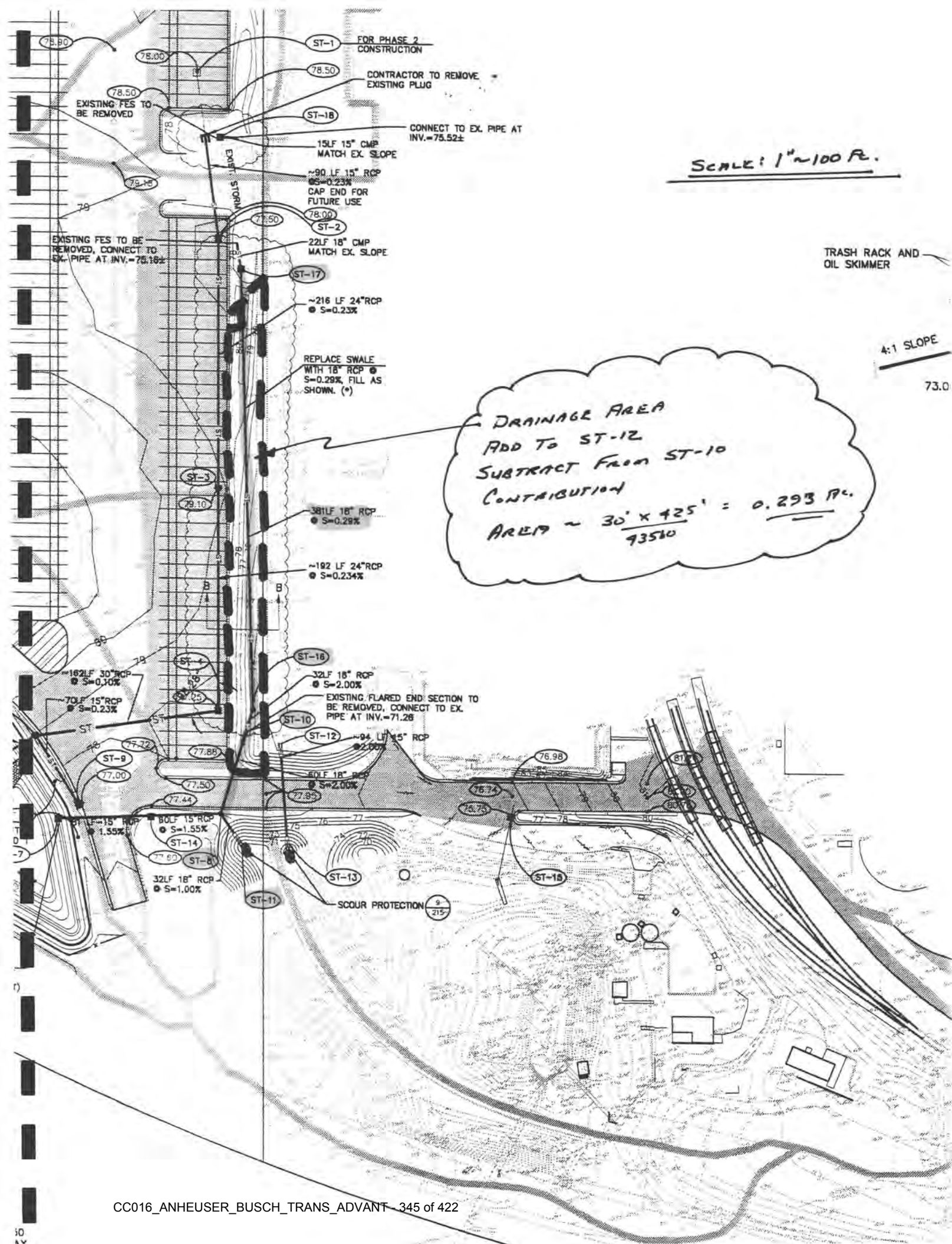
Drainage Analysis for Replacement of Open-Channel along Phase I easterly parking area with 18-inch RCP storm pipe.

Changes to the previously approved plans and drainage calculations:

1. Previously permitted 15-inch RCP connecting ST-10 to ST-8 was replaced with 18-inch RCP. ✓
2. ST-10 (flared end section) was deleted 18-inch RCP was extended to new manhole structure ST-16. ✓
3. Previously permitted open-channel between Phase I parking and existing monorail was replaced with approximately 381 LF – 18 inch RCP @ 0.29% slope. ✓
4. New structure ST-17 (grated inlet) was installed to connect new 18-inch RCP with existing storm pipe running under existing concrete driveway. ✓
5. New structure ST-18 (grated inlet) was installed connecting existing 15-inch cmp running under monorail from plant site to existing 18-inch storm cmp under existing driveway. ✓
6. Contributing drainage areas change with new installation. Drainage area contribution from storm structure ST-16 to storm structure ST-8 (previously ST-10 to ST-8) is reduced by approximately 0.293 acres of pervious area. Drainage area contribution to storm structure ST-12 is increased by 0.293 acres of pervious area. ✓
7. The difference in time of concentration between pipe flow and shallow concentrated flow is approximately 2 minutes; therefore, time of concentration is reduced from 15 minutes to 13 minutes for the drainage area contributing to ST-16. There is no change in time of concentration for the drainage area contributing to storm structure ST-12 and 10 minutes is used as in previous calculations. ✓
8. Runoff coefficients for drainage areas change (see attached).

#### Results of Drainage Analysis:

Results of analysis as shown on following pages indicate that the 18-inch RCP pipe is adequate to replace the open-channel with negligible impact to areas downstream of the system.



$$\begin{aligned} \text{ST-16 CONTRIBUTING DRAINAGE AREA} &= 1.30 \text{ Ac.} \\ &= 0.79 \text{ Ac.} \\ &\underline{1.01 \text{ Ac.}} \end{aligned}$$

$$\text{IMPERV. AREA} = 0.24 \text{ Ac. (No Change)}$$

$$\bar{C} = [(0.24)(0.95) + (0.77)(0.20)] / 1.01 = 0.38$$

$$T_c = 13 \text{ min.} \therefore i_2 = 4.25''/\text{hr}$$

$$i_{10} = 5.50''/\text{hr}$$

$$\text{AND } Q_2 = (1.01)(4.25)(0.38) = 1.63 \text{ CFS}$$

$$Q_{10} = (1.01)(5.50)(0.38) = 2.11 \text{ CFS}$$

$$\begin{aligned} \text{ST-12 CONTRIBUTING DRAINAGE AREA} &= 0.68 \text{ Ac.} \\ &+ 0.29 \text{ Ac.} \\ &\underline{0.97 \text{ Ac.}} \end{aligned}$$

$$\text{IMPERV. AREA} = 0.065 \text{ Ac. @ } C = 0.95 \text{ (No Change)}$$

$$\text{SEMI-IMPERV. AREA} = 0.069 \text{ Ac. @ } C = 0.50 \text{ (No Change)}$$

$$\text{PERV. AREA} = 0.837 \text{ Ac. @ } C = 0.20$$

$$\begin{aligned} \bar{C} &= [(0.065)(0.95) + (0.069)(0.50) + (0.837)(0.20)] / 0.97 \\ &= 0.27 \end{aligned}$$

$$T_c = 10 \text{ min. (No Change)} \therefore i_2 = 4.75''/\text{hr}$$

$$i_{10} = 6.00''/\text{hr}$$

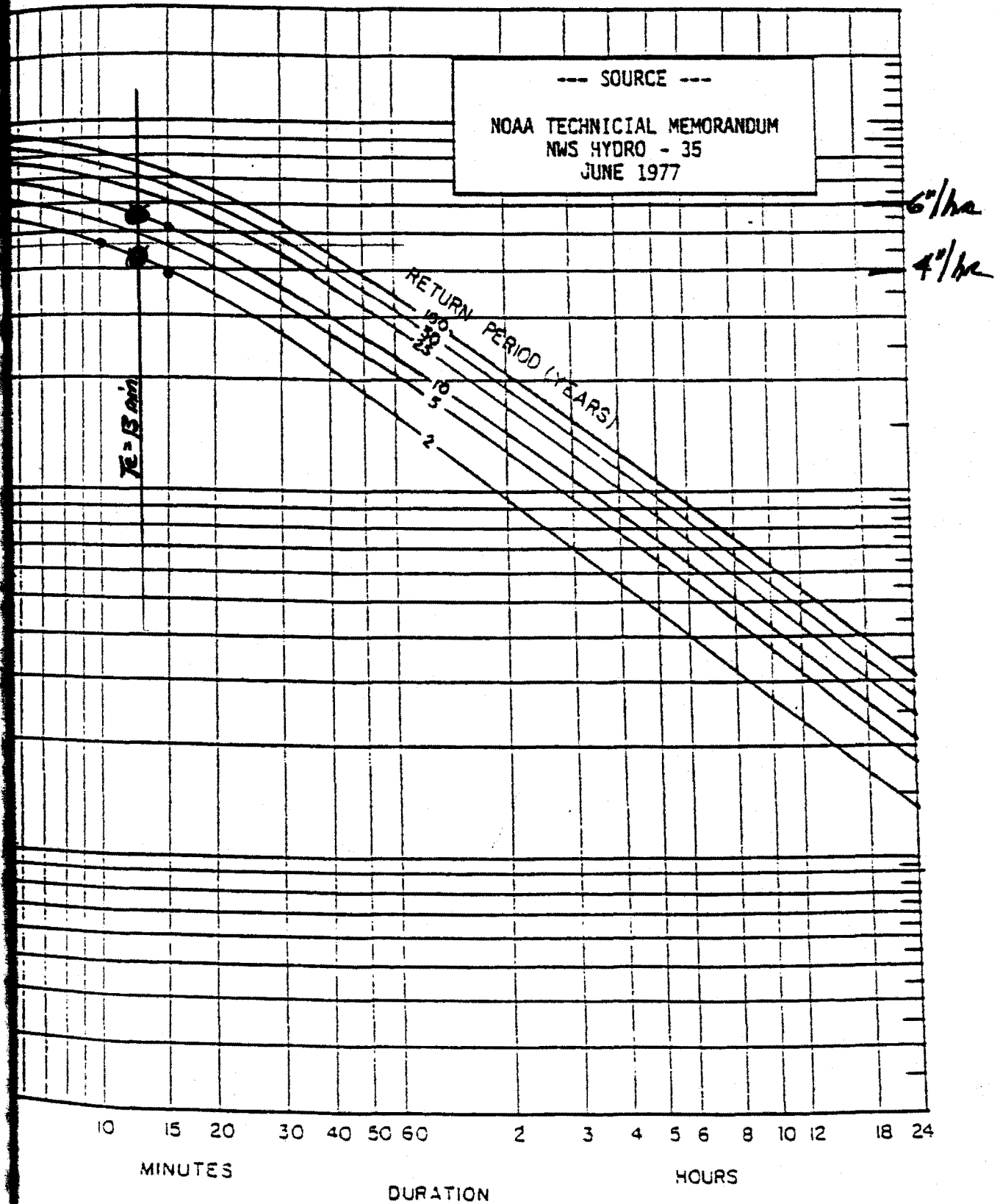
$$\text{AND } Q_2 = (0.97)(4.75)(0.27) = 1.24 \text{ CFS}$$

$$Q_{10} = (0.97)(6.00)(0.27) = 1.57 \text{ CFS}$$



Fig. 1.5.1.7

NORFOLK, VA.





VELOCITY CHECK  
PARTIAL FLOW

$Z_{\text{re}} Q = \underline{1.63 \text{ cfs}}$

18" RCP @ 0.29% (n = 0.013)

$$K_p = \frac{Q_n}{D^{2/3} S^{1/2}} = \frac{(1.63)(0.013)}{(1.5)^{2/3} (0.0029)^{1/2}} = \underline{0.1335}$$

From Fig. 7-9,  $d/D = 0.36$

From Fig. 7-10 &  $d/D = 0.36$   $K_v = 0.50$

$$\therefore V = \frac{K_v D^{2/3} S^{1/2}}{n} = \frac{(0.50)(1.5)^{2/3} (0.0029)^{1/2}}{0.013} = \underline{2.71 \text{ fps}} > \underline{2.5 \therefore \text{OK}}$$

CLEAN-OUT VELOCITY OK



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Job AB-Wab

Job No. 32193 By JWS Date 7/1/00 Sheet 2 of 2

## VELOCITY CHECK PARTIAL FLOW

ST-12 TO ST-13

$Q_2 = \underline{1.29 \text{ cfs}}$

15" RCP @ 2%, ( $n = 0.013$ )

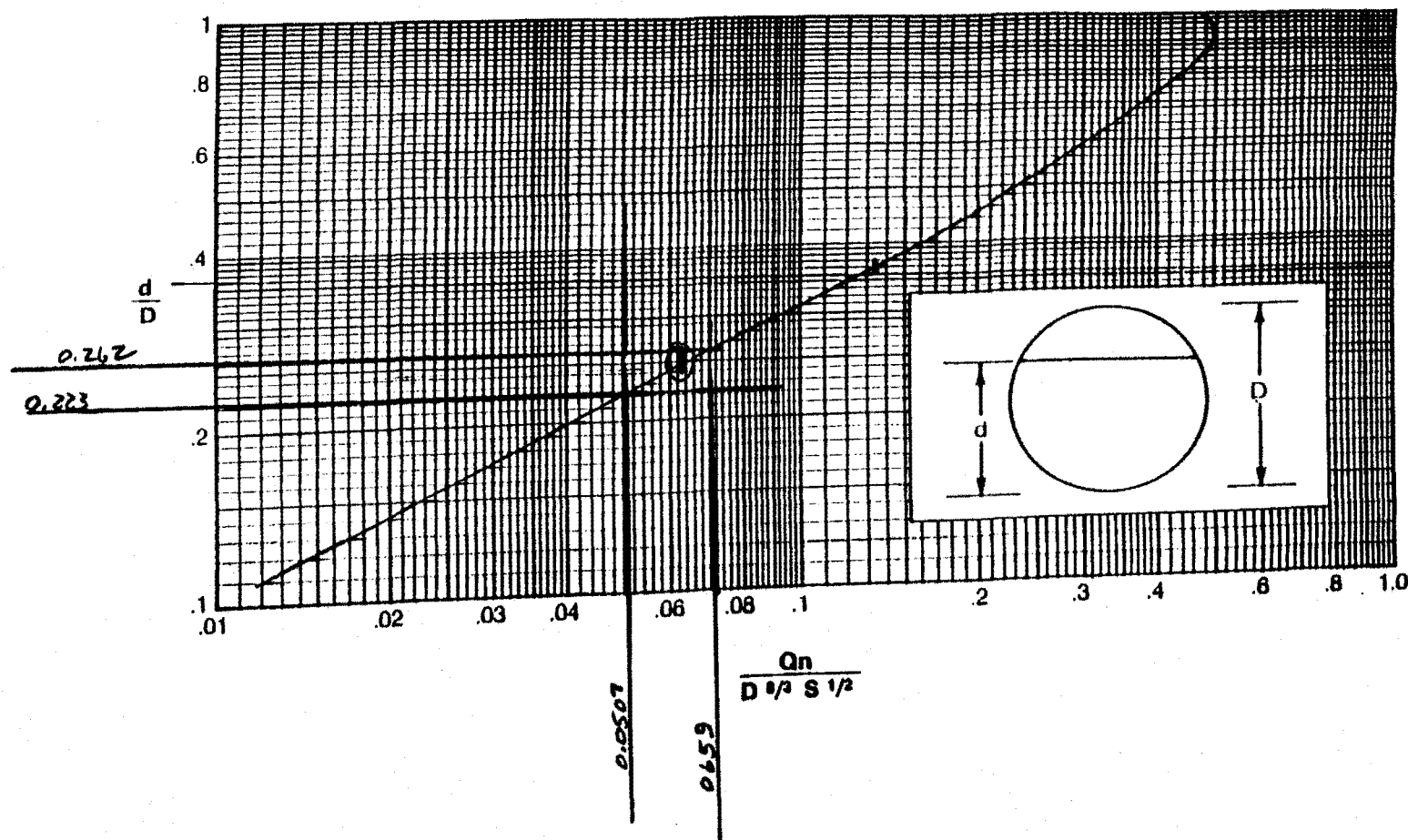
$$K_p = Q / D^{2/3} S^{1/2} = (1.29)(0.013) / (1.25)^{2/3} (0.02)^{1/2} \\ = \underline{0.0629}$$

