



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.

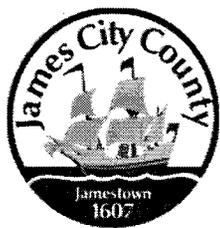
BMP NUMBER: PC190

DATE VERIFIED: June 5, 2012

QUALITY ASSURANCE TECHNICIAN: Leah Hardenbergh

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA



Stormwater Division

MEMORANDUM

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

General File ID or BMP ID: PC190

PIN: 3330100005H

Subdivision, Tract, Business or Owner

Name (if known):

Bruces Super Body Shop

Property Description:

Site Address:

5521 Richmond Road

(For internal use only)

Box 1

Drawer: 1

Agreements: (in file as of scan date)

Y

Book or Doc#:

020002955

Page:

51

24

Comments

Property owned by PBH, LLC.

DECLARATION OF COVENANTS

COPY

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 17th day of JANUARY, 18 2002
between PBH, LLC
and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the
following property: ± 5.28 Acres Lot 2, Berkeley District 5521 Richmond Rd
Deed Book 51, Page No. 24 or Instrument No. _____
and James City County, Virginia, hereinafter referred to as the "COUNTY."

WITNESSETH:

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

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.
2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.
3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.
4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.
5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.
6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.
7. The COVENANTOR(S) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.
8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.
9. This COVENANT shall be recorded in the County Land Records.

Instrument # 020002955

Recorded on 1/31/02

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 17 day of JANUARY, 192002

COVENANTOR(S)

Paul B Hutchins

Print Name/Title Paul B Hutchins
Manager

ATTEST:

[Signature]

COVENANTOR(S)

Print Name/Title _____

ATTEST:

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Henrico

I hereby certify that on this 17 day of January, ²⁰⁰²~~19~~, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of Henrico, aforesaid personally appeared Paul B. Hutchins and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 17 day of January, 192002

Judy B. Postone
Notary Public

My Commission expires: 2-28-2002

Approved as to form:

[Signature]
Deputy County Attorney

This Declaration of Covenants prepared by:

Peter V. Henderson
(Print Name)

President
(Title)

5800 Mooretown Rd.
(Address)

Williamsburg, Va. 23158
(City) (State) (Zip)

drainage.pre
Revised 2/97

PREPARED BY:
Hirschler, Fleischer, Weinberg, Cox & Allen
P. O. Box 500
Richmond, Virginia 23218-0500
(804) 771-9500

**DECLARATION OF COVENANTS
INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM**

THIS DECLARATION is made this 28th day of JUNE, 2001, by AMF BOWLING CENTERS, INC., a Virginia corporation, and all successors in interest, hereinafter referred to as "AMF", owner of the property located in James City County, and described on Exhibit A hereto (the "AMF Property"); WBB PARTNERS, a Virginia general partnership, owner of the property located in James City County, and described on Exhibit B hereto (the "WBB Property"), and all successors in interest, hereinafter referred to as the "Covenantor"; and JAMES CITY COUNTY, VIRGINIA, hereinafter referred to as the "County".

WITNESSETH:

AMF and Covenantor, 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. Pursuant to a separate Drainage Easement between AMF and Covenantor, AMF has granted Covenantor the right to improve, maintain and drain into an existing stormwater management facility, conveyance systems and associated easements (the "System"), located on the AMF Property and serving, among others, the WBB Property. AMF enters into this Declaration of

Covenants solely to agree to (i) provide and maintain perpetual access from public right-of-ways to the System for the County, its agent and its contractor; and (ii) grant the County, its agent and its contractor, a right of entry to the System for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the System.

2. The Covenantor shall provide maintenance for the System 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.

3. If necessary, the Covenantor shall levy regular or special assessments against all present or subsequent owners of the WBB Property served by the System to ensure that the System is properly maintained.

4. If, after reasonable notice by the County, the Covenantor 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 and/or all of the WBB Property served by the System for the cost of the work and any applicable penalties.

5. The Covenantor shall indemnify and save the County harmless from any and all claims and for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the System.

6. The Covenantor shall promptly notify the County when the Covenantor legally transfers any of the Covenantor's responsibilities for the System. The Covenantor shall supply the County with a copy of any document of transfer, executed by both parties.

