



## **CERTIFICATE OF AUTHENTICITY**

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

**BMP NUMBER: CC-029**

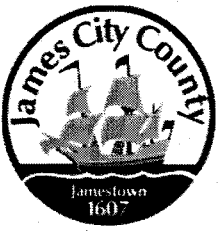
**DATE VERIFIED: March 16, 2012**

**QUALITY ASSURANCE TECHNICIAN:**

**Leah Hardenbergh**

*Leah Hardenbergh*

**LOCATION: WILLIAMSBURG, VIRGINIA**



## Stormwater Division

### MEMORANDUM

**DATE:** March 11, 2010  
**TO:** Michael J. Gillis, Virginia Correctional Enterprises Document Management Services  
**FROM:** Jo Anna Ripley, Stormwater  
**PO:** 270712  
**RE:** Files Approved for Scanning

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**General File ID or BMP ID:** CC029

**PIN:** 3910100001

**Subdivision, Tract, Business or Owner**

**Name (if known):**

Dumont, Pamela N

**Property Description:**

Godspeed Animal Clinic

**Site Address:**

102 Tewning Road

*(For internal use only)*

**Box** 12

**Drawer:** 7

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

**Y**

**Book or Doc#:**

040029617

**Page:**

010007854

Comments

CE029

**Contents for Stormwater Management Facilities As-built Files**

Each file is to contain:

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

040029617

COUNTY OF JAMES CITY, VIRGINIA

 **COPY**

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 8<sup>th</sup> day of NOV., 20 04,  
between Pam Dumont, and  
all successors in interest, ("COVENANTOR(S),") owner(s) of the following property:  
Street Address: 102 TEWNING ROAD  
Legal Description: ROPER AND TILLAGE  
Project Name: Godspeed Animal Care Expansion  
Document No. 010002854, 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, monitoring, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.
5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.



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

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

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

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

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

COVENANTOR(S)

Pam Dumont

Print Name/Title

Pam Dumont

owner.

ATTEST:

Kimberly Padgett

COVENANTOR(S)

\_\_\_\_\_

Print Name/Title

\_\_\_\_\_

ATTEST:

\_\_\_\_\_

COMMONWEALTH OF VIRGINIA  
CITY/COUNTY OF James City

I hereby certify that on this 8<sup>th</sup> day of November, 2004, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of James City, aforesaid personally appeared Pamela Dumont and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 8<sup>th</sup> day of November, 2004.

Joan J. Merdcoli  
Notary Public

My Commission expires: My Commission Expires August 01, 2007

Approved as to form:

M. H. L. Denny  
Asst. County Attorney

P. Dumont

This Declaration of Covenants prepared by:

Pamela N. Dumont  
(Print Name)

President / Owner  
(Title)

113 Forest Ln.  
(Address)

Williamsburg VA 23183  
(City) (State) (Zip)

VIRGINIA: CITY OF WILLIAMSBURG & COUNTY OF JAMES CITY  
This document was admitted to record on 23 Nov 04  
at 9:33 AM/PM. The taxes imposed by Virginia Code  
Section 58.1-801, 58.1-802 & 58.1-814 have been paid.  
STATE TAX LOCAL TAX ADDITIONAL TAX

\$        \$        \$         
TESTE: BETSY B. WOOLRIDGE, CLERK

BY: Betsy B. Woolridge Clerk

drainage.pre

3910/0000/RO.  
102 Tanning Rd.  
C-45-04

James City County Environmental Division  
Stormwater Management/BMP Record Drawing and Construction Certification Review  
Tracking Form

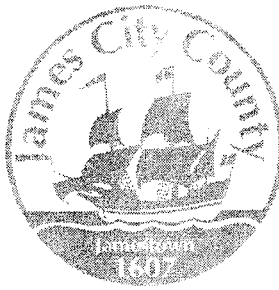
APPROV DIV  
ENV 10/25/04

County Plan No.: SP-70-04  
Project Name: GODSPEED ANIMAL CARE  
Stormwater Management Facility: COUNTY TYPE D-2 SURF SAND FILTER  
BMP Phase #: I II III  
☒ Information Package Received. Date/By: Aug 17 '05  
☒ Completeness Check:  
☒ Record Drawing Date/By: Aug 17 '05  
☒ Construction Certification Date/By: DEC 08 '05  
☒ RD/CC Standard Forms (Required for all BMPs after Feb 1<sup>st</sup> 2001 Only)  
☒ Insp/Maint Agreement # / Date: #040029616 NOV 23 '04  
☒ BMP Maintenance Plan Location: Sheet C-4  
☐ Other:  
☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.  
☒ Yes ☐ No Location: Sheet C-11 Note # 20  
☒ Assign County BMP ID Code #: Code: ~~RD~~ CC 029  
☒ Preliminary Input/Log into Division's "As-Built Tracking Log"  
☒ Add Location to GIS Database Map. Obtain basic site information (GPIN, Owner, Address, etc.)  
☒ Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)  
☒ Active Project File Review (correspondence, H&H, design computations, etc.)  
☒ Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.)  
☒ Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review). NA  
☒ Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).  
☒ Final Inspection (FI) Performed Date: 10/07/05  
☒ Record Drawing (RD) Review Date: MAY 15 '06  
☒ Construction Certification (CC) Review Date: EMAIL ISSUED DEC 01 '05  
☐ Actions:  
☐ No comments.  
☒ Comments. Letter Forwarded. Date: Email issued CL, CR to Henderson  
☐ Record Drawing (RD)  
☐ Construction Certification (CC)  
☐ Construction-Related (CR)  
☐ Site Issues (SI)  
☐ Other:  
☒ Second Submission: CONST CERT DEC 08 '05 CG OK  
☒ Reinspection (if necessary): DRIVEBY ON SEV OCCASIONS (my dog goes there!!)  
☒ Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release process.  
☒ Complete "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 save into County BMP Inventory.  
☒ Request mylar/reproducible from As-Built plan preparer. LANDTECH VIA PHONE 5-15-06  
☒ Complete "As-built Tracking Log". RECEIVED 5-26-06  
☒ Last check of BMP Access Database (County BMP Inventory).  
☒ Add BMP to JCC Hydrology & Hydraulic database (optional). NO  
☒ Add BMP to PRIDE BMP ratings database.

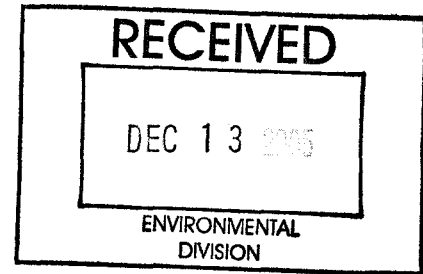
Final Sign-Off

Plan Reviewer: [Signature] Date: 5-15-06

\*\*\* See separate checklist, if needed.



James City County, Virginia  
Environmental Division



Stormwater Management / BMP Facilities  
Record Drawing and Construction Certification Forms

( Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County. )

Section 1 - Site Information:

Project Name: Godspeed Animal Care  
Structure/BMP Name: County Type D-2 Surface Sand Filter  
Project Location: Intersection Ironbound Rd & Tewning Rd.  
BMP Location: 102 Tewning Road  
County Plan No.: SP - 070 - 04

Project Type: ☐ Residential ☒ Business Tax Map/Parcel No.: 3910100001  
☐ Commercial ☐ Office BMP ID Code (if known):  
☐ Institutional ☐ Industrial Zoning District: M-1  
☐ Public ☐ Roadway Land Use: Veterinary Clinic  
☐ Other Site Area (sf or acres): 1.46 acres

Brief Description of Stormwater Management/BMP Facility: James City County  
Type D-2 Surface Sand Filter located at  
the southeast corner of the property

Nearest Visible Landmark to SWM/BMP Facility: SW Corner of Inte Ironbound Rd  
and Tewning Rd.

Nearest Vertical Ground Control ( if known ):

☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other  
Station Number or Name: # 325  
Datum or Reference Elevation: 110.67  
Control Description: 3 1/4" disk set in concrete @ Berkley ES Entrance  
Control Location from Subject Facility: Control location is approx. 1 mile  
south on Ironbound Rd from the BMP Facility

**Section 2 - Stormwater Management / BMP Facility Construction Information:**

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☒ Unknown  
Approx. Construction Start Date for SWM/BMP Facility: Fall 2004  
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☒ Unknown  
Name of Site Work Contractor Who Constructed Facility: Henderson, General Contractors  
Name of Professional Firm Who Routinely Monitored Construction: Unknown  
Date of Completion for SWM/BMP Facility: July 2005  
Date of Record Drawing/Construction Certification Submittal: \_\_\_\_\_

*( Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release. )*

**Section 3 - Owner / Designer / Contractor Information:**

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: Dr. Pamela Dumont  
Mailing Address: 102 Tawning Rd.  
Williamsburg, Va. 23185  
Business Phone: 253-0656 Fax: 253-1080  
Contact Person: Pamela Dumont Title: Dr.

Design Professional: *( Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility. )*

Firm Name: Vanasse Hangen Brustlin, Inc  
Mailing Address: 115 South 15th Street, Suite 200  
Richmond, Va. 23219  
Business Phone: (804) 343-7100  
Fax: (804) 343-1713  
Responsible Plan Preparer: Steven O. Wigley P.E. #019307  
Title: Professional Engineer  
Plan Name: Godspeed Animal Care  
Firm's Project No. 31248.01  
Plan Date: 10/5/04  
Sheet No.'s Applicable to SWM/BMP Facility: C-3/C-4 / C-5 / C-7 /

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

Name: Henderson, General Contractors  
Mailing Address: 5800 Mooretown Rd.  
Williamsburg, Va. 23188  
Business Phone: 565-1090  
Fax: 564-9120  
Contact Person: Bruce Grillam  
Site Foreman/Supervisor: Bruce Grillam  
Specialty Subcontractors & Purpose (for BMP Construction Only): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Section 4 - Professional Certifications:**

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

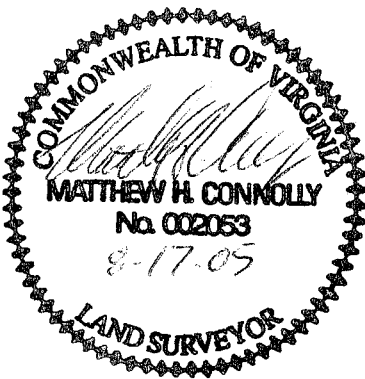
**Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities**

**Record Drawing Certification**

Firm Name: LandTech Resources, Inc.  
Mailing Address: 5810-F Haverstown Rd  
Williamsburg, Va. 23188  
Business Phone: 565-1677  
Fax: 565-0782

Name: Matthew Connolly  
Title: President  
Signature: [Signature]  
Date: 8-17-2005

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.



\_\_\_\_ ( Seal )  
Virginia Registered Professional Engineer  
or Certified Land Surveyor

**Construction Certification**

Firm Name: VANASSE HANGEN BRUSTLIN, Inc  
Mailing Address: 115 South 15th St.  
Richmond VA 23185  
Business Phone: 804-323-7100  
Fax: \_\_\_\_\_

Name: Richard S. Phillips  
Title: Senior Engineer  
Signature: [Signature]  
Date: 12/8/05

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



\_\_\_\_ ( Seal )  
Virginia Registered  
Professional Engineer

## Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

- ☐ PreConstruction Meeting - Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.

☒ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM*** and ***RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.

☒ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.

- ☐ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.

☒ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

**Dual Purpose Facilities** - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

*Interim Construction Certification* is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (\*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(\*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)



Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*



Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate "**RECORD DRAWING**" in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, *or similar forms thereof*, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducible.



Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as \*.dxf, \*.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.



**STORMWATER MANAGEMENT / BMP FACILITIES  
RECORD DRAWING CHECKLIST**

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete )

**I.     Methods and Presentation:** ( Required for all Stormwater Management / BMP facilities.)

- XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.
- XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.
- XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).
- XX 4. All plan sheet revision blocks modified to indicate date and record drawing status.
- XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

**II.    Minimum Standards:** (Required for all Stormwater Management / BMP facilities, as applicable.)

- XX 1. All requirements of Section I (Methods and Presentation) apply to this section.
- XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.
- XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.
- XX 4. Top widths, berm widths and embankment side slopes.
- XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.
- XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- N/A 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

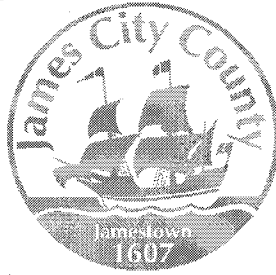
- YX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
- YX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
- YX 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.
- N/A 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
- N/A 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
- YX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
- YX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
- N/A 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
- Ine. 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
- YX 18. Maintenance plan taken from approved design plan transposed onto record drawing set.
- N/A 19. Fencing location and type, if applicable to facility.
- XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.
- YX 21. No visual signs of erosion or channel degradation immediately downstream of facility.
- YX 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

**STORMWATER MANAGEMENT / BMP FACILITIES  
RECORD DRAWING CHECKLIST**

( Key for Checklist is as follows: XX Acceptable    N/A Not Applicable    Inc Incomplete )

**VI.    Group D - Filtering Systems**    ( Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters )

- XX D1.    All requirements of Section II, Minimum Standards, apply to Group D facilities.
- N/A D2.    Sediment pretreatment devices provided.
- N/A D3.    For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.
- N/A D4.    For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.
- XX D5.    Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.
- Inc. D6.    No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed .
- XX D7.    Filtering system is off-line from storm drainage conveyance system.
- XX D8.    Overflow outlet has adequate erosion protection.
- N/A D9.    Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.
- N/A D10.    Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.
- XX D11.    Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.
- XX D12.    Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.
- XX D13.    No visual signs of erosion or channel degradation immediately downstream of facility.
- N/A D14.    Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

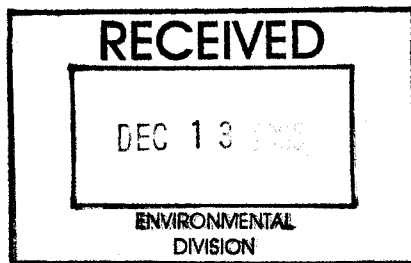


James City County, Virginia  
Environmental Division

**Stormwater Management / BMP Facilities  
Record Drawing and Construction Certification**

*Standard Forms & Instructions*

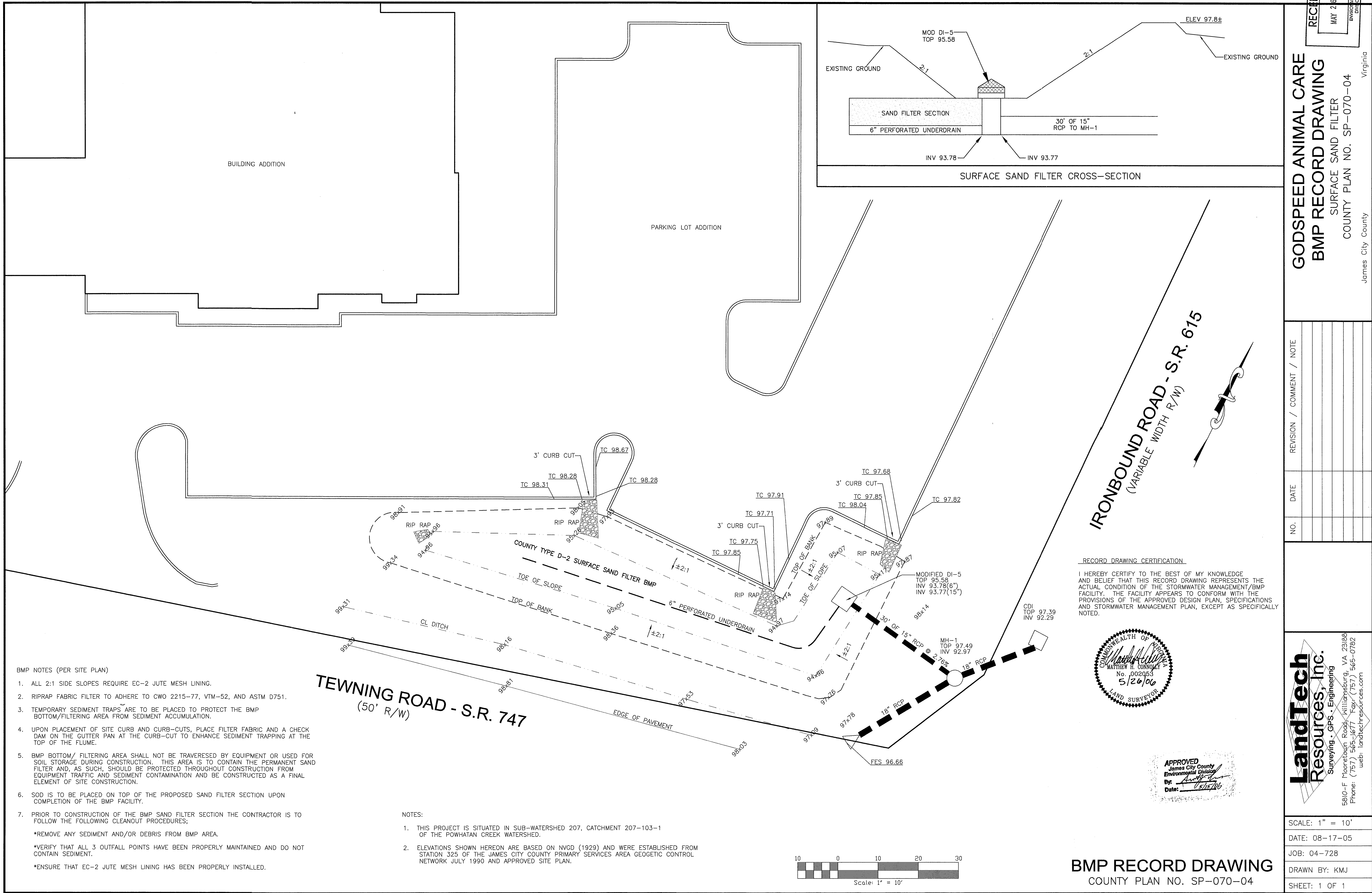
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GODSPEED  
PC 197-CC 029  
SP-70-04

*Issue Date  
February 1, 2001*





RECEIVED  
MAY 26 2006  
JAMES CITY COUNTY  
ENGINEERING DIVISION

**GODSPEED ANIMAL CARE  
BMP RECORD DRAWING**  
SURFACE SAND FILTER  
COUNTY PLAN NO. SP-070-04  
James City County  
Virginia

NO.	DATE	REVISION / COMMENT / NOTE

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

SCALE: 1" = 10'  
DATE: 08-17-05  
JOB: 04-728  
DRAWN BY: KMJ  
SHEET: 1 OF 1

# Transmittal

**LandTech Resources, Inc.**

## Surveying - Mapping - GPS

5810-F Mooretown Road, Williamsburg, VA 23188

Tel: 757-565-1677 Fax: 757-565-0782

To: Scott Thomas, P.E.

Company: James City County Environmental Division

From: Kenneth Jenkins

Date: 8/17/05

Job Name/Number: 05-001

The following have been sent:

- ☐ as requested  
☒ for review and comment  
☐ please sign and return  
☐ for temporary use, please return by \_\_\_\_\_

GOOSPEED  
PC 197  
SP-70-04

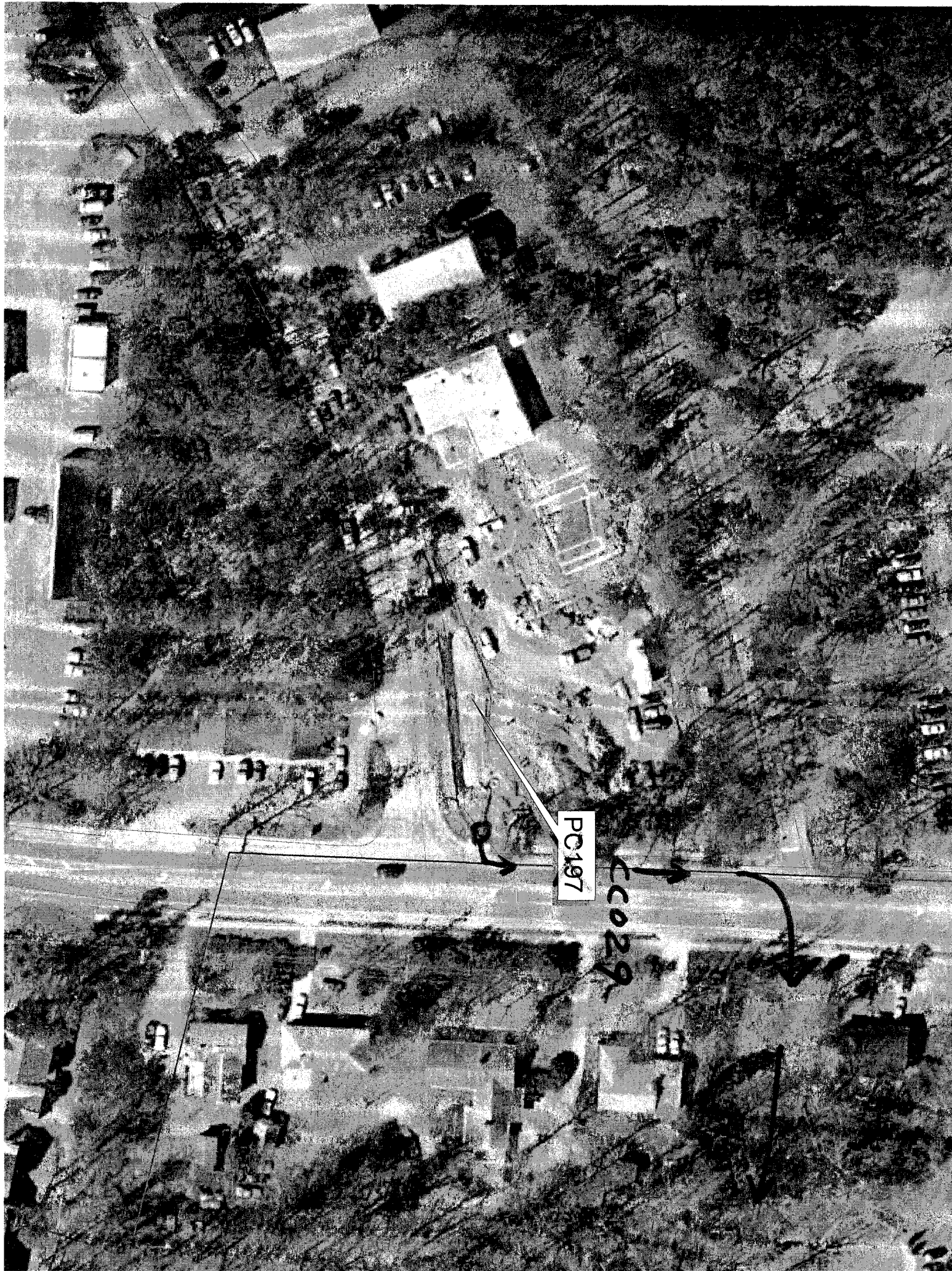
[illegible]

Remarks:

cc:Henderson, Inc.

Signature: Kenneth M. Jenkins







# odspeed Animal Care

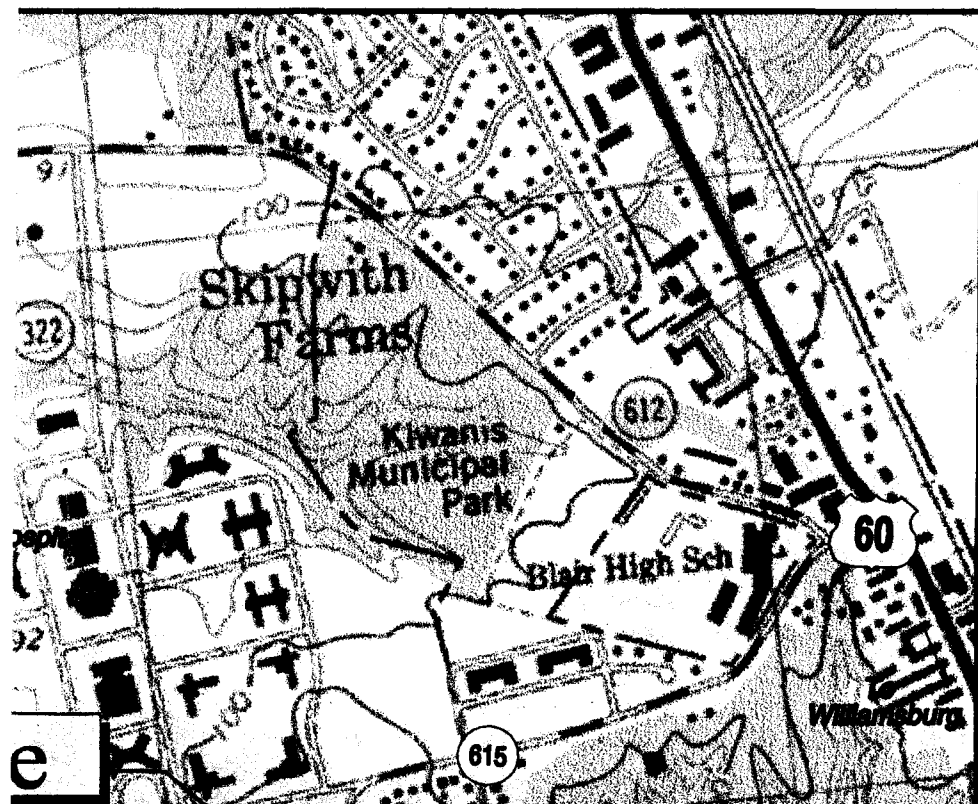
Tewning Road (State Route 747)  
James City County, Virginia



SP-070-04

COUNTY OF JAMES CITY FINAL SITE PLAN	
APPROVALS	DATE
Fire Dept. <u>NH/EC</u>	<u>6/23/04</u>
Health Dept. _____	_____
VDOT <u>BW/EC</u>	<u>10/29/04</u>
Planning <u>R</u>	<u>4/22/04</u>
Environ <u>DE/EC</u>	<u>10/25/04</u>
Zoning <u>R</u>	<u>4/23/04</u>
_____ <u>TF/EC</u>	<u>11/12/04</u>
County Ex. <u>WB/EC</u>	<u>6/17/04</u>
REA _____	_____
Other _____	_____

JCC SP -070-04



## Property Information

Owner:

**Dr. Pamela Dumont**  
102 Tewning Road  
Williamsburg, VA 23185

Applicant:

**Dr. Pamela Dumont**

SP-70-04  
CC 029

Zoning Summary Chart

Regulation Requirements	Required	Provided
LOT SIZE	10,000 sf	63,600 sf
SETBACK		
NORTHERN SIDE	50 FT.	50 FT.±
SOUTHERN SIDE	75 FT.	20 FT.±****
EASTERN SIDE	20 FT.	20 FT.±
WESTERN SIDE	20 FT.	20 FT.±
BUILDING HEIGHT	35'	2 STORY 28'-6"
PAVING PARKING SIZE	9' X 18'	9'X 18'
DRIVEWAY SPACE SIZE	9' X 18'	9'X 18'

DISTRICT: M-1: LIMITED BUSINESS/ INDUSTRIAL DISTRICT

Parking Summary Chart

Requirement	Existing	Required	Provided
DRIVEWAY SPACES (9'x18')	N/A	40	40***
SPACES OF HANDICAPPED - STD.*	-	2	2
SPACES	-	42	42
SPACES (10' X 50') **	-	1	1

REQUIREMENTS

COUNTY ZONING ORDINANCE

APPROVED BY THE PLANNING DIRECTOR AT THE TIME OF CONCEPTUAL VIEW IN ACCORDANCE WITH SECTION 24-59(D) AND AFTER REVIEWING THE PARKING QUALIFICATION INFORMATION (SEE BELOW).

IN ACCORDANCE TO SECTION 24-416 (NOV. 1, 2001), AND LOCAL REGULATIONS, ESTABLISH THE SETBACK 20 FEET FROM NORTHERN MOST PROPERTY LINE WITH THE CONDITION THAT ALL OUTDOOR DOG KENNELS BE LOCATED AT LEAST 35 FEET FROM THE NORTHERN MOST PROPERTY LINE.

Land Use Statistics

Total Site Area = 1.46 Acres

Description	Existing		Proposed		Proposed Percentage of Total Site
	(S.F.)	(AC)	(S.F.)	(AC)	
BUILDING FOOTPRINT	3895	0.09	11,798	0.27	18%
PAVEMENT	7840	0.18	17,116	0.39	27%
CONCRETE	719	0.02	1700	0.04	3%
OPEN SPACE	51144	1.17	32,984	0.76	52%
TOTAL	63598	1.46	63,598	1.46	100%

Total Area of Land Disturbance = 0.77 Acres

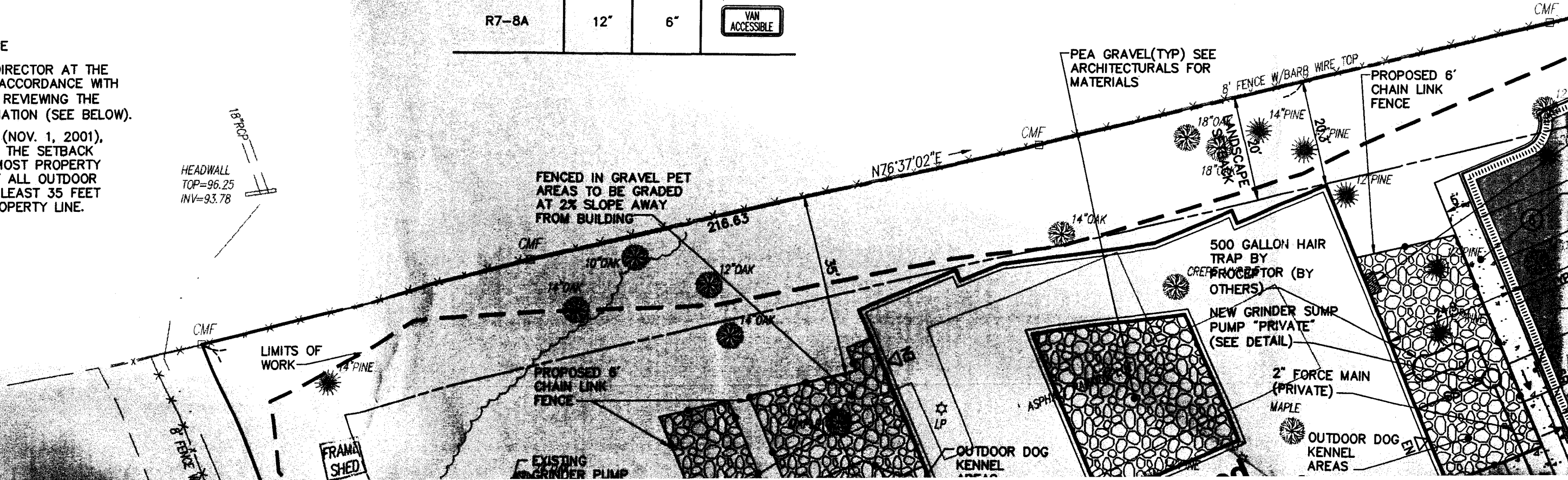
Sign Summary

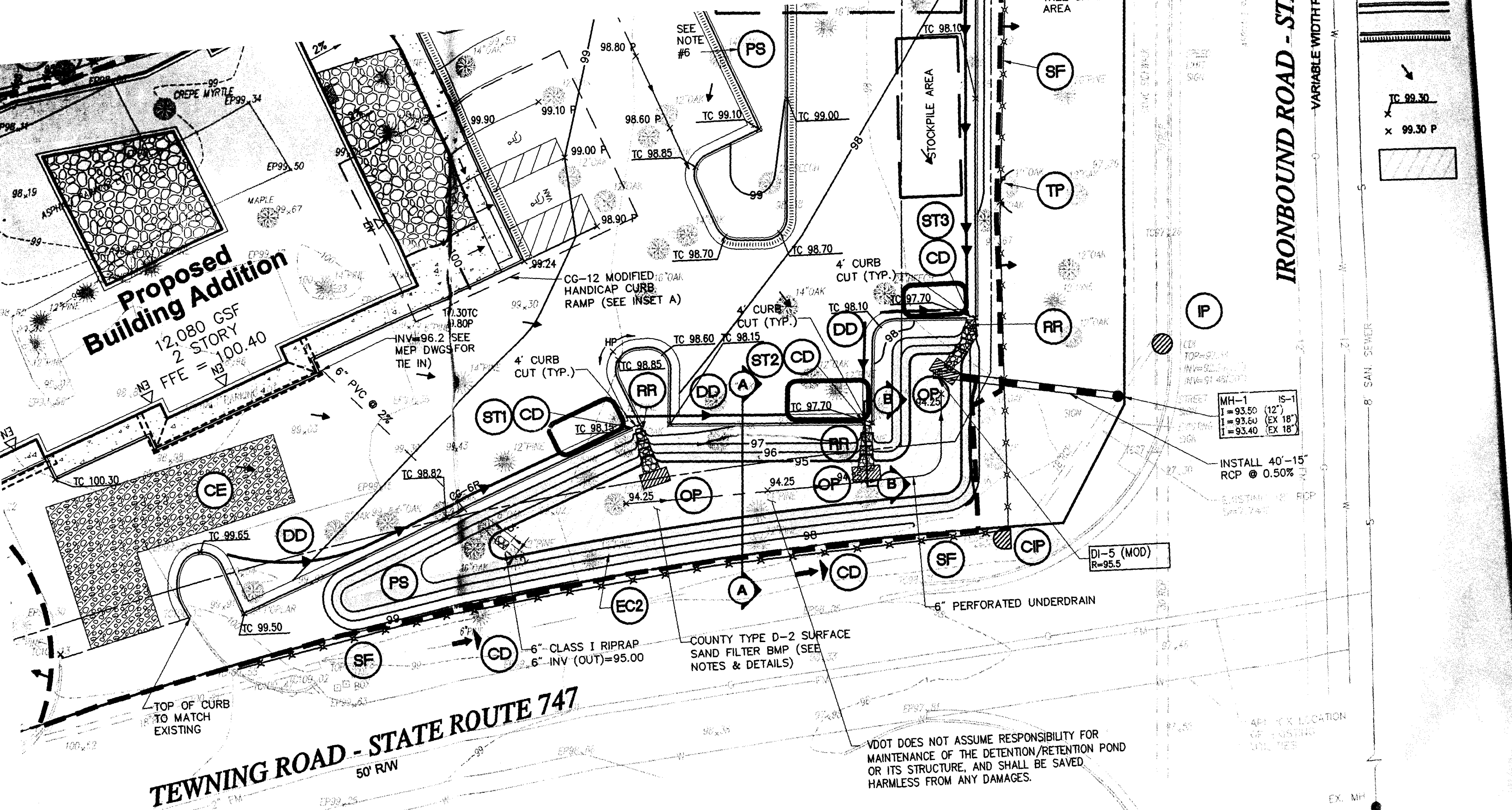
M.U.T.C.D. Number	Specification		Desc.
	Width	Height	
R7-8	12"	18"	RESERVED PARKING
R7-8A	12"	6"	VAN ACCESSIBLE

Legend

	STANDARD
	REVERSED
	STANDARD
	PROPOSED
	EXISTING
	FORCE MAIN
	EXISTING
	PROPOSED
	EXISTING
	TELEPHONE

N/F  
COMMONWEALTH OF VIRGINIA  
EASTERN STATE HOSPITAL  
TAX MAP (39-1)(1-152)  
ZONED R2





## Godspeer Animal Care Erosion and Sedimentation Control Narrative

EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED AS PROPOSED ON THE EROSION AND SEDIMENT CONTROL PLAN AND AS STATED IN THE STANDARD EROSION AND SEDIMENT CONTROL NOTES FOR JAMES CITY COUNTY ENVIRONMENTAL DIVISION TO PRECLUDE THE TRANSPORT OF WATERBORNE SEDIMENTS FROM ENTERING ONTO ADJACENT PROPERTIES OR INTO STATE WATERS

- CONSTRUCTION ENTRANCE - TO REDUCE THE AMOUNT OF MUD TRANSPORT ONTO PAVED PRIVATE AND PUBLIC ROADWAYS;



1. ALL 2:1 SIDE SLOPES REQUIRE EC-2 JUTE MESH LINING

2. RIPRAP FABRIC FILTER TO ADHERE TO CWO 2215-77, VTM-52, AND ASTM D751

3. TEMPORARY SEDIMENT TRAPS ARE TO BE PLACED TO PROTECT THE BMP BOTTOM/FILTERING AREA FROM SEDIMENT CONTAMINATION.

4. UPON PLACEMENT OF SITE CURB AND CURB-CUTS, PLACE FILTER FABRIC AND A CHECK DAM ON THE GUTTER PAN AT THE CURB-CUT TO ENHANCE SEDIMENT TRAPPING AT THE TOP OF THE FLUME.

5. BMP BOTTOM/FILTERING AREA SHALL NOT BE TRAVERSED BY EQUIPMENT OR USED FOR SOIL STORAGE DURING CONSTRUCTION. THIS AREA IS TO CONTAIN THE PERMANENT SAND FILTER AND, AS SUCH, SHOULD BE PROTECTED THROUGHOUT CONSTRUCTION FROM EQUIPMENT TRAFFIC AND SEDIMENT CONTAMINATION AND BE CONSTRUCTED AS A FINAL ELEMENT OF SITE CONSTRUCTION.

6. SOD IS TO BE PLACED ON TOP OF THE PROPOSED SAND FILTER SECTION UPON COMPLETION OF THE BMP FACILITY.

7. PRIOR TO CONSTRUCTION OF THE BMP SAND FILTER SECTION THE CONTRACTOR IS TO FOLLOW THE FOLLOWING CLEANOUT PROCEDURES;

\*REMOVE ANY SEDIMENT AND/OR DEBRIS FROM BMP AREA

\*VERIFY THAT ALL 3 OUTFALL POINTS HAVE BEEN PROPERLY MAINTAINED AND DO NOT CONTAIN SEDIMENT.

\*ENSURE THAT EC-2 JUTE MESH LINING HAS BEEN PROPERLY INSTALLED.