From Fig. 7-9,  $d/D = 0.25$

From Fig. 7-10  $\& d/D = 0.25$   $K_v = 0.41$

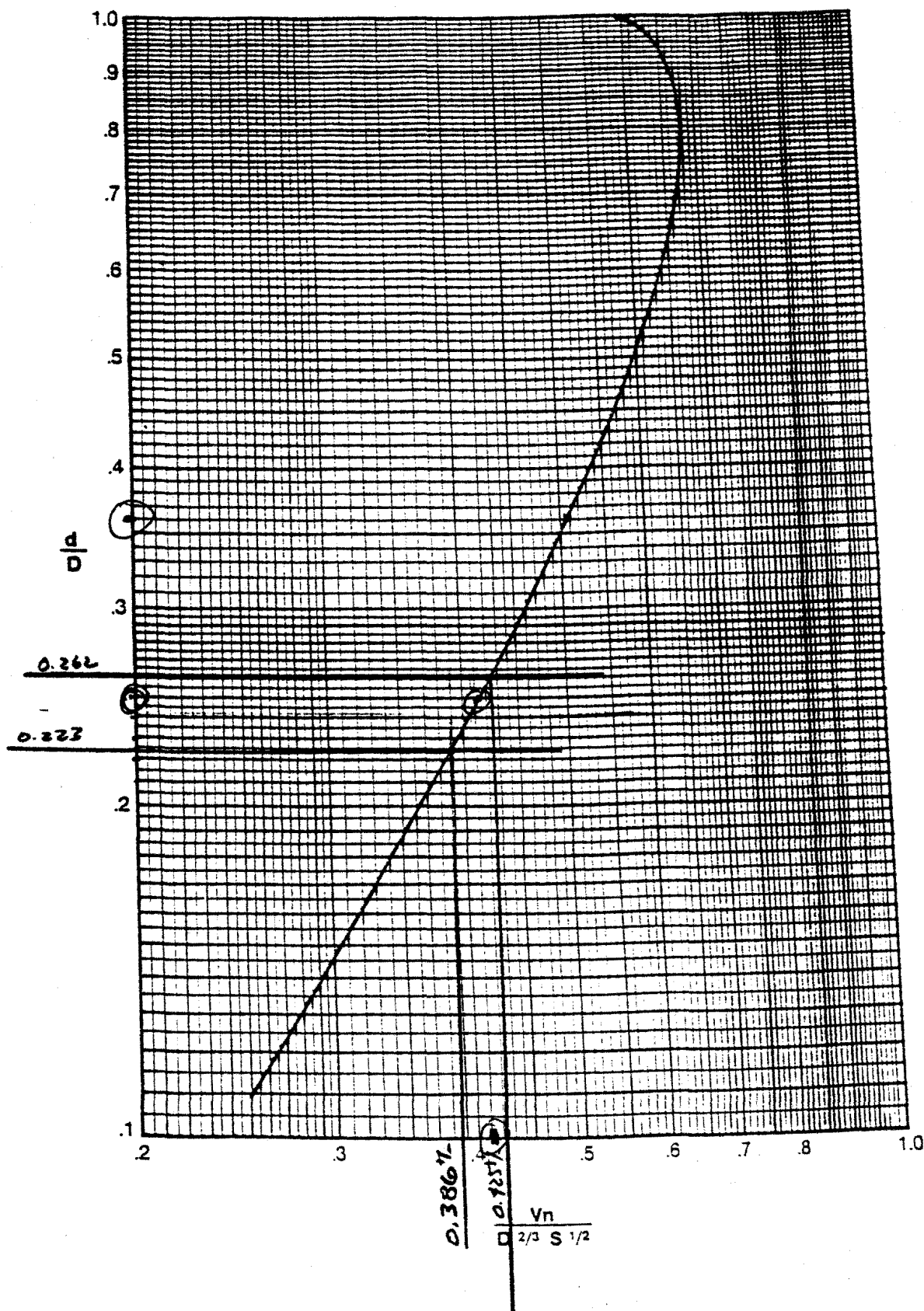
$$V = \frac{K_v D^{2/3} S^{1/2}}{n} = (0.41)(1.25)^{2/3} (0.02)^{1/2} / 0.013 \\ = 5.18 \text{ fps } (< 6 \text{ fps ok})$$

PREVIOUSLY CALCULATED @ 4.9 fps  
Negligible



**FIGURE 7-9**  
Circular Pipe Partial Flow Capacity Chart

CC016 ANHEUSER\_BUSCH\_TRANO\_ADVANT - 350 of 422



**FIGURE 7-10**  
Circular Pipe Partial Flow Velocity Chart

Anheuser Busch Williamsburg Brewery Truck Entrance  
Design Calculations  
Work in Right of Way

Contents

- Storm Sewer Design Calculations
- Time of Concentration-Roadside ditch sections
- Ditch Capacity Calculations
- Inlet Sizing and Spread Calculations

Add to Section Four  
Addendum No 2  
To  
STORM WATER MANAGEMENT PLAN  
for  
TRANSPORTATION ADVANTAGE - PHASE II  
ANHEUSER-BUSCH, INC.  
Williamsburg VA

US Route 60  
Computations

PROJECT NO. 19900223-000.06

[illegible]

OK ✓

Quick TR-55 Ver.5.46 S/N:  
 Executed: 14:45:13 12-13-1999 a:BREW60.TCT

Brewery Route 60 Frontage Drainage  
 Time of Concentration Through Roadside Channels

Tc COMPUTATIONS FOR: signalized ent

SHEET FLOW (Applicable to Tc only)

|                                     |          |        |        |
|-------------------------------------|----------|--------|--------|
| Segment ID                          | 1a       |        |        |
| Surface description                 | pavement |        |        |
| Manning's roughness coeff., n       | 0.0130   |        |        |
| Flow length, L (total < or = 300)   | ft       | 95.0   |        |
| Two-yr 24-hr rainfall, P2           | in       | 3.360  |        |
| Land slope, s                       | ft/ft    | 0.0050 |        |
|                                     | 0.8      |        |        |
| $T = \frac{.007 * (n * L)}{P2 * s}$ |          |        |        |
|                                     | hrs      | 0.04   | = 0.04 |

SHALLOW CONCENTRATED FLOW

|                              |         |        |        |
|------------------------------|---------|--------|--------|
| Segment ID                   | 1c      |        |        |
| Surface (paved or unpaved)?  | Unpaved |        |        |
| Flow length, L               | ft      | 10.0   |        |
| Watercourse slope, s         | ft/ft   | 0.0020 |        |
|                              | 0.5     |        |        |
| Avg.V = Csf * (s)            | ft/s    | 0.7216 |        |
| where: Unpaved Csf = 16.1345 |         |        |        |
| Paved Csf = 20.3282          |         |        |        |
| $T = L / (3600 * V)$         |         |        |        |
|                              | hrs     | 0.00   | = 0.00 |

CHANNEL FLOW

|  |       |        |        |
|--|-------|--------|--------|
| Segment ID                               |       |        |        |
| Cross Sectional Flow Area, a             | sq.ft | 0.00   |        |
| Wetted perimeter, Pw                     | ft    | 0.00   |        |
| Hydraulic radius, r = a/Pw               | ft    | 0.000  |        |
| Channel slope, s                         | ft/ft | 0.0000 |        |
| Manning's roughness coeff., n            |       | 0.0000 |        |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ |       |        |        |
|  | ft/s  | 0.0000 |        |
| Flow length, L                           | ft    | 0      |        |
| $T = L / (3600 * V)$                     |       |        |        |
|  | hrs   | 0.00   | = 0.00 |

.....  
 TOTAL TIME (hrs) 0.04

Quick TR-55 Ver.5.46 S/N:  
 Executed: 14:45:13 12-13-1999 a:BREW60.TCT



Brewery Route 60 Frontage Drainage  
Time of Concentration Through Roadside Channels

Tc COMPUTATIONS FOR: sig-extruck ent

SHEET FLOW (Applicable to Tc only)

| Segment ID  | 2a           | 2b          |        |
|---|--------------|-------------|--------|
| Surface description                                   | pavement     | grass       |        |
| Manning's roughness coeff., n                         | 0.0130       | 0.0200      |        |
| Flow length, L (total < or = 300)                     | ft 30.0      | 70.0        |        |
| Two-yr 24-hr rainfall, P2                             | in 3.360     | 3.360       |        |
| Land slope, s   | ft/ft 0.0050 | 0.0100      |        |
|   |              |             | 0.8    |
| $T = \frac{.007 * (n * L)^{0.8}}{P2^{0.5} * s^{0.4}}$ |              |             |        |
|   | hrs          | 0.01 + 0.03 | = 0.05 |

SHALLOW CONCENTRATED FLOW

| Segment ID                   | 2c           |             |
|------------------------------|--------------|-------------|
| Surface (paved or unpaved)?  | Unpaved      |             |
| Flow length, L               | ft 15.0      |             |
| Watercourse slope, s         | ft/ft 0.2000 |             |
|                              |              | 0.5         |
| Avg.V = Csf * (s)            | ft/s 7.2156  |             |
| where: Unpaved Csf = 16.1345 |              |             |
| Paved Csf = 20.3282          |              |             |
| $T = L / (3600 * V)$         |              |             |
|                              | hrs          | 0.00 = 0.00 |

CHANNEL FLOW

| Segment ID                               | 2d           |             |
|--|--------------|-------------|
| Cross Sectional Flow Area, a             | sq.ft 0.50   |             |
| Wetted perimeter, Pw                     | ft 2.00      |             |
| Hydraulic radius, r = a/Pw               | ft 0.250     |             |
| Channel slope, s                         | ft/ft 0.0050 |             |
| Manning's roughness coeff., n            | 0.0200       |             |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ |              |             |
|  | ft/s         | 2.0906      |
| Flow length, L                           | ft           | 800         |
| $T = L / (3600 * V)$                     |              |             |
|  | hrs          | 0.11 = 0.11 |

.....  
TOTAL TIME (hrs) 0.15

Quick TR-55 Ver.5.46 S/N:  
Executed: 14:45:13 12-13-1999 a:BREW60.TCT

Brewery Route 60 Frontage Drainage  
Time of Concentration Through Roadside Channels

Tc COMPUTATIONS FOR: extruck-newtruk

SHEET FLOW (Applicable to Tc only)

|   |       |         |        |  |
|---|-------|---------|--------|--|
| Segment ID  |       | 3a      | 3b     |  |
| Surface description   |       | parking | woods  |  |
| Manning's roughness coeff., n   |       | 0.0130  | 0.0400 |  |
| Flow length, L (total < or = 300)   | ft    | 25.0    | 50.0   |  |
| Two-yr 24-hr rainfall, P2   | in    | 3.360   | 3.360  |  |
| Land slope, s   | ft/ft | 0.0050  | 0.0300 |  |
|   |       | 0.8     |        |  |
| $T = \frac{.007 * (n * L)}{0.5 * P2} \quad \text{hrs} \quad 0.01 + 0.03 = 0.04$ |       |         |        |  |

SHALLOW CONCENTRATED FLOW

|   |       |         |  |
|---|-------|---------|--|
| Segment ID  |       | 3c      |  |
| Surface (paved or unpaved)?                             |       | Unpaved |  |
| Flow length, L  | ft    | 200.0   |  |
| Watercourse slope, s                                    | ft/ft | 0.0200  |  |
|   |       | 0.5     |  |
| Avg. V = Csf * (s)                                      | ft/s  | 2.2818  |  |
| where: Unpaved Csf = 16.1345                            |       |         |  |
| Paved Csf = 20.3282                                     |       |         |  |
| $T = L / (3600 * V) \quad \text{hrs} \quad 0.02 = 0.02$ |       |         |  |

CHANNEL FLOW

|   |       |        |  |
|---|-------|--------|--|
| Segment ID  |       | 3d     |  |
| Cross Sectional Flow Area, a  | sq.ft | 2.00   |  |
| Wetted perimeter, Pw  | ft    | 2.50   |  |
| Hydraulic radius, r = a/Pw  | ft    | 0.800  |  |
| Channel slope, s  | ft/ft | 0.0050 |  |
| Manning's roughness coeff., n   |       | 0.0200 |  |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n} \quad \text{ft/s} \quad 4.5398$ |       |        |  |
| Flow length, L  | ft    | 100    |  |
| $T = L / (3600 * V) \quad \text{hrs} \quad 0.01 = 0.01$                 |       |        |  |

.....  
TOTAL TIME (hrs) 0.07

Quick TR-55 Ver.5.46 S/N:  
Executed: 14:45:13 12-13-1999 a:BREW60.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS  
(Solved for Time using TR-55 Methods)

Brewery Route 60 Frontage Drainage

# Time of Concentration Through Roadside Channels

| Subarea descr.  | Tc or Tt | Time (hrs) |
|-----------------|----------|------------|
| signalized ent  | Tc       | 0.04       |
| sig-extruck ent | Tc       | 0.15       |
| extruck-newtruk | Tc       | 0.07       |

Ex ditch between signal & Ex Truck Ent  
Worksheet for Triangular Channel

| Project Description |                    |
|---------------------|--------------------|
| Project File        | untitled.fm2       |
| Worksheet           | ex ditch           |
| Flow Element        | Triangular Channel |
| Method              | Manning's Formula  |
| Solve For           | Discharge          |

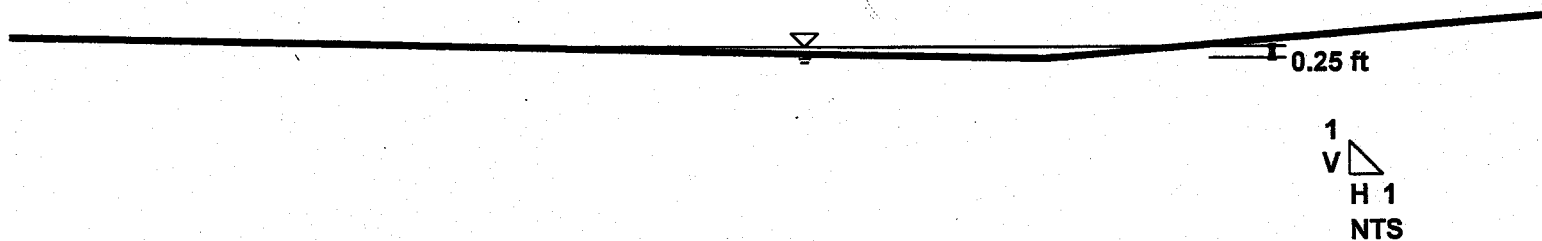
| Input Data           |                 |
|----------------------|-----------------|
| Mannings Coefficient | 0.030           |
| Channel Slope        | 0.005000 ft/ft  |
| Depth                | 0.25 ft         |
| Left Side Slope      | 50.000000 H : V |
| Right Side Slope     | 12.000000 H : V |

| Results              |          |                 |
|----------------------|----------|-----------------|
| Discharge            | 1.70     | cfs             |
| Flow Area            | 1.94     | ft <sup>2</sup> |
| Wetted Perimeter     | 15.51    | ft              |
| Top Width            | 15.50    | ft              |
| Critical Depth       | 0.18     | ft              |
| Critical Slope       | 0.029324 | ft/ft           |
| Velocity             | 0.88     | ft/s            |
| Velocity Head        | 0.01     | ft              |
| Specific Energy      | 0.26     | ft              |
| Froude Number        | 0.44     |                 |
| Flow is subcritical. |          |                 |

