



## 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.

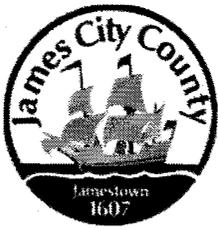
**BMP NUMBER:** YC034

**DATE VERIFIED:** January 17, 2013

**QUALITY ASSURANCE TECHNICIAN:** Leah Hardenbergh

*Leah Hardenbergh*

**LOCATION:** WILLIAMSBURG, VIRGINIA



# Stormwater Division

## MEMORANDUM

**DATE:** March 13, 2010  
**TO:** Michael J. Gillis, Virginia Correctional Enterprises Document Management Services  
**FROM:** Jo Anna Ripley, Stormwater  
**PO:** 270712  
**RE:** Files Approved for Scanning

---

**General File ID or BMP ID:** YC034

**PIN:** 2320100018

**Subdivision, Tract, Business or Owner**

**Name (if known):**

Johnson Development

**Property Description:**

Medical Office

**Site Address:**

7450 Richmond Road

*(For internal use only)*

**Box** 24

**Drawer:** 9

**Agreements:** (in file as of scan date)

Y

**Book or Doc#:**

020013205

**Page:**

010014642

Comments

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 30 day of May, 2002,  
between Timothy K. Johnston  
and all successors in interest, ("COVENANTOR(S),") owner(s) of the following property: 7450 Richmond Rd.  
project name, Dr. Johnston's Dental Office Clinic  
Document No. 010014642, Deed Book \_\_\_\_\_, Page No. \_\_\_\_\_; Instrument No. \_\_\_\_\_,  
and the County of James City, Virginia ("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.

Instrument # 020013205

Page 1

Revised 01/02

Recorded on June 10, 2002

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

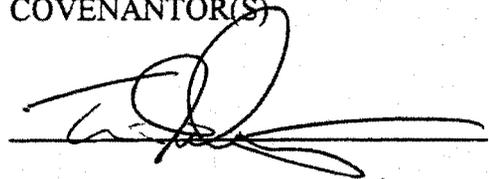
7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

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

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

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)



Print Name/Title

Timothy K. Johnston/owner

ATTEST:



COVENANTOR(S)

\_\_\_\_\_

Print Name/Title

\_\_\_\_\_

ATTEST:

\_\_\_\_\_

COMMONWEALTH OF VIRGINIA  
CITY/COUNTY OF Williamsburg

I hereby certify that on this 30 day of May, 2002, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of Williamsburg, aforesaid personally appeared Timothy K. Johnston and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 30 day of May, 2002.

Donna A. Chapman  
Notary Public

My Commission expires: 11/30/05

Approved as to form:

[Signature]  
Asst. County Attorney

This Declaration of Covenants prepared by:

Donna A. Chapman  
(Print Name)

Administrator  
(Title)

5500 Moorestown Rd.  
(Address)

Williamsburg, Va. 23188  
(City) (State) (Zip)

drainage.pre

(23-2) (1-18)  
7450 RICH ROAD  
1.515 AC.  
27500 SF (420)

# James City County, Virginia Environmental Division

## Stormwater Management/BMP Record Drawing and Construction Certification Review Tracking Form

Approved  
8/15/02

County Plan No.: SP-6-02  
Project Name: Johnston Medical Clinic  
Stormwater Management Facility: Dryswale

Phase:  I  II  III  
 Information Received. Date/By: LANOTECH 1/7/03  
 Administrative Check.  
 Record Drawing Date/By: LANOTECH 8/20/03  
 Construction Certification Date/By: S. ADAMS FEB 11 2004  
 RD/CC Standard Forms (Required for all BMPs after Feb 1<sup>st</sup> 2001 Only)  
 Insp/Maint Agreement #/Date: # 02 001 3205 June 10, 2005  
 BMP Maintenance Plan Location: \_\_\_\_\_  
 Other: \_\_\_\_\_

Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.  
 Yes  No Location: \_\_\_\_\_

Assign County BMP ID Code: Code: YC 034

Preliminary Input into Division's "As-Built Tracking Log"  
 Add Location to GIS Database Map. Obtain site information (GPIN, Owner, Site Area, Address, etc.)  
 Preliminary Log into Access BMP Database (BMP ID #, Plan No., GPIN, Project Name, etc.)  
 Active Project File Review (correspondence, H&H, etc.)  
 Initial As-Built File setup (Label, copy hydraulics, BMP plan and detail information, etc.)  
 Inspector Check of RD/CC (forward to inspector using transmittal for cursory review). 12-2-03  
 Pre-Inspection Drawing Review - Approved Plan (Quick look prior to Field Inspection).  
 Final Inspection (FI) Performed Date: 04/02/04  
 Record Drawing (RD) Review (\*\*\*) Date: WAC.  
 Construction Certification (CC) Review Date: WAC.

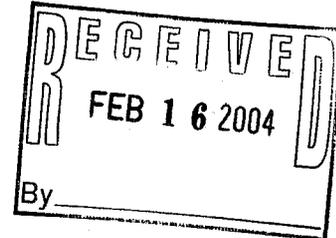
Actions:  
 No comments.  
 Comments. Letter Forwarded. Date: 4/09/04  
 Record Drawing (RD)  
 Construction Certification (CC)  
 Construction-Related (CR)  
 Site Issues (SI)  
 Other: \_\_\_\_\_

Second Submission:  
 Reinspection (if necessary): 6/8/05 SJT.  
 Acceptable for stormwater management facility purposes (RD/CC/CR/Other). Proceed with bond release.  
 Notify Inspector and Inspector Supervisor using "Surety Request Form".  
 Check/Clean active file of any remaining material and finish "As-Built" file.  
 Add to County BMP Inventory/Inspection schedule (Phase I, II or III)  
 Copy Final Inspection Report into County BMP Inspection Program file.  
 Obtain Digital Photographs of BMP and log into computer.  
 Complete "As-built Tracking Log"  
 Last check of BMP Access Database. Add to PRIDE database.  
 Add to JCC Hydrology & Hydraulic database (optional).  
 Add to PRIDE BMP ratings database.

Plan Reviewer: [Signature] Date: 7/12/05

\*\*\* See separate checklist. AND WAC

February 11, 2004



Bill Strack  
Henderson, Inc.  
5800 Mooretown Road  
Williamsburg, Virginia 23187

Subject: Project 04132003, BMP Inspection, Dr. Johnston's Office Building,  
Route 60 West, Williamsburg, Virginia

Dear Bill:

At your request, we have provided an inspection of the BMP facility constructed for the above referenced project. These services were provided in accordance with our proposal dated January 14, 2004 and accepted February 4, 2004.

Staff Engineering personnel visited the site on January 27, 2004 to observe the constructed BMP facility. The BPM Dry Swale appeared to be constructed in general accordance with the project plans with the following exceptions:

- The concrete apron at the downstream outlet of the BMP was not observed. The 8- inch diameter PVC pipe outlet was observed.
- The STR 4 clean-out located at the south end of the perforated HDPE pipe was not observed. We understand that the clean-out was under the riprap placed for the discharge of the 18-inch reinforced concrete pipe.

The project plans referenced above were dated January 21, 2002, with revisions per James City County comments dated April 24, 2002.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, opinion, or other instrument of service.

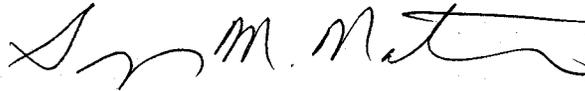
*"We are committed to serving our clients by exceeding their expectations."*

Geotechnical • Construction Monitoring • Dam Engineering • Geoscience • Environmental

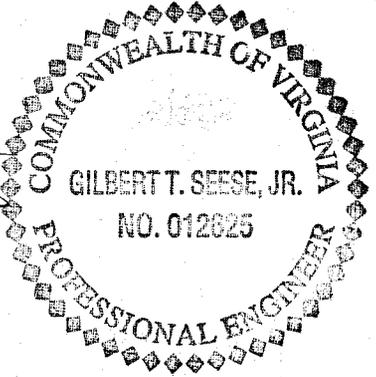
Very truly yours,  
SCHNABEL ENGINEERING SOUTH, LLC



Gilbert T. Seese, P.E.  
Senior Associate



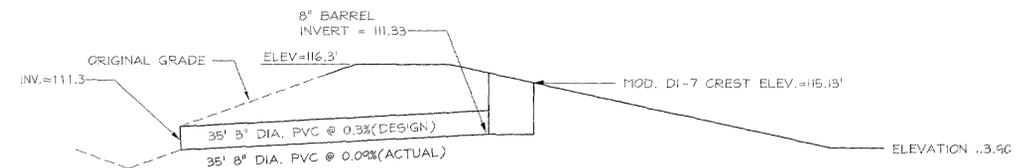
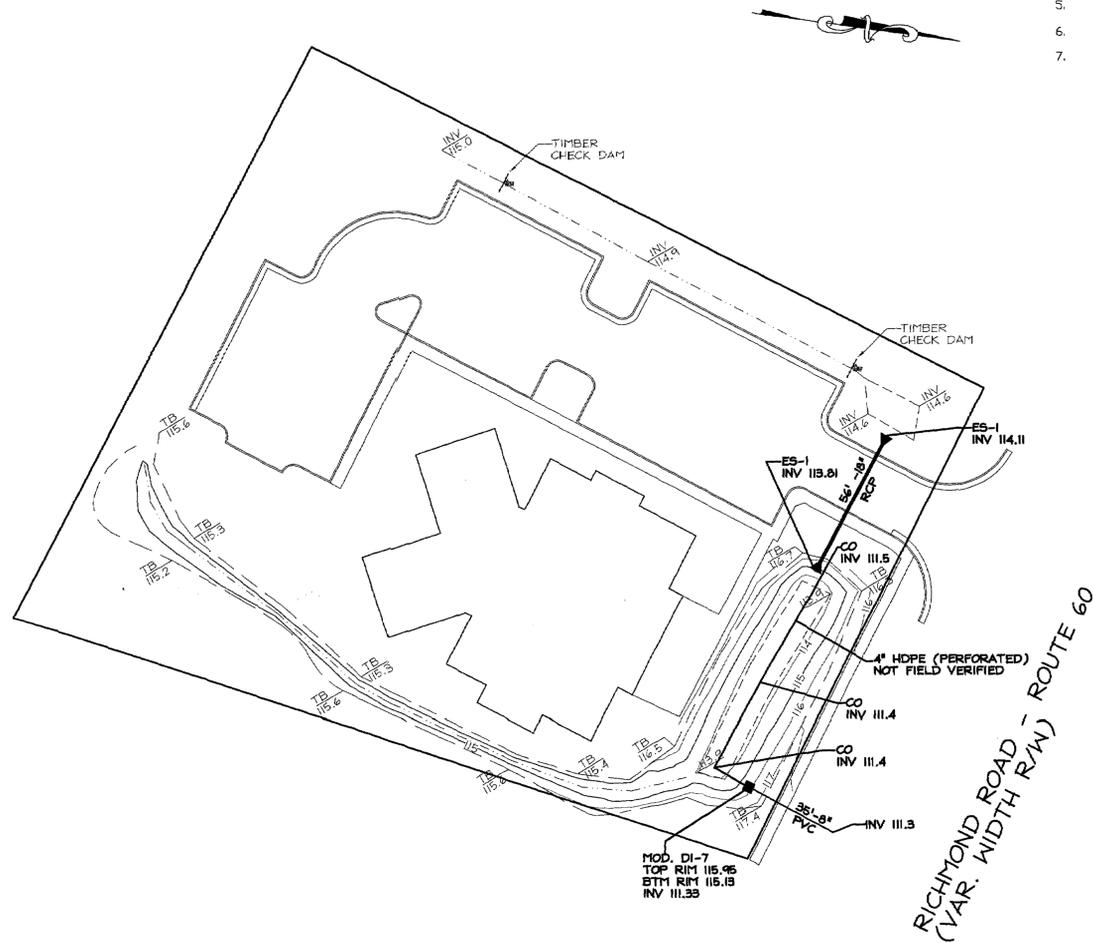
Gregory M. Nataluk, P.E.  
Senior Engineer



GTS:GMN:adh

**STORMWATER MANAGEMENT MAINTENANCE SCHEDULE (PER APPROVED PLANS)**

1. SIDE SLOPES, EMBANKMENT AND SWALES SHALL BE MOWED AT LEAST TWICE A MONTH WITH A GRASS CATCHER TO MINIMIZE MULCH BUILDUP.
2. DRY SWALE FACILITY SHALL BE INSPECTED BIANNUALLY TO ENSURE THAT THE STRUCTURE OPERATES IN THE MANNER ORIGINALLY INTENDED. INSPECT FOR CLOGGING OR RAPID RELEASE. ALSO CHECK FOR EROSION ALONG SWALE SIDE SLOPES. INSPECTION SHALL BE CARRIED OUT WITH AS BUILT PLANS IN HAND.
3. DEBRIS AND LITTER SHALL BE REMOVED FROM THE DETENTION AREA AND OUTFALL AREA TO PREVENT COGGING.
4. THE OWNER OF THE PROPERTY SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE STORMWATER MANAGEMENT FACILITY.
5. TIMBER CHECK DAMS TO BE CHECKED FOR CLOGGING AFTER EACH MOWING OPERATION. MULCH BUILDUP TO BE REMOVED.
6. THE 4" UNDERDRAIN PIPE WITHIN THE DRY SWALE FACILITY SHALL BE INSPECTED AND CLEANED IF NECESSARY ON A BIENNIAL BASIS.
7. AS BUILT PLANS ARE REQUIRED FOR THE BMP STRUCTURE TO INCLUDE ALL GRASS SWALES.



**BMP OUTLET STRUCTURES**  
NTS

**RECORD DRAWING PLAN**

SCALE 1" = 30'

Dr. Johnston's Dental Office BMP Record Drawings  
Stage-Storage Worksheet Design Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
114	2208	2589	1.00	2589	0	0.000
115	2829	3337	1.00	3337	2589	0.059
116	3745	4169	1.00	4169	5906	0.136
117	4592				10,075	0.231

Dr. Johnston's Dental Office BMP Record Drawings  
Stage-Storage Worksheet Actual Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
113.9	948	1092	0.10	109	0	0.000
114	1236	1702	1.00	1702	109	0.025
115	2167	2592	1.00	2592	1811	0.096
116	3016	3370	0.30	1011	4403	0.189
116.3	3723				5414	0.301

**RECORD DRAWING CERTIFICATION**

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management/BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

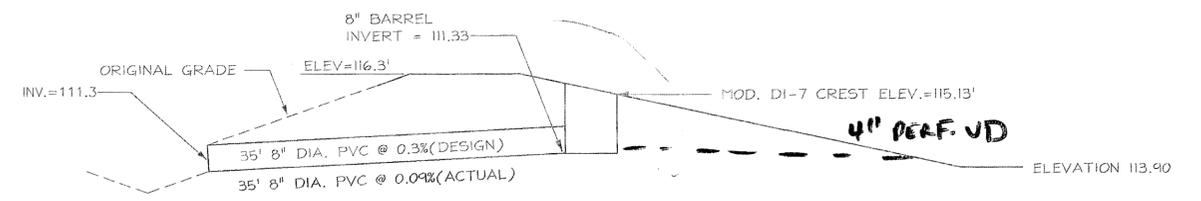
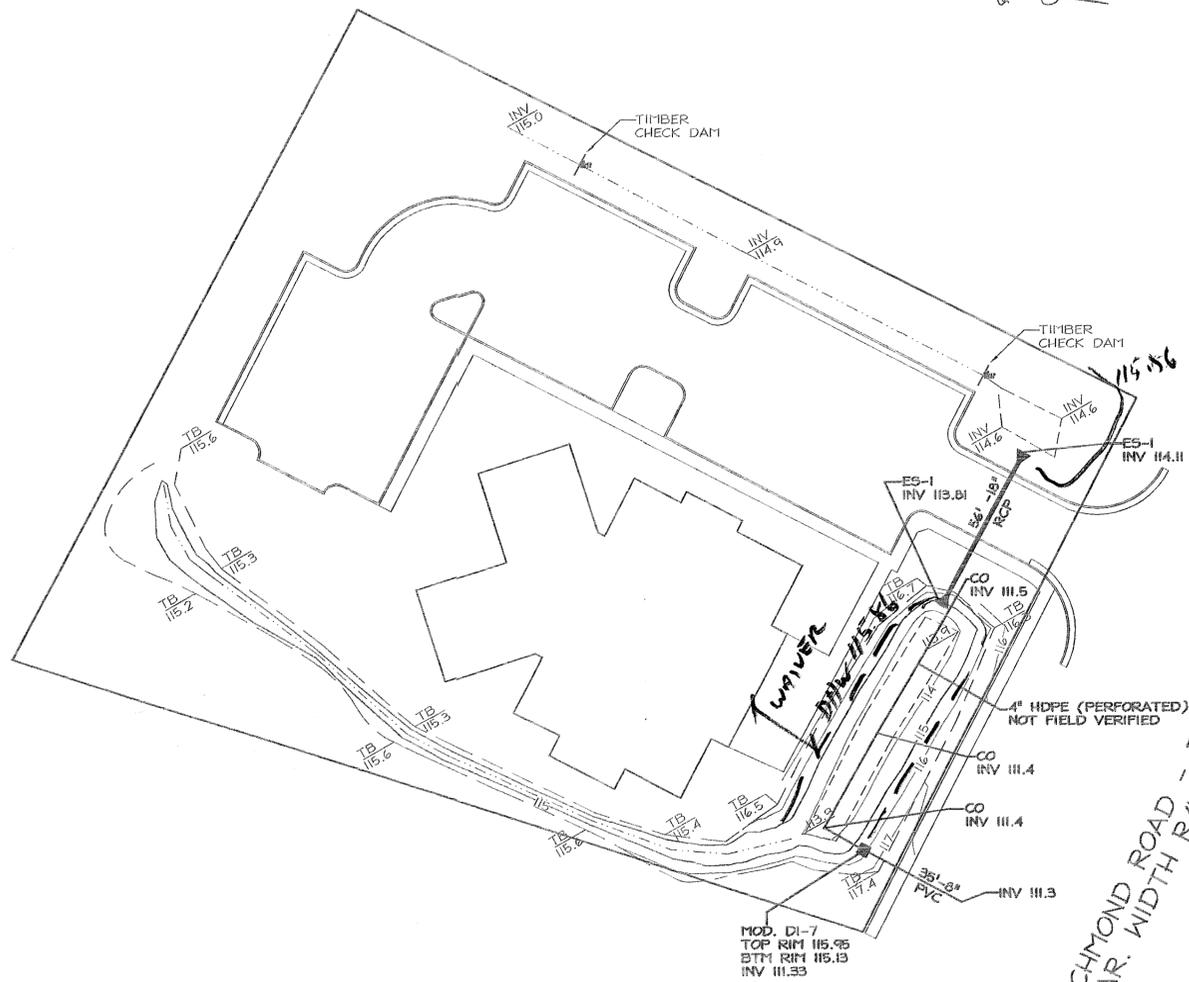
APPROVED  
James City County  
Environmental Division  
By: *[Signature]*  
Date: 06-12-05

*[Signature]*  
Virginia Registered Professional Engineer  
or Certified Land Surveyor

SCALE: 1" = 30'		<b>LandTech Resources, Inc.</b> Surveying • Mapping • GPS 5510-F Mooretown Road, Williamsburg, VA 23186 Phone: (757) 565-1677 Fax: (757) 565-0782 web: landtechresources.com	<b>DR. JOHNSTON'S DENTAL OFFICE</b> ONSITE DRY SWALE <b>BMP RECORD DRAWING PLAN</b> County Plan Number SP-06-02 - BMP ID Code: James City County, Virginia	NO.	DATE	REVISION / COMMENT / NOTE
DATE: 8/20/03						
JOB: 02-295						
DRAWN BY: KMJ						
SHEET: 1 OF 1						

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**BMP OUTLET STRUCTURES**  
NTS

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116.3	3723	3370	0.30	1011	5414	0.301

*Richmond Road - ROUTE 60  
(VAR. WIDTH R/W)*

*Routings  
2- 0.12cfs @ EL 115.18  
3- 3.05  
10- 0.02cfs @ EL 115.41  
100- 3.16cfs @ EL 115.82*

*For copy*

*Gain 23201 00018  
2150 Richmond Road  
1.51 AC.  
P&T SWALE*

*- NEED CONST CERT  
- NEED FORMS*

**RECORD DRAWING CERTIFICATION**

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management/BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

ADVANCE COPY FOR COUNTY REVIEW

*NO AB CERT*

Virginia Registered Professional Engineer or Certified Land Surveyor

SCALE: 1" = 30'  
DATE: 8/20/03  
JOB: 02-295  
DRAWN BY: KMJ  
SHEET: 1 OF 1

**LandTech Resources, Inc.**  
Surveying • Mapping • GPS  
5810-F Mooretown Road, Williamsburg, VA 23188  
Phone: (757) 565-1677 Fax: (757) 565-0782  
web: landtechresources.com

DR. JOHNSTON'S DENTAL OFFICE  
ONSITE DRY SWALE  
**BMP RECORD DRAWING PLAN**  
County Plan Number SP-06-02 - BMP ID Code: YC034  
James City County, Virginia

NO.	DATE	REVISION / COMMENT / NOTE

*SP-6-02; YC034*

**Record Drawing / Construction Certification Submittal for a BMP**

Date: 12-2-03

Inspector:  Pat Menichino  
 Joe Buchite  
 Beth Davis  
 Gerry Lewis  
 Jim Rudnicky  
 Other: \_\_\_\_\_

Project: Johnston Dental Clinic  
BMP Facility: Dry Swale  
Plan No.: SP-6-02  
Assigned County BMP ID Code: YC 034

I have received a transmittal for a  Record Drawing and  Construction Certification for the above referenced facility on 11/06/03. Prior to performing a field inspection of the BMP and performing a full review of these certification items, I am first forwarding the items to you to cursory review in case any major field changes were performed that I should be aware of and/or to ensure the record drawing accurately portrays what you saw observed in the field. Please review the drawing and return to me promptly so I can proceed with the review of certification material.

During my review, I will look at issues related to the BMP and its primary inflow and outflow conveyance systems, and may make comment on the following areas: Inspection/Maintenance agreement, Record Drawings (RD), Construction Certification (CC) and Construction-Related (CR) field items as it pertains to the BMP. If you have any other related non-BMP site issues such as site erosion, stabilization, removal of erosion & sediment controls, etc. that are not related to the BMP, you must proceed with closing out these items on your own accord; or alternatively, if needed, I can easily add these items to any comment letter that I may generate to the owner.

Let me know if I need to add any site-related items to my punch list.

Scott

AsBuilts\Admin\z-inspector

*please  
Return  
to me.  
Drawings*

*1. Timber check dam. Installed  
2. outfit concrete. Jan 12-17-03*

# Medical Clinic

10,500 S.F.  
31 Ft. Max Ht.  
F.F.E. 120.17

275 L.F. OF GRASS SWALE AT 0.5%

210' L.F. OF GRASS SWALE AT 0.50%

Small grates

Open

VDOT CG-6

3H:1V SLOPES (TYP.)

STR 4 CLEAN OUT  
R=114.00  
I=111.78 (OUT)

STR 5 ES-1  
I=114.00

TIMBER CHECK DAM (SEE DETAIL THIS SHEET)

CONSTRUCT TOP OF BANK AT ELEV. 117.10 TO ALLOW FOR SETTLING

3:1 SIDE SLOPES (TYP.)

90-4" HDPE (PERFORATED) AT 0.30%

HA-2

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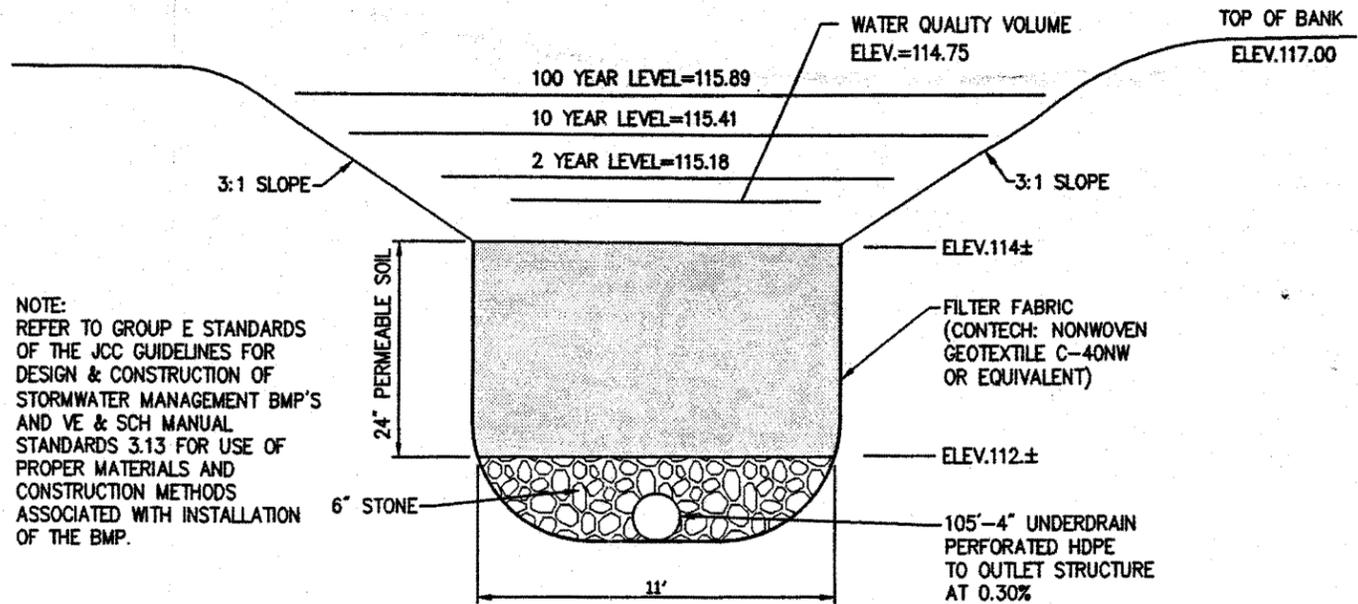
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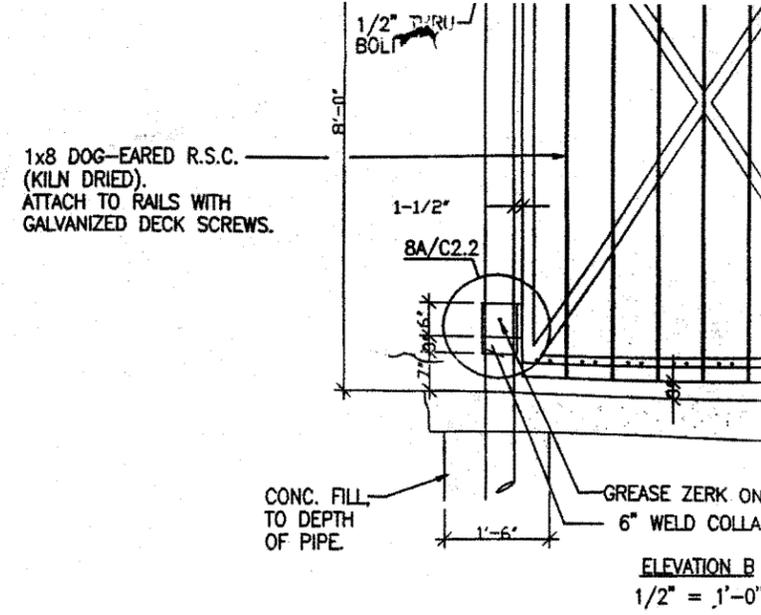
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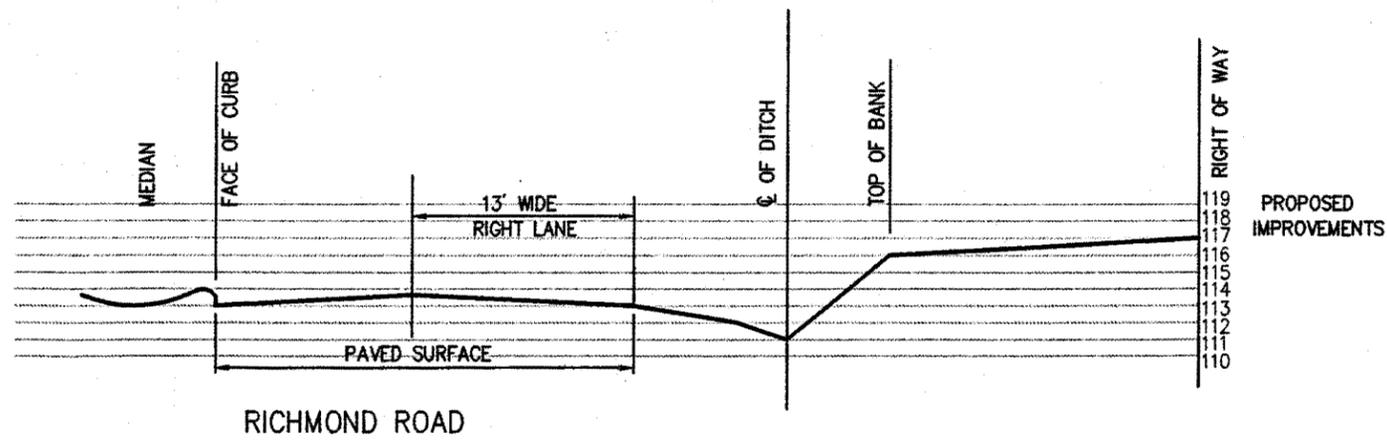
NOTE:  
REFER TO GROUP E STANDARDS  
OF THE JCC GUIDELINES FOR  
DESIGN & CONSTRUCTION OF  
STORMWATER MANAGEMENT BMP'S  
AND VE & SCH MANUAL  
STANDARDS 3.13 FOR USE OF  
PROPER MATERIALS AND  
CONSTRUCTION METHODS  
ASSOCIATED WITH INSTALLATION  
OF THE BMP.



**Dry Swale Detail**

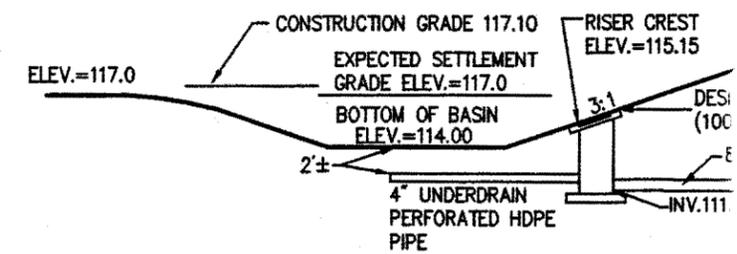
N.T.S.

**Wood Dumpster Enclosure Elevations**



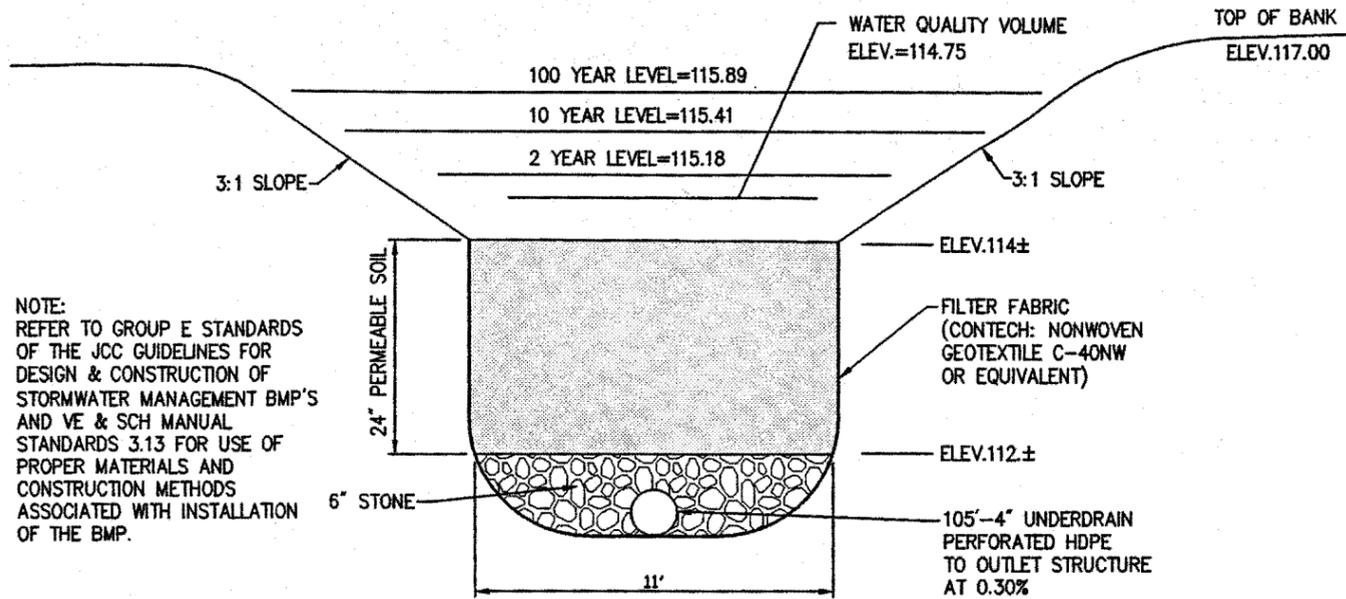
**Section A-A (Dry Swale BMP - County Type E-2 Facility)**

N.T.S.



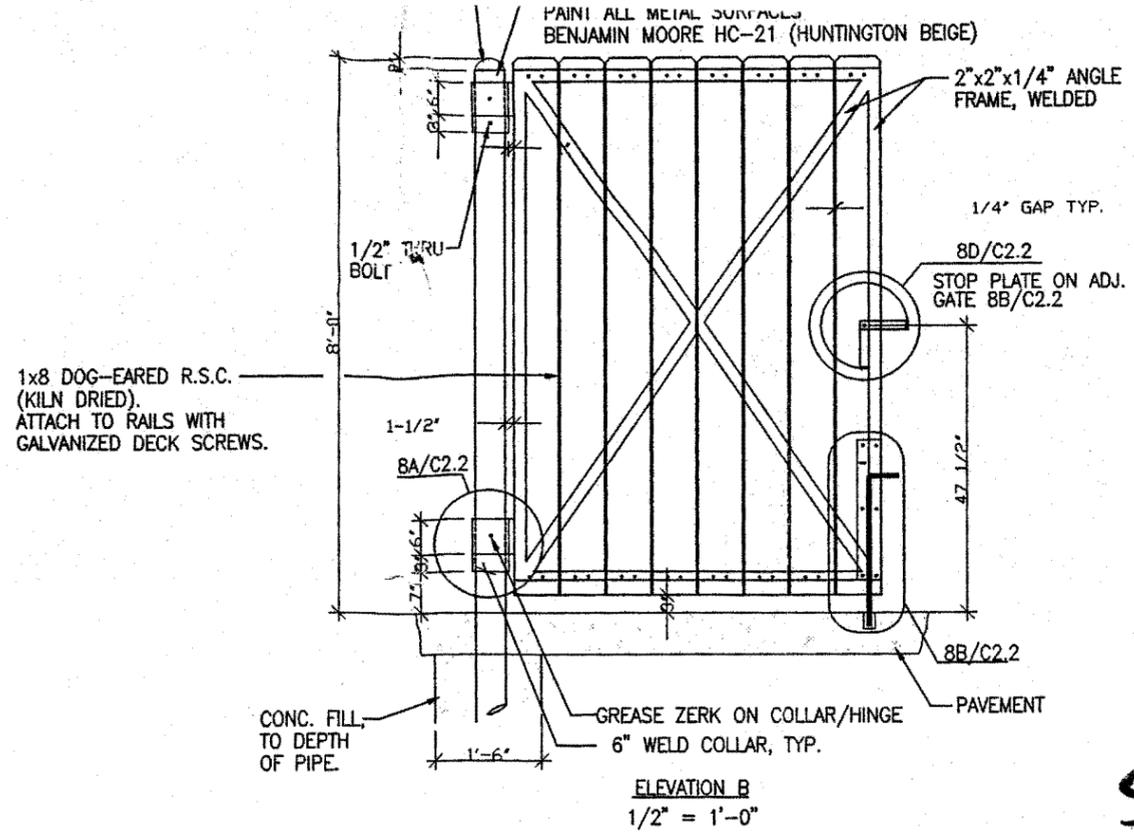
1. IT IS UNDERSTOOD THAT PREPARATION OF RECORD DRAWINGS AND FOR PROJECT FACILITIES MAY NOT NECESSARILY BE PERFORMED BY OTHERS.
2. REMOVAL OF UNSUITABLE MATERIAL UNDER PROPOSED BMP FACILITY AT THE DIRECTION OF THE SITE GEOTECHNICAL ENGINEER.

**Section B-B (Dry Swale BMP - County Type)**

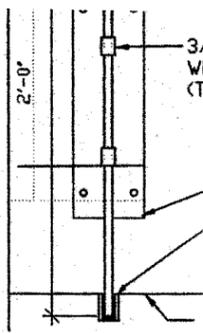


**Dry Swale Detail**

N.T.S.



SP-6-02

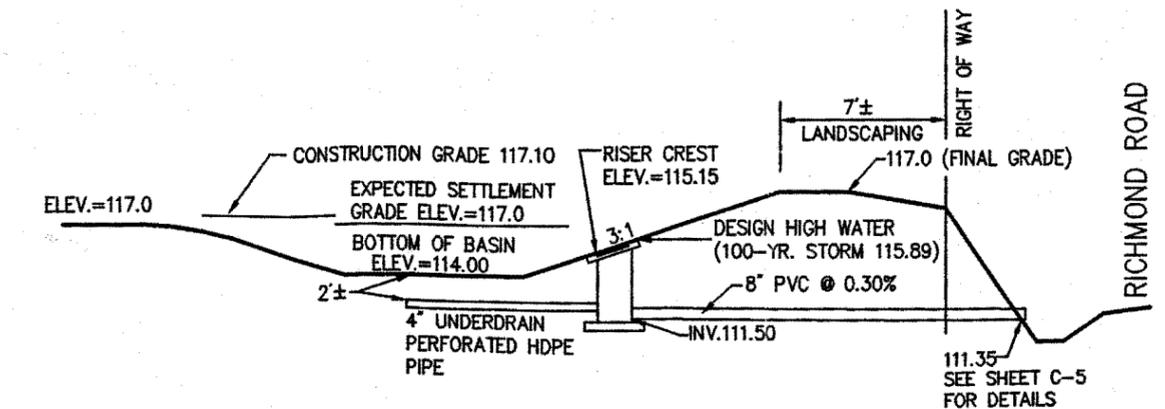
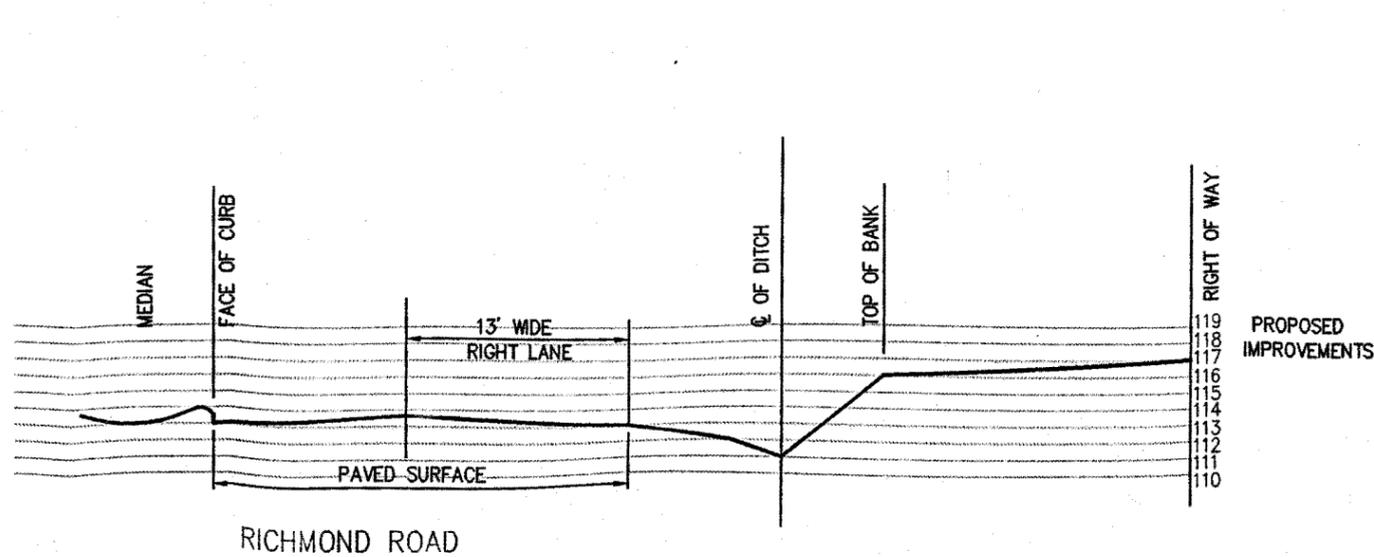


47-1/2"  
 1/4" PLATE ON 3" WIDE GATE

**Wood Dumpster Enclosure Elevations**

N.T.S.

**Dumpster E**



1. IT IS UNDERSTOOD THAT PREPARATION OF RECORD DRAWINGS AND CONSTRUCTION CERTIFICATIONS AS REQUIRED FOR PROJECT FACILITIES MAY NOT NECESSARILY BE PERFORMED BY THE PLAN PREPARER. THESE COMPONENTS MAY BE PERFORMED BY OTHERS.
2. REMOVAL OF UNSUITABLE MATERIAL UNDER PROPOSED BMP FACILITY AND REPLACEMENT MATERIAL SHALL BE AT THE DIRECTION OF THE SITE GEOTECHNICAL ENGINEER.

**Section A-A (Dry Swale BMP - County Type E-2 Facility)**

**Section B-B (Dry Swale BMP - County Type E-2 Facility)**

**Section C-C**

SP.006.02  
*Proposed*  
*Dental Medical Clinic*

James City County  
Virginia

---

Prepared for Timothy K. Johnston, D.D.S. and Kelly T. Johnston  
James City County, Virginia

Prepared by **VHB**/Vanasse Hangen Brustlin, Inc.  
Williamsburg, Virginia

# *Proposed Dental Medical Clinic*

James City County  
Virginia

---

Prepared for **Timothy K. Johnston, D.D.S. and Kelly T. Johnston**  
3402 Acorn Street, Suite 103  
Williamsburg, VA 23188  
(757) 564-0804

Prepared by **VHB/Vanasse Hangen Brustlin, Inc.**  
Transportation, Land Development, Environmental Services  
477 McLaws Circle, Suite 1  
Williamsburg, Virginia  
(757) 220-0500

January 2002



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# Narrative

Dr. Johnston's Dental Office

NARRATIVE DESCRIPTION

Revised To January 21, 2002

Site Location and Existing Conditions

The property is located in Norge at 7450 Richmond Road. The front left corner is located approximately 500' south of Norge Lane. The property runs approximately 200' along Richmond Road and 300 feet deep. Originally the property was developed and has since grown over with heavy under brush and young tree growth, mostly saplings. There is an old one story building that will be removed as well as fencing, a shed foundation and an abandoned septic tank. The entire property slopes from Richmond Road to Norge Saddle Club. Slopes range from 2 to 4 percent. The only available outfall for storm runoff is the roadside ditch running parallel to Richmond Road. James City Service Authority water is available within the Richmond Road right-of-way and sewer is nearby to the south located on private property.

A: Description of Project 42

The subject project consists of 1.515 acres. The owner proposes to construct a two story dentist office and 44 parking spaces for the facility. Additionally a bioretention BMP facility will be constructed for stormwater management. Exceptional considerations have been given to the shape, depth and aesthetics of the Best Management Practice, BMP, measure as well as enhanced landscaping.

The property is zoned A-1 General Agricultural and requires a special use permit for the type of development proposed. Special use permit SP 21-01 was approved by James City County in December 2001 with conditions. The conditions of the special use permit have been incorporated into the design to allow for additional landscaping and buffering. The proposed use of the property is consistent with SUP 21-01 and zoning requirements.

The area of construction is wooded with heavy undergrowth. The landform is mildly sloping with slopes ranging from 2% to 4%. Elevations range from elevation 119 near the southeastern boundary line to elevation 113 in northeastern side of the site. Natural surface drainage is directed northeasterly via overland flow onto Norge Saddle Club property. In post-development the natural flows will be reversed. The entire project site ultimately will drain to Cranstons Pond then to Yarmouth Creek.