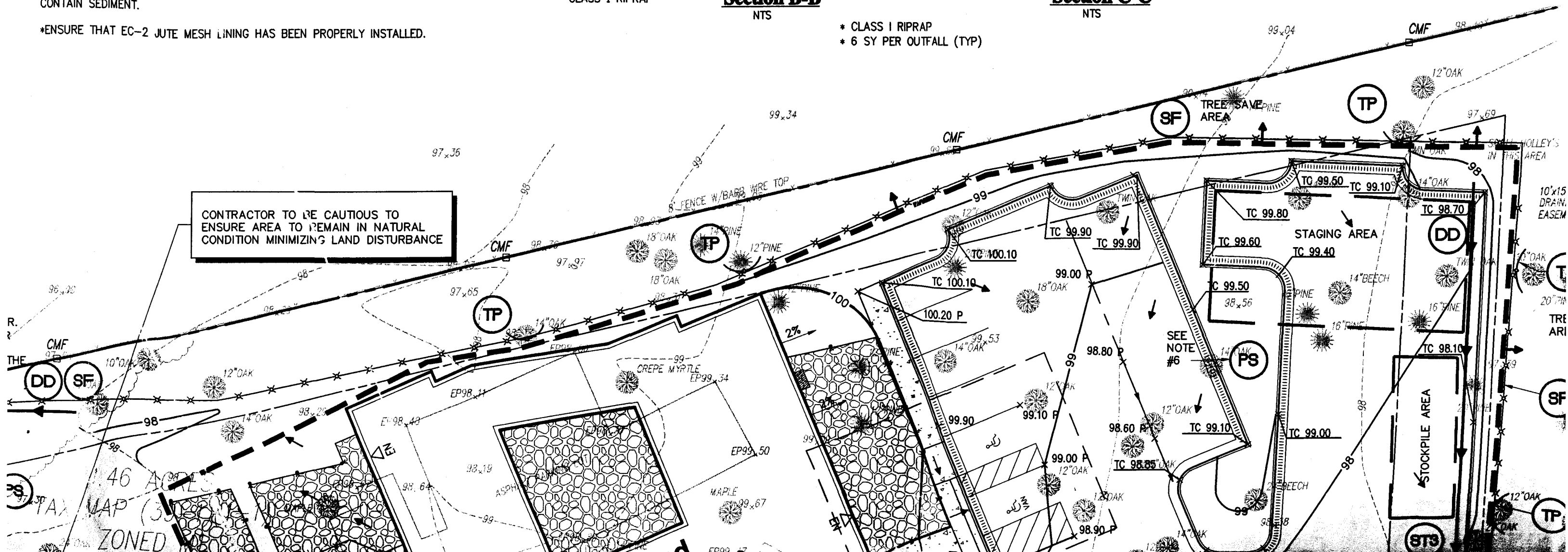
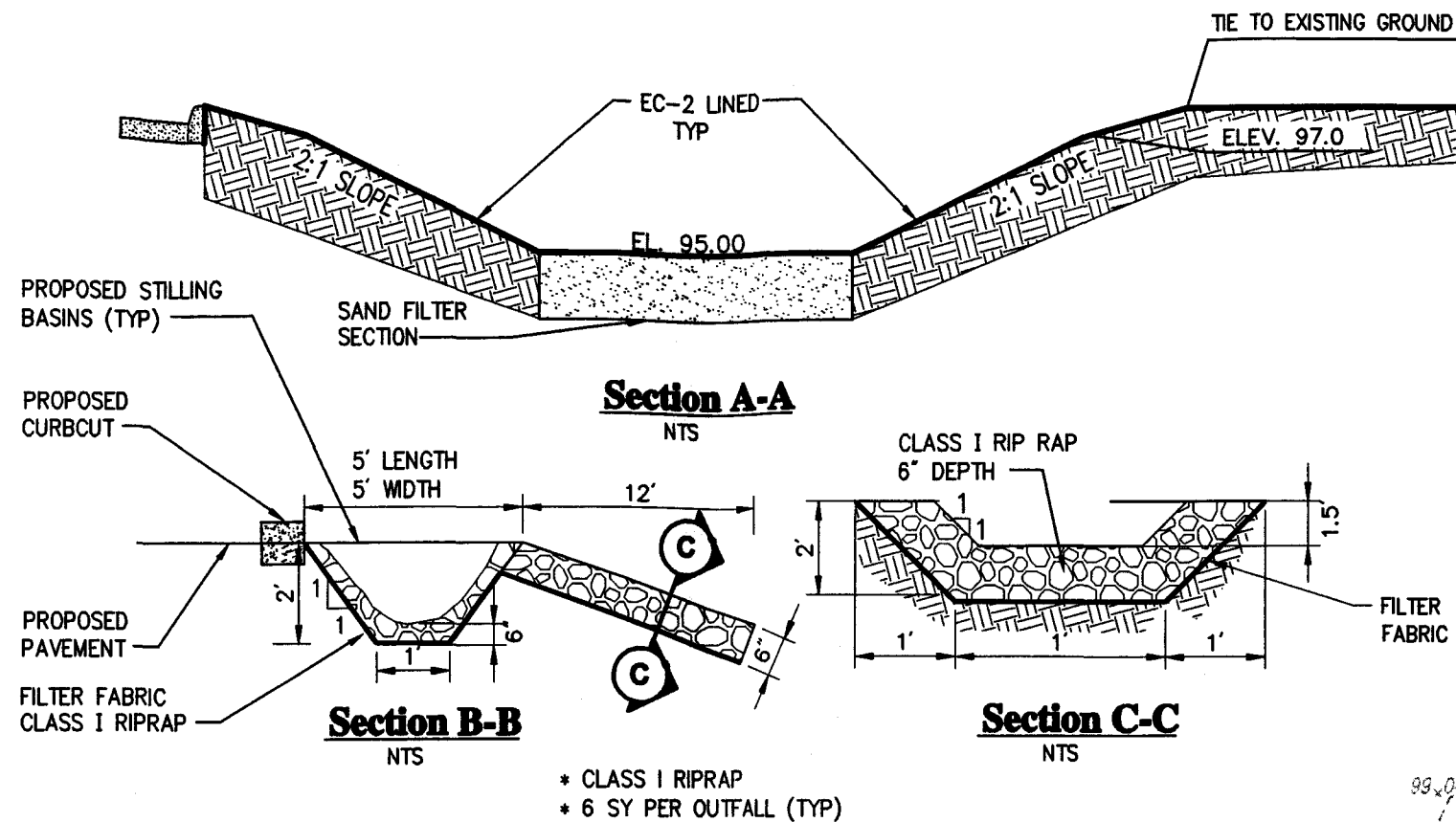
1. ALL ELEVATIONS SHOWN INDICATE

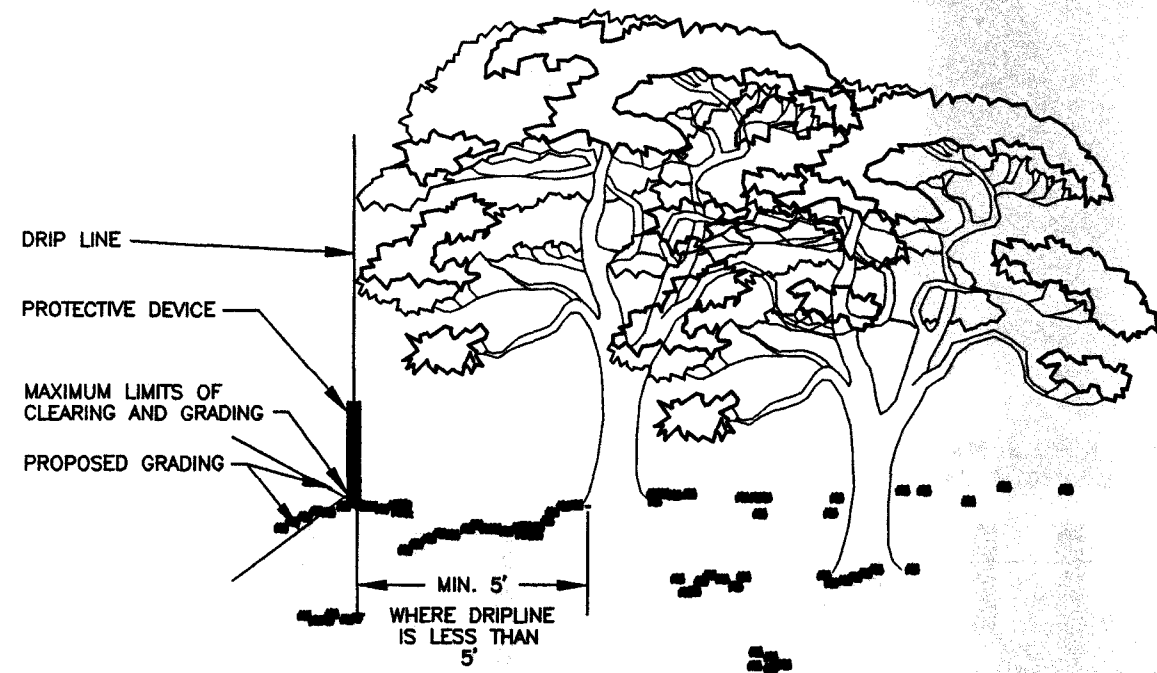
2. DOMESTIC TRASH WILL BE REMOVED BY THE EMPLOYEES.

3. SEPTIC SERVICE WILL REMOVE ,

4. CONTRACTOR IS TO PROVIDE THE SUBMISSION, REVIEW AND APPROVAL OF CONSTRUCTION CERTIFICATION AND BOND/SURVEY. THIS INCLUDES THE IS TO BE INSTALLED AS A PER

5. CONTRACTOR TO SEED/MULCH IMMEDIATELY UPON COMPLETION



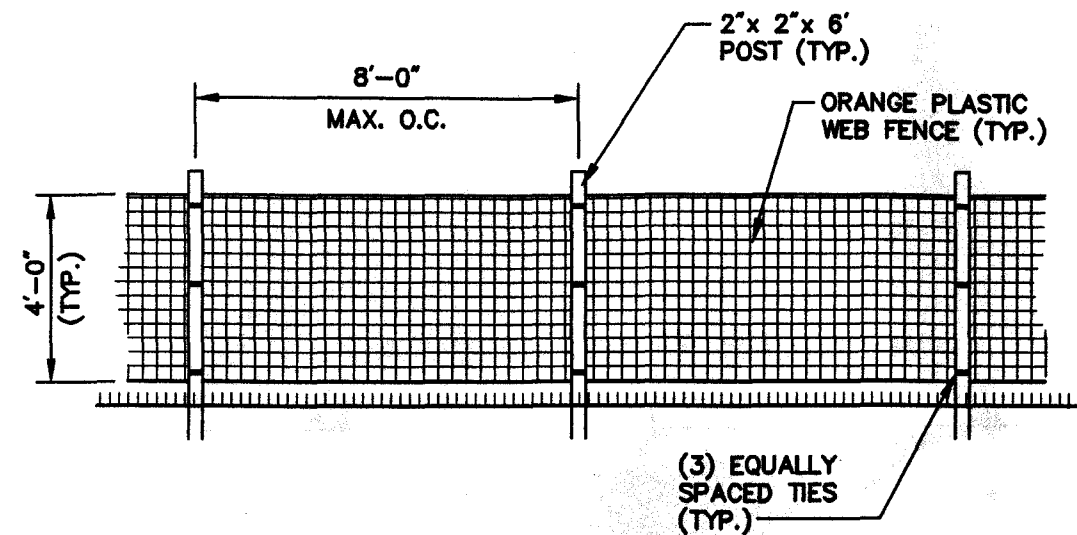


### Construction Operations Relative to the Location of Protected Trees (TP)

3-38.1

VAESCH Std. No. 3-38.1

N.T.S.



### Tree Protection Fence

(TP)

N.T.S.

VDOT #3, #357, #57 COARSE AGG. GALVANIZED WIRE

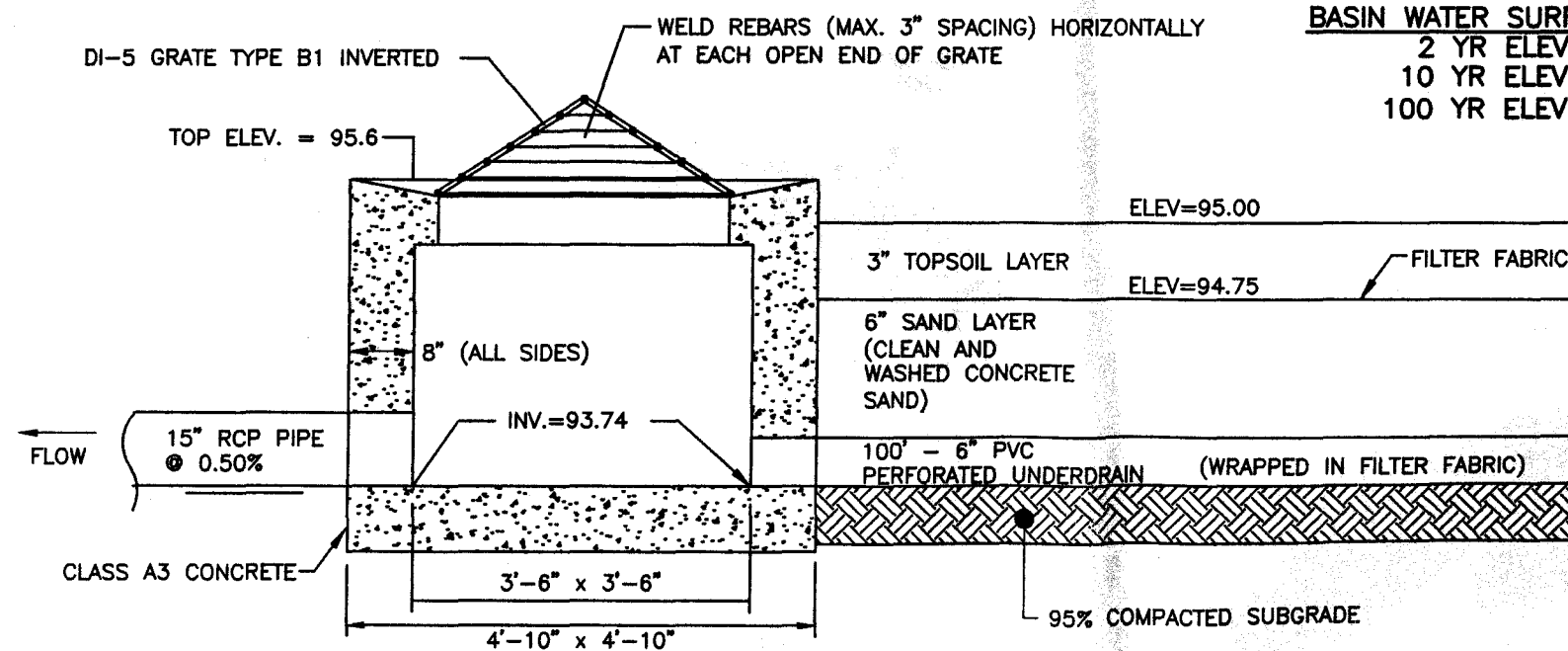
\* FILTER CLOTH—  
SECURE WIRE TO (WITH WIRE STAPLE)



\* MIN. P

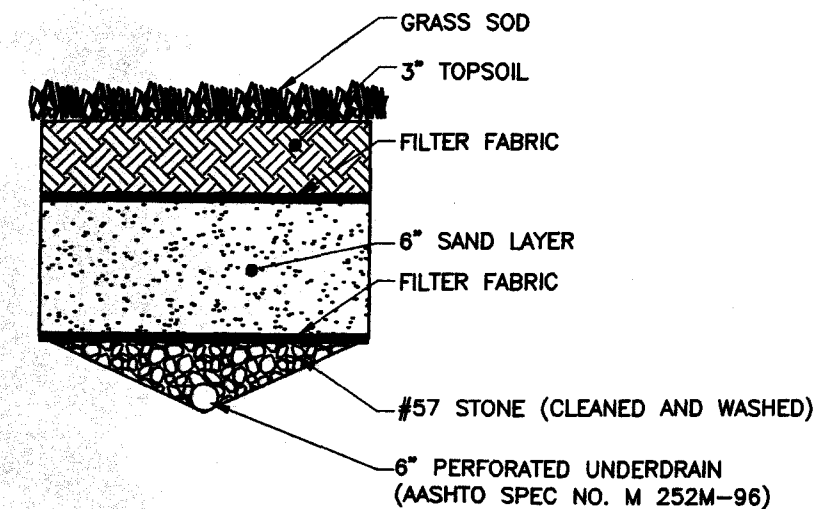
### Level Spread

N.T.S.



### BASIN WATER SURFACE ELEVATIONS

2 YR ELEV	= 95.15
10 YR ELEV	= 95.87
100 YR ELEV	= 96.38



### NOTES:

1. SAND AND STONE MEDIAS TO BE "CLEAN WASHED"

### Modified VDOT DI-5

N.T.S.

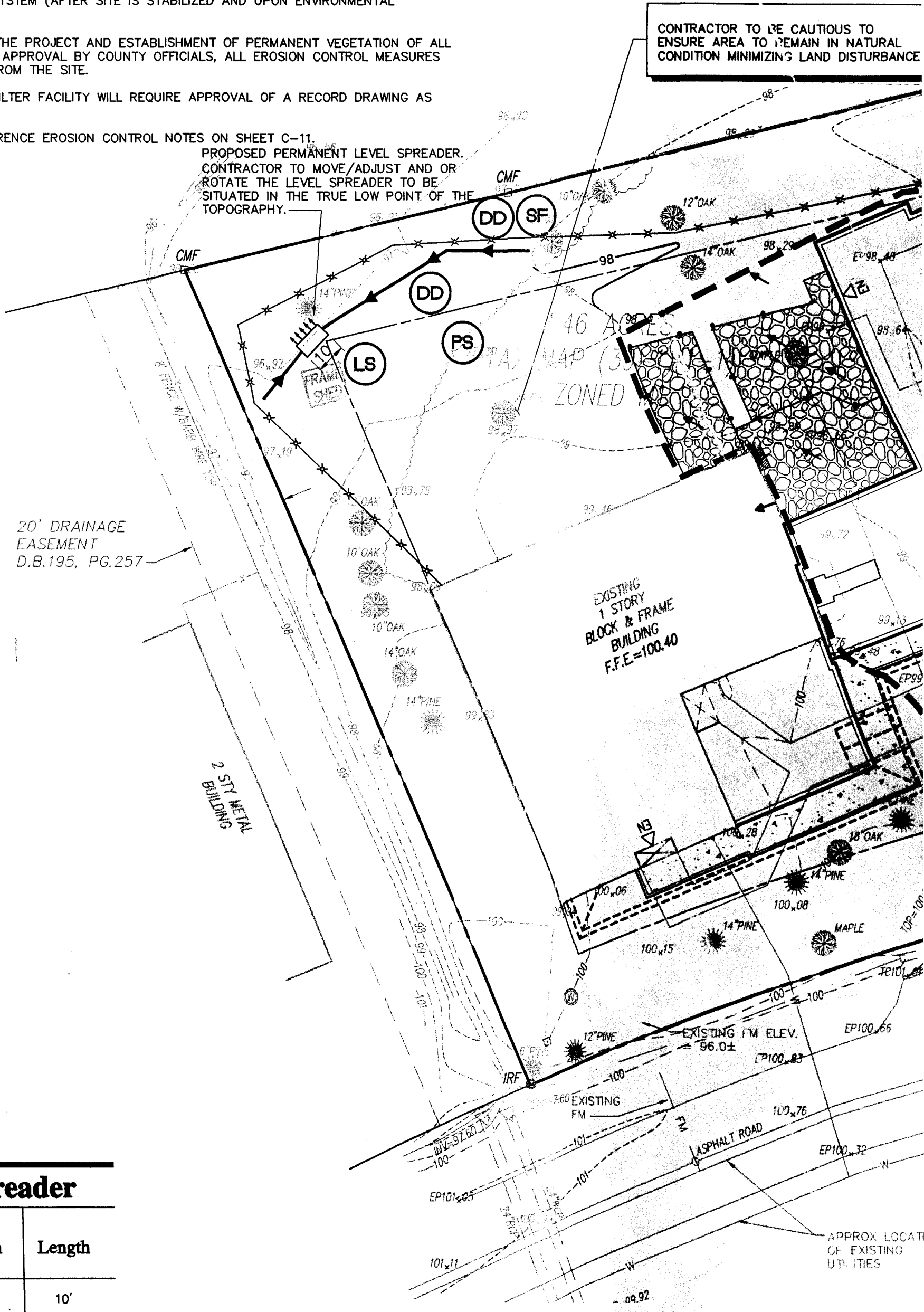
### Surface Sand Filter Structure (8 Pt. BMP)

- UPON BRINGING THE EARTHWORK TO FINAL GRADE IMMEDIATELY PLACE TEMPORARY SEEDING IN ALL DISTURBED AREAS THAT ARE NOT TO BE PAVED.
- BEGIN CONSTRUCTION OF BMP, BUT DO NOT CONSTRUCT SAND FILTER SECTION.
- INSTALL LEVEL SPREADER, CURB AND GUTTER AND RIPRAP FLUME SECTIONS.
- INSTALL FILTERED CHECK DAMS AT THE THREE CURB CUT LOCATIONS.
- INSTALL BASE STONE WITHIN PROPOSED PAVED PARKING AREAS AND REMOVE TEMPORARY SEDIMENT TRAPS.
- BEGIN BUILDING CONSTRUCTION
- PLACE TOPSOIL IN ALL DISTURBED AREAS, SEED AND MULCH
- INSTALL LANDSCAPING
- INSTALL SAND FILTER SYSTEM (AFTER SITE IS STABILIZED AND UPON ENVIRONMENTAL INSPECTOR APPROVAL)
- UPON COMPLETION OF THE PROJECT AND ESTABLISHMENT OF PERMANENT VEGETATION OF ALL DISTURBED AREAS AND APPROVAL BY COUNTY OFFICIALS, ALL EROSION CONTROL MEASURES ARE TO BE REMOVED FROM THE SITE.
- THE PROPOSED SAND FILTER FACILITY WILL REQUIRE APPROVAL OF A RECORD DRAWING AS BUILT.

\*CONTRACTOR TO REFERENCE EROSION CONTROL NOTES ON SHEET C-11.

PROPOSED PERMANENT LEVEL SPREADER.  
CONTRACTOR TO MOVE/ADJUST AND OR  
ROTATE THE LEVEL SPREADER TO BE  
SITUATED IN THE TRUE LOW POINT OF THE  
TOPOGRAPHY.

- \*REMOVE ANY SEDIMENT AND/OR DEBRIS FROM BMP AREA
- \*VERIFY THAT ALL 3 OUTFALL POINTS HAVE BEEN PROPERLY MAINTAINED AN  
CONTAIN SEDIMENT.
- \*ENSURE THAT EC-2 JUTE MESH LINING HAS BEEN PROPERLY INSTALLED.

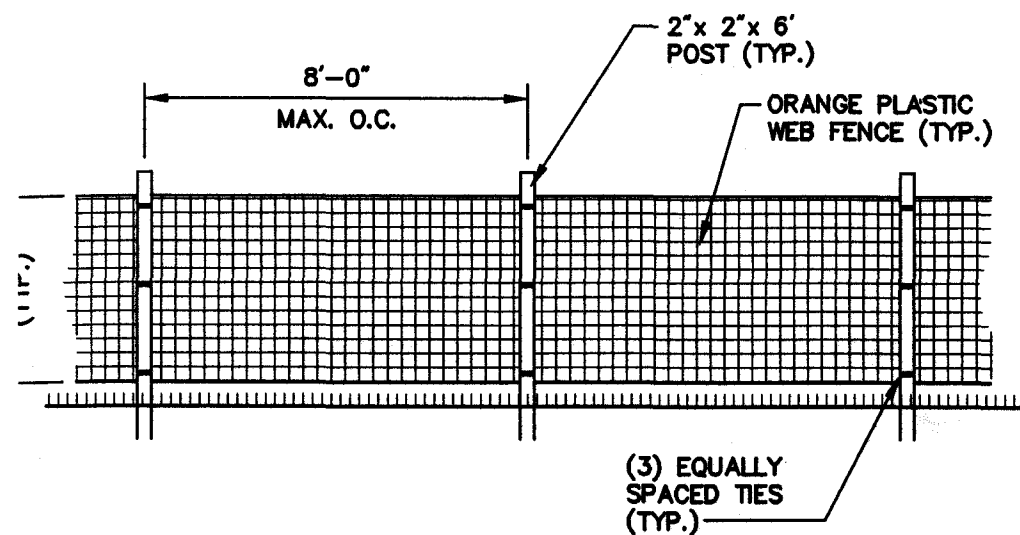


### Level Spreader

Depth	Width	Length
0.5'	6'	10'

### Temporary Sediment Traps

Trap #	Drainage Area	Wet Stor. Vol	Wet Stor. Vol	Dry Stor. Vol	Dry Stor. Vol	Bottom Elev.	Wet Stor. Elev	Dry Storage Elev	Top Width	Top Length
--------	---------------	---------------	---------------	---------------	---------------	--------------	----------------	------------------	-----------	------------

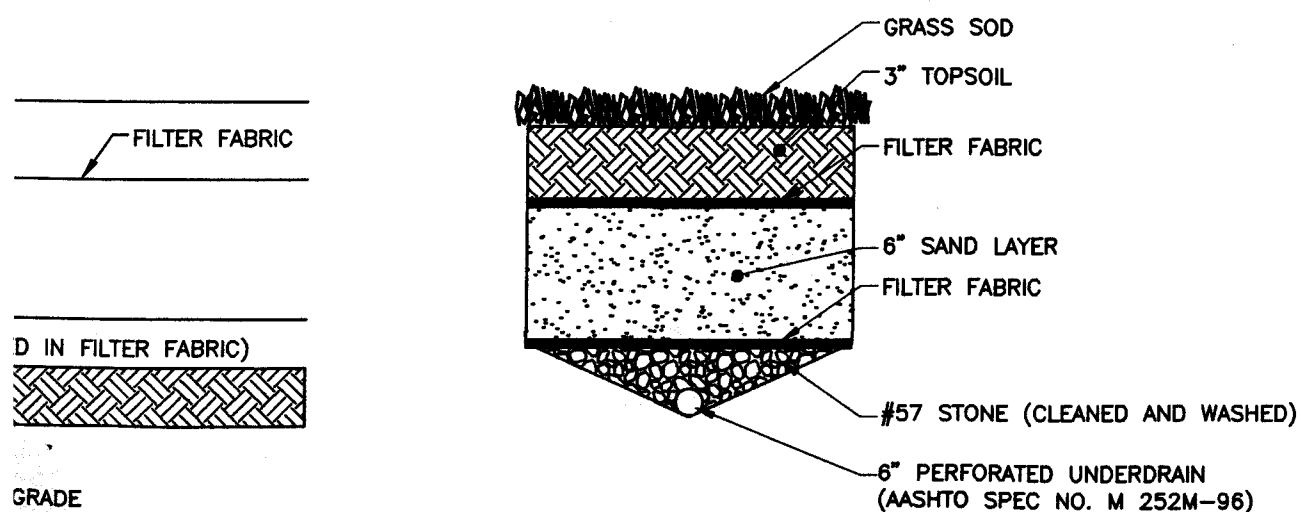


## Silt Protection Fence

TP  
N.T.S.

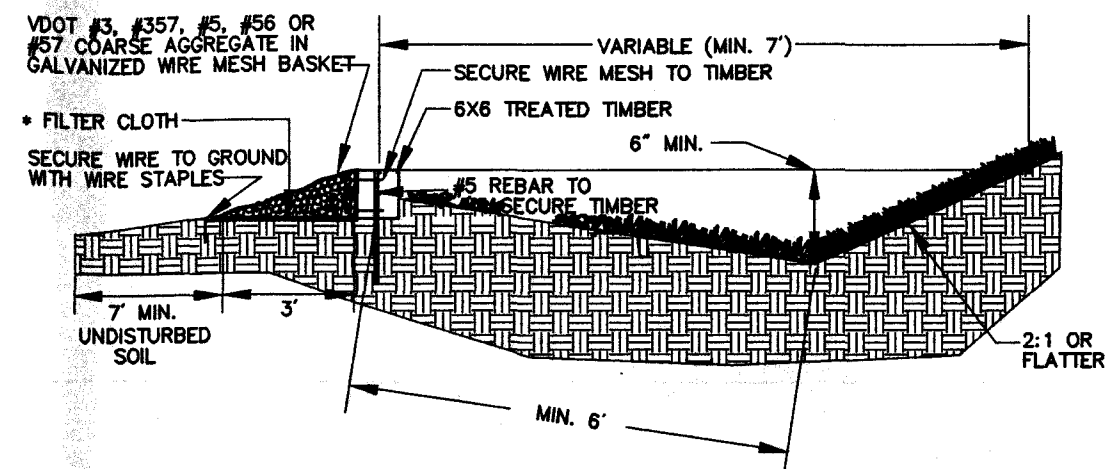
### BASIN WATER SURFACE ELEVATIONS

2 YR ELEV = 95.15  
10 YR ELEV = 95.87  
100 YR ELEV = 96.38



#### NOTES:

1. SAND AND STONE MEDIAS TO BE "CLEAN WASHED"



### Level Spreader With Rigid Lip

\* MIN. PHYSICAL REQUIREMENTS OF FILTER CLOTH NOTED IN STD. & SPEC. 3.19, RIPRAP

## Level Spreader

11/02

N.T.S.

Source: Virginia Erosion And Sediment Control Handbook

Plate 3.21-2



RIGHT-OF-WAYS. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE THOROUGHLY CLEANED AT THE END OF EACH DAY (STD & SPEC 3.02).

5. SEDIMENT BASINS AND TRAPS (STD & SPEC 3.13 AND 3.14), PERIMETER DIKES (STD & SPEC 3.09 AND 3.12), SEDIMENT FILTER BARRIERS (STD. & SPEC 3.05) AND OTHER MEASURES INTENDED TO TRAP SEDIMENT ON-SITE MUST BE CONSTRUCTED AS A FIRST STEP IN GRADING AND MUST BE MADE FUNCTIONAL PRIOR TO ANY UPSLOPE LAND DISTURBANCE TAKING PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS MUST BE SEEDED AND MULCHED IMMEDIATELY AFTER INSTALLATION. PERIODIC INSPECTIONS OF THE EROSION CONTROL MEASURES BY THE OWNER OR OWNERS REPRESENTATIVES SHALL BE MADE TO ASSESS THEIR CONDITION. ANY NECESSARY MAINTENANCE OF THE MEASURES SHALL BE ACCOMPLISHED IMMEDIATELY AND SHALL INCLUDE THE REPAIR OF MEASURES DAMAGED BY ANY SUBCONTRACTOR INCLUDING THOSE OF THE PUBLIC UTILITY COMPANIES.

6. SURFACE FLOWS OVER CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER REDIRECTING FLOWS FROM TRANSVERSING THE SLOPES OR BY INSTALLING MECHANICAL DEVICES TO SAFELY LOWER WATER DOWNSLOPE WITHOUT CAUSING EROSION. A TEMPORARY FILL DIVERSION (STD. & SPEC. 3.10) AND SLOPE DRAIN (STD. & SPEC. 3.15) SHALL BE INSTALLED PRIOR TO THE END OF EACH WORKING DAY.

7. SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT TIME OF CONSTRUCTION TO INSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED. ENVIRONMENTAL DIVISION APPROVAL WILL BE REQUIRED FOR OTHER DEVIATIONS FROM THE APPROVED PLAN.

8. THE CONTRACTOR SHALL PLACE SOIL STOCKPILES AT THE LOCATIONS SHOWN ON THE PLAN. SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. OFF-SITE WASTE OR BORROW AREAS SHALL BE APPROVED BY THE ENVIRONMENTAL DIVISION PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.

9. THE CONTRACTOR SHALL COMPLETE DRAINAGE FACILITIES WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT. THE INSTALLATION OF DRAINAGE FACILITIES SHALL TAKE PRECEDENCE OVER ALL UNDERGROUND UTILITIES. OUTFALL DITCHES FROM DRAINAGE STRUCTURES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION OF THE SAME (STD & SPEC 3.18). THIS INCLUDES INSTALLATION OF EROSION CONTROL STONE OR PAVED DITCHES WHERE REQUIRED. ANY DRAINAGE OUTFALLS REQUIRED FOR A STREET MUST BE COMPLETED BEFORE STREET GRADING OR UTILITY INSTALLATION BEGINS.

10. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAT 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

11. NO MORE THAN 300 FEET OF SANITARY SEWER, STORM DRAIN, WATER OR UNDERGROUND UTILITY LINES ARE TO BE OPEN AT ONE TIME. FOLLOWING INSTALLATION OF ANY PORTION OF THESE ITEMS, ALL DISTURBED AREAS ARE TO BE IMMEDIATELY STABILIZED (I.E., THE SAME DAY).

12. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING (STD & SPEC 3.35). SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.

13. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABILIZATION ON THIS PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED CONTAINING THE SPECIFIED AMOUNTS OF SEED, LIME AND FERTILIZER (STD & SPEC 3.32). IRRIGATION SHALL BE REQUIRED AS NECESSARY TO ENSURE ESTABLISHMENT OF GRASS COVER.

14. ALL SLOPES STEEPER THAN 3H:1V SHALL REQUIRE THE USE OF EROSION CONTROL BLANKETS AND MATTINGS TO AID IN THE ESTABLISHMENT OF A VEGETATIVE COVER. INSTALLATION SHALL BE IN ACCORDANCE WITH STD. & SPEC. 3.35, MULCHING, STD. & SPEC. 3.36, SOIL STABILIZATION BLANKETS AND MATTING AND MANUFACTURERS INSTRUCTIONS. NO SLOPES SHALL BE CREATED STEEPER THAN 2H:1V.

15. INLET PROTECTION (STD & SPEC 3.07 AND 3.08) SHALL BE PROVIDED FOR ALL STORM DRAIN AND CULVERT INLETS FOLLOWING CONSTRUCTION OF THE SAME.

16. TEMPORARY LINERS, SUCH AS POLYETHYLENE SHEETS, SHALL BE PROVIDED FOR ALL PAVED DITCHES UNTIL THE PERMANENT CONCRETE LINER IS INSTALLED.

17. PAVED DITCHES SHALL BE REQUIRED WHEREVER ACCELERATED EROSION IS EVIDENT. PARTICULAR ATTENTION SHALL BE PAID TO THOSE AREAS WHERE GRADES EXCEED 3 PERCENT.

18. TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCE ARE NOT TO BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. TRAPPED SEDIMENT SHALL BE SPREAD, SEEDED AND MULCHED. AFTER THE PROJECT AND STABILIZATION IS COMPLETE, ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS.

19. NO SEDIMENT TRAP OR SEDIMENT BASIN SHALL BE REMOVED UNTIL A) AT LEAST 75 PERCENT OF THE LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN SOLD TO A THIRD PARTY (UNRELATED TO THE DEVELOPER) FOR THE CONSTRUCTION OF HOMES AND/OR B) 60 PERCENT OF THE SINGLE FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN COMPLETED AND THE SOIL STABILIZED. A BULK SALE OF THE LOTS TO ANOTHER BUILDER DOES NOT SATISFY THIS PROVISION. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL NOT BE REMOVED WITHOUT THE EXPRESS AUTHORIZATION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION.

20. RECORD DRAWINGS (AS-BUILTS) AND CONSTRUCTION CERTIFICATIONS ARE BOTH REQUIRED FOR NEWLY CONSTRUCTED OR MODIFIED STORMWATER MANAGEMENT/BMP FACILITIES. CERTIFICATION ACTIVITIES SHALL BE ADEQUATELY COORDINATED AND PERFORMED BEFORE, DURING AND FOLLOWING CONSTRUCTION IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER MANAGEMENT/BMP FACILITIES, RECORD DRAWING AND CONSTRUCTION CERTIFICATION, STANDARD FORMS & INSTRUCTIONS.

21. DESIGN AND CONSTRUCTION OF PRIVATE-TYPE SITE DRAINAGE SYSTEMS OUTSIDE VDOT RIGHTS-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER DRAINAGE CONVEYANCE SYSTEMS (NON-BMP RELATED), GENERAL DESIGN AND CONSTRUCTION GUIDELINES.

CE

N.T.S.

1	REVISED PER COUNTY COMME
1	REVISED PER JCC COMMENTS
No.	Revision
Designed by MM	Drawn by M
CAD checked by	
Scale	As Noted
Project Title	

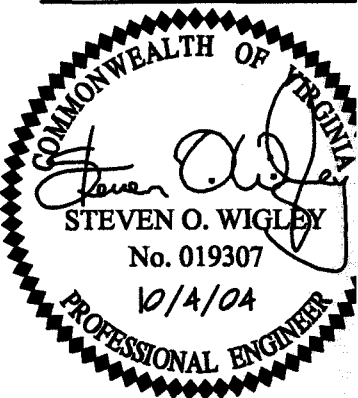
Godspeed An  
Proposed Site

James City County

Issued for

Not Approved for Cor  
Drawing Title

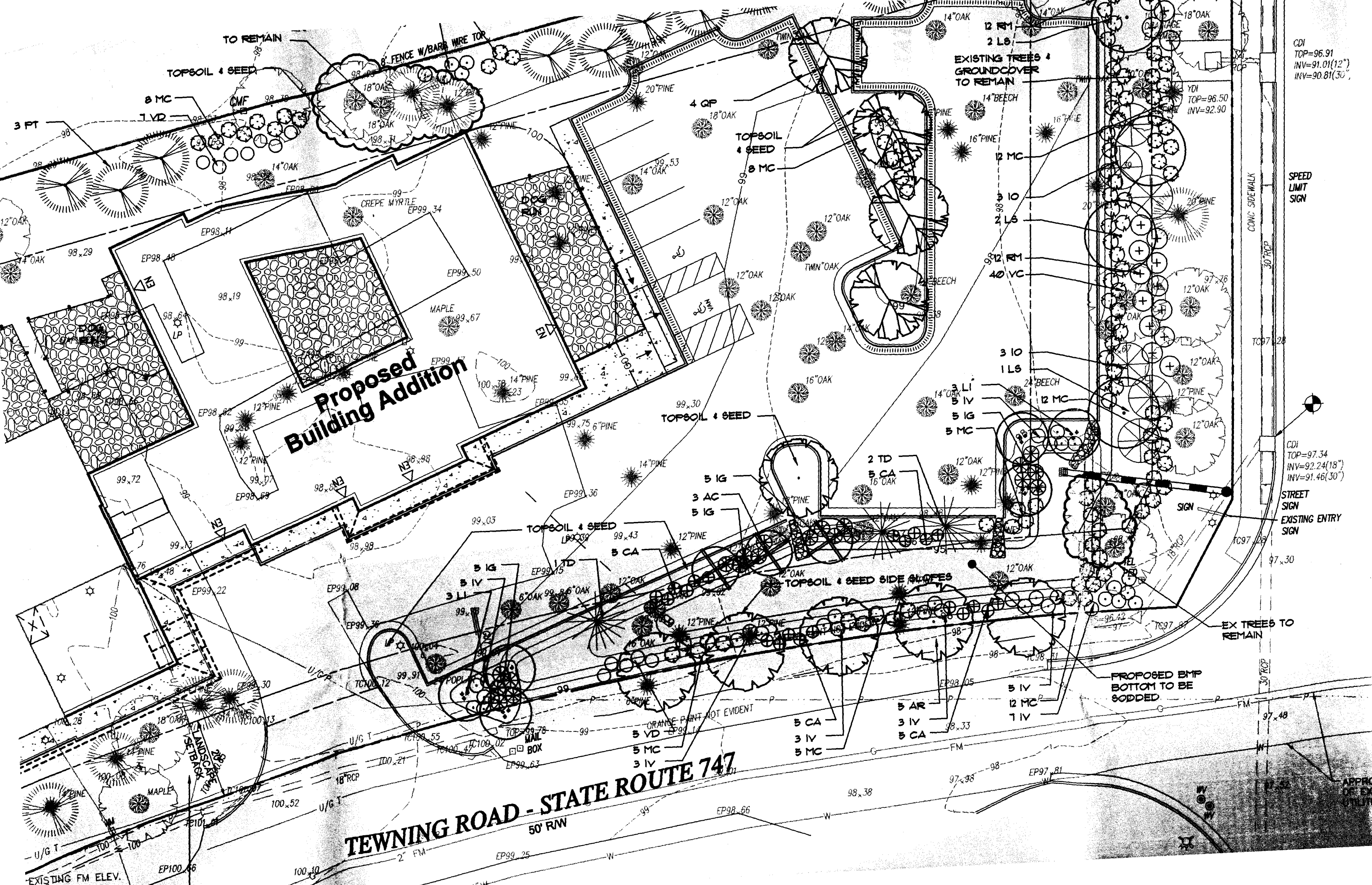
Erosion Cont  
and Details



IF FLOW

N.T.S.