Cross Section  
Cross Section for Triangular Channel

| Project Description |                    |
|---------------------|--------------------|
| Project File        | untitled.fm2       |
| Worksheet           | ex ditch           |
| Flow Element        | Triangular Channel |
| Method              | Manning's Formula  |
| Solve For           | Discharge          |

| Section Data         |                 |
|----------------------|-----------------|
| Mannings Coefficient | 0.030           |
| Channel Slope        | 0.005000 ft/ft  |
| Depth                | 0.25 ft         |
| Left Side Slope      | 50.000000 H : V |
| Right Side Slope     | 12.000000 H : V |
| Discharge            | 1.70 cfs        |



New ditch 22+00 to 18+00  
Worksheet for Triangular Channel

| Project Description |                          |
|---------------------|--------------------------|
| Project File        | untitled.fm2             |
| Worksheet           | new ditch 22+00 to 18+00 |
| Flow Element        | Triangular Channel       |
| Method              | Manning's Formula        |
| Solve For           | Discharge                |

| Input Data           |                |
|----------------------|----------------|
| Mannings Coefficient | 0.030          |
| Channel Slope        | 0.005000 ft/ft |
| Depth                | 1.00 ft        |
| Left Side Slope      | 4.000000 H : V |
| Right Side Slope     | 2.000000 H : V |

| Results              |          |                 |
|----------------------|----------|-----------------|
| Discharge            | 6.37     | cfs             |
| Flow Area            | 3.00     | ft <sup>2</sup> |
| Wetted Perimeter     | 6.36     | ft              |
| Top Width            | 6.00     | ft              |
| Critical Depth       | 0.78     | ft              |
| Critical Slope       | 0.019437 | ft/ft           |
| Velocity             | 2.12     | ft/s ✓          |
| Velocity Head        | 0.07     | ft              |
| Specific Energy      | 1.07     | ft              |
| Froude Number        | 0.53     |                 |
| Flow is subcritical. |          |                 |

# Cross Section Cross Section for Triangular Channel

| Project Description |                          |
|---------------------|--------------------------|
| Project File        | untitled.fm2             |
| Worksheet           | new ditch 22+00 to 18+00 |
| Flow Element        | Triangular Channel       |
| Method              | Manning's Formula        |
| Solve For           | Discharge                |

| Section Data         |                |
|----------------------|----------------|
| Mannings Coefficient | 0.030          |
| Channel Slope        | 0.005000 ft/ft |
| Depth                | 1.00 ft        |
| Left Side Slope      | 4.000000 H : V |
| Right Side Slope     | 2.000000 H : V |
| Discharge            | 6.37 cfs       |

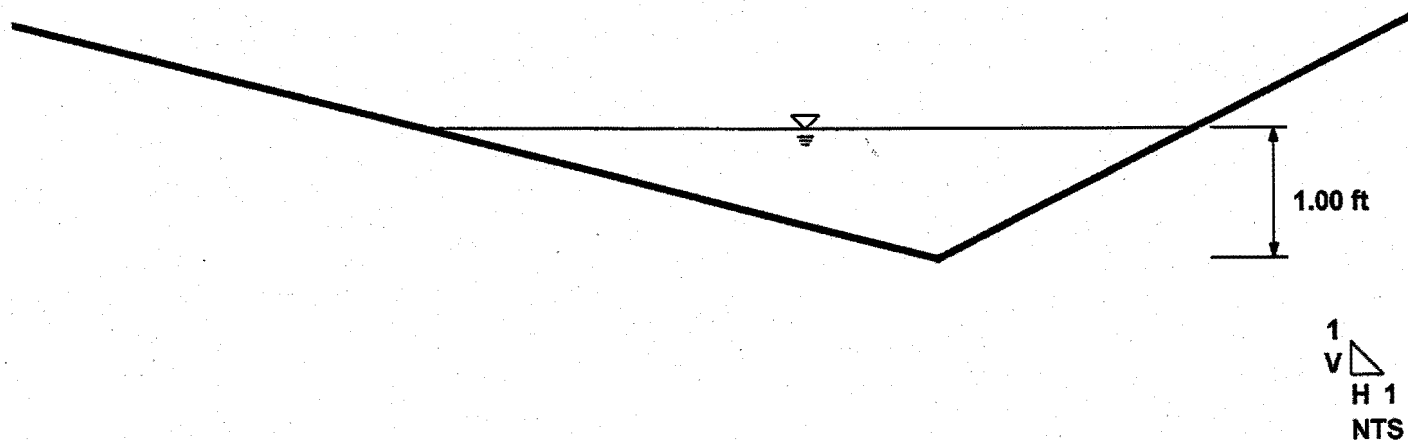


Table  
Rating Table for Triangular Channel

| Project Description |                          |
|---------------------|--------------------------|
| Project File        | untitled.fm2             |
| Worksheet           | new ditch 22+00 to 18+00 |
| Flow Element        | Triangular Channel       |
| Method              | Manning's Formula        |
| Solve For           | Discharge                |

| Constant Data        |                |
|----------------------|----------------|
| Mannings Coefficient | 0.030          |
| Channel Slope        | 0.005000 ft/ft |
| Left Side Slope      | 4.000000 H : V |
| Right Side Slope     | 2.000000 H : V |

| Input Data |         |         |           |
|------------|---------|---------|-----------|
|            | Minimum | Maximum | Increment |
| Depth      | 0.25    | 1.00    | 0.05 ft   |

| Rating Table  |                    |                    |
|---------------|--------------------|--------------------|
| Depth<br>(ft) | Discharge<br>(cfs) | Velocity<br>(ft/s) |
| 0.25          | 0.16               | 0.84               |
| 0.30          | 0.26               | 0.95               |
| 0.35          | 0.39               | 1.05               |
| 0.40          | 0.55               | 1.15               |
| 0.45          | 0.76               | 1.25               |
| 0.50          | 1.00               | 1.34               |
| 0.55          | 1.29               | 1.42               |
| 0.60          | 1.63               | 1.51               |
| 0.65          | 2.02               | 1.59               |
| 0.70          | 2.46               | 1.67               |
| 0.75          | 2.96               | 1.75               |
| 0.80          | 3.51               | 1.83               |
| 0.85          | 4.13               | 1.90               |
| 0.90          | 4.81               | 1.98               |
| 0.95          | 5.55               | 2.05               |
| 1.00          | 6.37               | 2.12               |



Table  
Rating Table for Triangular Channel

| Project Description |                        |
|---------------------|------------------------|
| Project File        | untitled.fm2           |
| Worksheet           | new ditch 18+00 to FES |
| Flow Element        | Triangular Channel     |
| Method              | Manning's Formula      |
| Solve For           | Discharge              |

| Constant Data        |                |
|----------------------|----------------|
| Mannings Coefficient | 0.030          |
| Channel Slope        | 0.006000 ft/ft |
| Left Side Slope      | 4.000000 H : V |
| Right Side Slope     | 2.000000 H : V |

| Input Data |         |         |           |
|------------|---------|---------|-----------|
|            | Minimum | Maximum | Increment |
| Depth      | 0.50    | 1.00    | 0.05 ft   |

| Rating Table  |                    |                    |
|---------------|--------------------|--------------------|
| Depth<br>(ft) | Discharge<br>(cfs) | Velocity<br>(ft/s) |
| 0.50          | 1.10               | 1.46               |
| 0.55          | 1.42               | 1.56               |
| 0.60          | 1.79               | 1.65               |
| 0.65          | 2.21               | 1.74               |
| 0.70          | 2.69               | 1.83               |
| 0.75          | 3.24               | 1.92               |
| 0.80          | 3.85               | 2.00               |
| 0.85          | 4.52               | 2.09               |
| 0.90          | 5.27               | 2.17               |
| 0.95          | 6.08               | 2.25               |
| 1.00          | 6.98               | 2.33               |

New Ditch 18+00 to FES  
Worksheet for Triangular Channel

| Project Description |                        |
|---------------------|------------------------|
| Project File        | untitled.fm2           |
| Worksheet           | new ditch 18+00 to FES |
| Flow Element        | Triangular Channel     |
| Method              | Manning's Formula      |
| Solve For           | Discharge              |

| Input Data           |                |
|----------------------|----------------|
| Mannings Coefficient | 0.030          |
| Channel Slope        | 0.006000 ft/ft |
| Depth                | 1.00 ft        |
| Left Side Slope      | 4.000000 H : V |
| Right Side Slope     | 2.000000 H : V |

| Results              |          |                 |
|----------------------|----------|-----------------|
| Discharge            | 6.98     | cfs             |
| Flow Area            | 3.00     | ft <sup>2</sup> |
| Wetted Perimeter     | 6.36     | ft              |
| Top Width            | 6.00     | ft              |
| Critical Depth       | 0.80     | ft              |
| Critical Slope       | 0.019201 | ft/ft           |
| Velocity             | 2.33     | ft/s            |
| Velocity Head        | 0.08     | ft              |
| Specific Energy      | 1.08     | ft              |
| Froude Number        | 0.58     |                 |
| Flow is subcritical. |          |                 |

pipe from FES#2 to DI #3  
Worksheet for Circular Channel

| Project Description |                   |
|---------------------|-------------------|
| Project File        | untitled.fm2      |
| Worksheet           | FES #2 to DI #3   |
| Flow Element        | Circular Channel  |
| Method              | Manning's Formula |
| Solve For           | Channel Depth     |

| Input Data           |          |       |
|----------------------|----------|-------|
| Mannings Coefficient | 0.013    |       |
| Channel Slope        | 0.018000 | ft/ft |
| Diameter             | 15.00    | in    |
| Discharge            | 5.70     | cfs   |

| Results                |          |                 |
|------------------------|----------|-----------------|
| Depth                  | 0.74     | ft              |
| Flow Area              | 0.76     | ft <sup>2</sup> |
| Wetted Perimeter       | 2.19     | ft              |
| Top Width              | 1.23     | ft              |
| Critical Depth         | 0.97     | ft              |
| Percent Full           | 59.18    |                 |
| Critical Slope         | 0.008737 | ft/ft           |
| Velocity               | 7.54     | ft/s            |
| Velocity Head          | 0.88     | ft              |
| Specific Energy        | 1.62     | ft              |
| Froude Number          | 1.69     |                 |
| Maximum Discharge      | 9.32     | cfs             |
| Full Flow Capacity     | 8.67     | cfs             |
| Full Flow Slope        | 0.007787 | ft/ft           |
| Flow is supercritical. |          |                 |

DI#3 to DI#4  
Worksheet for Circular Channel

| Project Description |                   |
|---------------------|-------------------|
| Project File        | untitled.fm2      |
| Worksheet           | DI#3 to DI#4      |
| Flow Element        | Circular Channel  |
| Method              | Manning's Formula |
| Solve For           | Channel Depth     |

| Input Data           |          |       |
|----------------------|----------|-------|
| Mannings Coefficient | 0.013    |       |
| Channel Slope        | 0.010000 | ft/ft |
| Diameter             | 15.00    | in    |
| Discharge            | 6.44     | cfs   |

| Results                |          |                 |
|------------------------|----------|-----------------|
| Depth                  | 12.3     | in              |
| Flow Area              | 1.07     | ft <sup>2</sup> |
| Wetted Perimeter       | 2.82     | ft              |
| Top Width              | 0.97     | ft              |
| Critical Depth         | 1.02     | ft              |
| Percent Full           | 81.69    |                 |
| Critical Slope         | 0.009967 | ft/ft           |
| Velocity               | 6.00     | ft/s ✓          |
| Velocity Head          | 0.56     | ft              |
| Specific Energy        | 1.58     | ft              |
| Froude Number          | 1.00     |                 |
| Maximum Discharge      | 6.95     | cfs             |
| Full Flow Capacity     | 6.46     | cfs             |
| Full Flow Slope        | 0.009940 | ft/ft           |
| Flow is supercritical. |          |                 |

PAVED

DI#4 to FES #5  
Worksheet for Circular Channel

| Project Description |                   |
|---------------------|-------------------|
| Project File        | untitled.fm2      |
| Worksheet           | DI#4 to FES#5     |
| Flow Element        | Circular Channel  |
| Method              | Manning's Formula |
| Solve For           | Channel Depth     |

| Input Data           |          |       |
|----------------------|----------|-------|
| Mannings Coefficient | 0.013    |       |
| Channel Slope        | 0.072000 | ft/ft |
| Diameter             | 15.00    | in    |
| Discharge            | 7.23     | cfs   |

| Results                |          |                 |
|------------------------|----------|-----------------|
| Depth                  | 0.56     | ft              |
| Flow Area              | 0.54     | ft <sup>2</sup> |
| Wetted Perimeter       | 1.84     | ft              |
| Top Width              | 1.24     | ft              |
| Critical Depth         | 1.07     | ft              |
| Percent Full           | 45.04    |                 |
| Critical Slope         | 0.011616 | ft/ft           |
| Velocity               | 13.48    | ft/s ✓          |
| Velocity Head          | 2.83     | ft              |
| Specific Energy        | 3.39     | ft              |
| Froude Number          | 3.62     |                 |
| Maximum Discharge      | 18.64    | cfs             |
| Full Flow Capacity     | 17.33    | cfs             |
| Full Flow Slope        | 0.012528 | ft/ft           |
| Flow is supercritical. |          |                 |

=====

| INLET NUMBER 1 | LENGTH 2.5 | STATION 14+40 |
|----------------|------------|---------------|
|----------------|------------|---------------|

DRAINAGE AREA = 0.080 ACRES C VALUE = .900 CA = 0.072  
DRAINAGE AREA = 0.010 ACRES C VALUE = .900 CA = 0.009

FOR THE FIRST SIDE  
SUM CA= 0.072 INT= 4.00 CFS= 0.288 CO= 0.000 GUTTER FLOW= 0.288  
FOR THE OTHER SIDE  
SUM CA= 0.009 INT= 4.00 CFS= 0.036 CO= 0.000 GUTTER FLOW= 0.036  
AT THE INLET

SUM CA= 0.081 INT= 4.00 CFS= 0.324 CO= 0.000 GUTTER FLOW= 0.324

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0200 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.29 (cfs) IS 5.04 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXXXX  
P EFFEC. LENGTH (ft) = 6.10 H (ft) = 0.458  
DEPTH OF WATER (ft) = 0.08 SPREAD (ft) = 4.05

=====

| INLET NUMBER 3 | LENGTH 2.5 | STATION 11+00L |
|----------------|------------|----------------|
|----------------|------------|----------------|

DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108  
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018

FOR THE FIRST SIDE  
SUM CA= 0.108 INT= 4.00 CFS= 0.432 CO= 0.000 GUTTER FLOW= 0.432  
FOR THE OTHER SIDE  
SUM CA= 0.018 INT= 4.00 CFS= 0.072 CO= 0.000 GUTTER FLOW= 0.072  
AT THE INLET

SUM CA= 0.126 INT= 4.00 CFS= 0.504 CO= 0.000 GUTTER FLOW= 0.504

GUTTER SLOPE = 0.0050 FT/FT PAVEMENT CROSS SLOPE = 0.0200 FT/FT

SPREAD AT A SLOPE OF .005 (ft./ft.) AND 0.43 (cfs) IS 3.73 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXXXX  
P EFFEC. LENGTH (ft) = 6.10 H (ft) = 0.458  
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.44

=====

| INLET NUMBER 4 | LENGTH 2.5 | STATION 11+00R |
|----------------|------------|----------------|
|----------------|------------|----------------|

TOTAL PEAK DISCHARGE = 0.56 (cfs)

GUTTER SLOPE = 0.0050 FT/FT PAVEMENT CROSS SLOPE = 0.0200 FT/FT

SPREAD AT A SLOPE OF .005 (ft./ft.) AND 0.56 (cfs) IS 4.58 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXXXX

P EFFEC. LENGTH (ft) = 6.10 H (ft) = 0.458

DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.83

# 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)       | ?          |

### 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% |

### Parcel 'D-2' Interior Trailer Parking Additions & Driveway Improvements

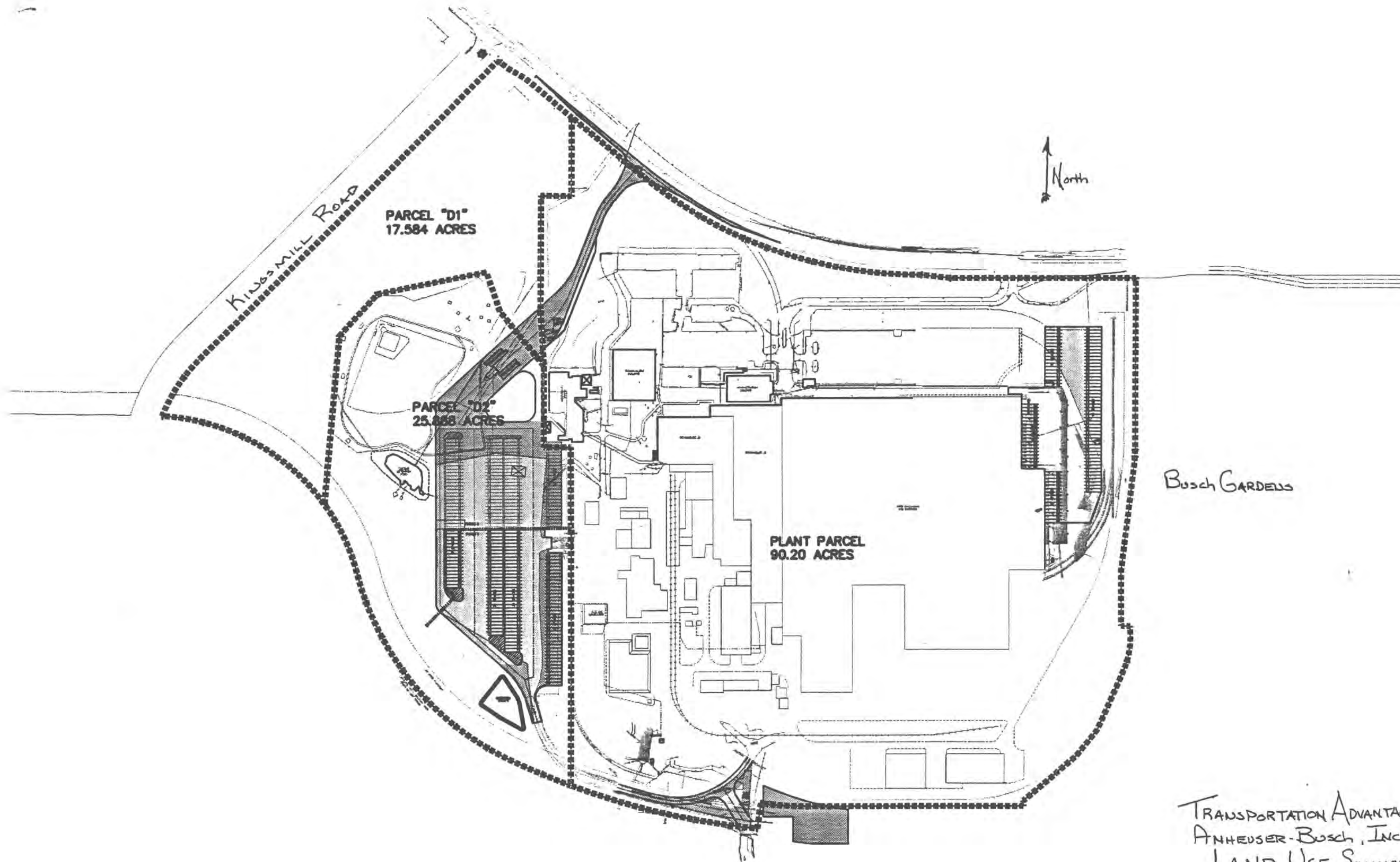
|                            |              |      |
|----------------------------|--------------|------|
| Building Areas             | 0.050 acres  | 0%   |
| Pavement Areas             | 9.950 acres  | 38%  |
| Grass, Trees, & Open Areas | 14.170 acres | 55%  |
| Pond Areas                 | 1.718 acres  | 7%   |
| Total Area                 | 25.888 acres | 100% |

$9.95 + 0.05$   
 $+ 0.629$   
 $= 10.629$   
 $17.584 + 25.888$   
 $= 43.472$   
 $= 24.45\%$

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

$w/o \text{ PLANT IMPROV}$   
 $10.62$   
 $90.2 + 17.584 + 25.888$   
 $= 17.94\%$





# **8. Correspondence With Owners**



THE HASKELL COMPANY

Facsimile Letter

Date/Time: March 10, 2000 4:37 PMTo: SCOTT J. THOMAS, P.E. at: JAMES CITY COUNTY ENVIRONMENTAL DIVISIONFax No.: 757/259-4032 Total No. Of Pages: 4 (including this cover sheet)*Message:*

Anheuser-Busch Transportation Advantage Project  
Phase II - Williamsburg, VA  
JCC Plan No. SP - 13 -- 00

(Eng. Project 32193)

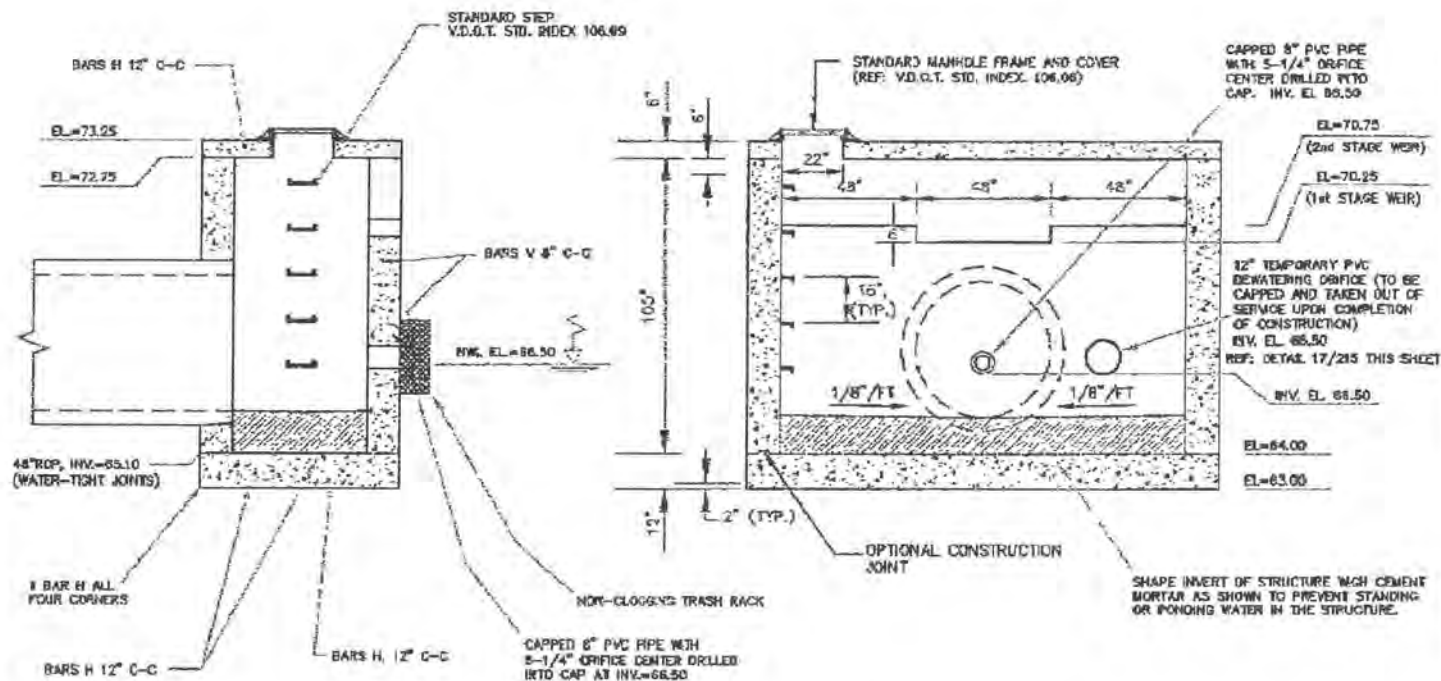
Transmitted herewith are some corrected details for sheet 215 of the above referenced plans

Give me a call if you have any questions.

Thanks,

From:  
Joe Stepp  
Civil Engineer

*If you do not receive all of these pages, or are having a problem with the reception of this material, please call: 904/791-4500, ext. 4873*Return FAX Number: ☐ 904/791-4693 ☒ 904/791-4697 ☐ 904/791-4699 ☐ 904/695-2112 ☐ 904/695-2396 ☐ \_\_\_\_\_



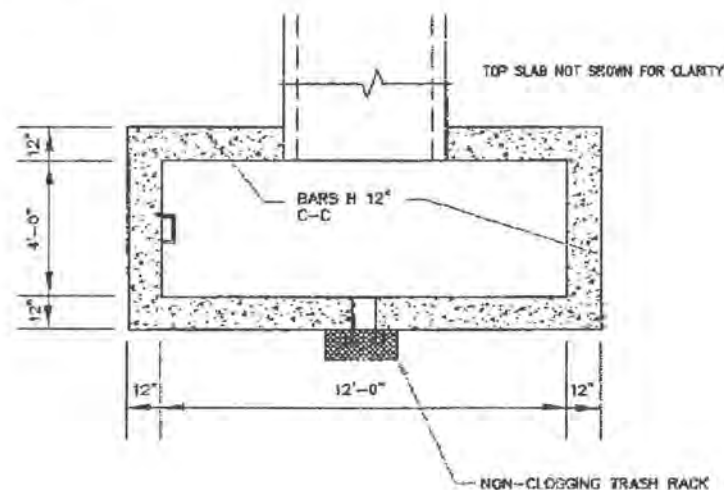
48" ROP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/  
BELL & SPIGOT JOINTS UTILIZING WATER-TIGHT "O" RING  
BASKETED JOINTS MEETING ASTM C443 REQUIREMENTS.  
(REF. DETAIL 18/215 THIS SHEET)

GENERAL NOTES:

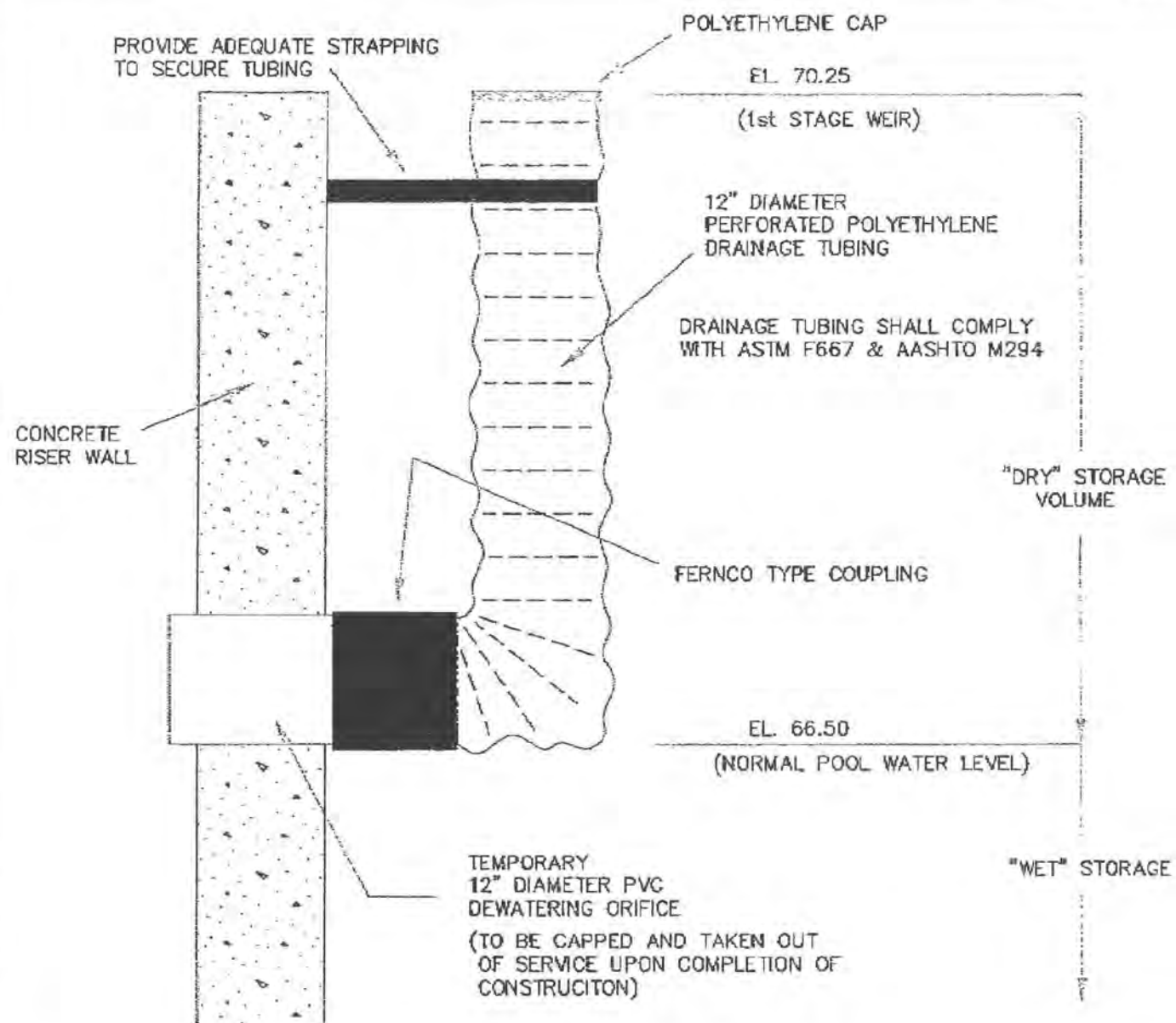
1. FOR ALL DETAILS, DIMENSIONS, ETC. OF GRATE, AND  
STEEL OR CAST IRON COLLAR SEE V.D.O.T. STD. DROP INLET D1-1.
2. ALL CAST IN PLACE CONCRETE TO BE CLASS A-3.
3. IF OPTIONAL CONSTRUCTION JOINT IS USED IT IS TO BE KEYS.
4. ALL SPLICES IN BARS V TO LAP A MINIMUM OF 40 x DIA. (20 INCHES)