7. The covenants contained herein shall run with the land and shall bind AMF and the Covenantor(s) and their respective successors and assignees, and shall bind all present and subsequent owners of the WBB Property served by the System and of the AMF Property.

8. This Covenant shall be recorded in the County Land Records.

[Signatures to appear on following page.]

IN WITNESS WHEREOF, AMF and the Covenantor have executed this Declaration of Covenants as of this 28th day of JUNE, 2001.

AMF BOWLING CENTERS, INC.

ATTEST:

By: Mark L. Hutcherson
Title: Vice President, Real Estate

WBB PARTNERS

ATTEST:

By: Beverly W. [Signature]
Title: _____

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Stanley

I hereby certify that on this 28th day of June, 2001 before the
subscribed, a Notary Public of the State of Virginia, and for the City/County of
Stanley, aforesaid personally appeared Mark S. Natchee,
V.P. of Real Estate and did acknowledge the foregoing
instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal
this 28th day of June, 2001.

My commission expires: 10/31/03

Ann J. Davis
Notary Public

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Virginia

I hereby certify that on this 28th day of June, 2001 before the
subscribed, a Notary Public of the State of Virginia, and for the City/County of
Richmond, aforesaid personally appeared Beverly W.
Armstrong and did acknowledge the foregoing
instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal
this 28 day of June, 2001.

My commission expires: 5/31/03

Cheryl K. Toy
Notary Public

Approved as to form:

Larry S. Barry, P.E., President
Norman H. Mason, L.S., VP
Vaughn B. Rinner, C.L.A.
Elizabeth J. Anderson, P.E.
Kenneth A. Dierks
Robert P. Kerr, R.E.P., P.W.S.

LANDMARK DESIGN GROUP

Clayton E. Massey, P.E.
Charles R. Orsborne, L.S.
Stephen A. Romeo, L.S.
Mark W. Strickland, P.E.
William R. Turner, Jr., A.I.C.P.
A. Gary Webb, P.E.

July 19, 2001



Ms. Jill E. Schmidle
Senior Planner
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784

Re: Bruce's Super Body Shops
SP-72-01

Dear Jill:

Accompanying this letter are 2 copies of the executed Declaration of Covenants Inspection/Maintenance of Drainage System for the referenced project. Please forward 1 copy to the individual in the Environmental Division assigned to this project.

Thank you.

The LandMark Design Group Inc.


Stephen A. Romeo, L.S.
Principal

SAR/dhm
Enclosure
Copy: 2000211-000.07

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

GPIN
3330100005A

James City County, Virginia Environmental Division

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

County Plan No.:

SP-72-01

Project Name:

BRUCES SUPER BODY SHOP, (5521 RICHMOND ROAD)

Stormwater Management Facility:

Forebay to exist offsite WP expanded

Phase:

I II III

Information Received.

Date/By: LandTech Resources 9/16/03

Administrative Check.

Record Drawing NOT CERTIFIED

Date/By: LANDTECH 8/20/03

DUE TO VOLUME PROBLEM.

Construction Certification

Date/By: ECS 2/12/04

RD/CC Standard Forms

(Required for all BMPs after Feb 1st 2001 Only)

Insp/Maint Agreement

#/Date: 020002955 1/31/02 + AGREEMENT

BMP Maintenance Plan

Location: on PLAN

Other: _____

Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.

Yes No

Location: Sheet

Assign County BMP ID Code:

Code: PC190 to ex PC142 expanded

Preliminary Input into Division's "As-Built Tracking Log"

Add Location to GIS Database Map. Obtain site information (GPIN, Owner, Site Area, Address, etc.)

Preliminary Log into Access BMP Database (BMP ID #, Plan No., GPIN, Project Name, etc.)

Active Project File Review (correspondence, H&H, etc.)

Initial As-Built File setup (Label, copy hydraulics, BMP plan and detail information, etc.)

Inspector Check of RD/CC (forward to inspector using transmittal for cursory review). CEL

Pre-Inspection Drawing Review - Approved Plan (Quick look prior to Field Inspection).