According to the Soil Survey of James City and York Counties and the City of Williamsburg, Virginia, there are two types of soils within the project construction boundaries, Kempsville Emporia, fine sandy loam and Kenansville a loamy fine sand.

NATURAL DRAINAGE  
TO BACK.  
POST DEV TO  
FRONT IN  
URDF SYSTEM.

### **Kempsville Emporia:**

Kempsville Emporia complex consists of deep, gently sloping, well drained soils. Slopes range from 2 to 6 percent. Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam. The substratum is yellowish brown fine sandy loam to a depth of at least 68 inches. The permeability of Kempsville soil is moderate, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is slight. The subsoil has low to moderate shrink-swell potential. A seasonal high water table is 3 to 4 ½ feet above in winter and spring. The soil is in capability subclass IIe. The hydrologic soil group for this soil is B & C.

### **Kenansville:**

Kenansville complex consists of deep, gently sloping, well drained soils. Slopes range from 2 to 6 percent. Typically, the surface layer of this soil is dark grayish brown loamy fine sand about 2 inches thick. The subsurface layer is light yellowish brown loamy fine sand. The substratum is yellowish brown loamy fine sand with lamellae of brown fine sandy loam to a depth of at least 78 inches. The permeability of Kenansville soil is moderately rapid, and available water capacity is low. Surface runoff is slow. The erosion hazard is slight. The subsoil has low shrink-swell potential. A seasonal high water table is 4 to 6 feet above in winter and spring. The soil is in capability subclass IIs. The hydrologic soil group for this soil is A.

### **B: Characteristics of Runoff**

Reference manuals to be used for the design of the proposed facility are:

- “James City County Guidelines for Design and Construction of Stormwater Management BMP’s”
- “Virginia Erosion and Sediment Control Handbook, Third Edition”
- “Virginia Stormwater Management Handbook, 1999”

### **Quantity:**

The project site in its existing condition is completely wooded with natural surface drainage flowing via sheet flow onto the Norge Saddle Club property. In the post-development drainage condition storm runoff will be collected and conveyed to a BMP at the front of the property then discharged into the existing roadside ditch along Richmond Road. Currently, the roadside drainage system receives approximately 1.0 acre of

drainage area at design point 'A' (see map under pre-development conditions section). The proposed BMP has been designed to minimize additional flows to the roadside ditch.

Hydrographs of pre-development and post-development runoff for the project site and Richmond Road were calculated. To ensure a conservative approach is considered for the pre-development site runoff hydrographs are not included as part of the ditch flow in the pre-developed state. In the post-development condition site runoff was routed through the BMP and linked with the pre-development hydrograph for Richmond Road runoff in order to model the most extreme circumstance. Peak runoff response at Design Point 'A' is estimated for a 2-year, 10-year and 100-year frequency storms. The predicted peak runoff discharge values for the described models are as follows:

Pre development

Undeveloped site

Sheet flows to rear:	2 year peak discharge	=	0.59 C.F.S
	10 year peak discharge	=	2.67 C.F.S ✓
	100year peak discharge	=	5.23 C.F.S

*To BACK TO RICHMOND RD.*

Richmond Road:

2 year peak discharge	=	3.20 C.F.S
10 year peak discharge	=	5.51 C.F.S ✓
100year peak discharge	=	7.68 C.F.S

Post development

Richmond Road and Developed site drains to BMP at front

2 year peak discharge	=	3.20 C.F.S
10 year peak discharge	=	6.70 C.F.S
100 year peak discharge	=	10.53 C.F.S

*MS-19  
NEED TO CONTROL 10-YEAR SINCE O/S STORM DRAINAGE SYSTEM IS O/S ADEQUATE FOR 10 SITE DESIGN MUST MEET 10-YEAR PRE*

Quality:

Calculations for determining the adequacy of the BMP system are provided in this stormwater management plan under the BMP Water Quality Calculations section. The calculations are based on procedures as required by James City County Worksheet for the BMP Point System.

The keystone pollutant for the Tidewater area is total phosphorus. This pollutant shares the general characteristics of most other pollutants, and by removing the keystone pollutant; other pollutants will be theoretically removed.

Reducing the post-development loading rate as required by James City County is accomplished by directing storm runoff to the proposed onsite bioretention facility. The bioretention facility is capable of a minimum 60% removal efficiency rate. This basin

will effectively reduce the post-development loading as required. The site stormwater management plan will follow the design criteria and guidelines as set forth by state and local laws. The BMP measure will be constructed to manage both the quality and quantity of storm runoff.

**C: Runoff and Pollutant Loading Mitigation Measures**

The primary measure for runoff control and pollutant mitigation for this project will be the proposed bioretention facility. Additional features include a natural storm runoff conveyance system, such as flat graded grassed swales and an enhanced landscaping scheme that exceeds James City County Guidelines. The grassed swales will be graded flat enough to encourage slow release into the receiving BMP facility. The bioretention facility will function as a temporary detention impoundment and will provide a highly effective approach to control runoff quality while providing a reliable system of flood control by retaining, buffering, and attenuating flows. This facility will provide a measure of downstream water quality for the following reasons:

1. Sediment and particulate pollutants will settle out and be trapped.
2. Delayed releases of runoff will stretch out the loading of the receiving stream.
3. Downstream pollution by litter and debris is reduced to the extent that it will be trapped.
4. Impervious area in the post-developed state will be much lower than allowed by James City zoning ordinance.

Additionally, use of a bioretention system creates an opportunity for the developer to provide an example of a low impact aesthetically pleasing and sustainable BMP facility.

**D: Runoff Control and Performance**

As stated, the primary measure for runoff control and pollutant mitigation will be the proposed bioretention facility. A channel adequacy analysis for the receiving roadside ditch demonstrates that no increase in flow velocity will occur for the two-year storm. Considering a storm that occurs 90 percent of the time the facility will mostly infiltrate storm runoff slowly to the substratum. The analysis further demonstrates that the receiving drainage ditch is considered an adequate channel. An evaluation, via a rating table, of post-development flows added to the existing ditch system reveals no change in flow depth for the 2 year and a rise of 0.09 feet and 0.15 feet for the 10 and 100 year storms respectively.

NOT PER  
BORING HA-2  
FR CLAY.

**E: Spill Containment Measures**

There will be no commercial or manufacturing activities involving any process or storage of hazardous materials associated with this project. There will be no commercial or manufacturing activities involving any process or storage of hazardous materials associated with construction.

**F: Offsite Stormwater Quality Management**

There will be no off-site stormwater quality management facilities associated with this project.

**G: Land Disturbance Considerations**

The total site will be cleared with minimal offsite construction activity for sewer and water connections. The majority of the offsite development is associated with the new entrance. A CE-7 permit will be required by VDOT to begin work within their right-of-way.

**H: Critical Areas for High Erosion**

There are no critical erosion areas for this site. However, precautionary measures have been proposed to ensure minimal erosion and sediment buildup in the downstream system.

---

# Pre-Development Conditions

- Maps
- Roadside Ditch
  - Cross Section A-A
  - Capacity Calculations
- On Site Hydrographs
- Roadway Hydrographs

# NORGE QUADRANGLE

## VIRGINIA

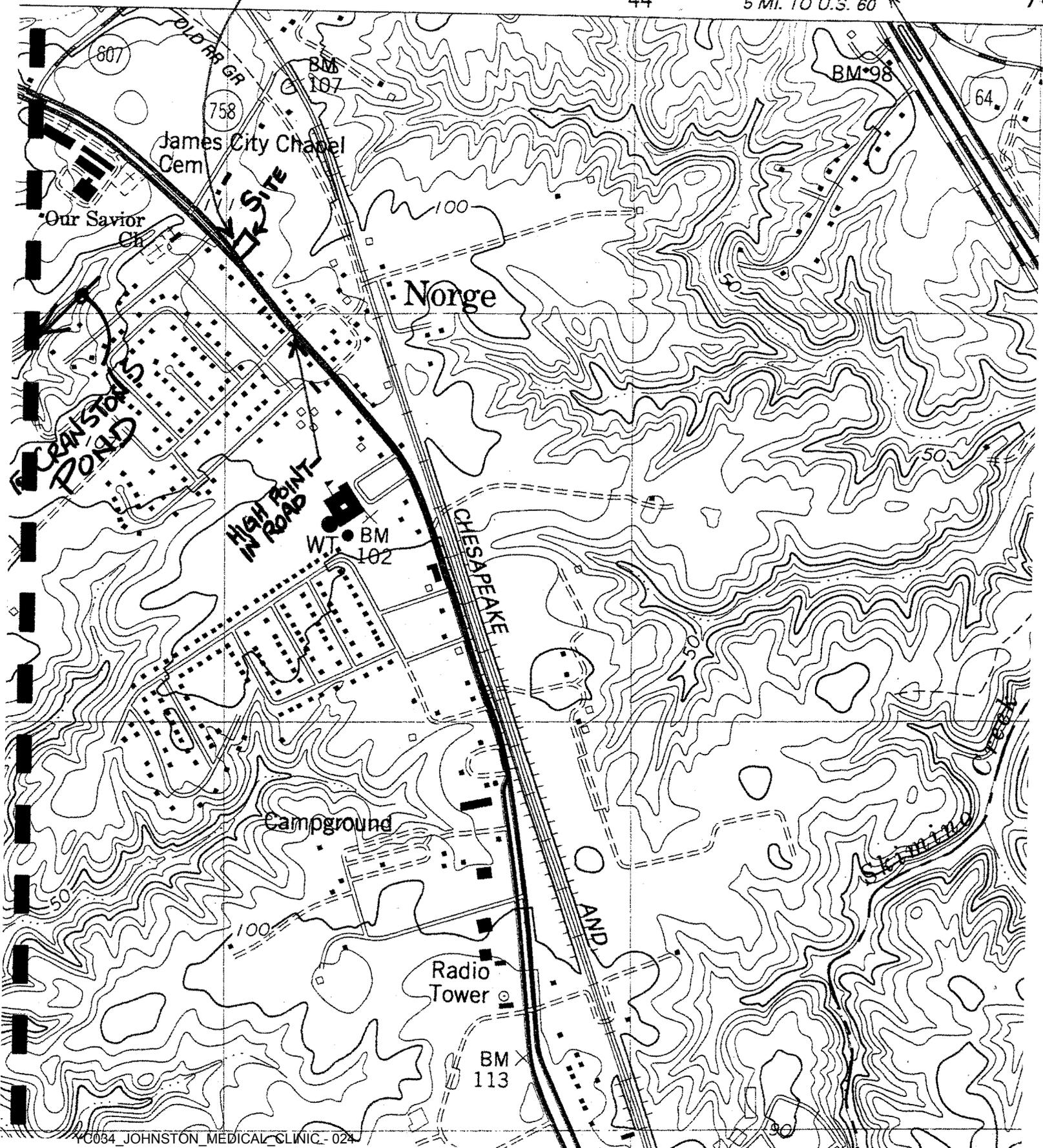
### 7.5 MINUTE SERIES (TOPOGRAPHIC)

2 500 000 FEET

344

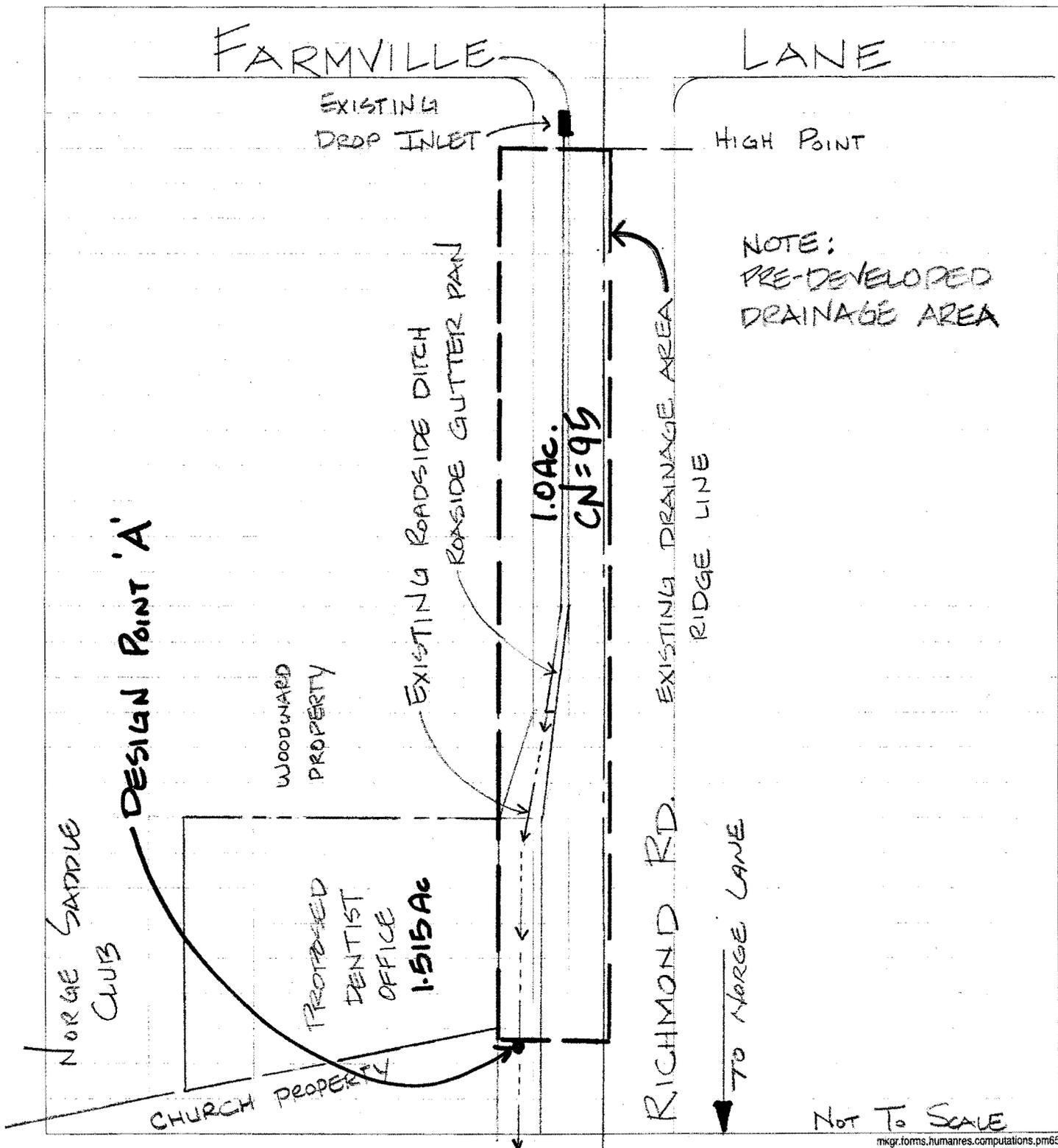
RICHMOND 42 MI.  
5 MI. TO U.S. 60

71





Project: Dr. Johnston's Off. Project # 3119200  
 Location: NORGE Sheet of  
 Calculated by: MEL Date: 1/18/2002  
 Checked by: Date:  
 Title MASTER DRAINAGE AREA MAP

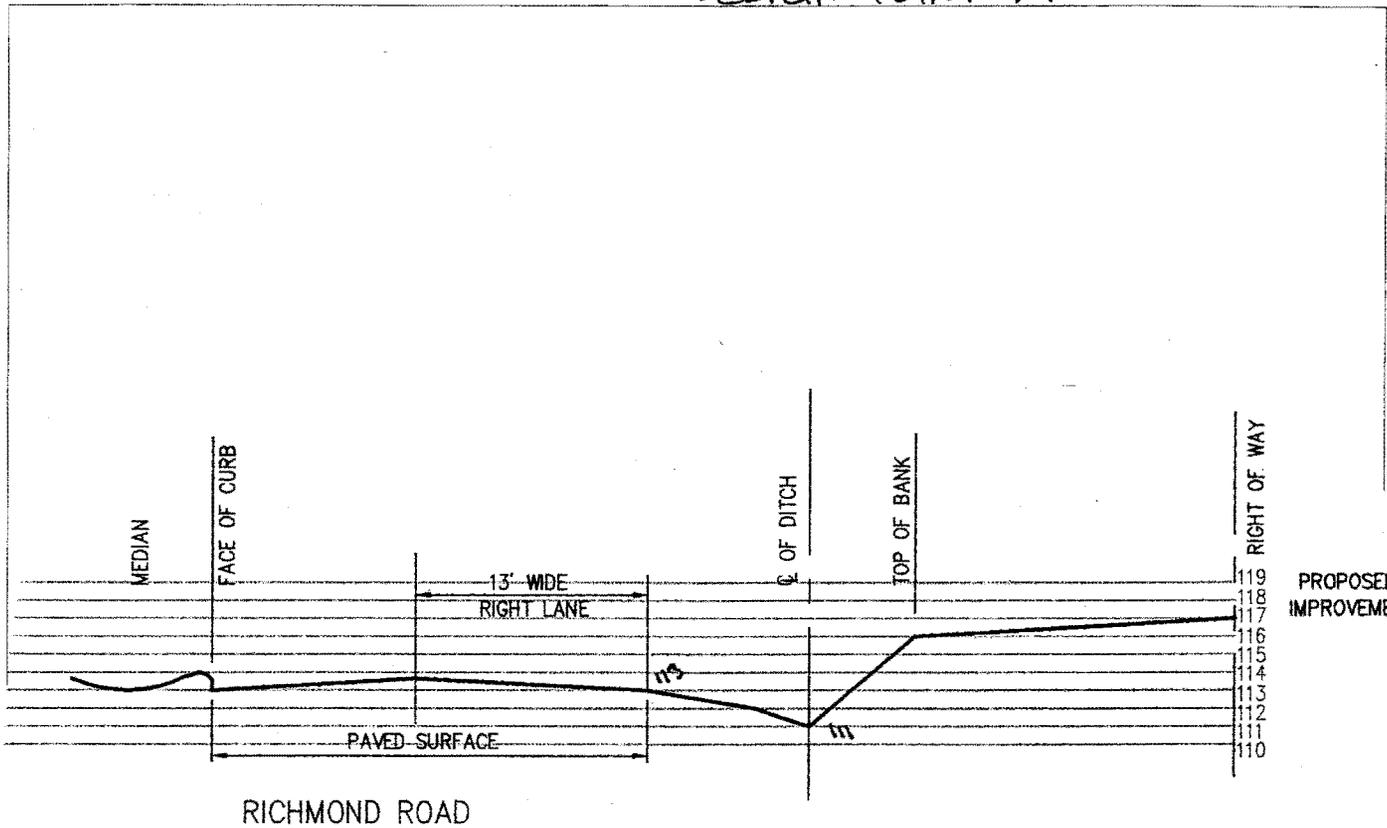


mkgr.forms.humanres.computations.pm65



Computations

Project: *Dr. Johnston's Off.* Project # *31192.00*  
 Location: *NORGE* Sheet *of*  
 Calculated by: *MEL* Date: *1/21/2002*  
 Checked by: *MEL* Date:  
 Title *CROSS SECTION A-A @*  
*DESIGN POINT 'A'*



**Section A-A**

**N.T.S.**

# Table Rating Table for Irregular Channel

Project Description	
Worksheet	Roadside Ditch
Flow Element	Irregular Chann
Method	Manning's Form
Solve For	Channel Depth

Input Data	
Slope	005000 ft/ft

Options	
Current Roughness Method	Lotter's Method
Open Channel Weighting Method	Lotter's Method
Closed Channel Weighting Method	Horton's Method

Attribute	Minimum	Maximum	Increment
Discharge (cfs)	1.00	15.00	0.50

Discharge (cfs)	Water Surface Elevation (ft)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
1.00	111.59	1.44	0.7	2.65	2.36
1.50	111.69	1.59	0.9	3.09	2.75
2.00	111.77	1.71	1.2	3.44	3.06
2.50	111.83	1.81	1.4	3.74	3.33
3.00	111.89	1.89	1.6	4.00	3.56
3.50	111.94	1.96	1.8	4.24	3.78
4.00	111.99	2.03	2.0	4.46	3.97
4.50	112.04	2.06	2.2	4.85	4.33
5.00	112.09	2.09	2.4	5.22	4.69
5.50	112.13	2.11	2.6	5.55	5.00
6.00	112.17	2.14	2.8	5.85	5.29
6.50	112.21	2.17	3.0	6.14	5.56
7.00	112.24	2.20	3.2	6.40	5.81
7.50	112.27	2.23	3.4	6.64	6.04
8.00	112.30	2.25	3.5	6.88	6.26
8.50	112.33	2.28	3.7	7.10	6.47
9.00	112.36	2.31	3.9	7.31	6.67
9.50	112.38	2.33	4.1	7.51	6.87
10.00	112.41	2.35	4.2	7.70	7.05
10.50	112.43	2.38	4.4	7.89	7.23
11.00	112.45	2.40	4.6	8.07	7.40
11.50	112.47	2.42	4.7	8.24	7.56
12.00	112.50	2.45	4.9	8.41	7.72
12.50	112.52	2.47	5.1	8.57	7.87
13.00	112.54	2.49	5.2	8.73	8.02
13.50	112.56	2.51	5.4	8.88	8.17
14.00	112.57	2.53	5.5	9.03	8.31
14.50	112.59	2.55	5.7	9.17	8.45
15.00	112.61	2.57	5.8	9.31	8.58

EXIST VANT ROAD CH  
 @ Design Point A

←  $Q = 3.20 \text{ cfs}$

←  $Q_{top} = 6.91 \text{ cfs}$   
 ← 6.7 cfs post Q<sub>10</sub> EXIST

# Worksheet Worksheet for Irregular Channel

Project Description	
Worksheet	Roadside Ditch
Flow Element	Irregular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data	
Slope	005000 ft/ft
Discharge	15.00 cfs <span style="margin-left: 20px;">CAP</span>

Options	
Current Roughness Method	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weighting	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elev.	112.61 ft
Elevation Range	1.00 to 117.00
Flow Area	5.8 ft <sup>2</sup>
Wetted Perimeter	9.31 ft
Top Width	8.58 ft
Actual Depth	1.61 ft
Critical Elevation	112.30 ft
Critical Slope	0.017968 ft/ft
Velocity	<u>2.57</u> ft/s
Velocity Head	0.10 ft
Specific Energy	112.71 ft
Froude Number	0.55
Flow Type	Subcritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+64	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	117.00
0+18	116.00
0+20	115.00
0+21	114.00
0+23	113.00
0+24	112.00
0+26	111.00
0+28	112.00
0+34	113.00
0+48	113.50
0+64	113.00

**Worksheet 2: Runoff curve number and runoff**

Project Dr. Tim Johnston's Dental Office By Mel Date \_\_\_\_\_

Location NORGE Checked \_\_\_\_\_ Date \_\_\_\_\_

Circle one: Present Developed \_\_\_\_\_

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN <sup>1/</sup>			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> mi <sup>2</sup> <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
EMPORIA C	WOODED PARCEL	61			1.515	92.41
Totals =					1.515	92.41

<sup>1/</sup> Use only one CN source per line.

Totals =

$$CN \text{ (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{92.41}{1.515} = \underline{61}$$

Use CN =

61

2. Runoff

Frequency ..... yr  
 Rainfall, P (24-hour) ..... in  
 Runoff, Q ..... in  
 (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3
3.5	5.8	8.0



---

# BMP Water Quality Calculations

- Map
- Variance Request
- Water Quality Volume Calculations
- Worksheet for BMP Point System
- Orifice Calculations for Draw Down

62.79

62279  
3500  
500

---

66279

$$= \frac{1152.40}{1.515} = 1.0043$$

10

dry waste

$$10 \times 1.0043 = 10.04$$

**Subcatchment pre site: Pre 2yr From Site**

Runoff = 0.59 cfs @ 12.20 hrs, Volume= 0.057 af

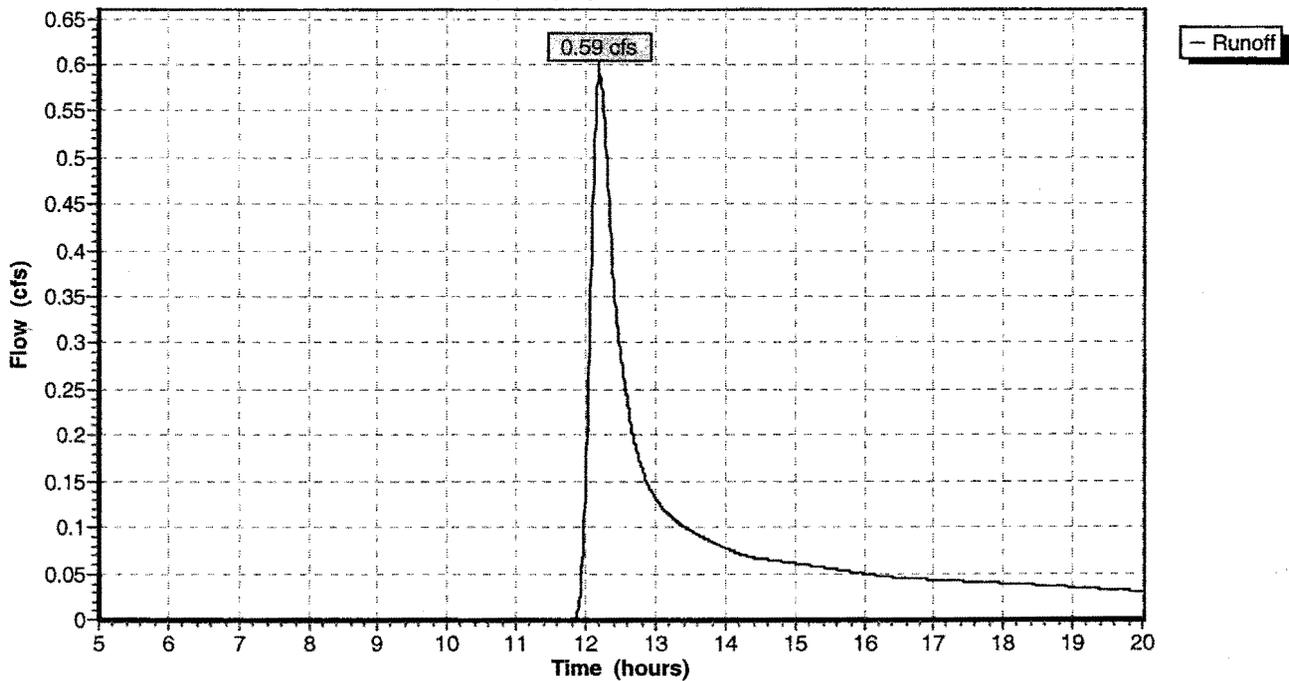
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
 Type II 24-hr Rainfall=3.50"

Area (ac)	CN	Description
1.515	60	undeveloped lot

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0					Direct Entry, TR55

**Subcatchment pre site: Pre 2yr From Site**

Hydrograph Plot



**Subcatchment pre site: Pre 10yr From Site**

Runoff = 2.67 cfs @ 12.17 hrs, Volume= 0.202 af

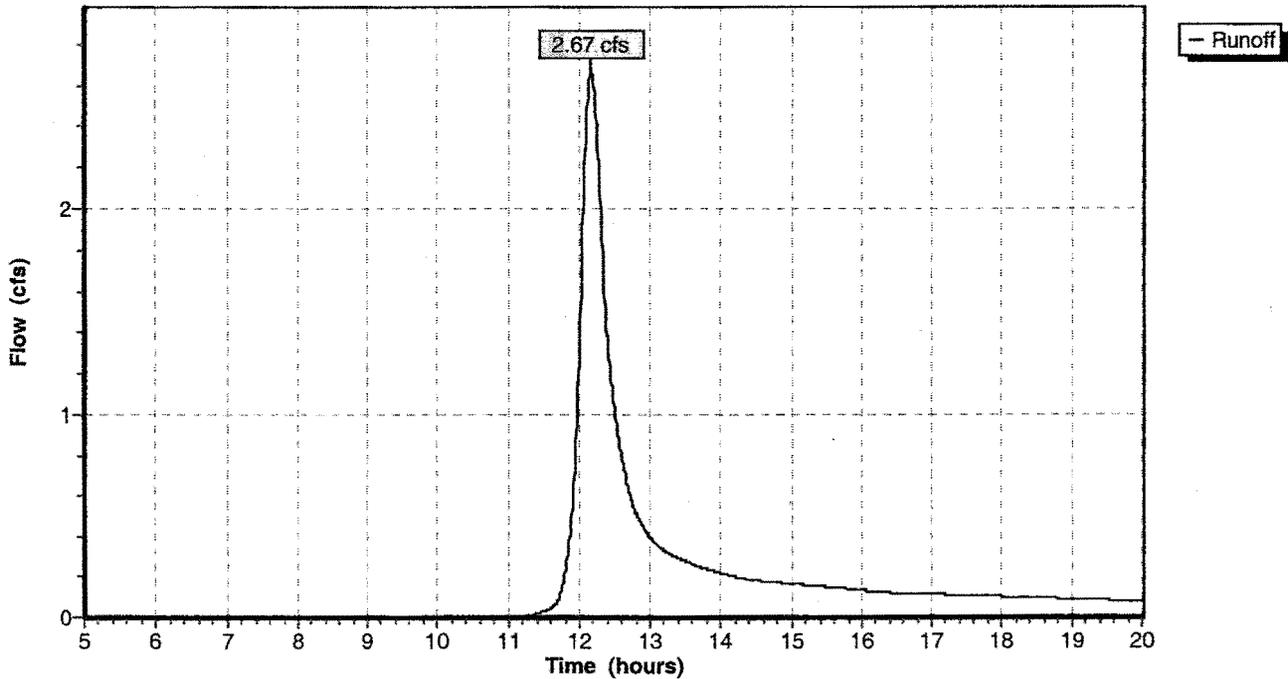
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
 Type II 24-hr Rainfall=5.80"

Area (ac)	CN	Description
1.515	60	undeveloped lot

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0					Direct Entry, TR55

**Subcatchment pre site: Pre 10yr From Site**

Hydrograph Plot



**Dr. Johnston's Pre 100yr**

Type II 24-hr Rainfall=8.00"

Prepared by {enter your company name here}

Page 2

HydroCAD® 6.00 s/n 001238 © 1986-2001 Applied Microcomputer Systems

1/18/02

**Subcatchment pre site: Pre 100yr From Site**

Runoff = 5.23 cfs @ 12.15 hrs, Volume= 0.381 af

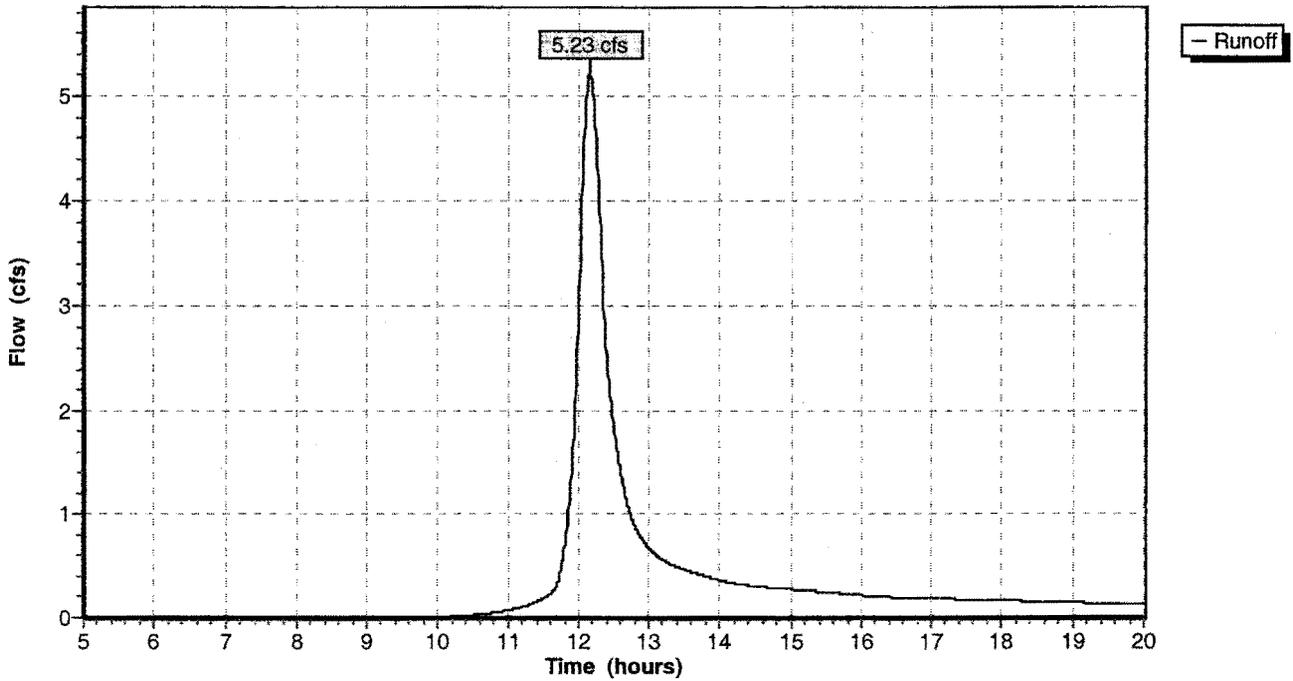
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=8.00"

Area (ac)	CN	Description
1.515	60	undeveloped lot

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0					Direct Entry, TR55

**Subcatchment pre site: Pre 100yr From Site**

Hydrograph Plot



Determine Runoff Rate using Rational Method

**Richmond Road**

Cross Section A-A

Project: **Drainage area**

Design storm event **10**

Project #: 3119200

(select 2,5,10,25)

Date: 1/1//2002

Engineer: Mel Hopkins

C  
coefficients

**Composite C Predevelopment conditions**

total area	43560 sf	1.00 acres	
impervious area			
building area	0 sf	0.00 acres	
driveway area	39000 sf	0.90 acres	
sidewalk and pads	0 sf	0.00 acres	
total impervious	39000 sf	0.90 acres	0.9
green area	4560 sf	0.10 acres	0.2
percent impervious	90		
percent green	10		

$$C = \frac{(\text{impervious area} * \text{Impervious Coefficient}) + (\text{Green area} * \text{Green coefficient})}{\text{Total Area}}$$

C = **0.83**      Assume CN Value of 95 for Roadway Drainage area

**Determine Time of Concentration**

**Overland Flow Time of Concentration Tco**

Length of Strip in watershed	feet	300
% Slope of surface	feet/feet	0.010
Rational "C" Value		0.83
Tco	minutes	7

**Shallow Concentrated Flow Time of Concentration Tcs**

Length of Watershed	feet	200.0
Velocity of flow	feet/second	2
Slope of surface	feet/feet	0.01
Tcs	minutes	6.67

**Channel Flow Time of Concentration Tcc**

Drop in Channel "H"	feet	1.5
Length of Channel "L"	feet	300.0
Tcc	minutes	5

**Total Time of Concentration to Design Point A**

Tt = **18.66** minutes

**Subcatchment Road Area: Road Drainage Area**

Runoff = 3.20 cfs @ 12.11 hrs, Volume= 0.229 af

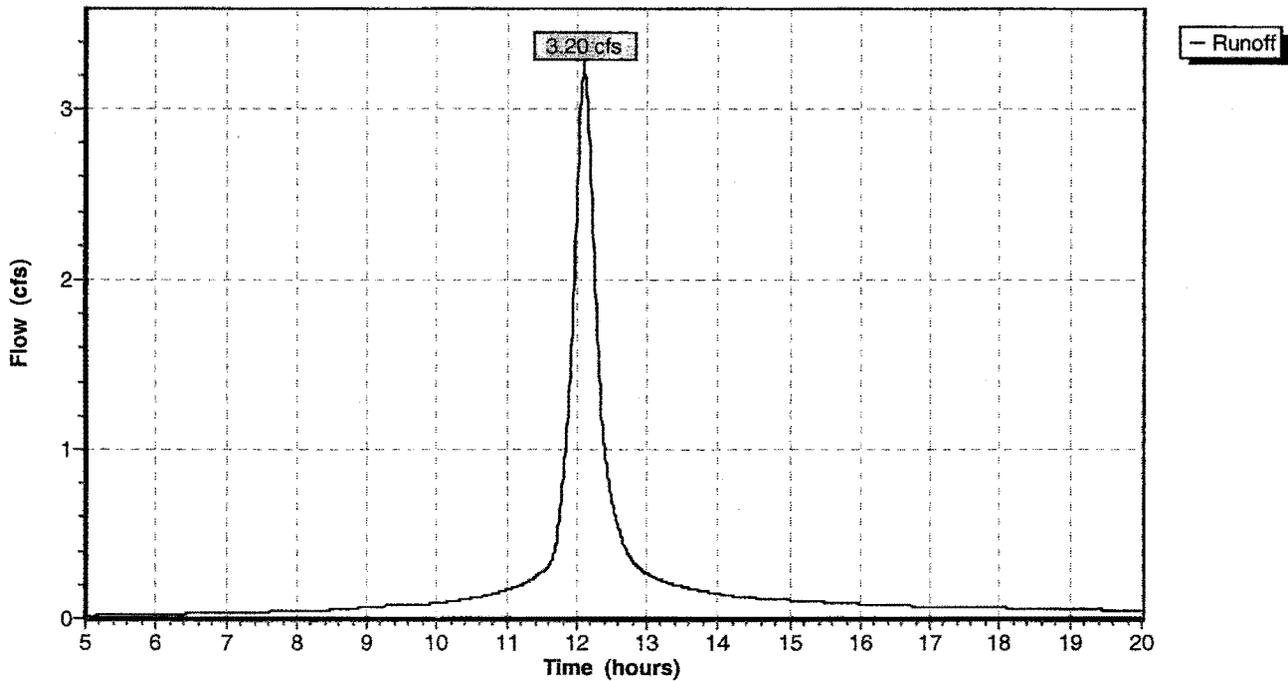
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=3.50"

Area (ac)	CN	Description
1.000	95	Richmond Road Drainage

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					Direct Entry, TR -20

**Subcatchment Road Area: Road Drainage Area**

Hydrograph Plot



Subcatchment Road Area: Road Drainage Area

Runoff = 5.51 cfs @ 12.11 hrs, Volume= 0.404 af

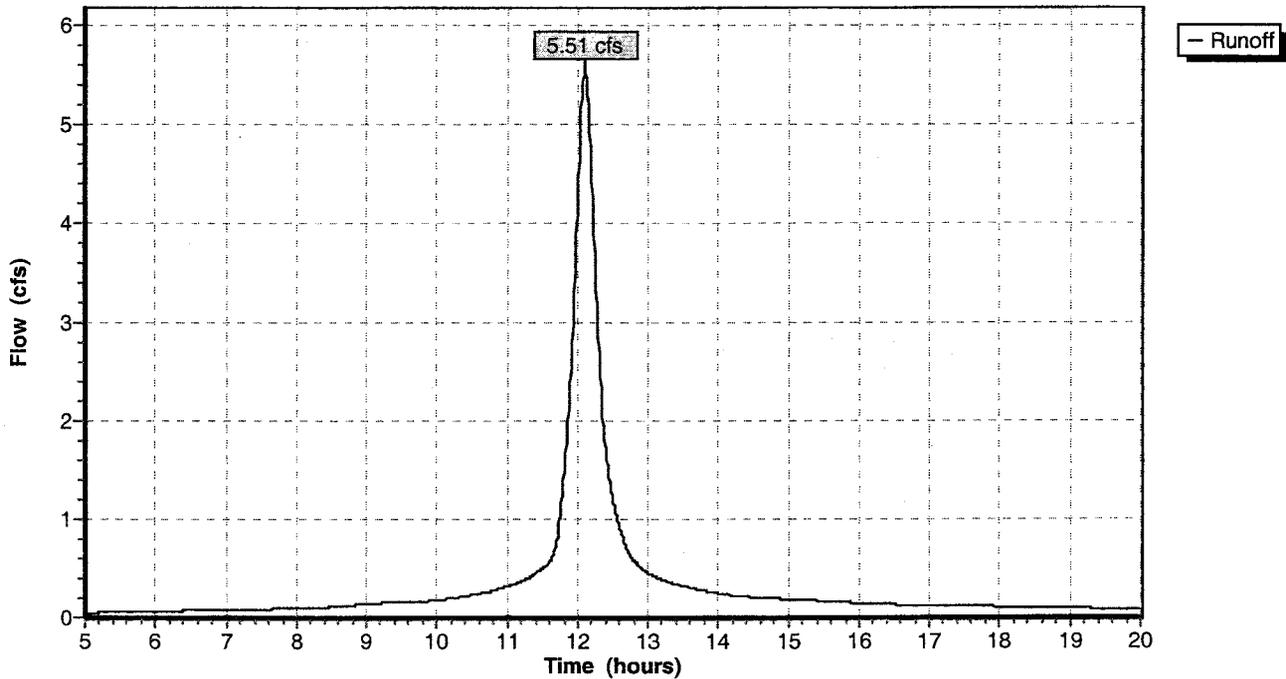
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=5.80"

Area (ac)	CN	Description
1.000	95	Richmond Road Drainage

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					Direct Entry, TR -20

Subcatchment Road Area: Road Drainage Area

Hydrograph Plot



Subcatchment Road Area: Road Drainage area

Runoff = 7.68 cfs @ 12.10 hrs, Volume= 0.570 af

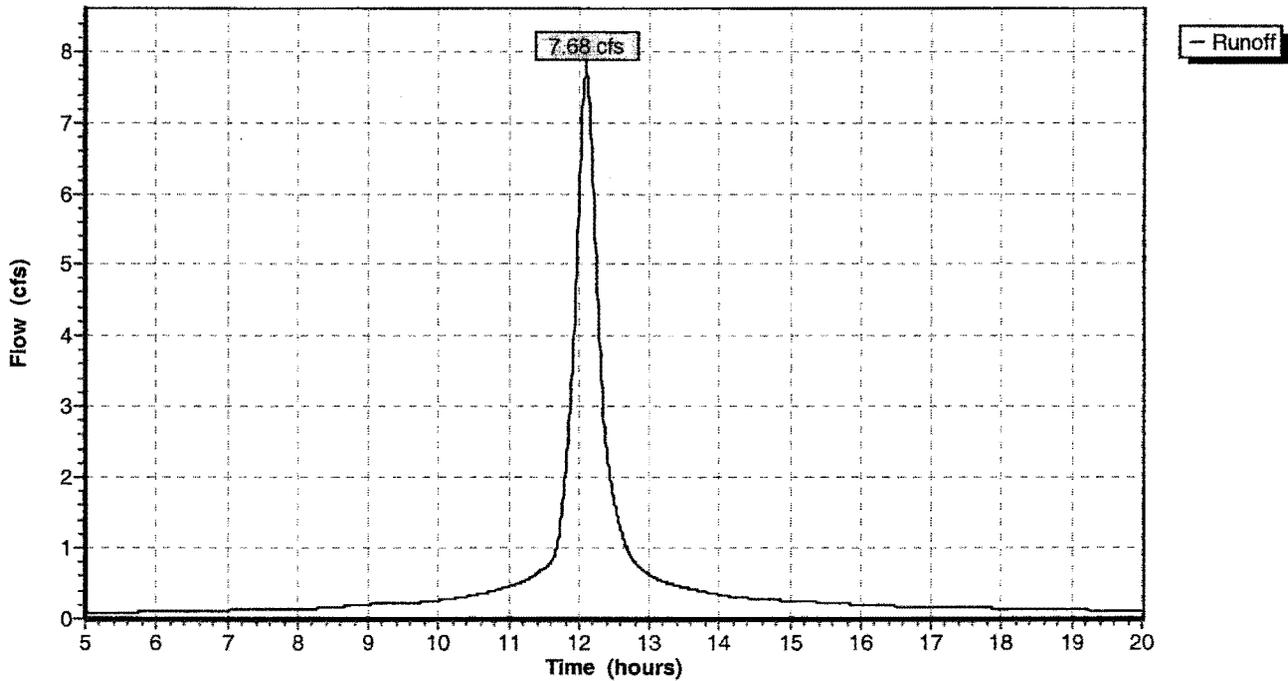
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=8.00"