REINFORCING STEEL SCHEDULE:

|        | SIZE |
|--------|------|
| Bars H | #5   |
| Bars V | #4   |

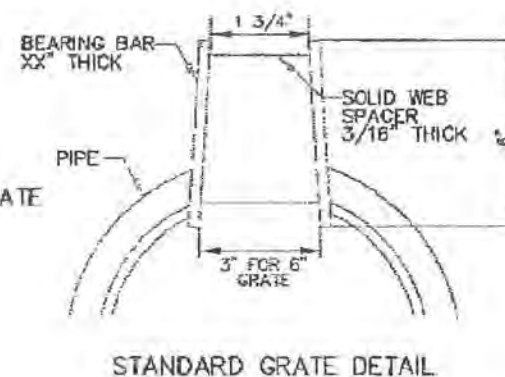
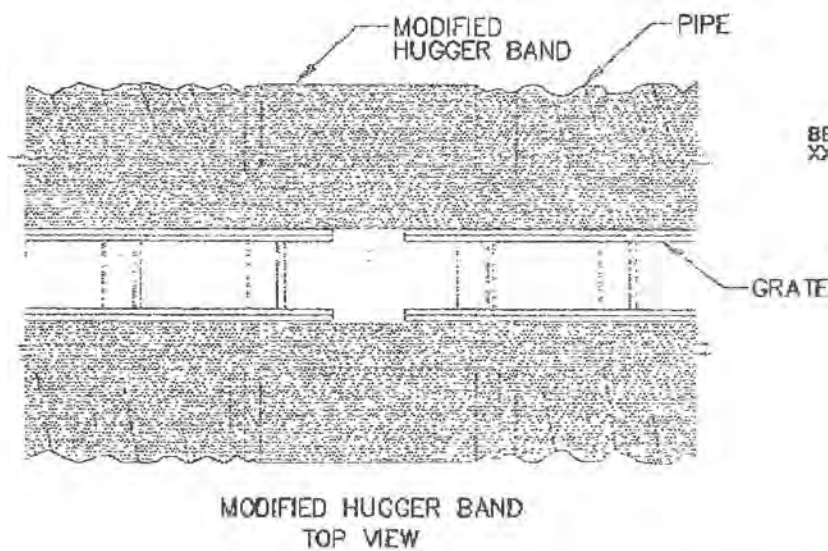
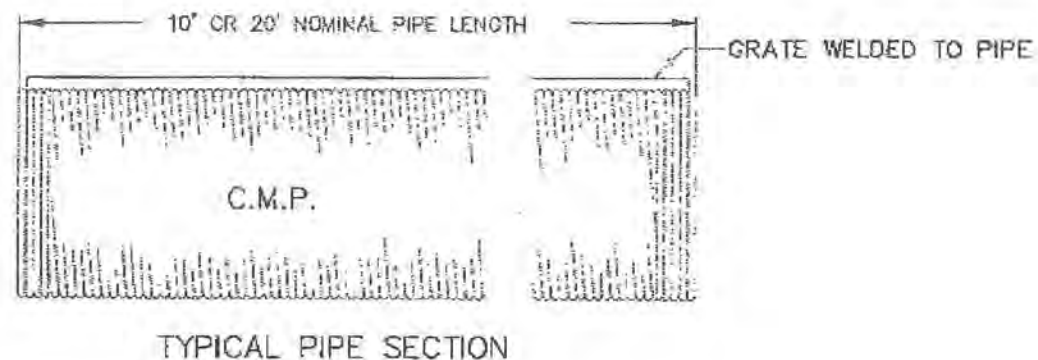


POND '2' CONTROL STRUCTURE (REF. V.D.O.T. STANDARD INDEX NO. 104.02)



## DEWATERING SYSTEM FOR SEDIMENT BASINS

17



SLOTTED DRAIN TO BE 16 GAUGE CORRUGATED STEEL PIPE SUCH AS THAT MANUFACTURED BY ARMCO (OR EQUAL)

SLOTTED DRAIN DETAIL

8



THE HASKELL COMPANY

Facsimile Letter

Date/Time: March 15, 2000 3:46 PMTo: SCOTT J. THOMAS, P.E. at: JAMES CITY COUNTY ENVIRONMENTAL DIVISIONFax No.: 757/259-4032 Total No. Of Pages: 10 (including this cover sheet)**Message:**

Anheuser-Busch Transportation Advantage Project  
Phase II - Williamsburg, VA  
JCC Plan No. SP - 13 - 00

(Eng. Project 32193)

Transmitted herewith is additional information added to the plans as we discussed this morning. If additional information is necessary, I will be glad to forward the appropriate information. I will get you the revised plans showing all information by Friday.

Give me a call if you have any questions.

Thanks,

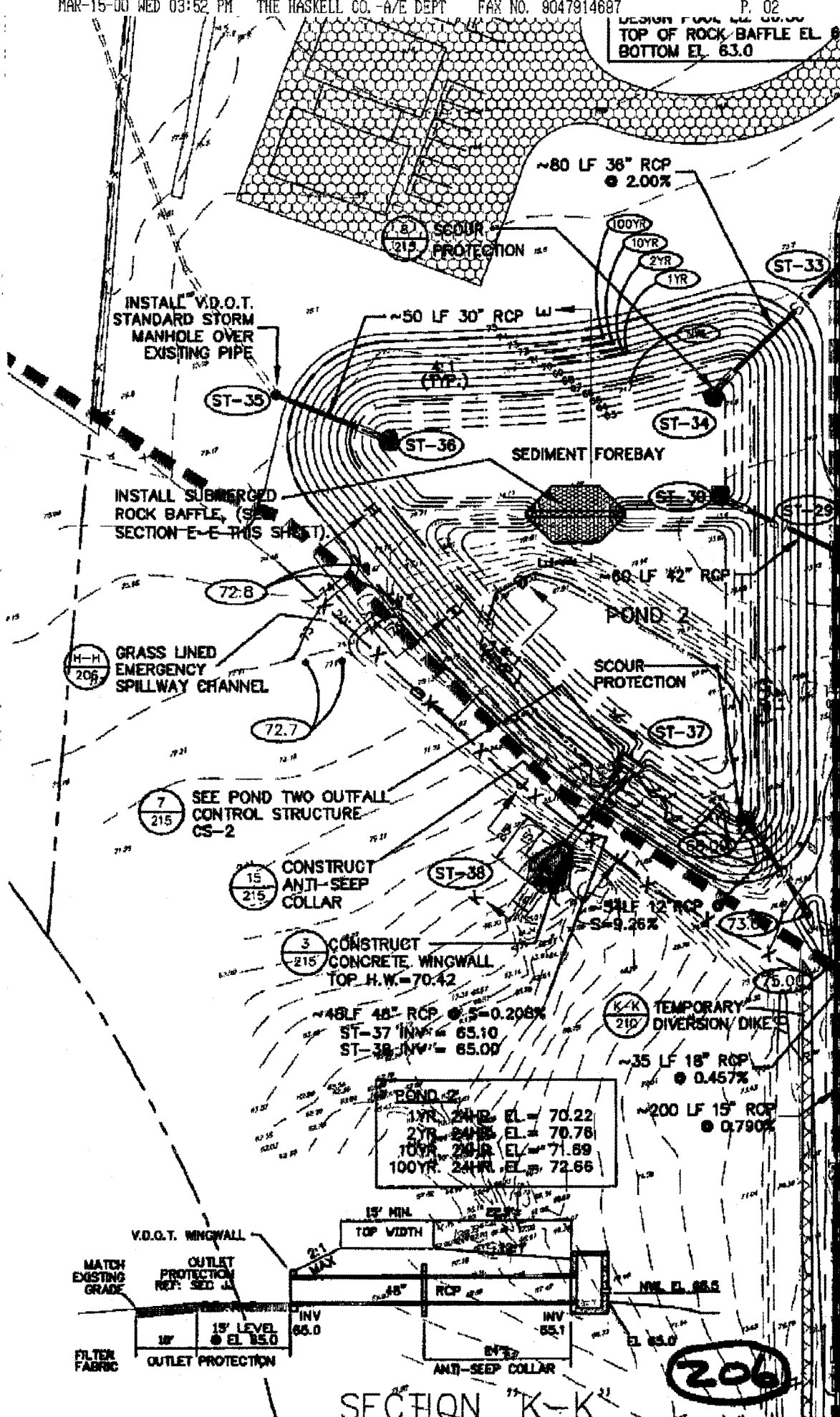
From:

Joe SteppCivil Engineer

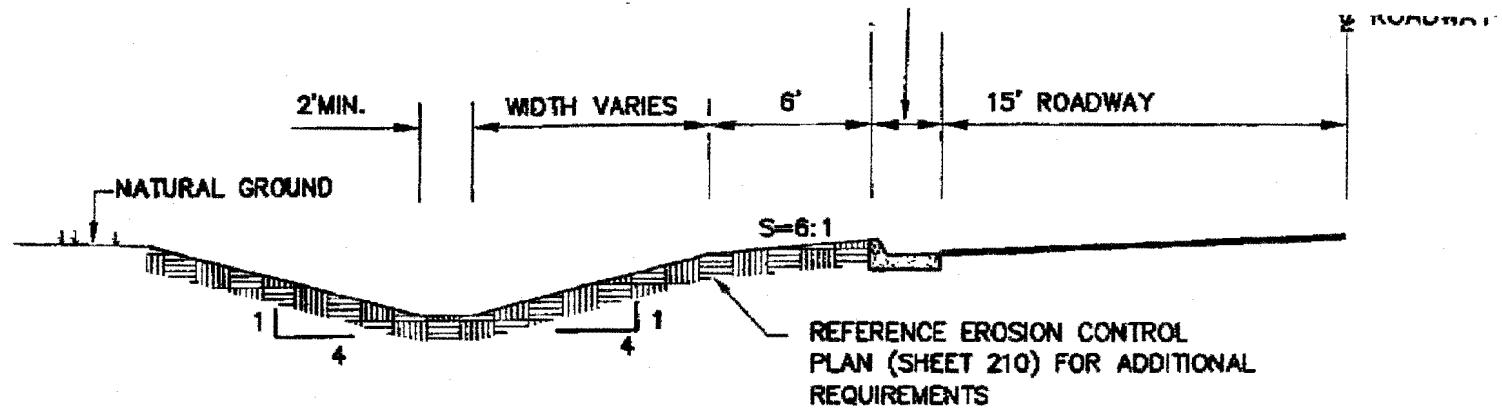
*If you do not receive all of these pages, or are having a problem with the reception of this material, please call: 904/791-4500, ext. 4873*

Return FAX Number: ☐ 904/791-4693 ☒ 904/791-4697 ☐ 904/791-4699 ☐ 904/695-2112 ☐ 904/695-2396 ☐ \_\_\_\_\_

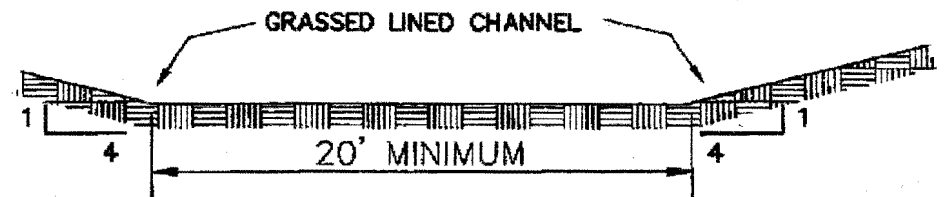
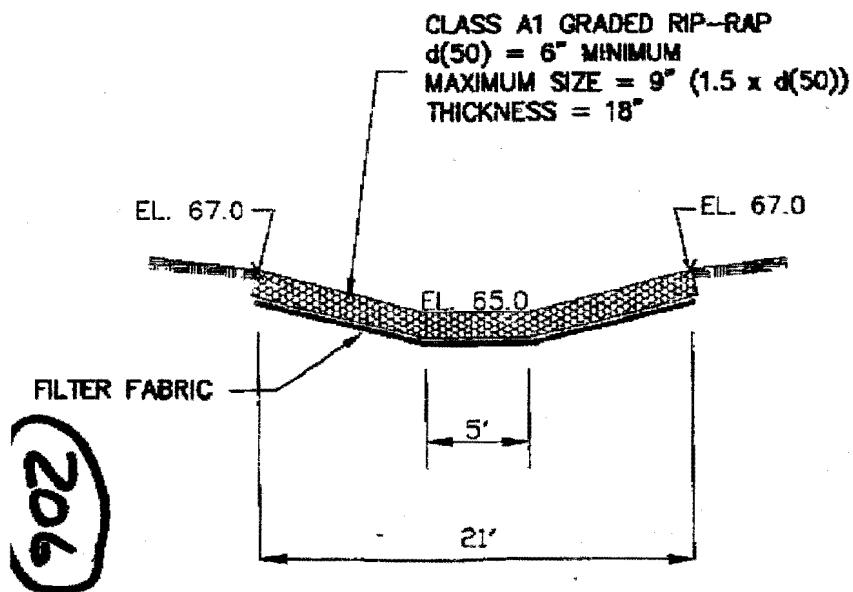
DESIGN FLOOD EL. 66.00  
TOP OF ROCK BAFFLE EL. 66.0  
BOTTOM EL. 63.0








TYPICAL SWALE SECTION "G-G"



SECTION "H-H"  
EMERGENCY SPILLWAY

NOTES:

ALL LOCATED WITHIN TRAFFIC AREAS SHALL BE RATED FOR HEAVY DUTY TRUCK TRAFFIC



| NO. SOILS | SOILS NAME | HYDROLOGIC GROUP | AVERAGE SLOPE |
|-----------|------------|------------------|---------------|
| 37        | URBAN LAND | ---              | ~2% SLOPE     |
| 11C       | GRAVEN     | C                | OFFSITE       |
| 19B       | KEMPSVILLE | B                | OFFSITE       |
| 29A       | SLAGLE     | C                | OFFSITE       |
| 29B       | SLAGLE     | C                | OFFSITE       |

**STOCKPILE AREAS:**

ON-SITE CONTRACTOR SHALL ESTABLISH ALL TEMPORARY SOIL STOCKPILE AREAS, STAGING AND EQUIPMENT STORAGE AREAS WITHIN ESTABLISHED CLEARING LIMITS IN ACCORDANCE WITH ALL APPLICABLE EROSION AND SEDIMENT CONTROL MEASURES.

ANTICIPATED STOCKPILE AREAS ARE CONSTRUCTION TRAILER COMPOUND AREA AND HOSPITALITY HOUSE PARKING AREA, AS SHOWN.

**GENERAL NOTES:**

1. POND AREA TO BE SODDED TO DESIGN NORMAL WATER ELEVATION OF 67.00.
2. REFERENCING THE FLOOD INSURANCE RATE MAP, (F.I.R.M.), FOR JAMES CITY COUNTY, VIRGINIA, UNINCORPORATED AREAS, PANEL 50 OF 60, COMMUNITY PANEL NO. 510201 0050 B, EFFECTIVE DATE 2-6-91. THE REFERENCE SITE IS LOCATED WITHIN ZONE X.
3. CONTRACTOR SHALL DISPOSE OF CONSTRUCTION DEBRIS IN A FACILITY APPROVED FOR WASTE DISPOSAL OF THIS TYPE OF MATERIAL.

**ENVIRONMENTAL INVENTORY:**

PER TOPOGRAPHIC SURVEY THE FOLLOWING ITEMS ARE NOT PRESENT WITHIN THE PROJECT LIMITS OF CONSTRUCTION:

- (A) TIDAL WETLANDS;
- (B) TIDAL SHORES;
- (C) NONTIDAL WETLANDS IN RPA;
- (D) A 100-FOOT BUFFER AREA LOCATED ADJACENT TO AND LANDWARD OF THE COMPONENTS LISTED IN SUBSECTIONS A. THROUGH C. ABOVE, AND ALONG BOTH SIDES ON ANY TRIBUTARY STREAM;
- (E) 25% OR GREATER SLOPES.