Final Inspection (FI) Performed

Date: 03/02/04

Record Drawing (RD) Review (***)

Date: _____

Construction Certification (CC) Review

Date: 3/03/04

Actions:

No comments.

Comments. Letter Forwarded.

Date: Tues Mar 2 '04

Record Drawing (RD)

Construction Certification (CC)

Construction-Related (CR)

Site Issues (SI)

Other: _____

Minor comment FI. sent via email.

Second Submission:

Reinspection (if necessary): _____

Acceptable for stormwater management facility purposes (RD/CC/CR/Other). Proceed with bond release.

Notify Inspector and Inspector Supervisor using "Surety Request Form".

Check/Clean active file of any remaining material and finish "As-Built" file.

Add to County BMP Inventory/Inspection schedule (Phase I, II or III).

Copy Final Inspection Report into County BMP Inspection Program file.

Obtain Digital Photographs of BMP and log into computer.

Complete "As-built Tracking Log"

Last check of BMP Access Database. Add to PRIDE database.

Add to JCC Hydrology & Hydraulic database (optional).

Add to PRIDE BMP ratings database.

Plan Reviewer: _____

Date: _____

*** See separate checklist.

Record Drawing / Construction Certification Submittal for a BMP

Date: 9/23/03

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

Project: Brucs Super Body Shop
BMP Facility: Forebay onsite + downstream wet pond expanded
Plan No.: SP-72-01
Assigned County BMP ID Code: PC190 (Forebay) + PC042 (Downstream Wet Pond)

I have received a transmittal for a Record Drawing and Construction Certification for the above referenced facility on Sept 16 '03. Prior to performing a field inspection of the BMP and performing a full review of these certification items, I am first forwarding the items to you to cursory review in case any major field changes were performed that I should be aware of and/or to ensure the record drawing accurately portrays what you saw observed in the field. Please review the drawing and return to me promptly so I can proceed with the review of certification material.

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

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

Scott

AsBuilts\Admin\z-inspector

Note: The record drawing shows a 14,000 c.f. deficiency in volume required + the ~~enr~~ engineer refuses to certify that it was not built per the plan. Based on preliminary review it appears that the forebay + offsite (bowling) wet pond were not ~~deep~~ built deep enough. I will deal with that issue; however I need to know from the inspector(s) if there are limiting constraints to deepening the swm/bmp facilities. I would not have expected I had to know of this till the asbuilts were turned in.



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: Bruces Auto Body Shop
Structure/BMP Name: BMP Primary Pond and BMP Second Pond
Project Location: U.S. Route 60
BMP Location: Rear of Property
County Plan No.: SP - 072 - 01

Project Type: Residential Business Office Institutional Industrial Public Roadway Other
Tax Map/Parcel No.: _____
BMP ID Code (if known): PC 190; SP-72-01
Zoning District: _____
Land Use: _____
Site Area (sf or acres): _____

Brief Description of Stormwater Management/BMP Facility:
Primary Pond consists of a sediment forebay and the primary pond. This pond has a outlet with a concrete drainage ditch which transmit water to the second pond which has a riser structure.

Nearest Visible Landmark to SWM/BMP Facility: AMF Bowling Center

Nearest Vertical Ground Control (if known):
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
Station Number or Name: _____
Datum or Reference Elevation: _____
Control Description: _____
Control Location from Subject Facility: _____

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: _____
 Mailing Address: _____
 Business Phone: _____
 Fax: _____
 Name: _____
 Title: _____
 Signature: _____
 Date: _____

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

(Seal)
Virginia Registered Professional Engineer
or Certified Land Surveyor

Construction Certification

Firm Name: ECS, Ltd.
 Mailing Address: 108 Ingram Rd., Suite 1
Williamsburg, Va 23188
 Business Phone: (757) 229-4677
 Fax: (757) 229-9970
 Name: Michael J. Galli, P.E.
 Title: Principal Engineer
 Signature: [Signature]
 Date: 2/17/04

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.