*Godspeed Animal Care*  
*102 Tewning Road*

James City County,  
Virginia

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Prepared for Dr. Pamela Dumont  
Williamsburg, Virginia

Prepared by  Vanasse Hangen Brustlin, Inc.  
Richmond, Virginia

Oct. 5, 2004

5/14/04  
3025 3000  
(FINAL COMPS.)

**Godspeed Animal Care**  
***Building Expansion***

Engineering Report

*Table of Contents*

1. Stormwater Management Design Narrative
2. Stormwater Management Calculations
3. Water Meter Sizing Calculations
4. Storm Water Calculations
5. Sewage Pump Station Design
6. BMP Geotechnical Report
7. Existing Site Photos



## GODSPEED ANIMAL CARE BUILDING EXPANSION PROJECT

### Stormwater Management Design Narrative

#### Project Description

The existing animal care facility is located at the corner of Tewning Road and Ironbound Road in James City County, Virginia. The project encompasses 1.46 acres of land and proposes an expansion of an existing building and associated parking. The project will generally include the addition of a two story building with a total gross square footage of 12,080, parking lots in the front and side of the site, and a comprehensive stormwater management system. The project site is identified as Tax Map Parcel #36-1 and is zoned M-1.

The proposed stormwater management plan for this project will include the use of a D-2 Surface Sand Filter System with 6" perforated underdrain piping to capture the filtered stormwater. The stormwater management system will attenuate the increased runoff anticipated from site development associated with the increased impervious cover.

The stormwater management system is designed to control up to the 100-year, twenty-four hour storm events, for post developed conditions. The volume created by the 10 year storm will have a 48 hour drawdown time before being released into the existing VDOT system along Ironbound Road. The proposed system is also designed to safely contain the 100-year storm event without the use of emergency spillways.

#### Description of Site

Under predevelopment conditions, the area to be developed is comprised of moderately wooded Hardwoods and Pines throughout. The general landform consists of elevations ranging from 100 to 97 and slopes gently away from the center outward to the east and west. Surface hydrology is directed by overland flow to two (2) ravines located along the rear of the property and also through an existing channel and culvert along Tewning Road. The site is located within the RPA but does not contain any wetlands or hydric soils.

#### General Description of Stormwater Management

The proposed onsite Sand Filter System will be the primary water quantity and quality control for this project. Surface waters drain to the proposed BMP by way of the pavement surface through curb cuts in the proposed curb and gutter. The water quality requirement is met by the use of the proposed sand filter and stilling basins located at each outfall curb cut from the proposed parking area. The depth of the

Surface Sand Filter BMP ranges from 3' to 4' below the proposed pavement elevations. The outlet control structure will consist of a VDOT DI-5 structure, modified with a 12" outfall pipe to accommodate the 48 hour detention storage drawdown.

Temporary Sediment Traps and silt fence will serve as temporary erosion and sediment control devices during initial land clearing, grading, and earthmoving operations. The addition of the sand filter system and a spreader box in the rear of the site will serve in controlling the quality of run-off from the site once the improvements are completed. Appropriate details to construct the facilities for temporary and permanent erosion and sediment control are shown on the site plan.

### Hydrology and Hydraulics

Topographic data used for site hydrology and storm/pond hydraulics was obtained from field survey by Michaels Surveying and Mapping dated 12/17/01. The survey verified the site boundary and provided topography related to utilities, drainage structures, and other physical improvements.

Hydrology and hydraulic modeling was performed utilizing the Hydrocad stormwater modeling system as developed by Haestad Methods, Waterbury, Connecticut..

The SCS TR-20 Method is the basis for overall watershed modeling for this project. Precipitation data for the County was obtained by source data provided by the U. S. Weather Bureau as found in Technical Paper No. 76 Rainfall Frequency Atlas of the United States.

Storage-indication pond routing procedures were used to predict the drawdown storage response (outflow hydrograph and incremental stage) to the inflow hydrograph. This sequential routing method uses the elevation-storage and elevation-discharge relationships for repeatedly solving the continuity equation, each solution being a step in delineating the outflow hydrograph.

### Pre-development Hydrology

Pre-development conditions were evaluated to determine the existing peak discharges at the eastern discharge point from the proposed sand filter system. Based on current conditions, peak discharges for the 1-year, 24-hour storm was determined to be 0.78 cfs. This discharge was computed based on a drainage area of 0.73 acres and an SCS Curve Number of 77. The Time of concentration (Tc) value (0.25 hours) was based on the "Overland Flow" Method, whereby the flow path was divided into segments according to the type of flows such as overland, shallow concentrated, and channel flow.

### Post-development Hydrology

Post-development drainage patterns differ slightly from pre-development, in that all of the proposed improvements will be directed to the proposed BMP.

Post-development conditions are based on ultimate development of the site with current conditions of paved and non-paved areas, to determine overall peak discharges to the existing receiving channels as was performed for predevelopment conditions. Based on this criteria, peak discharges for the 1-year, 24 hour storm, was determined to be 0.0424 cfs for the BMP outfall point. These discharges were based on a total drainage area of 0.73 acres. As with pre-development methodology, runoff SCS values were based on land use and hydrologic soil group, and time of concentration values were based on the SCS velocity method.

Comparison of the predevelopment discharges with the post-development discharges results in an overall decrease in peak discharges to the existing storm system due to attenuation by the onsite sand filter facility.

### Hydraulics – Proposed Surface Sand Filter System

The proposed stormwater management system consists of one (1) Surface Sand Filter system, to control the increased runoff from the site development.

Post-development inflow hydrographs were developed and routed through the storage volume and outlet structure for this system using level pool routing methods to determine post-development peak discharges. Simultaneously routing procedures allows the system to respond to dynamic changes such as variable tailwater created by downstream system components. The following is a performance summary for the system tabulating peak outflow and water surface elevation for the 1-year, 10-year, and 100-year storm events.

#### D-2 Sand Filter System

<i>Storm Event</i>		<i>Outflow (cfs)</i>	<i>Elevation (ft.)</i>	<i>Release Time</i>
1-Year		0.06	96.60	30 hrs. +
10-year		6.24	96.89	30 hrs. +
100-year		8.89	96.97	30 hrs. +



**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>
D-2 SURFACE SAND FILTER	<u>7</u>	x	<u>50%</u>	=	<u>7</u>
PERMANENT LEVEL SPREADER	<u>2</u>	x	<u>14%</u>	=	<u>2</u>
_____	_____	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>
<u>N/A</u>	x	<u>—</u>	=	<u>0</u>
_____		(0.1 per 1%)		_____
_____	x	<u>—</u>	=	_____
		(0.15 per 1%)		_____

TOTAL NATURAL OPEN SPACE CREDIT: 0**C. TOTAL WEIGHTED POINTS**

<u>(9) 8.94</u>	+	<u>0</u>	=	<u>9</u>
Structural BMP Points		Natural Open Space Points		Total

SJT CHECK      SITE = 0.70 AC.

(DA = 0.73 AC.)    D-2 SAND FILTER    8 PT.     $\frac{0.73}{0.70} = 8.34$

DA = 0.21 AC    LEVEL SPREADER IN  
EAST UNCONTROLLED  
AREA    2 PT.     $\frac{0.21}{0.70} = 0.60$

8.94 ~ 9SEE WAIVER APPROVAL  
LETTER. COPY ATTACHED

September 14, 2004

Mr. Mitch Mitchell  
Vanasse Hangen Brustlin, Inc.  
115 South 15<sup>th</sup> Street, Suite 200  
Richmond, Va. 23219

SEE FOR  
FILE FOR  
SIGNED COPY.

Re: 10-point system and Sand Filter Variance Request  
Godspeed Animal Care Expansion  
County Plan No. SP-70-04

Dear Mr. Mitchell:

The Environmental Division is in receipt of your written variance request letter dated August 17<sup>th</sup> 2004 for the above referenced project. The variance request is dual-fold, as it requests variance from the County 10-point BMP water quality system and also requests a variance from a minimum depth of 18 inches to 6 inches for the filter sand layer associated with a County type D-2 BMP.

Based on our review of information as submitted, the variance as requested is hereby **approved** for this specific review case only. The variance was considered appropriate due to information as submitted in the letter request and the amended plan of development including:

- There is a distinct site constraint for the project. The restraint is the vertical elevation of an existing 18-inch storm drain pipe system along the west side of Ironbound Road. This storm drainage pipe system is the only reasonable receiving drainage facility to accept discharge from the development site.
- The site contains Soil Group 29B - Slagle fine sandy loam, which exhibit seasonal high water tables and slow permeability of the subsoil. These characteristics limit the feasibility of certain types of onsite BMPs including bioretention and dry swales.
- The onsite BMP must be able to be landscaped in order to blend with aesthetics of the area and meet Zoning ordinance requirements.
- A wet pond pool at this location would generally be unsafe due to the location of the parking area and the presence of Ironbound Road and Tewning Road.

The following conditions apply to approval of this waiver request:

1. The owner should be made completely aware of waiver from the 10-point system and reduced depth of sand media. Reduced depth of sand media will result in more importance being placed on BMP maintenance as trash, debris, grass clippings and sediment can cause premature clogging of the sand layer.
2. The three stilling basins around the sand filter BMP as shown on Sheet C-4 of the plan set must be installed as permanent features and be adequately cleaned on a frequent basis.
3. The level spreader as situated in the northwest corner of the site must be installed as a permanent feature and be adequately cleaned and maintained on a routine basis.
4. Sod must be placed in the bottom of the sand filter BMP consistent with that shown on plan Sheet C-4 and Landscape plan Sheet C-7.
5. The variance approval shall become part of the approved site stormwater management plan.

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.

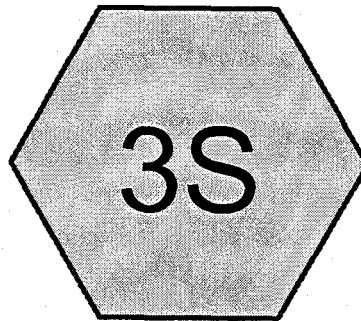
Sincerely,

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

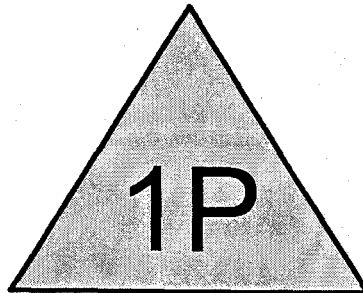
SJT/sjt

cc: Ellen Cook, Planning

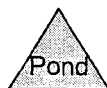
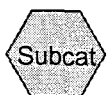
SWMPProg/Variations/SPvar/Var091404.SP07004



Post Development



Surface Sand Filter



**Drainage Diagram for D2 Sand Filter BMP**

Prepared by Vanasse Hangen Brustlin, Inc., Richmond, VA 6/2/2004  
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**CHANNEL PROTECTION VOLUME CALCULATION**

James City County Method

**Project Name :** Godspeed Animal Care**Project # :** 31248.01

One Year Precipitation : P= 2.8 Inches

**TABLE F1 / TR-55**

Coefficients for Rainfall Type II

**PRE-DEVELOPMENT CONDITIONS :**

	$I_a/P$	$C_0$	$C_1$	$C_2$
Drainage Area : $DA_{PRE} = 0.73$ Acres	0.10	2.55323	-0.61512	-0.16403
SCS Curve Number : $CN_{PRE} = 77$ Unitless	0.30	2.46532	-0.62257	-0.11657
Time of Concentration : $TC_{PRE} = 0.25$ Hours	0.35	2.41896	-0.61594	-0.08820
	0.40	2.36409	-0.59857	-0.05621
	0.45	2.29238	-0.57005	-0.02281
	0.50	2.20282	-0.51599	-0.01259

Initial abstraction ;  $I_a = 0.2 \times (1000/CN - 10) = 0.597$  Inches  
 $I_a/P = 0.21$

Accumulated direct runoff :  $Q_U = (P - I_a)^2 / (P + 4 \times I_a) = 0.93$  Inches

Unit Peak Discharge :  $q_u = 731$  cfs/sq.mile/in.

$$\log(q_u) = C_0 + C_1 \log(T_c) + C_2 [\log(T_c)]^2$$

$C_0, C_1, C_2$ : Coefficients from TABLE F1 above

Pre-development peak discharge :

$$q_p = q_u \times DA \times Q_U / 640 = 0.78 \text{ c.f.s.}$$

**POST DEVELOPMENT CONDITIONS :**

Drainage Area :  $DA_{POST} = 0.73$  Acres  
 SCS Curve Number :  $CN_{POST} = 92$  Unitless  
 Time of Concentration :  $TC_{POST} = 0.025$  Hours

Initial abstraction ;  $I_a = 0.174$  Inches  
 $I_a/P = 0.10$

Accumulated direct runoff :  $Q_U = 1.97$  Inches

Unit Peak Discharge :  $q_u = 1311$  cfs/sq.mile/in.

Post development peak discharge rate :  $q_i = q_p = 2.95$  c.f.s.

Ration of outflow to inflow : \*  $q_o/q_i = 11.98 \times q_u^{-0.937} = 0.0144$

\* Direct calculation using equation for T=24hr. developed by Stewart Comstock, P.E., MDE

Outflow discharge :  $q_o = 0.0424$  c.f.s.

Ratio of storage volume to runoff volume :  $V_s/V_r = 0.66$

$$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 8.04(q_o/q_i)^3 =$$

Required Storage Volume :

$$V_s = V_s/V_r \times Q_U \times A / 12 \times 43560 = \underline{3465} \text{ cubic feet}$$

**D2 Sand Filter BMP***Type II 24-hr 1 year JCC Rainfall=2.80"*

Prepared by Vanasse Hangen Brustlin, Inc., Richmond, VA

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8/11/2004

**Hydrograph for Pond 1P: Surface Sand Filter**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	94.25	0.00
1.00	0.00	0	94.25	0.00
2.00	0.00	0	94.25	0.00
3.00	0.00	0	94.25	0.00
4.00	0.00	0	94.25	0.00
5.00	0.00	0	94.25	0.00
6.00	0.00	2	94.26	0.00
7.00	0.01	6	94.27	0.01
8.00	0.01	10	94.28	0.01
9.00	0.02	36	94.35	0.01
10.00	0.04	103	94.55	0.01
11.00	<b>0.09</b>	<b>272</b>	<b>95.01</b>	<b>0.01</b>
12.00	<b>1.00</b>	<b>2,276</b>	<b>96.31</b>	<b>1.47</b>
13.00	0.12	2,042	96.22	0.13
14.00	0.07	2,025	96.21	0.07
15.00	0.06	2,019	96.21	0.06
16.00	0.04	2,015	96.20	0.05
17.00	0.04	2,013	96.20	0.04
18.00	0.03	2,011	96.20	0.04
19.00	0.03	2,007	96.20	0.03
20.00	0.03	1,998	96.20	0.03
21.00	0.02	1,980	96.19	0.03
22.00	0.02	1,958	96.18	0.03
23.00	0.02	1,934	96.17	0.03
24.00	0.02	1,907	96.16	0.03
25.00	0.00	1,804	96.12	0.03
26.00	0.00	1,701	96.08	0.03
27.00	0.00	1,599	96.03	0.03
28.00	0.00	1,499	95.99	0.03
29.00	0.00	1,405	95.94	0.02
30.00	0.00	1,320	95.89	0.02
31.00	0.00	1,242	95.84	0.02
32.00	0.00	1,170	95.80	0.02
33.00	0.00	1,104	95.75	0.02
34.00	0.00	1,039	95.69	0.02
35.00	0.00	976	95.63	0.02
36.00	0.00	914	95.58	0.02
37.00	0.00	855	95.53	0.02
38.00	0.00	797	95.48	0.02
39.00	0.00	741	95.43	0.02
40.00	0.00	686	95.38	0.01
41.00	0.00	633	95.33	0.01
42.00	0.00	582	95.29	0.01
43.00	0.00	532	95.24	0.01
44.00	0.00	483	95.20	0.01
45.00	0.00	436	95.16	0.01
46.00	0.00	390	95.12	0.01
47.00	0.00	345	95.08	0.01
48.00	0.00	302	95.04	0.01

**D2 Sand Filter 81204 BMP**

Type II 24-hr 1 year JCC Rainfall=2.80"

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**Subcatchment 3S: Post Development**

Runoff = 2.86 cfs @ 11.92 hrs, Volume= 0.120 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1 year JCC Rainfall=2.80"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		<b>Sheet Flow, Pavement</b> Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 1.97" for 1 year JCC event  
 Inflow = 2.86 cfs @ 11.92 hrs, Volume= 0.120 af  
 Outflow = 0.06 cfs @ 14.94 hrs, Volume= 0.097 af, Atten= 98%, Lag= 181.4 min  
 Primary = 0.06 cfs @ 14.94 hrs, Volume= 0.097 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.60' @ 14.94 hrs Surf.Area= 2,553 sf Storage= 3,569 cf  
 Plug-Flow detention time= 910.8 min calculated for 0.097 af (81% of inflow)  
 Center-of-Mass det. time= 832.3 min ( 1,627.7 - 795.4 )

#	Invert	Avail.Storage	Storage Description			
1	94.25'	4,542 cf	<b>Custom Stage Data (Irregular) Listed below</b>			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	<b>15.0" x 40.0' long Culvert</b> RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 '/ n= 0.013 Cc= 0.900
2	Device 1	94.00'	<b>0.000800 fpm Sand filter over Surface area above invert</b>
3	Device 1	96.60'	<b>3.00' x 3.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600
4	Secondary	97.00'	<b>20.0' long x 15.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Transportation  
Land Development  
Environmental  
Services



*Vanasse Hangen Brustlin, Inc.*

101 Walnut Street

Post Office Box 9151

Watertown

Massachusetts 02471-9151

617.924.1770

FAX 617.924.2286

**Phone  
Notes**

Person Contacted: .....

Title: .....

Company: .....

Telephone No.: .....

FAX No.: .....

VHB Rep: .....

VHB Project No.: .....

Project Name: .....

Type of Call: .....

Date and Time: .....

GODSPEED BMP

<u>EVENT FREQ.</u>	<u>Q<sub>PEAK</sub></u>	<u>W.S.E.</u>	<u>RELEASE TIME</u>
1YR	.06 cfs	96.60	> 30 hrs.
2YR	.49 cfs	96.65	> 30 hrs.
10YR	6.24 cfs	96.89	> 30 hrs
100YR.	8.89	96.97	> 30 hrs.



## D2 Sand Filter 81204 BMP

Type II 24-hr 1 year JCC Rainfall=2.80"

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Primary OutFlow Max=0.05 cfs @ 14.94 hrs HW=96.60' (Free Discharge)

1=Culvert (Passes 0.05 cfs of 8.60 cfs potential flow)

2=Sand filter (Exfiltration Controls 0.03 cfs)

3=Orifice/Grate (Weir Controls 0.01 cfs @ 0.2 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

## D2 Sand Filter 81204 BMP

Type II 24-hr 2 year JCC Rainfall=3.50"

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Primary OutFlow Max=0.48 cfs @ 12.04 hrs HW=96.65' (Free Discharge)

└─1=Culvert (Passes 0.48 cfs of 8.70 cfs potential flow)

└─2=Sand filter (Exfiltration Controls 0.03 cfs)

└─3=Orifice/Grate (Weir Controls 0.44 cfs @ 0.7 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

└─4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**D2 Sand Filter 81204 BMP**

Type II 24-hr 2 year JCC Rainfall=3.50"

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**Subcatchment 3S: Post Development**

Runoff = 3.74 cfs @ 11.92 hrs, Volume= 0.160 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2 year JCC Rainfall=3.50"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 2.64" for 2 year JCC event  
 Inflow = 3.74 cfs @ 11.92 hrs, Volume= 0.160 af  
 Outflow = 0.49 cfs @ 12.04 hrs, Volume= 0.136 af, Atten= 87%, Lag= 7.6 min  
 Primary = 0.49 cfs @ 12.04 hrs, Volume= 0.136 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.65' @ 12.04 hrs Surf.Area= 2,588 sf Storage= 3,681 cf  
 Plug-Flow detention time= 678.2 min calculated for 0.136 af (85% of inflow)  
 Center-of-Mass det. time= 609.8 min ( 1,397.0 - 787.2 )

#	Invert	Avail.Storage	Storage Description
1	94.25'	4,542 cf	Custom Stage Data (Irregular) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	15.0" x 40.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 '/' n= 0.013 Cc= 0.900
2	Device 1	94.00'	0.000800 fpm Sand filter over Surface area above invert
3	Device 1	96.60'	3.00' x 3.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Secondary	97.00'	20.0' long x 15.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**D2 Sand Filter 81204 BMP**

Type II 24-hr 10 year JCC Rainfall=5.80"

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8/16/2004

**Subcatchment 3S: Post Development**

Runoff = 6.61 cfs @ 11.92 hrs, Volume= 0.296 af, Depth= 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 10 year JCC Rainfall=5.80"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		<b>Sheet Flow, Pavement</b> Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 4.87" for 10 year JCC event  
 Inflow = 6.61 cfs @ 11.92 hrs, Volume= 0.296 af  
 Outflow = 6.24 cfs @ 11.93 hrs, Volume= 0.271 af, Atten= 6%, Lag= 0.9 min  
 Primary = 6.24 cfs @ 11.93 hrs, Volume= 0.271 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.89' @ 11.93 hrs Surf.Area= 2,775 sf Storage= 4,277 cf  
 Plug-Flow detention time= 367.1 min calculated for 0.271 af (91% of inflow)  
 Center-of-Mass det. time= 321.3 min ( 1,091.9 - 770.6 )

#	Invert	Avail.Storage	Storage Description			
1	94.25'	4,542 cf	<b>Custom Stage Data (Irregular) Listed below</b>			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	<b>15.0" x 40.0' long Culvert</b> RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 ' /' n= 0.013 Cc= 0.900
2	Device 1	94.00'	<b>0.000800 fpm Sand filter over Surface area above invert</b>
3	Device 1	96.60'	<b>3.00' x 3.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600
4	Secondary	97.00'	<b>20.0' long x 15.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

## D2 Sand Filter 81204 BMP

Type II 24-hr 10 year JCC Rainfall=5.80"

Prepared by Vanasse Hangen Brustlin, Inc., Richmond, VA

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8/16/2004

**Primary OutFlow** Max=6.22 cfs @ 11.93 hrs HW=96.89' (Free Discharge)

└1=Culvert (Passes 6.22 cfs of 9.24 cfs potential flow)

└└2=Sand filter (Exfiltration Controls 0.04 cfs)

└└└3=Orifice/Grate (Weir Controls 6.18 cfs @ 1.8 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

└4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**D2 Sand Filter 81204 BMP**

Type II 24-hr 100year JCC Rainfall=8.00"

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8/16/2004

**Subcatchment 1S: Pre development**

Runoff = 4.93 cfs @ 12.07 hrs, Volume= 0.321 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100year JCC Rainfall=8.00"

Area (ac)	CN	Description
0.180	98	Roof & Paving
0.550	70	Wooded
0.730	77	Weighted Average

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

**Subcatchment 3S: Post Development**

Runoff = 9.32 cfs @ 11.92 hrs, Volume= 0.428 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100year JCC Rainfall=8.00"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 7.04" for 100year JCC event  
 Inflow = 9.32 cfs @ 11.92 hrs, Volume= 0.428 af  
 Outflow = 8.89 cfs @ 11.93 hrs, Volume= 0.403 af, Atten= 5%, Lag= 0.8 min  
 Primary = 8.89 cfs @ 11.93 hrs, Volume= 0.403 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.97' @ 11.93 hrs Surf.Area= 2,835 sf Storage= 4,470 cf  
 Plug-Flow detention time= 263.4 min calculated for 0.403 af (94% of inflow)  
 Center-of-Mass det. time= 228.7 min ( 990.0 - 761.3 )

#	Invert	Avail.Storage	Storage Description
1	94.25'	4,542 cf	Custom Stage Data (Irregular) Listed below

**D2 Sand Filter 81204 BMP**

Type II 24-hr 100year JCC Rainfall=8.00"

Prepared by Vanasse Hangen Brustlin, Inc., Richmond, VA

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8/16/2004

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	<b>15.0" x 40.0' long Culvert</b> RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 '/' n= 0.013 Cc= 0.900
2	Device 1	94.00'	<b>0.000800 fpm Sand filter over Surface area above invert</b>
3	Device 1	96.60'	<b>3.00' x 3.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600
4	Secondary	97.00'	<b>20.0' long x 15.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=8.89 cfs @ 11.93 hrs HW=96.97' (Free Discharge)

- 1=Culvert (Passes 8.89 cfs of 9.41 cfs potential flow)  
 2=Sand filter (Exfiltration Controls 0.04 cfs)  
 3=Orifice/Grate (Weir Controls 8.85 cfs @ 2.0 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

- 4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Godspeed Animal Care 102  
Tewning Road James City  
County, VA

8/11/2004

**SIZING WATER SERVICE LINES AND METERS**  
(PLUMBING FIXTURE VALUE)

	Fixture Value	No. of Fixtures	Total Fixture Value
Bathtub	8	x 4	= 32
Bedpan washers	10	x	= 0
Combination sink and tray	3	x	= 0
Dental unit	1	x 0	= 0
Dental lavatory	2	x 1	= 2
Drinking fountain (cooler)	1	x 0	= 0
Drinking fountain (public)	2	x 0	= 0
Kitchen sink: 1/2" connection	3	x 1	= 3
3/4" connection	7	x	= 0
Lavatory: 3/8" connection	2	x	= 0
1/2" connection	4	x 6	= 24
Laundry tray: 1/2" connection	3	x 1	= 3
3/4" connection	7	x	= 0
Shower head (shower only)	4	x 2	= 8
Service sink: 1/2" connection	3	x 2	= 6
3/4" connection	7	x 0	= 0
Urinal: Pedestal flush valve	35	x	= 0
Wall or stall	12	x	= 0
Trough (2' unit)	2	x	= 0
Wash sink (each set of faucets)	4	x 19	= 76
Water closet: Flush valve	35	x	= 0
Tank type	3	x 7	= 21
Dishwasher: 1/2" connection	4	x 1	= 4
3/4" connection	10	x 0	= 0
Washing machine: 1/2" connection	5	x 2	= 10
3/4" connection	12	x	= 0
1" connection	25	x	= 0
Hose connections (wash down): 1/2"	6	x 5	= 30
3/4"	10	x 0	= 0
Hose (50' length-wash down): 1/2"	6	x	= 0
5/8"	9	x	= 0
3/4"	12	x	= 0
<b>GRAND TOTAL OF FIXTURE VALUES</b>			<b>219</b>



TABLE 4.3  
*Plumbing Fixture Value*

Fixture Type	Fixture Value Based on 35 psi at Meter Outlet
Bathtub . . . . .	8
Bedpan washers . . . . .	10
Combination sink and tray . . . . .	3
Dental unit . . . . .	1
Dental lavatory . . . . .	2
Drinking fountain (cooler) . . . . .	1
Drinking fountain (public) . . . . .	2
Kitchen sink: 1/2-in. connection . . . . .	3
3/4-in. connection . . . . .	7
Lavatory: 3/8-in. connection . . . . .	2
1/2-in. connection . . . . .	4
Laundry tray: 1/2-in. connection . . . . .	3
3/4-in. connection . . . . .	7
Shower head (shower only) . . . . .	4
Service sink: 1/2-in. connection . . . . .	3
3/4-in. connection . . . . .	7
Urinal: Pedestal flush valve . . . . .	35
Wall or stall . . . . .	12
Trough (2-ft unit) . . . . .	2
Wash sink (each set of faucets) . . . . .	4
Water closet: Flush valve . . . . .	35
Tank type . . . . .	3
Dishwasher: 1/2-in. connection . . . . .	4
3/4-in. connection . . . . .	10
Washing machine: 1/2-in. connection . . . . .	5
3/4-in. connection . . . . .	12
1-in. connection . . . . .	25
Hose connections (wash down): 1/2-in. . . . .	6
3/4-in. . . . .	10
Hose (50-ft length—wash down): 1/2-in. . . . .	6
5/8 in. . . . .	9
3/4 in. . . . .	12

value of a number of units by simply multiplying the single value times the number of fixtures in the customer's use to get a total value. The list of plumbing items in Table 4.3 represents those most commonly used; however, the estimator will eventually encounter special equipment that will need to be evaluated. Since the fixture flow requirements in gallons per minute and the fixture values are the same in Table 4.3, the engineer can list the demand in gallons per minute for the special equipment, along with the other fixtures, to obtain one total.

#### Demand

After the fixture values have been determined, the results can be applied to a graph to obtain the customer demand in gallons per minute at 35 psi at the meter outlet. The maximum water flow of any one fixture is above the average of any one of a number of fixtures when operated in a customer's service. This is because the probability of all

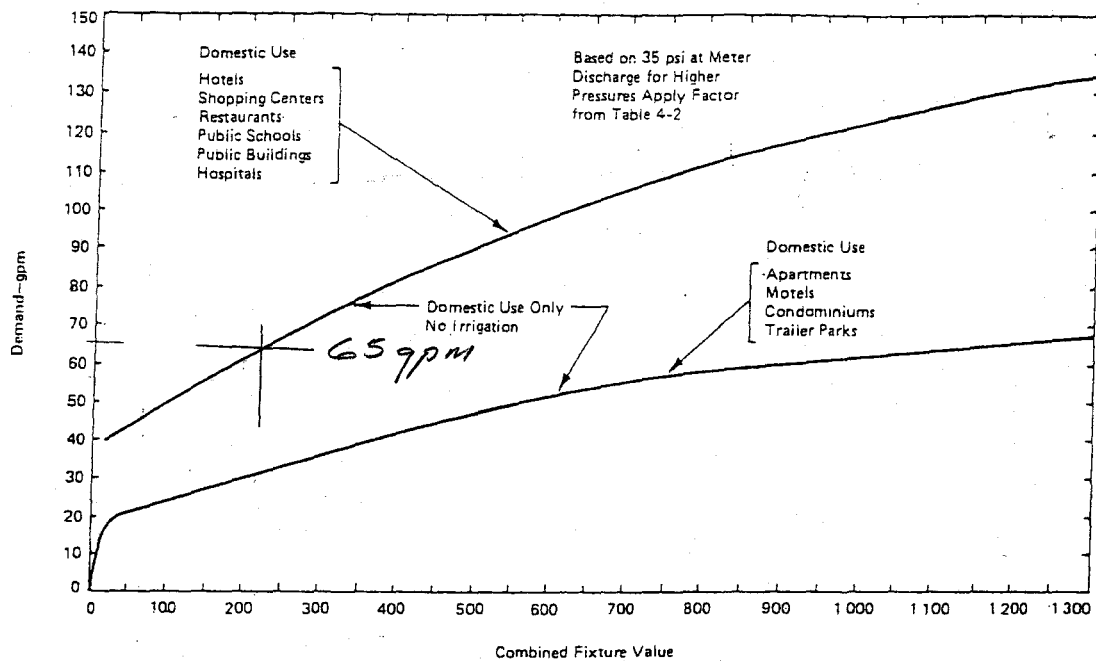


Fig. 4.4. Water-Flow Demand per Fixture Value—Low Range

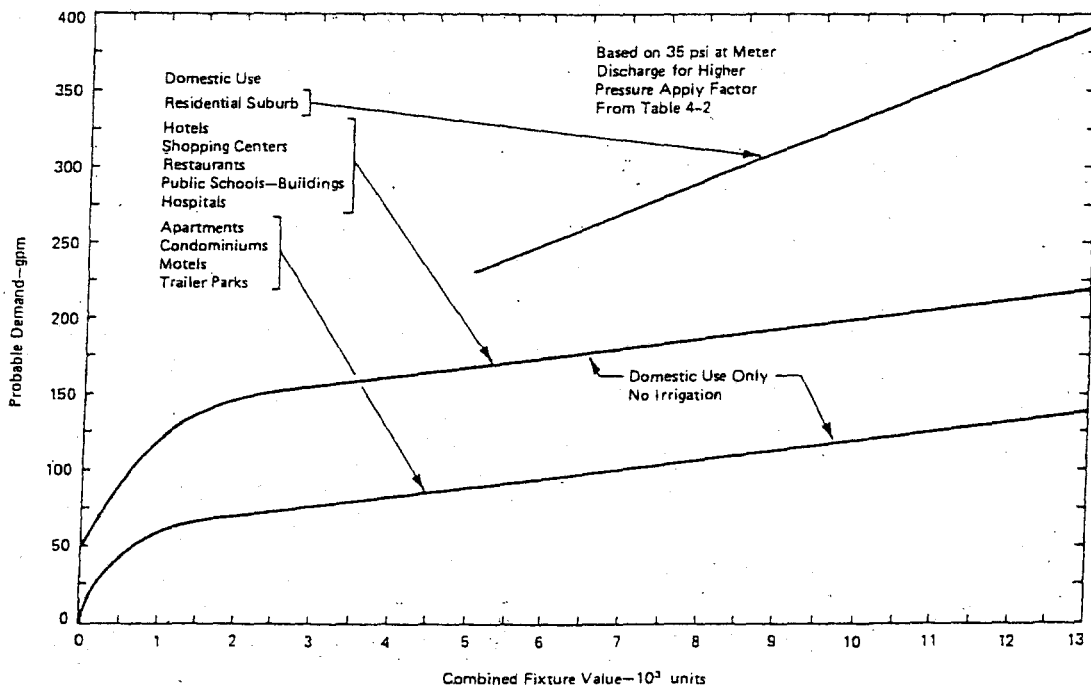


Fig. 4.5. Water-Flow Demand per Fixture Value—High Range

detailed lists of fixtures before estimates can be prepared. If the structure is in the planning stage, the mechanical engineer or architect is the best source of information, and, if construction is underway, the plumbing contractor or the building permits section of the city will have the information. Field trips by the estimator are often necessary to assist the customer as well as to properly assess the project when

TABLE 5.6  
Displacement-Type Meters Meeting AWWA Standards  
Flow-Pressure Loss Averages of 1990-Model Meters

Size in.	Maximum Capacity AWWA Flow Criteria		Recommended Design Criteria—80% Cap.		Continuous Flow Criteria—50% Cap.		Brands Included in Averages
	gpm	psi	gpm	psi	gpm	psi	
1/2	15	7.9	12	5.0	7.5	2.0	1
5/8	20	9.7	16	6.2	10	2.4	5
3/4	30	10.4	24	6.7	15	2.6	5
1	50	9.8	40	6.3	25	2.5	5
→ 1 1/2	100	10.6	80	6.8	50	2.7	4
2	160	11.3	130	7.1	80	2.8	4

TABLE 5.7  
Compound-Type Meters Meeting AWWA Standards  
Flow-Pressure Loss Averages of 1990-Model Meters

Size in.	Maximum Capacity AWWA Flow Criteria		Recommended Design Criteria—80% Cap.		Continuous Flow Criteria—50% Cap.		Brands Included in Averages
	gpm	psi	gpm	psi	gpm	psi	
2	160	8.0	130	5.1	80	2.0	5
3	320	7.2	255	4.6	160	1.8	5
4	500	6.2	400	4.1	250	1.6	5
6	1000	8.4	800	5.4	500	2.1	5
8	1600	14.5	1300	9.3	800	3.8	1

TABLE 5.8  
Class II Turbine-Type Meters Meeting AWWA Standards  
Flow-Pressure Loss Averages of 1990-Model Meters

Size in.	Maximum Capacity AWWA Flow Criteria		Recommended Design Criteria—80% Cap.		Continuous Flow Criteria—50% Cap.		Brands Included in Averages
	gpm	psi	gpm	psi	gpm	psi	
2	160	4.0	130	2.5	100	1.0	5
3	350	4.0	280	2.6	240	.9	5
4	630	2.0	500	1.4	420	.7	5
6	1 400	2.0	1 100	1.2	920	.5	5
8	2 400	2.7	1 900	1.7	1 600	.7	5
10	3 800	2.6	3 000	1.4	2 500	.5	5
12	5 000	1.7	4 000	1.1	3 300	.4	1

5.9 as the equivalent length of straight pipe that will give the friction loss that will occur as the water passes through the fitting. The values will be approximate in some cases because the pipe's inside diameter is based on the size of the fittings, and in some cases the inside diameter will be slightly larger or smaller; however, the effects of the error will be negligible and the values are considered sufficiently accurate for the purpose of this manual.