209

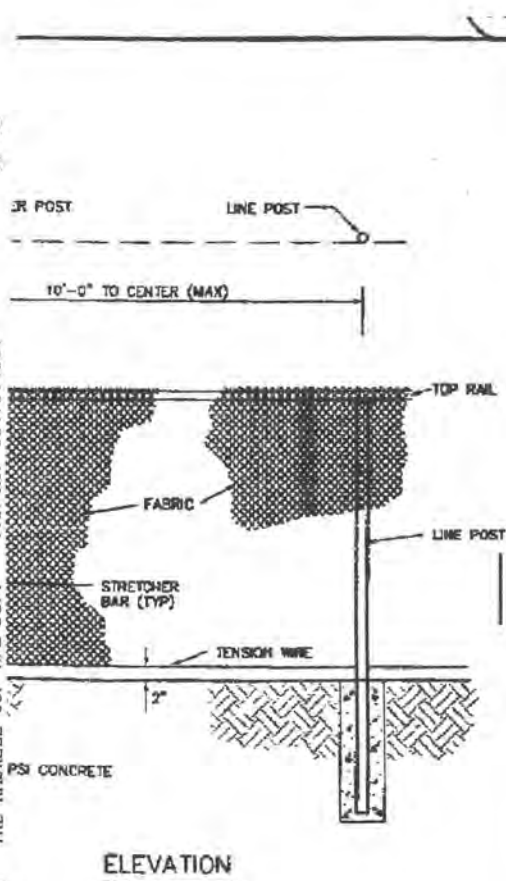




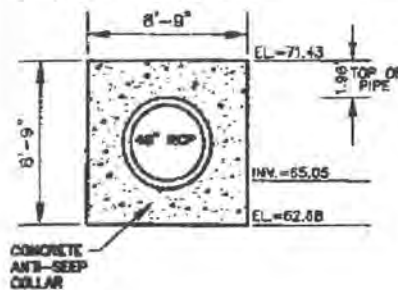




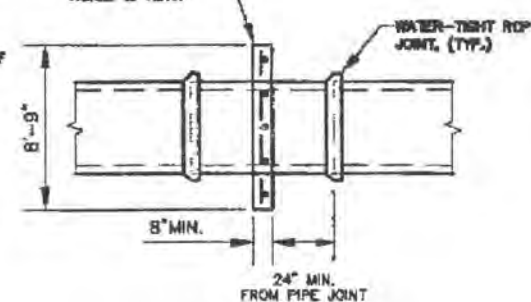
P. 08  
JR POST  
LINE POST  
10'-0" TO CENTER (MAX)  
TOP RAIL  
FABRIC  
STRETCHER BAR (TYP)  
TENSION WIRE  
PSI CONCRETE  
ELEVATION  
MAR-15-00 WED 03:57 PM THE HASSELL CO. - A/E DEPT FAX NO. 9047914867



NOTE: CONTRACTOR SHALL ASSURE 90% MIN. COMPACTION AROUND COLLAR AND PIPE



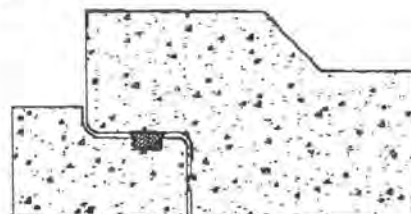
8" WIDE WITH NO. 3 REBAR 18" O.C. HORIZ. & VERT.



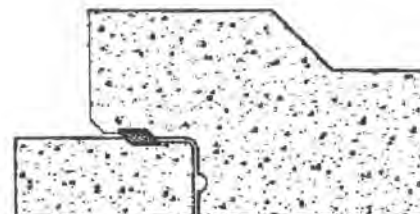
## ANTI-SEEP COLLAR DETAIL

15

NOTE: WATER-TIGHT JOINTS REQUIRED FOR 48" RCP PIPE OUTLET AT POND NO. TWO.



TYPICAL CROSS SECTION OF SPIGOT GROOVE TYPE JOINT WITH O-RING GASKET



TYPICAL CROSS SECTION OF OPPOSING SHOULDER TYPE JOINT WITH O-RING GASKET

14

## RUBBER GASKET JOINT DETAIL

16

3/07/00 REV. PERMIT #S  
01/28/00 PERMIT ISSUE

DATE ISSUE/REVISION

We hereby expressly reserve the property rights to this drawing and it is not to be reproduced, copied in any format or manner whatsoever without first obtaining our express written permission and consent.

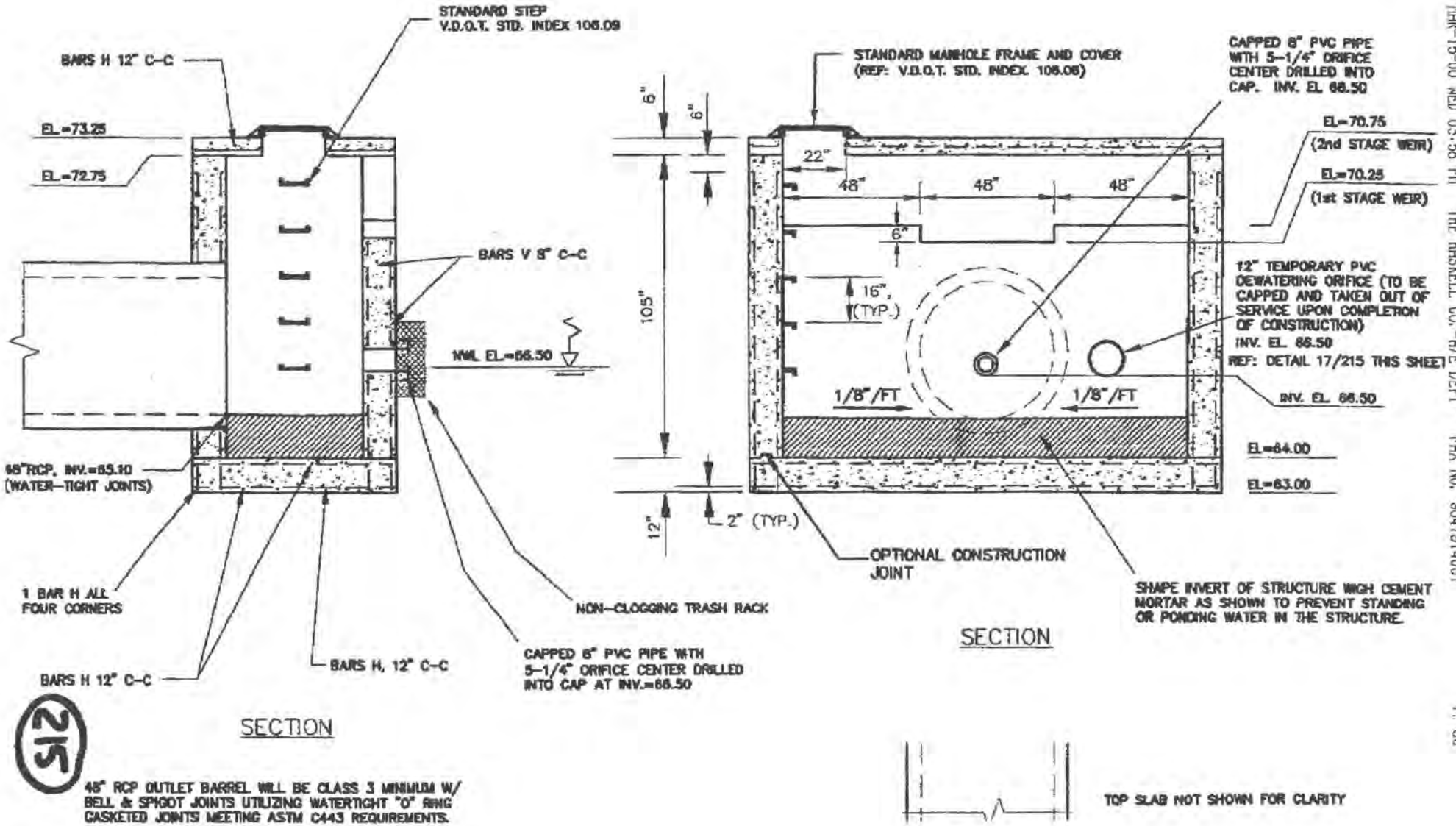
DRAWN BY: PAQ  
CHECKED BY: JWS

AE JOB NUMBER

32193201

CIVIL  
DETAIL  
3

215  
SHEET NUMBER





SECTION

48" RCP OUTLET BARREL WILL BE CLASS 3 MINIMUM W/ BELL & SPIGOT JOINTS UTILIZING WATERTIGHT "O" RING GASKETED JOINTS MEETING ASTM C443 REQUIREMENTS. (REF; DETAIL 16/215 THIS SHEET)

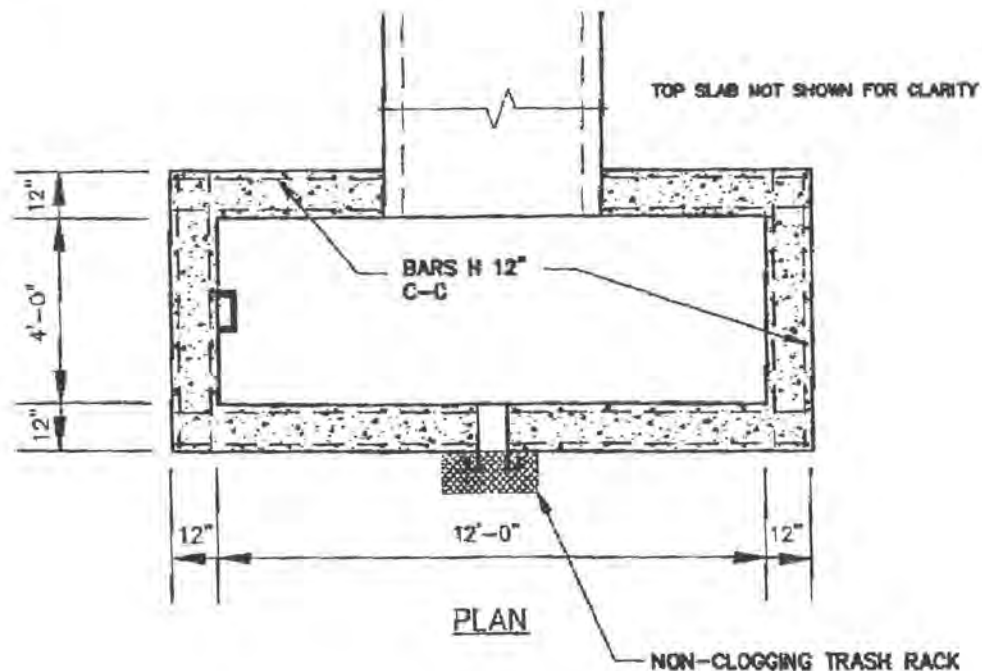
GENERAL NOTES:

1. FOR ALL DETAILS, DIMENSIONS, ETC. OF GRATE; AND STEEL OR CAST IRON COLLAR SEE V.D.O.T. STD. DROP INLET 01-1.
2. ALL CAST IN PLACE CONCRETE TO BE CLASS A-3.
3. IF OPTIONAL CONSTRUCTION JOINT IS USED IT IS TO BE KEYED.
4. ALL SPLICES IN BARS V TO LAP A MINIMUM OF 40 x DIA. (20 INCHES)

REINFORCING STEEL SCHEDULE:

|        | SIZE |
|--------|------|
| Bars H | #5   |
| Bars V | #4   |

215







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) *CC 015; 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)

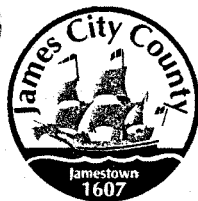
If you have any questions or desire additional information, please feel free to contact us at (904) 791-4500.

Sincerely,

Michael H. Wheeler, P.E.

Enclosures

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



## 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](mailto:devtman@james-city.va.us)

CODE COMPLIANCE

(757) 253-6626

[codecomp@james-city.va.us](mailto:codecomp@james-city.va.us)

ENVIRONMENTAL DIVISION

(757) 253-6670

[environ@james-city.va.us](mailto:environ@james-city.va.us)

PLANNING

(757) 253-6685

[planning@james-city.va.us](mailto: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 14<sup>th</sup> 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 28<sup>th</sup> 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.

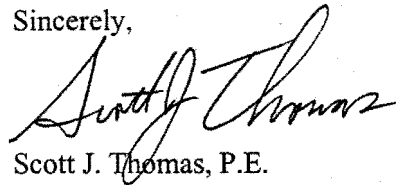
**Construction - Related Items:**

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



**T H E H A S K E L L C O M P A N Y**  
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.*



Mr. Scott J. Thomas  
March 13, 2001  
Page 2

**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.*



Mr. Scott J. Thomas  
March 13, 2001  
Page 3

**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.*



Mr. Scott J. Thomas  
March 13, 2001  
Page 4

**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](mailto: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

1. File: \_\_\_\_\_
2. Mike Wheeler - 1 copy print \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Enclosures

☐  
☒  
☐  
☐  
☐

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. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Enclosures**

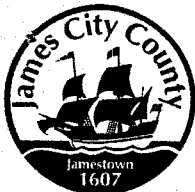
☐  
☐  
☐  
☐  
☐

LandMark Design Group, Inc.

By: PF

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

# **9. Inspection Records (Construction Phase)**



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

COUNTY PLAN: SP-13-00

Database Inventory No. (if known): CC 016  
Name of Facility: ANHEUSER BUSCH TRANSPORTATION ADVANTAGE PH 2 BMP No.: 2 of 2 Date: 02-28-01  
Location: WET POND #2 - Southwest Corner of site PARCEL D-2  
Name of Owner: Anheuser-Busch  
Inspector: SJ Thomas, Mike Woolson  
Type of Facility: Wet Extended Detention  
Weather Conditions: P. Cloudy, High 40's

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

9  
END

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                            |
|---|------|---------|--------|-------------------------------------|
| <b>Embankments and Side Slopes:</b>   |      |         |        |                                     |
| Grass Height  | X    |         |        | Seeded & Mulched COVERING.          |
| Vegetation Condition  | X    |         |        | OK, EXCEPT NORTH SIDE @ TRAILERS.   |
| Tree Growth   | X    |         |        | None.                               |
| Erosion   |      | X       |        | North side @ CONST. TRAILERS.       |
| Trash & Debris  |      | X       |        | REMOVE TRASH & DEBRIS (EAST OF R/R) |
| Seepage   | X    |         |        |                                     |
| Fencing or Benches  |      |         |        | N/A                                 |
| <b>Interior Landscaping/Planted Areas:</b> <input type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation |      |         |        |                                     |
| Vegetated Conditions  |      |         |        | INTERIOR SLOPE AREAS                |
| Trash & Debris  |      |         |        | NEED SEED & MULCHED                 |
| Floating Material   |      |         |        | ESP. ALONG CONST TRAILER            |
| Erosion   |      |         |        | SIDE. BARE SOIL AREAS               |
| Sediment  |      |         |        |                                     |
| Dead Plant  |      |         |        | WET EXT DET POND                    |
| Aesthetics  |      |         |        |                                     |
| Other   |      |         |        |                                     |