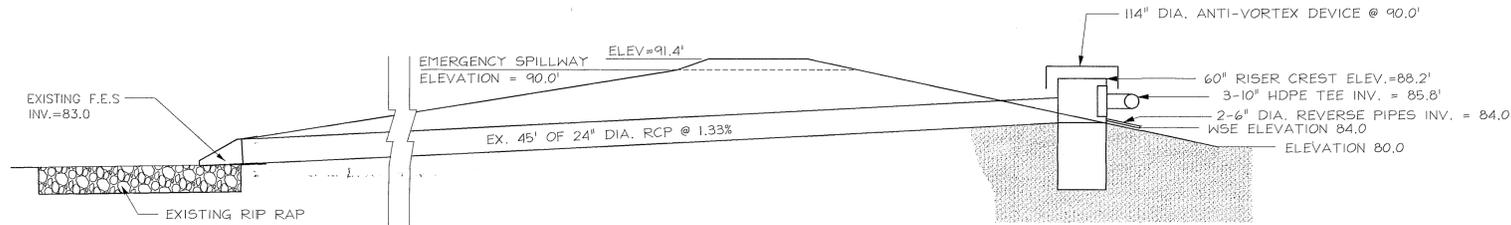
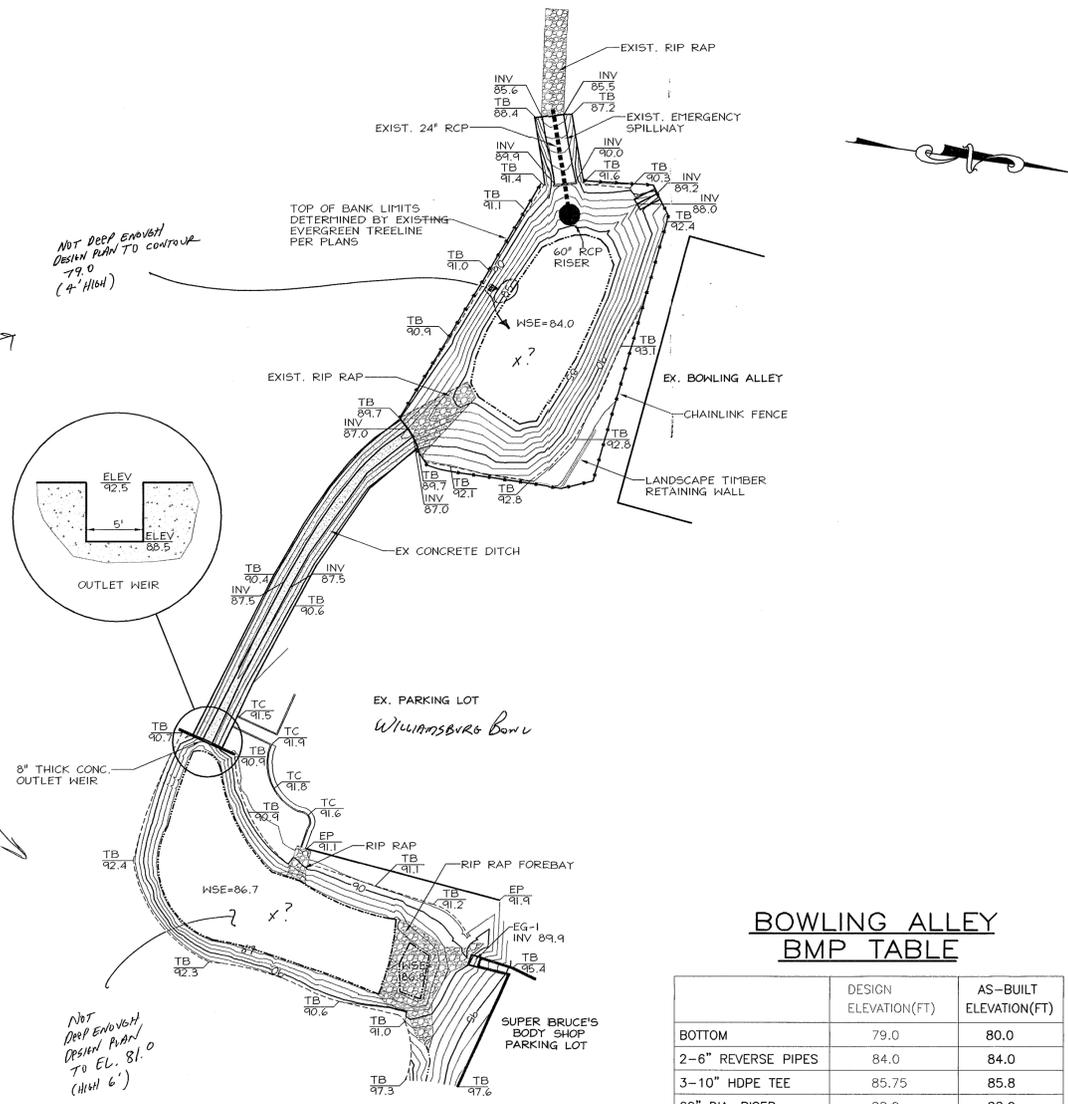
(Seal)
Virginia Registered
Professional Engineer