Pressure-reducing valves are used in mountainous and hilly areas to protect the



Project: GODSPEED

Location: JCC

Calculated by: WEM

Checked by:

Title

Project # 31248.01

Sheet 1 of 1

Date:

Date:

"AREA 1 TO LEVEL SPREADER"

PRE -

$$Area = 0.21AC$$

$$"C" = 0.42$$

$$Q_2 = CIA = 0.50 \text{ cfs}$$

$$T_c = 5 \text{ min.} \quad I = 5.7$$

POST -

$$Area = 0.21AC$$

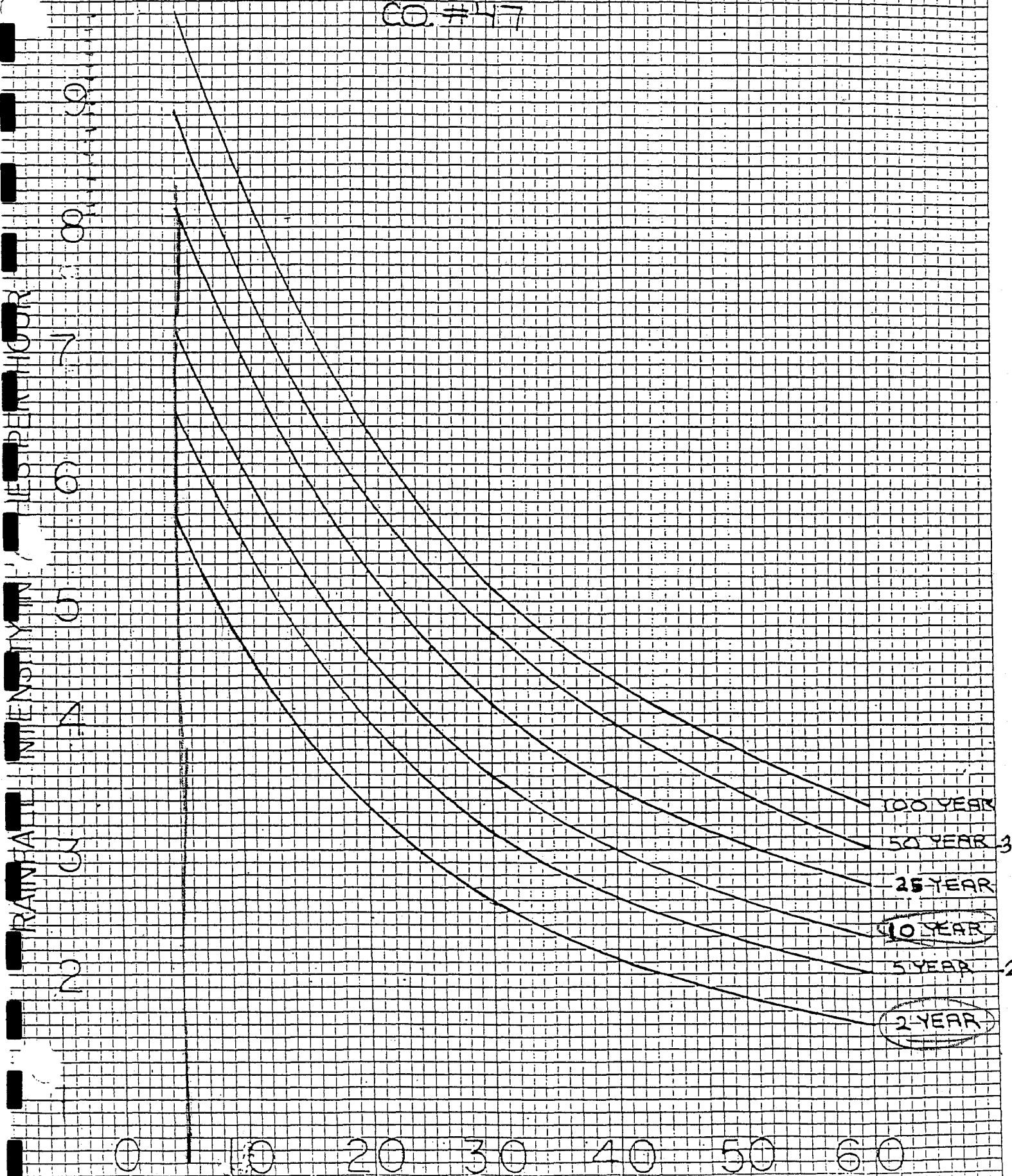
$$"C" = 0.45$$

$$Q_2 = CIA = 0.54 \text{ cfs}$$

$$T_c = 5 \text{ min.} \quad I = 5.7$$

JAMES CITY CO.

CO. #47

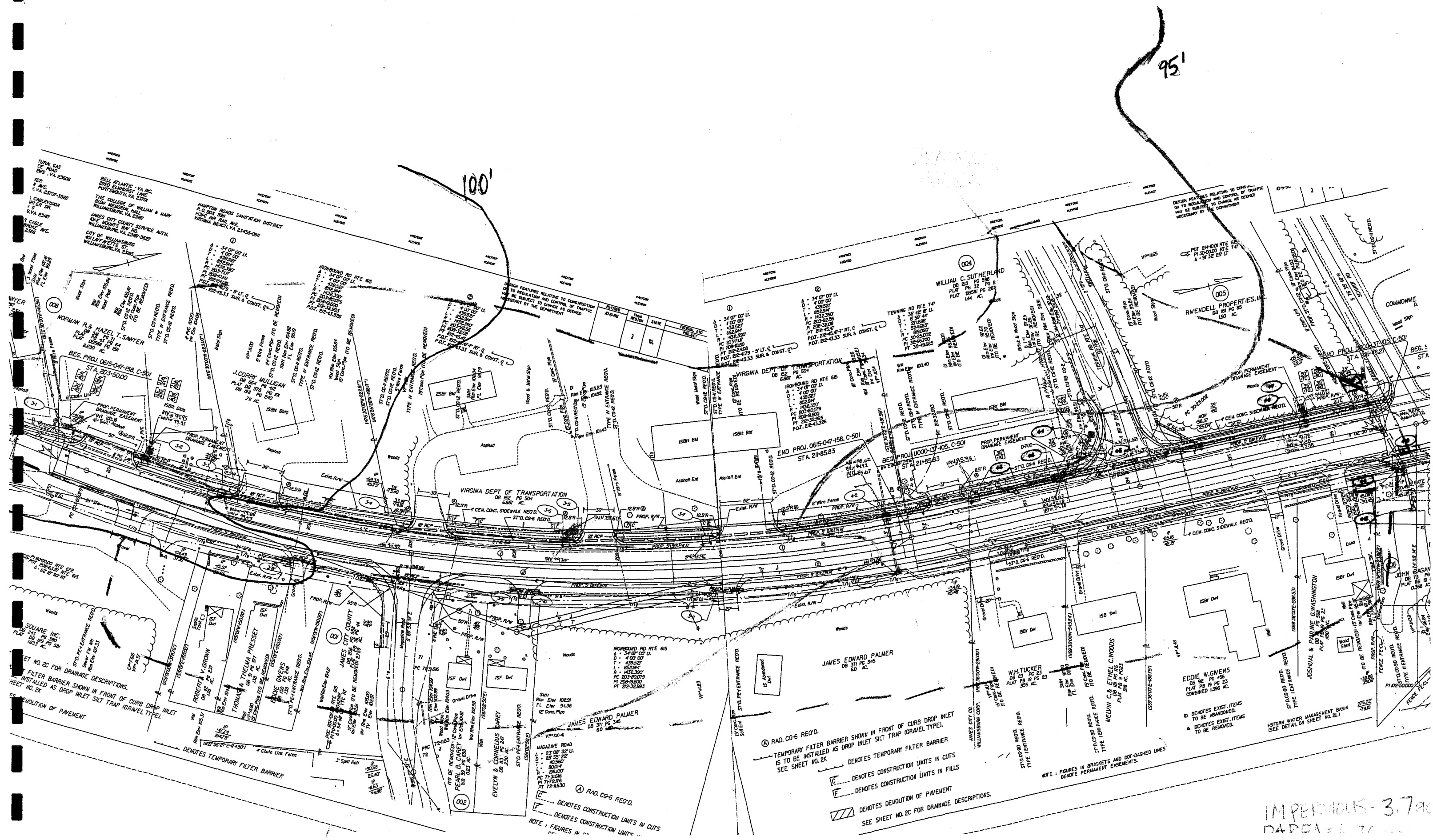


Project: GOODSPEED  
Location: JCC  
Calculated by: WEM/KL  
Checked by:  
Title

Project # 31248.01  
Sheet 1 of 1  
Date:  
Date:

### EXISTING VDOT SYSTEM

- AS SHOWN IN THE "STORM DRAINAGE COMPUTATIONS",  
THE CAPACITY OF THE EXISTING 30" RCP (STR. 4-8)  
IS 37.37 CFS AND THE EXISTING  $Q_{10} = 17.47$  CFS  
THE IMPROVEMENTS TO GOODSPEED ( $Q_{10}$  OUTFLOW = 6.24 CFS)  
IS ACCEPTABLE AND THE EXISTING SYSTEM CAN HANDLE  
THESE FLOWS.



**VHB** Vanasse Hangen Brustlin, Inc.

115 South 15th Street

Suite 200

Richmond, VA 23219

804-343-7100

Design Parameters

10 Year Storm

15" Min. Pipe Size

n=0.013

**Storm Drainage Computations**Name Godspeed

Client \_\_\_\_\_

Subject PIPE SIZINGProj. No. 31248.01Date 8/12/2004Computed by KEL

Checked by \_\_\_\_\_

FROM POINT (1)	TO POINT (2)	AREA DRAIN. ACRES (3)	RUNOFF COEF. C (4)	C A		INLET TIME MIN. (7)	RAIN- FALL IN./HR. (8)	RUNOFF Q C.F.S. (9)	INV ERT ELEV ATIONS		LENGTH FT. (12)	SLOPE FT./FT. (13)	DIA. INCHES (14)	CAPA- CITY C.F.S. (15)	VELO- CITY F.P.S. (16)	FLOW TIME SEC. (17)	MINIMUM PIPE DIA(in) (18)
				INCRE- MENT (5)	ACCUM- ULATED (6)				UPPER (10)	LOWER (11)							
Ex. 18"	Ex. JB	0.430	0.460	0.198	0.198	5.00	7.17	1.42	97.270	93.090	65.0	0.06431	18	26.64	8.01	8.11	5.99
Ex. JB	No. 4-8	3.500	N/A	2.710	2.908	10.00	6.01	17.47	92.310	91.480	100.0	0.00830	30	37.37	7.48	13.37	22.56
No. 4-8	No. 4-9	0.260	0.900	0.234	3.314	10.22	5.96	19.76	91.480	90.980	66.0	0.00758	30	35.70	7.61	8.67	24.03
No. 4-9	No. 4-11	0.050	0.900	0.045	3.359	10.37	5.94	19.94	88.500	87.990	66.0	0.00773	30	36.06	7.63	8.65	24.02
No. 4-11	No. 4-12	1.730	0.610	1.055	4.414	10.51	5.91	26.08	87.990	87.700	34.0	0.00853	30	37.88	8.50	4.00	26.08
No. 4-7	No. 4-8	0.430	0.400	0.172	0.172	5.00	7.17	1.23	94.020	93.980	10.0	0.00400	12	2.25	2.93	3.41	9.57
No. 4-6	No. 4-8	N/A	N/A	2.710	2.710	10.00	6.01	16.28	93.030	92.310	132.0	0.00545	30	30.29	6.08	21.71	23.77

• This shows that ~~there~~ <sup>there</sup> is capacity in the system. by estimating existing conditions



115 South 15th Street  
Suite 200  
Richmond, VA 23219  
804-343-7100

# HYDRAULIC GRADE LINE

Project :  
Calculated by:  
Date:  
n = 0.013

Godspeed  
KEL  
8/12/2004

INLET STATION #	OUTLET WATER SURFACE ELEV. (2)	D <sub>o</sub> (IN) (3)	Q <sub>o</sub> (CFS) (4)	L <sub>o</sub> (FT) (5)	S <sub>Fo</sub> % (6)	H <sub>i</sub> (FT) (7)	JUNCTION LOSS												Final H (FT) (19)	Inlet Water Surface Elev. (20)	Rim Elev./ Gutter Elev. (21)	Flow Through Drop Inlet (CFS) (22)	Inlet Shaping Y/N (23)
							V <sub>o</sub> (FPS) (8)	H <sub>o</sub> (FT) (9)	Q <sub>i</sub> (CFS) (10)	V <sub>i</sub> (FPS) (11)	Q <sub>i</sub> x V <sub>i</sub> (12)	V <sub>i</sub> <sup>2</sup> 2g (13)	H <sub>i</sub> (FT) (14)	Angle (14)	H <sub>a</sub> (FT) (15)	H <sub>f</sub> (FT) (16)	1.3 H <sub>i</sub> (17)	0.5 H <sub>i</sub> (18)					
No. 4-11	89.70	30	26.08	34.00	0.4074	0.14	8.50	0.28	19.94	7.63	152.14	0.90	0.32	0	0.00	0.60	N.A.	N.A.	0.74	90.44	96.33	0.00	N
No. 4-9	90.44	30	19.94	66.00	0.2381	0.16	7.63	0.23	19.76	7.61	150.37	0.90	0.31	90	0.63	1.17	N.A.	N.A.	1.33	91.76	97.70	0.00	N
No. 4-8	92.98	30	19.76	66.00	0.2339	0.15	7.61	0.22	17.47	7.48	130.68	0.87	0.30	0	0.00	0.53	N.A.	N.A.	0.68	93.66	97.73	0.00	N
Ex. JB	93.66	30	17.47	100.00	0.1828	0.18	7.48	0.22	16.28	6.08	98.98	0.57	0.20	0	0.00	0.42	N.A.	N.A.	0.60	94.26	98.19	0.00	N

## Equations:

Outlet Water Elevation = 80% diameter  $H_o = 0.25 V_o^2 / 2g$

$S_f = [n Q_o / (1.486 A R^{2/3})]^2$

$H_i = 0.35 V_i^2 / 2g$

FINAL H =  $H_i + H_f$

$H_{\Delta} = K V_o^2 / 2g$

$H_f = H_o + H_i + H_{\Delta}$

90° K = 0.70

80° K = 0.66

70° K = 0.61

60° K = 0.55

50° K = 0.47

40° K = 0.38

30° K = 0.28

25° K = 0.22

20° K = 0.16

15° K = 0.10

*This approximates the existing Hydraulic Grade Line.*

## SEWAGE PUMP STATION DESIGN:

James City Service Authority Water and Sanitary Sewer Design criteria, Table 2.1, indicate that the average daily flow for a Veterinary Clinic should be 0.18 Gallons Per Day Per Gross Square Foot of Building Area. For the proposed addition this would translate as Sewage pump design Flow of 7.05 gallons per minute.

Actual Water use records for the last quarter billed indicate a daily water demand of 0.25 Gallons Per day Per Gross Square Foot, which gives a Sewage pump design flow of 9.75 gallons per minute.

Fixture plans for the addition indicate that the peak water demand would be 57 to 63 gallons per minute and the resulting sewage flow could be 30 to 36 gallons per minute.

In their review comments the James City Service Authority indicated that we would be able to connect to the existing force main in Tewning Road only if we identify the model of each of the other pumps on the system to assure that our pump will not over ride and cause problems with the others.

We have determined by directly contacting the owners that all of the pumps on the system are the E-one semi-positive displacement pumps. There are a total of 13 pump stations on the system. The addition would increase this to fourteen. We have also determined that the JCSA force main does not connect to the HRSD force main as we were originally informed, but ties into the gravity sewer parallel to the HRSD main.

The duplex E-one system as we proposed in our June 14, 2004 Memorandum to Danny Poe of the Service Authority would be a solution that would be fully compatible with the system. However, the maximum flow rate obtainable with the E-one is less than 16 g.p.m., which is above the flow rate required by JCSA standards, but less than the IPC Code estimate of 30 g.p.m..

With this information we have re-evaluated the pump design and are proposing to use a submersible grinder pump system as manufactured by Crane Pumps & System, Barnes Professional Plumbing.

For a system of 10 to 18 pumps the probable maximum number of pumps operating simultaneously is four. Calculations indicate that the selected pump will operate above the JCSA Standard design rate of 10 g.p.m. with up to eight other pumps operating. At the maximum probable flow condition it will provide 36 g.p.m. and with no other pumps operating it will discharge at 44 g.p.m.

## SEWAGE PUMP STATION CALCULATIONS

FILE NO.: 31248.01

GODSPEED ANIMAL CARE EXPANSION  
TEWNING ROAD, JAMES CITY COUNTY, VA

### ESTIMATED DESIGN FLOW :

J.C.S.A. TABLE 2.1; VETERINARY CLINIC: 0.18 GPD/GSF 11270 S.F. 2028.6 GPD @ DF = 12  
J.C.S.A. WATER METER RECORDS : 0.25 GPD/GSF 11270 S.F. 2817.5 GPD @ DF = 12  
USE HIGHER VALUE: 2818

Qavg. = 3.91 g.p.m.  
Qmin. = 1.96 g.p.m.  
QDESIGN = 9.78 g.p.m.

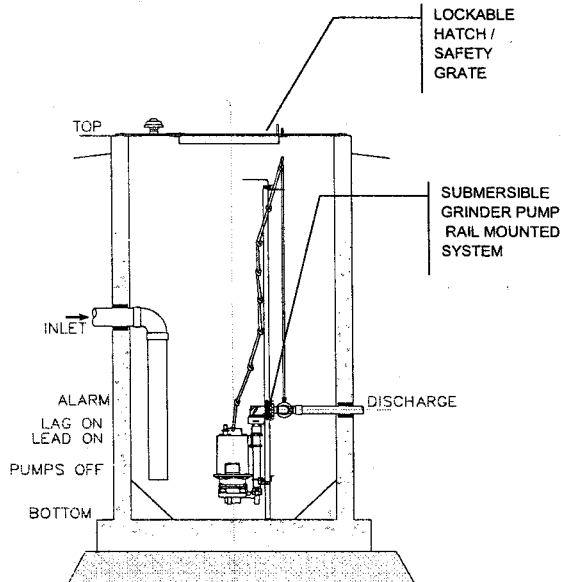
SEWAGE PUMP FLOW AT PEAK FACTOR: 2.50

Using 2000 IPC as Basis :

TOTAL FIXTURE UNIT VALUE FOR ADDITION : 119 SFU TABLE E101B  
ESTIMATED PEAK DEMAND : 48 g.p.m. TABLE E102  
Qpeak = 48.00 g.p.m.  
PEAKING FACTOR: 4.0 Qavg. = 12.00 g.p.m.  
Qmin. = 6.00 g.p.m.  
SEWAGE PUMP DESIGN FLOW AT 2.5 QPEAK = 30.00 g.p.m.

PUMP DESIGN FLOW RATE: 10.00 g.p.m.

### WET WELL DIMENSIONS & CONTROL POINTS :



PUMP WETWELL		*W=0 IF ROUND	
	D or L		W *
INTERIOR :	4.00	FEET	0.00
WALL THICKNESS :	4.00	INCHES	
BASE EXTENSION :	8.00	INCHES	
BASE THICKNESS :	8.00	INCHES	
TOP THICKNESS :	0.00	INCHES	Neglect top weight
TOP :	100.50	FEET	
GROUND :	100.00	FEET	
WATER TABLE :	96.50	FEET	
PIPE OUT INV. :	97.00	FEET	
SEWER IN INV. :	96.00	FEET	
HIGH WATER ALARM :	95.83	FEET	
LAG PUMP ON :	95.33	FEET	
LEAD PUMP ON :	95.00	FEET	
PUMPS OFF :	94.33	FEET	
WET WELL FLOOR :	93.50	FEET	
UNIT DISPLACEMENT; Vdisp = 17.10 CF/ VF			
UNIT STORAGE ; Vint = 12.57 CF/ VF			
BASE AREA; Ab = 28.27 SQ.FT.			
TOP AREA; At = 12.57			

UNIT WEIGHT CONCRETE : 150.0 POUNDS / C.F.  
UNIT WEIGHT WATER : 62.4 POUNDS / C.F.  
UNIT WEIGHT SOIL : 110.0 POUNDS / C.F.

### STORAGE VOLUMES ;

TOTAL :	71	C.C.F.>GAL	533
LAG :	4	C.C.F.>GAL	31
OPERATING :	8	C.C.F.>GAL	63
ABOVE ALARM :	52	C.C.F.>GAL	392

### FILL / RUN TIME CALCULATIONS :

FILL TIME @ MINIMUM FLOW ; 31 MINUTES

PUMP RUN TIME @ MINIMUM FLOW ; 8 MINUTES

CYCLE TIME ; 39 MINUTES

OVERFLOW TIME ; 39 MINUTES

### BOUYANCY CALCULATION :

DISPLACEMENT BELOW GROUND WATER ; 70 CU.FT.

BOUYANT FORCE (UPWARD) ; 4378 POUNDS

WEIGHT OF STRUCTURE ; 7592 POUNDS

WEIGHT OF SOIL ; 6510 POUNDS

TOTAL RESISTING FORCE ; 14102 POUNDS

### RESISTANCE TO FLOTATION:

CHECK F.S. ~ 1.5 3.2

## SEWAGE PUMP STATION CALCULATIONS

FILE NO.: 31248.01

GODSPEED ANIMAL CARE EXPANSION  
TEWNING ROAD, JAMES CITY COUNTY, VA

PIPE SIZE	Well/Pit	FITTING TYPE	QUANTITY OF FITTINGS	EQUIVALENT	
				LENGTH IN DIAMETERS	LENGTH IN FEET
1.50	GATE VALVE	FULL OPEN	1	13	1.6
		GLOBE VALVE OPEN	0	340	0.0
		SWING CHECK VALVE	1	80	10.0
		ELBOWS			
		90° STANDARD	2	31	7.8
		90° LONG RADIUS	0	20	0.0
		45° STANDARD	0	16	0.0
		TEE ( BRANCH )	1	75	9.4
		TEE ( LINE )	0	20	0.0
		TOTAL EQUIVALENT LENGTH ;			29

PIPE SIZE	Onsite	FITTING TYPE	QUANTITY OF FITTINGS	EQUIVALENT	
				LENGTH IN DIAMETERS	LENGTH IN FEET
1.50	GATE VALVE	FULL OPEN	2	13	3.3
		GLOBE VALVE OPEN	0	340	0.0
		SWING CHECK VALVE	0	80	0.0
		ELBOWS			
		90° STANDARD	1	31	3.9
		90° LONG RADIUS		20	0.0
		45° STANDARD	0	16	0.0
		TEE ( BRANCH )	1	75	9.4
		TEE ( LINE )	1	20	2.5
		TOTAL EQUIVALENT LENGTH ;			19

PIPE SIZE	Force Main	FITTING TYPE	QUANTITY OF FITTINGS	EQUIVALENT	
				LENGTH IN DIAMETERS	LENGTH IN FEET
2.00	GATE VALVE	FULL OPEN	1	13	2.2
		GLOBE VALVE OPEN	0	340	0.0
		SWING CHECK VALVE	0	80	0.0
		ELBOWS			
		90° STANDARD	0	31	0.0
		90° LONG RADIUS		20	0.0
		45° STANDARD	0	16	0.0
		TEE ( BRANCH )	1	75	12.5
		TEE ( LINE )		20	0.0
		TOTAL EQUIVALENT LENGTH ;			15

## SEWAGE PUMP STATION CALCULATIONS

FILE NO.: 31248.01

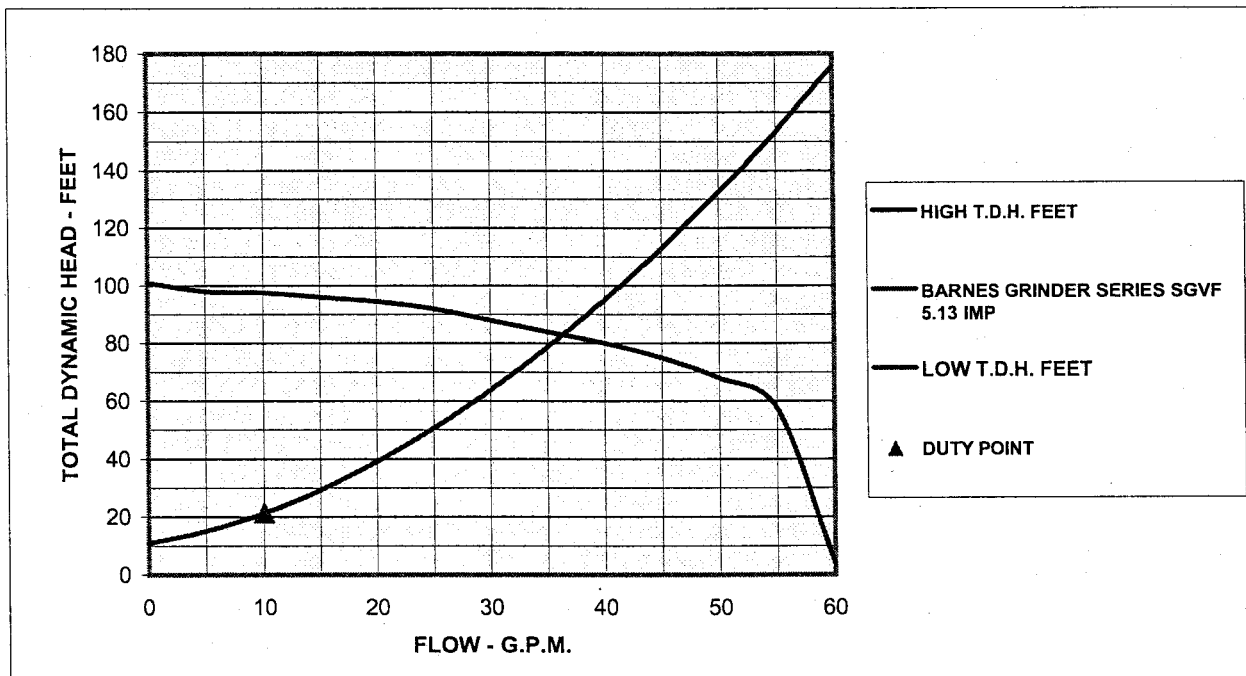
Godspeed Animal Care  
Williamsburg / James City County

MAXIMUM PROBABLE FLOW CONDITION  
THREE OTHER PUMPS OPERATING

BARNES GRINDER  
SERIES SGVF  
5.13 IMP

### PUMP TOTAL DYNAMIC HEAD CALCULATION:

PUMP TOTAL DYNAMIC HEAD CALCULATION:				FLOW G.P.M.	HIGH T.D.H. FEET	5.13 IMP
	Other Flow to Shared Forcemain :	33		0	10.99	101
PUMP ON LIQUID ELEV.:	95.00	FEET		5	15.12	98
PUMP OFF LIQUID ELEV.:	94.33	FEET		10	21.32	97.5
HIGH POINT ELEV.:	97.00	FEET		15	29.38	96
ELEVATION AT CONNECTION:	95.00	FEET		20	39.21	94.5
NORMAL LOW HEAD AT CONNECTION.:	0.00	FEET		25	50.74	92
MAXIMUM HEAD AT CONNECTION.:	0.00	FEET	0	30	63.92	88
STATIC HEAD :	0.67	FEET		35	78.70	84
	Well/Pit	Onsite	Force Main	40	95.07	80
LENGTH OF PIPE :	10	245	350	FEET	45	112.98
EQUIVALENT LENGTH OF FITTINGS :	29	19	15	FEET	50	132.42
PIPE DIAMETER :	1.50	1.50	2	INCHES	55	153.36
HAZEN-WILLIAMS CONSTANT :	130	130	130		60	175.78
DESIGN FLOW RATE :	10	10	43	G.P.M.		
DESIGN FLOW VELOCITY =	1.82	1.82	4.39	F.P.S.		
DESIGN FLOW FRICTION HEAD =	0.49	3.33	16.84	FEET		
TOTAL DYNAMIC =	21.32 FEET					



HIGH RANGE OPERATING FLOW : 36.30 G.P.M.  
HIGH RANGE OPERATING HEAD : 82.81 FEET  
WATER HORSEPOWER : 0.76 H.P.  
MAIN VELOCITY :

MEETS DESIGN RATE

COMBINED FLOW

Well/Pit	6.59	F.P.S.
Onsite	6.59	F.P.S.
Force Main	7.08	F.P.S.

69.3 G.P.M. TOTAL F.M. FLOW

## SEWAGE PUMP STATION CALCULATIONS

FILE NO.: 31248.01

Godspeed Animal Care  
Williamsburg / James City County

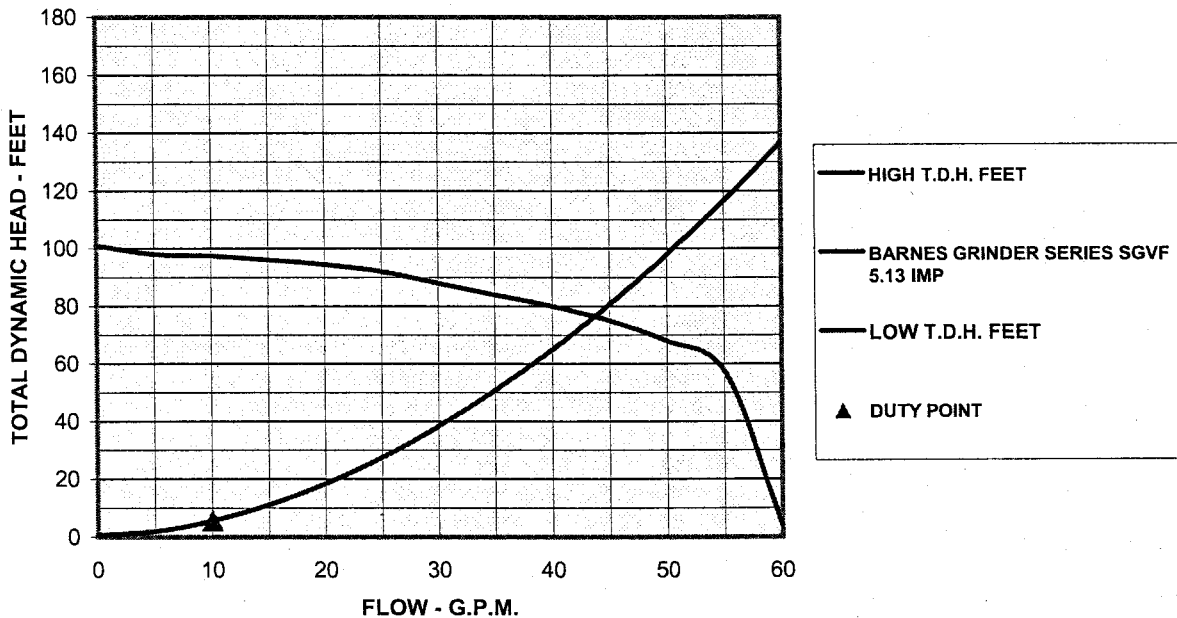
NO OTHER PUMPS  
OPERATING

### PUMP TOTAL DYNAMIC HEAD CALCULATION:

	Other Flow to Shared Forcemain : 0					
PUMP ON LIQUID ELEV.:	95.00	FEET				
PUMP OFF LIQUID ELEV.:	94.33	FEET				
HIGH POINT ELEV.:	97.00	FEET				
ELEVATION AT CONNECTION:	95.00	FEET				
NORMAL LOW HEAD AT CONNECTION:	0.00	FEET				
MAXIMUM HEAD AT CONNECTION:	0.00	FEET	0			
STATIC HEAD:	0.67	FEET				
	Well/Pit	Onsite	Force Main			
LENGTH OF PIPE:	10	245	350	FEET		
EQUIVALENT LENGTH OF FITTINGS:	29	19	15	FEET		
PIPE DIAMETER:	1.50	1.50	2	INCHES		
HAZEN-WILLIAMS CONSTANT:	130	130	130			
DESIGN FLOW RATE:	10	10	10	G.P.M.		
DESIGN FLOW VELOCITY =	1.82	1.82	1.02	F.P.S.		
DESIGN FLOW FRICTION HEAD =	0.49	3.33	1.13	FEET		
TOTAL DYNAMIC =	5.62 FEET					

FLOW G.P.M.	HIGH T.D.H. FEET	
0	0.67	101
5	2.04	98
10	5.62	97.5
15	11.15	96
20	18.51	94.5
25	27.62	92
30	38.44	88
35	50.90	84
40	64.97	80
45	80.63	75
50	97.84	68
55	116.57	57.5
60	136.81	4

BARNES GRINDER  
SERIES SGVF  
5.13 IMP



HIGH RANGE OPERATING FLOW : 43.64 G.P.M.  
HIGH RANGE OPERATING HEAD : 76.21 FEET  
WATER HORSEPOWER : 0.84 H.P.  
MAIN VELOCITY :

MEETS DESIGN RATE

Well/Pit	7.92	F.P.S.
Onsite	7.92	F.P.S.
Force Main	4.46	F.P.S.

## SEWAGE PUMP STATION CALCULATIONS

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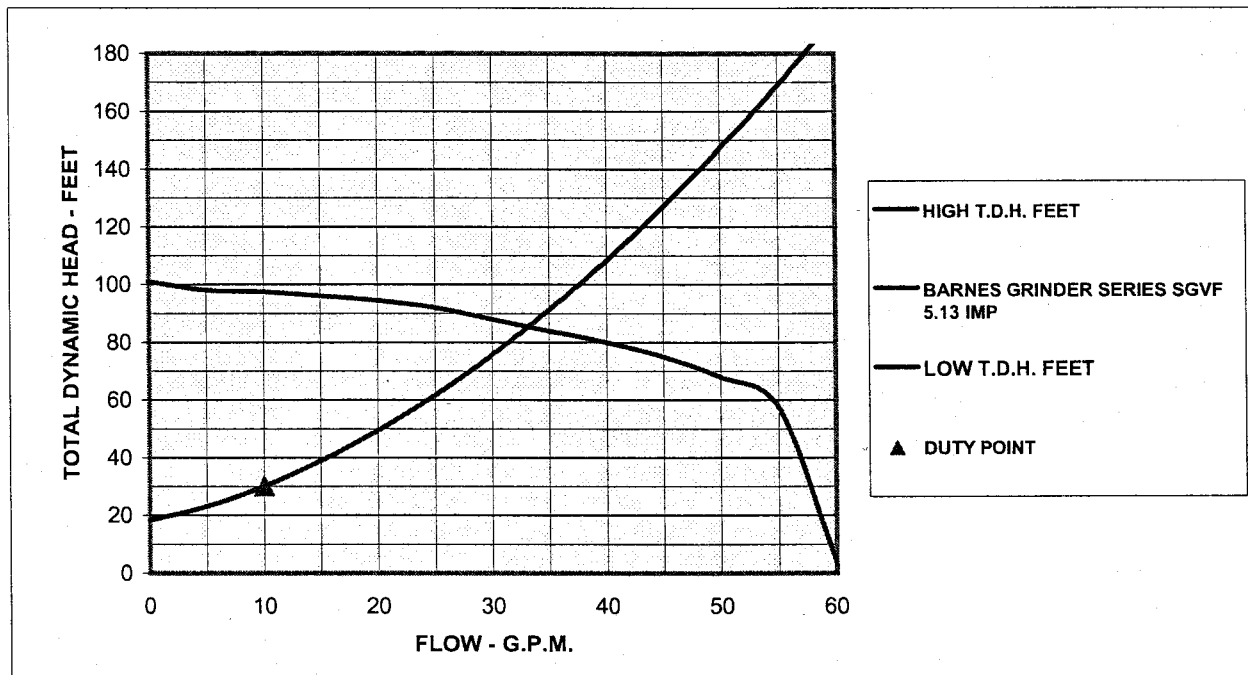
Godspeed Animal Care  
Williamsburg / James City County

MAXIMUM ALLOWABLE FORCE MAIN  
VELOCITY CONDITION 4 OTHER PUMPS  
OPERATING

BARNES GRINDER  
SERIES SGVF  
5.13 IMP

### PUMP TOTAL DYNAMIC HEAD CALCULATION:

				LOW G.P.M.	HIGH T.D.H. FEET	
	Other Flow to Shared Forcemain :	44		0	18.24	101
PUMP ON LIQUID ELEV.:	95.00	FEET		5	23.17	98
PUMP OFF LIQUID ELEV.:	94.33	FEET		10	30.15	97.5
HIGH POINT ELEV. :	97.00	FEET		15	38.98	96
ELEVATION AT CONNECTION :	95.00	FEET		20	49.56	94.5
NORMAL LOW HEAD AT CONNECTION.:	0.00	FEET		25	61.84	92
MAXIMUM HEAD AT CONNECTION.:	0.00	FEET	0	30	75.75	88
STATIC HEAD :	0.67	FEET		35	91.27	84
	Well/Pit	Onsite	Force Main	40	108.36	80
LENGTH OF PIPE :	10	245	350	45	126.99	75
EQUIVALENT LENGTH OF FITTINGS :	29	19	15	50	147.14	68
PIPE DIAMETER :	1.50	1.50	2	55	168.78	57.5
HAZEN-WILLIAMS CONSTANT :	130	130	130	60	191.90	4
DESIGN FLOW RATE :	10	10	54	G.P.M.		
DESIGN FLOW VELOCITY =	1.82	1.82	5.52	F.P.S.		
DESIGN FLOW FRICTION HEAD =	0.49	3.33	25.66	FEET		
TOTAL DYNAMIC =	30.15 FEET					



HIGH RANGE OPERATING FLOW : 33.14 G.P.M.  
HIGH RANGE OPERATING HEAD : 85.30 FEET  
WATER HORSEPOWER : 0.71 H.P.  
MAIN VELOCITY :

MEETS DESIGN RATE

COMBINED FLOW

Well/Pit 6.02 F.P.S.  
Onsite 6.02 F.P.S.  
Force Main 7.88 F.P.S.