Area (ac)	CN	Description
1.000	95	Richmond Road Drainage

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					Direct Entry, TR -20

Subcatchment Road Area: Road Drainage area

Hydrograph Plot

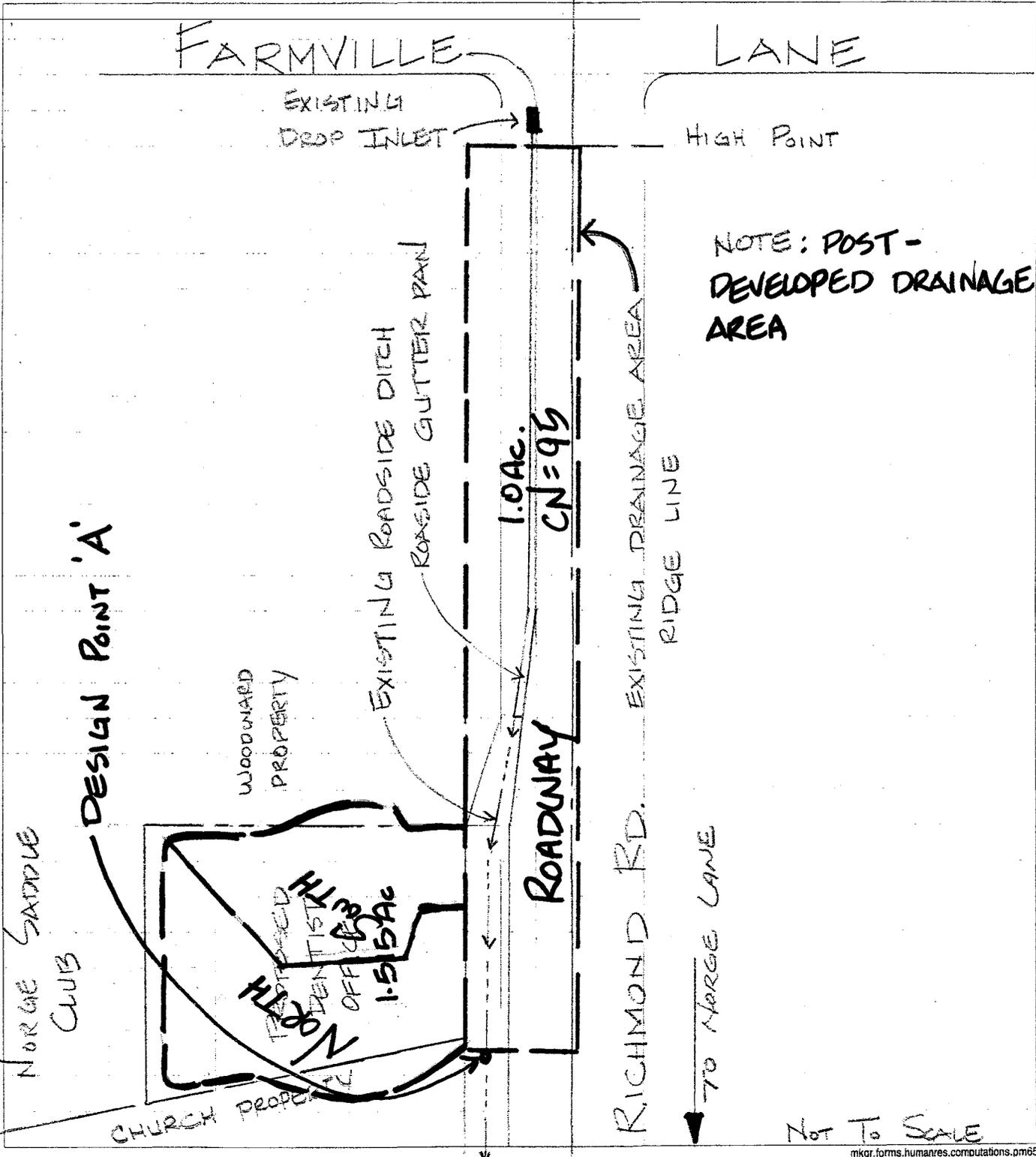


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# Post-Development Conditions

- Map
- Composite CN Calculations
- Post Development Hydrographs
  - 2 Year
  - 10 Year
  - 100 Year
- Outfall Structure

Project: Dr. Johnston's Off. Project # 3119200  
 Location: NORGE Sheet of  
 Calculated by: MEL Date: 1/13/2002  
 Checked by: Date:  
 Title: MASTER DRAINAGE AREA MAP



**Worksheet 2: Runoff curve number and runoff**

Project Dr. Tim Johnston's Dental Office By Mel Date \_\_\_\_\_

Location NORGE Checked \_\_\_\_\_ Date \_\_\_\_\_

Circle one: Present Developed SITE COMPOSITE CN

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN <sup>1/</sup>			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> mi <sup>2</sup> <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
	PAVED SURFACE	98			.636	62.33
EMPORIA C		61			.878	53.56
					Totals =	1.515 115.89

<sup>1/</sup> Use only one CN source per line.

$$CN \text{ (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{115.89}{1.515} = 76.49$$
 Use CN = 76

2. Runoff

Frequency ..... yr

Rainfall, P (24-hour) ..... in

Runoff, Q ..... in  
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3
3.5	6.8	8.0

**Dr. J Dental Off Post 2yr**

Type II 24-hr Rainfall=3.50"

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Time span=5.00-20.00 hrs, dt=0.01 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Type II 24-hr Rainfall=3.50"  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment north: pond area**

Tc=18.0 min CN=76 Area=0.758 ac Runoff= 1.20 cfs 0.078 af

**Subcatchment roadway: Roadway Drainage**

Tc=18.7 min CN=95 Area=1.000 ac Runoff= 3.20 cfs 0.229 af

**Subcatchment south: south side parking area**

Tc=18.0 min CN=76 Area=0.758 ac Runoff= 1.20 cfs 0.078 af

**Pond biobmp: BMP One**

Peak Storage= 3,726 cf Inflow= 1.27 cfs 0.126 af  
Primary= 0.12 cfs 0.041 af Outflow= 0.12 cfs 0.041 af

**Pond swale: South side storage**

Peak Storage= 1,388 cf Inflow= 1.20 cfs 0.078 af  
Primary= 0.62 cfs 0.048 af Outflow= 0.62 cfs 0.048 af

**Link outditch: (new node)**

Inflow= 3.20 cfs 0.270 af  
Primary= 3.20 cfs 0.270 af

**Runoff Area = 2.516 ac Volume = 0.385 af Average Depth = 1.84"**

*1/2 in ditch?*

**Subcatchment north: pond area**

Runoff = 1.20 cfs @ 12.11 hrs, Volume= 0.078 af

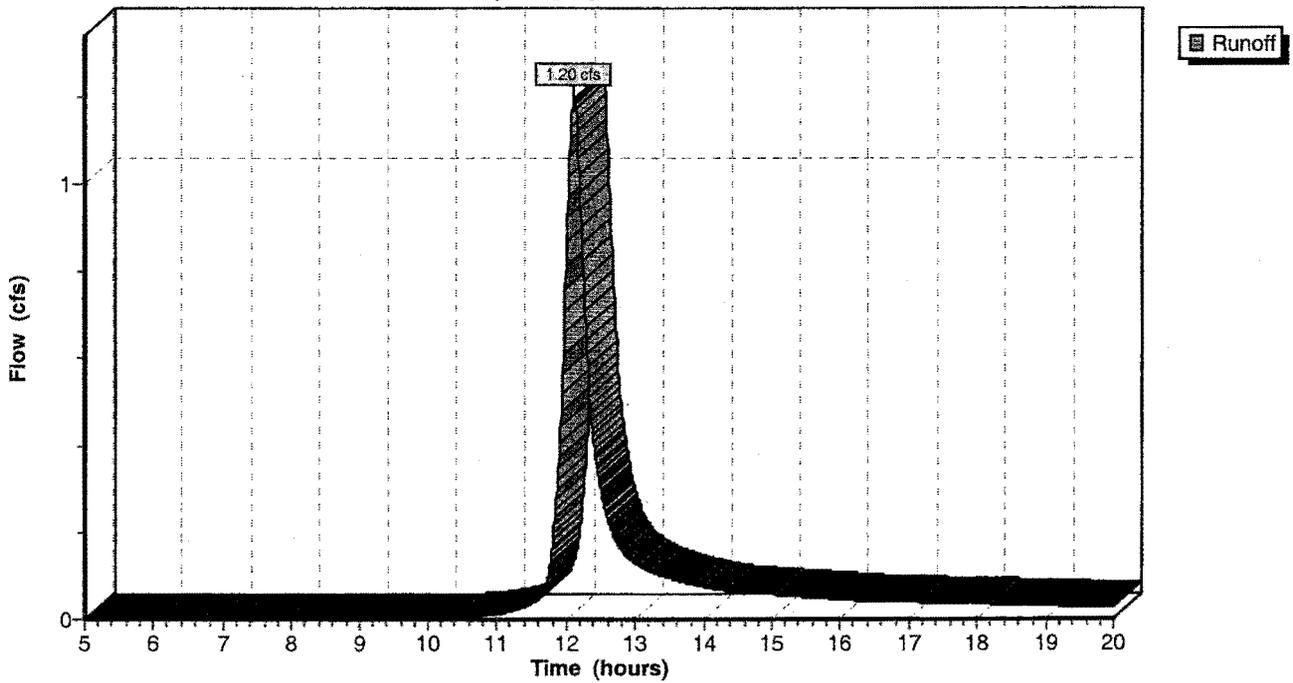
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
 Type II 24-hr Rainfall=3.50"

Area (ac)	CN	Description
0.689	76	north side of property
0.069	76	offsite church property
0.758	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					Direct Entry, green area

**Subcatchment north: pond area**

Hydrograph Plot



**Subcatchment roadway: Roadway Drainage**

Runoff = 3.20 cfs @ 12.11 hrs, Volume= 0.229 af

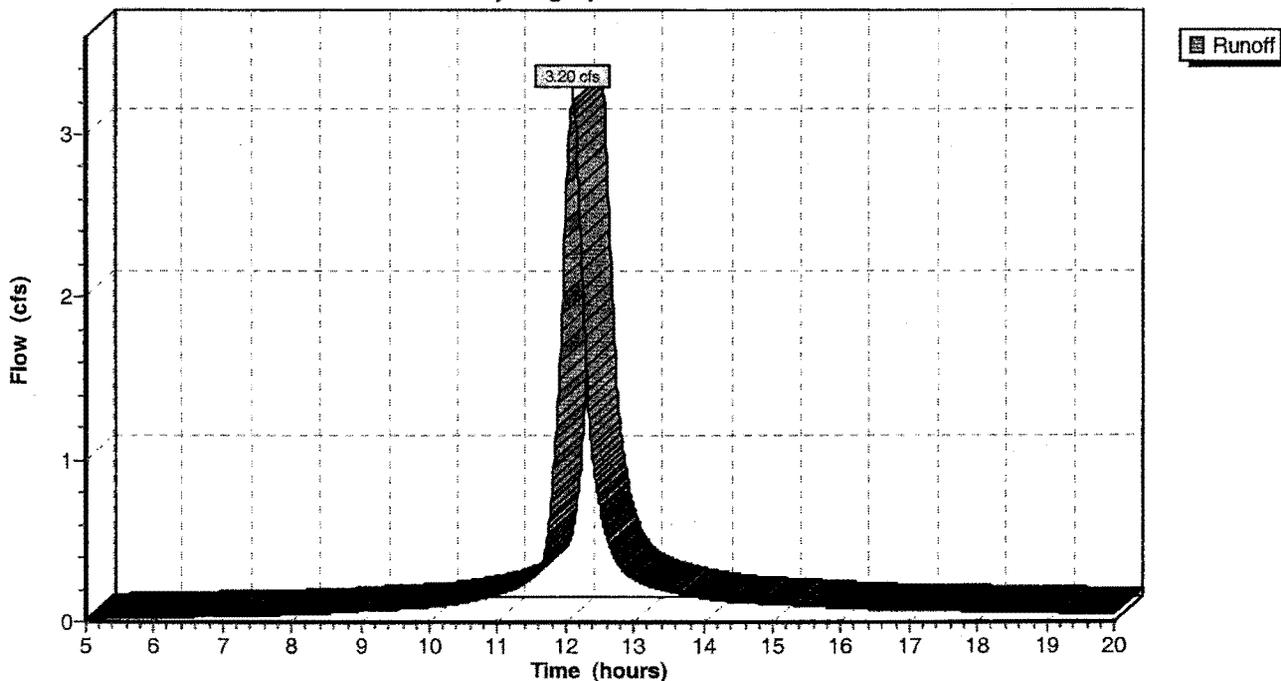
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
 Type II 24-hr Rainfall=3.50"

Area (ac)	CN	Description
1.000	95	Property within right of way

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					Direct Entry, Time to High point in Richmond Rd

**Subcatchment roadway: Roadway Drainage**

Hydrograph Plot



**Subcatchment south: south side parking area**

Runoff = 1.20 cfs @ 12.11 hrs, Volume= 0.078 af

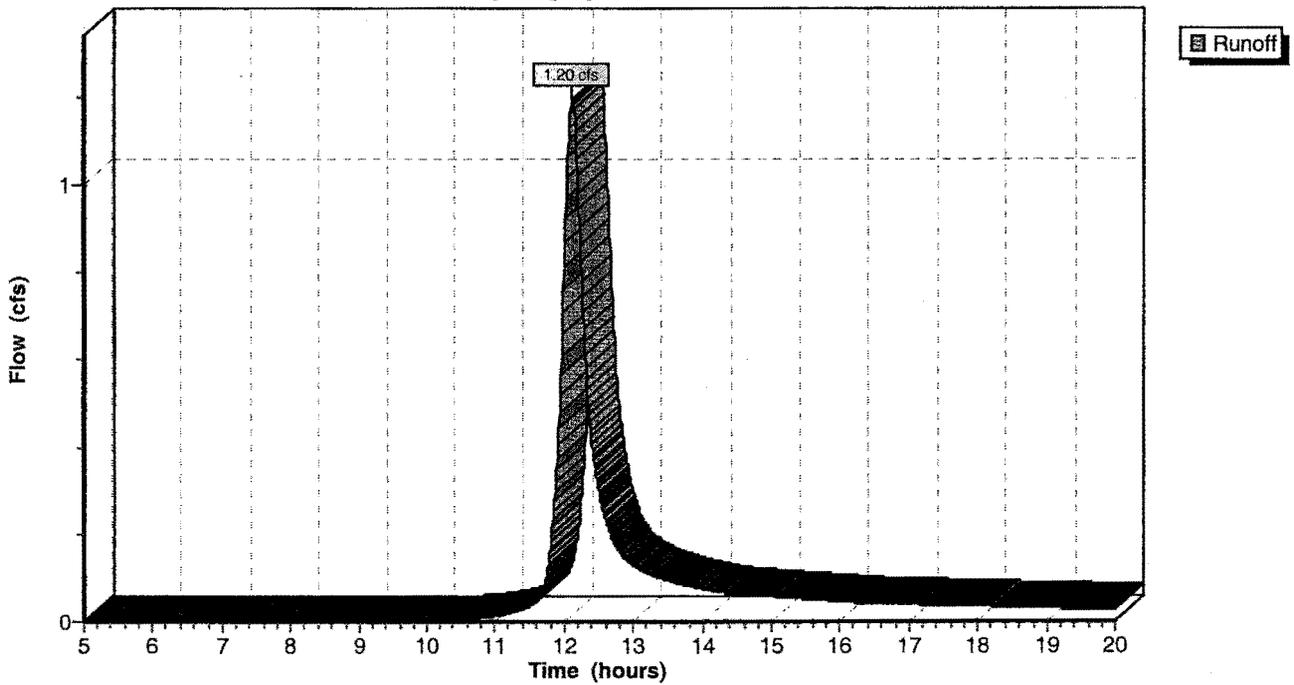
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=3.50"

Area (ac)	CN	Description
0.735	76	south side of site
0.023	76	portion of woodward property
0.758	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					Direct Entry, impervious surface

**Subcatchment south: south side parking area**

Hydrograph Plot



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**Dr. J Dental Off Post 2yr**

Type II 24-hr Rainfall=3.50"

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**Pond biobmp: BMP One**

Inflow = 1.27 cfs @ 12.28 hrs, Volume= 0.126 af  
 Outflow = 0.12 cfs @ 14.64 hrs, Volume= 0.041 af, Atten= 90%, Lag= 141.8 min  
 Primary = 0.12 cfs @ 14.64 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Peak Elev= 115.18' Storage= 3,726 cf

Plug-Flow detention time= 274.4 min calculated for 0.041 af (33% of inflow)

Storage and wetted areas determined by Prismatic sections

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	2,300	0	0
114.50	2,900	1,300	1,300
115.00	3,600	1,625	2,925
115.50	5,500	2,275	5,200
116.00	8,604	3,526	8,726
117.00	9,125	8,865	17,591

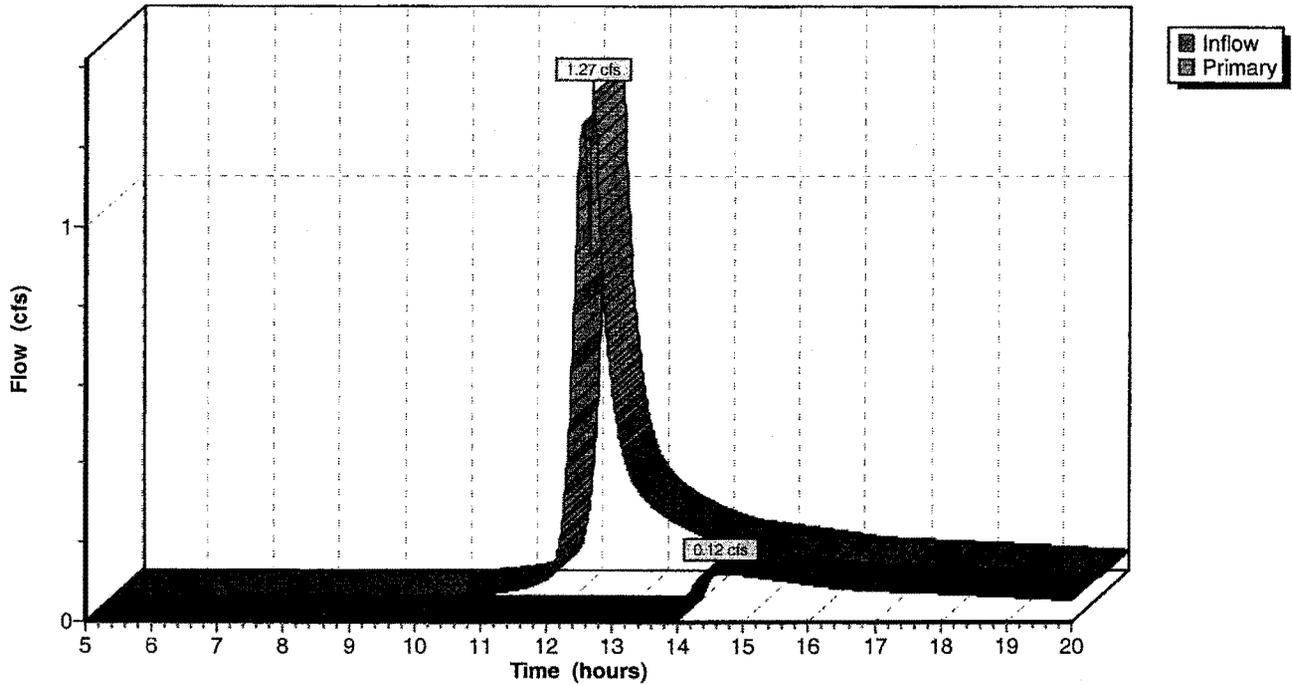
**Primary OutFlow** (Fixed Tailwater Elevation= 111.85')

- 1=Culvert
- 2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	111.50'	<b>8.0" x 50.0' long Culvert</b> RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 110.84' S= 0.0132 ' n= 0.010 Cc= 0.900
2	Device 1	115.15'	<b>2.60' x 2.60' Horiz. Orifice/Grate X 0.80</b> Limited to weir flow C= 0.600

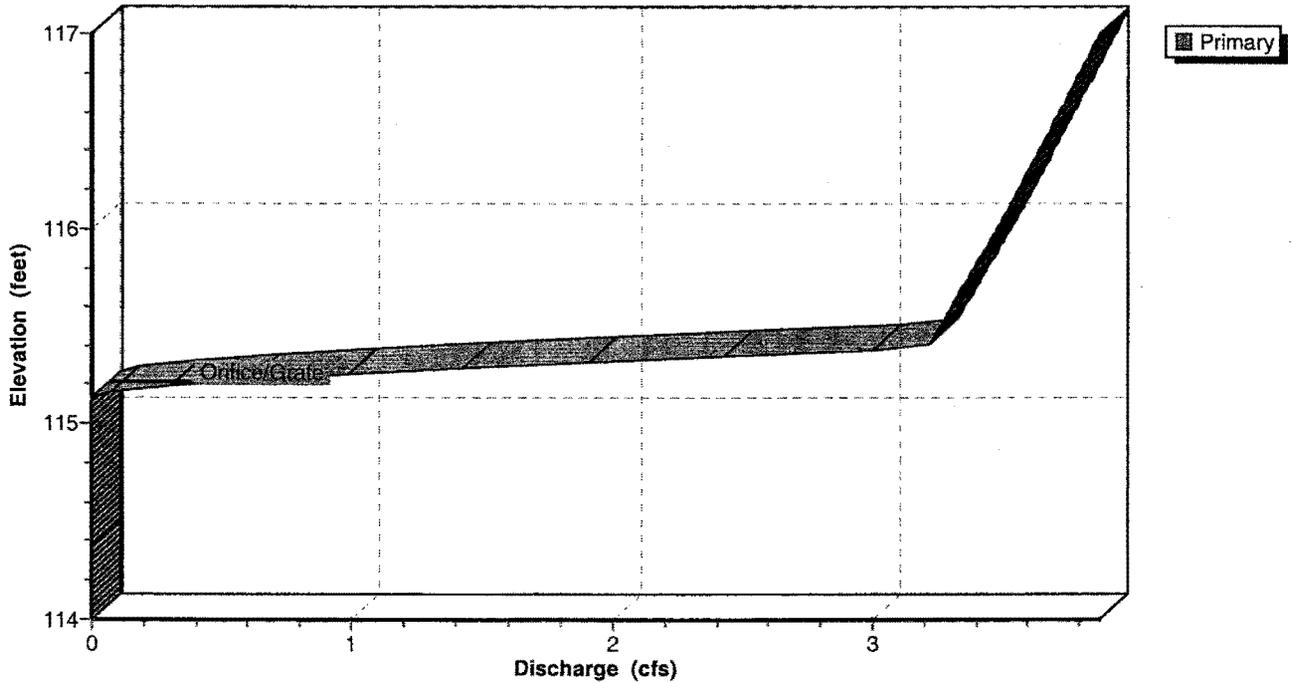
### Pond biobmp: BMP One

Hydrograph Plot



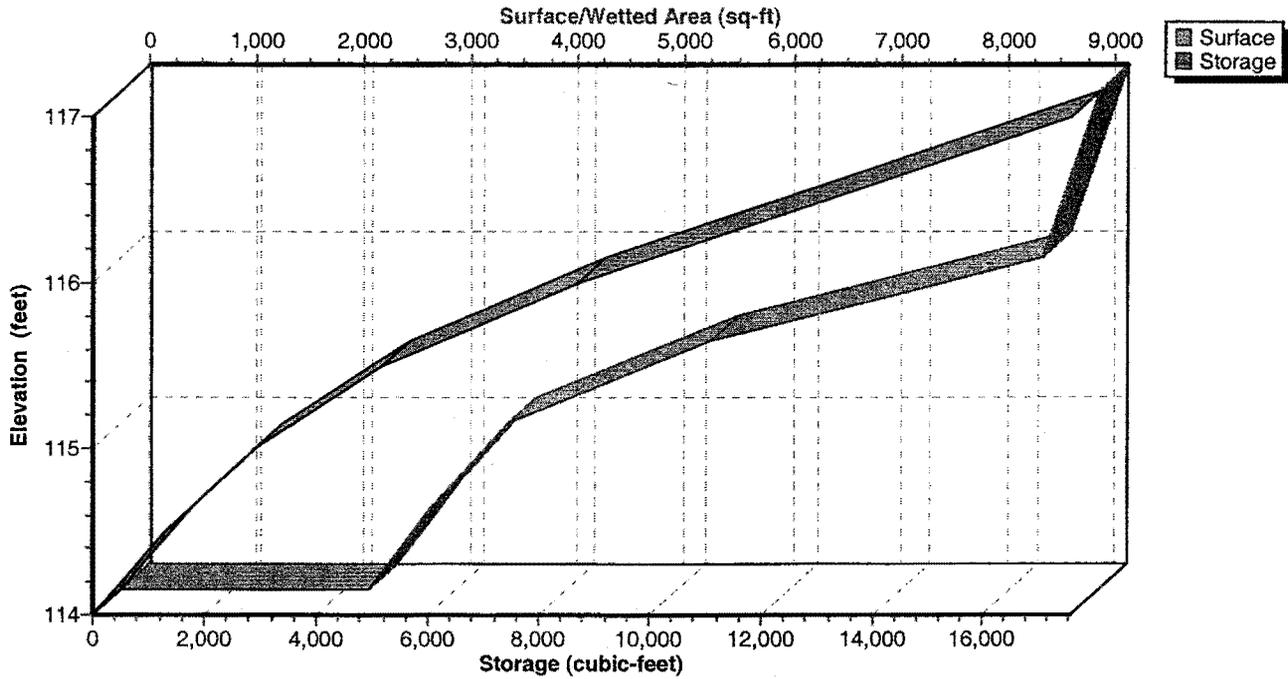
### Pond biobmp: BMP One

Stage-Discharge



### Pond biobmp: BMP One

#### Stage-Area-Storage



**Pond swale: South side storage**

Inflow = 1.20 cfs @ 12.11 hrs, Volume= 0.078 af  
 Outflow = 0.62 cfs @ 12.30 hrs, Volume= 0.048 af, Atten= 48%, Lag= 11.4 min  
 Primary = 0.62 cfs @ 12.30 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Peak Elev= 115.19' Storage= 1,388 cf  
 Plug-Flow detention time= 136.9 min calculated for 0.048 af (61% of inflow)  
 Storage and wetted areas determined by Prismatic sections

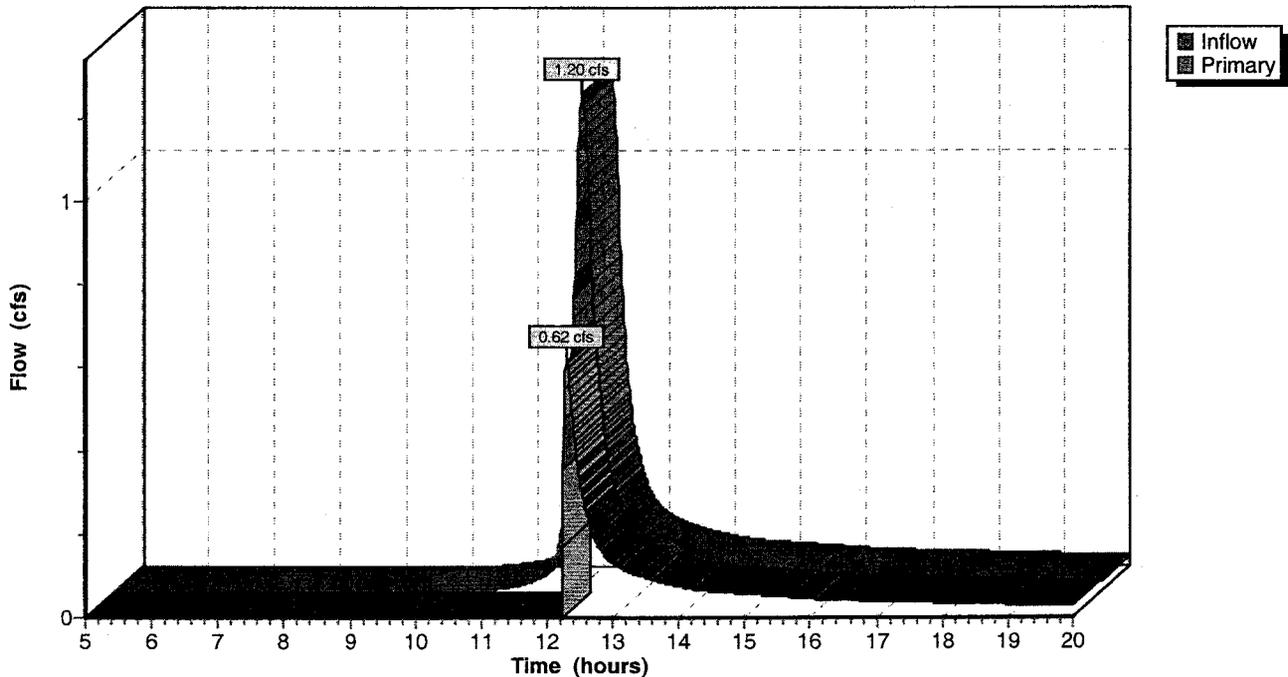
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	0	0	0
115.00	1,435	718	718
116.00	5,700	3,568	4,285
117.00	8,500	7,100	11,385

**Primary OutFlow** (Fixed Tailwater Elevation= 115.18')  
 ↳ 1=Orifice/Grate

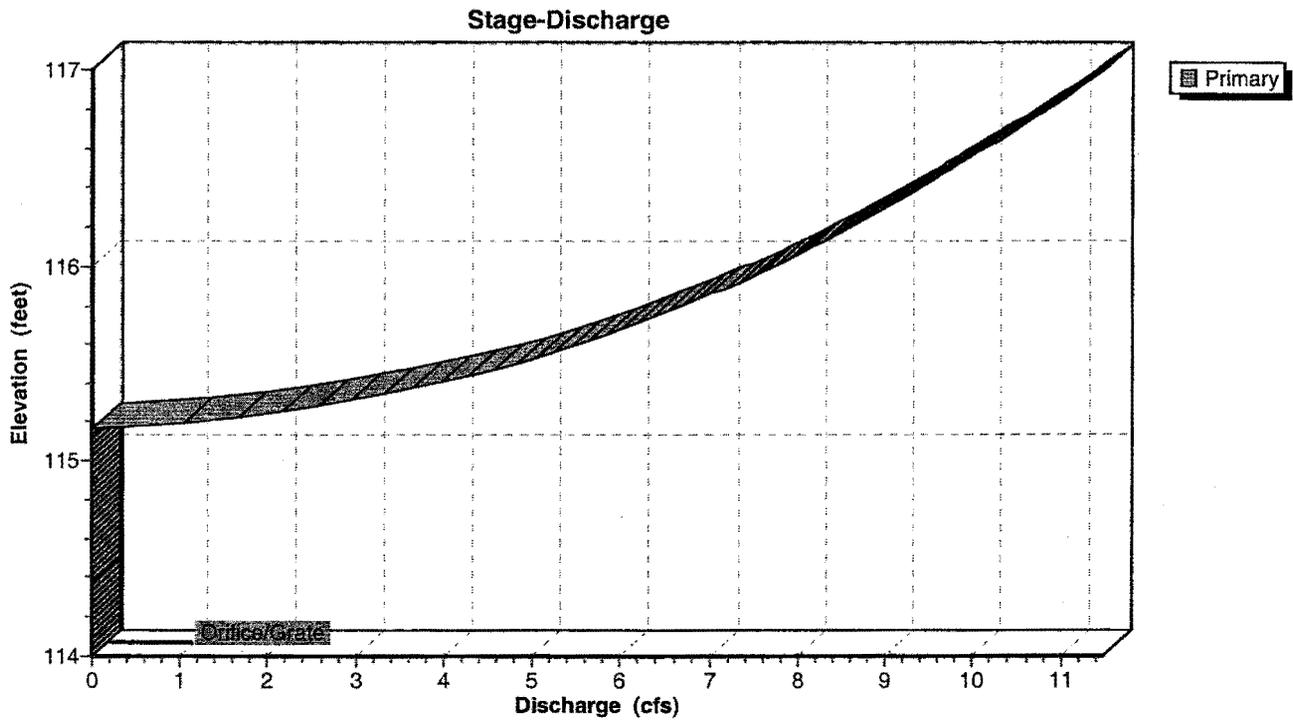
#	Routing	Invert	Outlet Devices
1	Primary	114.00'	18.0" Vert. Orifice/Grate C= 0.600

**Pond swale: South side storage**

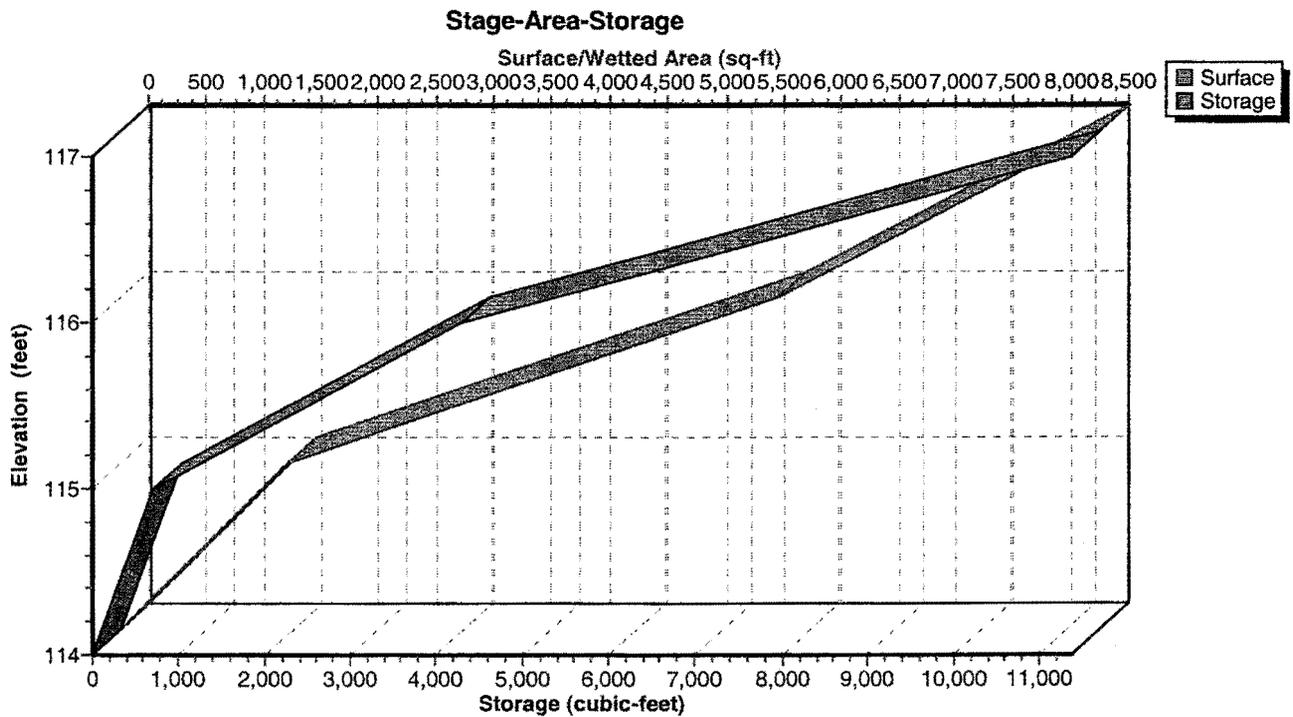
Hydrograph Plot



### Pond swale: South side storage



### Pond swale: South side storage



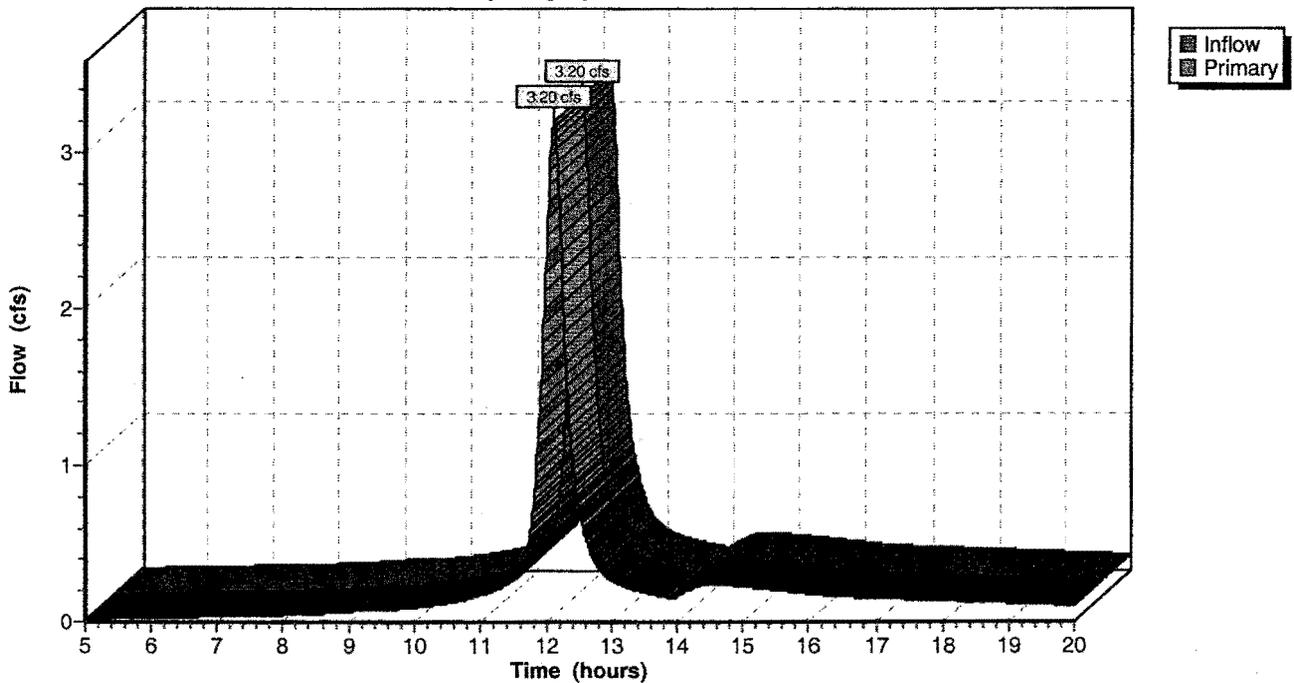
**Link outditch: (new node)**

Inflow = 3.20 cfs @ 12.11 hrs, Volume= 0.270 af  
Primary = 3.20 cfs @ 12.11 hrs, Volume= 0.270 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

**Link outditch: (new node)**

Hydrograph Plot



**Dr. J Dental Off Post 10yr**

Type II 24-hr Rainfall=5.80"

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Time span=5.00-20.00 hrs, dt=0.01 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Type II 24-hr Rainfall=5.80"  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment north: north side area**

Tc=18.0 min CN=76 Area=0.758 ac Runoff= 2.87 cfs 0.187 af

**Subcatchment roadway: Roadway Drainage**

Tc=18.7 min CN=95 Area=1.000 ac Runoff= 5.51 cfs 0.404 af

**Subcatchment south: south side parking area**

Tc=18.0 min CN=76 Area=0.758 ac Runoff= 2.87 cfs 0.187 af

**Pond biobmp: BMP One**

Peak Storage= 4,805 cf Inflow= 5.17 cfs 0.323 af  
Primary= 3.05 cfs 0.238 af Outflow= 3.05 cfs 0.238 af

**Pond swale: South side swale storage**

Peak Storage= 2,489 cf Inflow= 2.87 cfs 0.187 af  
Primary= 2.50 cfs 0.136 af Outflow= 2.50 cfs 0.136 af

**Link Point A: Design Point A**

Inflow= 6.70 cfs 0.641 af  
Primary= 6.70 cfs 0.641 af

**Runoff Area = 2.516 ac Volume = 0.777 af Average Depth = 3.70"**

*INCREASE.*

**Subcatchment north: north side area**

Runoff = 2.87 cfs @ 12.10 hrs, Volume= 0.187 af

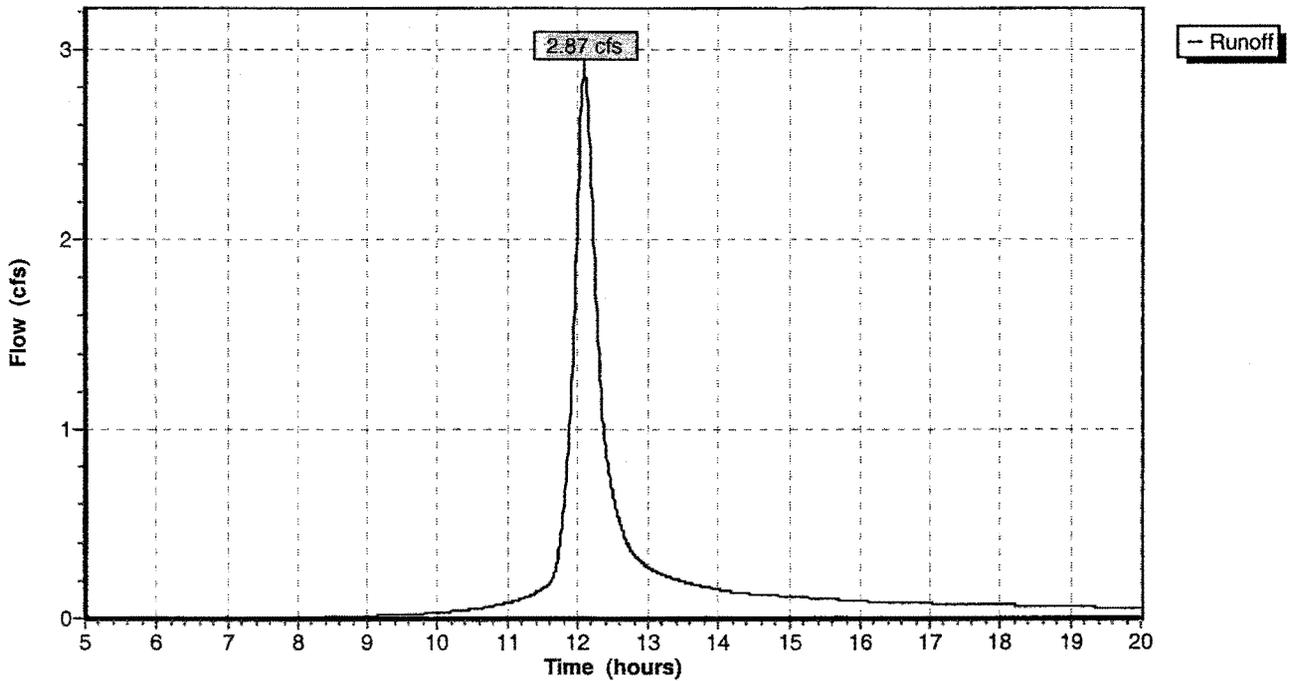
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
 Type II 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.689	76	north side of property
0.069	76	offsite church property
0.758	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					Direct Entry, green area

**Subcatchment north: north side area**

Hydrograph Plot



Subcatchment roadway: Roadway Drainage

Runoff = 5.51 cfs @ 12.11 hrs, Volume= 0.404 af

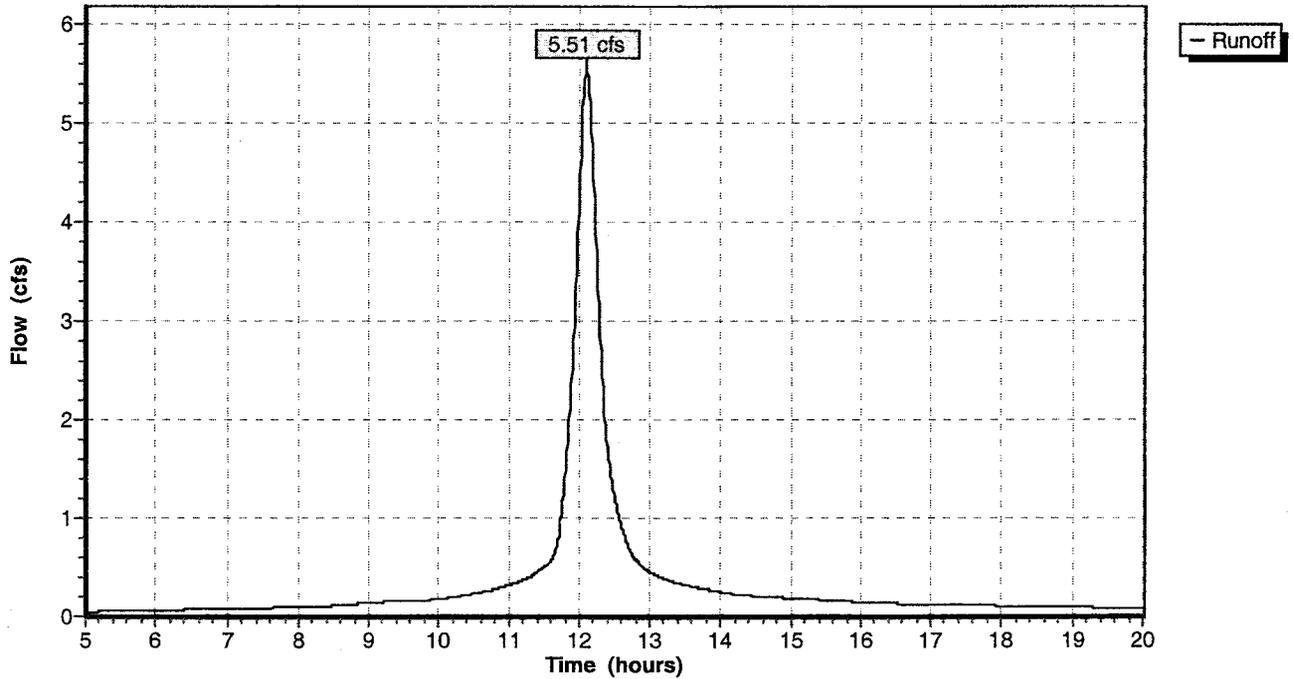
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=5.80"