BRUCE'S SUPER BODY SHOP
SP-72-01, Per 190/PC 1/12

BMP INSPECTION AND MAINTENANCE PLAN

1. Inspect for sediment buildup by visual observation and a physical determination of sediment depth within pond storage areas. If the depth of sediment reaches the Cleanout Elevation of 82.7 feet in the primary pond and/or 80.2 feet in the second pond, removal is required. At the same time, or at least once per year, clean pretreatment devices, the riser bottom and outlet pipes of accumulated sediments. Dispose of sediments removed from the facility at an acceptable disposal area. (Note: Cleanout Elevation corresponds to 10 percent of the Water Quality Volume)
2. Perform maintenance mowing of pond grasses at least twice each year. Grasses such as tall fescue should be mowed in early summer after emergence of the heads on cool season grasses and in late fall to prevent seeds of annual weeds from maturing. Mowing of legumes can be less frequent. Trees, shrubs and woody vegetation are not permitted to grow along or on any part of the embankment that was constructed using engineered (compacted) fills.
3. Perform soil sampling on stabilized pond soil areas at least once every 4 years. Soil sampling and testing should be performed by qualified independent soil testing laboratory such as VPI & SU. Apply additional lime and fertilizer in accordance with test recommendations.
4. In stabilized pond areas, if vegetation covers less than 40% of soil surfaces, lime, fertilize and seed in accordance with recommendations for new seedings. If vegetation covers more than 40% but less than 70% of soil surfaces, lime, fertilize and over seed in accordance with current seeding recommendations or requirements of the Virginia Erosion and Sediment Control Handbook (VESCH).
5. Perform quarterly inspections of the riser section and crest spillway for the observation of collected trash and debris. Immediately remove any trash or debris that prevents the movement of water. Remove any trash and litter downstream and at storm drain or channel inflow locations to maintain the integrity of the structure and provide an attractive appearance.
6. Perform yearly structural inspections of the facility for damage. Structural inspection shall be performed on the concrete riser, anti-vortex device, trash rack, orifices/weirs, outlet barrel and pond embankment. If damage is evident, further investigation by a professional engineer may be required to assess the integrity of the structure.
7. Perform quarterly inspections of the graded side slopes of the facility for signs of animal/rodent borrows or slope erosion. Immediately perform necessary repairs, refilling or reseeding.
8. Perform yearly observations of perimeter area surrounding the facility to ensure changes in land use, topography or access have not occurred and do not affect the operation, maintenance, access or safety features as provided. Appropriate action is required to ensure adequacy and to provide a clear, safe passage for maintenance vehicles to the engineered embankment and principal flow control structures.
9. Inspect and exercise pond drain valves, if provided, on a regular basis.
10. Record Keeping. The owner or designated representative shall keep reasonable, accurate written records of inspections performed for the structure. Records shall document routine maintenance and/or repairs performed. Copies shall be provided to the County upon request.
11. The facility shall not accept additional drainage or be modified in any way without prior consent or approval by the Environmental Division of James City County.