77.1 G.P.M. TOTAL F.M. FLOW

## SEWAGE PUMP STATION CALCULATIONS

FILE NO.: 31248.01

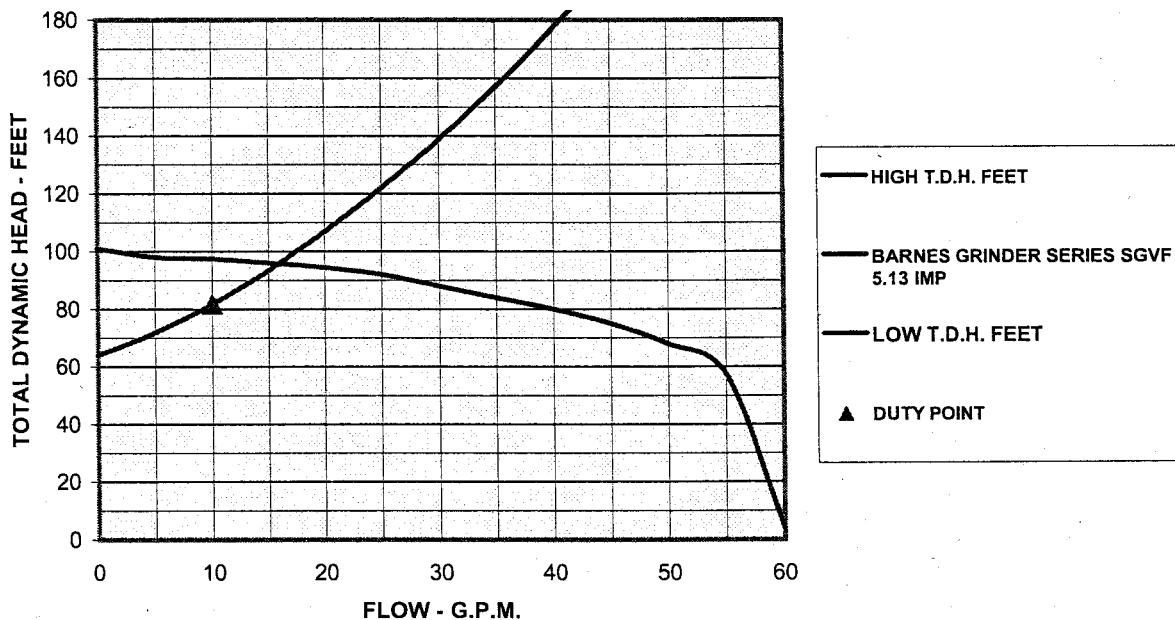
Godspeed Animal Care  
Williamsburg / James City County

EIGHT OTHER PUMPS  
OPERATING

### PUMP TOTAL DYNAMIC HEAD CALCULATION:

	Other Flow to Shared Forcemain : 88		
PUMP ON LIQUID ELEV.:	95.00	FEET	
PUMP OFF LIQUID ELEV.:	94.33	FEET	
HIGH POINT ELEV.:	97.00	FEET	
ELEVATION AT CONNECTION:	95.00	FEET	
NORMAL LOW HEAD AT CONNECTION:	0.00	FEET	
MAXIMUM HEAD AT CONNECTION:	0.00	FEET	0
STATIC HEAD:	0.67	FEET	
	Well/Pit	Onsite	Force Main
LENGTH OF PIPE:	10	245	350 FEET
EQUIVALENT LENGTH OF FITTINGS:	29	19	15 FEET
PIPE DIAMETER:	1.50	1.50	2 INCHES
HAZEN-WILLIAMS CONSTANT:	130	130	130
DESIGN FLOW RATE:	10	10	98 G.P.M.
DESIGN FLOW VELOCITY:	1.82	1.82	10.01 F.P.S.
DESIGN FLOW FRICTION HEAD:	0.49	3.33	77.29 FEET
TOTAL DYNAMIC =	81.78 FEET		

FLOW G.P.M.	HIGH T.D.H. FEET	BARNES GRINDER SERIES SGVF 5.13 IMP
0	64.01	101
5	71.88	98
10	81.78	97.5
15	93.49	96
20	106.93	94.5
25	122.04	92
30	138.76	88
35	157.07	84
40	176.92	80
45	198.30	75
50	221.17	68
55	245.52	57.5
60	271.34	4



HIGH RANGE OPERATING FLOW : 15.84 G.P.M.  
HIGH RANGE OPERATING HEAD : 95.63 FEET  
WATER HORSEPOWER : 0.38 H.P.  
MAIN VELOCITY :

MEETS DESIGN RATE

COMBINED FLOW

Well/Pit 2.88 F.P.S.  
Onsite 2.88 F.P.S.  
Force Main 10.61 F.P.S.

103.8 G.P.M. TOTAL F.M. FLOW



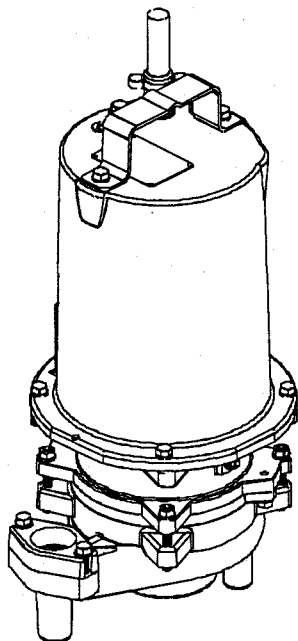


# SGVF & SGVH

## SUBMERSIBLE GRINDER PUMPS

### Recessed Vortex

Grinder Pumps	
DATE	11/02
REPLACES	1/01



**Series: SGVF & SGVH**  
**2 HP, 3450 RPM, 60Hz**  
**High-Flow and High Head**

# SGV<sup>3</sup>

CENTRIFUGAL GRINDER PUMPS



CSA 108 - File No. LR16567  
 UL 778

NRTLIC

Models SGVF2022L and SGVH2022L  
 are NOT UL or CSA listed.

### Description:

THE GRINDER PUMP IS DESIGNED TO  
 REDUCE DOMESTIC, COMMERCIAL,  
 INSTITUTIONAL AND LIGHT INDUSTRIAL  
 SEWAGE TO A FINELY GROUND SLURRY.

### Specifications:

<b>DISCHARGE:</b>	1-1/4" NPT, Vertical
<b>LIQUID TEMPERATURE:</b>	160°F (71°C) Intermittent
<b>VOLUTE:</b>	Cast Iron ASTM A-48, Class 30.
<b>MOTOR HOUSING:</b>	Cast Iron ASTM A-48, Class 30.
<b>SEAL PLATE:</b>	Cast Iron ASTM A-48, Class 30.
<b>IMPELLER:</b>	Design: 12 Vane, Vortex, With Pump Out Vanes On Back Side. Dynamically Balanced, ISO G6.3. Material: 85-5-5-5 Bronze (Std). ASTM A-48 Cast Iron (Optional)
<b>SHREDDING RING:</b>	Hardened 440C Stainless Steel Rockwell® C-55.
<b>CUTTER:</b>	Hardened 440C Stainless Steel, Rockwell® C-55.
<b>SHAFT:</b>	416 Stainless Steel
<b>SQUARE RINGS:</b>	Buna-N
<b>HARDWARE:</b>	300 Series Stainless Steel
<b>PAINT:</b>	Air Dry Enamel.
<b>SEAL:</b>	Design: Tandem Mechanical, Oil Filled Reservoir. Material: Rotating Faces - Carbon Stationary Faces - Ceramic Elastomer - Buna-N Hardware - 300 Series Stainless
<b>CABLE ENTRY:</b>	15 ft. (4.6M) Std. Cord. Custom Molded Quick Connect, for Sealing and Strain Relief. Other Lengths Available Include 8ft (2.4M), 20ft (6M), 30ft (9M), 50ft (15M), 75ft (22.8M) & 100ft (30.5M). CSA/UL Approved 12/4 Type SOW.
<b>CABLE:</b>	
<b>UPPER BEARING:</b>	Design: Single Row, Ball, Oil Lubricated Load: Radial
<b>INTERMEDIATE BEARING:</b>	Design: Single Row, Ball, Oil Lubricated Load: Radial & Thrust
<b>LOWER BEARING:</b>	Design: Sleeve Lubrication: Oil Load: Radial
<b>MOTOR:</b>	Design: NEMA L-Single Phase, (SGVF2022L or SGVH2022L includes overload protection in the motor). NEMA B-Three Phase Torque Curve. Oil-Filled, Squirrel Cage Induction. Class B.
	Insulation: Class B.
<b>SINGLE PHASE:</b>	Capacitor Start/Capacitor Run. Requires Overload Protection to be Included In control panel, except SGVF2022L or SGVH2022L. Requires Barnes® Starter or Control Panel which Includes Capacitors, or Capacitor pack.
<b>THREE PHASE:</b>	Dual Voltage 240/480; Requires Overload Protection to be Included in control panel.
<b>OPTIONAL EQUIPMENT:</b>	Seal Material, Impeller Trims, Cable Length. Moisture Sensors, Leg Kit P/N: 108339.

## CRANE

PUMPS & SYSTEMS

A Crane Co. Company

1485 Lexington Ave.  
 Mansfield, Ohio 44907-2674  
 Ph: (937) 778-8947  
 Fax: (419) 774-1530  
[www.Barnes-PS.com](http://www.Barnes-PS.com)

420 Third Street  
 Piqua, Ohio 45356-0603  
 Ph: (937) 778-8947  
 Fax: (937) 773-2238  
[www.cranepumps.com](http://www.cranepumps.com)



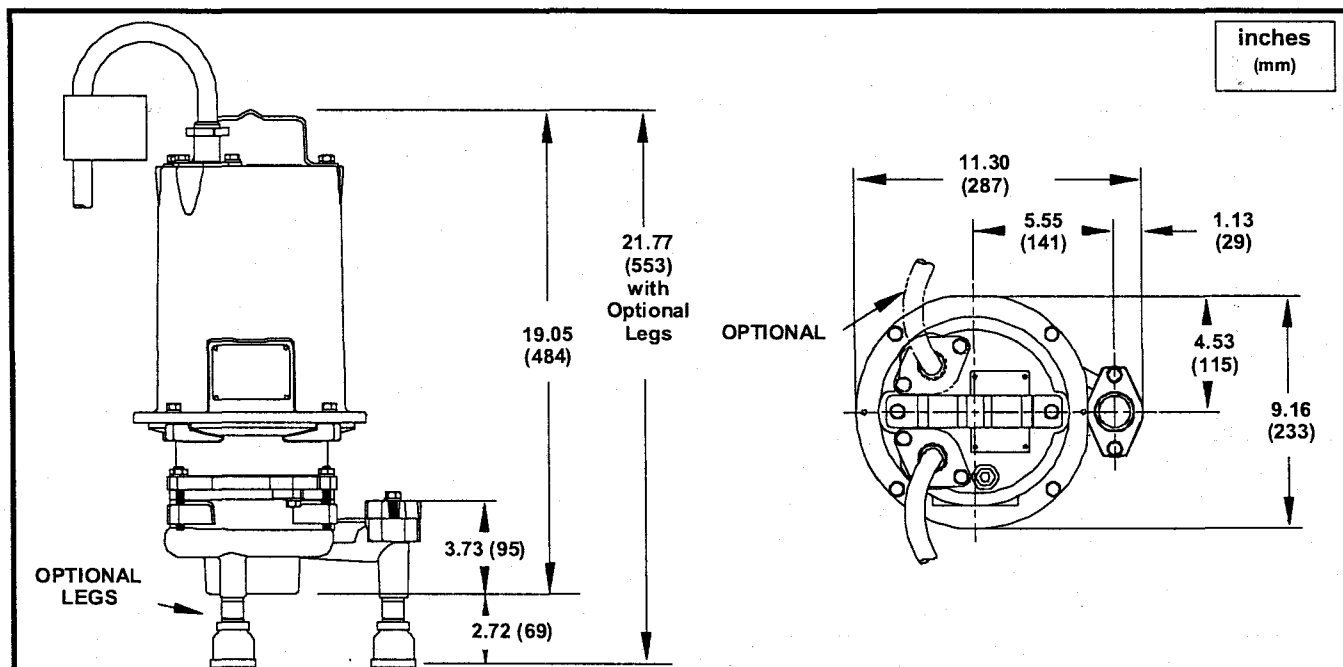
PS-001

Grinder Pumps	
DATE	9/02
REPLACES	1/01

# SGVF & SGVH

## SUBMERSIBLE GRINDER PUMPS

### Recessed Vortex



MODEL NO.	PART NO.	HP	VOLT	PH	RPM (NOM)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D. $\pm .02$ (.5) in (mm)
<b>HIGH-FLOW</b>											
SGVF2002L*	110614	2	200	1	3450	F	17.0	53.0	12/4	SOW	0.67 (17)
SGVF2022L	110609	2	240	1	3450	H	15.0	53.8	12/4	SOW	0.67 (17)
SGVF2062L	110610	2	200	3	3450	J	11.0	42.0	12/4	SOW	0.67 (17)
SGVF2032L	110611	2	240	3	3450	H	9.0	36.0	12/4	SOW	0.67 (17)
SGVF2042L	110612	2	480	3	3450	H	4.0	18.0	12/4	SOW	0.67 (17)
SGVF2052L	110613	2	600	3	3450	H	3.2	14.4	12/4	SOW	0.67 (17)
<b>HIGH-HEAD</b>											
SGVH2002L*	110620	2	200	1	3450	F	17.0	53.0	12/4	SOW	0.67 (17)
SGVH2022L	110615	2	240	1	3450	H	15.0	53.8	12/4	SOW	0.67 (17)
SGVH2062L	110616	2	200	3	3450	J	11.0	42.0	12/4	SOW	0.67 (17)
SGVH2032L	110617	2	240	3	3450	H	9.0	36.0	12/4	SOW	0.67 (17)
SGVH2042L	110618	2	480	3	3450	H	4.0	18.0	12/4	SOW	0.67 (17)
SGVH2052L	110619	2	600	3	3450	H	3.2	14.4	12/4	SOW	0.67 (17)

#### Standard Units:

Temperature Sensor cable is 14/3 SOW, 0.530 OD. (13.5mm) (Not used on SGVF2022L or SGVH2022L).

**Optional** - Moisture/Temperature sensor cable for all models is 18/5 SOW, 0.470 OD. (12mm), replaces Temp sensor cable.

\* This pump is NOT UL or CSA listed.

#### IMPORTANT !

- 1.) PUMP MAY BE OPERATED "DRY" FOR EXTENDED PERIODS WITHOUT DAMAGE TO MOTOR AND/OR SEALS.
- 2.) THIS PUMP IS APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION II HAZARDOUS LOCATIONS.
- 3.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION I HAZARDOUS LOCATIONS.
- 4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.

# CRANE

A Crane Co. Company

#### PUMPS & SYSTEMS

1485 Lexington Ave.  
Mansfield, Ohio 44907-2674  
Ph: (937) 778-8947  
Fax: (419) 774-1530  
www.Barnes-PS.com

420 Third Street  
Piqua, Ohio 45356-0603  
Ph: (937) 778-8947  
Fax: (937) 773-2238  
www.cranepumps.com

PS-002



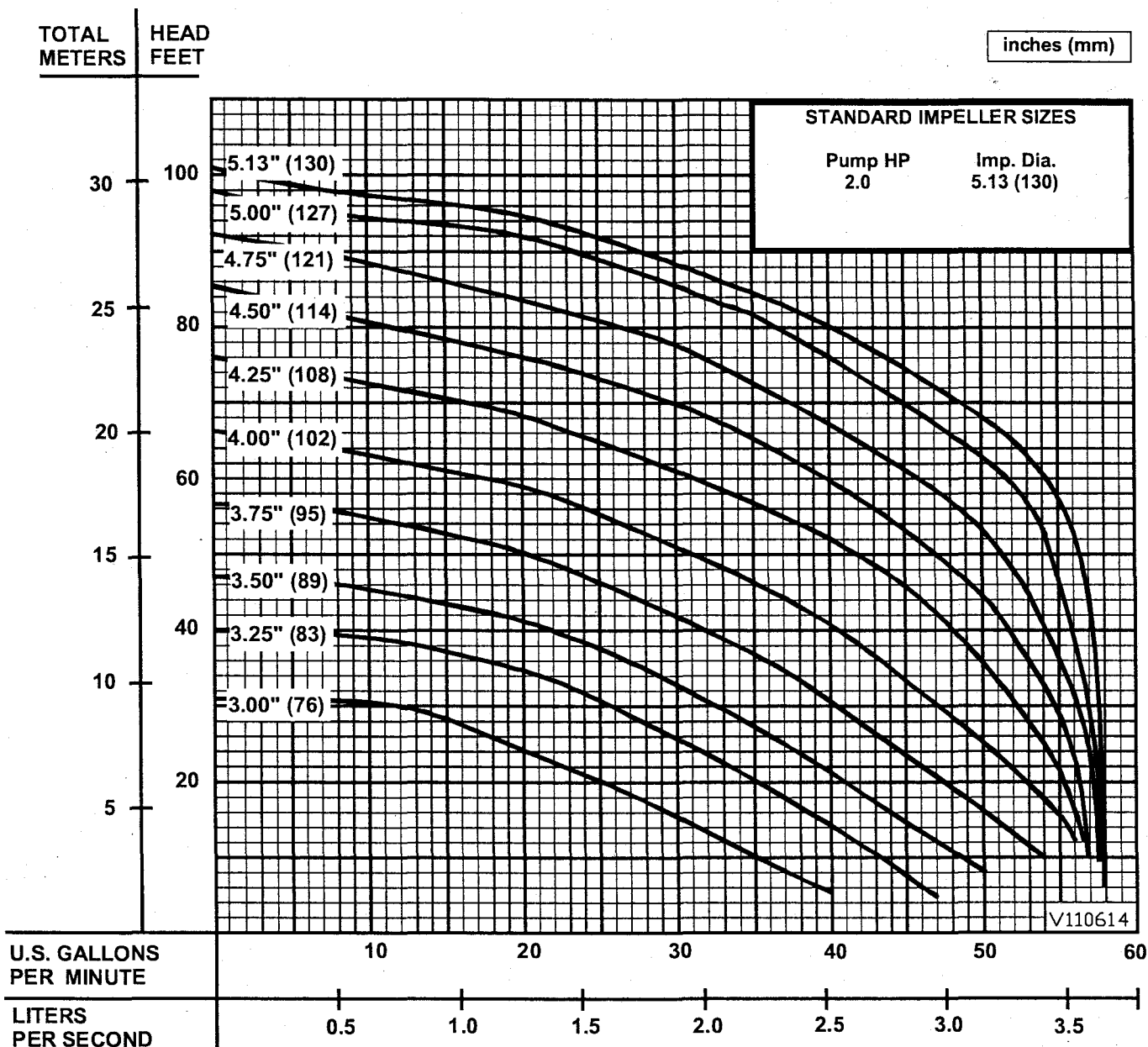
8



# PERFORMANCE CURVE

## Series: SGVF Grinder, 2HP, 3450RPM, 60Hz, High Flow

Grinder Pumps	
DATE	11/02
REPLACES	1/01



Testing is performed with water, specific gravity of 1.0 @ 68° F (20°C), other fluids may vary performance.

**CRANE.**

A Crane Co. Company

### PUMPS & SYSTEMS

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Fax: (937) 773-2238  
www.cranepumps.com

Submersible Wastewater  
Pump Association  
**SWPA**  
**MEMBER**

## Twening Road Pressurized Sewer System

In response to comments from the James City Service Authority relative to the sewage pump for the Godspeed Animal Care Facility, VHB has completed a study to determine the state of the pressurized sewer system serving the property and its ability to accept additional sewage from the proposed improvements. The following are the findings:

1. The existing sewer does not tie into the Hampton Roads Sanitary District force main in Ironbound Road. Rather it ties into the gravity sewer on the north side of Ironbound Road.
2. By contacting all of the property owners directly, it has been determined that all use the E-one semi-positive displacement type pump. There are presently 13 pumps connected. Six pumps are on the JCSA operations site and there is one pump on each of the seven developed lots which includes the existing Godspeed Animal Care facility. There are four undeveloped lots on Twening Road.
3. We have obtained actual water usage data for the properties and determined that the water consumption for the existing Godspeed facility is 0.25 gallons per day per square foot of building area.
4. The capacity of the existing force main limited by a maximum permissible velocity of 5 feet per second is 78.3 g.p.m.
5. The probable maximum flow condition for a system of 10 to 18 pumps is four (4) pumps operating simultaneously.

The conclusion is that the pressure sewer system can accept as much as 45 g.p.m. from a single pump station with three other pumps operating without exceeding the permissible velocity standard.



# Computations

GODSPEED ANIMAL

Project: CARE

Project # 31248.01

Location:

Sheet of

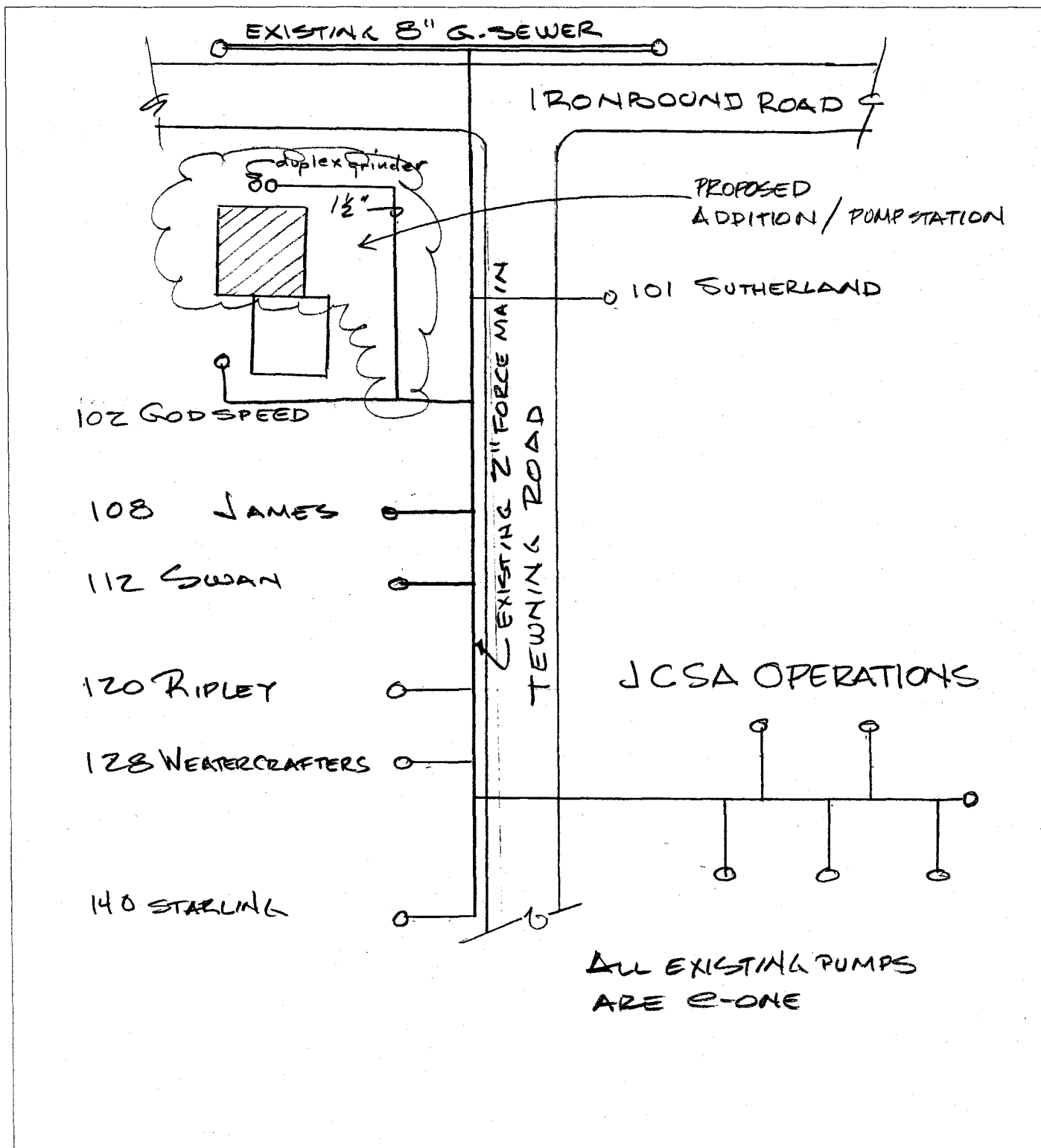
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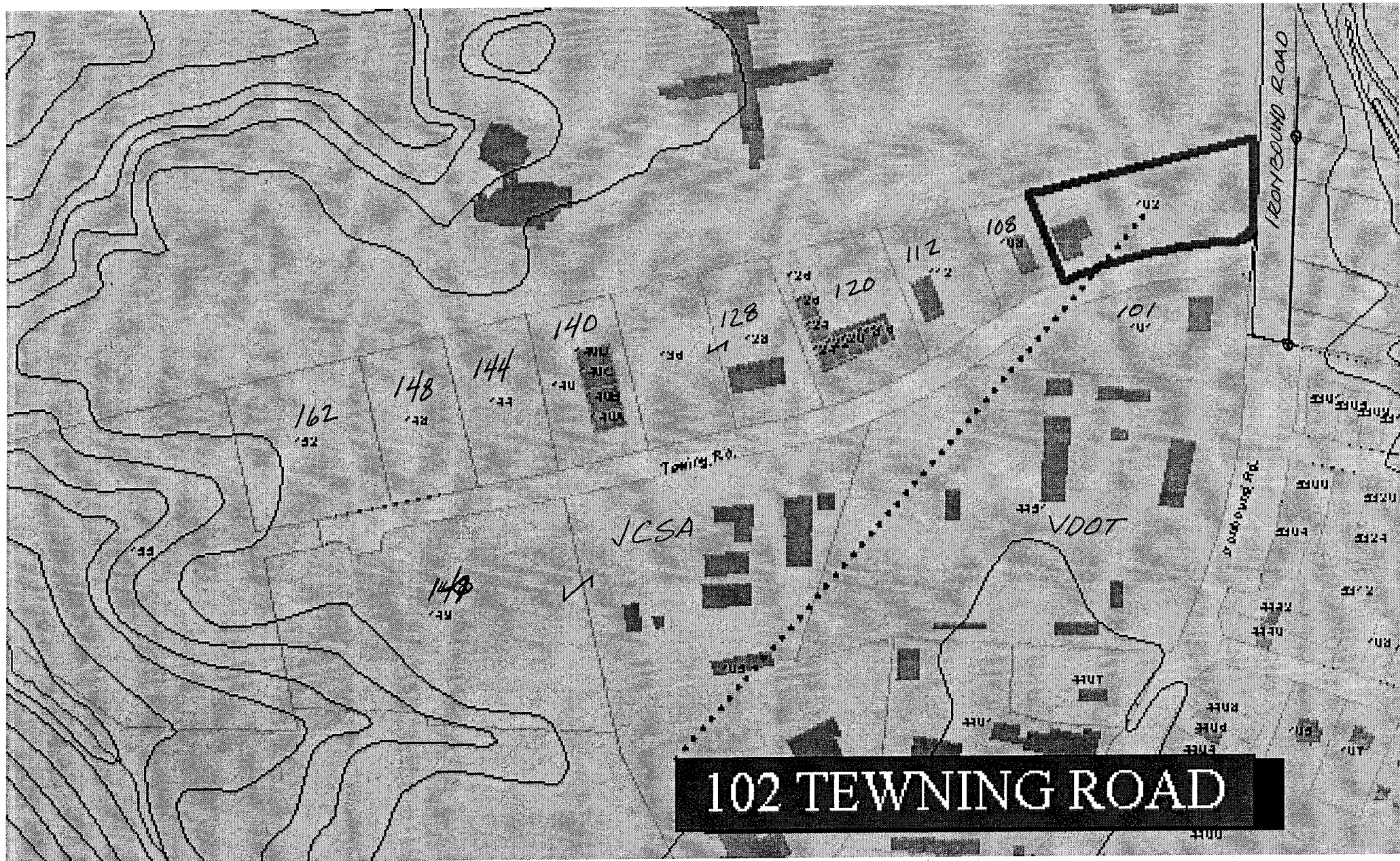
Date:

Checked by:

Date:

Title





SOURCE: JAMES CITY COUNTY PROPERTY INFORMATION WEBSITE

Telephone contacts August 3 thru 11, 2004

1. 101 Tewning E-one 2010-74  
Sutherland Optometry 1-757-229-6302 Dr. Sutherland  
Replaced by Just Plumbing, Newport News 1-757-877-8540,  
within last year.
2. 102 Tewning Godspeed Animal Care E-One  
Replaced by Just Plumbing 2001
3. 108 Tewning James Pest Control 1-757-229- 3370  
Environment ONE Observed by R S Phillips 8/11/04
4. 112 Tewning E-One Receiver observed by R S Phillips 8/11/04  
Swan Cleaners Etta & Richard Eggelston 1-757-566-3266, cell 1-757-870-8221
5. 120 Tewning E-one,  
Ripley Construction 1-757-253-0233  
Robert Ripley new pump 2004
6. 128 Tewning E-one  
Tewning Commercial Park, Weathercrafters Heating and Air Conditioning  
Jim Smith 1-757-244-4357
7. 140 Tewning E-one  
Starling Guttering, Glen Starling 1-757-465-7662  
1-800-390-3839  
Recently replaced: Steve Ziegler Plumber 1-757-877-2054



**Phillips, Richard**

---

**From:** Tim Fortune [tfortune@james-city.va.us]  
**Sent:** Monday, July 26, 2004 2:34 PM  
**To:** Phillips, Richard  
**Subject:** FW: Godspeed Animal Clinic

Dick,

As promised, our billing department provided the following peak water usage data over the last quarter:

- 1) Dr Sutherland (101) - 12,150 Gallons
- 2) Godspeed Animal Clinic (102 Tewning Road) - 70,800 Gallons
- 3) James Pest Control (108 Tewning Road) - 18,450 Gallons
- 4) Swan Cleaners (112 Tewning Road) - 9,650 Gallons
- 5) Tewning Commercial Park (120 Tewning Road) - 21,950 Gallons
- 6) Tewning Commercial Park (128 Tewning Road) - 9,700 Gallons
- 7) Tewning Industrial Park (140 Tewning Road) - 44,950 Gallons
- 8) JCSA Operations/JCC Maint Facility:
  - a) 103 Maint Facility - 84,900 Gallons
  - b) 105 Warehouse - 10,500 Gallons
  - c) 107 Ops Bldg - 31,650 Gallons
  - d) 107 Shop - 11,750 Gallons
  - e) 107 Utilities - 4,000 Gallons
  - f) 109 JCC Transit - 16,750 Gallons
  - g) 111 Old Maint - 8,400 Gallons
  - h) 113 Grounds & Maint - 9,500 Gallons
  - i) 115 Mosquito Control - 8,300 Gallons

Call if you have questions.

Thanks,  
Tim

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

**From:** Tim Fortune  
**Sent:** Friday, July 23, 2004 11:10 AM  
**To:** 'rphillips@vhb.com'  
**Cc:** Danny Poe  
**Subject:** Godspeed Animal Clinic

Dick,

The following are customers along Tewning Rd which our records show as having Grinder pumps:

- Dr. Sutherlands Optometry (101 Tewning Road) 565-2699
- Godspeed Animal Clinic (102 Tewning Road)
- James Pest Control (108 Tewning Road) 229-3370
- Swan Cleaners (112 Tewning Road) 220-3874
- Tewning Commercial Park (120 Tewning Road) 565-2436
- Tewning Commercial Park (128 Tewning Road) 566-0237
- Tewning Industrial Park (140 Tewning Road) 253-0233
- JCSA Operations/JCC Maint Facility (107 Tewning Road) 259-4096

7/26/2004



You may want to verify the phone numbers above as our records date back to 1985 on some of these properties.

Concerning JCSA Operations/Maintenance yard, there are 6 grinder pumps serving the various functions there (all are E-one grinders w/1 HP motors). Billing is compiling water usage data for the various parcels noted above. I will forward this data to you once completed. Nice meeting you today and should you have questions, please do not hesitate to call.

Thanks,

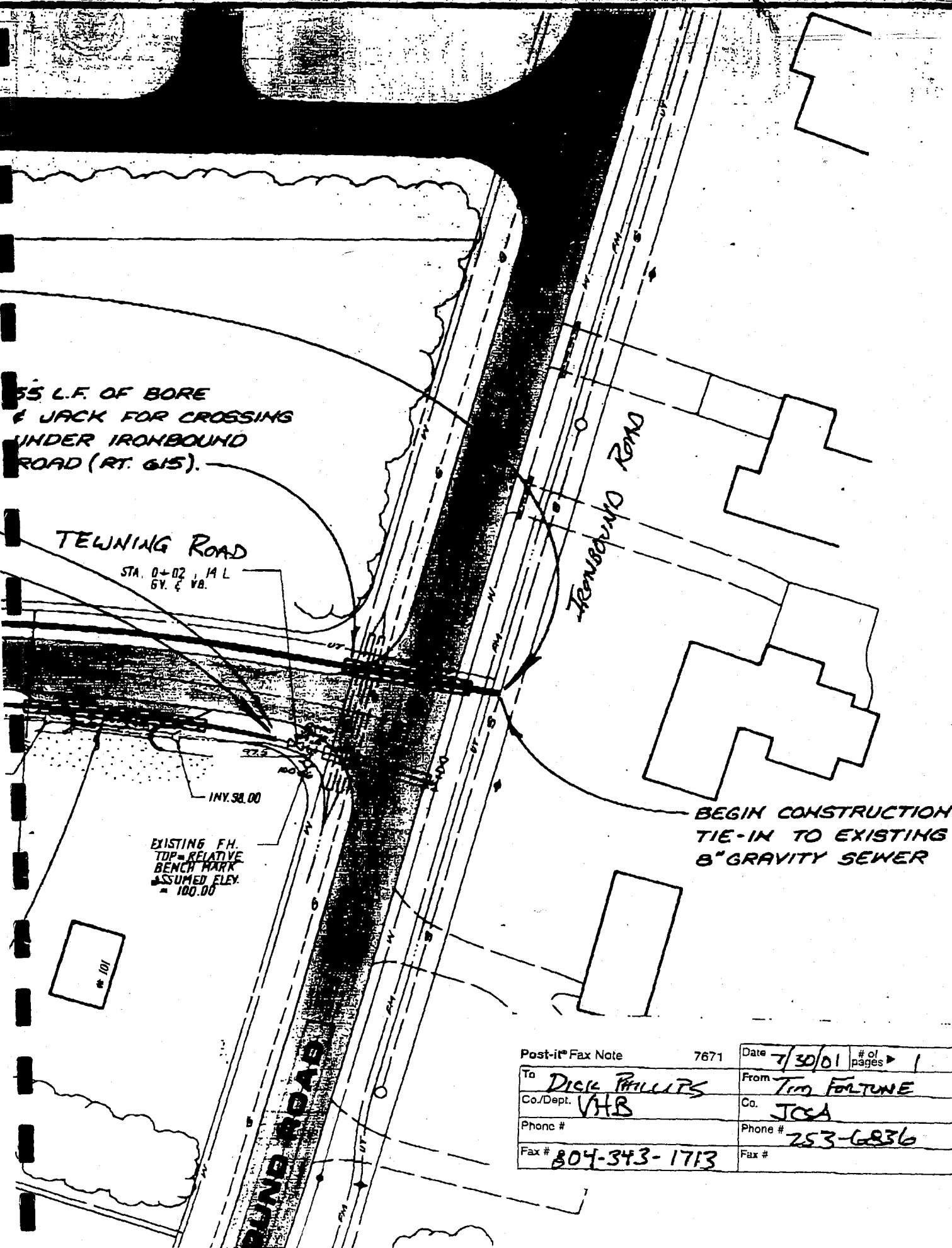
Timothy O. Fortune, P.E.

**James City Service Authority**

Phone (757) 253-6836

Fax (757) 253-6850

7/26/2004



Post-it® Fax Note	7671	Date	7/30/01	# of pages	1
To	DICK PHILLIPS	From	TIM FORTUNE		
Co./Dept.	VHB	Co.	JCSA		
Phone #		Phone #	253-6836		
Fax #	804-343-1713	Fax #			

Project: GOODSPEED A.C. Project # 31248.01  
 Location: TEWNING ROAD Sheet of  
 Calculated by: RSP Date:  
 Checked by: Date:  
 Title

### ESTIMATED SEWAGE FLOW:

JCSA TABLE 2.1 UNIT FLOW  $0.18 \frac{\text{GPD}}{\text{S.F.}}$

BILLING RECORDS 1<sup>ST</sup> QTR 2004 70800 GALLONS  
 BASED ON 78 BUSINESS DAYS PER QTR.  $\frac{\$}{\text{S.F.}}$   
 EXIST'G. BUILDING 3612 G.S.F. UNIT =  $0.25 \frac{\text{GPD}}{\text{S.F.}}$

PRORATED FLOW FOR NEW FACILITY:

AVERAGE DAILY FLOW (ADF)

ADF EXISTING PUMP:

$$4422 \text{ GSF} \times .25 \frac{\text{GPD}}{\text{S.F.}} = 1106 \text{ GPD}$$

ADF NEW PUMP:

$$11270 \text{ GSF} \times .25 \frac{\text{GPD}}{\text{S.F.}} = 2818 \text{ GPD}$$

$$\underline{3924 \text{ GPD}}$$

SEWAGE PUMP DESIGN FLOW:

DURATION OF FLOW 12 HR/DAY

$$\text{EXISTING PUMP: } \frac{1106}{12} = 92 \text{ GPH} = 1.5 \text{ GPM}$$

$$\text{NEW PUMP: } \frac{2818}{12} = 235 \text{ GPH} = 3.9 \text{ GPM}$$

$$\text{DESIGN FLOW: } 2.5 \times 3.9 = 9.75 \text{ GPM}$$



## **EARTHWORKS**

Earthworks Consulting Engineers, Inc.

May 28, 2004

Mr. Scott Van Voorhees  
Guernsey Tingle Architects  
3200 Ironbound Road  
Williamsburg, Virginia 23188

Earthworks Project No. 1316

Reference: Godspeed Animal Clinic Infiltration Investigation

Dear Mr. Van Voorhees:

Pursuant to your request, an engineer from Earthworks visited the above referenced site to perform a subsurface investigation to determine the suitability of the soils for support of a proposed stormwater infiltration facility. This investigation was completed by performing two (2) handauger borings at locations within the proposed infiltration facility, as determined by the project Civil Engineer. The borings were extended to depths of 82 inches below existing surface elevations. In addition, two 15-foot deep soil test borings performed adjacent to the infiltration facility as part of our subsurface investigation for the proposed building addition were used in this investigation. A boring location diagram and logs of the two handauger borings and two soil test borings are attached to this report.

In general, the soil test and handauger borings encountered Silty Sand with Clay, Clayey Sand, and Sandy Clay to depths of about 5 feet. These soils contained seasonal water indicators below a depth of about 40 inches and appeared to be moderately to poorly drained. Soils below about 5 or 6 feet consisted of moderately well drained Silty Sands. These soils too contained seasonal water indicators, but to a lesser degree. The groundwater table was encountered at a depth of about 10 feet.

Based on the results of our field classifications of the soils encountered, it is estimated that soils above a depth of about 5 feet possess an infiltration rate less than about 0.5 inches per hour. Water movement through these soils appears to be restricted, based on soil color, and water appears to be present in these soils during wet seasonal conditions. Soils below a depth of about 5 feet also appear to be seasonally wet. However, these soils are moderately well drained. We estimate that these soils possess an infiltration rate of 0.6 inches per hour or better.

It is expected that construction of pavements and other impervious surfaces will substantially reduce the presence of seasonal water in the soils surrounding the proposed infiltration facility. If an infiltration facility is considered feasible based on seasonal water conditions, we recommend the infiltration level be placed about 5 to 6 feet below existing grades and that side-wall infiltration rates be considered minimal.