Serves Portion US 60, Truck Scale Entrance, Truck Scale & Const. Trailer Area  
SHOULDER STABIL OUTSIDE FENCE AREA @ TRUCK FENCE SCALES

| Facility Item  | O.K. | Routine | Urgent | Comments  |
|--|------|---------|--------|---|
| <b>Water Pools</b> <input checked="" type="checkbox"/> Permanent Pool (Retention Basin) <input type="checkbox"/> Shallow Marsh (Detention Basin) <input type="checkbox"/> None (Detention Basin) |      |         |        |   |
| Shoreline Erosion  | X    |         |        | None.   |
| Algae  | X    |         |        | None  |
| Trash & Debris   |      | X       |        | SOUTHEAST CORNER, WOOD & TRASH.                               |
| Sediment   | X    |         |        |   |
| Aesthetics   | X    |         |        | OK.   |
| Other  |      |         |        |   |
| <b>Inflow Structures (Describe Locations):</b> 6 INFLOWS (RCP & CPP) W/ END SECTIONS. CPP AT NORTH SLOPE.  |      |         |        |   |
| Condition of Structure   | X    |         |        |   |
| Erosion  |      | X       |        | NORTH SLOPE<br>CPP OUTFALL NEEDS OP (NEAR CONST TRAILERS)     |
| Trash and Debris   | X    |         |        |   |
| Sediment   |      | X       |        | NORTHEAST CORN RCP/CPP OUTFALL NEEDS CLEANED                  |
| Aesthetics   | X    |         |        |   |
| Other  |      |         |        | PIPE 2/3 NEEDS SED REM.                                       |
| <b>Principal Flow Control Structure - Intake, Riser, etc. (Describe Location):</b> 4' RISER BOX W/ 2 PIPES + WEIRS.  |      |         |        |   |
| Condition of Structure   | X    |         |        | 12x4 RISER BOX W/ 5-1/4" DRILLED ORIF IN 8" PVC; 48" RCP OUT. |
| Corrosion  | X    |         |        | NEW STRUCTURE.  |
| Trash and Debris   |      | X       |        | CLEAN + REMOVE WOOD DEBRIS.                                   |
| Sediment   | X    |         |        |   |
| Aesthetics   | X    |         |        | CLEAN INSIDE.   |
| Other  |      |         |        | CONFIL SMALL DIA PVC; REMOVE TEMP; ORIF CLOGGING.             |
| <b>Principal Outlet Structure - Barrel, Conduit, etc.:</b> 48" RCP W/ OP   |      |         |        |   |
| Condition of Structure   | X    |         |        | OK.   |
| Settlement   | X    |         |        |   |
| Trash & Debris   | X    |         |        | MINOR WOOD DEBRIS IN OP.                                      |
| Sediment   | X    |         |        |   |
| Erosion  | X    |         |        |   |
| Other  |      | ✓       |        | REMOVE D/S SF.  |
| <b>Emergency Spillway (Overflow):</b> 5' RIPRAP SOUTH EMBANKMENT   |      |         |        |   |
| Vegetation   | X    |         |        |   |
| Lining   | X    |         |        |   |
| Erosion  | X    |         |        |   |
| Trash & Debris   | X    |         |        |   |
| Other  |      |         |        |   |

| Facility Item   | O.K. | Routine | Urgent | Comments  |
|---|------|---------|--------|---|
| <b>Nuisance Type Conditions:</b>  |      |         |        |   |
| Mosquito Breeding   | X    |         |        | None.   |
| Animal Burrows  | X    |         |        |   |
| Graffiti  | X    |         |        |   |
| Other   |      |         |        |   |
| <b>Surrounding Perimeter Conditions:</b>  |      |         |        |   |
| Land Uses   | X    |         |        | Adj. Truck scale PARKING + CONST TRAIL.                         |
| Vegetation  | X    |         |        | Green Area LANDSCAPED.  |
| Trash & Debris  | X    |         |        |   |
| Aesthetics  | X    |         |        |   |
| Access /Maintenance Roads or Paths  | X    |         |        | ADEQUATE, CONTACT RANDALL <sup>SCOTT</sup> 253-2136 FOR ACCESS. |
| Other   |      |         |        |   |
| <b>Remarks:</b> <ul style="list-style-type: none"> <li>▶ BARE SOIL &amp; ERODED AREAS ON NORTH (CONST TRAILER) SIDE NEEDS FIXED.</li> <li>▶ PIPE INFLOW (RCP/CPP) AT/NEAR ENTRANCE TO CONST TRAILER NEEDS SED. REMOVED</li> <li>▶ SMALL Ø PVC CLOGGED W/ TURN DOWN ELBOW. MAKE SURE ORIFICES @ FINAL CONFIG 5 1/4" DRILL IN 8" CAP.</li> <li>▶ REMOVE SF D/S OF OP.</li> <li>▶ CAP TEMP. 12" PVC</li> </ul> |      |         |        |   |
| <b>NOTE:</b> OUTLET → RISER TO MANHOLE TO PIPE OUTFALL W/ OP. MANHOLE RELATIVELY CLEAN @ TIME OF INSPECTION.  |      |         |        |   |
| Overall Environmental Division Internal Rating: <u>4</u>  |      |         |        |   |
| <div style="display: flex; justify-content: space-between;"> <div> <b>Signature:</b> <u>Scott J. Thomas, P.E.</u><br/> <b>Title:</b> <u>Civil Engineer, JCC ENV. DIV.</u> </div> <div> <b>Date:</b> <u>02/28/01</u> </div> </div>   |      |         |        |   |

# 11. Miscellaneous

|                     |                                     |                       |  |                                   |             |
|---------------------|-------------------------------------|-----------------------|--|-----------------------------------|-------------|
| WATERSHED           | CC                                  | MAINTENANCE PLAN      | Yes                                    | CTRL STRUC DESC                   | Conc. Riser |
| BMP ID NO           | 016                                 | SITE AREA acre        | 17.04                                  | CTRL STRUC SIZE inches            | 12' x 4'    |
| PLAN NO             | SP-13-00                            | LAND USE              | Gen Industrial                         | OTLT BARRL DESC                   | RCP         |
| TAX PARCEL          | (51-03)(01-03)                      | old BMP TYP           |  | OTLT BARRL SIZE inch              | 48          |
| PIN NO              | 5130100003                          | JCC BMP CODE          | A3 Wet ED Pond                         |                                   |             |
| CONSTRUCTION DATE   | 1/31/2000                           | POINT VALUE           | 10                                     | EMERG SPILLWAY                    | Yes         |
| PROJECT NAME        | Anheuser Busch Trans Advant Phase 2 |                       |  | DESIGN HW ELEV                    | 72.66       |
| FACILITY LOCATION   | Wet Pond # 2 - Brewery Parcel D-2   |                       |  | PERM POOL ELEV                    | 66.5        |
| CITY-STATE          | Williamsburg, Va. 23185             | SVC DRAIN AREA acres  | 44.9                                   | 2-YR OUTFLOW cfs                  | 6.10        |
| CURRENT OWNER       | Anheuser Busch, Inc.                |                       |  | 10-YR OUTFLOW cfs                 | 46.70       |
| OWNER ADDRESS       | One Busch Place                     |                       |  | REC DRAWING                       | Yes         |
| OWNER ADDRESS 2     |                                     | SERVICE AREA DESCRI   | Part US 60, Parking & Truck Scale Area |                                   |             |
| CITY-STATE-ZIP CODE | St. Louis, MO 63188                 | IMPERV AREA acres     | 17                                     | 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  | 1.43                                   | INTERNAL RATING                   | 4           |
|                     |                                     | CHAN PROT CTRL        | Yes                                    | MISC/COMMENTS                     |             |
|                     |                                     | CHAN PROT VOL acre-ft | 4.26                                   | Larger BMP. Also See CC 015. Call |             |
|                     |                                     | SW/FLOOD CONTROL      | Yes                                    | 253-2136 for access.              |             |
|                     |                                     | GEOTECH REPORT        | Yes                                    |                                   |             |

[Get Last BMP No](#)

[Return to Menu](#)



CC016

**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**

HANDLED  
WITHIN  
FLOOD  
ROUTING  
PROGRAM

✓ 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).

**D. MISCELLANEOUS COMPUTATIONS**

✓ Water quality volume for permanent pool.

✓ Water quality volume for extended detention with drawdown computations.

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

## II. SOILS INVESTIGATION

|          |   |
|----------|---|
| <u>✓</u> | Geotechnical report. <i>WHERE</i>   |
| <u>✓</u> | Minimum boring locations: borrow area; pool area; principal spillway; top of dam near one abutment or emergency spillway if provided. |
| <u>✓</u> | 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

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

### B. MAINTENANCE ITEMS

|            |  |
|------------|--|
| <u>✓</u>   | Person or organization responsible for maintenance.  |
| <u>✓</u>   | Inspection and maintenance agreement. <i>(Phase I)</i>   |
| <u>N/A</u> | Maintenance access from public right-of-way or publicly traveled road.   |
| <u>✓</u>   | Maintenance easement, minimum 15 feet around 100-year pool elevation.  |
| <u>✓</u>   | Forebay (if proposed).   |
| <u>✓</u>   | Temporary erosion and sediment control measures for pond construction.   |
| <u>✓</u>   | Fence, or minimum 6' wide safety shelf for public safety.  |
| <u>N/A</u> | 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

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

a. ANTI-SEEP COLLAR

- ✓ 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

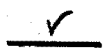
6. OUTFALL PROTECTION



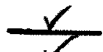
Size for maximum barrel release (but not greater than 10 year storm)



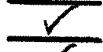
Cross-section at end of barrel in accordance with receiving channel section



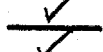
Endsection with footer



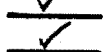
Outfall dimensions



Slope - 0%



Rip-rap size, VDOT Classification

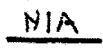


Thickness (1.5 Times Maximum Stone Diameter)

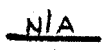


Approved filter fabric (nonwoven)

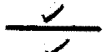
7. ELEVATIONS



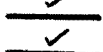
Top of dam - construction height and settled height (10% settlement)



Crest of emergency spillway



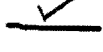
Crest of riser structure



Inverts of control release orifice/weirs



Pools: permanent; extended detention; 2-year; 10-year; 100-year; and appropriate safety storms



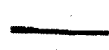
Appropriate freeboard per SCS National Engineering Handbook, provide minimum one foot of free board above the 100-year design highwater.



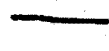
Inlet and outlet inverts of pipes (with slopes in %)

D. CROSS SECTION THROUGH DAM ALONG CENTERLINE

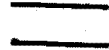
NOT APPLICABLE



Existing ground



Proposed grade



Top of dam - constructed and settled



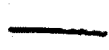
Location of emergency spillway with side slopes labeled (emergency spillway in cut)



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

- 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:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

BY: Michael H. H. H.

DATE: 1-27-00

sdbdc.txt

**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.

☒ Downstream hydrographs at established study points (if required).

C. **HYDRAULIC COMPUTATIONS**

☒ Elevation-Storage (curve)

☒ Weir/Orifice control - extended detention control.

☒ Weir/Orifice control - riser 2 year control.

☒ Weir/Orifice control - riser 10 year control.

☒ Inlet/Outlet (barrel) control - (all storms).

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

☒ Emergency spillway capacity.

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

D. **MISCELLANEOUS COMPUTATIONS**

☒ Water quality volume for permanent pool.

☒ Water quality volume for extended detention with drawdown computations.

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

## II. SOILS INVESTIGATION

|          |   |
|----------|---|
| <u>✓</u> | Geotechnical report.  |
| <u>✓</u> | Minimum boring locations: borrow area; pool area; principal spillway; top of dam near one abutment or emergency spillway if provided. |
| <u>✓</u> | 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

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

#### B. MAINTENANCE ITEMS

|              |            |  |
|--------------|------------|--|
| <u>OWNER</u> | <u>✓</u>   | Person or organization responsible for maintenance.  |
| "            | <u>✓</u>   | Inspection and maintenance agreement.  |
|              | <u>✓</u>   | Maintenance access from public right-of-way or publicly traveled road.   |
|              | <u>✓</u>   | Maintenance easement, minimum 15 feet around 100-year pool elevation.  |
|              | <u>N/A</u> | Forebay (if proposed).   |
|              | <u>✓</u>   | Temporary erosion and sediment control measures for pond construction.   |
|              | <u>✓</u>   | Fence, or minimum 6' wide safety shelf for public safety.  |
|              | <u>✓</u>   | 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

☒ Dam side slopes labeled.  
☒ Top width labeled (per VESCH).  
☒ Removal of unsuitable material under proposed dam (per geotechnical report).

2. CORE TRENCH

SCS ☒ Materials (per construction specifications)  
SCS ☒ Bottom width (4' minimum or greater as dictated by geotechnical report)  
☒ Side slopes (1:1 maximum steepness)  
SCS ☒ 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

☒ Materials (ASTM C-361 or as required)  
☒ Support for concrete barrels-concrete cradles, etc. (detail required)  
☒ Gauge and corrugation size for metal barrels

5. SEEPAGE CONTROL

\_\_\_\_\_ Phreatic line (4:1 slope measured from the intersection of the dam and the principal spillway design high water).

a. ANTI-SEEP COLLAR SCS

\_\_\_\_\_ Anti-seep collar (detail required)  
\_\_\_\_\_ 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 SCS

\_\_\_\_\_ 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

- ☒ Top of dam - construction height and settled height (10% settlement)
- ☒ 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

- ☒ 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)
- SCS ☒ Location of each soil boring
- ☒ Barrel location
- ☒ Existing and proposed utility location/protection

E. EMERGENCY SPILLWAY PROFILE

☒ Existing ground  
☒ Inlet, level (control), and outlet sections per SCS  
☒ Spillway and crest elevations

F. CONSTRUCTION SPECIFICATIONS

☐ 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:

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BY: Hand V. R.

DATE: 9/30/99

sdbdc.txt

## Stormwater Management Design Plan Staff “Quick” Review

CC016

Soils Information:  
Soil Survey Sheet  
27

Site: 37 URBAN LAND Hydric: ☐ Yes ☒ No  
DA: 37 URBAN LAND HSG: N/A  
BMP: 37 URBAN LAND Hydric: ☐ Yes ☒ No  
Description of Soils at Site / DA / BMP: None. BORING Phase I show silty clays, clayey sands. Wet ponds being utilized.

BMP Control: ☐ None ☒ Onsite ☐ Offsite ☒ Previous Approved (POND 1) PH I  
BMP Types: 1- Name: POND 1 (JCC BMP Type A - 3), Points 10  
2- Name: POND 2 (JCC BMP Type A - 3), Points 10

OnSite Drainage Type: ☒ Reinforced Concrete Pipe ☐ Corrugated Metal Pipe ☐ Aluminum Type Pipe  
☐ Corrugated Polyethylene Pipe ☒ PVC Type Pipe SMALL DRAIN ☐ Open Channel Type  
Type: RCP  
☒ Other (Specify): CLASS IV 24" SLOTTED DRAIN IN TRAIL TRAIL PARKING AREA  
1. VDOT Standards & Specifications Referenced for work within R/W: US60 ☒ Yes ☐ No  
2. VDOT Standards & Specifications Referenced for work outside R/W: ☐ Yes ☒ No

Site Limitations: ☐ RPA ☒ RMA-H ☐ Steep Slopes ☐ Delineated Wetlands  
☒ Hydric Soils ☐ Critical Soils ☐ Vegetated ☐ Buffers  
☒ Defined Natural Drainage Features onsite ☒ Downstream Storm/Culv.  
☒ Evidence of Downstream Channel Erosion (by Field Observation) BELOW POND 2  
☐ Floodplain or Problem Drainage Area ☐ Stormwater Hotspot  
☐ Other (Specify):

Site Stormwater Management / BMP Control: WET EXT. DET.

| <input type="checkbox"/> Yes <input type="checkbox"/> No (#1 / #2) | #1 <u>POND 1</u>   | #2 <u>POND 2</u>                              |
|--|--|---|
| Predev (Present)   | DA = <u>2.94</u> / <u>45.5</u> ac. C/CN = <u>80</u> / <u>61</u>      | Tc = <u>24</u> / <u>66</u> min / <u>hrs</u>   |
| 2-year   | <u>4.59</u> cfs  | <u>12.39</u> cfs                              |
| 10-year  | <u>10.07</u> cfs   | <u>73.71</u> cfs                              |
| 100-year   | <u>3.94</u> <u>33.05</u> cfs   | <u>- -</u> cfs                                |
| PostDev w/o Detention  | DA = <u>4.04</u> / <u>44.9</u> ac. C/CN = <u>85</u> / <u>61</u> DCIA | Tc = <u>10</u> / <u>61.8</u> min / <u>hrs</u> |
| 2-year   | <u>13.26</u> <u>13.51</u> cfs  | <u>43.52</u> ✓ cfs                            |
| 10-year  | <u>22.84</u> <u>23.27</u> cfs  | <u>85.12</u> cfs                              |
| 100-year   | <u>3.94</u> <u>32.22</u> <u>32.85</u> cfs                            | <u>131.21</u> cfs                             |
| PostDev w/ Detention   | DA = <u>4.04</u> / <u>44.9</u> ac. C/CN = <u>85</u> / <u>61</u>      | Tc = <u>10</u> / <u>6.10</u> min / hrs.       |
| 2-year   | <u>1.26</u> <u>1.46</u> cfs at El. <u>76.15</u> <u>76.13</u>         | <u>46.7</u> cfs at El. <u>70.76</u> ✓         |
| 10-year  | <u>5.36</u> <u>6.55</u> cfs at El. <u>76.82</u>                      | <u>46.7</u> cfs at El. <u>71.69</u> ✓         |
| 100-year   | <u>1.30</u> <u>8.22</u> cfs at El. <u>77.53</u>                      | <u>84.24</u> ✓ cfs at El. <u>72.66</u> ✓      |

Downstream Tailwater Assumption for Pond Routing: dc or tw via program (1 ft. for BOTH)

Routed Peak Discharges (Outflows) from BMP - 1 meets Predevelopment Allowables: ☒ Yes ☐ No  
Routed Peak Discharges (Outflows) from BMP - 2 meets Predevelopment Allowables: ☒ Yes ☐ No  
Appears to Meet VESCH / E&SC Ordinance / CBP Ordinance Requirements: ☒ Yes ☐ No

POND 2 25-YEAR DISTURB ROUTING = 65.5 cfs @ EL. 72.13

Pond / BMP Design Data (Add Sheet If Necessary):

☐ Check if None Provided ☒ Provided: BMP # 1 Type: Wet Det Pond  
WET EXT DET

Y N

☒ Top of Facility El. 79.00

☒ Design High Water El. 77.53 72.66

☒ Emergency Spillway (E.S.)  
 Crest El. 77.53 7 Width: 1.47 FT. SS: \_\_\_\_\_  
☐ FreeBoard \_\_\_\_\_ 1 ft. or > with E.S.  
☒ Acceptable ☐ Not Acceptable. 2 ft. or > w/o E.S.