BOWLING ALLEY BMP TABLE

	DESIGN ELEVATION(FT)	AS-BUILT ELEVATION(FT)
BOTTOM	79.0	80.0
2-6" REVERSE PIPES	84.0	84.0
3-10" HDPE TEE	85.75	85.8
60" DIA. RISER	88.0	88.2

BOWLING ALLEY BMP OUTLET STRUCTURES

NTS

RECORD DRAWING PLAN
SCALE 1" = 40'

Bruce's Super Body Shop BMP Record Drawings
Stage-Storage Worksheet Design Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
88.5	7274				0	0.000
		7612	0.50	3806	3806	0.087
89.0	7950				8576	0.284
		8576	1.00	8576	12,382	0.284
90.0	9202					

Bruce's Super Body Shop BMP Record Drawings
Stage-Storage Worksheet Actual Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
88.5	7598				0	0.000
		3921	0.50	3921	3921	0.090
89.0	8087				8658	0.289
		8658	1.00	8658	12,579	0.289
91.0	9229					

Bowling Alley BMP Record Drawings
Stage-Storage Worksheet Design Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
84.0	4689				0	0.000
		5138	1.00	5138	5138	0.118
85.0	5587				11,264	0.259
		6126	1.00	6126	18,488	0.424
86.0	6665				26,823	0.616
		7224	1.00	7224	36,360	0.835
87.0	7782				46,960	1.078
		8335	1.00	8335	58,718	1.348
88.0	8887					
		9537	1.00	9537		
89.0	10,187					
		10,600	1.00	10,600		
90.0	11,013					
		11,758	1.00	11,758		
91.0	12,503					

Bowling Alley BMP Record Drawings
Stage-Storage Worksheet Actual Design Volumes

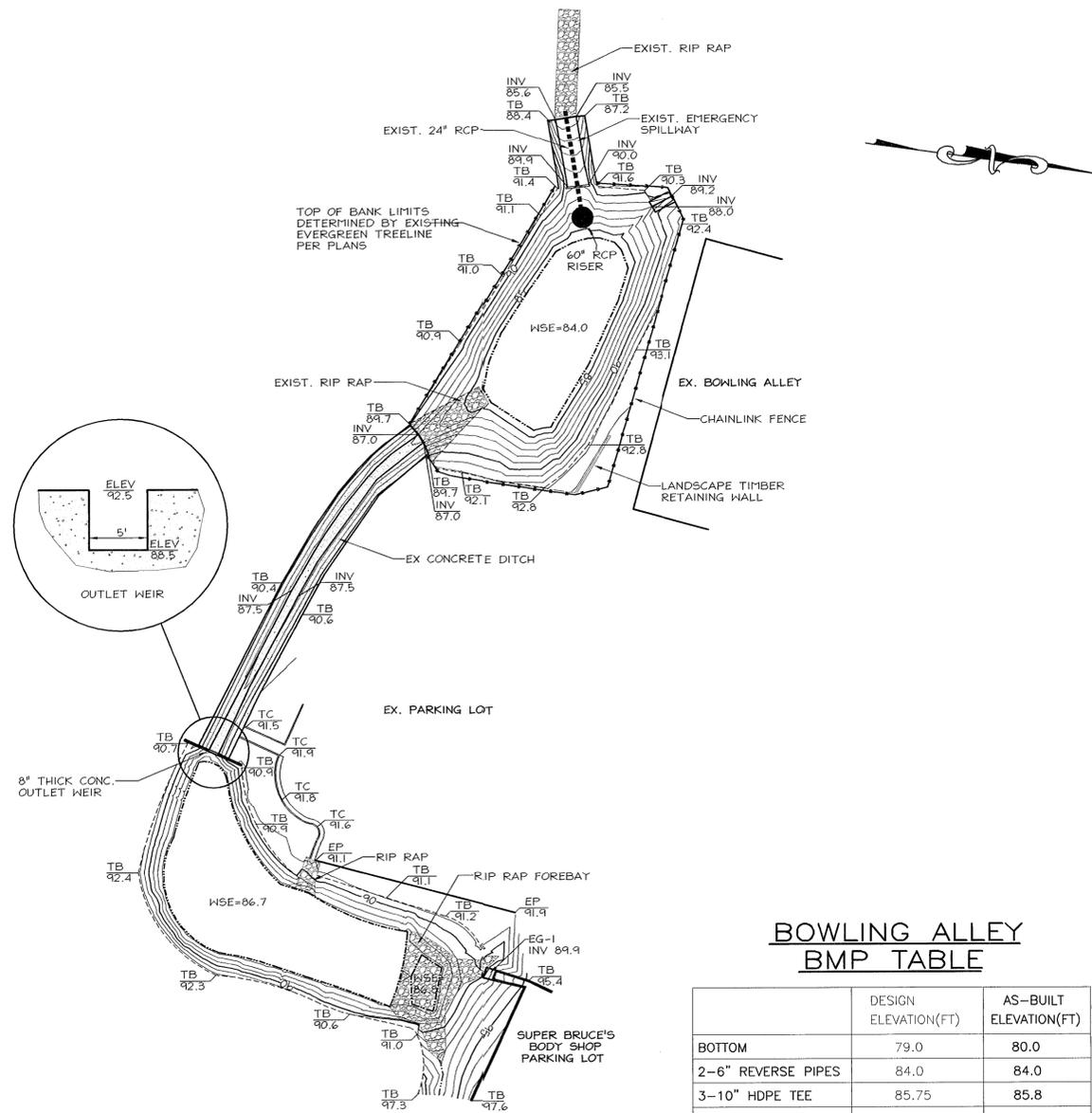
Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
84.0	3464				0	0.000
		3741	1.00	3741	3741	0.086
85.0	4017				8246	0.189
		4505	1.00	4505	13,686	0.314
86.0	4992				19,974	0.459
		5440	1.00	5440	27,142	0.623
87.0	5887					
		6288	1.00	6288		
88.0	6689					
		7168	1.00	7168		
89.0	7646					
		8186	1.00	8186		
90.0	8725					
		9191	1.00	9191		
91.0	9657					