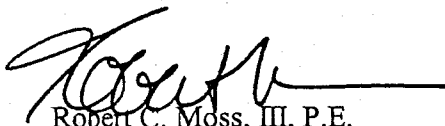
Should the client or Civil Engineer require more extensive investigation, Earthworks can provide in-field infiltration testing to confirm our estimated infiltration rates upon request.

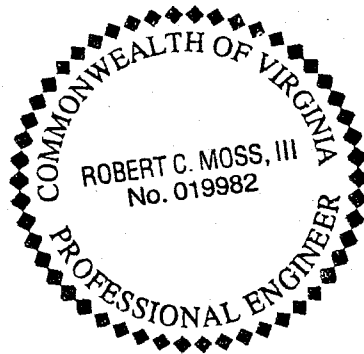
Godspeed Animal Clinic Infiltration Investigation  
Earthworks Project No. 1316  
Page 2

We appreciate this opportunity to be of service to you. Should you have questions concerning this investigation or wish to discuss our findings in more detail, please contact our office.

Respectfully,

EARTHWORKS CONSULTING ENGINEERS, INC.

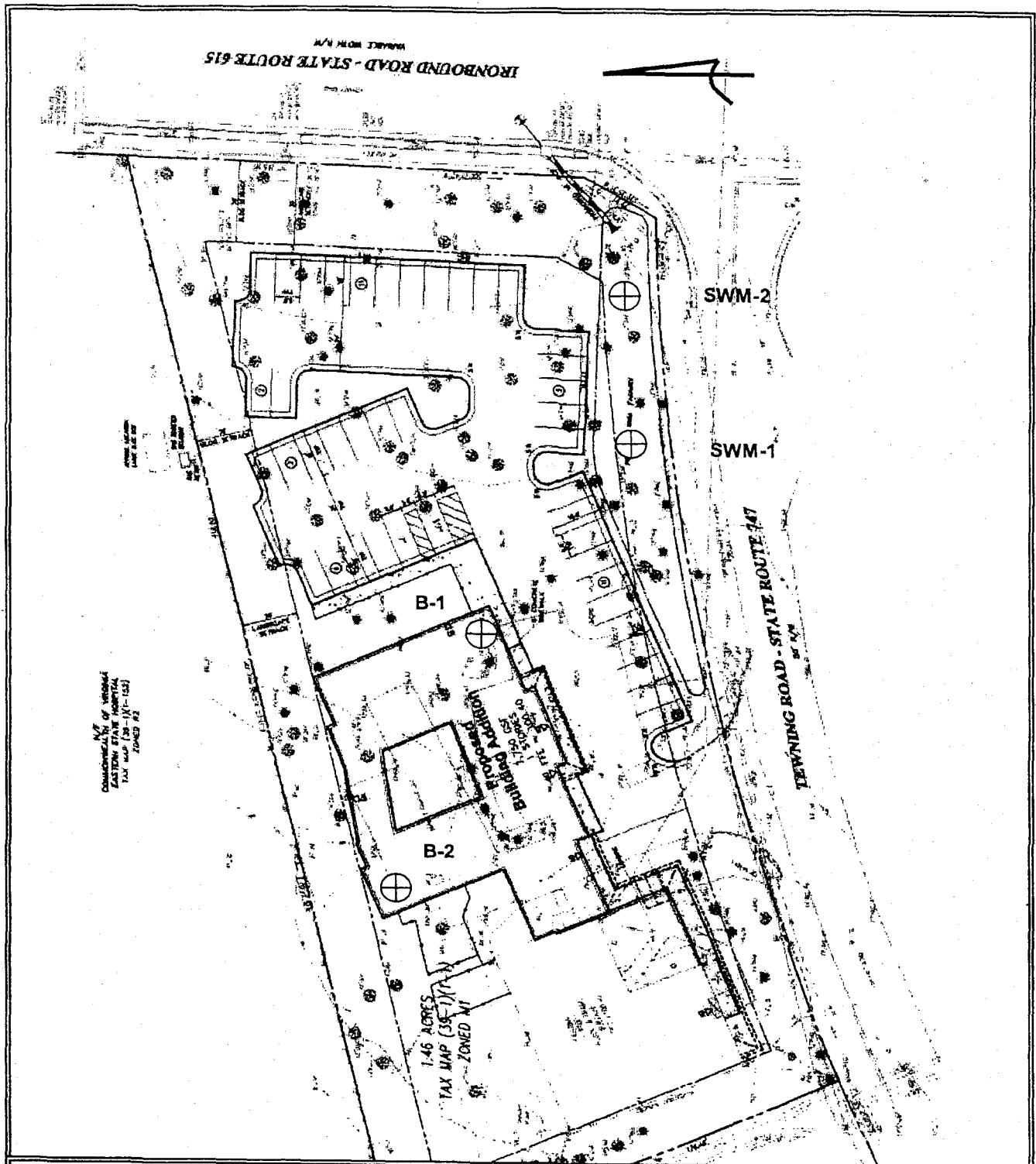
  
Robert C. Moss, III, P.E.  
President / Principal Engineer



Enclosures:     Boring Location Diagram  
                     Soil Test and Handauger Boring Logs  
                     Summary of Laboratory Test Data

Copies:     (1) Client  
                 (1) VHB – Mitchell Warren

geotech\letters\1316.doc



**EARTHWORKS**

Earthworks Consulting Engineers, Inc.  
4305 Cutshaw Avenue · Richmond, Virginia 23230

### BORING LOCATION DIAGRAM

Godspeed Animal Clinic  
Infiltration Investigation

EARTHWORKS PROJECT NO. 1316

**EARTHWORKS CONSULTING ENGINEERS, INC.**  
**HANDAUGER BORING LOGS**

Godspeed Animal Clinic  
Infiltration Investigation

DEPTH (IN)	BORING NUMBER SWM-1
	DESCRIPTION OF SOILS
0-4	Topsoil
4-20	Light tan, Silty, fine SAND (SM) with roots
20-27	Brownish tan, Silty to Clayey, fine SAND (SM-SC)
27-40	Brownish orange, fine Sandy CLAY (CL)
40-52	Brownish orange with gray mottles, Clayey to Silty, fine SAND (SC-SM)
52-82	Light gray with orange brown, Silty, fine SAND (SM) trace Clay lenses Moisture Content – 17.2% Silt/Clay Content – 34.7%
	Seasonal Water Indicators below 40 inches. No free groundwater.
	END OF BORING AT 82 INCHES

DEPTH (IN)	BORING NUMBER SWM-2
	DESCRIPTION OF SOILS
0-3	Topsoil
3-21	Light tan, Silty, fine SAND (SM) with roots
21-46	Brownish tan, Silty to Clayey, fine SAND (SM-SC)
46-67	Brownish orange with gray mottles, Silty, fine SAND (SM) trace Clay
67-82	Light gray with orangish brown, Silty, fine SAND (SM)
	Seasonal Water Indicators below 46 inches. No free groundwater.
	END OF BORING AT 82 INCHES

OWNER <b>Godspeed Animal Clinic</b>				JOB # <b>1316</b>		BORING # <b>B-1</b>		SHEET <b>1 OF 1</b>		 <b>EARTHWORKS</b> Consulting Geotechnical Engineers
PROJECT NAME <b>Addition to Godspeed Animal Clinic</b>				ARCHITECT-ENGINEER <b>Guernsey Tingle Architects</b>						
SITE LOCATION <b>James City County, VA</b>										


  

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FEET)	CALIBRATED PENETROMETER TONS/FT <sup>2</sup>			WATER CONTENT %	LIQUID LIMIT %
							1	2	3		
SURFACE ELEVATION: 100 FT											
0	1	ss	24	16	Grayish brown, moist, loose, Silty, fine SAND (SM-ML) with roots	100	⊗	●			
	2	ss	24	16	Light brown, moist, medium stiff, fine Sandy CLAY (CL-SC)		10	⊗	●		
5	3	ss	24	22	Light gray and brown, moist, medium dense, Clayey, fine SAND (SC)	95	10	⊗			
	4	ss	24	18	Light gray and tan, very moist, medium dense, Silty, fine SAND (SM) trace Clay			15	⊗		
	5	ss	24	20				18	⊗		
10						90					
	6	ss	24	23	Light brown, wet, medium dense, Silty, fine SAND (SM) trace Clay lenses			12	⊗		
15					Bottom of Boring 15 FT	85					
20						80					
25						75					
30						70					
35						65					

<b>BORING TERMINATED AT 15 FEET.</b>		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL		
WATER DEPTH IN BOREHOLE	BORING STARTED <b>19 April 2004</b>	TOPSOIL DEPTH: <b>3 IN</b>
AFTER DRILLING <b>10.2</b> FT.	BORING COMPLETED <b>19 April 2004</b>	CAVE-IN DEPTH AT <b>13 FT</b>
AFTER            HRS:            FT.	DRILLER <b>Scott Drilling</b>	DRILLING METHOD <b>Hollow Stem Auger</b>



OWNER <b>Godspeed Animal Clinic</b>				JOB # <b>1316</b>		BORING # <b>B-2</b>		SHEET <b>1 OF 1</b>		 <b>EARTHWORKS</b> Consulting Geotechnical Engineers
PROJECT NAME <b>Addition to Godspeed Animal Clinic</b>				ARCHITECT-ENGINEER <b>Guernsey Tingle Architects</b>						
SITE LOCATION <b>James City County, VA</b>										

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FEET)	CALIBRATED PENETROMETER TONS/FT <sup>2</sup>				
							PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % 10      20      30      40      50+				
							STANDARD PENETRATION BLOWS/FT.				
							10      20      30      40      50+				
0	1	ss	24	11	Dark gray, moist, loose, Silty, fine SAND (SM-ML) with roots [FILL]		8				
	2	ss	24	19	Light gray and brown, very moist, medium stiff, fine Sandy CLAY (CL)	95	9				
5	3	ss	24	18	Light gray and brown, very moist, loose, Clayey, fine SAND (SC)		9				
	4	ss	24	19	Light gray and tan, moist, medium dense, Silty, fine SAND (SM) trace Clay	90		21			
	5	ss	24	19				21			
10											
	6	ss	24	20	Light brown, wet, medium dense, Silty, fine SAND (SM)	85		11			
15					Bottom of Boring 15 FT						
						80					
						75					
						70					
						65					
35											

BORING TERMINATED AT 15 FEET.		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL		
WATER DEPTH IN BOREHOLE	BORING STARTED <b>19 April 2004</b>	TOPSOIL DEPTH: <b>3 IN</b>
AFTER DRILLING <b>9.5 FT.</b>	BORING COMPLETED <b>19 April 2004</b>	CAVE-IN DEPTH AT <b>10.8 FT</b>
AFTER      HRS:      FT.	DRILLER <b>Scott Drilling</b>	DRILLING METHOD <b>Hollow Stem Auger</b>

**SUMMARY OF LABORATORY TEST DATA**

**GODSPEED ANIMAL CLINIC  
INFILTRATION INVESTIGATION**

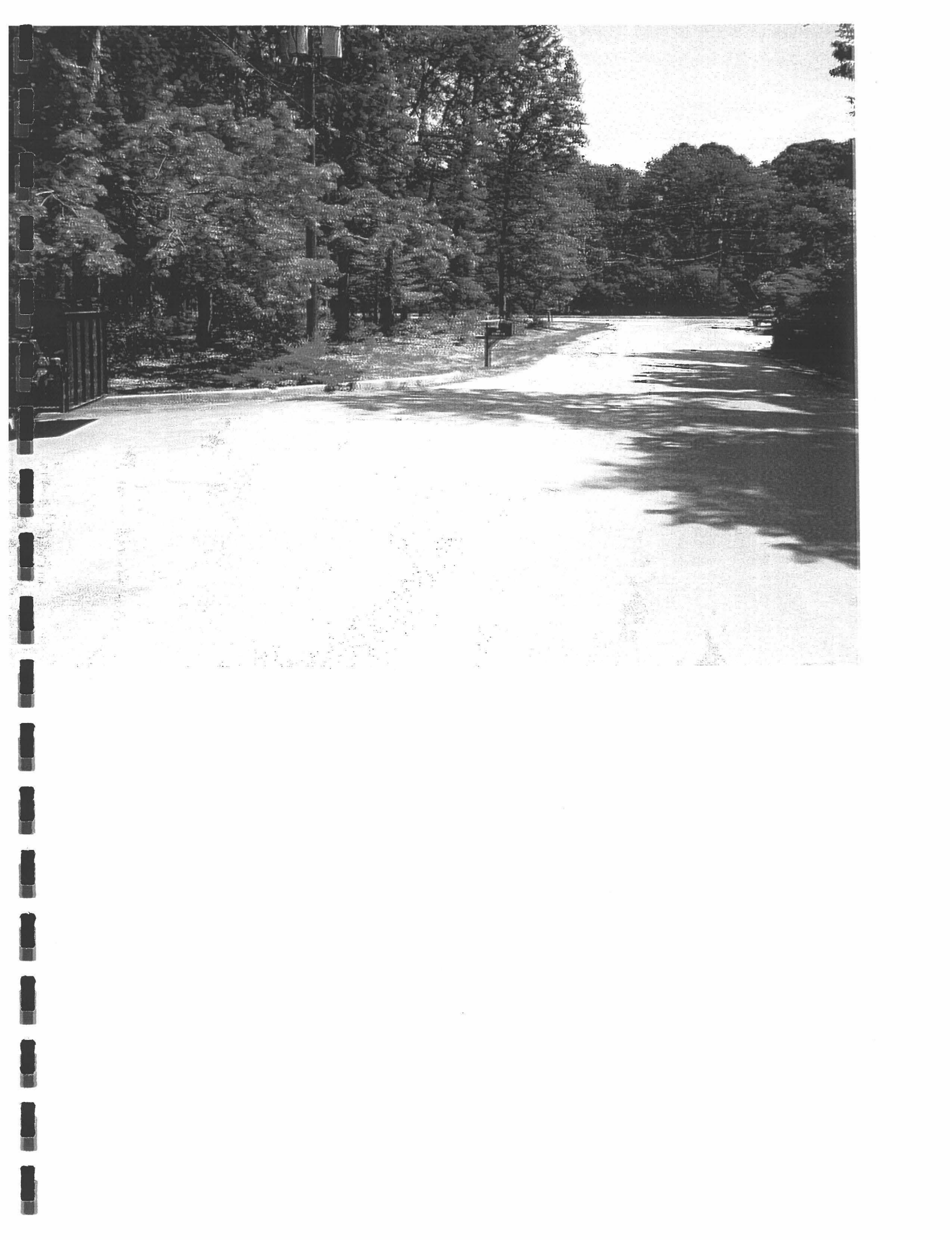
**EARTHWORKS PROJECT NO. 1316**

<b>Boring No.</b>	<b>Sample No.</b>	<b>Sample Depth (in)</b>	<b>Natural Moisture Content (%)</b>	<b>Silt and/or Clay Fraction (%)</b>	<b>Unified Soil Classification</b>
SWM-1	1	66-70	17.2	34.7	SM
B-1	S-1	0-24	11.8	49.5	SM-ML
B-1	S-2	24-48	17.7	51.8	CL-SC
B-2	S-3	48-72	15.5	43.2	SC



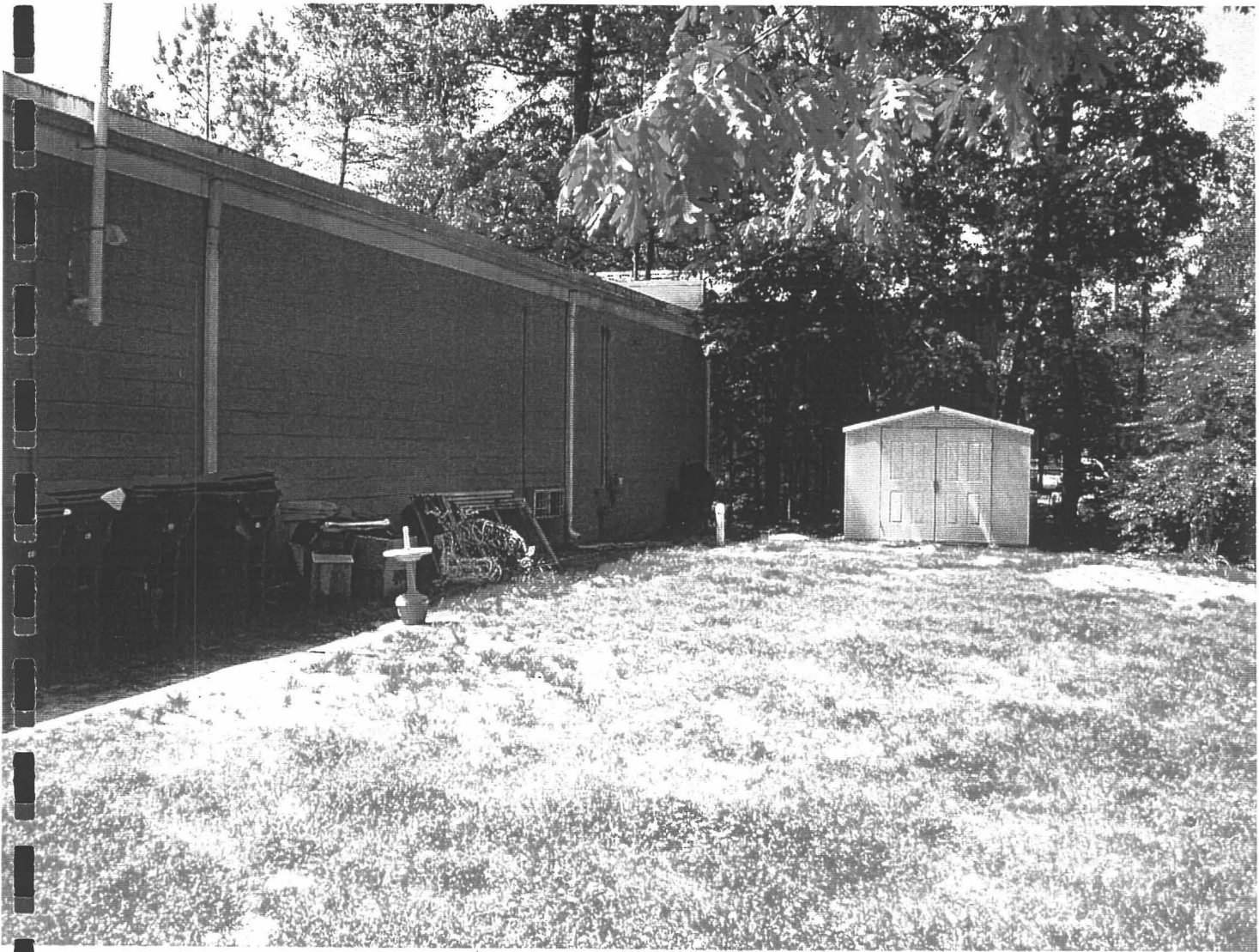



















*Godspeed Animal Care*  
*102 Tewning Road*

James City County,  
Virginia

---

Prepared for Dr. Pamela Dumont  
Williamsburg, Virginia

Prepared by  Vanasse Hangen Brustlin, Inc.  
Richmond, Virginia

Aug. 17, 2004

2ND SUB  
SP-70-04

# **Godspeed Animal Care** ***Building Expansion***

## **Engineering Report**

### ***Table of Contents***

1. Stormwater Management Design Narrative
2. Stormwater Management Calculations
3. Water Meter Sizing Calculations
4. Storm Water Calculations
5. BMP Geotechnical Report
6. Existing Site Photos

## GODSPEED ANIMAL CARE BUILDING EXPANSION PROJECT

### Stormwater Management Design Narrative

DIST AREA  
0.77 AC.

#### Project Description

The existing animal care facility is located at the corner of Tewning Road and Ironbound Road in James City County, Virginia. The project encompasses 1.46 acres of land and proposes an expansion of an existing building and associated parking. The project will generally include the addition of a two story building with a total gross square footage of 12,080, parking lots in the front and side of the site, and a comprehensive stormwater management system. The project site is identified as Tax Map Parcel #36-1 and is zoned M-1.

The proposed stormwater management plan for this project will include the use of a D-2 Surface Sand Filter System with 6" perforated underdrain piping to capture the filtered stormwater. The stormwater management system will attenuate the increased runoff anticipated from site development associated with the increased impervious cover.

The stormwater management system is designed to control up to the 100-year, twenty-four hour storm events, for post developed conditions. The volume created by the 10 year storm will have a 48 hour drawdown time before being released into the existing VDOT system along Ironbound Road. The proposed system is also designed to safely contain the 100-year storm event without the use of emergency spillways.

#### Description of Site

Under predevelopment conditions, the area to be developed is comprised of moderately wooded Hardwoods and Pines throughout. The general landform consists of elevations ranging from 100 to 97 and slopes gently away from the center outward to the east and west. Surface hydrology is directed by overland flow to two (2) ravines located along the rear of the property and also through an existing channel and culvert along Tewning Road. The site is located within the RPA but does not contain any wetlands or hydric soils.

#### General Description of Stormwater Management

The proposed onsite Sand Filter System will be the primary water quantity and quality control for this project. Surface waters drain to the proposed BMP by way of the pavement surface through curb cuts in the proposed curb and gutter. The water quality requirement is met by the use of the proposed sand filter and stilling basins located at each outfall curb cut from the proposed parking area. The depth of the

Surface Sand Filter BMP ranges from 3' to 4' below the proposed pavement elevations. The outlet control structure will consist of a VDOT DI-5 structure, modified with a 12" outfall pipe to accommodate the 48 hour detention storage drawdown.

Temporary Sediment Traps and silt fence will serve as temporary erosion and sediment control devices during initial land clearing, grading, and earthmoving operations. The addition of the sand filter system and a spreader box in the rear of the site will serve in controlling the quality of run-off from the site once the improvements are completed. Appropriate details to construct the facilities for temporary and permanent erosion and sediment control are shown on the site plan.

### Hydrology and Hydraulics

Topographic data used for site hydrology and storm/pond hydraulics was obtained from field survey by Michaels Surveying and Mapping dated 12/17/01. The survey verified the site boundary and provided topography related to utilities, drainage structures, and other physical improvements.

Hydrology and hydraulic modeling was performed utilizing the Hydrocad stormwater modeling system as developed by Haestad Methods, Waterbury, Connecticut..

The SCS TR-20 Method is the basis for overall watershed modeling for this project. Precipitation data for the County was obtained by source data provided by the U. S. Weather Bureau as found in Technical Paper No. 76 Rainfall Frequency Atlas of the United States.

Storage-indication pond routing procedures were used to predict the drawdown storage response (outflow hydrograph and incremental stage) to the inflow hydrograph. This sequential routing method uses the elevation-storage and elevation-discharge relationships for repeatedly solving the continuity equation, each solution being a step in delineating the outflow hydrograph.

### Pre-development Hydrology

Pre-development conditions were evaluated to determine the existing peak discharges at the eastern discharge point from the proposed sand filter system. Based on current conditions, peak discharges for the 1-year, 24-hour storm was determined to be 0.78 cfs. This discharge was computed based on a drainage area of 0.73 acres and an SCS Curve Number of 77. The Time of concentration (Tc) value (0.25 hours) was based on the "Overland Flow" Method, whereby the flow path was divided into segments according to the type of flows such as overland, shallow concentrated, and channel flow.

## Post-development Hydrology

Post-development drainage patterns differ slightly from pre-development, in that all of the proposed improvements will be directed to the proposed BMP.

Post-development conditions are based on ultimate development of the site with current conditions of paved and non-paved areas, to determine overall peak discharges to the existing receiving channels as was performed for predevelopment conditions. Based on this criteria, peak discharges for the 1-year, 24 hour storm, was determined to be 0.0424 cfs for the BMP outfall point. These discharges were based on a total drainage area of 0.73 acres. As with pre-development methodology, runoff SCS values were based on land use and hydrologic soil group, and time of concentration values were based on the SCS velocity method.

Comparison of the predevelopment discharges with the post-development discharges results in an overall decrease in peak discharges to the existing storm system due to attenuation by the onsite sand filter facility.

## Hydraulics – Proposed Surface Sand Filter System

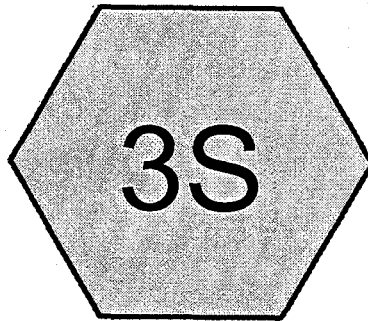
The proposed stormwater management system consists of one (1) Surface Sand Filter system, to control the increased runoff from the site development. Post-development inflow hydrographs were developed and routed through the storage volume and outlet structure for the system using level pool routing methods to determine post-development peak discharges. Simultaneously, routing procedures allows the system to respond to dynamic changes such as variable tailwater created by downstream system components. The following is a performance summary for the system tabulating peak outflow and water surface elevation for the 1-year, 10-year, and 100-year storm events.

### D-2 Sand Filter System

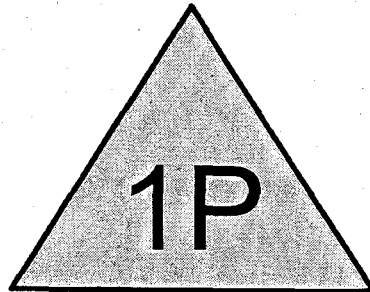
Storm Event	Outflow (cfs)	Elevation (ft.)	Release Time
1-year	0.06	96.60	30 hrs. +
10-year	6.24	96.89	30 hrs. +
100-year	8.89	96.97	30 hrs. +

\* 8pt. **D-2 SAND FILTER**  $\frac{0.73}{0.70} = 1.04 \times 8 = 8.34$   
 \* THREE "STILLING BASINS" HAVE BEEN ADDED TO THE DESIGN TO ~~REDUCE~~ REDUCE FLOODS TO THE PROPOSED FACILITY AND PROVIDE ADDITIONAL SEDIMENTATION CONTROL.  $\frac{0.21}{0.70} = 0.60$   
 (SEE ATTACHED WAIVER REQUEST LETTER)  $\frac{0.73}{1.46} = 0.50 = 4$   $\frac{0.73}{1.11} = 0.6577$  **8.94**  
 9  $\frac{0.21}{1.11} = 18.92\%$   $0.37$   
 0.94

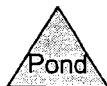




Post Development



Surface Sand Filter



Drainage Diagram for D2 Sand Filter BMP

Prepared by Vanasse Hangen Brustlin, Inc., Richmond, VA 6/2/2004  
HydroCAD® 7.00 s/n 001234 © 1986-2003 Applied Microcomputer Systems

Transportation  
Land Development  
Environmental  
Services



*Vanasse Hangen Brustlin, Inc.*

101 Walnut Street

Post Office Box 9151

Watertown

Massachusetts 02471-9151

617.924.1770

FAX 617.924.2286

**Phone  
Notes**

Person Contacted:

Title:

Company:

Telephone No.:

FAX No.:

VHB Rep:

VHB Project No.:

Project Name:

Type of Call:

Date and Time:

GODSPEED BMP

EVENT FREQ.

Q<sub>PEAK</sub>

WS.E.

RELEASE  
TIME

1YR

.06 cfs

96.60

> 30 hrs.

2YR

.49 cfs

96.65

> 30 hrs.

10YR

6.24 cfs

96.89

> 30 hrs

100YR

8.89

96.97

> 30 hrs.

**CHANNEL PROTECTION VOLUME CALCULATION**

James City County Method

Project Name : Godspeed Animal Care

Project # : 31248.01

One Year Precipitation : P = 2.8 Inches

**TABLE F1 / TR-55**

Coefficients for Rainfall Type II

**PRE-DEVELOPMENT CONDITIONS :**

Drainage Area :  $DA_{PRE} = 0.73$  Acres  
SCS Curve Number :  $CN_{PRE} = 77$  Unitless  
Time of Concentration :  $T_{C_{PRE}} = 0.25$  Hours

$I_a/P$	$C_0$	$C_1$	$C_2$
0.10	2.55323	-0.61512	-0.16403
0.30	2.46532	-0.62257	-0.11657
0.35	2.41896	-0.61594	-0.08820
0.40	2.36409	-0.59857	-0.05621
0.45	2.29238	-0.57005	-0.02281
0.50	2.20282	-0.51599	-0.01259

Initial abstraction :  $I_a = 0.2 \times (1000/CN - 10) = 0.597$  Inches  
 $I_a/P = 0.21$

Accumulated direct runoff :  $Q_u = (P - I_a)^2 / (P + 4 \times I_a) = 0.93$  Inches

Unit Peak Discharge :  $q_u = 731$  cfs/sq.mile/in.  
 $\log(q_u) = C_0 + C_1 \log(T_c) + C_2 [\log(T_c)]^2$   
 $C_0, C_1, C_2$ : Coefficients from TABLE F1 above

Pre-development peak discharge :  $q_p = q_u \times DA \times Q_u / 640 = 0.78$  c.f.s.

**POST DEVELOPMENT CONDITIONS :**

Drainage Area :  $DA_{POST} = 0.73$  Acres  
SCS Curve Number :  $CN_{POST} = 92$  Unitless  
Time of Concentration :  $T_{C_{POST}} = 0.025$  Hours

Initial abstraction :  $I_a = 0.174$  Inches  
 $I_a/P = 0.10$   
Accumulated direct runoff :  $Q_u = 1.97$  Inches  
Unit Peak Discharge :  $q_u = 1311$  cfs/sq.mile/in.  
Post development peak discharge rate :  $q_i = q_p = 2.95$  c.f.s.

Ration of outflow to inflow : \*  $q_o/q_i = 11.98 \times q_u^{0.937} = 0.0144$   
\* Direct calculation using equation for T=24hr. developed by Stewart Comstock, P.E., MDE

Outflow discharge :  $q_o = 0.0424$  c.f.s. ✓

Ratio of storage volume to runoff volume :  $V_s/V_r = 0.66$   
 $V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 8.04(q_o/q_i)^3$

Required Storage Volume :  $V_s = V_s/V_r \times Q_u \times A / 12 \times 43560 = 3465$  cubic feet

*5 Hour compliance with serv regis.*

**D2 Sand Filter BMP**

Type II 24-hr 1 year JCC Rainfall=2.80"

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**Hydrograph for Pond 1P: Surface Sand Filter**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	94.25	0.00
1.00	0.00	0	94.25	0.00
2.00	0.00	0	94.25	0.00
3.00	0.00	0	94.25	0.00
4.00	0.00	0	94.25	0.00
5.00	0.00	0	94.25	0.00
6.00	0.00	2	94.26	0.00
7.00	0.01	6	94.27	0.01
8.00	0.01	10	94.28	0.01
9.00	0.02	36	94.35	0.01
10.00	0.04	103	94.55	0.01
11.00	0.09	272	95.01	0.01
12.00	1.00	2,276	96.31	1.47
13.00	0.12	2,042	96.22	0.13
14.00	0.07	2,025	96.21	0.07
15.00	0.06	2,019	96.21	0.06
16.00	0.04	2,015	96.20	0.05
17.00	0.04	2,013	96.20	0.04
18.00	0.03	2,011	96.20	0.04
19.00	0.03	2,007	96.20	0.03
20.00	0.03	1,998	96.20	0.03
21.00	0.02	1,980	96.19	0.03
22.00	0.02	1,958	96.18	0.03
23.00	0.02	1,934	96.17	0.03
<del>24.00</del> 124	0.02	1,907	96.16	0.03
25.00	0.00	1,804	96.12	0.03
26.00	0.00	1,701	96.08	0.03
27.00	0.00	1,599	96.03	0.03
28.00	0.00	1,499	95.99	0.03
29.00	0.00	1,405	95.94	0.02
30.00	0.00	1,320	95.89	0.02
31.00	0.00	1,242	95.84	0.02
32.00	0.00	1,170	95.80	0.02
33.00	0.00	1,104	95.75	0.02
34.00	0.00	1,039	95.69	0.02
35.00	0.00	976	95.63	0.02
36.00	0.00	914	95.58	0.02
37.00	0.00	855	95.53	0.02
38.00	0.00	797	95.48	0.02
39.00	0.00	741	95.43	0.02
40.00	0.00	686	95.38	0.01
41.00	0.00	633	95.33	0.01
42.00	0.00	582	95.29	0.01
43.00	0.00	532	95.24	0.01
44.00	0.00	483	95.20	0.01
45.00	0.00	436	95.16	0.01
46.00	0.00	390	95.12	0.01
47.00	0.00	345	95.08	0.01
48.00	0.00	302	95.04	0.01

STATION  
Pond 1P  
Surface Sand Filter

**D2 Sand Filter 81204 BMP**

Type II 24-hr 1 year JCC Rainfall=2.80"

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**Subcatchment 3S: Post Development**

Runoff = 2.86 cfs @ 11.92 hrs, Volume= 0.120 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type II 24-hr 1 year JCC Rainfall=2.80"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		<b>Sheet Flow, Pavement</b> Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 1.97" for 1 year JCC event

Inflow = 2.86 cfs @ 11.92 hrs, Volume= 0.120 af

Outflow = 0.06 cfs @ 14.94 hrs, Volume= 0.097 af, Atten= 98%, Lag= 181.4 min

Primary = 0.06 cfs @ 14.94 hrs, Volume= 0.097 af

Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5

Peak Elev= 96.60' @ 14.94 hrs Surf.Area= 2,553 sf Storage= 3,569 cf

Plug-Flow detention time= 910.8 min calculated for 0.097 af (81% of inflow)

Center-of-Mass det. time= 832.3 min ( 1,627.7 - 795.4 )

#	Invert	Avail.Storage	Storage Description
1	94.25'	4,542 cf	<b>Custom Stage Data (Irregular) Listed below</b>

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	<b>15.0" x 40.0' long Culvert</b> RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 ' / n= 0.013 Cc= 0.900
2	Device 1	94.00'	<b>0.000800 fpm Sand filter over Surface area above invert</b>
3	Device 1	96.60'	<b>3.00' x 3.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600
4	Secondary	97.00'	<b>20.0' long x 15.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

## D2 Sand Filter 81204 BMP

Type II 24-hr 1 year JCC Rainfall=2.80"

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**Primary OutFlow** Max=0.05 cfs @ 14.94 hrs HW=96.60' (Free Discharge)

1=Culvert (Passes 0.05 cfs of 8.60 cfs potential flow)

2=Sand filter (Exfiltration Controls 0.03 cfs)

3=Orifice/Grate (Weir Controls 0.01 cfs @ 0.2 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**D2 Sand Filter 81204 BMP**

Type II 24-hr 2 year JCC Rainfall=3.50"

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**Subcatchment 3S: Post Development**

Runoff = 3.74 cfs @ 11.92 hrs; Volume= 0.160 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2 year JCC Rainfall=3.50"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

A=0.73AC  
CN=92

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 2.64" for 2 year JCC event  
 Inflow = 3.74 cfs @ 11.92 hrs, Volume= 0.160 af  
 Outflow = 0.49 cfs @ 12.04 hrs, Volume= 0.136 af, Atten= 87%, Lag= 7.6 min  
 Primary = 0.49 cfs @ 12.04 hrs, Volume= 0.136 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.65' @ 12.04 hrs Surf.Area= 2,588 sf Storage= 3,681 cf  
 Plug-Flow detention time= 678.2 min calculated for 0.136 af (85% of inflow)  
 Center-of-Mass det. time= 609.8 min ( 1,397.0 - 787.2 )

#	Invert	Avail.Storage	Storage Description			
1	94.25'	4,542 cf	Custom Stage Data (Irregular) Listed below			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	15.0" x 40.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 1/1' n= 0.013 Cc= 0.900
2	Device 1	94.00'	0.000800 fpm Sand filter over Surface area above invert
3	Device 1	96.60'	3.00' x 3.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Secondary	97.00'	20.0' long x 15.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

## D2 Sand Filter 81204 BMP

Type II 24-hr 2 year JCC Rainfall=3.50"

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**Primary OutFlow** Max=0.48 cfs @ 12.04 hrs HW=96.65' (Free Discharge)

↑1=Culvert (Passes 0.48 cfs of 8.70 cfs potential flow)

↑2=Sand filter (Exfiltration Controls 0.03 cfs)

↑3=Orifice/Grate (Weir Controls 0.44 cfs @ 0.7 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

↑4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)



**D2 Sand Filter 81204 BMP**

Type II 24-hr 10 year JCC Rainfall=5.80"

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**Subcatchment 3S: Post Development**

Runoff = 6.61 cfs @ 11.92 hrs, Volume= 0.296 af, Depth= 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type II 24-hr 10 year JCC Rainfall=5.80"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		Sheet Flow, Pavement
					Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 4.87" for 10 year JCC event  
 Inflow = 6.61 cfs @ 11.92 hrs, Volume= 0.296 af  
 Outflow = 6.24 cfs @ 11.93 hrs, Volume= 0.271 af, Atten= 6%, Lag= 0.9 min  
 Primary = 6.24 cfs @ 11.93 hrs, Volume= 0.271 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.89' @ 11.93 hrs Surf.Area= 2,775 sf Storage= 4,277 cf  
 Plug-Flow detention time= 367.1 min calculated for 0.271 af (91% of inflow)  
 Center-of-Mass det. time= 321.3 min ( 1,091.9 - 770.6 )

#	Invert	Avail.Storage	Storage Description			
1	94.25'	4,542 cf	Custom Stage Data (Irregular) Listed below			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	15.0" x 40.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 ' n= 0.013 Cc= 0.900
2	Device 1	94.00'	0.000800 fpm Sand filter over Surface area above invert
3	Device 1	96.60'	3.00' x 3.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Secondary	97.00'	20.0' long x 15.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

## D2 Sand Filter 81204 BMP

Type II 24-hr 10 year JCC Rainfall=5.80"

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**Primary OutFlow** Max=6.22 cfs @ 11.93 hrs HW=96.89' (Free Discharge)

1=Culvert (Passes 6.22 cfs of 9.24 cfs potential flow)

2=Sand filter (Exfiltration Controls 0.04 cfs)

3=Orifice/Grate (Weir Controls 6.18 cfs @ 1.8 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**D2 Sand Filter 81204 BMP**

Type II 24-hr 100year JCC Rainfall=8.00"

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**Subcatchment 1S: Pre development**

Runoff = 4.93 cfs @ 12.07 hrs, Volume= 0.321 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100year JCC Rainfall=8.00"

Area (ac)	CN	Description
0.180	98	Roof & Paving
0.550	70	Wooded
0.730	77	Weighted Average

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

**Subcatchment 3S: Post Development**

Runoff = 9.32 cfs @ 11.92 hrs, Volume= 0.428 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100year JCC Rainfall=8.00"

Area (ac)	CN	Description
0.570	98	Paving and Roofs
0.160	70	Lot area
0.730	92	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.1		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.50"

**Pond 1P: Surface Sand Filter**

Inflow Area = 0.730 ac, Inflow Depth = 7.04" for 100year JCC event  
 Inflow = 9.32 cfs @ 11.92 hrs, Volume= 0.428 af  
 Outflow = 8.89 cfs @ 11.93 hrs, Volume= 0.403 af, Atten= 5%, Lag= 0.8 min  
 Primary = 8.89 cfs @ 11.93 hrs, Volume= 0.403 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 5  
 Peak Elev= 96.97' @ 11.93 hrs Surf.Area= 2,835 sf Storage= 4,470 cf  
 Plug-Flow detention time= 263.4 min calculated for 0.403 af (94% of inflow)  
 Center-of-Mass det. time= 228.7 min ( 990.0 - 761.3 )

#	Invert	Avail.Storage	Storage Description
1	94.25'	4,542 cf	Custom Stage Data (Irregular) Listed below

**D2 Sand Filter 81204 BMP**

Type II 24-hr 100year JCC Rainfall=8.00"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.25	850	217.0	40.0	0	0	850
94.90	863	220.0	40.0	223	223	1,026
95.00	1,422	276.0	100.0	113	336	3,237
96.00	2,087	319.0	100.0	1,744	2,080	5,294
97.00	2,858	365.0	100.0	2,462	4,542	7,821

#	Routing	Invert	Outlet Devices
1	Primary	93.74'	<b>15.0" x 40.0' long Culvert</b> RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 93.50' S= 0.0060 '/' n= 0.013 Cc= 0.900
2	Device 1	94.00'	<b>0.000800 fpm Sand filter over Surface area above invert</b>
3	Device 1	96.60'	<b>3.00' x 3.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600
4	Secondary	97.00'	<b>20.0' long x 15.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=8.89 cfs @ 11.93 hrs HW=96.97' (Free Discharge)

- 1=Culvert (Passes 8.89 cfs of 9.41 cfs potential flow)
- 2=Sand filter (Exfiltration Controls 0.04 cfs)
- 3=Orifice/Grate (Weir Controls 8.85 cfs @ 2.0 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=94.25' (Free Discharge)

- 4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Godspeed Animal Care 102  
Tewning Road James City  
County, VA

8/11/2004

**SIZING WATER SERVICE LINES AND METERS**  
*(PLUMBING FIXTURE VALUE)*

	Fixture Value	No. of Fixtures	Total Fixture Value
Bathtub	8	x 4	= 32
Bedpan washers	10	x	= 0
Combination sink and tray	3	x	= 0
Dental unit	1	x 0	= 0
Dental lavatory	2	x 1	= 2
Drinking fountain (cooler)	1	x 0	= 0
Drinking fountain (public)	2	x 0	= 0
Kitchen sink: 1/2" connection	3	x 1	= 3
3/4" connection	7	x	= 0
Lavatory: 3/8" connection	2	x	= 0
1/2" connection	4	x 6	= 24
Laundry tray: 1/2" connection	3	x 1	= 3
3/4" connection	7	x	= 0
Shower head (shower only)	4	x 2	= 8
Service sink: 1/2" connection	3	x 2	= 6
3/4" connection	7	x 0	= 0
Urinal: Pedestal flush valve	35	x	= 0
Wall or stall	12	x	= 0
Trough (2' unit)	2	x	= 0
Wash sink (each set of faucets)	4	x 19	= 76
Water closet: Flush valve	35	x	= 0
Tank type	3	x 7	= 21
Dishwasher: 1/2" connection	4	x 1	= 4
3/4" connection	10	x 0	= 0
Washing machine: 1/2" connection	5	x 2	= 10
3/4" connection	12	x	= 0
1" connection	25	x	= 0
Hose connections (wash down): 1/2"	6	x 5	= 30
3/4"	10	x 0	= 0
Hose (50' length-wash down): 1/2"	6	x	= 0
5/8"	9	x	= 0
3/4"	12	x	= 0
<b>GRAND TOTAL OF FIXTURE VALUES</b>			<b>219</b>

TABLE 4.3  
*Plumbing Fixture Value*

Fixture Type	Fixture Value Based on 35 psi at Meter Outlet
Bathtub .....	8
Bedpan washers .....	10
Combination sink and tray .....	3
Dental unit .....	1
Dental lavatory .....	2
Drinking fountain (cooler) .....	1
Drinking fountain (public) .....	2
Kitchen sink: 1/2-in. connection .....	3
3/4-in. connection .....	7
Lavatory: 3/8-in. connection .....	2
1/2-in. connection .....	4
Laundry tray: 1/2-in. connection .....	3
3/4-in. connection .....	7
Shower head (shower only) .....	4
Service sink: 1/2-in. connection .....	3
3/4-in. connection .....	7
Urinal: Pedestal flush valve .....	35
Wall or stall .....	12
Trough (2-ft unit) .....	2
Wash sink (each set of faucets) .....	4
Water closet: Flush valve .....	35
Tank type .....	3
Dishwasher: 1/2-in. connection .....	4
3/4-in. connection .....	10
Washing machine: 1/2-in. connection .....	5
3/4-in. connection .....	12
1-in. connection .....	25
Hose connections (wash down): 1/2-in. ....	6
3/4-in. ....	10
Hose (50-ft length—wash down): 1/2-in. ....	6
5/8 in. ....	9
3/4 in. ....	12

value of a number of units by simply multiplying the single value times the number of fixtures in the customer's use to get a total value. The list of plumbing items in Table 4.3 represents those most commonly used; however, the estimator will eventually encounter special equipment that will need to be evaluated. Since the fixture flow requirements in gallons per minute and the fixture values are the same in Table 4.3, the engineer can list the demand in gallons per minute for the special equipment, along with the other fixtures, to obtain one total.