☒ Principal Spillway (Riser) Crest El. 77.75

☐ Principal Spillway Crest 1 ft. below crest of emergency spillway. ☐ Yes ☒ No ☐ N/A

☒ 1-year design storm El. 75.96

☒ 1-year, 24 hour detention criteria for stream channel protection. ☒ Yes ☐ No ☐ N/A

☒ Extended Detention Provided ☒ Yes ☐ No ☐ N/A

☒ Normal/Permanent Pool El. 74.50

☐ Orifice/Weir #1 El. 74.65 Type: CIRC. 3-13/16"

☐ Orifice/Weir #1 El. 76.00 Type: 3-(2'x1.75H)

☐ Orifice/Weir #3 El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ Orifice/Weir #4 El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ Orifice/Weir #5 El. \_\_\_\_\_ Type: \_\_\_\_\_

☒ Low Flow Orifice El. 74.65 Type: CIRC. 3-13/16"

☐ Pond Drain w/ Valve El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ Pond Bottom El. 70.50 Riser Height: 7.75

☒ Steps (for over 4 ft.)

☐ Riser Base NONE SPEC. Bottom El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ Core Trench

☒ Anti-Seep Collars or other acceptable Seepage Control Method.

☒ Principal Spillway Anti-Vortex Device and Trash Rack. Type: 100-YR 0.22' BRUW PSC.

☒ Low Flow Orifice Cage-Type Trash Rack.

☐ Outlet Barrel: Type/Class: RCP-CL4 Size: 15"  
 Inv. U/S: 73.6 Inv D/S: 71.74  
 Slope: 1.55% Length: 81 (ft.)

☐ Flared End Section. Matches Outlet Barrel material type. (INLET)

☒ Outlet Protection.

☐ Standard riprap outlet protection (OP) Type: \_\_\_\_\_

☐ Special Dissipator Structure (SDS) Type: N/A

☐ Sediment / Cleanout Elevation El. \_\_\_\_\_

☒ Adequate Channel Downstream of BMP or Meets 1-year, 24-hour detention criteria.

Sketch and Notes, If Needed:

POND 1 Previously Approved PHASE I OF PLAN.

Sediment Trap & Basins

☐ Temporary Sediment Trap # 1 DA = \_\_\_\_\_

☐ Temporary Sediment Trap # 2 DA = \_\_\_\_\_

☐ Temporary Sediment Trap # 3 DA = \_\_\_\_\_

☒ Temporary Sediment Basin # 1 BMP Pond 1 DA = 4.0 ☐ BMP # 1 convert.

☒ Temporary Sediment Basin # 2 Pond 2 DA = 45.0 ☐ BMP # 2 convert.

Pond / BMP Design Data (Add Sheet If Necessary for Multiple Facilities):

☐ Check if None ☒ Provided: BMP # (2) Type: WET EXT. DET.

Y N

☒ ☐ Top of Facility El. 74.0

☒ ☐ Design High Water El. 72.66

☒ ☐ Emergency Spillway (E.S.) Crest El. 72.80 BW: 20 SS: 4H:1V GRASS

☒ ☐ FreeBoard 1.34' 1 ft. or > with E.S.

☒ ☐ Acceptable ☐ Not Acceptable. 2 ft. or > w/o E.S.

☐ ☐ Principal Spillway (Riser) Crest El. ~~70.75~~ 70.75 Size/Type: 12'W x 2'H RECT.

☐ ☐ Principal Spillway Crest 1 ft. below crest of emergency spillway. ☐ Yes ☐ No ☐ N/A

☐ ☐ Stage-Storage Curve or Data

☐ ☐ Outlet Rating Curve or Table (Discharge Structure Rating)

☐ ☐ 1-year design storm El. 70.22 or Volume 185,913 c.f.

☐ ☐ 1-year, 24 hour detention criteria for stream channel protection. ☒ Yes ☐ No ☐ N/A

☐ ☐ Extended Detention Provided (Min. 24 hours) ☒ Yes ☐ No ☐ N/A

☐ ☐ Normal/Permanent Pool El. 66.50

☒ ☐ Orifice/Weir #1 (highest El.) El. 70.75 Type: RECT. 2-4' L x 2'H

☒ ☐ Orifice/Weir #2 El. 70.25 Type: RECT. 1-4' L x 30"H

☒ ☐ Orifice/Weir #3 El. 66.5 Type: 5 1/4" CIRC.

☐ ☐ Orifice/Weir #4 El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ ☐ Orifice/Weir #5 (lowest El.) El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ ☐ Low Flow Orifice ( ExDet, CPv) El. 66.50 Type: 5 1/4" CIRC.

☐ ☒ Pond Drain w/ Valve El. \_\_\_\_\_ Type: \_\_\_\_\_

☐ ☐ Pond Bottom El. 63.0 Riser Height: 9.25'

☒ ☐ Steps or Access Provided (for over 4 ft. depth)

☐ ☒ Riser Base Bottom El. 63.00 Type: CONC. BOX DI-1A

☐ ☒ Core Trench EXCAVATED. 14 x 6, 12" THICK.

☒ ☐ Anti-Seep Collars or other acceptable Seepage Control Method.

☐ ☒ Principal Spillway Anti-Vortex Device and Trash Rack. Type: \_\_\_\_\_

☒ ☐ Low Flow Orifice Cage-Type Trash Rack. Type: \_\_\_\_\_

☐ ☐ Outlet Barrel: Type/Class: RCP ASTM C311 Size: 48 INCH CLASS III

Inv. U/S: 65.48 Inv D/S: 65.0

Slope: 1.00% Length: 48 (ft.)

☐ ☒ Flared End Section. Matches Outlet Barrel material type. HEADWALL FLARED. EW-2

☒ ☐ Outlet Protection.

☒ ☐ Standard riprap outlet protection (OP) Type: CLASS I TYPE 2' DEEP.

☐ ☐ Special Dissipator Structure (SDS) Type: \_\_\_\_\_

☐ ☐ Sediment / Cleanout Elevation El. 66.5 or Depth 1.9'

☐ ☐ Adequate Channel Downstream of BMP using MS #19 or 1-year, 24-hour detention criteria.

Sketch and Notes, If Needed:

EXT. DET VOL. (1") = 62,436 CF (BASED ON 17.2 AC IMP.)  
 1 YR, 24 HR VOL = 185,913 CF 749,232 S.F.  
 PERM POOL VOL (1") = 62,436 CF  
 PRETREATMENT ROCK BAFFLE = TOP EL. 66.0

Sediment Trap & Basins

☐ Temporary Sediment Trap # 1 DA = \_\_\_\_\_ < 3 acres

☐ Temporary Sediment Trap # 2 DA = \_\_\_\_\_ < 3 acres

☐ Temporary Sediment Trap # 3 DA = \_\_\_\_\_ < 3 acres

☒ Temporary Sediment Basin # 1 BMP POND 1 DA = 4.04 AC. ☒ BMP # 1 convert.

☐ Temporary Sediment Basin # 2 BMP POND 2 DA = 45 AC. ☒ BMP # 2 convert.

BMP #2

CO. EL. 64.90 (44,085 CF)  
 WET STOK EL. 66.5 (84,147 CF)  
 DET STOK EL. 70.25 (129,000 CF)

Plan Review Steps & Components:

- |                                     |                                     |   |
|-------------------------------------|-------------------------------------|---|
| Y                                   | N                                   |   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | First "Look-Thru". Quick look through plan for familiarity.                                       |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Worksheet for BMP Point System. Check for 10 BMP points. (DEFAULT CBPA CALCS.)                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | FEMA Special Flood Hazard Area check against property, site and development.                      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Check Tax Parcel Maps for RPA/RMA and parcel location. (RMA-H)                                    |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Stormwater Hotspots or Separation Distance Requirements (if any) satisfied.                       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Environmental Inventory components based on Chesapeake Bay Ordinance requirements.                |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Highlight environmental sensitive areas (wetlands, RPA, steep slope, etc.).                       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Demolition plan (if any). Identification of offsite LD, borrow or waste areas and E&SC.           |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review existing topography to determine adequacy of E&SC plan (Phase I).                          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review grading plan to check for conflicts (offsite grading, cut-fills, slopes,) & Phase II E&SC. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review layout plan to check for conflicts (buildings, parking, buffers, etc.).                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Highlight storm drain system. Check for major utility conflicts and cover situations.             |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review storm drain specifications, notes, and details.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review sequence of construction (for E&SC and SWM plan purposes). (SWMPP PLAN.)                   |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Review plan based on Chapter 19 Subdivision ordinance as it relates to SWM.                       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on Chapter 24 Zoning as it relates to SWM.                                      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on Chapter 23 Chesapeake Bay ordinance requirements. NO NET INCREASE < 60%.     |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on General Knowledge and Experience for Design/Construction.                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on JCC BMP manual for the BMP type selected for project. NET EXT. DET. A-3      |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Review plan based on JCC Stormwater Conveyance System D/C Guidelines (Future).                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on Virginia Erosion and Sediment Control Handbook (VESCH).                      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on Virginia Stormwater Management Handbook (VSMH).                              |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Review plan based on Hampton Roads BMP Design Guidance manual (Optional).                         |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on MWCOC, Controlling Urban Runoff BMP manual (Optional).                       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review plan based on standard JCC E&SC and SWM Design Plan Checklists.                            |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Review plan based on JCC BMP Construction Specifications (Future).                                |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review Maintenance Plan for SWM / BMP facility.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review E&SC Plan Design Report or computations (Attachment).                                      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Review SWM Design Report or computations (Attachment). ADDENDUM 3 DATED MAR 8 2000.               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Adequate Channel information provided downstream of both uncontrolled or BMP areas.               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Provisions on plan requiring proper As-Built and Certification of facility during construction.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Inclusion of SWM/BMP data into any Departmental databases.  |
| <input type="checkbox"/>            | <input type="checkbox"/>            | Reserved.   |

Prepared Environmental Division comments for the following based on above components:

- |                          |                          |   |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <u>General Comments:</u>                    |
| <input type="checkbox"/> | <input type="checkbox"/> | <u>Erosion &amp; Sediment Control Plan:</u> |
| <input type="checkbox"/> | <input type="checkbox"/> | <u>Floodplain:</u>                          |
| <input type="checkbox"/> | <input type="checkbox"/> | <u>Chesapeake Bay Preservation:</u>         |
| <input type="checkbox"/> | <input type="checkbox"/> | <u>Stormwater Management / Drainage:</u>    |

None

Additional Notes & Comments: POLLUTANT LOAD CALCS PROVIDED IN TAB 4 OF REPORT IN LIEU OF POINT BASED SYSTEM PER OUR PHASE I COMMENTS.

PRINCIPAL STRUCTURE WAS RECONFIGURED DUAL OUTLETS TO SINGLE 48" REROUTING PROVIDED.

5 minor comments to be corrected by engineer. Reamend no formal comm.

(Note: THIS FORM FOR COUNTY USE ONLY.)

*[Signature]*  
Signature

03-15-00  
Date



Plan Review Steps & Components:

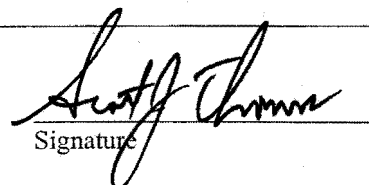
| Y                                   | N                        |   |
|-------------------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | First "Look-Thru". Quick look through plan for familiarity.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Worksheet for BMP Point System for 10 points system.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | FEMA SFHA check against property, site and development.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Environmental Inventory based on Chesapeake Bay Ordinance requirements.                               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Highlight environmental sensitive areas (wetlands, RPA, steep slope, etc.).                           |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review existing topography to determine adequacy of E&SC plan (Phase I).                              |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review Grading Plan to check for conflicts (offsite grading, steep cut-fill slopes, etc.).            |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review Development Plan to check for conflicts (drainage, buffers, etc.).                             |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Highlight storm drain system. Check for major utility conflicts and cover situations.                 |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review Storm Drain component specifications, notes, and details.                                      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review Sequence of Construction (E&SC and SWM plan purposes).   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on Chapter 19 Subdivision ordinance as it relates to SWM.                           |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on Chapter 24 Zoning as it relates to SWM.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on Chapter 23 Chesapeake Bay ordinance requirements.                                |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on General Knowledge and Experience.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on Virginia Erosion and Sediment Control Handbook (VESCH).                          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC BMP manual for the BMP type(s) selected for project. <b>A-3</b>              |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on Hampton Roads BMP Design Guidance manual.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC E&SC and SWM Design Plan Checklist. (Pre-final).                             |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on Virginia Stormwater Management Handbook (VSMH).                                  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC Stormwater Conveyance System D/C Guidelines (Pre-final).                     |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC BMP Construction Specifications (Future).                                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review Maintenance Plan for SWM / BMP facility. <b>POND 1 OK. POND 2 NOT PROVIDED</b>                 |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review E&SC Plan Design Report or computations (Attachment).  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Review SWM Design Report or computations (Attachment).  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Adequate Channel Information downstream of both uncontrolled or BMP areas. <b>1-YEAR, 24 HR CONT.</b> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Provisions on plan requiring proper As-Built and Certification of facility during construction.       |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Inclusion of Design Plan into any Department SWM/BMP databases.                                       |
| <input type="checkbox"/>            | <input type="checkbox"/> | Reserved.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | Reserved.   |

Prepared Environmental Division comments for the following based on above components:

- ☒ General Comments:
- ☒ Erosion & Sediment Control Plan:
- ☐ Floodplain:
- ☒ Chesapeake Bay Preservation:
- ☒ Stormwater Management / Drainage:

Additional Notes & Comments: Need BMP POINT OR LOAD CALCS.  
SPECS - OK, 1 comment.  
POND 2 IS EXCAVATED, NO CORE TRENCH REQUIRED.

(Note: THIS FORM FOR COUNTY USE ONLY.)

  
 Signature

02-11-00  
 Date

Anheuser Busch Transportation  
Advantage Phase I & II  
Stormwater Management Facilities



Also See CC 015 for Pond

Contact Scott Randall - 253-2136

7-1-1-1

*R. J. Glidden*  
RESIDENT CONSTRUCTION ENGINEER



*SCOTT RANDALL* ENV. ENGINEER  
*253-2136*

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