Area (ac)	CN	Description
1.000	95	Property within right of way

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					Direct Entry, Time to High point in Richmond Rd

Subcatchment roadway: Roadway Drainage

Hydrograph Plot



**Subcatchment south: south side parking area**

Runoff = 2.87 cfs @ 12.10 hrs, Volume= 0.187 af

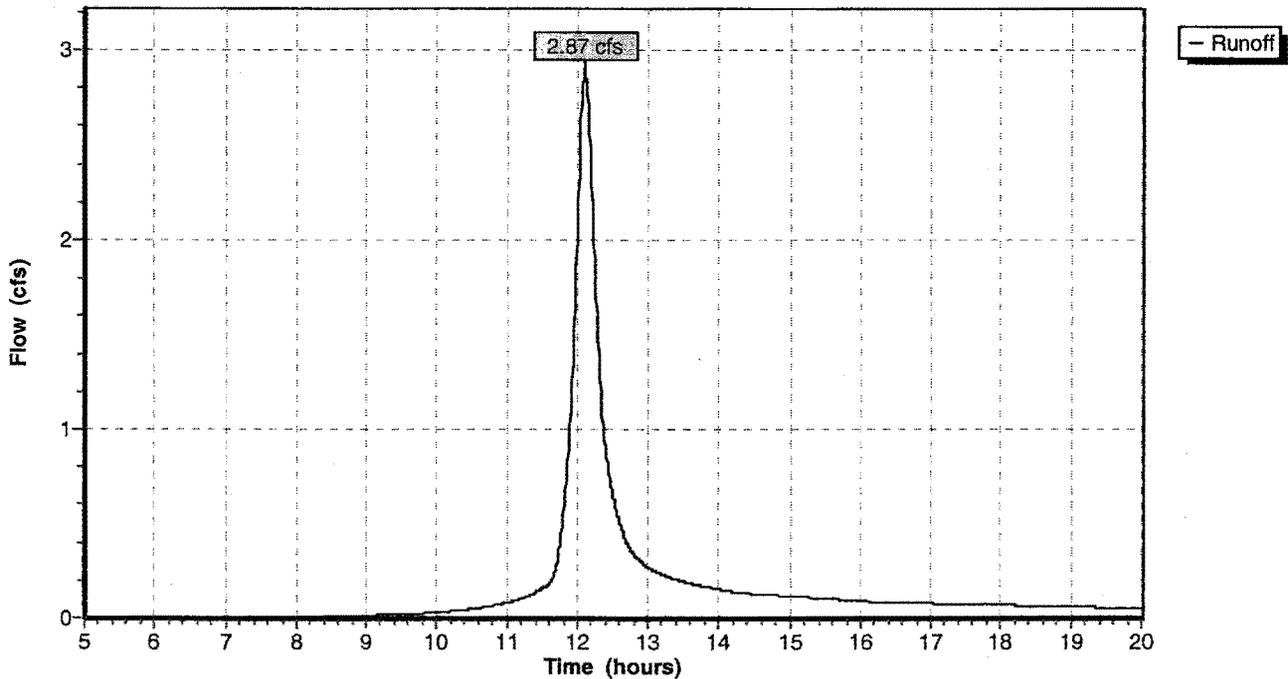
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs  
Type II 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.735	76	south side of site
0.023	76	portion of woodward property
0.758	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					Direct Entry, impervious surface

**Subcatchment south: south side parking area**

Hydrograph Plot



**Pond biobmp: BMP One**

Inflow = 5.17 cfs @ 12.14 hrs, Volume= 0.323 af  
 Outflow = 3.05 cfs @ 12.31 hrs, Volume= 0.238 af, Atten= 41%, Lag= 10.1 min  
 Primary = 3.05 cfs @ 12.31 hrs, Volume= 0.238 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Peak Elev= 115.41' Storage= 4,805 cf  
 Plug-Flow detention time= 105.6 min calculated for 0.238 af (74% of inflow)  
 Storage and wetted areas determined by Prismatic sections

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	2,300	0	0
114.50	2,900	1,300	1,300
115.00	3,600	1,625	2,925
115.50	5,500	2,275	5,200
116.00	8,604	3,526	8,726
117.00	9,125	8,865	17,591

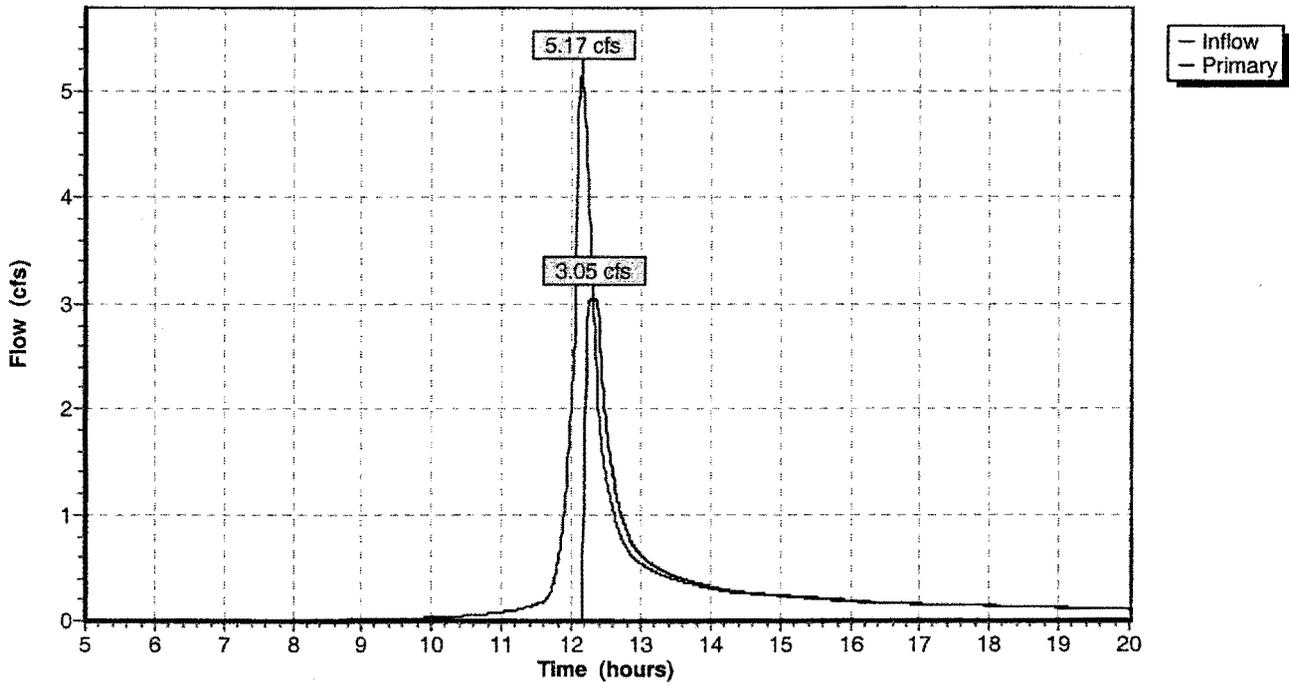
**Primary OutFlow** (Fixed Tailwater Elevation= 112.21')

- 1=Culvert
- 2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	111.50'	<b>8.0" x 50.0' long Culvert</b> RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 110.84' S= 0.0132 '/' n= 0.010 Cc= 0.900
2	Device 1	115.15'	<b>2.60' x 2.60' Horiz. Orifice/Grate X 0.80</b> Limited to weir flow C= 0.600

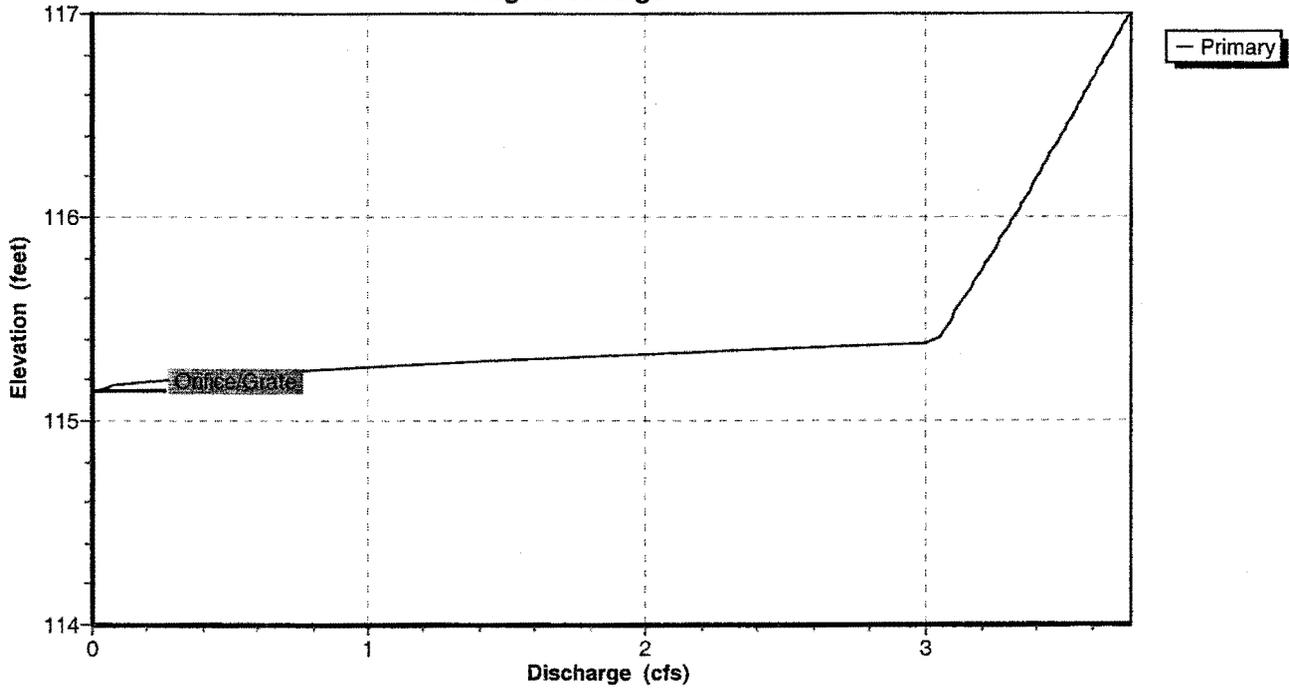
### Pond biobmp: BMP One

#### Hydrograph Plot



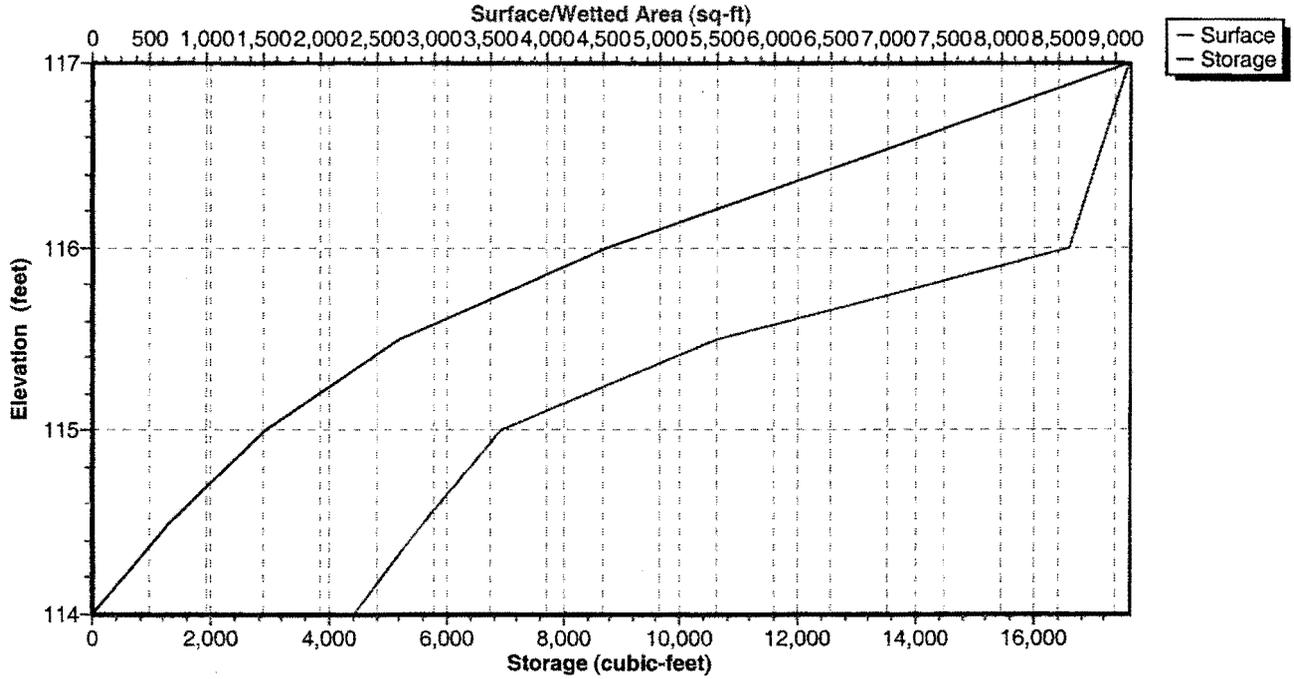
### Pond biobmp: BMP One

#### Stage-Discharge



### Pond biobmp: BMP One

#### Stage-Area-Storage



**Pond swale: South side swale storage**

Inflow = 2.87 cfs @ 12.10 hrs, Volume= 0.187 af  
 Outflow = 2.50 cfs @ 12.18 hrs, Volume= 0.136 af, Atten= 13%, Lag= 4.5 min  
 Primary = 2.50 cfs @ 12.18 hrs, Volume= 0.136 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Peak Elev= 115.50' Storage= 2,489 cf  
 Plug-Flow detention time= 98.8 min calculated for 0.136 af (73% of inflow)  
 Storage and wetted areas determined by Prismatic sections

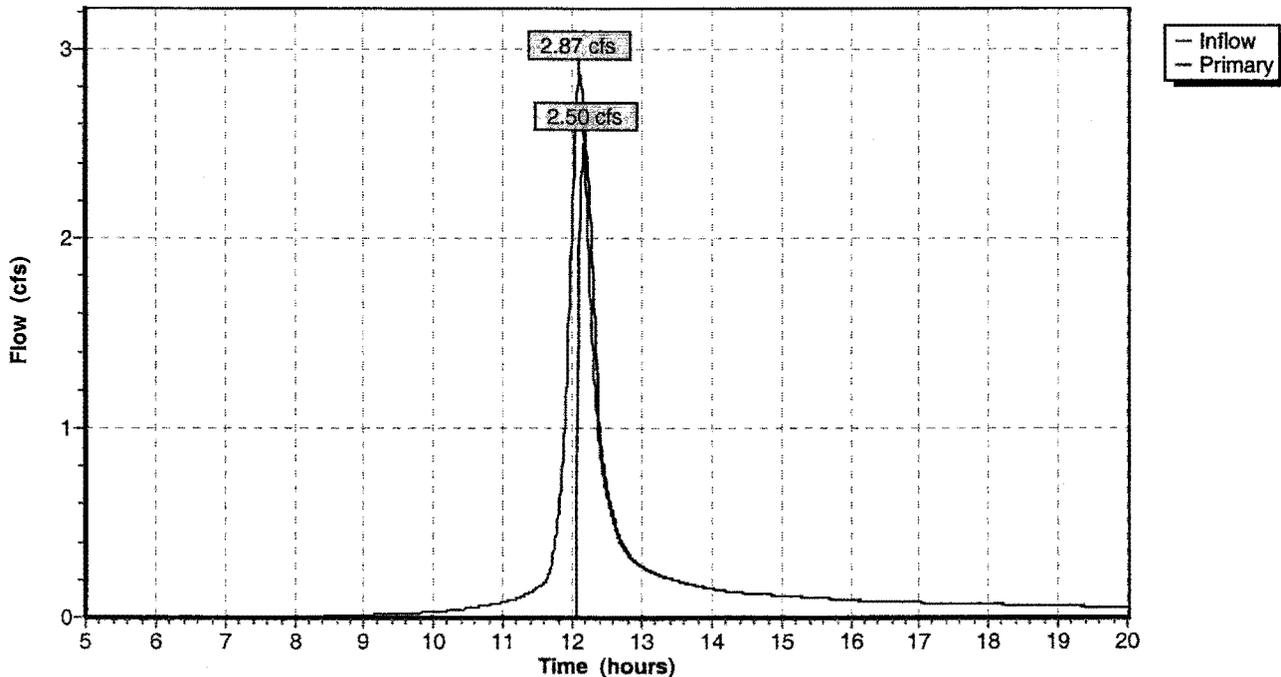
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	0	0	0
115.00	1,435	718	718
116.00	5,700	3,568	4,285
117.00	8,500	7,100	11,385

**Primary OutFlow** (Fixed Tailwater Elevation= 115.41')  
 1=Orifice/Grate

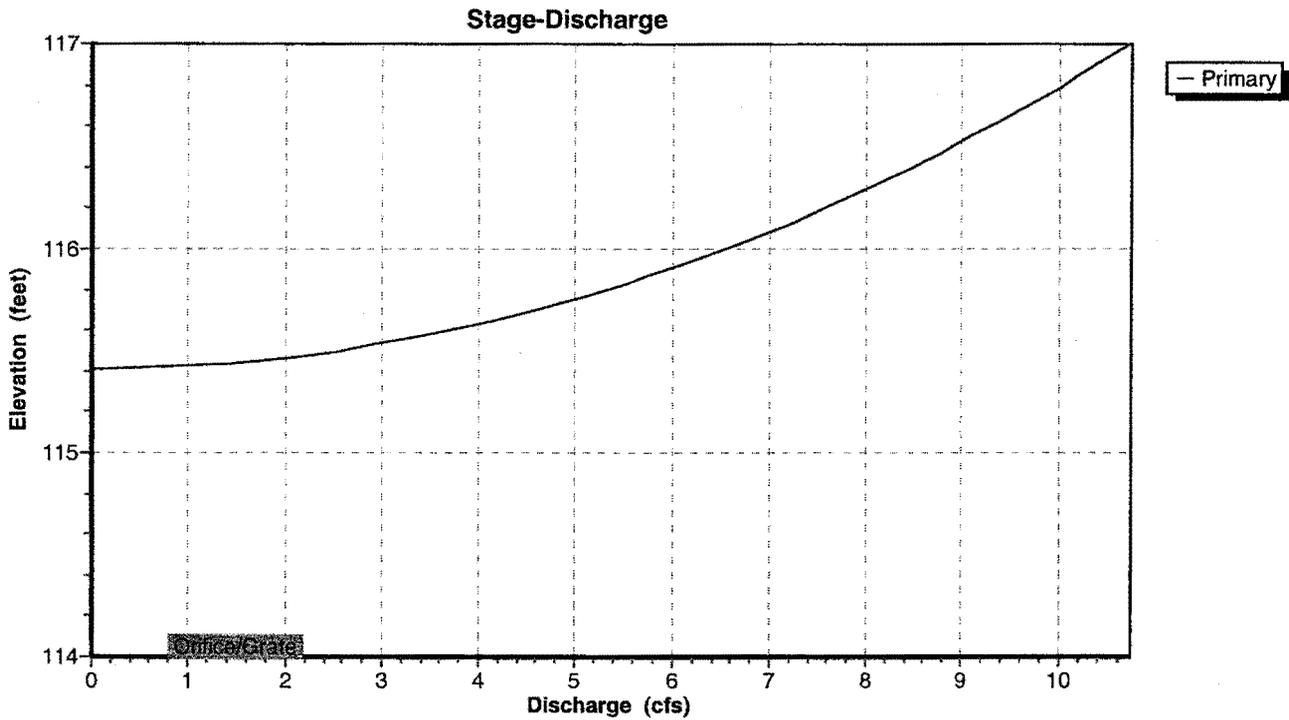
#	Routing	Invert	Outlet Devices
1	Primary	114.00'	18.0" Vert. Orifice/Grate C= 0.600

**Pond swale: South side swale storage**

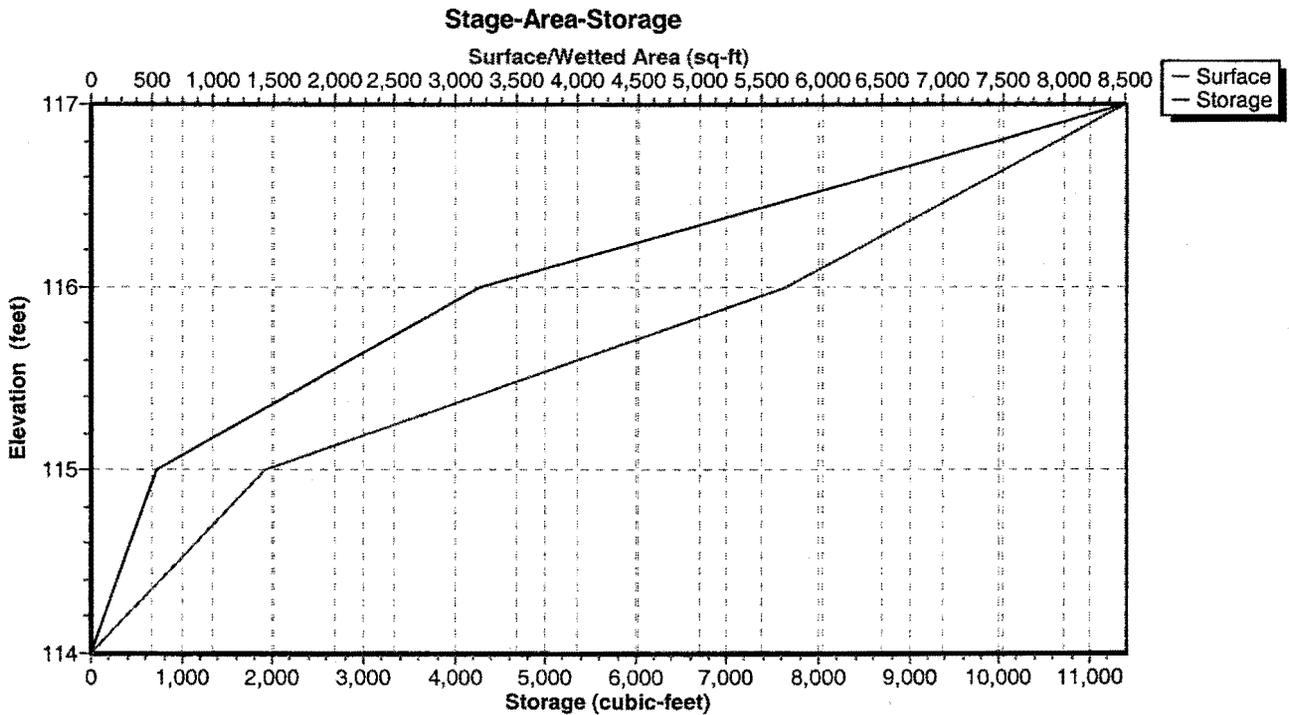
Hydrograph Plot



### Pond swale: South side swale storage



### Pond swale: South side swale storage



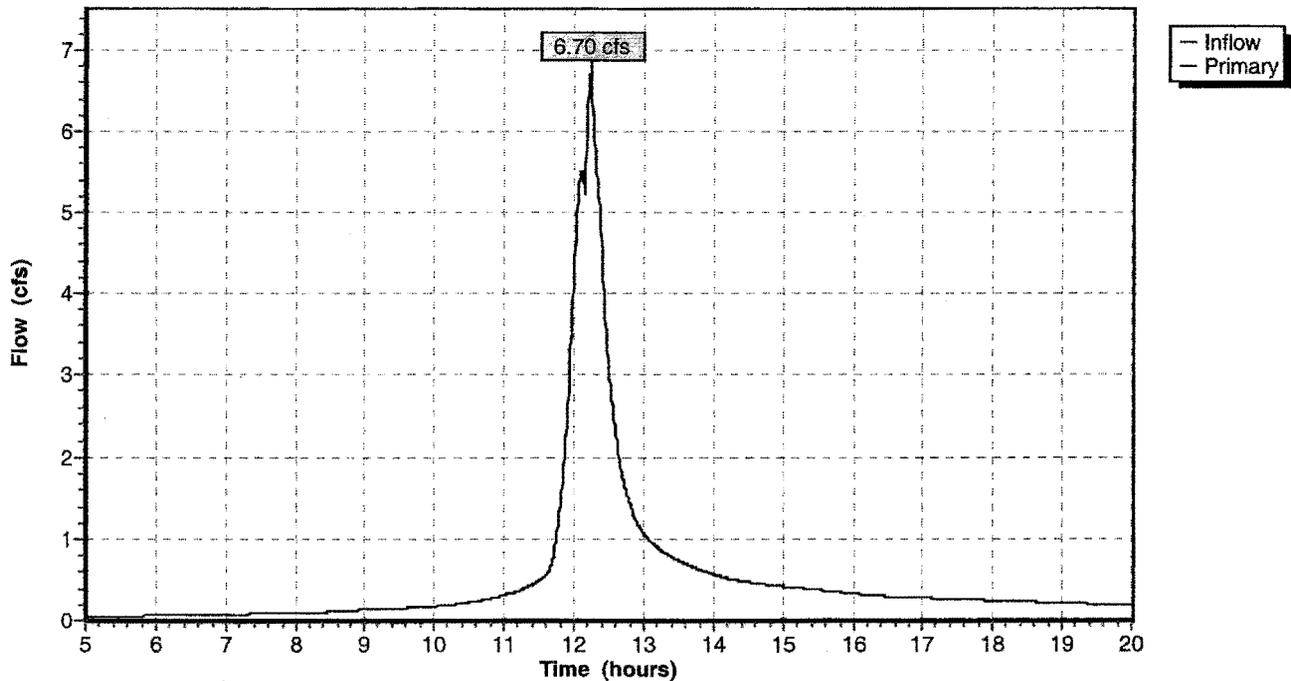
### Link Point A: Design Point A

Inflow = 6.70 cfs @ 12.23 hrs, Volume= 0.641 af  
Primary = 6.70 cfs @ 12.23 hrs, Volume= 0.641 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

### Link Point A: Design Point A

Hydrograph Plot



**Dr. J Dental Off Post 100yr**

*Type II 24-hr Rainfall=8.00"*

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Time span=5.00-20.00 hrs, dt=0.10 hrs, 151 points  
Runoff by SCS TR-20 method, UH=SCS, Type II 24-hr Rainfall=8.00"  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment north: north side area**

Tc=18.0 min CN=76 Area=0.758 ac Runoff= 4.48 cfs 0.302 af

**Subcatchment roadway: Roadway Drainage**

Tc=18.7 min CN=95 Area=1.000 ac Runoff= 7.53 cfs 0.571 af

**Subcatchment south: south side parking area**

Tc=18.0 min CN=76 Area=0.758 ac Runoff= 4.48 cfs 0.302 af

**Pond biobmp: BMP One**

Peak Storage= 7,715 cf Inflow= 7.41 cfs 0.515 af  
Primary= 3.16 cfs 0.429 af Outflow= 3.16 cfs 0.429 af

**Pond swale: South side swale storage**

Peak Storage= 4,629 cf Inflow= 4.48 cfs 0.302 af  
Primary= 3.40 cfs 0.213 af Outflow= 3.40 cfs 0.213 af

**Link Point A: Design Point A**

Inflow= 10.53 cfs 1.000 af  
Primary= 10.53 cfs 1.000 af

**Runoff Area = 2.516 ac Volume = 1.176 af Average Depth = 5.61"**

**Subcatchment north: north side area**

Runoff = 4.48 cfs @ 12.10 hrs, Volume= 0.302 af

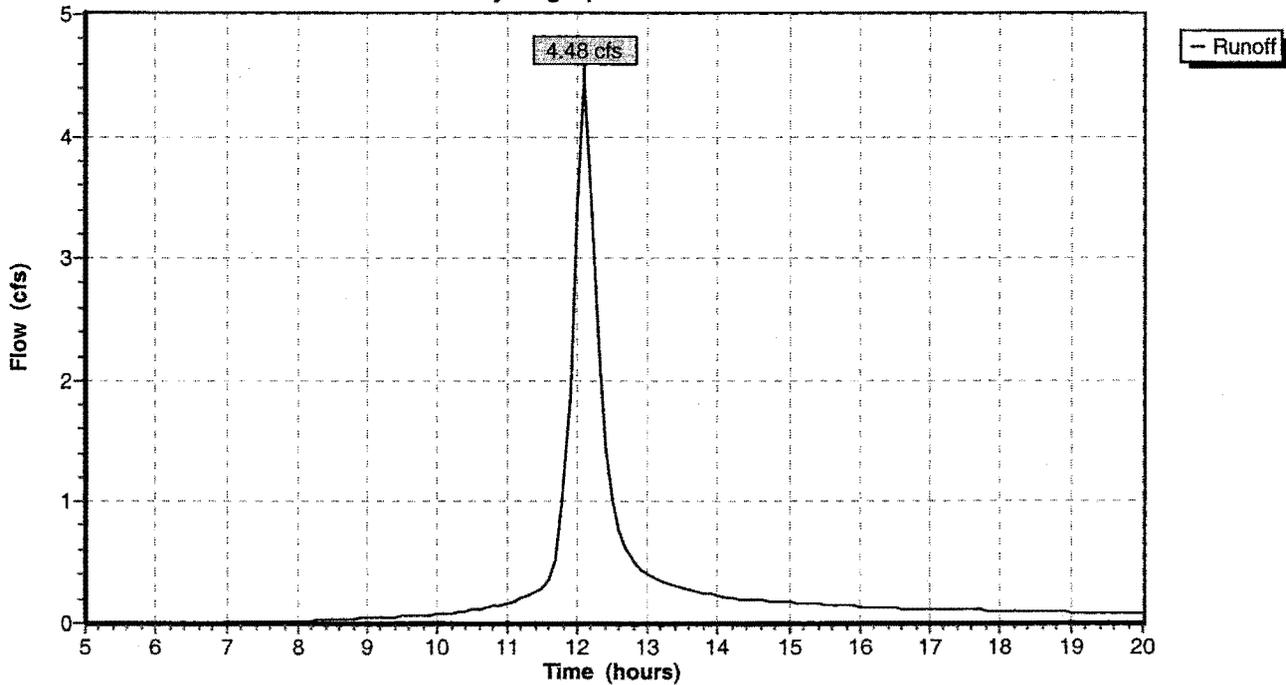
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.10 hrs  
 Type II 24-hr Rainfall=8.00"

Area (ac)	CN	Description
0.689	76	north side of property
0.069	76	offsite church property
0.758	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					Direct Entry, green area

**Subcatchment north: north side area**

Hydrograph Plot



Subcatchment roadway: Roadway Drainage

Runoff = 7.53 cfs @ 12.10 hrs, Volume= 0.571 af

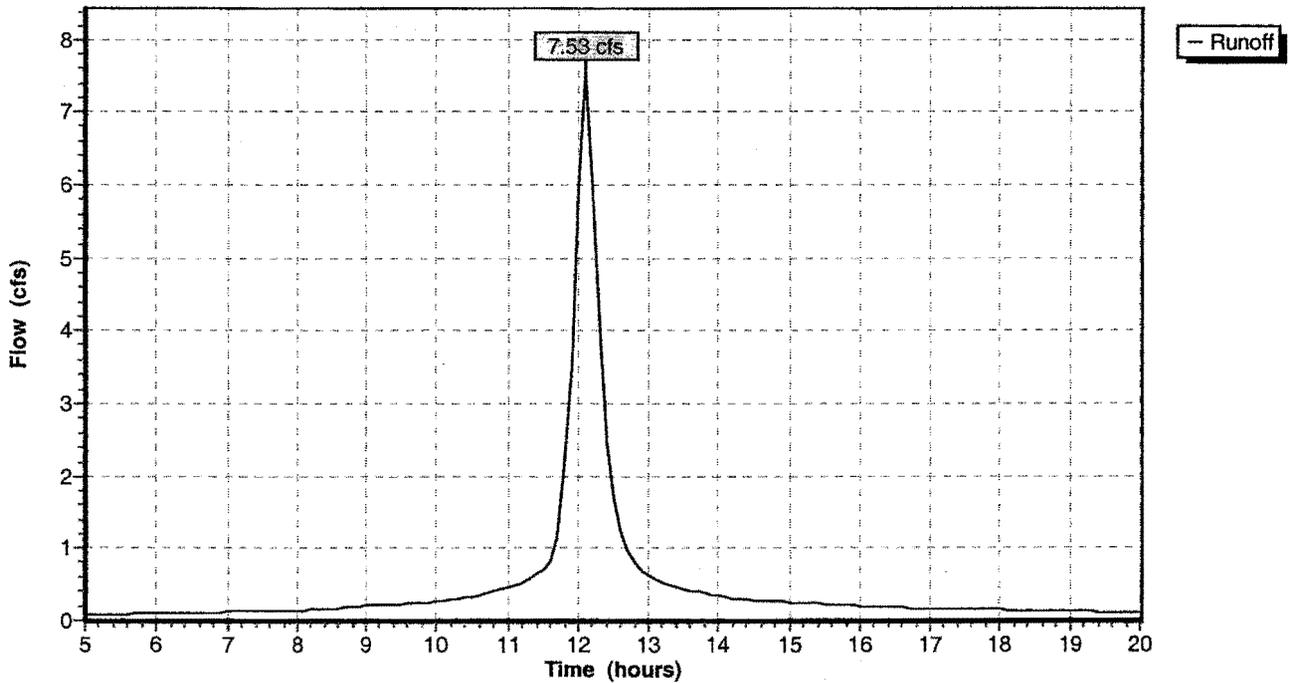
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.10 hrs  
Type II 24-hr Rainfall=8.00"

Area (ac)	CN	Description
1.000	95	Property within right of way

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7					Direct Entry, Time to High point in Richmond Rd

Subcatchment roadway: Roadway Drainage

Hydrograph Plot



**Subcatchment south: south side parking area**

Runoff = 4.48 cfs @ 12.10 hrs, Volume= 0.302 af

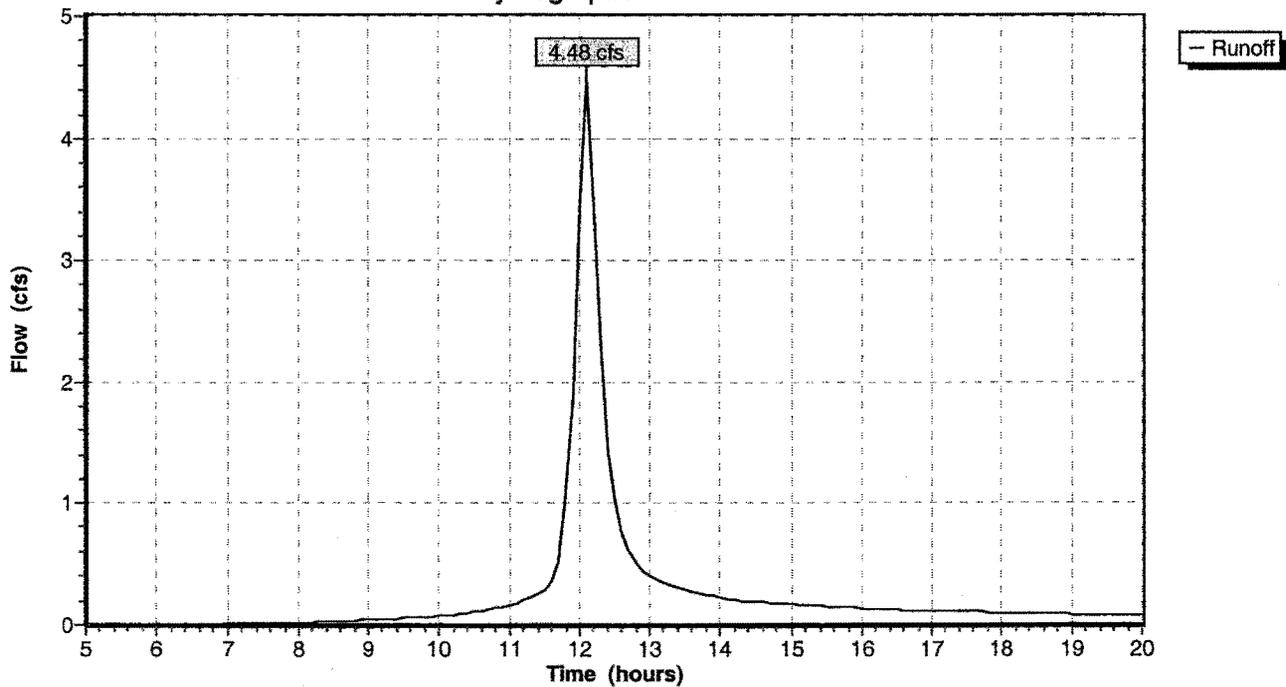
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.10 hrs  
 Type II 24-hr Rainfall=8.00"

Area (ac)	CN	Description
0.735	76	south side of site
0.023	76	portion of woodward property
0.758	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					Direct Entry, impervious surface

**Subcatchment south: south side parking area**

Hydrograph Plot



**Pond biobmp: BMP One**

Inflow = 7.41 cfs @ 12.15 hrs, Volume= 0.515 af  
 Outflow = 3.16 cfs @ 12.44 hrs, Volume= 0.429 af, Atten= 57%, Lag= 17.3 min  
 Primary = 3.16 cfs @ 12.44 hrs, Volume= 0.429 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.10 hrs

Peak Elev= 115.86' Storage= 7,715 cf  
 Plug-Flow detention time= 79.9 min calculated for 0.427 af (83% of inflow)  
 Storage and wetted areas determined by Prismatic sections

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	2,300	0	0
114.50	2,900	1,300	1,300
115.00	3,600	1,625	2,925
115.50	5,500	2,275	5,200
116.00	8,604	3,526	8,726
117.00	9,125	8,865	17,591

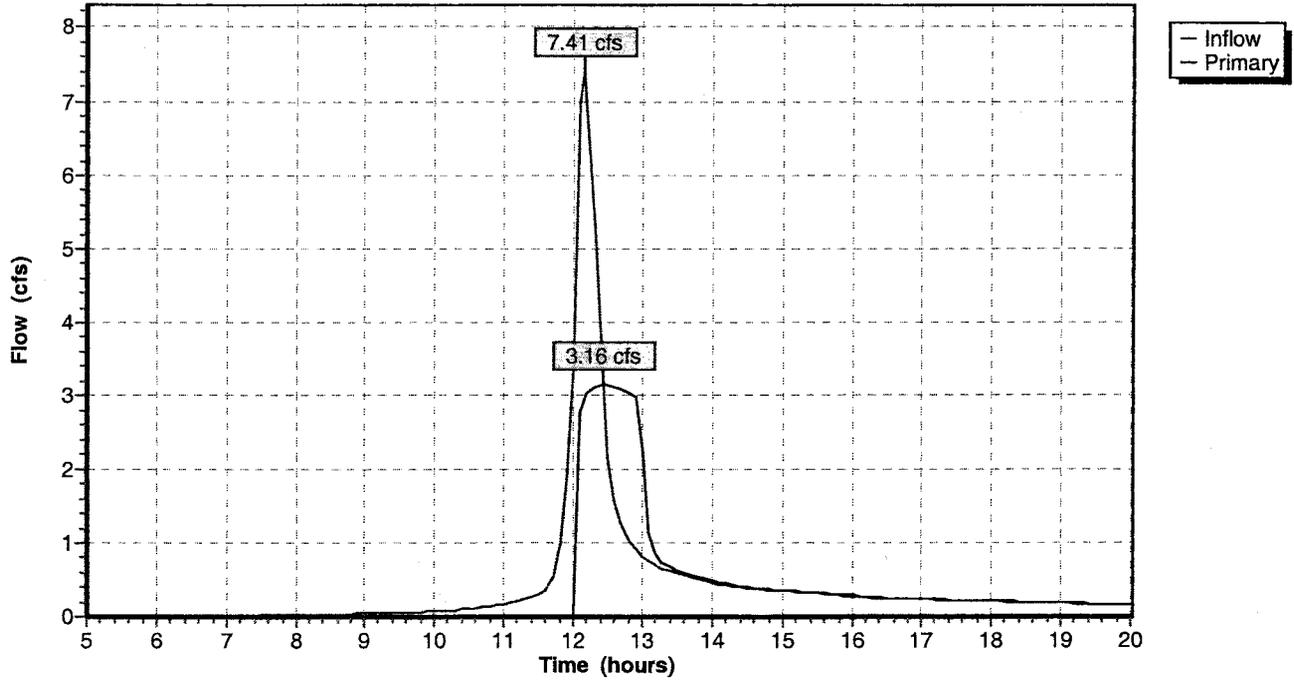
**Primary OutFlow** (Fixed Tailwater Elevation= 112.43')

- 1=Culvert
- 2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	111.50'	<b>8.0" x 50.0' long Culvert</b> RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 110.84' S= 0.0132 1/8" n= 0.010 Cc= 0.900
2	Device 1	115.15'	<b>2.60' x 2.60' Horiz. Orifice/Grate X 0.80</b> Limited to weir flow C= 0.600