#### Demand

After the fixture values have been determined, the results can be applied to a graph to obtain the customer demand in gallons per minute at 35 psi at the meter outlet. The maximum water flow of any one fixture is above the average of any one of a number of fixtures when operated in a customer's service. This is because the probability of all

## SIZING WATER SERVICE LINES AND METERS

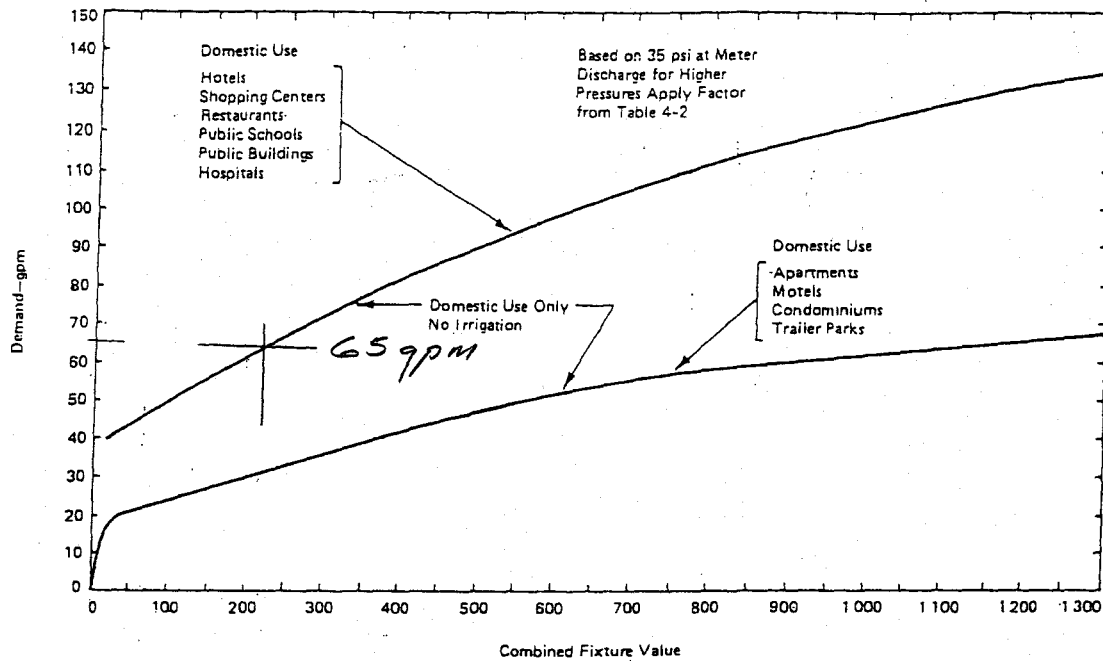


Fig. 4.4. Water-Flow Demand per Fixture Value—Low Range

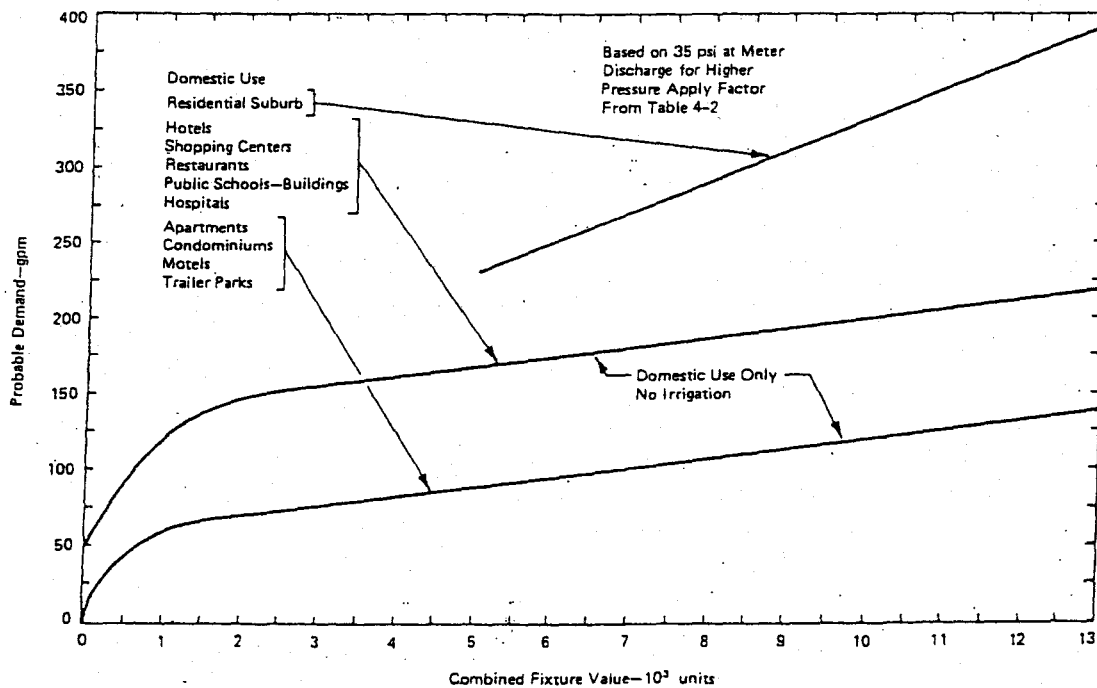


Fig. 4.5. Water-Flow Demand per Fixture Value—High Range

detailed lists of fixtures before estimates can be prepared. If the structure is in the planning stage, the mechanical engineer or architect is the best source of information, and, if construction is underway, the plumbing contractor or the building permits section of the city will have the information. Field trips by the estimator are often necessary to assist the customer as well as to properly assess the project when

TABLE 5.6  
*Displacement-Type Meters Meeting AWWA Standards*  
*Flow-Pressure Loss Averages of 1990-Model Meters*

Size in.	Maximum Capacity AWWA Flow Criteria		Recommended Design Criteria—80% Cap.		Continuous Flow Criteria—50% Cap.		Brands Included in Averages
	gpm	psi	gpm	psi	gpm	psi	
1/2	15	7.9	12	5.0	7.5	2.0	1
5/8	20	9.7	16	6.2	10	2.4	5
3/4	30	10.4	24	6.7	15	2.6	5
1	50	9.8	40	6.3	25	2.5	5
→ 1 1/2	100	10.6	80	6.8	50	2.7	4
2	160	11.3	130	7.1	80	2.8	4

TABLE 5.7  
*Compound-Type Meters Meeting AWWA Standards*  
*Flow-Pressure Loss Averages of 1990-Model Meters*

Size in.	Maximum Capacity AWWA Flow Criteria		Recommended Design Criteria—80% Cap.		Continuous Flow Criteria—50% Cap.		Brands Included in Averages
	gpm	psi	gpm	psi	gpm	psi	
2	160	8.0	130	5.1	80	2.0	5
3	320	7.2	255	4.6	160	1.8	5
4	500	6.2	400	4.1	250	1.6	5
6	1000	8.4	800	5.4	500	2.1	5
8	1600	14.5	1300	9.3	800	3.8	1

TABLE 5.8  
*Class II Turbine-Type Meters Meeting AWWA Standards*  
*Flow-Pressure Loss Averages of 1990-Model Meters*

Size in.	Maximum Capacity AWWA Flow Criteria		Recommended Design Criteria—80% Cap.		Continuous Flow Criteria—50% Cap.		Brands Included in Averages
	gpm	psi	gpm	psi	gpm	psi	
2	160	4.0	130	2.5	100	1.0	5
3	350	4.0	280	2.6	240	.9	5
4	630	2.0	500	1.4	420	.7	5
6	1 400	2.0	1 100	1.2	920	.5	5
8	2 400	2.7	1 900	1.7	1 600	.7	5
10	3 800	2.6	3 000	1.4	2 500	.5	5
12	5 000	1.7	4 000	1.1	3 300	.4	1

5.9 as the equivalent length of straight pipe that will give the friction loss that will occur as the water passes through the fitting. The values will be approximate in some cases because the pipe's inside diameter is based on the size of the fittings, and in some cases the inside diameter will be slightly larger or smaller; however, the effects of the error will be negligible and the values are considered sufficiently accurate for the purpose of this manual.

Pressure-reducing valves are used in mountainous and hilly areas to protect the





# Computations

Project: GOODSPEED

Location: JCC

Calculated by: Wear

Checked by:

Title

Project # 31248.01

Sheet 1 of 1

Date:

Date:

"AREA 1 TO LEVEL SPREADER"

PRE -

$$Area = 0.21AC$$

$$"C" = 0.42$$

$$Q_2 = CIA = 0.50 \text{ cfs}$$

$$T_c = 5 \text{ min.} \quad I = 5.7$$

POST -

$$Area = 0.21AC$$

$$"C" = 0.45$$

$$Q_2 = CIA = 0.54 \text{ cfs}$$

$$T_c = 5 \text{ min} \quad I = 5.7$$

JAMES CITY CO.

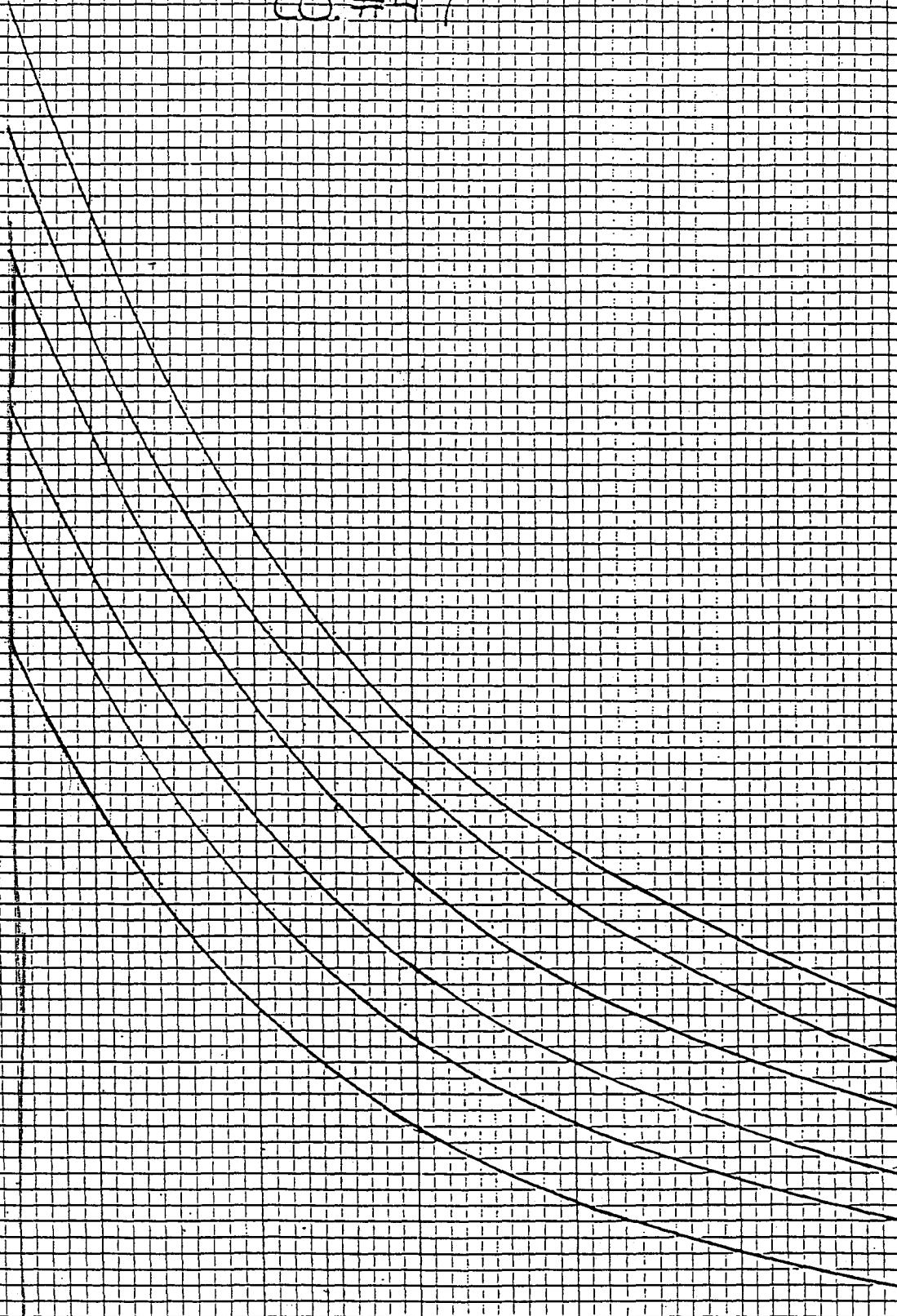
CO. #47

RAINFALL INTENSITY IN INCHES PER HOUR

3  
2  
1  
0  
1  
2  
3  
4  
5  
6  
7  
8  
9

0 10 20 30 40 50 60

100 YEAR  
50 YEAR 3  
25 YEAR  
10 YEAR  
5 YEAR 2  
2 YEAR





## Computations

Project: **GOOSPEED**  
Location: **JCC**  
Calculated by: **WEM/KL**  
Checked by:  
Title

Project # **31248.01**  
Sheet **1** of **1**  
Date:  
Date:

### EXISTING VDOT SYSTEM

- AS SHOWN IN THE "STORM DRAINAGE COMPUTATIONS",  
THE CAPACITY OF THE EXISTING 30" RCP (STR. 4→8)  
IS 37.37 CFS AND THE EXISTING  $Q_{10} = 17.47$  CFS  
THE IMPROVEMENTS TO GOOSPEED ( $Q_{10}$  OUTFLOW = 6.24 CFS)  
IS ACCEPTABLE AND THE EXISTING SYSTEM CAN HANDLE  
THESE FLOWS.

Post Dev 10-YEAR  
OUT FLOW BMD ✓  
 $Q_{10} = 6.24$  CFS  
(6.22 CFS)

PRE 10

OK

is  
adequate.

# VHB Vanasse Hangen Brustlin, Inc.

115 South 15th Street

Suite 200

Richmond, VA 23219

804-343-7100

## Design Parameters

10 Year Storm

15" Min. Pipe Size

n=0.013

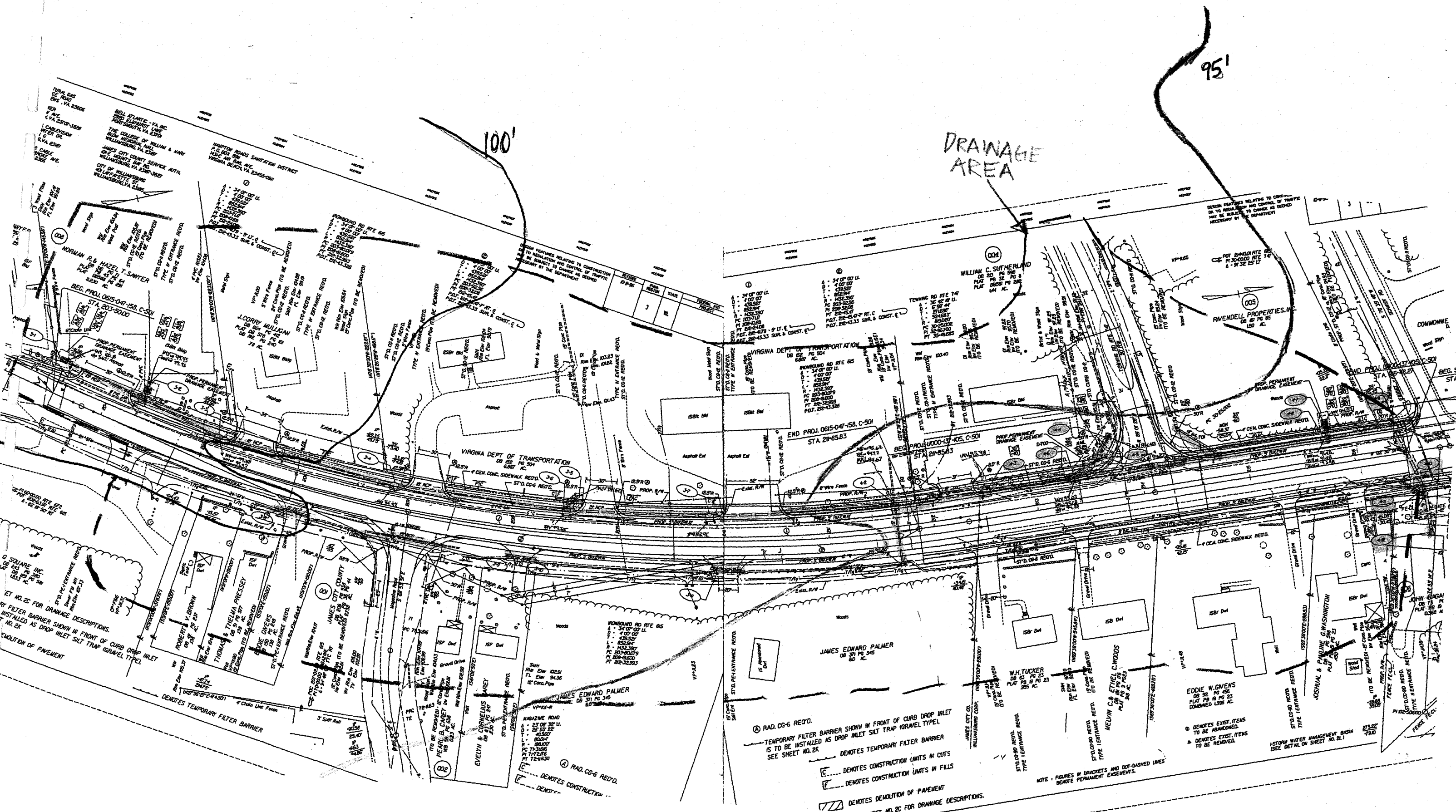
## Storm Drainage Computations

Name Godspeed  
Client \_\_\_\_\_  
Subject PIPE SIZING

Proj. No. 31248.01  
Date 8/12/2004  
Computed by KEL  
Checked by \_\_\_\_\_

FROM POINT (1)	TO POINT (2)	AREA DRAIN ACRES (3)	RUNOFF COEF. C (4)	C A		INLET TIME MIN. (7)	RAIN- FALL IN./HR. (8)	RUNOFF Q C.F.S. (9)	INV ERT ELEV ATIONS		LENGTH FT. (12)	SLOPE FT./FT. (13)	DIA. INCHES (14)	CAPA- CITY C.F.S. (15)	VELO- CITY F.P.S. (16)	FLOW TIME SEC. (17)	MINIMUM PIPE DIA(in) (18)
				INCRE- MENT (5)	ACCUM- ULATED (6)				UPPER (10)	LOWER (11)							
Ex. 18"	Ex. JB	0.430	0.460	0.198	0.198	5.00	7.17	1.42	97.270	93.090	65.0	0.06431	18	26.64	8.01	8.11	5.99
Ex. JB	No. 4-8	3.500	N/A	2.710	2.908	10.00	6.01	17.47	92.310	91.480	100.0	0.00830	30	37.37	7.48	13.37	22.56
No. 4-8	No. 4-9	0.260	0.900	0.234	3.314	10.22	5.96	19.76	91.480	90.980	66.0	0.00758	30	35.70	7.61	8.67	24.03
No. 4-9	No. 4-11	0.050	0.900	0.045	3.359	10.37	5.94	19.94	88.500	87.990	66.0	0.00773	30	36.06	7.63	8.65	24.02
No. 4-11	No. 4-12	1.730	0.610	1.055	4.414	10.51	5.91	26.08	87.990	87.700	34.0	0.00853	30	37.88	8.50	4.00	26.08
No. 4-7	No. 4-8	0.430	0.400	0.172	0.172	5.00	7.17	1.23	94.020	93.980	10.0	0.00400	12	2.25	2.93	3.41	9.57
No. 4-6	No. 4-8	N/A	N/A	2.710	2.710	10.00	6.01	16.28	93.030	92.310	132.0	0.00545	30	30.29	6.08	21.71	23.77

• This shows that ~~there~~ <sup>there</sup> is capacity in the system. by estimating existing conditions





## **EARTHWORKS**

Earthworks Consulting Engineers, Inc.

May 28, 2004

Mr. Scott Van Voorhees  
Guernsey Tingle Architects  
3200 Ironbound Road  
Williamsburg, Virginia 23188

Earthworks Project No. 1316

Reference: Godspeed Animal Clinic Infiltration Investigation

Dear Mr. Van Voorhees:

Pursuant to your request, an engineer from Earthworks visited the above referenced site to perform a subsurface investigation to determine the suitability of the soils for support of a proposed stormwater infiltration facility. This investigation was completed by performing two (2) handauger borings at locations within the proposed infiltration facility, as determined by the project Civil Engineer. The borings were extended to depths of 82 inches below existing surface elevations. In addition, two 15-foot deep soil test borings performed adjacent to the infiltration facility as part of our subsurface investigation for the proposed building addition were used in this investigation. A boring location diagram and logs of the two handauger borings and two soil test borings are attached to this report.

In general, the soil test and handauger borings encountered Silty Sand with Clay, Clayey Sand, and Sandy Clay to depths of about 5 feet. These soils contained seasonal water indicators below a depth of about 40 inches and appeared to be moderately to poorly drained. Soils below about 5 or 6 feet consisted of moderately well drained Silty Sands. These soils too contained seasonal water indicators, but to a lesser degree. The groundwater table was encountered at a depth of about 10 feet.

Based on the results of our field classifications of the soils encountered, it is estimated that soils above a depth of about 5 feet possess an infiltration rate less than about 0.5 inches per hour. Water movement through these soils appears to be restricted, based on soil color, and water appears to be present in these soils during wet seasonal conditions. Soils below a depth of about 5 feet also appear to be seasonally wet. However, these soils are moderately well drained. We estimate that these soils possess an infiltration rate of 0.6 inches per hour or better.

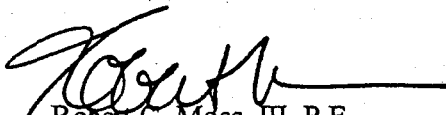
It is expected that construction of pavements and other impervious surfaces will substantially reduce the presence of seasonal water in the soils surrounding the proposed infiltration facility. If an infiltration facility is considered feasible based on seasonal water conditions, we recommend the infiltration level be placed about 5 to 6 feet below existing grades and that side-wall infiltration rates be considered minimal.

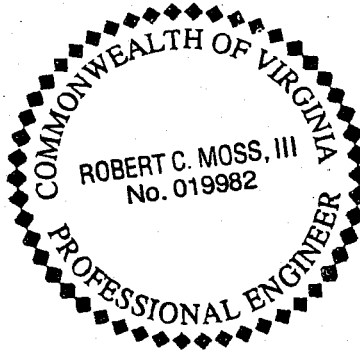
Should the client or Civil Engineer require more extensive investigation, Earthworks can provide in-field infiltration testing to confirm our estimated infiltration rates upon request.

We appreciate this opportunity to be of service to you. Should you have questions concerning this investigation or wish to discuss our findings in more detail, please contact our office.

Respectfully,

EARTHWORKS CONSULTING ENGINEERS, INC.

  
Robert C. Moss, III, P.E.  
President / Principal Engineer



Enclosures:     Boring Location Diagram  
                     Soil Test and Handauger Boring Logs  
                     Summary of Laboratory Test Data

Copies:     (1) Client  
                 (1) VHB – Mitchell Warren

geotech\letters\1316.doc

115 South 15th Street  
Suite 200  
Richmond, VA 23219  
804-343-7100

# HYDRAULIC GRADE LINE

Project :  
Calculated by:  
Date:  
n = 0.013

Godspeed  
KEL  
8/12/2004

INLET STATION #	OUTLET WATER SURFACE ELEV. (2)	D <sub>o</sub> (IN) (3)	Q <sub>o</sub> (CFS) (4)	L <sub>o</sub> (FT) (5)	S <sub>f</sub> % (6)	H <sub>f</sub> (FT) (7)	JUNCTION LOSS												Final H (FT) (19)	Inlet Water Surface Elev. (20)	Rim Elev./ Gutter Elev. (21)	Flow Through Drop Inlet (CFS) (22)	Inlet Shaping Y/N (23)
							V <sub>o</sub> (FPS) (8)	H <sub>o</sub> (FT) (9)	Q <sub>i</sub> (CFS) (10)	V <sub>i</sub> (FPS) (11)	Q <sub>i</sub> x V <sub>i</sub> (12)	V <sub>i</sub> <sup>2</sup> 2g (13)	H <sub>i</sub> (FT) (14)	Angle (14)	H <sub>Δ</sub> (FT) (15)	H <sub>i</sub> (FT) (16)	1.3 H <sub>i</sub> (17)	0.5 H <sub>i</sub> (18)					
No. 4-11	89.70	30	26.08	34.00	0.4074	0.14	8.50	0.28	19.94	7.63	152.14	0.90	0.32	0	0.00	0.60	N.A.	N.A.	0.74	90.44	96.33	0.00	N
No. 4-9	90.44	30	19.94	66.00	0.2381	0.18	7.63	0.23	19.76	7.61	150.37	0.90	0.31	90	0.63	1.17	N.A.	N.A.	1.33	91.76	97.70	0.00	N
No. 4-8	92.98	30	19.76	66.00	0.2339	0.15	7.61	0.22	17.47	7.48	130.68	0.87	0.30	0	0.00	0.53	N.A.	N.A.	0.68	93.66	97.73	0.00	N
Ex. JB	93.66	30	17.47	100.00	0.1828	0.18	7.48	0.22	16.28	6.08	98.98	0.57	0.20	0	0.00	0.42	N.A.	N.A.	0.60	94.26	98.19	0.00	N

## Equations:

Outlet Water Elevation = 80% diameter Ho = 0.25 V<sub>o</sub><sup>2</sup>/2g

Sf = [nQ<sub>o</sub>/(1.486AR<sup>2/3</sup>)]<sup>2</sup>

H<sub>i</sub> = 0.35 V<sub>i</sub><sup>2</sup>/2g

FINAL H = H<sub>i</sub> + H<sub>Δ</sub>

H<sub>Δ</sub> = K V<sub>o</sub><sup>2</sup>/2g

H<sub>f</sub> = Ho + H<sub>i</sub> + H<sub>Δ</sub>

90° K = 0.70

80° K = 0.66

70° K = 0.61

60° K = 0.55

50° K = 0.47

40° K = 0.38

30° K = 0.28

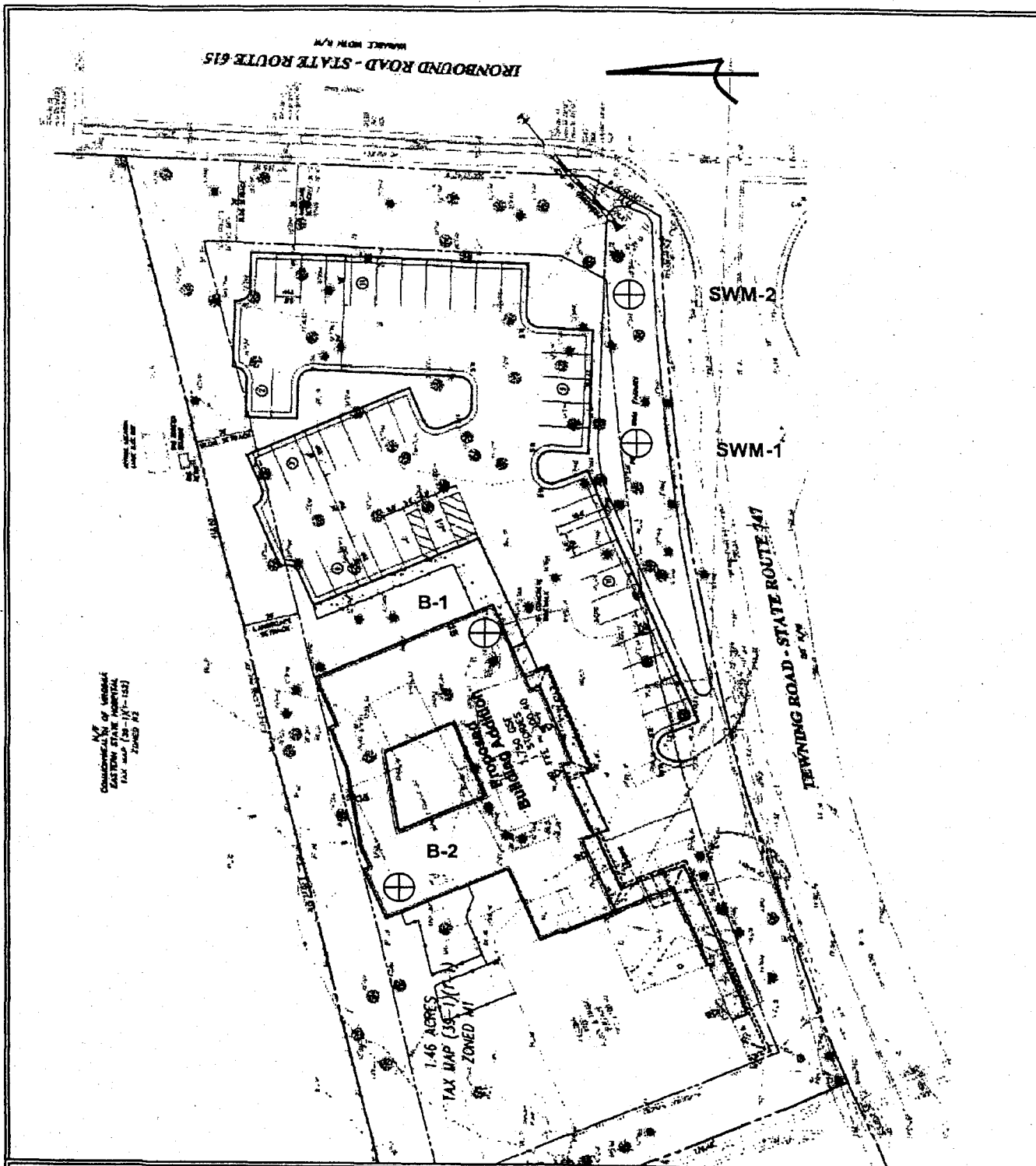
25° K = 0.22

20° K = 0.16

15° K = 0.10

*This approximates the existing Hydraulic Grade Line.*





**EARTHWORKS**

Earthworks Consulting Engineers, Inc.  
4305 Cutshaw Avenue • Richmond, Virginia 23230

## BORING LOCATION DIAGRAM

Godspeed Animal Clinic  
Infiltration Investigation

EARTHWORKS PROJECT NO. 1316

**EARTHWORKS CONSULTING ENGINEERS, INC.**  
**HANDAUGER BORING LOGS**

Godspeed Animal Clinic  
Infiltration Investigation

DEPTH (IN)	BORING NUMBER SWM-1
	DESCRIPTION OF SOILS
0-4	Topsoil
4-20	Light tan, Silty, fine SAND (SM) with roots
20-27	Brownish tan, Silty to Clayey, fine SAND (SM-SC)
27-40	Brownish orange, fine Sandy CLAY (CL)
40-52	Brownish orange with gray mottles, Clayey to Silty, fine SAND (SC-SM)
52-82	Light gray with orange brown, Silty, fine SAND (SM) trace Clay lenses Moisture Content – 17.2% Silt/Clay Content – 34.7%
	Seasonal Water Indicators below 40 inches. No free groundwater.
	END OF BORING AT 82 INCHES

DEPTH (IN)	BORING NUMBER SWM-2
	DESCRIPTION OF SOILS
0-3	Topsoil
3-21	Light tan, Silty, fine SAND (SM) with roots
21-46	Brownish tan, Silty to Clayey, fine SAND (SM-SC)
46-67	Brownish orange with gray mottles, Silty, fine SAND (SM) trace Clay
67-82	Light gray with orangish brown, Silty, fine SAND (SM)
	Seasonal Water Indicators below 46 inches. No free groundwater.
	END OF BORING AT 82 INCHES

OWNER <b>Godspeed Animal Clinic</b>				JOB # <b>1316</b>		BORING # <b>B-1</b>		SHEET <b>1 OF 1</b>		 <b>EARTHWORKS</b> Consulting Geotechnical Engineers
PROJECT NAME <b>Addition to Godspeed Animal Clinic</b>				ARCHITECT-ENGINEER <b>Guernsey Tingle Architects</b>						
SITE LOCATION <b>James City County, VA</b>										

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FEET)	CALIBRATED PENETROMETER TONS/FT <sup>2</sup>			WATER CONTENT %			LIQUID LIMIT %		
							1	2	3	4	5+	10	20	30	40
SURFACE ELEVATION: 100 FT							STANDARD PENETRATION BLOWS/FT.								
0	1	ss	24	16	Grayish brown, moist, loose, Silty, fine SAND (SM-ML) with roots	100	⊗	●							
	2	ss	24	16	Light brown, moist, medium stiff, fine Sandy CLAY (CL-SC)		10	⊗	●						
5	3	ss	24	22	Light gray and brown, moist, medium dense, Clayey, fine SAND (SC)	95	10	⊗							
	4	ss	24	18	Light gray and tan, very moist, medium dense, Silty, fine SAND (SM) trace Clay				15	⊗					
	5	ss	24	20						18	⊗				
10						90									
	6	ss	24	23	Light brown, wet, medium dense, Silty, fine SAND (SM) trace Clay lenses										
15					Bottom of Boring 15 FT	85			12	⊗					
20						80									
25						75									
30						70									
35						65									

<b>BORING TERMINATED AT 15 FEET.</b>		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL		
WATER DEPTH IN BOREHOLE	BORING STARTED <b>19 April 2004</b>	TOPSOIL DEPTH: <b>3 IN</b>
AFTER DRILLING <b>10.2 FT.</b>	BORING COMPLETED <b>19 April 2004</b>	CAVE-IN DEPTH AT <b>13 FT</b>
AFTER        HRS:        FT.	DRILLER <b>Scott Drilling</b>	DRILLING METHOD <b>Hollow Stem Auger</b>

OWNER <b>Godspeed Animal Clinic</b>				JOB # <b>1316</b>		BORING # <b>B-2</b>		SHEET <b>1 OF 1</b>		 <b>EARTHWORKS</b> Consulting Geotechnical Engineers
PROJECT NAME <b>Addition to Godspeed Animal Clinic</b>				ARCHITECT-ENGINEER <b>Guernsey Tingle Architects</b>						
SITE LOCATION <b>James City County, VA</b>										

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FEET)	CALIBRATED PENETROMETER TONS/FT <sup>2</sup>					
							<div style="display: flex; justify-content: space-between; width: 100%;"> <span>1</span><span>2</span><span>3</span><span>4</span><span>5+</span> </div>					
							<div style="display: flex; justify-content: space-between; width: 100%;"> <span>PLASTIC LIMIT %</span><span>WATER CONTENT %</span><span>LIQUID LIMIT %</span> </div>					
							<div style="display: flex; justify-content: space-between; width: 100%;"> <span>10</span><span>20</span><span>30</span><span>40</span><span>50+</span> </div>					
SURFACE ELEVATION: 98 FT							STANDARD PENETRATION BLOWS/FT.					
							<div style="display: flex; justify-content: space-between; width: 100%;"> <span>10</span><span>20</span><span>30</span><span>40</span><span>50+</span> </div>					
0	1	ss	24	11	Dark gray, moist, loose, Silty, fine SAND (SM-ML) with roots [FILL]			8				
	2	ss	24	19	Light gray and brown, very moist, medium stiff, fine Sandy CLAY (CL)		95	9				
5	3	ss	24	18	Light gray and brown, very moist, loose, Clayey, fine SAND (SC)			9				
	4	ss	24	19	Light gray and tan, moist, medium dense, Silty, fine SAND (SM) trace Clay		90		21			
	5	ss	24	19					21			
10												
	6	ss	24	20	Light brown, wet, medium dense, Silty, fine SAND (SM)		85		11			
15	Bottom of Boring 15 FT											
20												
25												
30												
35												

BORING TERMINATED AT 15 FEET.		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL		
WATER DEPTH IN BOREHOLE	BORING STARTED <b>19 April 2004</b>	TOPSOIL DEPTH: <b>3 IN</b>
AFTER DRILLING <b>9.5</b> FT.	BORING COMPLETED <b>19 April 2004</b>	CAVE-IN DEPTH AT <b>10.8 FT</b>
AFTER HRS: FT.	DRILLER <b>Scott Drilling</b>	DRILLING METHOD <b>Hollow Stem Auger</b>

**SUMMARY OF LABORATORY TEST DATA**

**GODSPEED ANIMAL CLINIC  
INFILTRATION INVESTIGATION**

**EARTHWORKS PROJECT NO. 1316**

<b>Boring No.</b>	<b>Sample No.</b>	<b>Sample Depth (in)</b>	<b>Natural Moisture Content (%)</b>	<b>Silt and/or Clay Fraction (%)</b>	<b>Unified Soil Classification</b>
SWM-1	1	66-70	17.2	34.7	SM
B-1	S-1	0-24	11.8	49.5	SM-ML
B-1	S-2	24-48	17.7	51.8	CL-SC
B-2	S-3	48-72	15.5	43.2	SC

# EARTHWORKS

Earthworks Consulting Engineers, Inc.