SCALE: 1" = 40' DATE: 8/20/03 JOB: 02-017 DRAWN BY: KMJ SHEET: 1 OF 1	LandTech Resources, Inc. Surveying • Engineering • GPS 5810-F Maoretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 web: landtechresources.com	BRUCE'S SUPER BODY SHOP TWO WET PONDS BMP RECORD DRAWING PLAN County Plan Number - BMP ID Code: James City County, Virginia	<table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>REVISION / COMMENT / NOTE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	NO.	DATE	REVISION / COMMENT / NOTE															
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SJT Field Copy

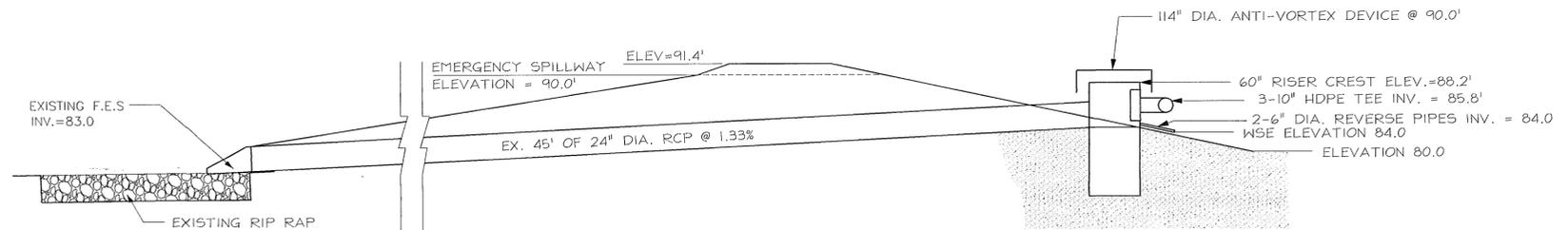
BMP INSPECTION AND MAINTENANCE PLAN

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3. Perform soil sampling on stabilized pond soil areas at least once every 4 years. Soil sampling and testing should be performed by qualified independent soil testing laboratory such as VPI & SU. Apply additional lime and fertilizer in accordance with test recommendations.
4. In stabilized pond areas, if vegetation covers less than 40% of soil surfaces, lime, fertilize and seed in accordance with recommendations for new seedings. If vegetation covers more than 40% but less than 70% of soil surfaces, lime, fertilize and over seed in accordance with current seeding recommendations or requirements of the Virginia Erosion and Sediment Control Handbook (VESCH).
5. Perform quarterly inspections of the riser section and crest spillway for the observance of collected trash and debris. Immediately remove any trash or debris that prevents the movement of water. Remove any trash and litter downstream and at storm drain or channel inflow locations to maintain the integrity of the structure and provide an attractive appearance.
6. Perform yearly structural inspections of the facility for damage. Structural inspection shall be performed on the concrete riser, anti-vortex device, trash rack, orifices/weirs, outlet barrel and pond embankment. If damage is evident, further investigation by a professional engineer may be required to assess the integrity of the structure.
7. Perform quarterly inspections of the graded side slopes of the facility for signs of animal/rodent borrows or slope erosion. Immediately perform necessary repairs, refilling or reseeding.
8. Perform yearly observations of perimeter area surrounding the facility to ensure changes in land use, topography or access have not occurred and do not affect the operation, maintenance, access or safety features as provided. Appropriate action is required to ensure adequacy and to provide a clear, safe passage for maintenance vehicles to the engineered embankment and principal flow control structures.