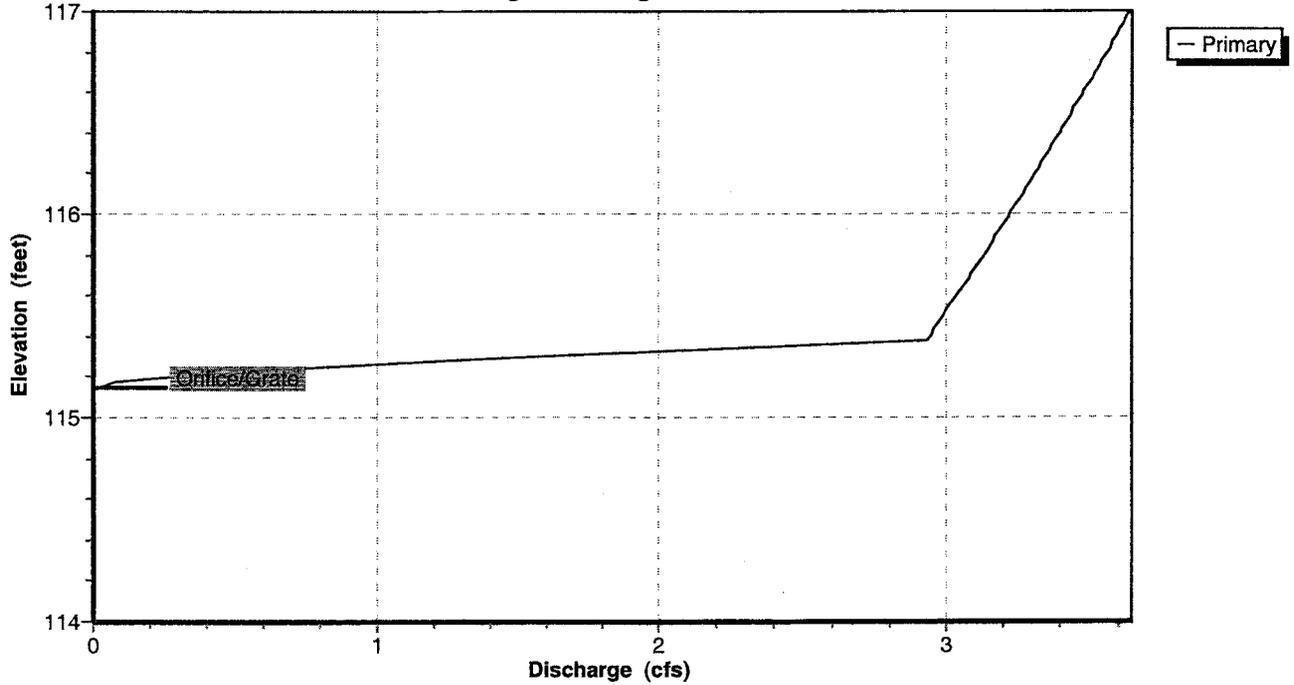
### Pond biobmp: BMP One

Hydrograph Plot



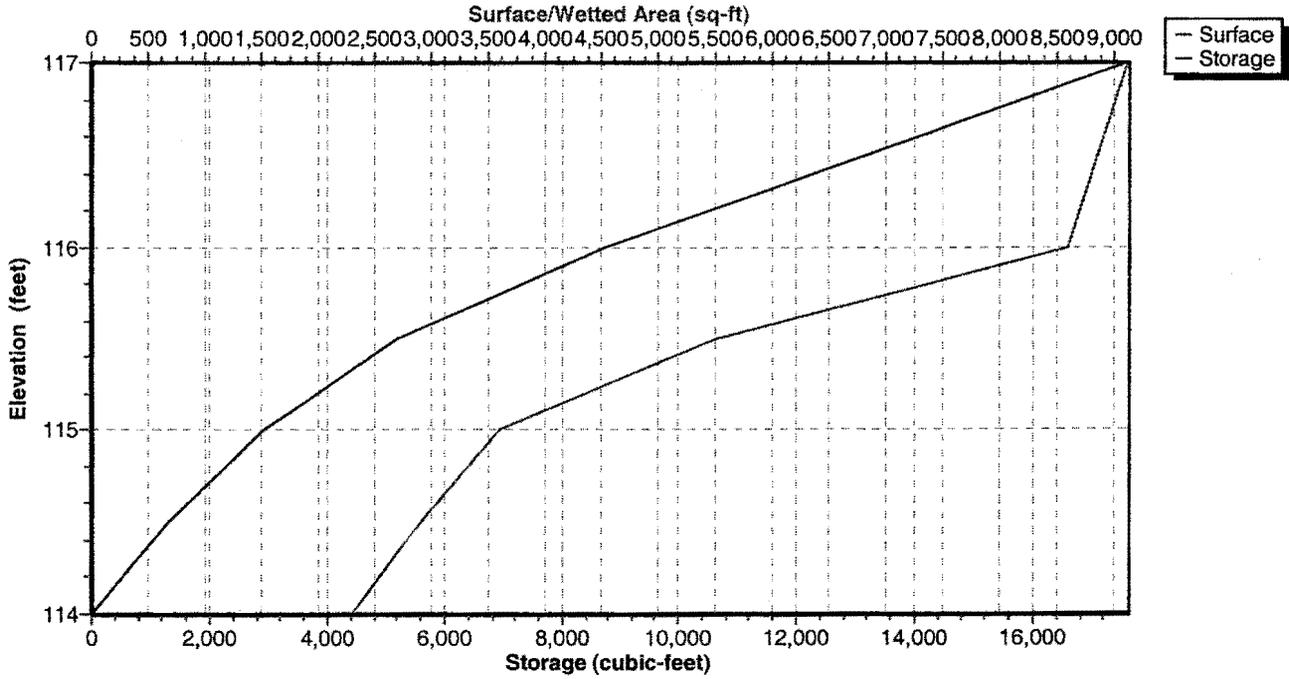
### Pond biobmp: BMP One

Stage-Discharge



### Pond biobmp: BMP One

#### Stage-Area-Storage



**Pond swale: South side swale storage**

Inflow = 4.48 cfs @ 12.10 hrs, Volume= 0.302 af  
 Outflow = 3.40 cfs @ 12.23 hrs, Volume= 0.213 af, Atten= 24%, Lag= 7.6 min  
 Primary = 3.40 cfs @ 12.23 hrs, Volume= 0.213 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.10 hrs

Peak Elev= 116.05' Storage= 4,629 cf  
 Plug-Flow detention time= 104.3 min calculated for 0.212 af (70% of inflow)  
 Storage and wetted areas determined by Prismatic sections

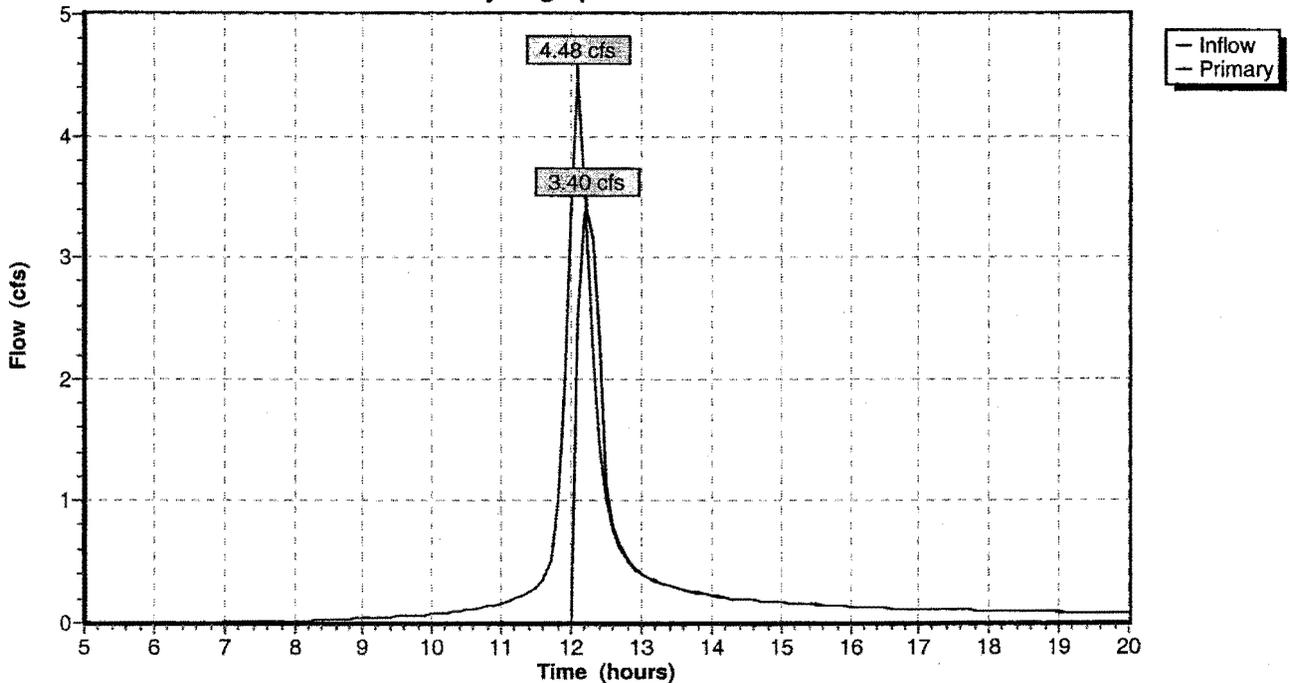
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	0	0	0
115.00	1,435	718	718
116.00	5,700	3,568	4,285
117.00	8,500	7,100	11,385

**Primary OutFlow** (Fixed Tailwater Elevation= 115.89')  
 ↳ 1=Orifice/Grate

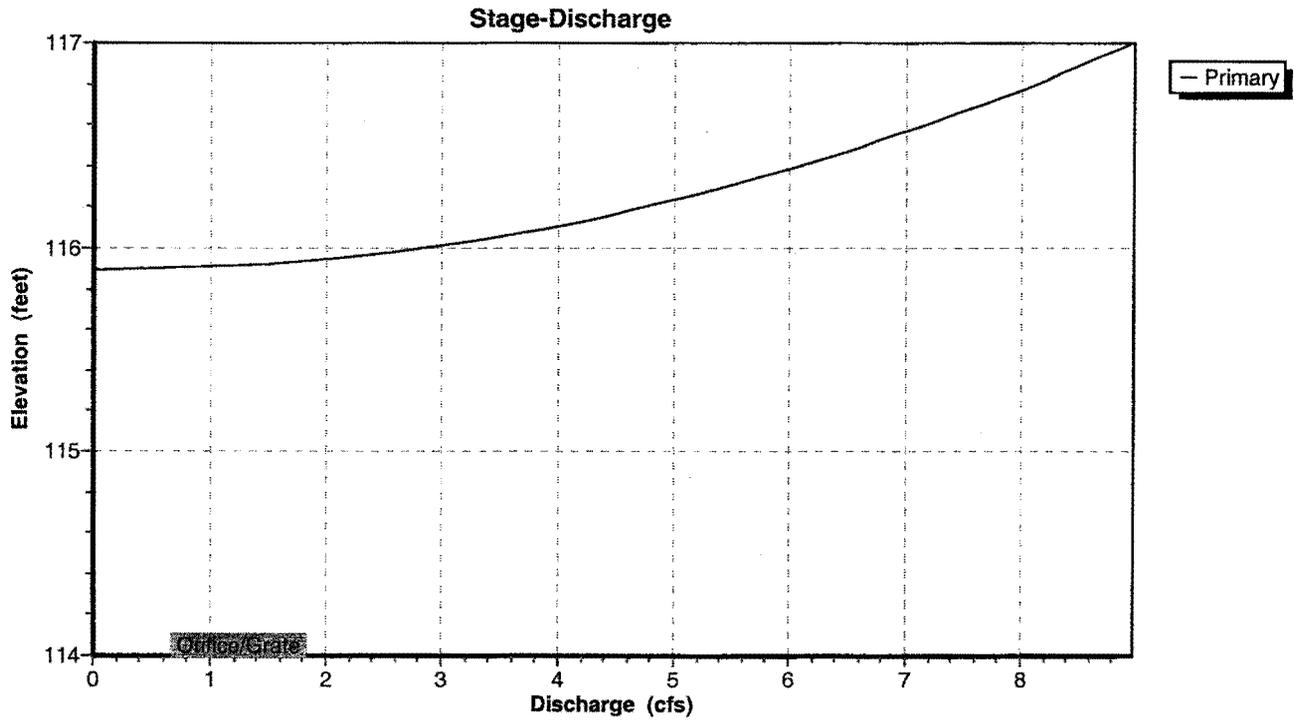
#	Routing	Invert	Outlet Devices
1	Primary	114.00'	18.0" Vert. Orifice/Grate C= 0.600

**Pond swale: South side swale storage**

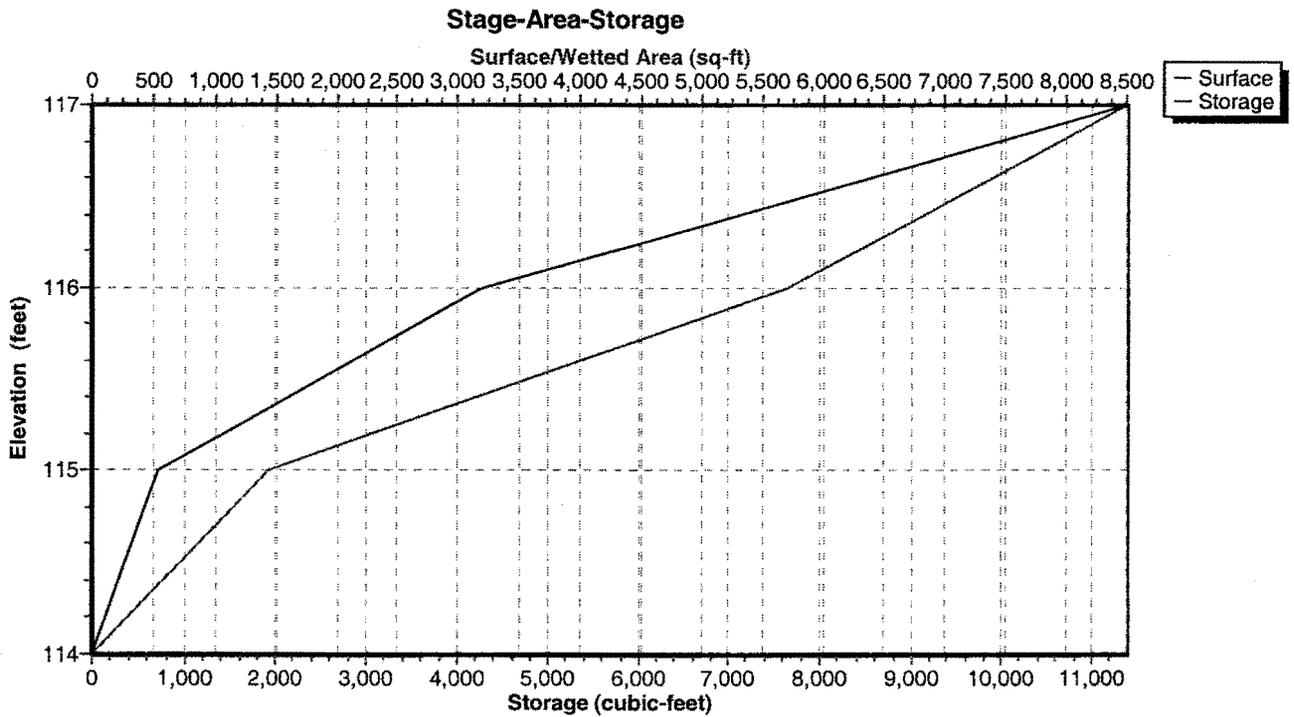
Hydrograph Plot



### Pond swale: South side swale storage



### Pond swale: South side swale storage



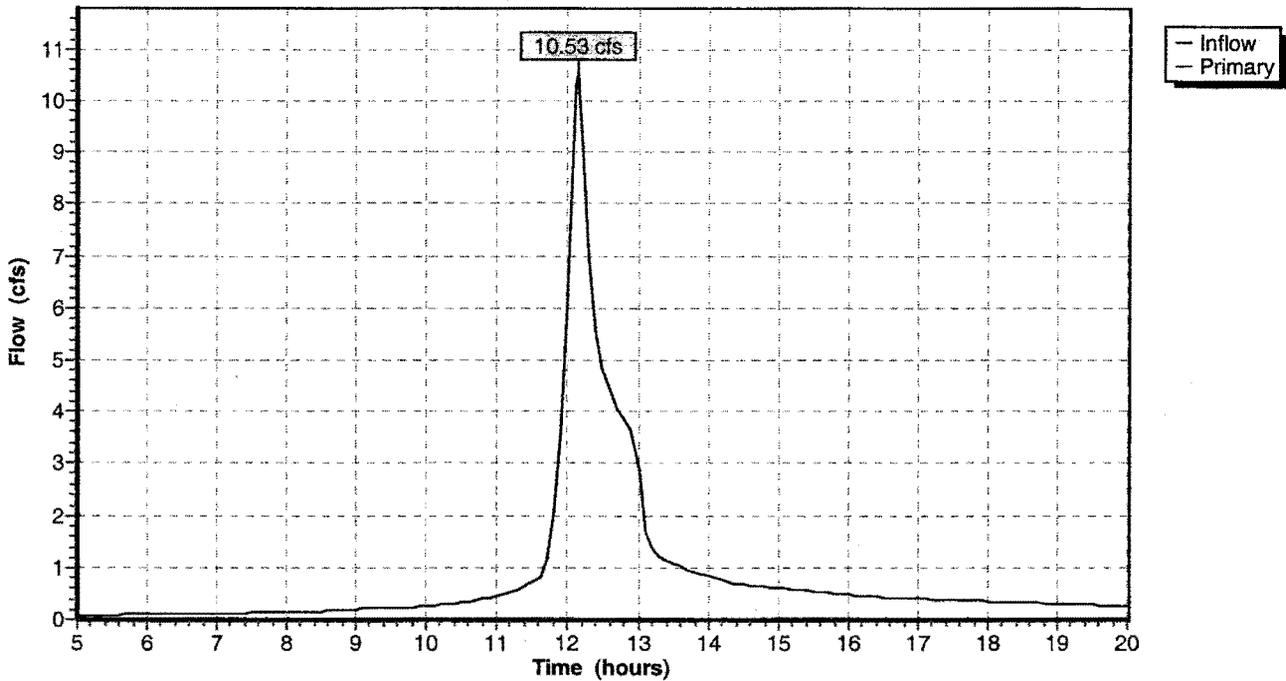
### Link Point A: Design Point A

Inflow = 10.53 cfs @ 12.13 hrs, Volume= 1.000 af  
Primary = 10.53 cfs @ 12.13 hrs, Volume= 1.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.10 hrs

### Link Point A: Design Point A

Hydrograph Plot





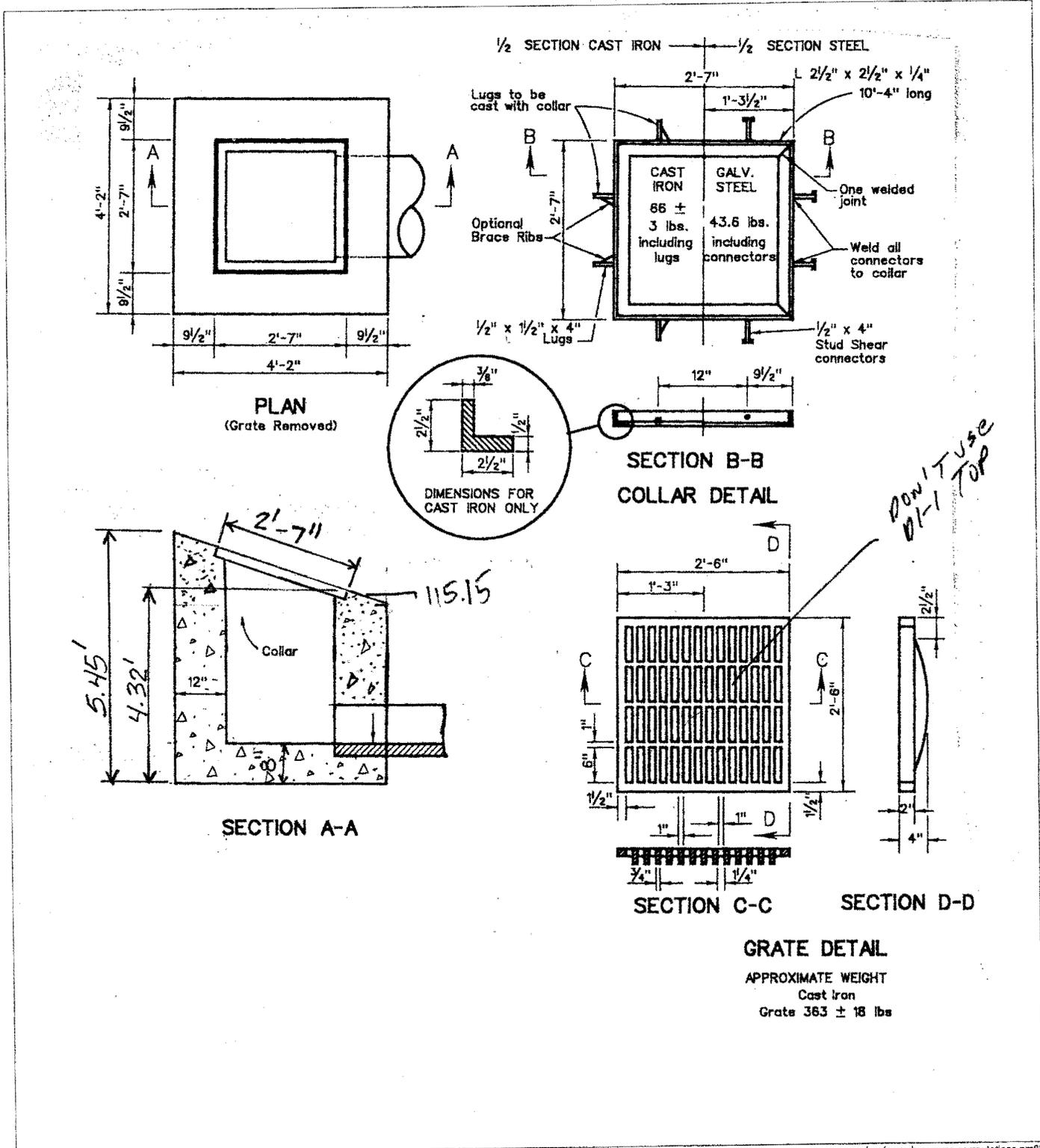
Project: Dr. Johnston's Off. Project # 3119200

Location: NORGE Sheet of

Calculated by: MEL Date: 1/18/2002

Checked by: Date:

Title: **OUTFALL STRUCTURE FOR BMP (MODIFIED VDOT DE-1)**



SP. 006.02

# *Proposed Dental Medical Clinic*

James City County  
Virginia

---

Prepared for Timothy K. Johnston, D.D.S. and Kelly T. Johnston  
James City County, Virginia

Prepared by **VHB**/Vanasse Hangen Brustlin, Inc.  
Melvin E. Hopkins, Jr.  
477 McLaws Circle, Suite 1  
Williamsburg, Virginia

Non-Env Div  
INFO.

# *Proposed Dental Medical Clinic*

James City County  
Virginia

---

Prepared for **Timothy K. Johnston, D.D.S. and Kelly T. Johnston**  
3402 Acorn Street, Suite 103  
Williamsburg, VA 23188  
(757) 564-0804

Prepared by **VHB/Vanasse Hangen Brustlin, Inc.**  
Transportation, Land Development, Environmental Services  
477 McLaws Circle, Suite 1  
Williamsburg, Virginia  
(757) 220-0500

January 2002

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■

# Sample Letter Adjacent Property Owner Notification



Vanasse Hangen Brustlin, Inc.

January 16, 2002

Ref: 31192.00

Mr. James Acheson  
P.O. Box 234  
Norge, VA 23127-0234

Re: Notice to Property Owner: Dental Office Building and Parking Lot  
(7450 Richmond Road; Norge, VA)

Dear Property Owner:

Per James City County Zoning Ordinance, Section 20-39, Paragraph (q), this is written notification that Vanasse Hangen Brustlin, Inc. (VHB), has submitted site plans on behalf of Tim Johnston, D.D.S. for construction of a dental office building and parking lot located at 7450 Richmond Road, Norge, VA.

Plans are on file and available for review at the James City County Office of Planning and Development, 101-E Mounts Bay Road, Williamsburg, VA (757) 253-6685.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Melvin Hopkins  
Project Engineer

cc: James City County  
John D. Hudgins  
Walter Sullivan - Bishop Catholic Diocese  
Norge Saddle Club  
J.W. Woodward, Jr.  
Jack L. Degges, Jr.  
John A. Hampton  
James and Clifford Acheson

Enclosure

N/F  
NORGE SPORTS CLUB  
ZONE A-1

N/F  
SCARIS — PAPPAS  
BAGANAKIS  
ZONING R-8

N/F  
JIM Jr. & ISAB WOODWARD  
ZONED A-1

LIMITS OF BUILDING  
ENVELOP (TYP)

**Proposed  
Dental  
Medical Clinic**  
11,000 S.F. Max.  
35 Ft. Max Ht.

15' SIDE  
YARD SETBACK

35' REAR  
YARD SETBACK

15' SIDE  
YARD SETBACK

20' LANDSCAPE  
BUFFER

50' FRONT  
YARD SETBACK

*Richmond Road*

*State Rt. 60 West*

**Vanasse Hangen Brustlin, Inc.**

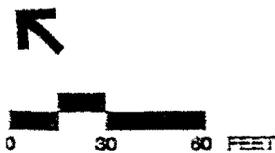
Master Plan of Dental Medical Clinic  
Timothy K. & Kelly T. Johnston

September 21, 2001

Site = 1.5+/- Acres

Site Zoned A-1

Tax Map Parcel No. (23-2)(01-0-0018)





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# Traffic Impact Analysis



*Vanasse Hangen Brustlin, Inc.*

The Liberty Mutual Bldg.  
4101 Cox Road, Suite 105  
Glen Allen, VA 23060  
804 527-1004  
FAX 804 527-2257

**Memorandum**

To: Mr. Steve Wigley, P.E.  
VHB  
Williamsburg, Virginia

Date: September 20, 2001

Project No.: 31192.00

From: Stephen E. Aldrich, P.E., PTOE  
Transportation Engineer

Re: Johnston/Dentist Office  
James City County, Virginia  
Traffic Access Assessment

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**Introduction**

Vanasse Hangen Brustlin, Inc. (VHB) has conducted a preliminary traffic access assessment for the proposed 11,000 gross square foot dentist office building development in James City County. The site is located in Norge, Virginia on the north side of Richmond Road (U.S. Route 60) to the east of Norge Lane. The proposed access for the dentist office is to be located on the east end of the site, approximately 700 feet east of Norge Lane. The proposed site location is shown in Figure 1. The posted speed limit along Richmond Road is 45 miles per hour (mph).

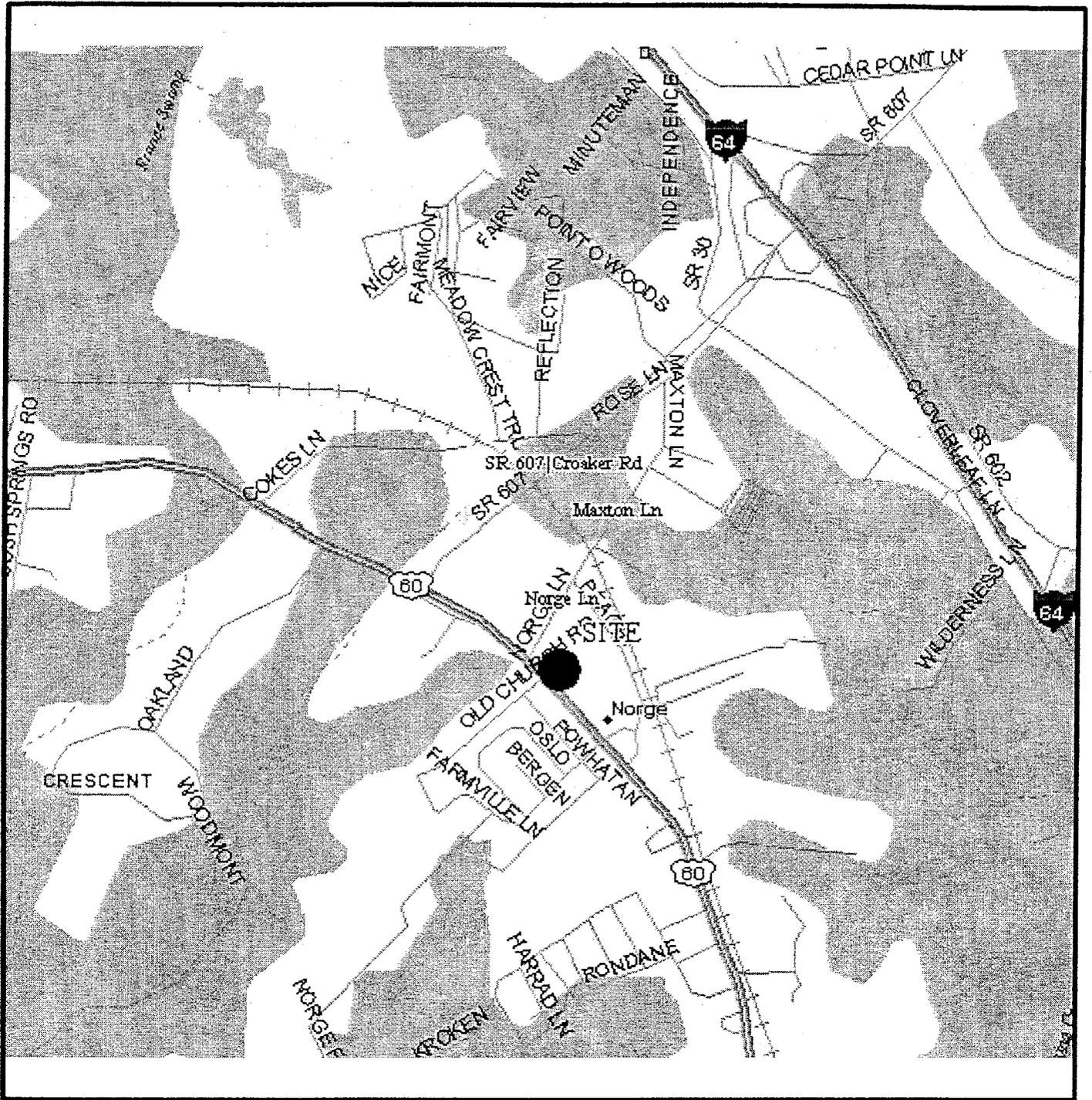
This assessment was conducted in order to determine the need for a detailed traffic impact study per James City County zoning ordinances. Specifically, a detailed traffic study is needed if:

- 1) The site generates 100 or more vehicle trips during the peak hour, or
- 2) The project with an entrance or exit onto a roadway [would experience] ..a Level of Service "D" or lower.

The preliminary traffic access assessment presented below demonstrates that the proposed development will not meet either condition, meaning that site traffic generation will be low and that acceptable traffic operations (Level of Service C or better) will be experienced at the proposed site driveway.

**Proposed Development**

The proposed development with a maximum of 11,000 gross square feet is located on a 1.514-acre parcel. The proposed driveway entrance is proposed to be located on Richmond Road at the east end of the site and approximately 700 feet east of Norge Lane. This entrance will be located approximately 400 feet east of an existing median opening.



↑  
Not to Scale

**Vanasse Hangen Brustlin, Inc.**

Site Location Map **Figure 1**

### Existing Traffic

Richmond Road is a four-lane, east-west arterial roadway, with a posted speed limit of 45 miles per hour in the site vicinity. Traffic signals are located to the west of the site at Norge Lane and Croaker Road (Route 607). Richmond Road is a divided roadway beginning in the middle of the site heading west and a five-lane, undivided roadway (four lanes with a center left-turn lane) heading to the east. Access to the site is proposed on the undivided portion of Richmond Road.

Existing traffic data was collected by the Virginia Department of Transportation (VDOT) on this section of Richmond Road in July 2001. A summary of these counts are summarized in Table 1 and a copy of the VDOT traffic counts is provided in the Appendix.

**TABLE 1  
 EXISTING STUDY AREA TRAFFIC VOLUMES**

Location	Date of Count	Direction	ADT *	Morning Peak Hour **	K *** Factor	Afternoon Peak Hour**	K *** Factor
Richmond Road (Route 60) Between Route 646 and Route 607	7/24/01	EB	9,500	430	4.5	810	8.5
		WB	<u>9,500</u>	<u>645</u>	<u>6.8</u>	<u>695</u>	<u>7.3</u>
		Total	19,000	1,075	5.7	1,505	7.9

\* Average Daily Traffic (ADT) Volumes. Data was obtained from VDOT year 2001 counts.

\*\* Expressed in vehicles per hour (vph).

\*\*\* The "K" factor is the percent of average daily traffic that occurs during the peak hours.

As shown in the Table 1, Richmond Road in the site vicinity carries approximately 19,000 vehicles per day (vpd). The weekday evening peak hour was found to occur between 4:00 and 5:00 PM, with a peak two-way flow of 1,505 vehicles per hour (vph).

### Background Traffic Growth

After a review of historical traffic volumes on Richmond Road and population trends in the greater Williamsburg area, a 3 percent annual growth rate was selected for this study. This growth rate is assumed to account for background growth in traffic that can be expected to occur within the next year when the development will be in full operation. Traffic Volumes estimated for future year 2002 no-build conditions are shown in the Appendix in Figures A-1 and A-2.

### Site-Generated Traffic Volumes

Estimated vehicular trips expected to be generated by proposed development were estimated by using trip generation data from 6<sup>th</sup> Edition of the ITE Trip Generation Manual.<sup>1</sup> Table 2 provides a summary of the projected daily and peak hour trips expected to be generated by the proposed development. The site is projected to generate approximately 400 two-way vehicle trips per day, with the highest commuter peak hour occurring during the evening with a total of 40 two-way vehicle trips.

<sup>1</sup> *Trip Generation, 6<sup>th</sup> Edition*, Institute of Transportation Engineers, 1997.

**TABLE 2  
 PROPOSED DENTIST OFFICE BUILDING  
 WEEKDAY MORNING AND EVENING TRIP GENERATION  
 SUMMARY**

	Trip Rate or Equation Used*	Entering Vehicles	Exiting Vehicles	Total Vehicles
Daily Two-Way Vehicle Trips	36.13	199	199	398
Morning Site Trips (7:00-9:00 AM)	2.43	22	5	27
Evening Site Trips (4:00-6:00 PM)	$\text{Ln}(T)=0.921\text{Ln}(X)+1.476$	11	29	40

\*Future site trips determined using Land Use Code 720 (Medical-Dental Office Building) from the 6<sup>th</sup> Edition of the Trip Generation Manual. "X" represents development size in thousand gross square feet.

**Trip Distribution**

The expected future arrival and departure traffic movement patterns of site-generated vehicle trips was determined using existing traffic patterns. As shown in the Appendix in Figure A-3, approximately sixty percent of site traffic will approach and depart the site heading in the westbound direction with the remaining 40 percent oriented to the east (towards Williamsburg).

**Build Traffic Volumes**

Traffic volume conditions with the addition of the proposed site development were developed by adding site-generated peak hour traffic volumes to year 2002 No-Build traffic volumes. Weekday peak hour traffic volumes expected with the implementation of the development are shown in the Appendix in Figure A-4 for the morning peak hour and in Figure A-5 for the evening peak hour.

**Traffic Operations**

The expected peak hour traffic operating conditions with the addition of the proposed development has been assessed. The results of this capacity analysis are summarized in Table 3. The Level of Service (LOS) analyses, calculated using Highway Capacity Software (release 2000) is based on the methodology described by the Transportation Research Board (TRB) in its *Highway Capacity Manual*, (2000 Edition). Capacity analysis worksheets are included in the Appendix to this report.

The site driveway approach to Richmond Road is projected to operate at Level of Service C or better during both the morning and evening peak hours in year 2002 with the addition of the proposed development. Left turns and right turns into the site are projected to operate at unconstrained operating conditions (Level of Service A).

**TABLE 3**  
**2002 BUILD - SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS SUMMARY**

Approach	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Control Delay (sec)*	Level of Service	Average Control Delay (sec)*	Level of Service
<b>Site Driveway at Richmond Road (Route 60)</b>					
Site Drive	- Approach	12.8	B	15.7	C
Eastbound	Left Turns	9.3	A	9.4	A

\* Average control delay expressed in seconds per vehicle.

**TURN LANE WARRANTS**

An evaluation was conducted to determine whether VDOT left-turn and right-turn warrants would be met at the proposed site driveway intersection with Richmond Road. Based on the projected volumes, turn lane warrants are not satisfied. Copies of the left and right-turn lane warrant charts, obtained from the VDOT Design Manual, are provided in the Appendix.

**SUMMARY/RECOMMENDATIONS**

VHB has evaluated the potential traffic impact of the proposed dental office development at the proposed site driveway intersection with Richmond Road. The proposed development will generate only 400 vehicle trips a day, with peak hour volumes of 40 two-way vehicle trips or less during the morning and evening peak hours. The projected traffic operations of the proposed driveway access was assessed and found to be Level of Service C or better with the addition of site traffic. Based on this information, the proposed development will not meet any of the county thresholds that require a more detailed traffic impact study to be conducted. In addition, VDOT turn lane warrants will not be met at the site driveway intersection with Richmond Road.

cc: File

# Appendix

- Traffic Count
- Trip Generation Work Sheet
- Site Trip Distribution
- Year 2002 No-Build and Build Morning and Evening Peak Hour Traffic Volumes
- Capacity Analysis Worksheets
- Turn Lane Warrant Worksheets

MS LinkID: 050095

Route: US 60

ADT: 0 (

James City County

From: 47-607

To: 47-614

Unit: Vehicle

Milepost: 231.59

234.44

HTRIS Node: 398028

398059

Start Time	Cntr	Lane	Dir	Cls 1	Cls 2	Cls 3	Cls 4	Cls 5	Cls 6	Cls 7	Cls 8	Cls 9	Cls 10	Cls 11	Cls 12	Cls 13	OtherUnClass	Total
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07/24/01

The data that follow have been Manually Reviewed and found to be Acceptable for all TMS uses.  
 The Classification data that follow have been Manually Reviewed and found to be Acceptable for all TMS uses.

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01:00 am	-	-	-	4	0	21	1	0	0	0	0	0	0	0	0	0	0	0	22	
02:00 am	-	-	-	2	0	8	4	1	0	0	0	1	0	0	0	0	0	0	14	
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10:00 pm	-	-	-	4	0	179	27	0	3	0	0	2	0	0	0	0	0	0	2	213
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11:00 pm	-	-	-	4	0	111	16	0	0	0	0	0	1	0	0	0	0	0	1	129
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07/25/01

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07:00 am	-	-	-	2	0	402	175	3	27	15	6	16	1	0	0	0	0	11	656	

TMS LinkID: 050095

Route: US 60

ADT: 0 (

James City County

From: 47-607

To: 47-614

Unit: Vehicle

Milepost: 231.59

234.44

HTRIS Node: 398028

398059

Start Time	Cntr	Lane	Dir	Cls 1	Cls 2	Cls 3	Cls 4	Cls 5	Cls 6	Cls 7	Cls 8	Cls 9	Cls 10	Cls 11	Cls 12	Cls 13	OtherUnClass	Total	
The data that follow have been Manually Reviewed and found to be Acceptable for all TMS uses. The Classification data that follow have been Manually Reviewed and found to be Acceptable for all TMS uses.																			
07:25/01																			
07:00 am	-	-	4	4	253	75	0	7	10	2	5	0	0	0	0	0	0	4	360
08:00 am	-	-	2	1	401	140	4	9	11	5	9	2	0	0	0	0	0	9	591
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09:00 am	-	-	2	1	385	148	6	17	13	4	3	0	0	0	0	0	0	6	583
09:00 am	-	-	4	0	295	96	4	16	9	1	5	2	0	0	0	0	0	6	434
10:00 am	-	-	2	0	408	168	3	16	12	7	11	1	0	0	0	0	0	8	634
10:00 am	-	-	4	0	315	96	0	18	16	1	4	0	0	0	0	0	0	7	457
11:00 am	-	-	2	0	457	136	1	17	7	6	7	0	0	0	0	0	0	15	646
11:00 am	-	-	4	1	361	124	10	25	14	1	9	2	0	0	0	0	0	15	562
12:00 pm	-	-	2	2	495	165	5	25	3	3	6	2	0	1	0	0	0	14	721
12:00 pm	-	-	4	0	479	138	2	26	15	0	10	1	0	0	0	0	0	18	689
01:00 pm	-	-	2	1	416	149	1	19	3	9	9	0	0	0	0	0	0	9	613
01:00 pm	-	-	4	1	496	124	2	20	9	1	9	0	1	0	0	0	0	18	681
02:00 pm	-	-	2	0	418	117	0	10	5	10	8	0	0	0	0	0	0	7	575
02:00 pm	-	-	4	0	465	121	3	18	9	0	10	0	0	0	0	0	0	14	640
03:00 pm	-	-	2	2	422	123	3	21	4	9	8	2	0	0	0	0	0	10	604
03:00 pm	-	-	4	0	503	177	3	22	12	1	7	1	0	0	0	0	0	18	744
04:00 pm	-	-	2	3	465	149	1	18	1	10	3	1	0	0	0	0	0	10	661
04:00 pm	-	-	4	1	582	166	2	22	10	2	10	0	0	0	0	0	0	18	813
05:00 pm	-	-	2	3	491	160	0	15	5	1	3	1	0	0	0	0	0	15	694
05:00 pm	-	-	4	3	606	155	2	19	7	1	3	1	0	0	0	0	0	23	820
06:00 pm	-	-	2	2	447	123	0	8	0	0	1	0	0	0	0	0	0	9	590
06:00 pm	-	-	4	0	474	119	1	8	1	1	2	0	0	0	0	0	0	12	618
07:00 pm	-	-	2	1	282	86	0	7	1	0	1	0	0	0	0	0	0	1	380
07:00 pm	-	-	4	1	392	105	1	11	1	0	5	1	0	0	0	0	0	11	528
08:00 pm	-	-	2	0	250	77	1	3	0	0	0	0	0	0	0	0	0	5	336
08:00 pm	-	-	4	1	335	78	0	2	0	0	4	1	0	0	0	0	0	9	430
09:00 pm	-	-	2	0	180	39	1	5	0	0	1	0	0	0	0	0	0	0	226
09:00 pm	-	-	4	0	289	61	0	8	1	0	1	0	0	0	0	0	0	6	366
10:00 pm	-	-	2	0	131	37	1	2	0	0	1	0	0	0	0	0	0	1	173
10:00 pm	-	-	4	1	196	40	0	4	0	1	1	0	0	0	0	0	0	4	247
11:00 pm	-	-	2	0	75	19	0	2	0	0	0	1	0	0	0	0	0	0	97
11:00 pm	-	-	4	0	115	25	0	2	0	0	3	0	0	0	0	0	0	2	147
Daily total for 07/25/01				32	13242	4044	68	498	224	85	184	28	2	1	0	0	0	331	18739

**ITE TRIP GENERATION WORKSHEET**  
 (6th Edition, Updated 12/97)

LANDUSE: Medical - Dental Office Building  
 LANDUSE CODE: 720 Independent Variable — Trips Per 1000 s.f. Gross Floor Area

JOB NAME: Johnston Dental Office  
 JOB NUMBER: 31192.00 FLOOR AREA (KSF): 11.00

**WEEKDAY**

**RATES:**

	Total Trip Ends			# Studies	Directional Distribution		R <sup>2</sup>
	Average	Low	High		Enter	Exit	
DAILY	36.13	23.16	50.51	10	50%	50%	0.90
AM PEAK	2.43	0.85	4.79	20	80%	20%	---
PM PEAK	3.66	0.97	8.86	40	27%	73%	0.78

**TRIPS:**

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	398	199	199	234	117	117
AM PEAK	27	22	5	NA	NA	NA
PM PEAK	41	11	30	40	11	29

**SATURDAY**

**RATES:**

	Total Trip Ends			# Studies	Directional Distribution		R <sup>2</sup>
	Average	Low	High		Enter	Exit	
DAILY	8.96	1.10	21.93	5	50%	50%	---
PEAK OF GEN.	3.63	3.08	4.02	3	57%	43%	---

**TRIPS:**

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	99	50	50	NA	NA	NA
PEAK OF GEN.	40	23	17	NA	NA	NA