May 28, 2004

Mr. Scott Van Voorhees  
Guernsey Tingle Architects  
3200 Ironbound Road  
Williamsburg, Virginia 23188

*Meets min.  
0.5" / HR ALTHOUGH  
D-2 IS A FILTERING  
SYSTEM. HAS  
UNDERDRAIN. NOT  
RELIANT ON  
FC INFIL  
SOILS.*

Earthworks Project No. 1316

Reference: Godspeed Animal Clinic Infiltration Investigation

Dear Mr. Van Voorhees:

Pursuant to your request, an engineer from Earthworks visited the above referenced site to perform a subsurface investigation to determine the suitability of the soils for support of a proposed stormwater infiltration facility. This investigation was completed by performing two (2) handauger borings at locations within the proposed infiltration facility, as determined by the project Civil Engineer. The borings were extended to depths of 82 inches below existing surface elevations. In addition, two 15-foot deep soil test borings performed adjacent to the infiltration facility as part of our subsurface investigation for the proposed building addition were used in this investigation. A boring location diagram and logs of the two handauger borings and two soil test borings are attached to this report.

In general, the soil test and handauger borings encountered Silty Sand with Clay, Clayey Sand, and Sandy Clay to depths of about 5 feet. These soils contained seasonal water indicators below a depth of about 40 inches and appeared to be moderately to poorly drained. Soils below about 5 or 6 feet consisted of moderately well drained Silty Sands. These soils too contained seasonal water indicators, but to a lesser degree. The groundwater table was encountered at a depth of about 10 feet.

Based on the results of our field classifications of the soils encountered, it is estimated that soils above a depth of about 5 feet possess an infiltration rate less than about 0.5 inches per hour. Water movement through these soils appears to be restricted, based on soil color, and water appears to be present in these soils during wet seasonal conditions. Soils below a depth of about 5 feet also appear to be seasonally wet. However, these soils are moderately well drained. We estimate that these soils possess an infiltration rate of 0.6 inches per hour or better.

It is expected that construction of pavements and other impervious surfaces will substantially reduce the presence of seasonal water in the soils surrounding the proposed infiltration facility. If an infiltration facility is considered feasible based on seasonal water conditions, we recommend the infiltration level be placed about 5 to 6 feet below existing grades and that side-wall infiltration rates be considered minimal.

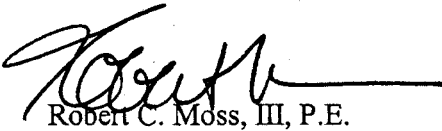
Should the client or Civil Engineer require more extensive investigation, Earthworks can provide in-field infiltration testing to confirm our estimated infiltration rates upon request.

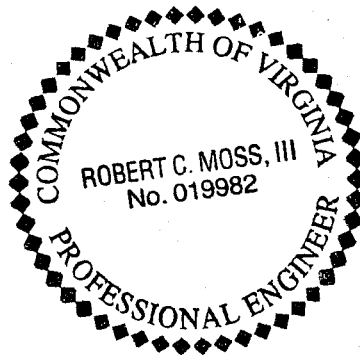
Godspeed Animal Clinic Infiltration Investigation  
Earthworks Project No. 1316  
Page 2

We appreciate this opportunity to be of service to you. Should you have questions concerning this investigation or wish to discuss our findings in more detail, please contact our office.

Respectfully,

**EARTHWORKS CONSULTING ENGINEERS, INC.**

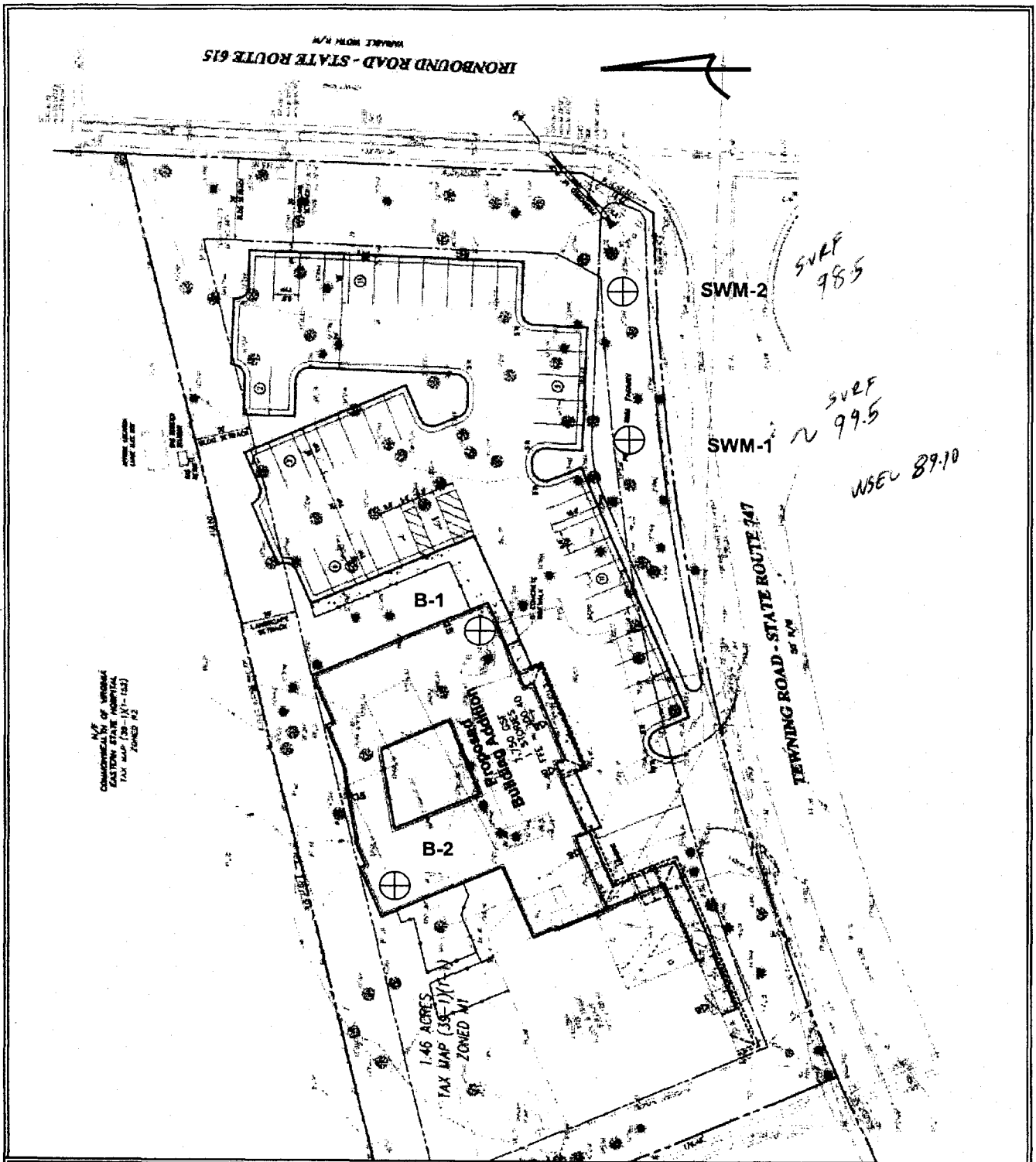
  
Robert C. Moss, III, P.E.  
President / Principal Engineer



Enclosures:     Boring Location Diagram  
                     Soil Test and Handauger Boring Logs  
                     Summary of Laboratory Test Data

Copies:     (1) Client  
                 (1) VHB – Mitchell Warren

geotech\letters\1316.doc



**EARTHWORKS**  
 Earthworks Consulting Engineers, Inc.  
 4305 Cutshaw Avenue • Richmond, Virginia 23230

**BORING LOCATION DIAGRAM**  
 Godspeed Animal Clinic  
 Infiltration Investigation  
 EARTHWORKS PROJECT NO. 1316



# EARTHWORKS CONSULTING ENGINEERS, INC. HANDAUGER BORING LOGS

Godspeed Animal Clinic  
Infiltration Investigation

99.5

DEPTH (IN)	BORING NUMBER SWM-1
	DESCRIPTION OF SOILS
0-4	Topsoil
4-20	Light tan, Silty, fine SAND (SM) with roots
20-27	Brownish tan, Silty to Clayey, fine SAND (SM-SC)
27-40	Brownish orange, fine Sandy CLAY (CL)
40-52	Brownish orange with gray mottles, Clayey to Silty, fine SAND (SC-SM)
52-82	Light gray with orange brown, Silty, fine SAND (SM) trace Clay lenses Moisture Content – 17.2% Silt/Clay Content – 34.7%
	Seasonal Water Indicators below 40 inches. No free groundwater.
	END OF BORING AT 82 INCHES

Bottom  
Sample  
Point

DEPTH (IN)	BORING NUMBER SWM-2
	DESCRIPTION OF SOILS
0-3	Topsoil
3-21	Light tan, Silty, fine SAND (SM) with roots
21-46	Brownish tan, Silty to Clayey, fine SAND (SM-SC)
46-67	Brownish orange with gray mottles, Silty, fine SAND (SM) trace Clay
67-82	Light gray with orangish brown, Silty, fine SAND (SM)
	Seasonal Water Indicators below 46 inches. No free groundwater.
	END OF BORING AT 82 INCHES

Bottom  
Sample  
Point

99.3

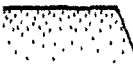
OWNER <b>Godspeed Animal Clinic</b>				JOB # <b>1316</b>		BORING # <b>B-1</b>		SHEET <b>1 OF 1</b>		 <b>EARTHWORKS</b> Consulting Geotechnical Engineers
PROJECT NAME <b>Addition to Godspeed Animal Clinic</b>				ARCHITECT-ENGINEER <b>Guernsey Tingle Architects</b>						
SITE LOCATION <b>James City County, VA</b>										

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FEET)	CALIBRATED PENETROMETER TONS/FT <sup>2</sup>			PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %
							1	2	3			
SURFACE ELEVATION: 100 FT												
0	1	ss	24	16	Grayish brown, moist, loose, Silty, fine SAND (SM-ML) with roots	100						
	2	ss	24	16	Light brown, moist, medium stiff, fine Sandy CLAY (CL-SC)							
5	3	ss	24	22	Light gray and brown, moist, medium dense, Clayey, fine SAND (SC)	95						
	4	ss	24	18	Light gray and tan, very moist, medium dense, Silty, fine SAND (SM) trace Clay							
	5	ss	24	20								
10												
	6	ss	24	23	Light brown, wet, medium dense, Silty, fine SAND (SM) trace Clay lenses							
15	Bottom of Boring 15 FT					85						
20						80						
25						75						
30						70						
35						65						

BORING TERMINATED AT 15 FEET.		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL		
WATER DEPTH IN BOREHOLE	BORING STARTED <b>19 April 2004</b>	TOPSOIL DEPTH: <b>3 IN</b>
AFTER DRILLING <b>10.2</b> FT.	BORING COMPLETED <b>19 April 2004</b>	CAVE-IN DEPTH AT <b>13 FT</b>
AFTER HRS:      FT.	DRILLER <b>Scott Drilling</b>	DRILLING METHOD <b>Hollow Stem Auger</b>

OWNER <b>Godspeed Animal Clinic</b>				JOB # <b>1316</b>	BORING # <b>B-2</b>	SHEET <b>1 OF 1</b>	 <b>EARTHWORKS</b> Consulting Geotechnical Engineers
PROJECT NAME <b>Addition to Godspeed Animal Clinic</b>				ARCHITECT-ENGINEER <b>Guernsey Tingle Architects</b>			
SITE LOCATION <b>James City County, VA</b>							

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FEET)	CALIBRATED PENETROMETER TONS/FT <sup>2</sup>			PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT %			STANDARD PENETRATION BLOWS/FT.			
							1	2	3	4	5+	10	20	30	40	50+
SURFACE ELEVATION: 98 FT																
0	1	ss	24	11	Dark gray, moist, loose, Silty, fine SAND (SM-ML) with roots [FILL]											
	2	ss	24	19	Light gray and brown, very moist, medium stiff, fine Sandy CLAY (CL)		95									
5	3	ss	24	18	Light gray and brown, very moist, loose, Clayey, fine SAND (SC)											
	4	ss	24	19	Light gray and tan, moist, medium dense, Silty, fine SAND (SM) trace Clay		90									
	5	ss	24	19												
10																
	6	ss	24	20	Light brown, wet, medium dense, Silty, fine SAND (SM)		85									
15					Bottom of Boring 15 FT											
							80									
20																
							75									
25																
							70									
30																
							65									
35																

BORING TERMINATED AT 15 FEET.		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL		
WATER DEPTH IN BOREHOLE	BORING STARTED <b>19 April 2004</b>	TOPSOIL DEPTH: <b>3 IN</b>
AFTER DRILLING <b>9.5</b> FT.	BORING COMPLETED <b>19 April 2004</b>	CAVE-IN DEPTH AT <b>10.8 FT</b>
AFTER      HRS:      FT.	DRILLER <b>Scott Drilling</b>	DRILLING METHOD <b>Hollow Stem Auger</b>

**SUMMARY OF LABORATORY TEST DATA**

**GODSPEED ANIMAL CLINIC  
INFILTRATION INVESTIGATION**

**EARTHWORKS PROJECT NO. 1316**

<b>Boring No.</b>	<b>Sample No.</b>	<b>Sample Depth (in)</b>	<b>Natural Moisture Content (%)</b>	<b>Silt and/or Clay Fraction (%)</b>	<b>Unified Soil Classification</b>
SWM-1	1	66-70	17.2	34.7	SM
B-1	S-1	0-24	11.8	49.5	SM-ML
B-1	S-2	24-48	17.7	51.8	CL-SC
B-2	S-3	48-72	15.5	43.2	SC

FINAL DESIGN

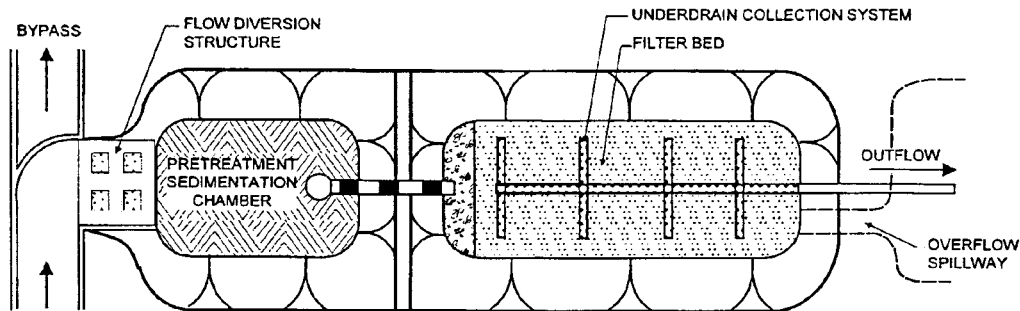
GODFREY  
ANIMAL  
CUMUL  
SP-70-04

James City County BMP Guidelines

D-2

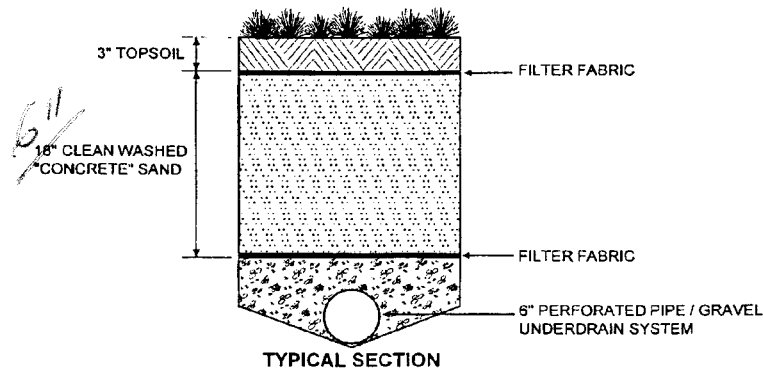
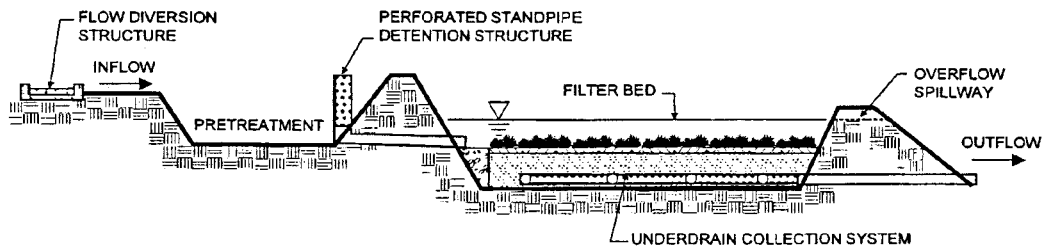
Figure 10 Example of a Surface Sand Filter

D-2



TOTAL  
DTA =  
0.73 AC  
IMPERV  
0.57 AC

PLAN VIEW



TYPICAL SECTION

PROFILE

Surface sand filters can serve the largest drainage area of all the filtering systems.

8 points / 1.0 inch per imperv. acre



Aug. 17, 2004

Ref: 31248.01

Scott J. Thomas, P.E.  
Senior Engineer  
Environmental Division  
101 Mounts Bay Road, P.O. Box 8784  
Williamsburg, Virginia 23187

Re: Godspeed Animal Care  
Case No. C-45-04

Dear Mr. Thomas;

Vanasse Hangen Brustlin, Inc. (VHB) on behalf of Dr. Pamela Dumont (property owner) hereby and in accordance with the James City County Zoning Ordinance respectfully request a waiver/modification of the 10 point BMP requirement for the proposed Surface Sand Filter System. As it states in the James City County BMP guidelines, this type of system only provides 8 of the required 10 points per site. Our waiver request is two-fold and involves the following:

- First, we are proposing to install pretreatment stone "Stilling Basins" at each of the three curb cut locations prior to entering the proposed Sand Filter Facility. We feel that due to the limited amounts of surface drainage area contributing to these locations, that this should be an adequate filtering measure and should make up for the lack of BMP Points.
- Second, we are requesting that the sand filter layer be reduced from the 18-inch minimum requirement to the proposed 6 inches shown. The reason for this request is due to our elevation limitations we have tying into the existing VDOT storm system on Ironbound Road. The calculations for the system show that we meet the county quantity requirements for the BMP, however we could not achieve the depth requirements for the filtering materials due to the elevation constraints. As requested in your comment letter, the installation of SOD was added to the surface of the BMP and we feel that this improvement will help protect the sand filter layer and also assist in slowing the permeability rate thus providing an adequate filtering system as intended.

We appreciate your consideration of this waiver/modification and hope these efforts will be an acceptable alternative. Therefore, VHB respectfully requests approval of this waiver request to satisfy the quality requirements.

Should you have any questions please give me a call.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Mitch Mitchell  
Sr. Project Engineer

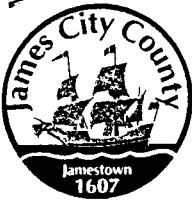
Vanasse Hangen Brustlin, Inc.

*Comments  
- Stilling basins P-2  
may be permanent  
- could spreader in NW  
corner must be installed  
on a perm feature  
- 100 in D-2 BMP*

*Waiver  
8.94 points instead of 10  
6" rather than 18" depth  
clean washed sand.  
Because SF is 80+ BMP  
points were not achieved  
if 10pt wet or bio  
basin could work  
10pts would  
be achieved.*

*PRETREATMENT  
This is  
required per  
P. 48 of the  
manual*

*OK  
6" instead  
of 18"  
due to  
constraining  
invert of 18" RCP  
storm drain  
along  
Ironbound*



## DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784

(757) 253-6671

Fax: (757) 253-6850

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

CODE COMPLIANCE

(757) 253-6626

[codecomp@james-city.va.us](mailto:codecomp@james-city.va.us)

ENVIRONMENTAL DIVISION

(757) 253-6670

[environ@james-city.va.us](mailto:environ@james-city.va.us)

PLANNING

(757) 253-6685

[planning@james-city.va.us](mailto:planning@james-city.va.us)

COUNTY ENGINEER

(757) 253-6678

INTEGRATED PEST MANAGEMENT

(757) 253-2620

September 14, 2004

Mr. Mitch Mitchell  
Vanasse Hangen Brustlin, Inc.  
115 South 15<sup>th</sup> Street, Suite 200  
Richmond, Va. 23219

Re: 10-point system and Sand Filter Variance Request  
Godspeed Animal Care Expansion  
County Plan No. SP-70-04

Dear Mr. Mitchell:

The Environmental Division is in receipt of your written variance request letter dated August 17<sup>th</sup> 2004 for the above referenced project. The variance request is dual-fold, as it requests variance from the County 10-point BMP water quality system and also requests a variance from a minimum depth of 18 inches to 6 inches for the filter sand layer associated with a County type D-2 BMP.

Based on our review of information as submitted, the variance as requested is hereby **approved** for this specific review case only. The variance was considered appropriate due to information as submitted in the letter request and the amended plan of development including:

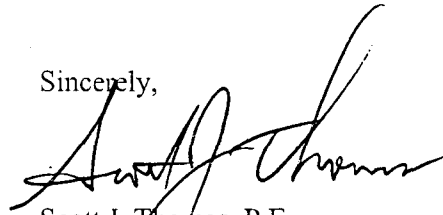
- There is a distinct site constraint for the project. The restraint is the vertical elevation of an existing 18-inch storm drain pipe system along the west side of Ironbound Road. This storm drainage pipe system is the only reasonable receiving drainage facility to accept discharge from the development site.
- The site contains Soil Group 29B - Slagle fine sandy loam, which exhibit seasonal high water tables and slow permeability of the subsoil. These characteristics limit the feasibility of certain types of onsite BMPs including bioretention and dry swales.
- The onsite BMP must be able to be landscaped in order to blend with aesthetics of the area and meet Zoning ordinance requirements.
- A wet pond pool at this location would generally be unsafe due to the location of the parking area and the presence of Ironbound Road and Tewning Road.

The following conditions apply to approval of this waiver request:

1. The owner should be made completely aware of waiver from the 10-point system and reduced depth of sand media. Reduced depth of sand media will result in more importance being placed on BMP maintenance as trash, debris, grass clippings and sediment can cause premature clogging of the sand layer.
2. The three stilling basins around the sand filter BMP as shown on Sheet C-4 of the plan set must be installed as permanent features and be adequately cleaned on a frequent basis.
3. The level spreader as situated in the northwest corner of the site must be installed as a permanent feature and be adequately cleaned and maintained on a routine basis.
4. Sod must be placed in the bottom of the sand filter BMP consistent with that shown on plan Sheet C-4 and Landscape plan Sheet C-7.
5. The variance approval shall become part of the approved site stormwater management plan.

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,



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

SJT/sjt

cc: Ellen Cook, Planning

SWMProg/Variations/SPvar/Var091404.SP07004





Aug. 17, 2004

Ref: 31248.01

Vanasse Hangen Brustlin, Inc.

Scott J. Thomas, P.E.  
Senior Engineer  
Environmental Division  
101 Mounts Bay Road, P.O. Box 8784  
Williamsburg, Virginia 23187

Re: Godspeed Animal Care  
Case No. C-45-04

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We appreciate your consideration of this waiver/modification and hope these efforts will be an acceptable alternative. Therefore, VHB respectfully requests approval of this waiver request to satisfy the quality requirements.

Should you have any questions please give me a call.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

  
Mitch Mitchell  
Sr. Project Engineer

**Scott Thomas**

---

**From:** Scott Thomas  
**Sent:** Thursday, December 01, 2005 5:07 PM  
**To:** 'Jordan Anglin'  
**Cc:** Darryl Cook; Pat Menichino  
**Subject:** RE: God Speed animal clinic release

Jordan,

After I sent this email I looked through the submittal package from LandTech Resources dated August 17, 2005. The transmittal states that the asbuilts and certifications are provided; however, looking through the certification forms only the record drawing part is stamped and sealed. In summary, a construction certification was not provided and normally I do not do a final inspection on the BMP until this is provided except for unusual circumstances like a bond renewal is upcoming and things could be worked through quickly. If you cannot get me the construction certification quickly, I don't believe that this could be done in 15 days as I would still have to review the material, perform a final inspection and the contractor would need to complete any field-related punch list items. I have stopped to see the BMP during one rain spell and one of field related items would be to clean-up sediment within the BMP and also I thought the sand filter bottom was to have a sod lining ( I believe the plans stipulated this, but I could be wrong).

If you previously provided me the construction certification, then I am in error, but I don't believe it was forwarded.

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

Visit:  
[http://www.james-city.va.us/resources/devmgmt/div\\_devmgmt\\_environ.html](http://www.james-city.va.us/resources/devmgmt/div_devmgmt_environ.html)  
 and  
[www.protectedwithpride.org](http://www.protectedwithpride.org)

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

**From:** Scott Thomas  
**Sent:** Thursday, December 01, 2005 4:47 PM  
**To:** 'Jordan Anglin'  
**Subject:** RE: God Speed animal clinic release

I will do my best to meet your request.

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

Visit:  
[http://www.james-city.va.us/resources/devmgmt/div\\_devmgmt\\_environ.html](http://www.james-city.va.us/resources/devmgmt/div_devmgmt_environ.html)  
 and  
[www.protectedwithpride.org](http://www.protectedwithpride.org)

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

**From:** Jordan Anglin [mailto:jordan@hendersoninc.com]  
**Sent:** Wednesday, November 30, 2005 4:12 PM  
**To:** Scott Thomas; pmenichini@james-city.va.us  
**Cc:** Julie Russell; Bill Strack; bruce gilliam  
**Subject:** RE: God Speed animal clinic release

12/1/2005

Hi Scott,

I am writing in regards to the final BMP inspection for God Speed Animal Clinic. You should have all the info you need as far as "as builts" and construction certification. The bond is up for renewal in 15 days and we would really like to close this one out. Please let me know where we stand.

Hope all is well at JCC

Thanks for your time,

Jordan Anglin  
Henderson Inc.  
(757) 565-1090  
Jordan@hendersoninc.com

12/1/2005

**Scott Thomas**

---

**From:** Jordan Anglin [jordan@hendersoninc.com]  
**Sent:** Thursday, April 13, 2006 9:07 AM  
**To:** Jason Beck  
**Cc:** Bill Strack; bruce gilliam; Peter Henderson; Scott Thomas; Joe Buchite; Julie Russell  
**Subject:** RE: E&S Bond Reductions for God Speed Animal Clinic & The Magoon Building @ Newtown

Hello Jason,

I would like to request an E&S bond reduction/release for the following projects:

**1) God Speed Animal Clinic  
102 Tewning Rd.**

The site has been stabilized, all E&S measures have been removed, and the BMP is in good working order. The rip-rap flumes leading to the BMP will be cleaned of debris today as per Scott Thomas' request. The current bond amount is **\$21,000**

**2) The "Magoon Building"  
New Town-Block 2- Parcel F  
JCC-SP- 21-04**

This building is complete and stabilized. The current bond amount is **\$3,500**

Thanks for your help!

**Jordan Anglin  
Henderson Inc.  
phone 757-565 1090  
cell 757 812 2394  
Jordan@hendersoninc.com**

5/15/2006

**Scott Thomas**

---

**From:** Jordan Anglin [jordan@hendersoninc.com]  
**Sent:** Friday, May 05, 2006 7:51 AM  
**To:** Scott Thomas  
**Cc:** Joe Conner; Bill Strack; Darryl Cook  
**Subject:** RE: Prudential Mcardle BMP & God Speed Animal Clinic

Scott,

I was curious if you had a chance to look at both the **Courthouse BMP** as well as the **Godspeed Animal Clinic BMP**. All the requested work has been completed and seemed to hold up well after that huge storm we had a few weeks back. We would really like to close these projects out and they appear to be ready. Please let me know what you think.

Hope all is well at JCC

Thanks for your help,

**Jordan Anglin**  
**Henderson Inc.**  
**phone 757-565 1090**  
**cell 757 812 2394**  
**Jordan@hendersoninc.com**

5/15/2006



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

SP-70-04

County BMP ID Code (if known): CC029

Name of Facility: GOOSPEED ANIMAL CUMC BMP No.: 1 of 1 Date: 10/07/05

Location: 102 Tenny Road

Name of Owner: DR. PAMELA DUMONT

Name of Inspector: SJ Thomas

Type of Facility: D-2 SURFACE SAND FILTER (6" deep)

Weather Conditions: Sunny, Warm Type: ☒ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection

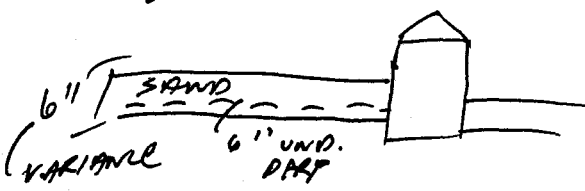
If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

- 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
Embankments and Side Slopes:				<u>EXCAV. AREA 24'x14' 55' 3-4' DEEP</u>
Grass Height	<input checked="" type="checkbox"/>			
Vegetation Condition	<input checked="" type="checkbox"/>			
Tree Growth	<input checked="" type="checkbox"/>			<u>None, except allowed LANDSCAPE.</u>
Erosion	<input checked="" type="checkbox"/>			
Trash & Debris	<input checked="" type="checkbox"/>			
Seepage	<input checked="" type="checkbox"/>			<u>None</u>
Fencing or Benches				
Interior Landscaping/Planted Areas:	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Constructed Wetland/Shallow Marsh	<input type="checkbox"/> Naturally Established Vegetation	
Vegetated Conditions	<input checked="" type="checkbox"/>			<u>Sodded, perm. sand w/ underdrain layer.</u>
Trash & Debris	<input checked="" type="checkbox"/>			
Floating Material	<input checked="" type="checkbox"/>			
Erosion	<input checked="" type="checkbox"/>			
Sediment	<input checked="" type="checkbox"/>			
Dead Plant	<input checked="" type="checkbox"/>			
Aesthetics	<input checked="" type="checkbox"/>			
Other	<input checked="" type="checkbox"/>			
Notes:	<u>Serves Bog + Park Lot Areas</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	✓			Filter dewaterers
Algae	✓			
Trash & Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other	✓			
<b>Inflows (Describe Types/Locations):</b> 3 Paved Flume, curb-cut w/ RIPRAP				
Condition of Structure	✓			North side of BWP in
Erosion	✓			parking lot.
Trash and Debris		✓		
Sediment	✓	✓		
Outlet Protection	✓			OK. STABLE
Other				
<b>Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):</b> MOD. D1-5				
Condition of Structure	✓			MOD. D1-5 is 2' deep
Corrosion	✓			15" RCP out, 6" pert.
Trash and Debris	✓			CPP underdrain, which
Sediment	✓			dewater sand layer
Vegetation	✓			
Other				
<b>Principal Outlet Structure - Barrel, Conduit, etc. :</b> 15 RCP TO IRONBOUND RD				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris	✓			
Erosion/Sediment	✓			
Outlet Protection	✓			
Other	✓			
<b>Emergency Spillway (Overflow):</b> None. OHW is contained.				
Vegetation				
Lining				
Erosion				
Trash & Debris				
Other				
<b>Notes:</b>				

Facility Item	O.K.	Routine	Urgent	Comments
<b>Nuisance Type Conditions:</b>				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other	✓			
<b>Surrounding Perimeter Conditions:</b> <i>North - Parking; South + East, VDOT ROAD</i>				
Land Uses	✓			
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			<i>LID-BMP</i>
Access /Maintenance Roads or Paths				<i>EASY access from site PARKING LOT</i>
Other				
<b>Remarks:</b>				
<ul style="list-style-type: none"> <li>• clean leaves + debris + trash from riprap flumes.</li> <li>• General clean leaves + trash from bottom surface of BMP.</li> <li>• Is working well, was draining during insp.</li> </ul>				
				
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p><b>Note:</b> LS OK!</p> <p>Also, visit Level spreader in NW corner of site around bldg. not "official" BMP, but inspect as part of County BMP Inventory!</p> </div>				
Overall Environmental Division Internal Rating: <u>3</u>				
Signature: <u><i>Luff Thoma P.E.</i></u> Date: <u><i>10/07/05</i></u>				
Title: <u><i>Senior Civil Engineer</i></u>				



<b>WATERSHED</b>	CC	<b>MAINTENANCE PLAN</b>	Yes	<b>CTRL STRUC DESC</b>	DI-5 Conc
<b>BMP ID NO</b>	029	<b>SITE AREA acre</b>	1.46	<b>CTRL STRUC SIZE inches</b>	
<b>PLAN NO</b>	SP-70-04	<b>LAND USE</b>	M1 Limited Busines	<b>OTLT BARRL DESC</b>	RCP Barrel
<b>TAX PARCEL</b>	(39-01)(01-01)	<b>old BMP TYP</b>		<b>OTLT BARRL SIZE inch</b>	15
<b>PIN NO</b>	3910100001	<b>JCC BMP CODE</b>	D2 Surface Sand Filter		
<b>CONSTRUCTION DATE</b>	7/1/2005	<b>POINT VALUE</b>	8	<b>EMERG SPILLWAY</b>	No
<b>PROJECT NAME</b>	Godspeed Animal Care (Tewning Road)			<b>DESIGN HW ELEV</b>	96.38
<b>FACILITY LOCATION</b>	102 Tewning Road			<b>PERM POOL ELE</b>	na
<b>CITY-STATE</b>	Williamsburg, VA 23188	<b>SVC DRAIN AREA acres</b>	0.73	<b>2-YR OUTFLOW cfs</b>	0.49
<b>CURRENT OWNER</b>	Dr. Pamela Dumont			<b>10-YR OUTFLOW cfs</b>	6.24
<b>OWNER ADDRESS</b>	102 Tewning Road			<b>REC DRAWING</b>	Yes
<b>OWNER ADDRESS 2</b>		<b>SERVICE AREA DESCRI</b>	Building & Parking Lot		
<b>CITY-STATE-ZIP CODE</b>	Williamsburg, VA 23188	<b>IMPERV AREA acres</b>	0.57	<b>CONSTR CERTI</b>	Yes
<b>OWNER PHONE</b>	757-253-0656	<b>RECV STREAM</b>	UT of College Creek		
<b>MAINT AGREEMENT</b>	Yes	<b>EXT DET-WQ-CTRL</b>	No	<b>LAST INSP DATE</b>	10/7/2005
<b>EMERG ACTION PLAN</b>	No	<b>WTR QUAL VOL acre-ft</b>	0.05	<b>INTERNAL RATING</b>	3
		<b>CHAN PROT CTRL</b>	Yes	<b>MISC/COMMENTS</b>	
		<b>CHAN PROT VOL acre-ft</b>	0.08		6" sand filter w/ 6" underdrain. Also level spreader in NW corn. of site.
		<b>SW/FLOOD CONTROL</b>	Yes		
		<b>GEOTECH REPORT</b>	Yes		

Get Last BMP No

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