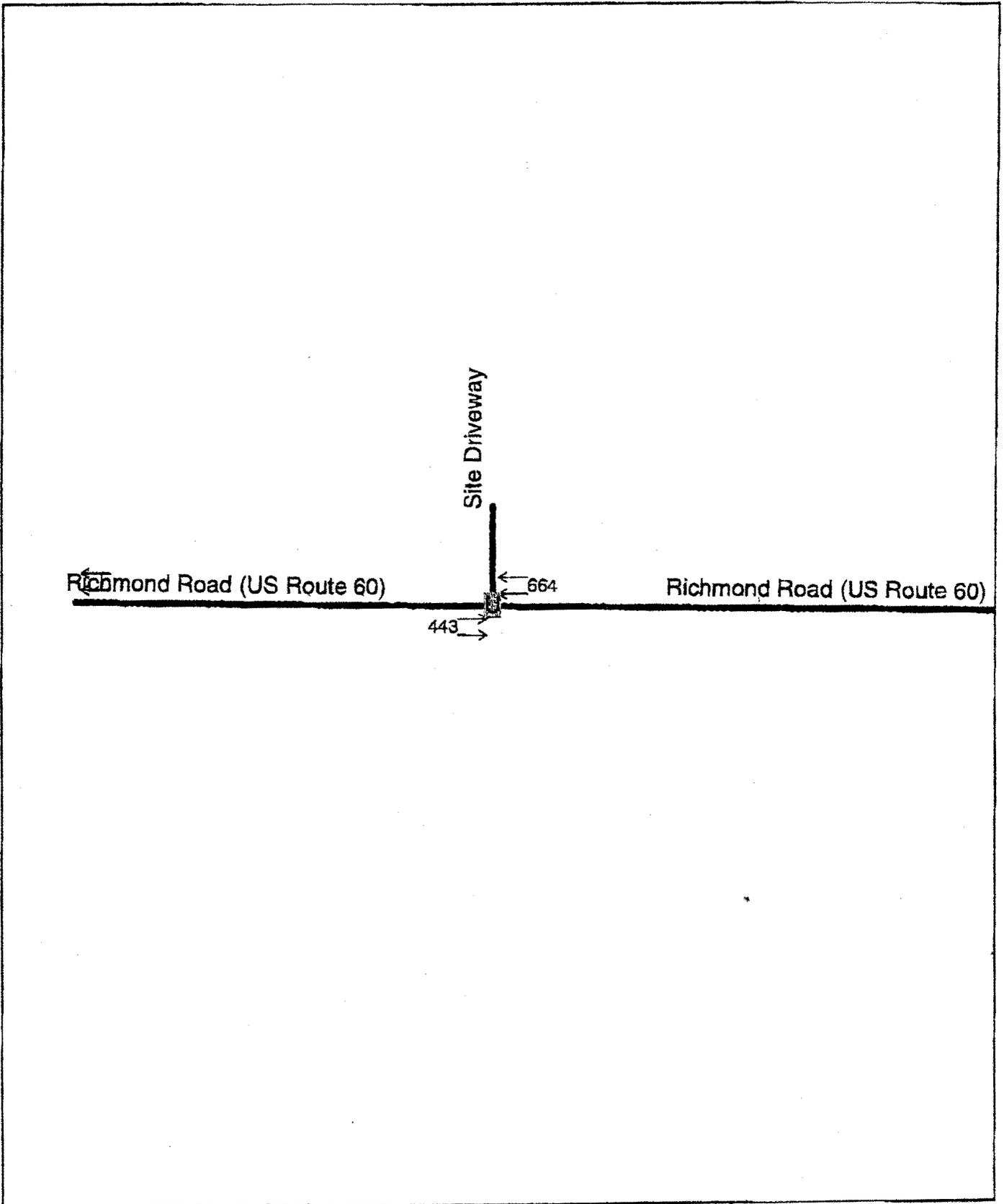
**SUNDAY**

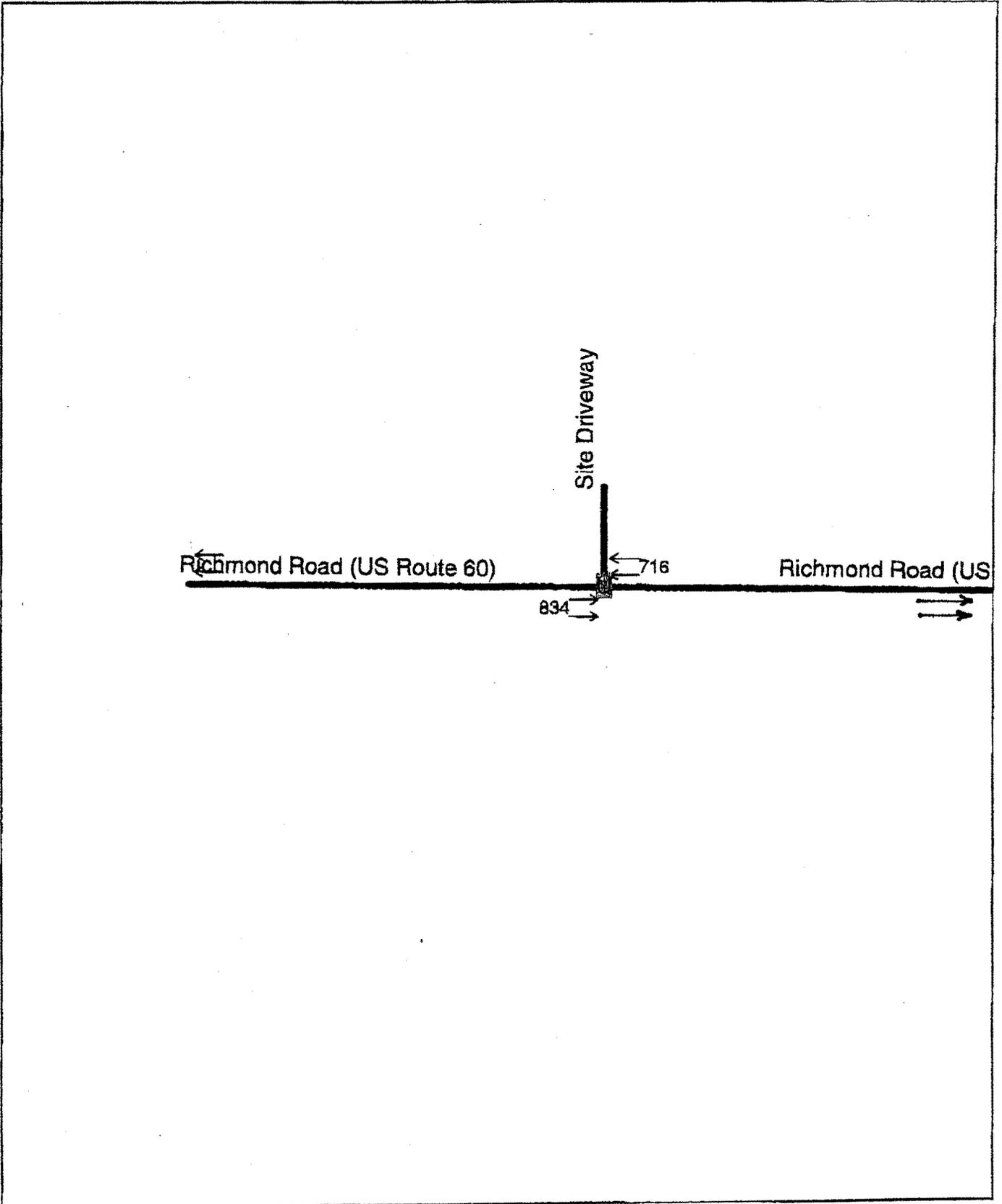
**RATES:**

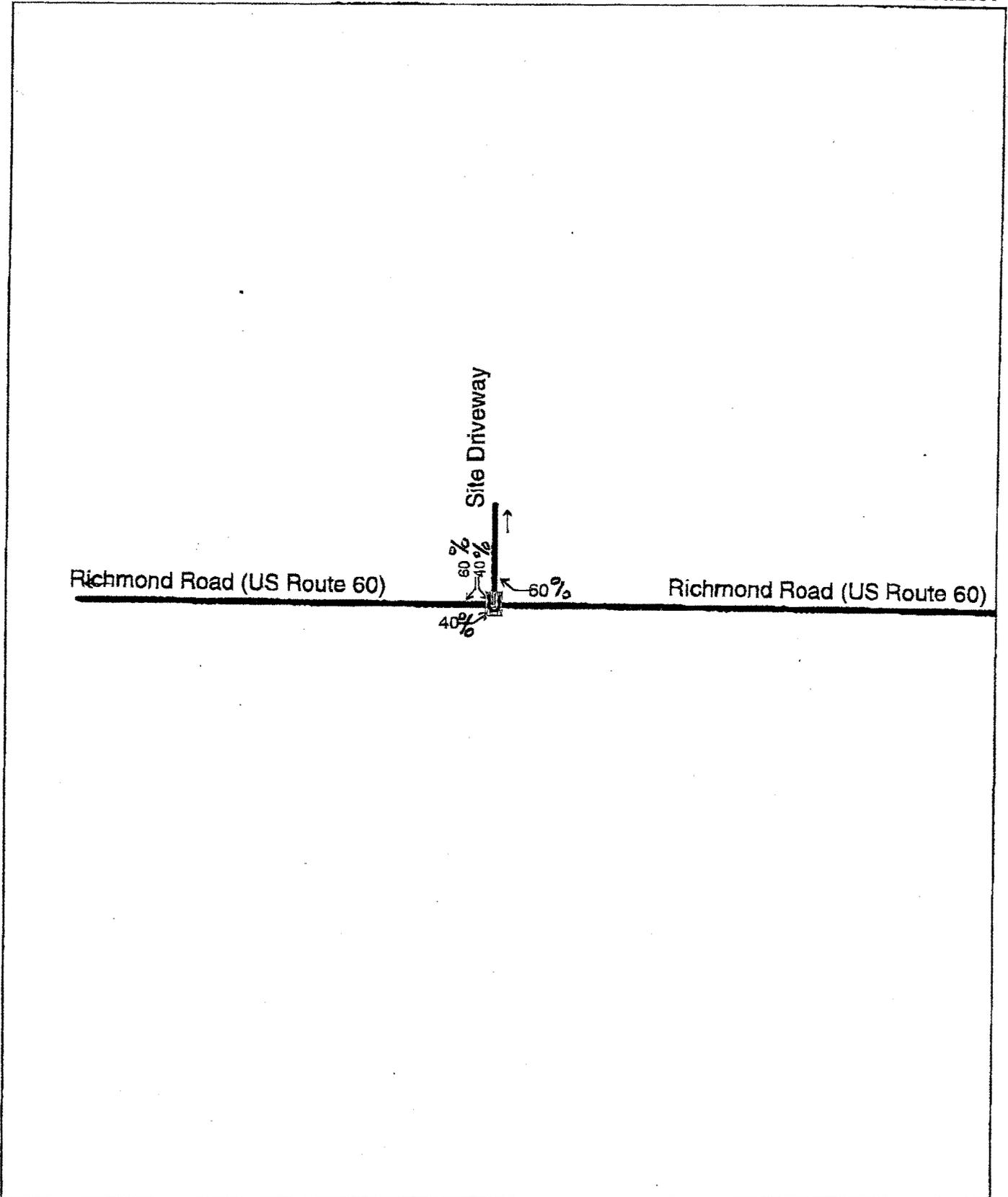
	Total Trip Ends			# Studies	Directional Distribution		R <sup>2</sup>
	Average	Low	High		Enter	Exit	
DAILY	1.55	0.71	5.11	4	50%	50%	---
PEAK OF GEN.	0.40	0.28	0.63	2	52%	48%	---

**TRIPS:**

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	18	9	9	NA	NA	NA
PEAK OF GEN.	4	2	2	NA	NA	NA

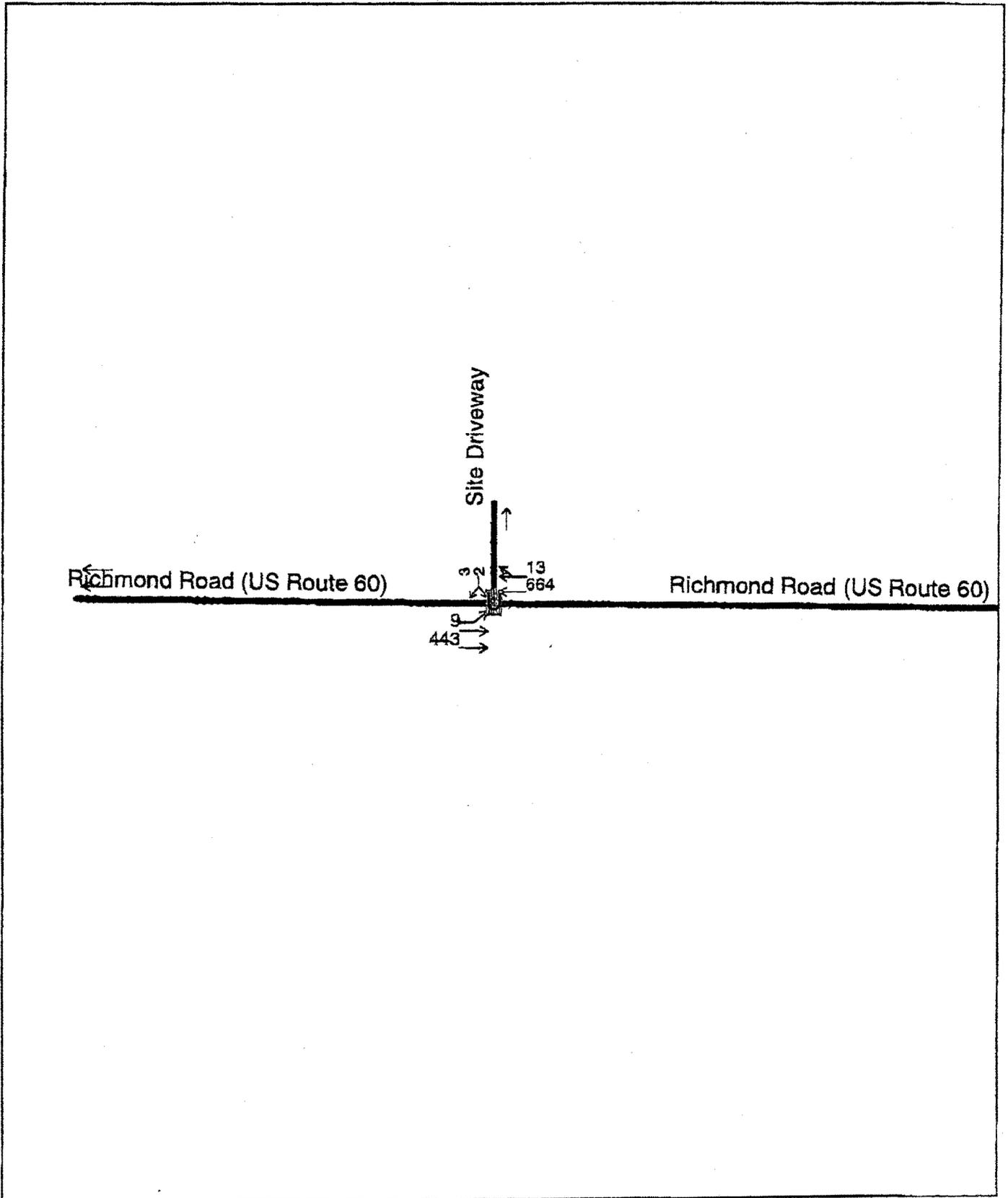


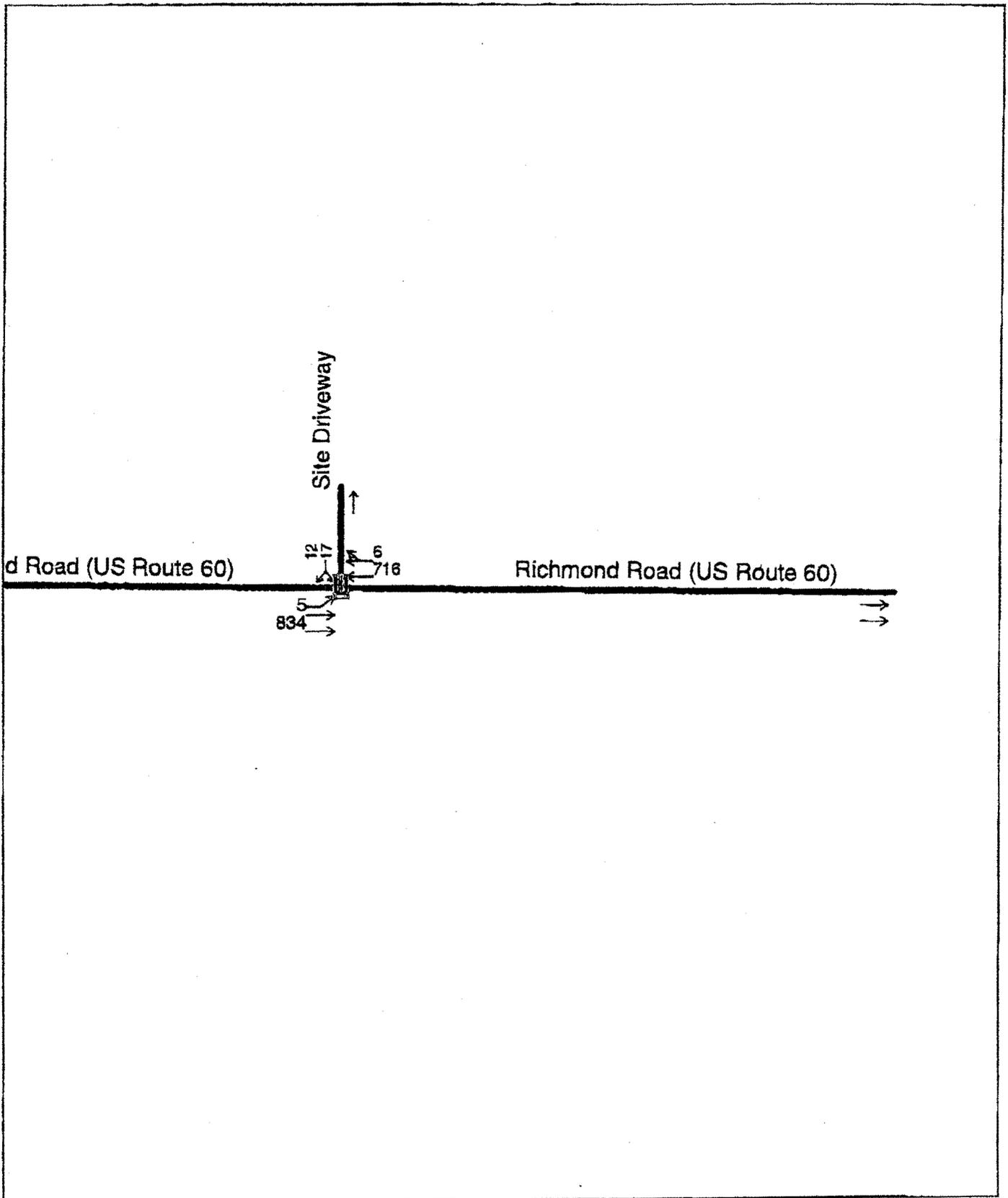




Site Trip Distribution (Percents) FIGURE A-3  
SEA

P:\WILLVA\31192\Trip Distribution.sy6





## TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	SEA	Intersection	Richmond Rd/Site Driveway
Agency/Co.	VHB, Inc.	Jurisdiction	James City County, VA
Date Performed	09/13/2001	Analysis Year	2002 AM Build
Analysis Time Period	5:00 pm	Project ID	Johnston/Dental Office Building

East/West Street: <i>Richmond Road (Rt 60)</i>	North/South Street: <i>Site Driveway</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>0.25</i>

### Vehicle Volumes and Adjustments

Major Street Movement	Eastbound			Westbound		
	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	9	443	0	0	664	13
Peak-Hour Factor, PHF	0.90	0.90	1.00	1.00	0.90	0.90
Hourly Flow Rate, HFR	10	492	0	0	737	14
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	<i>Two Way Left Turn Lane</i>					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street Movement	Northbound			Southbound		
	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	2	0	3
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.90	1.00	0.90
Hourly Flow Rate, HFR	0	0	0	2	0	3
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach	N			N		
Storage	0			0		
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration				LR		

### Delay, Queue Length, and Level of Service

Approach Movement	EB	WB	Northbound			Southbound		
	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (vph)	10						5	
C (m) (vph)	854						469	
v/c	0.01						0.01	
95% queue length	0.04						0.03	
Control Delay	9.3						12.8	
LOS	A						B	
Approach Delay	--	--					12.8	
Approach LOS	--	--					B	

## TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	SEA	Intersection	Richmond Road/Site Driveway
Agency/Co.	VHB, Inc.	Jurisdiction	James City County
Date Performed	09/13/2001	Analysis Year	2002 PM Build
Analysis Time Period	11:15 am	Project ID	Johnston/Dental Office Building

East/West Street: <i>Richmond Road (Rt 60)</i>	North/South Street: <i>Site Driveway</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>0.25</i>

### Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	834	0	0	716	6
Peak-Hour Factor, PHF	0.90	0.90	1.00	1.00	0.90	0.90
Hourly Flow Rate, HFR	5	926	0	0	795	6
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	<i>Two Way Left Turn Lane</i>					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	17	0	12
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.90	1.00	0.90
Hourly Flow Rate, HFR	0	0	0	18	0	13
Percent Heavy Vehicles	0	0	0	2	0	2
Percent Grade (%)	0			0		
Flared Approach	N			N		
Storage	0			0		
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration				LR		

### Level of Service and Delay

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (vph)	5						31	
C (m) (vph)	818						368	
v/c	0.01						0.08	
95% queue length	0.02						0.27	
Control Delay	9.4						15.7	
LOS	A						C	
Approach Delay	--	--					15.7	
Approach LOS	--	--					C	

WARRANT FOR LEFT-TURN STORAGE LANES ON FOUR-LANE HIGHWAYS

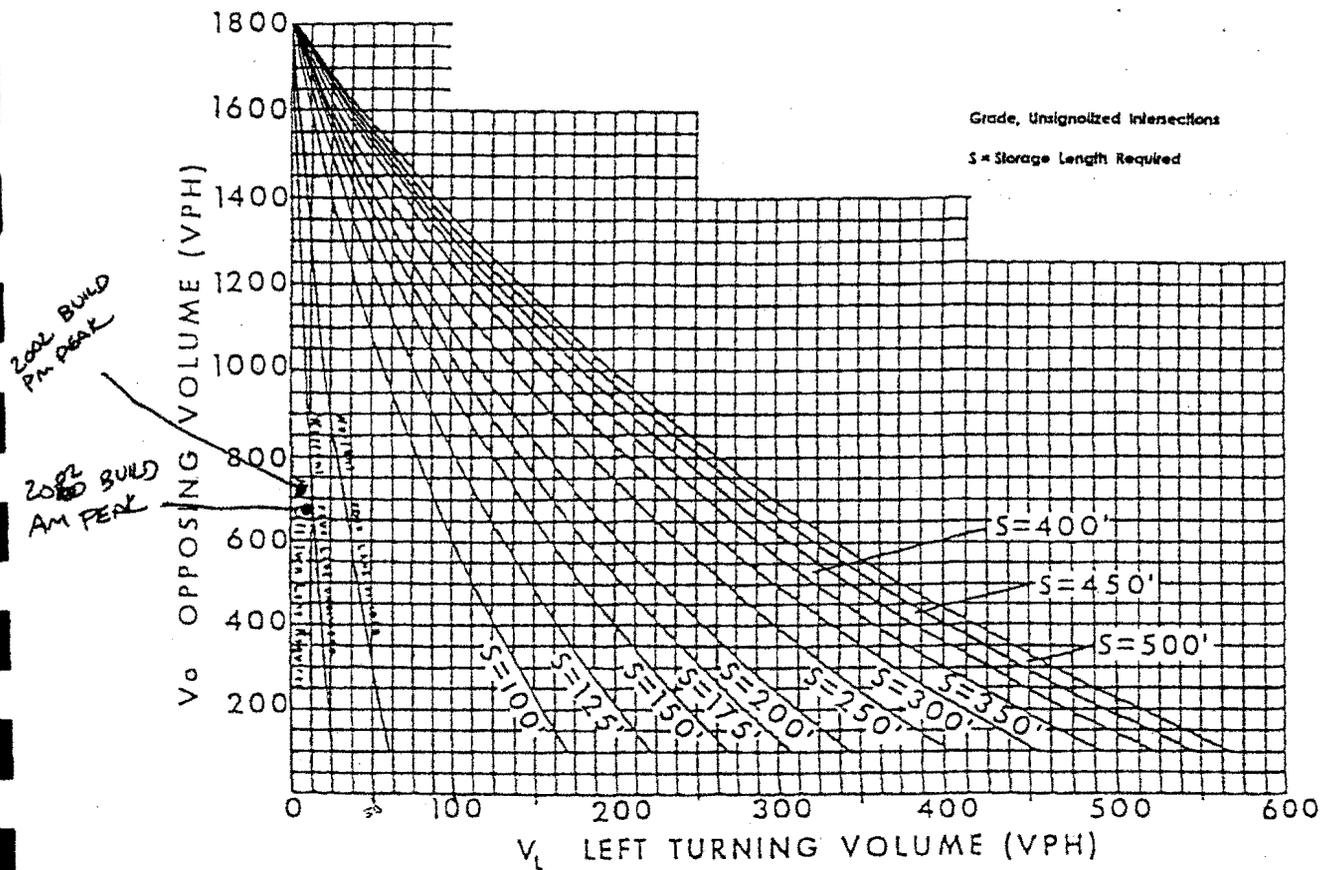


FIGURE C-1-1.1

When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from IIM LD- (D) 117.

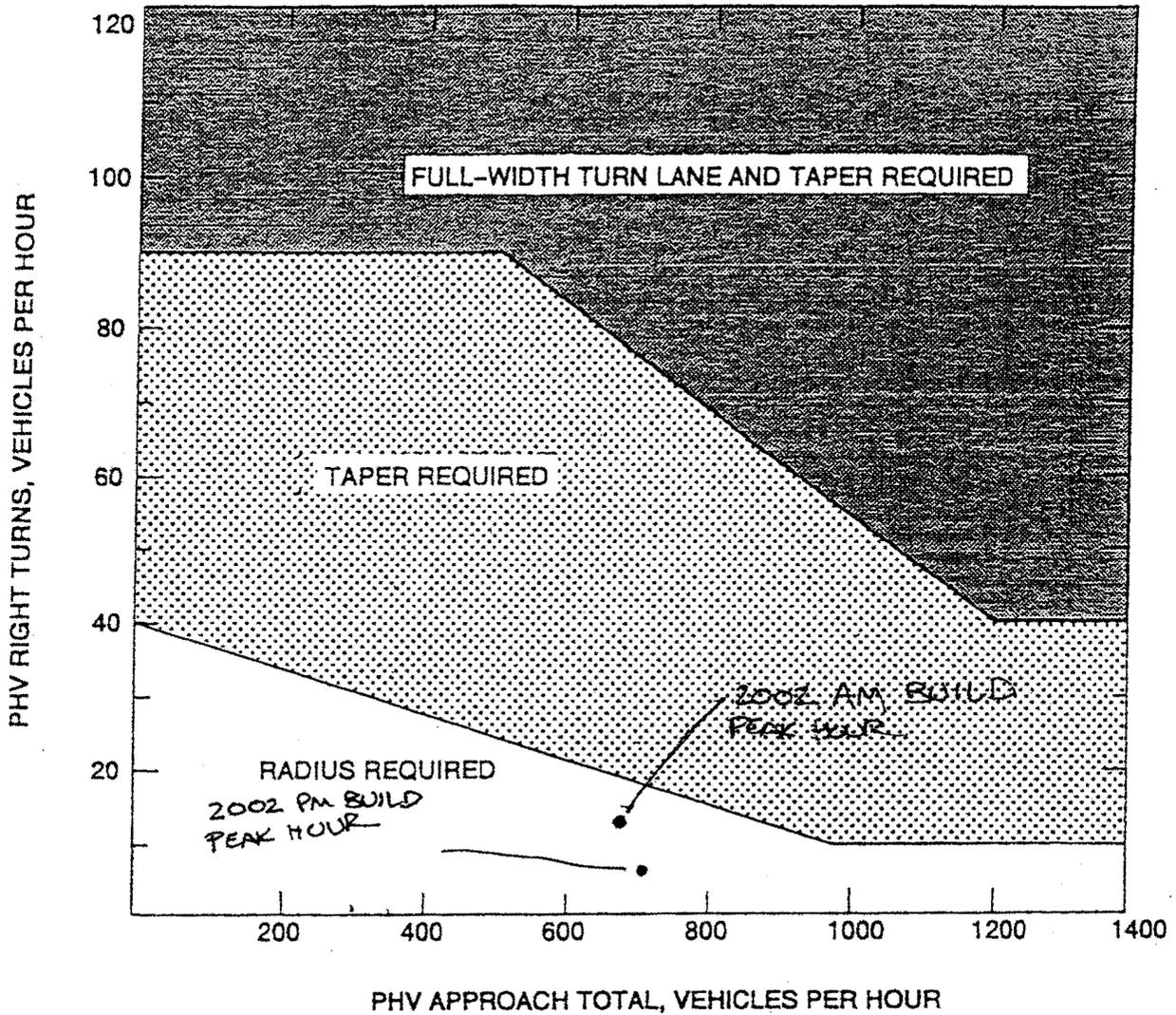
For plan detail requirements when curb and/or gutter are used, see VDOT's Road Design Manual, Volume 1, Section 2D-6.

Left-turn lanes should also be established on two-lane highways where traffic volumes are high enough to warrant them in accordance with the guidelines shown in Table C-1-2.

**Warrants For Left-Turn Storage Lanes On Two-Lane Highways**

The warrants in Table C-1-2 are taken from the 1994 AASHTO Greenbook, Table IX-15. They were derived from Highway Research Report No. 211, Figures 2 through 19, for required storage length determinations.

The No. 211 study was undertaken to provide consistent volume warrants for left-turn storage lanes at unsignalized intersections.



LEGEND

PHV - - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

If PHV is not known use formula:  $PHV = ADT \times K \times D$

K = the percent of AADT occurring in the peak hour  
 D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

**GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)**  
**FIGURE C-1-9**



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# Water and Sewer Data Sheets

**SEWER DATA SHEET  
APPENDIX "B"**

Date 1/18/2002

- I. Project Name: DR. JOHNSTON'S DENTAL OFFICE
- II. Project Location: #7450 RICHMOND RD.
- III. Engineer: Vanasse Hangen Brustlin, Inc.
- IV. Point of Connection to Authority System: EXISTING SHALLOW  
MANHOLE
- V. Design Population (Number and Type of Dwellings): 1-10,500 SQ FT DENTIST OFF.
- VI. Average Design Flow: 1833 gpd = 2.65 gpm (12 hr day)
- VII. Peak Design Flow: (1833 gpd) \* 2 (SHIFTS) \* 2.5 (PEAK) = 9190 gpd / 6.4 gpm
- VIII. Pipe Material: PVC 4" , PVC 8" , DI 8"

IX. Pipe Diameter:	<u>(Inches)</u>	<u>Length (Feet)</u>
	4" (laterals)	<u>103' PVC SDR 35</u>
	6"	
	8"	<u>395' - (150' PVC SDR 35) &amp; (245' DI)</u>
	10"	_____
	12"	_____
	15"	_____
	18"	_____
	21"	_____
	24"	_____
		TOTAL FEET <u>498'</u>

- X. Manholes: (A) Standard 3 (Number) Average Depth \_\_\_\_\_  
 (B) Drop \_\_\_\_\_ (Number) Average Depth \_\_\_\_\_
- XI. (A) Pump Stations Size N/A (GPM)  
 (B) Force Main (Size Length) N/A (Feet)

SewrData.App

## WATER DATA SHEET

Date: 1/18/2002

1. Project Name: DR. JOHNSTON'S Dental office
2. Project location: #7450 RICHMOND RD.
3. Engineer: Vanasse Hangen Brustlin, Inc.
4. Source of Water: TAP EXISTING 2" LINE
5. Design Population (Number and Type of Dwellings): ONE MEDICAL OFFICE
  - 5a: Industrial: \_\_\_\_\_ 5b: Domestic: 24 gpm (Peak)
  - 5c: Fire Flow: 2500 5d: Pressure: Maximum: \_\_\_\_\_  
Minimum: \_\_\_\_\_

6. Water Distribution System Piping:

Pipe Diameter (Inches)	Length (Feet)	Material (DI, PVC, etc.)
1"	320'	PVC

11. Water Meter Assemblies: 3/4 (Size), 1 (Number)
- \_\_\_\_\_ (Size), \_\_\_\_\_ (Number)
- \_\_\_\_\_ (Size), \_\_\_\_\_ (Number)
- \_\_\_\_\_ (Size), \_\_\_\_\_ (Number)

2.13. **FLOW DEMANDS:** Design basis for new developments shall be based on the following flow criteria:

- A. Maximum Day Demand: Maximum day demand is defined as 1.7 times average day demand.
- B. Peak Hour Demand: Peak hour demand is defined as 4.0 times average day demand.
- C. Average Day Demand: Average day demand is defined by the following table.

<u>Type of Development</u>	<u>Design Units</u>	<u>Flow (GPD/Unit)</u>	<u>Flow Duration (hr)</u>
Single Family Sub.	# of Units	300	24
Office Building	Gross Sq. Ft.	0.10	12
Medical Offices	Gross Sq. Ft.	0.175	12
Clinic	Gross Sq. Ft.	0.40	12
Nursing Home	# of Beds	130	24
Hospital	# of Beds	350	24
Restaurant	# of Seats	35	16
Carry-Out (Chain)	# of Seats	15	16
Motel	# of Units	130	24
Laundromat	# of Machines	500	16
Service Station	Gross Sq. Ft.	0.18	16
Convenience Store	Gross Sq. Ft.	0.15	24
Warehouse	Gross Sq. Ft.	0.02	24
Shopping Center	Gross Sq. Ft.	0.20	12
Grocery Store	Gross Sq. Ft.	0.20	12
Beauty Salon	Gross Sq. Ft.	0.35	12
Gift Shop	Gross Sq. Ft.	0.04	12

Calculation of Domestic Flows

Per International Plumbing Code, Appendix E

**Sizing the Building Water Supply Distribution System**

Project ID: **31192**  
 Project: **Dr. Tim Johnston's Office**

VHB Inc.  
 477 Mclaws Circle  
 Williamsburg VA 23185  
 Phone: 757-220-0500  
 Fax: 757-220-8544  
 Date: **January 18,2002**

Table E101B **Supply Fixture Unit Value**

Fixture Type	Fixture Value	Quantity	Total	Cum. Total
Water Cooler	0.25	0	0	0
Lavatory, Public	2	4	8	8
Lavatory, Private	0.7	3	2.1	10.1
Service Sink	3	1	3	13.1
Dishwasher 3/4"	1.4	0	0	13.1
Toilet (Tank)	3.6	5	18	31.1
Toilet (Flush Valve)	5	0	0	31.1
Toilet (Flush Valve)	10	0	0	31.1
Drinking Fountain	0.25	1	0.25	31.35
Kitchen Sink, Private	1.4	1	1.4	32.75
Kitchen Sink,Hotel/Rest.	4	0	0	32.75
Urinal, FV, 1"	10	0	0	32.75
Urinal, FV, 3/4"	5	0	0	32.75
Hose Bibb 1/2"	3	0	0	32.75
<b>TOTAL</b>				<b>32.75 fixture units</b>

**Maximum Probable Demand:**

(from Table E102) interpolated value

	fixture units	demand gpm
low value	30	23.3
high value	35	24.9

**Total Demand:** 24.18 gpm  
**use:** **24 gpm**

**Estimated Low Flow:** 1 gpm

**Meter Selection:** **3/4" INCH**



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# VDOT Checklist



FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE Dr. Johnston's Dental Office ROUTE 60  
 DEVELOPER Same PH. (757) 564 - 0804  
 ADDRESS 3402 Acorn St. Suite 103 ZIP 23188  
 ENGINEER Vanasse Hangen Brustlin Inc PHONE (757) 220 - 0500  
 COUNTY James City County VDOT RESIDENCY Williamsburg

GENERAL INFORMATION

	Plan Sheet to Include	Yes	No	Reason for No
1	Site plan name.	✓		
2	Date of plan.	✓		
3	Standard cover sheet with surveying and mapping control information. Vicinity map (1"=2000') and title block information section completed.	✓		
4	North arrow, designation of north orientation, match lines & sheet nos.	✓		
5	Contour intervals every 5'. <u>1' INTERVALS PROVIDED</u>	✓		
6	Boundary survey of record.	✓		
7	Seal and signature on each sheet by a Virginia registered professional engineer or land surveyor.	✓		
8	Show total acreage, current zoning, and proposed zoning by acres.	✓		
9	Parcel identification, tax map, ref. numbers, owners names, present zoning, and use of all abutting parcels.	✓		
10	Any waivers or zoning variances granted for the project shown on the plans.	✓		
11	Master plan (all phases or proposed sections).	✓		
12	Show site layout including lot nos. & acres, tabulate total no. of lots or units to acct. for site acreage.	✓		

### FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE Dr. Johnston's Dental Office ROUTE 600

	Plan Sheet to Include	Yes	No	Reason for No
13	Show state route nos. & names on all existing streets to which connections are to be made. Also, all proposed street names.	✓		
14	Show right-of-way lines, width, centerline, limits of construction, & pavement width.	✓		
15	Set of general notes explaining details of plan.			
16	Written description of all plan revisions shall accompany all revised plans submitted for re-evaluation & approval.	✓		

#### - GEOMETRICS

1	Location of entrance & distance measured to nearest intersection of state route or crossovers for field verification of sight distance.	✓		
2	Radius of all curb returns to face of curb. On streets where curb & gutter are not required, indicate radius to edge of pavement.	✓		
3	All proposed street frontage & intersection improvements.	✓		
4	Proposed bldg. location, use, square footages & distance to property lines.	✓		
5	Indicate all temporary turnaround construction with easements as indicated on preliminary plans.	✓		
6	Show existing entrances, street connections, crossovers, etc., that are located along existing roadway that may be affected by the development.	✓		
7	Existing & proposed rights of way, centerline, width, & route no.	✓		
8	Crossover spacing & sight distance in both directions.		✓	NOT APPLICABLE
9	Indicate lengths of existing & proposed deceleration, left & right turn storage lanes.	✓		

## FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE Dr. Johnston's Dental Office ROUTE 60

	Plan Sheet to Include	Yes	No	Reason for No
10	Indicate right of way, centerline distance including curve data, delta, radius, arc, chord, tangent, & profile.	✓		
11	Show sight distance at all street intersections & landscaping, sign placement & all obstructions that may affect or obstruct sight distance.	✓		
12	Provide sufficient information on each proposed development street including estimated future traffic so that the Resident Engineer can approve functional classification before final design stage.	✓		
13	Soils map information & actual tested CBR values under proposed roadway.	✓		

### DRAINAGE

1	Show direction of drainage flow for streets, storm sewer, valley gutters, subdrains, & the like, & all existing streams.	✓		
2	Show location of all streams or drainageway related to construction.	✓		
3	Existing storm drainage system & proposed major drainage structures.	✓		
4	Show 100-yr. flood boundaries, source of information, & square footage used.		✓	NOT APPLICABLE

### UTILITIES

1	Show all existing utilities & if within limits of proposed right of way.	✓		
2	Provide any notes or information necessary to explain intent & purpose of utilities or adjustment of existing utilities.	✓		
3	Existing & proposed easements, width, & use. Note certifying applicant has right to use existing ingress easement to make any proposed improvements.	✓		

### FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE Dr. Johnston's Dental Office ROUTE 60

	Plan Sheet to Include	Yes	No	Reason for No
4	Existing sanitary sewer, waterline, fire hydrants, & other existing utilities.	✓		

#### TRAFFIC ANALYSIS

1	Apts., townhouses, or time-share units should include no. of units & how parking will be handled.	✓		
2	Traffic analysis for development on existing & proposed facility. Level of service with & without proposed development. Must include existing & buildout year.	✓		
3	Intersection analysis including need for signalization, channelization, turn lanes, & modification of existing signals.	✓		
4	Recommendations for roadway improvements to accommodate existing traffic & proposed traffic generated by development.	✓		
5	Indicate any notes or information necessary to explain intent & purpose of proposed traffic analysis.	✓		
6	Traffic counts, left/right turn movements, & typical street section. Traffic impact study, if required.	✓		

#### TRAFFIC IMPACT ANALYSIS REPORT CONTENTS

1	Introduction. A. Site & study area boundaries. B. Existing & proposed site uses. C. Existing & proposed nearby uses. D. Existing & proposed roadways & intersections.	✓		
2	Analysis of existing traffic conditions. A. Daily & peak hour(s) traffic volumes. B. Capacity analysis at critical points. C. Levels of service at critical points.	✓		
	Analysis of future conditions without development. A. Daily & peak hour(s) traffic volumes. B. Capacity analysis at critical points. C. Levels of service at critical points.	✓		

## FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE Dr. Johnston's Dental Office ROUTE 600

	Plan Sheet to Include	Yes	No	Reason for No
4	Trip generation.	✓		
5	Trip distribution/direction split.	✓		
6	Traffic assignment/turning movements.	✓		
7	Analysis of future conditions with development. A. Future daily & peak hour(s) traffic volumes. B. Capacity analysis at critical points. C. Levels of service at critical points.	✓		
8	Recommended improvements. A. Proposed recommended improvements. B. Capacity analysis at critical points. C. Levels of service at critical points.	✓		
9	Conclusion.			

**OTHER**

1	Name of any previously approved plan must be referenced on plans.	✓		
2	Certification by submitter that plans conform to all VDOT design standards, as well as county ordinances, comprehensive plans & regulations.	✓		

**Certification**

I certify that the above stated information is included in the attached plans.

[Handwritten Signature]

---

Engineer's Signature

1/21/02

---

Date



---

# James City County Checklist

## CHECKLIST OF SITE PLAN CONTENTS

### I. GENERAL INFORMATION REQUIRED ON PLAN

- (✓) A. Title of Project  
(20-38(A)1.)
- (✓) B. Names of engineer, architect, landscape architect and/or surveyor  
(20-38(A)2.)
- (✓) C. Location map with scale no less than 1" = 2,000'  
(20-38(A)3.)
- (✓) D. North arrow  
(20-38(A)4.)
- (✓) E. Graphic and written scale  
(20-38(A)4.)
- (✓) F. Boundary survey of site  
(20-38(A)5.)

### II. EXISTING FEATURES TO BE SHOWN ON PLAN

- (✓) A. Streets: Name and route number, width of right-of-way and width of road surface  
(20-38(A)6.)
- (✓) B. Streams, bodies of water, watercourses, on this and adjacent property  
(20-38(A)4.)
- (✓) C. Easements: Type, ownership, and dimensions  
(20-38(A)6.)
- (✓) D. Septic tank, distribution tank size and type  
(20-38(A)6.)
- (✓) E. Water Supply: well and/or tank capacity  
(20-38(A)6.)
- (✓) F. Water mains on and nearby site with sizes indicated  
(20-38(A)6&13)
- (✓) G. Location of all underground utilities, i.e., compressed gas lines, petroleum lines, electricity, etc.  
(20-38(A)6.)
- (✓) H. Culverts and underground structures on or adjacent to the property (fuel tanks, etc.)  
(20-38(A)6.)
- (✓) I. Location, type and size of all entrances to the site  
(20-38(A)7.)
- (✓) J. Topography intervals (minimum five feet) existing contours  
(20-38(A)8.)

- (✓) K. Woodline before site preparation with predominant species and average diameter of trees indicated. Also, approximate location, type and diameter of single trees in open areas. Average size and predominant species of trees to be removed having a diameter of 12-inches or greater.  
(20-38(A)9.)
- (✓) L. Provisions for off-street parking, loading spaces and pedestrian walkways, including sidewalks.  
(20-38(A)10.)
- (✓) M. Sanitary and storm sewers on and adjacent to site (size and type)  
(20-38(A)13.)
- (✓) N. Fire hydrants, sizes, and types  
(20-38(A)13.)
- (✓) O. Location of Fire Department connections and underground fire service lines (valve pit details, where appropriate)  
(20-39(m))
- NOT APPLICABLE ✓ P. Indication of 100 year flood plain and flood elevation noted  
(20-549(A))

III. PROPOSED PROJECT: FEATURES TO BE SHOWN ON PLAN

- (✓) A. Underground utilities proposed  
(20-38(A)6.)
- N/A (✓) B. Proposed street names and street width; proposed easements and width  
(20-38(A)6.)
- (✓) C. Entrances designed to standards as set forth in VDH&T Minimum Standards of Entrances to State Highways manual, with indication as to which standard is applicable, and details of entrance  
(20-38(A)7.)
- (✓) D. Proposed finished contours where regrading is necessary indicated at intervals of no more than 2 feet  
(20-38(A)8.)
- (✓) E. Areas to be landscaped with approximate arrangements, plant types, and sizes  
(20-38(A)9.)
- (✓) F. Areas to be screened, fenced, walled with heights indicated, and location of gates and openings  
(20-38(A)9.)
- (✓) G. Seeding specifications  
(20-39(A)14.)
- (✓) H. Provisions for pedestrian and vehicular circulation and parking  
(20-38(A)10.)
  1. Location of pedestrian walkways, sidewalks and bike paths
  2. Dimensions of parking spaces, traffic aisles, medians and sidewalks

3. Location of curbs and bumpers
  4. Type of parking surface with detail of cross-section
  5. Loading spaces
- (✓) I. Solid waste disposal facilities (dry and wet)  
(20-38(A)13.)
1. If dumpsters are to be used, location of dumpster pad.
  2. If dumpsters are used for wet garbage
    - . drain with a drainfield, as per Health Department specifications
    - . dumpsters may not be connected to the sanitary sewer
    - . type of material of the dumpster pad
- (✓) J. Storm drainage system shown with calculations and drainage area map of contributing drainage areas  
(20-38(A)14.)
- N/A (✓) K. Drainage ways in excess of 3% grade and type of erosion control necessary.  
(20-38(A)14.)
- (✓) L. Location, type, and details of sedimentation and erosion control devices to be used during and after construction, e.g., perimeter dike with outfall structure or straw bale installation  
(20-38(A)14.)
- (✓) M. Water Supply  
(20-38(A)13.)
1. Well: Location, type, size, as per Health Department specifications
  2. Water lines
    - . on-site line and size (include standpipe size if applicable)
    - . public water main location and size at location of connection
    - . meter location and size

Required if lines are to be dedicated to the County:

    - . profiles, plan view
    - . materials list/specifications
- (✓) N. Sanitary waste disposal facilities:  
(20-38(A)13.)
1. Septic tank and drainfield; or
  2. Sewer line
    - . location of grease trap
    - . on-site line and size, laterals, cleanouts
    - . public line location and size
    - . elevation of connection at building and at public line

Required if lines are to be dedicated to the County:

- . profiles, Y's (slope, pipe size, type and manhole rim and invert elevations)
- . connection at building and at public line
- . details of any new manholes and pump stations
- . materials list/specifications

IV. LAND USE SUMMARY TABLE

- ✓A. Zoning of Site (20-39(A)4.)
- ✓B. Calculation for Parking Requirements
  - ✓Use category (as defined by Section 20-12.B.(d)(iii)) (20-38(A)10.)
  - ✓Number of spaces required
  - ✓Number of handicapped spaces required (marked by sign)
  - ✓Number of spaces provided
- C. ✓Open Space Data (20-38(A)15)
  - ✓Total Site Area
  - ✓Total Amount of Site Covered by Buildings
  - ✓Percent of Site Covered by Buildings
  - ✓Amount of Site Covered by Open Space
  - ✓Percent of Site Covered by Open Space
- D. Building Data (Existing and Proposed) (20-38(A)11.)
  - ✓Total Floor Area of Each Building
  - ✓Height of Each Building
  - ✓Number of Floors in Each Building
  - ✓Type (classification use group and construction type as per the Virginia Uniform Statewide Building Code)

V. ADDITIONAL REQUIREMENTS FOR MULTI-FAMILY DEVELOPMENTS

- N/A) A. Dwelling units (20-38(A)12)
  - 1. Number, size and type of dwelling units
  - 2. Units per developable acre (20-38(A)15)
  - 3. Numbers on buildings
- N/A) B. Recreation facilities (20-38(A)12)
  - 1. Type of equipment
  - 2. List of equipment, if playground (20-39(1))
  - 3. Recreation area as percent of total site acreage

- (N/A) C. Open space (as defined by Section 20-2 of the Zoning Ordinance) (20-38(A)15)
  1. Number of acres
  2. Percent of site
- (N/A) D. By-laws of Homeowners Association (where applicable)

VI. OTHER INFORMATION TO BE SUBMITTED WITH SITE PLANS

Will be provided

- ( ) A. Land Disturbing Permit Application, Surety and Siltation Agreement
- (✓) B. Water and Sewer Data Sheets
- ( ) C. Certificate to Construct public water and/or sewer facilities
- ( ) D. Public Improvements (water, sewer and roads) to be constructed or bonded prior to issuance of temporary Certificate of Occupancy for buildings
- (N/A) E. Kitchen plans must be submitted to and approved by the Health Department if structure will contain food preparation/serving areas
- (✓) F. Traffic Impact Analysis as required by the Director of Planning
- (✓) G. VDOT Check List

Updated 2-93 MAF  
0369A.wpf

NOW OR FORMERLY  
W. WOOD  
MAP 123-  
D.S. 103.5 F  
ZONED A-1  
243.02

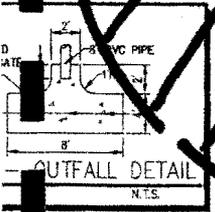
3,700 S.F.

62,219 S.F.

3,500 S.F.

500 S.F.

**Proposed  
Dental  
Medical Clinic**  
10,500 S.F.  
31 Ft. Max Ht.  
F.F.E. 119.50



775 LF. OF GRASS SWALE

200' LF. OF GRASS SWALE

STR 1  
R=112.02  
I=113.35 (OUT)

STR 2 Mod. D-1  
R=115.15  
I=111.50 STR 3  
I=111.50 (OUT)

STR 3 CLEAN OUT  
R=116.00  
I=111.80 STR 4  
I=111.80 (OUT)

STR 4  
R=114.80  
I=112.00 (OUT)

CONSTRUCT TOP OF BANK  
AT ELEV. 117.10  
ALLOW FOR SETTLING

PROPOSED BMP

REGRADE EXISTING DITCH  
MATCH EXISTING SLOPE  
CROSS SLOPE TO BE 2:1 MAX.  
INSTALL VDOT EC-2 ON  
REGRADED SLOPES

**TREATED AREA  
MAP**

**DESIGN  
POINT 'A'**



January 21, 2002

Vanasse Hangen Brustlin, Inc.

Ref: 31192.00

Mr. Darryl Cook  
Director, Environmental Division  
James City County  
101-E Mounts Bay Road  
Williamsburg, VA 23187

Re: Dr. Johnston's Dental Office  
7450 Richmond Road  
Norge, VA

Dear Mr Cook:

On behalf of Timothy K. Johnston and in accordance with the "James City County Guidelines for Design and Construction of Stormwater Management BMP's", Vanasse Hangen Brustlin, Inc. (VHB) respectfully requests a variance to the total phosphorus removal efficiency allowed by James City County for a (D-1) Bioretention Filtering System. The guidelines consider this system as 8-point BMP (Best Management Practice) measure and it is respectfully requested that it be considered as a 10 point BMP. The other acceptable 10-point systems considered were ruled out for reasons that follow:

- *Wet Extended Detention Pond and Pond/Wetland System:* Due to the small drainage area and soil types it has been determined that these types of systems will not hold water.
- *Infiltration Trench or Infiltration Basin:* Due to site topography, proximity of the receiving channel, and soil stratum constraints it has been determined that the insitu soils would receive excessive disturbance for these systems to work correctly.
- *Dry Swale:* Due to site topography, proximity of the receiving channel, site improvement constraints and extensive landscaping proposed it has been determined that this type of system is not suitable.

In considering the Bioretention system, please note the following design enhancements proposed:

- The design has been coordinated with the proposed landscaping. This Bioretention facility will be landscaped to conjoin the BMP system with the site for a natural appearance.
- The total site development area that drains to the Bioretention facility is only 1.51 acres. Calculations conclude the post-development conditions will have minimal impacts on the downstream system.
- Grass swales upstream of the bioretention system have been incorporated into the design to enhance infiltration and pretreatment of stormwater runoff.
- Reputable sources indicate, with the latest improved testing data, a trend for phosphorous removal efficiencies in bioretention BMP's to generally be higher than 60 percent.

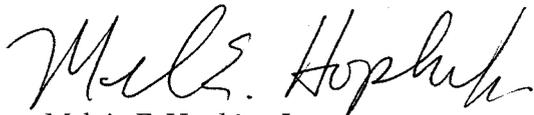
- The proposed impervious area for the site is 42 percent, well below the allowable 60 percent impervious area.

Favorable consideration of this request variance is consistent with current general design practices, is not detrimental to the safety and welfare of the general public, will not compromise the intent of the county's BMP guidelines and will permit for a well-designed facility.

Should you have any questions or be in the need of additional information, please give me a call.

Respectfully Submitted,

VANASSE HANGEN BRUSTLIN, INC



Melvin E. Hopkins, Jr  
Project Engineer

Enclosures





Project: Dr. Johnston's Off Project # 3119200  
 Location: Sheet of  
 Calculated by: MEL Date: 1/21/2002  
 Checked by: Date:  
 Title: WATER QUALITY CALCULATIONS

REQUIRED WATER QUALITY VOLUME CALCULATIONS

- 1" PER IMPERVIOUS ACRE OF DEVELOPMENT
- PROPOSED IMPERVIOUS AREA = 27,400 S.F.

$$\text{VOLUME} = \left(\frac{1''}{12''}\right)(27,400) = 2,192 \text{ FT}^3$$

STAGE STORAGE TABLE

ELEVATION	AREA FT <sup>2</sup>	STORAGE FT <sup>3</sup>
114.00	2530	0
114.50	2946	1369
→ 114.75	3161	2194 ←
115.00	3381	2956
115.50	3837	4392
116.00	4312	6842

**Table 2**

**Worksheet for BMP Point System**

**A. STRUCTURAL BMP POINT ALLOCATION**

<u>BMP</u>	<u>BMP Points</u>		<u>Fraction of Site Served by BMP</u>	=	<u>Weighted BMP Points</u>
<del>DT</del>	10	x	100%	=	10
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____

TOTAL WEIGHTED STRUCTURAL BMP POINTS: \_\_\_\_\_

**B. NATURAL OPEN SPACE CREDIT**

<u>Fraction of Site</u>		<u>Natural Open Space Credit</u>	=	<u>Points for Natural Open Space</u>
_____	x	(0.1 per 1%)	=	_____
_____	x	(0.15 per 1%)	=	_____

TOTAL NATURAL OPEN SPACE CREDIT: 0

**C. TOTAL WEIGHTED POINTS**

<u>10</u>	+	<u>0</u>	=	<u>10</u>
Structural BMP Points		Natural Open Space Points		Total

NOTE: TOTAL AREA OF DENTAL OFFICE SITE = 65,979 SQ FT  
 TOTAL AREA OF SITE TO BMP = 62,279  
 ADDITIONAL OFFSITE AREA TO BMP = 4,000  
 TOTAL AREA TO BMP = 66,279 SQ FT (1.52 AC)  
 = 100%

**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		

10 WITH APPROVED VARIANCE

**BASIN DRAWDOWN SUMMARY FOR CHANNEL PROTECTION VOLUME  
AND WATER QUALITY VOLUME WITH 1" OUTLET PIPE**

RISE	VOL(CF)	D	Q(OUT)	TIME(HR)	SUM(HR)	ELEV
0.75	2134.00	0.50	0.0189	2.31	2.31	49.65
0.70	1977.00	0.45	0.0179	2.42	4.73	49.60
0.65	1821.00	0.40	0.0169	2.52	7.25	49.50
0.60	1668.00	0.35	0.0158	2.64	9.88	49.40
0.55	1518.00	0.30	0.0146	2.83	12.71	49.30
0.50	1369.00	0.25	0.0133	3.06	15.77	49.20
0.45	1222.00	0.20	0.0119	3.35	19.12	49.10
0.40	1078.00	0.15	0.0103	3.81	22.94	49.00
0.35	936.00	0.10	0.0084	4.61	27.54	48.93
0.30	796.00	0.05	0.0060	6.42	33.96	48.85
0.25	658.00	0.00	0.0000	#DIV/0!	#DIV/0!	48.78
0.20	522.00	-0.05	#NUM!	#NUM!	#DIV/0!	48.70
0.15	389.00	-0.10	#NUM!	#NUM!	#DIV/0!	48.63
0.10	257.00	-0.15	#NUM!	#NUM!	#DIV/0!	48.55
0.05	128.00	0.23	0.0128	2.78	#DIV/0!	48.48
0.00	0.00	0.15	0.0103	-147.02	#DIV/0!	48.40
0.00	5473.00	0.08	0.0076	201.32	#DIV/0!	48.33
0.00	0.00	0.00	0.0000	0.00		48.25

Note: Use of a 1" inch orifice is required to achieve the 24 hour drawdown time. However using this size orifice is not a viable choice as the hole will become clogged.

**OK.**

**DRY SWALE.**

The bioretention system will infiltrate stormwater runoff to achieve the water quality measures as required by the Chesapeake Bay Preservation Act. Estimated drawdown time is 24 hours.

Per  
MANUAL

SCPV CAN BE WAIVED. A 1" ORIFICE WOULD CLOG. P. B8 JCEBMP MANUAL

Note: Inflow at Design Point 'A' in a pre-development state includes Richmond Road only. Post-development conditions Inflow at Design Point 'A' Include the routed BMP flows from the project site as well as Richmond Road flows. Richmond Road flows do not change from the pre-developed state to the post-developed state.

**SUMMARY OF RUNOFF ANALYSIS AT DESIGN POINT 'A'**

	Inflow from Road Ditch cfs	elevation of flow	Inflow to Pond cfs	Outflow from Pond cfs	Pond Elevation feet	Inflow from Pond & Roadside Ditch cfs	Change in flow rate cfs more	elevation of flow	Change in Depth of flow feet higher
2 YR - PRE DEVELOPMENT	3.2	111.9							
2 YR - POST DEVELOPMENT			1.27	0.12	115.18	3.2	none	111.9	none
10 YR - PRE DEVELOPMENT	5.51	112.13							
10 YR - POST DEVELOPMENT			5.17	3.05	115.41	6.7	1.53	112.22	0.09
100 YR - PRE DEVELOPMENT	7.68	112.28							
100 YR - POST DEVELOPMENT			7.41	3.16	115.86	10.53	3.12	112.43	0.15

← CAPACITY OK

Dr. Tim Johnston's Dental Office  
 PROJECT #3119200

inches  
 pipe size 2 area 0.021817 square feet

**BASIN DRAWDOWN SUMMARY FOR CHANNEL PROTECTION VOLUME  
 AND WATER QUALITY VOLUME WITH 2" OUTLET PIPE**

RISE	VOL(CF)	D	Q(OUT)	TIME(HR)	SUM(HR)	ELEV
0.75	2134.00	0.50	0.0755	0.58	0.58	49.65
0.70	1977.00	0.45	0.0716	0.60	1.18	49.60
0.65	1821.00	0.40	0.0675	0.63	1.81	49.50
0.60	1668.00	0.35	0.0632	0.66	2.47	49.40
0.55	1518.00	0.30	0.0585	0.71	3.18	49.30
0.50	1369.00	0.25	0.0534	0.76	3.94	49.20
0.45	1222.00	0.20	0.0478	0.84	4.78	49.10
0.40	1078.00	0.15	0.0414	0.95	5.73	49.00
0.35	936.00	0.10	0.0338	1.15	6.89	48.93
0.30	796.00	0.05	0.0239	1.61	<b>8.49</b>	48.85
0.25	658.00	0.00	0.0000	#DIV/0!	#DIV/0!	48.78
0.20	522.00	-0.05	#NUM!	#NUM!	#DIV/0!	48.70
0.15	389.00	-0.10	#NUM!	#NUM!	#DIV/0!	48.63
0.10	257.00	-0.15	#NUM!	#NUM!	#DIV/0!	48.55
0.05	128.00	0.23	0.0512	0.69	#DIV/0!	48.48
0.00	0.00	0.15	0.0414	-36.76	#DIV/0!	48.40
0.00	5473.00	0.08	0.0302	50.33	#DIV/0!	48.33
0.00	0.00	0.00	0.0000	0.00		48.25

Drawdown time is too low

Dr. Tim Johnston's Dental Office  
 PROJECT #3119200

inches  
 pipe size 3 area 0.049087 square feet

**BASIN DRAWDOWN SUMMARY FOR CHANNEL PROTECTION VOLUME  
 AND WATER QUALITY VOLUME WITH 3" OUTLET PIPE**

RISE	VOL(CF)	D	Q(OUT)	TIME(HR)	SUM(HR)	ELEV
0.75	2134.00	0.50	0.1699	0.26	0.26	49.65
0.70	1977.00	0.45	0.1612	0.27	0.53	49.60
0.65	1821.00	0.40	0.1520	0.28	0.81	49.50
0.60	1668.00	0.35	0.1422	0.29	1.10	49.40
0.55	1518.00	0.30	0.1316	0.31	1.41	49.30
0.50	1369.00	0.25	0.1201	0.34	1.75	49.20
0.45	1222.00	0.20	0.1075	0.37	2.12	49.10
0.40	1078.00	0.15	0.0931	0.42	2.55	49.00
0.35	936.00	0.10	0.0760	0.51	3.06	48.93
0.30	796.00	0.05	0.0537	0.71	<b>3.77</b>	48.85
0.25	658.00	0.00	0.0000	#DIV/0!	#DIV/0!	48.78
0.20	522.00	-0.05	#NUM!	#NUM!	#DIV/0!	48.70
0.15	389.00	-0.10	#NUM!	#NUM!	#DIV/0!	48.63
0.10	257.00	-0.15	#NUM!	#NUM!	#DIV/0!	48.55
0.05	128.00	0.23	0.1152	0.31	#DIV/0!	48.48
0.00	0.00	0.15	0.0931	-16.34	#DIV/0!	48.40
0.00	5473.00	0.08	0.0680	22.37	#DIV/0!	48.33
0.00	0.00	0.00	0.0000	0.00		48.25

Drawdown time is too low



---

# Soils (Preliminary BMP Evaluation)

Determine Runoff Rate using Rational Method

Cross Section C-C

Design storm event 2  
(select 2,5,10,25)

**Onsite grass**

Project: **Swale Capacity**

Project # : 3119200

Date : 3/12/02

Engineer : Mel Hopkins

**Composite C Predevelopment conditions**

C  
coefficients

total area	65979 sf	1.51 acres	
impervious area			
building area	8700 sf	0.20 acres	
driveway area	16300 sf	0.37 acres	
sidewalk and pads	2500 sf	0.06 acres	
total impervious	27500 sf	0.63 acres	0.9
green area	38479 sf	0.88 acres	0.2
percent impervious	42		
percent green	58		

$$C = \frac{(\text{impervious area} * \text{Impervious Coefficient}) + (\text{Green area} * \text{Green coefficient})}{\text{Total Area}}$$

C = 0.49

Scott  
Thomas  
Environmental  
Services

**Determine Time of Concentration**

**Overland Flow Time of Concentration Tco**

Length of Strip in watershed	feet	110	Across parking lot
% Slope of surface	feet/feet	0.010	
Rational "C" Value		0.49	
Tco	minutes	8	

**Shallow Concentrated Flow Time of Concentration Tcs**

Length of Watershed	feet	210.0	in the grassed swale
Velocity of flow	feet/second	2	
Slope of surface	feet/feet	0.005	
Tcs	minutes	7.00	

**Channel Flow Time of Concentration Tcc**

Drop in Channel "H"	feet	0.0
Length of Channel "L"	feet	0.0
Tcc	minutes	0

**Total Time of Concentration to Culvert on South side of entrance**

Tt = 15.00 minutes

Rainfall intensity 3.91 inches/hour

Q = ciA 2.91 cfs

ADDENDUM TO  
DRAINAGE REPORT.

Determine Runoff Rate using Rational Method

Cross Section C-C

Design storm event **10**  
(select 2,5,10,25)

**Onsite grass**

Project: **Swale Capacity**

Project # : 3119200

Date : 3/12/02

Engineer : Mel Hopkins

### Composite C Predevelopment conditions

C  
coefficients

total area	65979 sf	1.51 acres	
impervious area			
building area	8700 sf	0.20 acres	
driveway area	16300 sf	0.37 acres	
sidewalk and pads	2500 sf	0.06 acres	
total impervious	27500 sf	0.63 acres	0.9
green area	38479 sf	0.88 acres	0.2
percent impervious	42		
percent green	58		

$$C = \frac{(\text{impervious area} * \text{Impervious Coefficient}) + (\text{Green area} * \text{Green coefficient})}{\text{Total Area}}$$

$$C = 0.49$$

### Determine Time of Concentration

#### Overland Flow Time of Concentration Tco

Length of Strip in watershed	feet	110	Across parking lot
% Slope of surface	feet/feet	0.010	
Rational "C" Value		0.49	
Tco	minutes	8	

#### Shallow Concentrated Flow Time of Concentration Tcs

Length of Watershed	feet	210.0	in the grassed swale
Velocity of flow	feet/second	2	
Slope of surface	feet/feet	0.005	
Tcs	minutes	7.00	

#### Channel Flow Time of Concentration Tcc

Drop in Channel "H"	feet	0.0
Length of Channel "L"	feet	0.0
Tcc	minutes	0

#### Total Time of Concentration to Culvert on South side of entrance

$$Tt = 15.00 \text{ minutes}$$

Rainfall intensity **5.17** inches/hour

Q = ciA **3.85** cfs

# Grassed Swale Detail

## Worksheet for Triangular Channel

---

Project Description	
Worksheet	Grassed swale
Flow Element	Triangular Char
Method	Manning's Form
Solve For	Channel Depth

---

---

Input Data	
Mannings Coeffic	0.030
Slope	005000 ft/ft ✓
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Discharge	4.00 cfs

---

---

Results	
Depth	0.84 ft
Flow Area	2.1 ft <sup>2</sup>
Wetted Perim	5.31 ft
Top Width	5.03 ft
Critical Depth	0.64 ft
Critical Slope	0.020530 ft/ft
Velocity	1.89 ft/s ✓
Velocity Head	0.06 ft
Specific Energ	0.89 ft
Froude Numb	0.52
Flow Type	Subcritical

---

# Grassed Swale Detail

## Worksheet for Triangular Channel

---

Project Description	
Worksheet	Grassed swale
Flow Element	Triangular Char
Method	Manning's Forr
Solve For	Channel Depth

---

---

Input Data	
Mannings Coeffic	0.030
Slope	005000 ft/ft ✓
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Discharge	2.50 cfs

---

---

Results	
Depth	0.70 ft
Flow Area	1.5 ft <sup>2</sup>
Wetted Perim	4.45 ft
Top Width	4.22 ft
Critical Depth	0.53 ft
Critical Slope	0.021857 ft/ft
Velocity	1.68 ft/s ✓
Velocity Head	0.04 ft
Specific Energ	0.75 ft
Froude Numb	0.50
Flow Type	Subcritical

---

## Table Rating Table for Triangular Channel

Project Description	
Worksheet	Grassed swale
Flow Element	Triangular Char
Method	Manning's Forr
Solve For	Channel Depth

Input Data	
Mannings Coeffic	0.030
Slope	005000 ft/ft
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V

Attribute	Minimum	Maximum	Increment
Discharge (cfs)	2.00	5.00	0.50

Discharge (cfs)	Depth (ft)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
2.00	0.65	1.59	1.3	4.09	3.88
2.50	0.70	1.68	1.5	4.45	4.22
3.00	0.75	1.76	1.7	4.76	4.52
3.50	0.80	1.83	1.9	5.05	4.79
4.00	0.84	1.89	2.1	5.31	5.03
4.50	0.88	1.95	2.3	5.55	5.26
5.00	0.91	2.00	2.5	5.77	5.47

**Table 1**

Hand Auger Number	Depth (ft)	USDA Soil Type	USDA Texture Group	Estimated Infiltration Rate (in/hr)
HA-1	0.8-2.5	Loamy Sand	I	0-4
	2.5-3.0	Sandy Clay Loam	II	4-1.3
	3.0-3.5	Sandy Loam		
	5.5-7.0	Clay Loam	III	1.3-0.7
HA-2	0.7-1.5	Sandy Loam	II	4-1.3
	1.5-2.0	Sandy Clay Loam		
	2.0-5.0	Sandy Loam		
	5.0-7.0	Clay Loam	III	1.3-0.7
HA-3	0.8-1.3	Sandy Loam	II	4-0.7
	1.3-3.0	Sandy Clay Loam		
	3.0-5.0	Sandy Loam		
	5.0-7.0	Clay Loam	III	1.3-0.7

*> 0.5 in/hr  
 ∴ OK*  
*BMP  
 EL 111.5 AND BELOW*  
*N.G. 118.0  
 -111.5  
 6.5'*  
*f<sub>c</sub> = 1.3 to 0.7 in/hr*

**LIMITATIONS**

The analyses submitted in this report are based on the information revealed by our exploration. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project. Our recommendations are based on information on the site and proposed construction as described in this report. Substantial changes in locations or grades should be brought to our attention so we can modify our analyses as needed.

*GEO TECH  
 REPORT*

Trap

Project : Dr. Johnston's Dental Office

Project Number 3119200

Project Engineer: Mel Hopkins

Date: March 12, 2002

Computations for proposed Sediment Trap  
Required volume for trap or basin

drainage area 1.52 acres  
required wet and dry storage 102 cubic yards permanent pool  
total volume required 204 dry storage area

Elev (ft.)	Area(sq.ft.)	Volume (cb.ft.)	Volume (cb.yd.)	
112.00	1045	0	0	
112.21	1181	235	9	
112.42	1320	499	18	
112.63	1462	793	29	
112.84	1607	1119	41	
113.06	1756	1478	54	
113.27	1908	1869	69	
113.48	2063	2295	84	
<b>113.69</b>	<b>2221</b>	<b>2757</b>	<b>101</b>	<b>wet storage</b>
113.90	2383	3254	119	
114.11	2547	3790	138	
114.32	2715	4364	159	
114.53	2886	4977	181	
<b>114.74</b>	<b>3060</b>	<b>5631</b>	<b>204</b>	<b>dry storage</b>
114.95	3238	6326	229	
115.17	3419	7064	255	
115.38	3602	7845	282	
115.59	3790	8671	311	
115.80	3980	9542	341	
116.01	4173	10460	373	
116.22	4370	11426	407	
116.43	4570	12440	441	
116.64	4773	13504	478	
116.85	4979	14618	516	
117.06	5189	15784	556	
117.28	5402	17003	597	
117.49	5618	18275	640	

Bottom Length = 95  
Bottom Width = 11  
Side Slope = 3  
Starting Elev = 112.00  
Increment = 0.21

**James City County, Virginia  
Environmental Division  
Stormwater Management Program**

**Stormwater Management Design Plan  
Staff "Quick" Review**

Plan No. SP - 006 - 02 Date/Time: 2-14-02 4:50 pm  
 Project Name: Johnston Dental Office  
 Rough Location: 7450 RICHMOND ROAD (next to st 010F15)  
 ADC Map: Sheet 2 Grid: B - 9  First Review  
 Flood Map / Zone: 510201- 00 20B Zone: X  Review  
 Description: OUTSIDE 500-YEAR

Drainage Area:  
Submitted:

Y N

- Demolition Plan (if applicable) Sheets: C-3
- Site, Geometric or Layout Plan Sheets: C-4, C-5
- Grading Plan Sheets: C-5
- Storm Drainage Plan Sheets: C-5
- E&SC Plan Sheets: C-6
- Profiles (Storm) Sheets: C-11
- Environmental Inventory Sheets: COVER - TABULATION
- Note & Detail Sheets Sheets: C-2, C-10, C-11
- Drainage Map(s) Design report
- Soils Map/Narrative Report
- E&SC/SWM Design Plan Checklist (Required).
- E&SC/Stormwater Management / Drainage Narratives.
- E&SC/Stormwater Management Design Report with Calculations (Attachment).
- Geotechnical Report ( Attachment ). Borings
- Waivers, Variances, or Exceptions (Attachments in Writing).
- VESCH  CBP Ord (RPA, Steep Slope Policy)  JCC BMP Manual
- Other (List): SUP-21-01

JCC GIS Database: Zoning: A - 1 Tax Parcel/GPIN: (23-2)(1-18) 232 01 0001 B  
 Receiving Water: J T U F Y A R M O U T H C R . Site Acreage: 1.51 acres / s.f.

Other Approvals (SUP, etc.):  
Site Plan Information:

Owner: Huggins John D -> Timothy Johnston Dds.  
 Zoning: A - 1 Description:  
 Site Area: 1.515 acres / s.f.  
 Disturbed Area: \_\_\_\_\_ acres / s.f. ( . % )  
 Disturbance > 5 acres, VPDES Notice of Intent required.  
 Impervious Cover: \_\_\_\_\_ acres / s.f. ( . % )  
 Less than or equal to 60 percent. Meets CBPO requirements.  
 More than 60 percent. Does Not Meet CBPO requirements.  
 Open / Green Space: \_\_\_\_\_ acres / s.f. ( . % )

Site Development Plan:

- Residential, Lots, etc.  Commercial (B / O / R)  Govern./Institutional  Industrial
- Roadways or Entrances  Parking or Loading  Water  Sanitary Sewer
- Landscaping  SWM/BMP facilities  Manmade Drainage  Parks, Amenities
- Pump/Lift Station  Dams (regulated)  Other,

Description: Two story OFFICE (8700SF); Parking 42 spaces

*Refer to  
SUP-21-01  
SUPPORT  
BMP LAYOUT.*

Soils Information:  
Soil Survey Sheet

Site: 19B, 20B Kempsville  
 DA: same  
 BMP: same  
 Description of Soils at BMP: slow perc.

Hydric:  Yes  No  
 HSG: B  
 Hydric:  Yes  No

BMP Control:  
BMP Types:

None  Onsite  Offsite  Previously Approved  Manufactured BMP  
 1- Name: Dry Swale (JCC BMP Type E - 2), Points 10  
 2- Name: \_\_\_\_\_ (JCC BMP Type \_\_\_\_\_), Points \_\_\_\_\_  
 3- Name: \_\_\_\_\_ (JCC BMP Type \_\_\_\_\_), Points \_\_\_\_\_

Onsite Drainage:

Reinforced Concrete Pipe  Corrugated Metal Pipe  Aluminum Type Pipe  
 Corrugated Polyethylene Pipe  PVC Type Pipe  Open Channel Type  
 Storm Drain  Culverts Type: \_\_\_\_\_  
 Inlets  Other (Specify): \_\_\_\_\_

1. VDOT Standards & Specifications Referenced for work **within** R/W:  Yes  No  
 2. VDOT Standards & Specifications Referenced for work **outside** R/W:  Yes  No

Site Limitations:

RPA  RMA  Steep Slopes  Delineated Wetlands  
 Hydric Soils  Critical Soils  Vegetated  Buffers: \_\_\_\_\_  
 Defined Natural Drainage Features onsite  Downstream Storm/Culv.  
 Downstream Channel Erosion  Floodplain  Problem Drainage Area  
 Stormwater Hotspot  Other, \_\_\_\_\_  
 Site Activities may warrant a General VPDES Permit for Discharge of Stormwater Associated with Industrial Activities (ie. process water, batch plants, etc.).

Site Stormwater Management / BMP Control (Add sheets if necessary for Multiple Onsite Facilities):

<input type="checkbox"/> Yes <input type="checkbox"/> No	#			
		Predev (Present)	DA = <u>1.00</u> <u>1.515</u> ac.	C/CN = <u>670.83</u> Tc = <u>18.66</u> min / hrs.
		2-year	<u>0.59</u> <u>3.2</u>	cfs
		10-year	<u>2.67</u> <u>5.51</u>	cfs
		100-year	<u>5.23</u> <u>7.48</u>	cfs
		PostDev w/o Detention (Inflow)	DA = <u>2.515</u> ac.	C/CN = <u>76</u> Tc = _____ min / hrs.
		1-year	<u>3.20</u>	
		2-year	<u>6.70</u>	cfs
		10-year		cfs
		100-year		cfs
		PostDev with Detention (Routed)	DA = _____ ac.	C/CN = _____ Tc = _____ min / hrs.
		2-year	<u>3.2</u>	cfs at El. <u>111.9</u>
		10-year	<u>6.7</u>	cfs at El. <u>112.2</u>
		100-year (DHW)	<u>10.53</u>	cfs at El. <u>112.43</u>

Downstream Tailwater Assumption for Pond Routing: ?  
 Routed Peak Discharges (Outflows) from BMP meet Predevelopment Allowables:  Yes  No  
 Appears to Meet VESCH / E&SC Ordinance / CBP Ordinance Requirements:  Yes  No



**Plan Review Steps & Components:**

- |                          |                          |   |
|--------------------------|--------------------------|---|
| Y                        | N                        |   |
| <input type="checkbox"/> | <input type="checkbox"/> | First "Look-Thru". Quick look through plan for familiarity and completeness.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Existing Utilities - Miss Utility (1-800-552-7001) or other methods.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Responsible Land-Disturber Certification; Disturbed Area Estimate.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Worksheet for BMP Point System. 10 point (New Dev) or Pollutant Load method (Redevelopment).                          |
| <input type="checkbox"/> | <input type="checkbox"/> | FEMA Special Flood Hazard Areas. Check location relative to property site and/or development area.                    |
| <input type="checkbox"/> | <input type="checkbox"/> | Check JCC Tax Parcel Maps for RPA / RMA locations and Tax Parcel number.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Stormwater hotspot, general layout and/or BMP separation distances (if any) are satisfactory.                         |
| <input type="checkbox"/> | <input type="checkbox"/> | Environmental Inventory - Chesapeake Bay Ordinance requirements satisfactory.   |
| <input type="checkbox"/> | <input type="checkbox"/> | Highlight/check impacts to any Environmental Sensitive Areas (wetlands, RPA, floodplain, steep slopes, etc. ).        |
| <input type="checkbox"/> | <input type="checkbox"/> | Offsite borrow, waste areas and onsite stockpiles areas addressed.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review existing topography to determine adequacy of perimeter E&SC plan (Phase I).                                    |
| <input type="checkbox"/> | <input type="checkbox"/> | Current version of Standard JCC Erosion & Sediment Control Notes on plan.   |
| <input type="checkbox"/> | <input type="checkbox"/> | Virginia E&SC Regulations. Minimum Standards # 1 thru # 19 appear satisfied.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Check for Offsite Work; Grading Plan conflicts such as excessive cut-fill slopes, deep excavations, etc.              |
| <input type="checkbox"/> | <input type="checkbox"/> | Review adequacy of onsite E&SC plan (Phase II).   |
| <input type="checkbox"/> | <input type="checkbox"/> | Review layout to check for conflicts (utilities, buildings, parking, buffers, etc.).                                  |
| <input type="checkbox"/> | <input type="checkbox"/> | Storm Drainage - culverts, inlets, channels, storm drains. (pipe data, cover, conflicts, specs or reference to VDOT). |
| <input type="checkbox"/> | <input type="checkbox"/> | Proper Outlet Protection or Energy Dissipator information, details and computations.                                  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review Sequence of Construction (for E&SC and SWM/BMP installation).  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review E&SC Narrative (preferred to be on plan); SWM Narrative (Report).  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review for any Lot-to-Lot or adjacent property uncontrolled drainage problems.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on Chapter 19 Subdivision ordinance as it relates to SWM/BMP control.                               |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on Chapter 24 Zoning as it relates to SWM/BMP control.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on Chapter 23 Chesapeake Bay ordinance requirements.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC E&SC/SWM Design Plan Checklist.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on Virginia Erosion and Sediment Control Handbook (VESCH).  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review E&SC Plan Design Report and computations (Attached report ).   |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC BMP manual for BMP type selected for project.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on Virginia Stormwater Management Handbook (VSMH) for BMP type.                                     |
| <input type="checkbox"/> | <input type="checkbox"/> | Review SWM Design Report and computations (Attached Report ).   |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on JCC Stormwater Conveyance System Design/Construction Guidelines.                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on General Knowledge and Experience for Design/Construction.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review plan based on other BMP design/construction references. List:  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review BMP for Buffer/Setback Requirements (Min 25 ft. from DHW) and Access.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Review BMP Benching (aquatic, safety) & Pondscape Plan (deep pool, shallow water, shoreline fringes, etc.).           |
| <input type="checkbox"/> | <input type="checkbox"/> | Review Maintenance Plan for SWM / BMP facility. Detailed and specific guidance for long-term maintenance.             |
| <input type="checkbox"/> | <input type="checkbox"/> | Well defined, adequate channels downstream of uncontrolled or SWM/BMP areas. (MS # 19 or 1-year criteria).            |
| <input type="checkbox"/> | <input type="checkbox"/> | Adequate conversion plan for TSB to use as permanent BMP.   |
| <input type="checkbox"/> | <input type="checkbox"/> | Geotechnical. Information per Appendix E (infiltration) or to substantiate use of other BMPs (wet pond, etc.).        |
| <input type="checkbox"/> | <input type="checkbox"/> | Provisions on plan requiring Record Drawing and Construction Certification of SWM facilities.                         |
| <input type="checkbox"/> | <input type="checkbox"/> | Drainage, Maintenance and Open Space Easements (if provided) appear satisfactory.                                     |
| <input type="checkbox"/> | <input type="checkbox"/> | Wetland Permit required prior to issuance of a Land-Disturbance Permit or Final Approval.                             |
| <input type="checkbox"/> | <input type="checkbox"/> | Inclusion of H&H and SWM / BMP data into any JCC databases.   |
| <input type="checkbox"/> | <input type="checkbox"/> | Other:  |

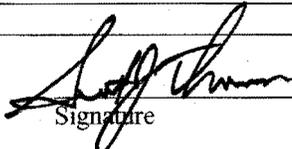
Prepared Environmental Division comments for the following categories based on above review areas:

- |                          |                          |  |                          |                          |   |
|--------------------------|--------------------------|--|--------------------------|--------------------------|---|
| <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> | <input type="checkbox"/> | <input type="checkbox"/> | <u>Other:</u>                               |

Additional Notes & Comments: Typical E&SC / Drainage / BMP.

(Note: THIS FORM FOR COUNTY USE ONLY.)

- 1<sup>st</sup> Rev     2<sup>nd</sup> Rev     3<sup>rd</sup> Rev

	2-21-02
Signature	Date
Signature	Date
Signature	Date

**Preliminary BMP Evaluation  
Proposed Dental Medical Clinic  
Richmond Road,  
Norge, Virginia**

**Schnabel Project 01132113**



January 11, 2001

Mr. Timothy K. Johnston, D.D.S.  
3402 Acorn Street, Suite 103  
Williamsburg, Virginia 23188

Subject: Project 01132113, Preliminary BMP Evaluation,  
Proposed Dental Medical Clinic, Richmond Road,  
Norge, Virginia

Dear Mr.: Johnston

We are pleased to submit two copies of our report for this project.

## INTRODUCTION

The scope of this study is as defined in our proposal P1132093 for this project dated December 14, 2001. Our services included subsurface exploration, field engineering, soil laboratory testing and development of a report. The objective of this study is to evaluate the subsurface conditions and to provide infiltration rate estimates regarding the design of the BMP's for this project.

## SITE DESCRIPTION

The site for the proposed clinic is located along the north side of Richmond Road (U.S. Route 60) just east of the intersection with Norge Lane in Norge, Virginia. The site at the time of our subsurface investigation was lightly wooded with thick under brush. Grades on the site vary from about El 118 along the south property line to about El 111 along the north property line. We obtained the site information from the undated site plan titled Layout, Utilities and Lighting Plan/ Dr. Johnston's Dental Office, prepared by VHB, Williamsburg, Virginia, and through our site visits.

## **PROPOSED CONSTRUCTION**

We understand that a two-story, 11,000 sf dental medical clinic is proposed at the site. Parking areas are proposed north and east of the clinic.

A detention pond in the northern section of the site and an infiltration/bio-retention pond in the southern section of the site are also proposed. Both BMP ponds are anticipated as being shallow. Final design grades had not been established at the writing of this report.

## **SUBSURFACE CONDITIONS**

### **Data Collection Techniques**

On December 17, 2001 personnel from our office performed three hand auger probes to depths of 7 ft in areas where the BMP's are proposed. Specific observations, remarks, and logs for the hand augers, subsurface exploration procedures and soil classification criteria are included as Attachments. Approximate hand auger locations are shown on Figure A1 also included as an Attachment. Soil samples collected from the hand auger probes will be retained up to 45 days beyond the issuance of this report, unless other disposition is requested.

Our geotechnical laboratory conducted tests on selected samples obtained in the hand auger probes. This testing aided in the classification of soils encountered in the subsurface exploration and provided data for use in the estimation of infiltration rates. The natural moisture content values of selected soil samples are presented on the hand auger probe logs. The results of the remaining laboratory tests are presented as an Attachment.

### **Generalized Subsurface Stratigraphy**

We have characterized the following generalized subsurface soil stratigraphy based on the boring and hand auger data presented in Appendix A:

**Surface Material:** Surface material consisting of forest litter, rootmat and topsoil was encountered in all of the hand auger probes to depths of 0.7 to 0.8 ft below the ground surface.

**Stratum A1:** Stratum A1 was encountered below the surface material in all of the hand auger probes to depths of 5 to 7 ft, the maximum depth of exploration. Stratum A1 consists of firm density SILTY SAND (SM) and CLAYEY SAND (SC). Stratum A1 represents coarse-grained soils of the Bacons Castle formation.

**Stratum A2:** Stratum A2 was encountered below the stratum A1 in hand auger probe HA-2 at a depth of 5 ft. Stratum A2 consists of stiff consistency FAT CLAY (CH). Stratum A2 represents fine-grained soils of the Bacons Castle formation.

### **Ground Water**

Ground water was not encountered in the hand auger probes performed for this study. Fluctuations in the hydrostatic water table should be anticipated depending on variations in precipitation, surface runoff, pumping (tidal action), evaporation, leaking utilities, stream levels and similar factors.

### **USDA SOIL TYPES AND INFILTRATION RATE ESTIMATES**

We reviewed the USDA Soil Survey of James City and York Counties and the City of Williamsburg Virginia. The survey indicates that the site is underlain by Emporia fine sandy loam and the Kempsville-Emporia fine sandy loam. According to the survey both soil series are deep and well drained.

Soil samples collected from the hand auger probes were classified visually in our laboratory using the USDA soil classification system. Once classified, the soils were assigned to the corresponding USDA Texture Groups. A correlation chart was used to estimate infiltration rate based on USDA Texture Group. Table 1 below summarizes USDA soil type, USDA Texture Group type and estimated infiltration rates from soils encountered in the hand auger probes.

CAN'T  
READ  
min/ft  
in/hr.

**Table 1**

Hand Auger Number	Depth (ft)	USDA Soil Type	USDA Permeability Group	Estimated Infiltration Rate (mm/min)
HA-1	0.8-2.5	Loamy Sand	I	0-16
	2.5-3.0	Sandy Clay Loam	II	17-45
	3.0-3.5	Sandy Loam		
	5.5-7.0	Clay Loam	III	46-90
HA-2	0.7-1.5	Sandy Loam	II	17-45
	1.5-2.0	Sandy Clay Loam		
	2.0-5.0	Sandy Loam		
	5.0-7.0	Clay Loam	III	46-90
HA-3	0.8-1.3	Sandy Loam	II	17-90
	1.3-3.0	Sandy Clay Loam		
	3.0-5.0	Sandy Loam		
	5.0-7.0	Clay Loam	III	46-90

**LIMITATIONS**

The analyses submitted in this report are based on the information revealed by our exploration. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project. Our recommendations are based on information on the site and proposed construction as described in this report. Substantial changes in locations or grades should be brought to our attention so we can modify our analyses as needed.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this agreement, or any report, opinion, document, or other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

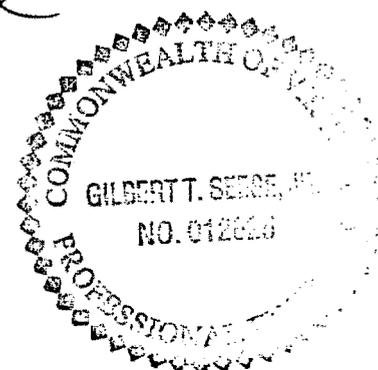
Very truly yours,  
SCHNABEL ENGINEERING ASSOCIATES, INC.



Steven P. Pond, C.P.G.  
Project Geologist



Gilbert T. Seese, P.E.  
Senior Associate



SPP:GTS:nsm

Attachments: Subsurface Exploration Procedures  
Identification of Soil  
Hand Auger Probe Logs (HA-1 through HA-3)  
Location Plan; Figure A1  
Soil Laboratory Test Results

c: Mr. Mel Hopkins, VHB, Inc.

## **SUBSURFACE EXPLORATION PROCEDURES**

### **Hand Auger Probes**

Our personnel drilled the hand augers using a 3-inch O.D. auger. We visually classified the soils encountered according to ASTM D-2487. Geostick Penetrometer readings were taken during excavation. Geostick Penetrometer readings give a general indication of the soil's in place density or consistency. Geostick penetrations are shown in the remarks column as "GP= ".

### **Soil Classification Criteria**

The group symbols on the logs represent the Unified Soil Classification System Group Symbols (ASTM D-2487) based on visual observation and limited laboratory testing of the samples. Criteria for visual identification of soil samples are included in the Attachments. Some variation may be expected between samples visually classified and samples classified in the laboratory.

### **Boring and Hand Auger Locations and Elevations**

Our personnel staked the hand augers by taping from Richmond Road and existing onsite features. Approximate hand auger locations are shown in Figure A1. Ground surface elevations at the hand auger locations were scaled from the site plan provided by VHB, Inc. These locations and elevations should be considered no more accurate than the methods and plans used to obtain them.

**SCHNABEL ENGINEERING ASSOCIATES, INC.**

**Consulting Geotechnical Engineers**

**IDENTIFICATION OF SOILS**

**I DEFINITION OF SOIL GROUP NAMES (ASTM D-2487-83)**

**SYMBOL GROUP NAME**

Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels – More than 50% of coarse fraction retained on No. 4 sieve Coarse, 3/4" to 3" Fine, No. 4 to 3/4"	Clean Gravels Less than 5% fines	GW	Well graded gravel
			GP	Poorly graded gravel
		Gravels with fines More than 12% fines	GM	Silty gravel
			GC	Clayey gravel
	Sands – 50% or more of coarse Fraction passes No. 4 sieve Coarse, No. 40 to No. 4 Medium, No. 40 to No. 10 Fine, No. 200 to No. 40	Clean Sands Less than 5% fines	SW	Well-graded sand
			SP	Poorly graded sand
Sands with fines More than 12% fines		SM	Silty sand	
		SC	Clayey sand	
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays – Liquid Limit less than 50 Low to medium plasticity	Inorganic	CL	Lean clay
			ML	Silt
		Organic	OL	Organic clay
				Organic silt
	Silts and Clays – Liquid Limit 50 or more Medium to high plasticity	Inorganic	CH	Fat clay
			MH	Elastic silt
		Organic	OH	Organic clay
				Organic silt
Highly Organic Soils	Primarily organic matter, dark in color and organic odor	PT	Peat	

**II DEFINITION OF MINOR SOIL COMPONENT PROPORTIONS**

**Examples**

Adjective Form	Gravelly		Examples
	Sandy	30% or more coarse grained	Gravelly lean clay
"With"	With gravel	15% or more coarse grained	Fat clay with gravel
	With sand		
"Trace"	With silt	5% to 12% fine grained	Poorly graded sand with silt
	With clay		
"Trace"	Trace gravel	1% to 15% coarse grained	Silty sand, trace gravel
	Trace sand		
	Trace clay	1% to 5% fine grained	Poorly graded sand, trace clay
	Trace silt		

**III GLOSSARY OF MISCELLANEOUS TERMS**

- SYMBOLS** ..... Unified Soil Classification Symbols are shown above as group symbols. Dual symbols are used for borderline classifications.
- BOULDERS & COBBLES** ..... Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inch size.
- DISINTEGRATED ROCK** ..... Residual rock materials with a standard penetration resistance (SPT) between 60 blows per foot and refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.
- ROCK FRAGMENTS** ..... Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.
- QUARTZ** ..... A hard silica mineral often found in residual soils.
- IRONITE** ..... Iron oxide deposited within a soil layer forming cemented deposits.
- CEMENTED SAND** ..... Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other materials.
- MICA** ..... A soft plate of silica mineral found in many rocks, and in residual or transported soil derived therefrom.
- ORGANIC MATERIALS** ..... Topsoil ..... Surface soils that support plant life and which contain considerable amounts of organic matter;  
(Excluding Peat) Organic Matter ..... Soil containing organic colloids throughout its structure;  
Lignite ..... Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).
- FILL** ..... Man-made deposit containing soil, rock and often foreign matter.
- PROBABLE FILL** ..... Soils which contain no visually detected foreign matter but which are suspect with regard to origin.
- LENSES** ..... 0 to 1/2 inch seam of minor soil component.
- LAYERS** ..... 1/2 to 12 inch seam of minor soil component.
- POCKET** ..... Discontinuous body of minor soil component.
- COLOR SHADES** ..... Light to dark to indicate substantial difference in color.
- MOISTURE CONDITIONS** ..... Wet, moist or dry to indicate visual appearance of specimen.



**Project:** Proposed Dental Medical Clinic  
 Richmond Road  
 Norge, Virginia

**Boring Number:** HA-1  
**Contract Number:** 01132113  
**Sheet:** 1 of 1

**Excavation Equipment:** 3" O.D. Hand Auger

**Location:** See Location Plan, Figure A1

**SEA Representative:** J. Hollowell

**Date:** 12/17/01

**Ground Surface Elevation:** 113.0± (feet)

**Groundwater Elevation:** Not Encountered

DEPTH (ft)	ELEV. (ft)	STRATA DESCRIPTION	STRATUM	REMARKS
0.8	112.2	Forest litter, rootmat and topsoil	A1	GP=7"
		Firm density, fine to medium silty sand (SM), moist - brown		GP=1/2"
2.5	110.5			GP=1/2"
		Firm density, fine to medium clayey sand (SC), moist - brown		BACONS CASTLE FORMATION
3.0	110.0			GP=1/4" W=4.5%
		Firm density, fine to medium silty sand (SM), moist - brown		GP=1/2"
5.5	107.5			GP=1/4"
		Firm density, fine clayey sand (SC), moist - brown		
7.0	106.0	Hand Auger Terminated at 7.0 ft		GP=1/4"

TEST PIT LOG 01132113.GPJ SCHNABEL.GDT 1/10/02

**Comments:**

1. Hand auger backfilled upon completion.



**HAND AUGER LOG**

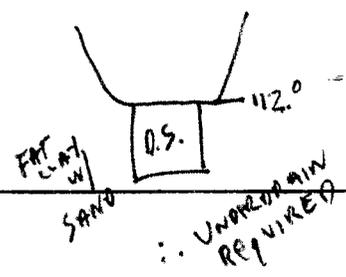
Project: Proposed Dental Medical Clinic  
 Richmond Road  
 Norge, Virginia

Boring Number: **HA-2**  
 Contract Number: 01132113  
 Sheet: 1 of 1

Excavation Equipment: 3" O.D. Hand Auger      Location: See Location Plan, Figure A1  
 SEA Representative: J. Hollowell  
 Date: 12/17/01      Ground Surface Elevation: 117.0± (feet)  
 Groundwater Elevation: Not Encountered

DEPTH (ft)	ELEV. (ft)	STRATA DESCRIPTION	STRATUM	REMARKS
0.7	116.3	Forest litter, rootmat and topsoil		GP=4"
		Firm density, fine to medium silty sand (SM), contains clayey sand pockets, moist - brown		GP=1/4"
1.5	115.5	Firm density, fine to medium clayey sand (SC), moist - red brown	A1	GP=1/2" BACONS CASTLE FORMATION GP=1/4" GP=1/2"
5.0	112.0	Stiff consistency, fat clay with sand (CH), moist - brown and red brown	A2	GP=1/4" W=18.9% GP=1/4"
7.0	110.0	Hand Auger Terminated at 7.0 ft		GP=1/4"

*Asp BMP BOTTOM*



TEST PIT LOG 01132113.GPJ\_SCHNABEL.GDT 1/10/02

Comments:  
 1. Hand auger backfilled upon completion.



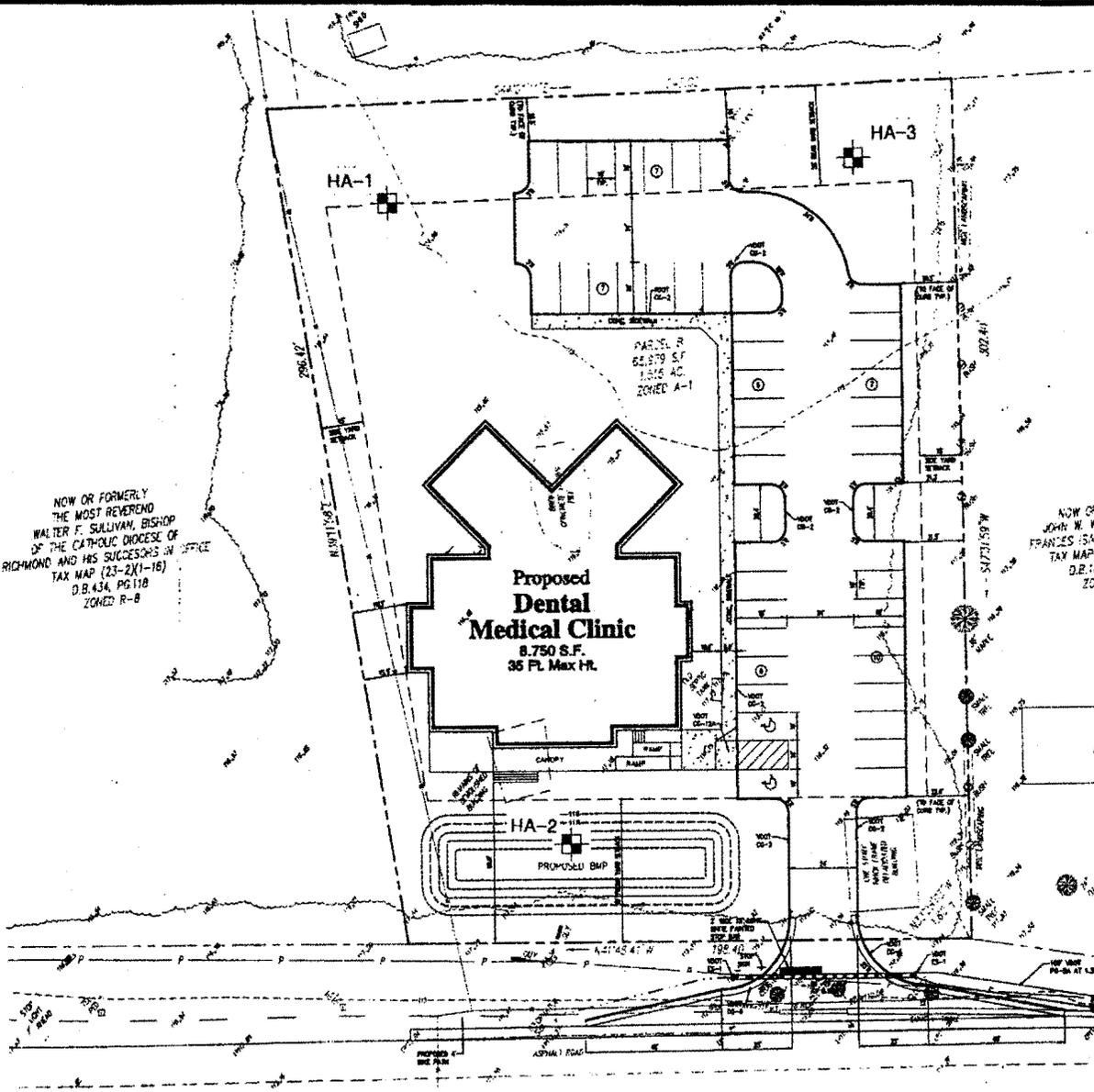
NOW OR FORMERLY  
THE MOST REVEREND  
WALTER F. SULLIVAN, BISHOP  
OF THE CATHOLIC DIOCESE OF  
RICHMOND AND HIS SUCCESSORS IN OFFICE  
TAX MAP (23-2)(1-16)  
D.B. 434, PG. 118  
ZONED R-B

NOW OR FORMERLY  
JOHN W. WOODWARD, JR.  
FRANCES ISABELLE WOODWARD  
TAX MAP (23-2)(1-18)  
D.B. 103, PG. 248  
ZONED A-1

PARCEL R  
62,879 S.F.  
1.146 AC.  
ZONED A-1

**Proposed  
Dental  
Medical Clinic**  
8,750 S.F.  
36 Ft. Max Ht.

ONE STORY  
BROCK RESIDENCE



**LEGEND**

☒ APPROXIMATE HAND AUGER LOCATION

 Schnabel Engineering Associates, Inc.		PROPOSED DENTAL MEDICAL CLINIC	
		RICHMOND ROAD NORGE, VIRGINIA	
<h1>LOCATION PLAN</h1>	APPROXIMATE SCALE	DATE	
	1"=40'	JANUARY 2002	
	DRAWN BY	CHECKED BY	REVISION DATE
	DPC	SP/GS	
CONTRACT NO.	SHEET	REVISED DATE	
01132113	A1		

**SUMMARY OF SOIL LABORATORY TESTS**

HAND AUGER	HA-1	HA-2		
DEPTH	3'-5.5'	5'-7'		
SAMPLE TYPE	JAR	JAR		
STRATUM	A1	A2		
SAMPLE DESCRIPTION	FINE TO MEDIUM SILTY SAND (SM), BROWN	FAT CLAY WITH SAND (CH), BROWN AND RED BROWN		
NATURAL MOISTURE CONTENT (%)	4.5	18.9		
NATURAL WET DENSITY (pcf)	--	--		
LIQUID LIMIT	NP	59		
PLASTIC LIMIT	NP	24		
PLASTICITY INDEX	NP	35		
GRADATION DATA				
(% FINER THAN SIEVE)				
3/4"	--	--		
NO. 4	--	--		
NO. 40	98.9	99.0		
NO. 200	18.9	71.2		
MOISTURE DENSITY RELATION DATA (ASTM D-698)				
MAXIMUM DRY DENSITY (pcf)	--	--		
OPTIMUM MOISTURE CONTENT (%)	--	--		
CBR TEST DATA (VTM-8)				
BEFORE SOAK CBR	--	--		
AFTER SOAK CBR	--	--		
% SWELL	--	--		
COMPACTED SAMPLE DRY DENSITY (pcf)	--	--		
COMPACTED SAMPLE MOISTURE CONTENT (%)	--	--		
REMARKS				

NOTES: 1. Soil tests in accordance with applicable ASTM, AASHTO and VTM Standards

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**Erosion and Sediment Control  
and Stormwater Management  
Design Plan Checklists**



James City County, Virginia  
Environmental Division

**Erosion and Sediment Control and  
Stormwater Management Design Plan Checklists**

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GENERAL INFORMATION

Project Name: DR. JOHNSTON'S DENTAL OFFICE  
 Owner / Applicant: TIMOTHY K. JOHNSTON, D.D.S.  
 Plan Preparer: Vanasse Hangen Brustlin Email: mhopkinse.vhb.com  
 Project Location: #7450 RICHMOND ROAD  
 Tax Map / Parcel: (23-2)(1-18)  
 County Plan No. (if known): SUP 21-01  
 County BMP Type: BIORETENTION ( - )

Other information submitted in addition to this checklist (Check all that apply):

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

*Issue Date*  
**March 1, 2001**

**JAMES CITY COUNTY, VIRGINIA  
ENVIRONMENTAL DIVISION**

***EROSION AND SEDIMENT CONTROL PLAN CHECKLIST***

**I. GENERAL:**

Yes No N/A

- FAMILIARITY* with current versions of Chapter 8, Erosion and Sedimentation Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia and the Virginia Erosion and Sediment Control Handbook (VESCH).
- LAND DISTURBING PERMIT AND SILTATION AGREEMENT* with surety are required for the project. **WILL PROVIDE NEXT SUBMITTAL**
- VARIANCE* if necessary, requested in writing, for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.

**II. SITE PLAN:**

Yes No N/A

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

Yes No N/A

- EXISTING SITE FEATURES* including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.
- SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.
- ENVIRONMENTAL INVENTORY* in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.
- 100-YEAR FLOODPLAIN LIMITS* or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.
- DRAINAGE AREAS* for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.
- CRITICAL EROSION AREAS* which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.
- DEVELOPMENT PLAN* for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.
- LOCATION OF PRACTICES* proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.
- TEMPORARY STOCKPILE AREAS* or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.
- OFFSITE LAND DISTURBING AREAS* including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.
- DETAILS* or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.

Yes No N/A

*MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.

*TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.

*CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.

*PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.

*STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated ~~May 5, 1999~~ → 7/06/2001.

*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

### III. NARRATIVE:

Yes No N/A

*PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.

*EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.

*ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.

*OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.

*SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.

*CRITICAL AREAS* on the site which many have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

*PROPOSED EROSION & SEDIMENT CONTROL MEASURES* inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.

*STABILIZATION MEASURES* required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.

*STORMWATER MANAGEMENT CONSIDERATIONS* for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

#### IV. CALCULATIONS:

Yes No N/A

*CALCULATIONS AND COMPUTATIONS* associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.

*TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET* submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

**JAMES CITY COUNTY, VIRGINIA  
ENVIRONMENTAL DIVISION**

**STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST**

**I. GENERAL:**

Yes No N/A

- FAMILIARITY* with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).
  
- WAIVER OR EXCEPTION* if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to this review case only.
  
- VARIANCE REQUEST* if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.
  
- PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved stormwater management plans, drawings, technical reports and specifications.
  
- WORKSHEET FOR BMP POINT SYSTEM* to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only).
  
- PROPOSED CONSERVATION EASEMENT AREAS* for any natural open space points claimed in the BMP worksheet.
  
- INSPECTION/MAINTENANCE AGREEMENT* is required to be prepared and executed with the County for the project. *will BEGIN Process next submittal*
  
- FEMA FIRM PANEL* reference with designated special flood hazard areas or zone designations associated with the site, as applicable.
  
- DRAINAGE AREA MAP* at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map.

Yes No N/A

*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.

*STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.

*TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.

*MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.

*STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and multi-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.

*PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)

North arrow and plan legend.

Property lines.

Adjacent property information.

Existing site features and existing impervious cover areas.

Impervious cover tabulations.

Existing drainage facilities (natural or manmade).

Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.).

Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.

Existing and proposed easement locations.

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

II. STORMWATER CONVEYANCE SYSTEMS:

Yes No N/A

- |                                     |                          |                                     |  |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <b>PLAN VIEWS</b>  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Storm drain lengths, sizes, types, classes and slopes for all segments. Label directly on plan or use structure/pipe schedule.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | All structure numbers labeled.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Adequate horizontal clearance from other site utilities or structures.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <b>PROFILES</b> generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas. <b>NOT PROVIDED</b> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <b>DETAILS</b>   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Typical storm drain bedding details or reference note.   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Inlet shaping detail or applicable reference note.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Step detail or applicable reference note (if depth 4 ft. or more).   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.   |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outlet protections at all pipe outfalls.   |

Yes No N/A

**STORMWATER CONVEYANCE SYSTEM COMPUTATIONS**

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

**III. STORMWATER MANAGEMENT / BMP FACILITIES:**

Yes No N/A

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

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

**FACILITY CONFIGURATION and MINIMUM SEPARATIONS**

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

Yes No N/A

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

Yes No N/A

*HYDRAULIC COMPUTATIONS*

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

*POND or RESERVOIR ROUTING*

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

*MISCELLANEOUS COMPUTATIONS*

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

LONG DISTANCE FLAT GRASS SWALES USED.  
PARKING LOT FLUMES USED.

Yes No N/A

- Riser / base structure flotation analyses. FS = 1.25 minimum. **DRY FACILITY**
- Downstream danger reach study and/or emergency action plan (if conditions warrant).
- Upstream backwater analyses onto offsite adjacent property (if conditions warrant).
- 100 year floodplain impacts (if conditions warrant).

Yes No N/A

**GEOTECHNICAL REQUIREMENTS**

- Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.
- Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
- Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
- Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.
- Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.
- Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*

**PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS**

**EXISTING GROUND AND PROPOSED GRADE**

- Embankment or excavation side slopes labeled (3H:1V maximum).
- Minimum top width labeled (per VESCH or VSMH requirements).
- Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

Yes No N/A

CORE TRENCH

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

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

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

PRINCIPAL CONTROL STRUCTURE OUTLET BARREL

- Material (ASTM C-361 reinforced concrete pipe) with watertight joints. Prior approval required for all other pipe material (other RCP types, CMP, CPP, PVC, etc.).
- Support and bedding requirements for barrel - concrete cradles, etc. or as recommended by the Geotechnical Report. *VDOT PB-1*
- Pipe inverts, length, size, class and slope shown.
- Flared end section or endwall provided on barrel outlet.

*EXPOSED AGGREGATE CONCRETE SWALE*

SEEPAGE CONTROL

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

ANTI-SEEP COLLARS

- Anti-seep collar, concrete preferred.
- Size - 15 percent increase in length of saturation using outside pipe diameter.
- Spacing and location on barrel (located at least 2 feet from a pipe joint).

- FILTER DIAPHRAGMS*
- Design based on latest NRCS design methods and certified by a professional engineer.

Yes No N/A

- ELEVATION AND DIMENSIONAL DESIGN DATA*
- Top of facility - construction height and settled height (10 percent settlement).
- Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.
- Minimum freeboard of one (1) foot above the 100-year design high water elevation for facilities with an emergency spillway.
- Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities without an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).
- Basin Sediment Clean-Out elevation (permanent mode). Typically 10 to 25 percent of water quality volume.

- CROSS SECTION THROUGH FACILITY*
- Existing Ground.
- Proposed grade.
- Top of facility - constructed and settled.
- Location of emergency spillway with side slopes labeled (emergency spillway in cut).
- Bottom of core trench (4' minimum).
- Location of each soil boring.
- Barrel location.
- Existing and proposed utility location/protection.

- EMERGENCY SPILLWAY PROFILE*
- Existing ground.
- Inlet, level (control) and outlet sections per SCS.
- Spillway and crest elevations.

- PRETREATMENT DEVICES* of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

Yes No N/A

*CONSTRUCTION SPECIFICATIONS and NOTES*

- Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan).
- Provisions to control base stream or storm flow conditions encountered during construction.
- Site and subgrade preparation requirements.
- Embankment, fill and backfill material soil and placement (lift) thickness requirements.
- Compaction and soil moisture content requirements.
- Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes.
- Clay or synthetic (PVC or HDPE) pond liners.
- Storm drain, underdrain and pipe conduit requirements.
- Minimum depth of pipe cover for temporary (construction) and final cover conditions.
- Permanent shutoff valve and pond drain.
- Concrete requirements for structural components.
- Riprap and slope protection.
- Access or maintenance road surface, base, subbase.
- Temporary and permanent stabilization measures.
- Temporary or permanent safety fencing.
- BMP Landscaping (deep, shallow, fringe, perimeter, etc.)
- Dust and traffic control (if warranted).
- Construction monitoring and certification by professional.
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

*MAINTENANCE PROVISIONS*

- Entity responsible for maintenance identified..
- Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays
- Maintenance access from public right-of-way or publicly traveled road.
- Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas.
- Minimum 6 foot wide public safety shelf (landing) or alternative fencing.





## DEVELOPMENT MANAGEMENT

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

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

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

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

COUNTY ENGINEER  
(757) 253-6678  
INTEGRATED PEST MANAGEMENT  
(757) 253-2620

April 15, 2002

Mr. Melvin Hopkins  
VHB, Inc.  
477 McLaws Circle, Suite 1  
Williamsburg, Va. 23185

Re: Pond Buffer/Setback Variance  
Dr. Johnston's Dental Office  
County Plan No. SP-06-02

Dear Mr. Hopkins:

The Environmental Division is in receipt of your written request dated March 13, 2002 to obtain variance from the County BMP manual for a reduced setback/buffer from design high water elevation of the onsite dry swale BMP being utilized for the above referenced project.

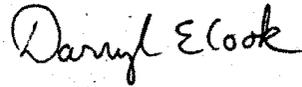
Based on our review of information as submitted, the variance as requested is hereby **approved**. The variance was considered appropriate due to information as submitted in the revised plan of development application including: 1) there is an adequate emergency overflow path away from the sidewalk/building location due to the El. 117 berm along the Richmond Road side of the BMP; and 2) although only 23.3 feet of horizontal separation was provided, there is an adequate vertical separation of 3.61 feet from design high water of the BMP (El. 115.89) to proposed finished floor elevation of the main building (FFE 119.5).

In addition, approval of the variance is subject to following conditions:

1. The owner should be made completely aware of the reduced horizontal buffer and the provisions of this variance;
2. The variance approval shall become part of the approved site stormwater management plan;
3. The owner should ensure that maintenance of the BMP is adequately performed in accordance with the schedule presented on Sheet C-5 of the plan set and Minimum Standard 3.13 of the Virginia Stormwater Management Handbook. Proper maintenance will reduce the chance of clogging of the principal flow control structure of the dry swale BMP.

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

Sincerely,



Darryl E. Cook, P.E.  
Environmental Director

DEC/sjt

cc: Karen Drake, JCC Planning

SWMPProg/Variances/SPvar/Var022102



# DEVELOPMENT MANAGEMENT

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

CODE COMPLIANCE  
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ENVIRONMENTAL DIVISION  
(757) 253-6670

environ@james-city.va.us

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(757) 253-6685

planning@james-city.va.us

COUNTY ENGINEER  
(757) 253-6678

INTEGRATED PEST MANAGEMENT  
(757) 253-2620

April 9, 2004

Mr. Bill Strack  
Henderson Inc.  
5800 Mooretown Road  
Williamsburg, VA 23188

Re: Dr. Johnston's Dental Office (7450 Richmond Road)  
County Plan No. SP-06-02  
County BMP ID Code: YC 034

Dear Mr. Strack:

The Environmental Division has reviewed the record drawing information as submitted to our office for the BMP at the above referenced project. The record drawing provides as-built information for stormwater conveyance channels situated along the east and west portions of the site and for the dry swale BMP situated in front of the site along Richmond Road.

Based on our review of the project and a concurrent field inspection as performed on April 2<sup>nd</sup> 2004, the following items must be addressed prior to release of the developer's surety instrument for the drainage and stormwater management facilities and proceeding with closing out the project:

### Construction Certification:

1.

Based on observations from an inspection of the referenced facility, it appears that the actual construction of the BMP deviates from that of the original approved plan. Major items include an apparent offsets in the barrel pipe in proximity to the outfall and the omission of watertight caps over cleanouts for the underdrain system. These items must be either brought to a condition consistent with the approved plan or a letter of certification must be submitted by the design engineer providing that the system will function as designed with the current modifications. If the latter is chosen, routing computations reflecting the as-built configuration must be submitted to the Environmental Division for review.

See ABOVE NOTES  
FIXED

### Record Drawing:

✓  
2-11-05

2. The record drawing requires a certification statement with a state approved professional engineer's seal and signature included on the record drawing set. Refer to pages 3 and 4 of the James City County Stormwater Management/BMP Facilities Record Drawing and Construction Certification

REINSPECT  
SIT 6/9/05  
OUTLET PIPE FIXED  
STANDING WATER IN BOTTOM  
BMP - 3 AREA  
CAP IN NORTH UNDERDRAIN  
PUSHED DOWN IN VERTICAL  
CLOSURE  
TILL SURF SOILS IN  
3 AREAS  
NO NEED TO CAP  
C.O.  
ADD MUDPAST  
INLET TO LOWER  
J.D. RIVER  
CALL FOR  
REINSPECT

*Standard Forms & Instructions* (packet) for record drawing certification statements.

3. ✓ Along with the record drawing set, submit completed record drawing and construction certification forms, Sections 1 through 5, as contained in the James City County *Stormwater Management/BMP Facilities Record Drawing and Construction Certification Standard Forms & Instructions* (packet). The Environmental Division began use of the forms and checklists in this packet effective February 1st 2001. FORGET NOW
4. ✓ The as-built drawing does not reflect as-built conditions of the outlet barrel from the BMP. Based on our field observations, the barrel is not continuously straight from the principal flow control structure to the channel along Richmond Road. It appears there is a fitting or elbow placed on the barrel pipe segment which is not consistent with the approved plan and would promote clogging.

Construction-Related:

5. ✓ Based on our field observations, the barrel from the BMP was not constructed in accordance with the approved plan. It appears there is a fitting or elbow placed on the barrel pipe segment which would promote clogging. This condition is creating a standing water condition in the principal spillway (riser) structure which is subsequently creating a tailwater condition by which the perforated underdrain pipes in the BMP cannot positively drain. This is a condition which prohibits to BMP to serve as a filtering structure as inflow from building and parking areas cannot filter through the engineered soil media. REVISED TO MARK NOW
6. Cleanouts on the underdrain system component of the dry swale are not capped. This promotes the filtering portion of the dry swale to be "short circuited", substantially reducing the efficiency of the facility. As the system has been in use for quite some time, we will require that the underdrain and cleanouts be fully cleaned or flushed and proper caps be installed at the ends of vertical portions of the cleanouts. / SEE ABOVE RATE

Once this work has been satisfactorily completed, contact our office so that a reinspection of the facility may be performed. It is then that the final release of surety and/or closing out the project may be performed. After the above items are adequately addressed, one reproducible and one blue/black line set of the record drawings must be submitted to the Environmental Division per county requirements. STILL WILL OCCUR, BUT NEED TO PROMOTE POSITIVE DRAINAGE MASS. CONDITIONS

If you have any further comments or questions, please feel free to contact me at 757-253-6702, or the assigned Environmental Division inspector Jim Rudnicky (757-259-4026).

Sincerely,

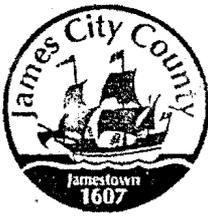


William A. Cain  
Civil Engineer  
Environmental Division

WAC/wac

cc: Gilbert Seese - via fax (757) 838-0995  
Scott J. Thomas, JCC Environmental Division  
Jim Rudnicky, JCC Environmental Division Inspector

G:\AsBuilts\SP0602.YC034



JAMES CITY COUNTY - ENVIRONMENTAL DIVISION

Office Phone: 757-253-6670

Fax Number: 757-259-4032

DATE SENT: 4/9/04

Name: BILL STRAK  
Firm or Company: HUNTERSON INC.  
Facsimile Number: 564-9120  
Number of pages including this transmittal: 4  
From: BILL CAIN

James City County  
P O Box 8784  
Williamsburg VA 23187-8784

Comments:

IF YOU HAVE ANY QUESTIONS OR COMMENTS, PLEASE CONTACT ME AT  
THE NUMBERS LISTED BELOW

If you do not receive all pages, call 757-253-6670 as soon as possible



WILLIAM CAIN  
CIVIL ENGINEER

ENVIRONMENTAL DIVISION

101 MOUNTS BAY ROAD, P.O. Box 8784 (757) 253-6702  
WILLIAMSBURG, VIRGINIA 23187-8784 FAX: (757) 259-4032

E-MAIL: [wacain@james-city.va.us](mailto:wacain@james-city.va.us)



JAMES CITY COUNTY - ENVIRONMENTAL DIVISION

Office Phone: 757-253-6670

Fax Number: 757-259-4032

DATE SENT: 4/9/04

Name: GILBERT SEESE  
Firm or Company: SCHWABEL  
Facsimile Number: 838-0995  
Number of pages including this transmittal: 4  
From: \_\_\_\_\_

James City County  
P O Box 8784  
Williamsburg VA 23187-8784

Comments:

IF YOU HAVE ANY QUESTIONS OR COMMENTS, PLEASE CONTACT US AT  
THE NUMBERS LISTED BELOW.

If you do not receive all pages, call 757-253-6670 as soon as possible



WILLIAM CAIN  
CIVIL ENGINEER

ENVIRONMENTAL DIVISION

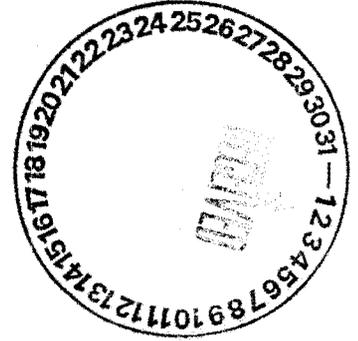
101 MOUNTS BAY ROAD, P.O. BOX 8784 (757) 253-6702  
WILLIAMSBURG, VIRGINIA 23187-8784 FAX: (757) 259-4032  
E-MAIL: [wacain@james-city.va.us](mailto:wacain@james-city.va.us)

Established 1957  
State Regis No. 4849  
www.hendersoninc.com

**HENDERSON**  
INCORPORATED  
GENERAL CONTRACTORS  
5800 Mooretown Road  
Williamsburg, VA 23188

(757) 565-1090  
FAX: (757) 564-9120  
E-Mail: Henderson@hendersoninc.com

3



YC034  
SP-6-02

March 3, 2004

James City County  
Scott Thomas  
EDS  
101 Mounts Bay Rd.  
Williamsburg, Va.

RE: Johnston Dental Clinic

Scott,

Attached please find the engineer's certification on the above named project. As you will see, the concrete apron was an exception to this report. At the time of site visit on January 27, 2004, the apron was not complete.

At this time, the apron has been completed.

We are providing all the requested paperwork, and respectfully request the E&S permit # SP-006-02 be released at this time.

We thank you in advance for your cooperation in this matter.

Henderson Inc.

  
Bill Strack  
Vice President

SEE LETTER IN RESPONSE  
TO THIS CERT.  
G. LABBUILT (SP006-02)  
YC034

CC: PVH  
BS  
RH  
CAK

# H ENDERSON

INCORPORATED  
GENERAL CONTRACTORS

5800 MOORETOWN ROAD  
WILLIAMSBURG, VA 23188

(757) 565-1090 FAX (757) 564-9120

## LETTER OF TRANSMITTAL

DATE:	11/6/03
JOB#:	21737
ATTENTION:	Scott Thomas
RE:	Johnston Dental Clinic



TO:

James City County  
101 Mounts Bay Rd  
Williamsburg, Va.

[Empty box for recipient address]

**We are sending you:**

<input checked="" type="checkbox"/>	Attached		
<input type="checkbox"/>	Under separate cover VIA:		
<input type="checkbox"/>	Shop drawings	<input checked="" type="checkbox"/>	Plans
<input type="checkbox"/>	Copy of letter	<input type="checkbox"/>	Change Order
<input type="checkbox"/>	Photographs	<input type="checkbox"/>	Samples
<input type="checkbox"/>	Contract	<input type="checkbox"/>	Specifications

**Transmitted as checked below:**

<input type="checkbox"/>	For your approval
<input checked="" type="checkbox"/>	For your use
<input type="checkbox"/>	As requested
<input type="checkbox"/>	For your review and comment
<input type="checkbox"/>	Approved as submitted
<input type="checkbox"/>	Returned for correction
<input type="checkbox"/>	Other: _____

Copies	Date		Number	Descriptions
1	8/20/03		1 of 1	BMP Record drawing Plan

**Remarks:**

[Empty box for remarks]

Copy To: RH, BS, CK-File

Signed

*Donna A. Chapman*

**Scott Thomas**

---

**From:** Scott Thomas  
**Sent:** Monday, January 05, 2004 11:30 AM  
**To:** Joan Etchberger; 'Donna Chapman'  
**Subject:** RE: E&S as built

Although I did receive the asbuilts from LandTech Resources for both these projects (SP-72-01 Bruces Super Body Shop and SP-6-02 Johnston Dental Clinic), I have not received construction certifications which were required for the BMPs associated with the projects. Although I do not normally proceed with a final inspection of BMPs until I receive the asbuilts and the construction certification, I will proceed with review of the asbuilts and perform a final inspection on these project BMPs; however, the construction certifications will be an outstanding issue that needs resolved. We require both asbuilts and construction certifications for BMPs. (Attached is a copy of our current requirements for certification of BMPs in .pdf file format.)

*Scott J. Thomas, P.E.*  
*James City County*  
*Environmental Division*

-----Original Message-----

**From:** Joan Etchberger  
**Sent:** Wednesday, December 31, 2003 8:46 AM  
**To:** Scott Thomas  
**Cc:** 'Donna Chapman'  
**Subject:** RE: E&S as built

Scott, can you give us an update when you come back next week. Thanks.

Donna, Happy New Year!!!!

joan

-----Original Message-----

**From:** Donna Chapman [mailto:donna@hendersoninc.com]  
**Sent:** Monday, December 29, 2003 5:05 PM  
**To:** Joan Etchberger  
**Cc:** Bill Strack; Julie Russell  
**Subject:** FW: E&S as built

Joan,  
 Can you offer any update on these projects?  
 Thanks,  
 Donna

-----Original Message-----

**From:** Joan Etchberger [mailto:jetchberger@james-city.va.us]  
**Sent:** Tuesday, December 09, 2003 2:30 PM  
**To:** Donna Chapman  
**Subject:** RE: E&S as built

Scott Thomas is working on both of these projects. He needs to perform final inspections and he hopes to do that sometime within the next week or two.

-----Original Message-----

**From:** Donna Chapman [mailto:donna@hendersoninc.com]

AB  
 LOGIN

**Sent:** Thursday, December 04, 2003 11:52 AM  
**To:** Joan Etchberger  
**Subject:** E&S as built

Joan,

Last month we sent as built to Scott Thomas on two projects. We have heard nothing yet and we believe that these are the only thing holding up E&S release on these two projects. Can you offer an update for these:

- Bruce's Body Shop                      Permit #02-37                      \$85,000.
- Norge Dental clinic                      Permit #SP-006-02                      \$25,000.

Please feel free to contact us with any questions.  
Thanks for your help.  
Donna A. Chapman



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

County BMP ID Code (if known): YC 034  
 Name of Facility: Johnston Dental Clinic BMP No.: # of 1 Date: 4/22/04  
 Location: 2450 Richmond Road  
 Name of Owner: \_\_\_\_\_  
 Name of Inspector: SJ Thomas, WACAIN  
 Type of Facility: Dry Swale  
 Weather Conditions: Cloudy High 50's Type:  Final Inspection  County BMP Inspection Program  Owner Inspection

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

- O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
- Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
- Urgent - The item checked requires immediate attention to keep the BMP operational and to prevent damage to the facility.

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

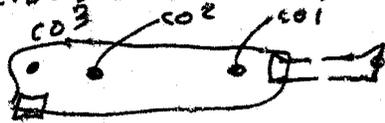
Facility Item	O.K.	Routine	Urgent	Comments
<b>Embankments and Side Slopes:</b> <u>6' HIGH BERM ALONG RICHMOND ROAD</u>				
Grass Height	✓			<u>GRASS + LANDSCAPED</u>
Vegetation Condition	✓			
Tree Growth	✓			<u>LANDSCAPE TREES ONLY</u>
Erosion				
Trash & Debris	✓			<u>Looks great.</u>
Seepage	✓			<u>NONE</u>
Fencing or Benches				
<b>Interior Landscaping/Planted Areas:</b> <input checked="" type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation				
Vegetated Conditions	✓			<u>MANICURED GRASS.</u>
Trash & Debris	✓			
Floating Material	✓			
Erosion	✓			
Sediment	✓			
Dead Plant	✓			
Aesthetics	✓			
Other		✓		<u>Underdrain CO NEED CAPPED.</u>
Notes:	<u>SERVICES BUILDING + PARKING LOT + OFFSITE AREA</u>			

Facility Item	O.K.	Routine	Urgent	Comments
<b>Water Pools:</b> <input type="checkbox"/> Permanent Pool (Retention Basin) <input type="checkbox"/> Shallow Marsh (Detention Basin) <input checked="" type="checkbox"/> None, Dry (Detention Basin)				
Shoreline Erosion				
Algae				Dry Swale, GRASSED
Trash & Debris				BOTTOM
Sediment				
Aesthetics				
Other				
<b>Inflows (Describe Types/Locations):</b> PARKING LOT TO SLL RUNS EAST PART OF SITE TO 18" RCD				
Condition of Structure	✓			
Erosion	✓			
Trash and Debris	✓			
Sediment	✓			SOME,
Outlet Protection	N/A			
Other				Channel Loss Gage, 2 checktimbers
<b>Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):</b> 4x4 01-7 GRATE, 4' DEEP				
Condition of Structure	✓			
Corrosion	✓			
Trash and Debris	✓			ABOUT 1/2 FT WATER IN CONC. BOX
Sediment				
Vegetation				
Other				4" PER FOR RISER
<b>Principal Outlet Structure - Barrel, Conduit, etc. :</b> 8" PVC OUTLET				
Condition of Structure		✓	✓	problems, not per plan
Settlement		✓	✓	
Trash & Debris	✓			
Erosion/Sediment	✓			
Outlet Protection	✓			TO PAVED CHANNEL AT RICH RD.
Other				
<b>Emergency Spillway (Overflow):</b> NONE, WOULD FLOW TO ENTRANCE ROAD.				
Vegetation	NA			
Lining	NA			
Erosion	NA			
Trash & Debris	NA			
Other	NA			
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
<b>Nuisance Type Conditions:</b>				
Mosquito Breeding	✓			None Major
Animal Burrows	✓			
Graffiti	✓			
Other				
<b>Surrounding Perimeter Conditions:</b> site, SF to east, open field to N, church to west				
Land Uses	✓			RR to south
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			Looks great. Well landscaped
Access /Maintenance Roads or Paths	✓			Parking lot
Other				

**Remarks:**

- Cleanout near end 18" RPD needs cap. Currently short-circuiting filtering system. Clean + cap. (CO1)
- 2nd cleanout same (CO2) cap + clean.
- 3rd C.D. same (CO3)



- Major problem 80' PVC. unable to drain, not per spec. (90° elbow?)
- INLET Having 1' water indicative of clogged or improperly constructed outlet pipe.

Overall Environmental Division Internal Rating: 2

Barrel problem

Signature: [Signature]

Date: 4/02/04

Title: CIVIL ENG ENV DIV

6/8/05 Reinspect

- outlet pipe fixed; standing water
- cap in underdrain pipe (pushed down) obstructing uo
- Till silt sals where ponding (3 areas)
- No need to cap lower c.o., fine grade silt to drain, add Nyloplast inlet cap.
- Call for reinspect 8/11

Date Record Created:

WS\_BMPNO:

Print Form

Created By:

YC034

**WATERSHED** YC  
**BMP ID NO** 034  
**PLAN NO** SP-6-02  
**TAX PARCEL** (23-2)(1-18)  
**PIN NO** 2320100018  
**CONSTRUCTION DATE** 1/4/2004  
**PROJECT NAME** Johnston Medical Clinic  
**FACILITY LOCATION** 7450 Richmond Road  
**CITY-STATE** Norge, Va. 23168  
**CURRENT OWNER** Timothy K. Johnston D.D.S.  
**OWNER ADDRESS** 7450 Richmond Road  
**OWNER ADDRESS 2**  
**CITY-STATE-ZIP CODE** Norge, Va. 23168  
**OWNER PHONE**  
**MAINT AGREEMENT** Yes  
**EMERG ACTION PLAN** No

**PRINTED ON:**  
**Saturday, March 13, 2010**  
**3:19:36 PM**

**MAINTENANCE PLAN**

**Yes**  
**SITE AREA acre** 1.515  
**LAND USE** Dental Office  
**old BMP TYP** Dry Swale  
**JCC BMP CODE** E2 Dry Swale  
**POINT VALUE** 10

**CTRL STRUC DESC** DI-7 Riser

**CTRL STRUC SIZE inches**

**OTLT BARRL DESC** PVC

**OTLT BARRL SIZE inch** 8

**EMERG SPILLWAY** No

**DESIGN HW ELEV** 115.8

**PERM POOL ELEV** na

**2-YR OUTFLOW cfs** 0.12

**10-YR OUTFLOW cfs** 3.05

**REC DRAWING** Yes

**SVC DRAIN AREA acres** 1.52

**SERVICE AREA DESCRI** Building, Parking & Offsite Road

**IMPERV AREA acres** 0.63

**CONSTR CERTIF** Yes

**RECV STREAM** UT of Yarmouth Creek

**EXT DET-WQ-CTRL** Yes

**LAST INSP DATE** 6/9/2005 **Inspected by:**

**WTR QUAL VOL acre-ft** 0.0503

**INTERNAL RATING** 3

**CHAN PROT CTRL** Yes

**CHAN PROT VOL acre-ft** 0.049

**MISC/COMMENTS**

**SW/FLOOD CONTROL** Yes

SUP-21-01. Perf. 4-inch UD with cleanouts.  
LID type design.

**GEOTECH REPORT** Yes

Get Last BMP No

Return to Menu

Additional Comments:



**ENVIRONMENTAL DIVISION REVIEW COMMENTS**  
**JOHNSTON DENTAL OFFICE**  
**COUNTY PLAN NO. SP - 006 - 02**  
*February 21, 2002*

**General Comments**

1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
2. An Inspection/Maintenance Agreement shall be executed with the County for the BMP facility for this project.
3. Record Drawing and Construction Certification. The stormwater management/BMP facility as proposed for this project will require submission, review and approval of a record drawing (as-built) and construction certification prior to release of the posted bond/surety. Provide notes on the plan accordingly to ensure this activity is adequately coordinated and performed before, during and following construction in accordance with current County guidelines. *(Note: Since the grassed swales along the east and west borders of the site are of relatively flat slopes, these features will need to be included in the final record drawings for the site to verify proper grade and positive drainage were achieved.)*
4. Responsible Land-Disturber Notification. Provide the name of an individual who will be in charge of and responsible for carrying out the land-disturbing activity. Permits or plans without this information are deemed incomplete and not approved until proper notification is received.
5. Offsite Work. Provide evidence of permission to occupy or disturb offsite tracts from their respective owner(s). Offsite grading is shown on the Woodward parcel and installation of a 8-inch sanitary sewer is shown on the Degges parcel, both east of the site. Show complete parcel information for the Degges tract as placement of title blocks has blocked out this information on all plan sheets.

**Erosion & Sediment Control Plan:**

6. Stockpiles. Note 1 on the cover sheet gives the contractor responsibility to establish areas for stockpiling and equipment storage and staging areas. The plans need to reflect these locations even if approximate or if they may change before the preconstruction meeting.
7. Offsite Work. Limits of work need to identify all off-site land disturbing areas (utilities) and proper erosion control measures. Also, give an indication, if known, of where demolition material is to be disposed of.
8. Demolition Plan. The demolition plan and notes on Sheet C-3 and the sequence of construction on Sheet C-6 should clearly reflect that perimeter site erosion and sediment measures shall be installed and functional prior to site demolition activities.
9. Sediment Trap. Provide calculations for the sediment trap per Minimum Standard 3.13 of the VESCH and provide a table near the detail on Sheet C-7 outlining critical dimensions and elevations for the trap. Show where the trap outlet will be placed or whether the riser structure and outfall piping is going to be installed early and modified to serve as a outlet release mechanism. Show modification details as necessary for the riser to serve as a temporary sediment control device. Explain how the trap will work before grading of the site is complete, as it appears that upon initial clearing and the start of grading, all site drainage cannot be directed to the trap for use as a primary site control measure. *(Note: Also, in order to reduce the risk for failure, it is important to note on the plans and sequence of construction that installation of the underdrain and filter portion of the dry swale BMP must be delayed until such time as the site stabilization is achieved.)*