9. Inspect and exercise pond drain valves, if provided, on a regular basis.
10. Record Keeping. The owner or designated representative shall keep reasonable, accurate written records of inspections performed for the structure. Records shall document routine maintenance and/or repairs performed. Copies shall be provided to the County upon request.
11. The facility shall not accept additional drainage or be modified in any way without prior consent or approval by the Environmental Division of James City County.



**BOWLING ALLEY
BMP TABLE**

	DESIGN ELEVATION(FT)	AS-BUILT ELEVATION(FT)
BOTTOM	79.0	80.0
2-6" REVERSE PIPES	84.0	84.0
3-10" HDPE TEE	85.75	85.8
60" DIA. RISER	88.0	88.2



**BOWLING ALLEY
BMP OUTLET STRUCTURES**

NTS

RECORD DRAWING PLAN

SCALE 1" = 40'

APPROVED
James City County
Environmental Division
By: *[Signature]*
Date: 08/20/03

Bruce's Super Body Shop BMP Record Drawings
Stage-Storage Worksheet Design Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
88.5	7274				0	0.000
89.0	7950	7612	0.50	3806	3806	0.087
90.0	9202	8576	1.00	8576	12,382	0.284

Bruce's Super Body Shop BMP Record Drawings
Stage-Storage Worksheet Actual Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
88.5	7598				0	0.000
89.0	8087	3921	0.50	3921	3921	0.090
91.0	9229	8658	1.00	8658	12,579	0.289

Bowling Alley BMP Record Drawings
Stage-Storage Worksheet Design Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
84.0	4689				0	0.000
85.0	5587	5138	1.00	5138	5138	0.118
86.0	6665	6126	1.00	6126	11,264	0.259
87.0	7782	7224	1.00	7224	18,488	0.424
88.0	8887	8335	1.00	8335	26,823	0.616
89.0	10,187	9537	1.00	9537	36,360	0.835
90.0	11,013	10,600	1.00	10,600	46,960	1.078
91.0	12,503	11,758	1.00	11,758	58,718	1.348

Bowling Alley BMP Record Drawings
Stage-Storage Worksheet Actual Design Volumes

Elevation	Area (sf)	Average Area (sf)	Contour Interval (ft)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (ac-ft)
84.0	3464				0	0.000
85.0	4017	3741	1.00	3741	3741	0.086
86.0	4992	4505	1.00	4505	8246	0.189
87.0	5887	5440	1.00	5440	13,686	0.314
88.0	6689	6288	1.00	6288	19,974	0.459
89.0	7646	7168	1.00	7168	27,142	0.623
90.0	8725	8186	1.00	8186	35,328	0.811
91.0	9657	9191	1.00	9191	44,519	1.022

RECORD DRAWING CERTIFICATION

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

ADVANCE COPY
FOR COUNTY REVIEW

Virginia Registered Professional Engineer
or Certified Land Surveyor

SCALE: 1" = 40'
DATE: 8/20/03
JOB: 02-017
DRAWN BY: KMJ
SHEET: 1 OF 1

ADVANCE COPY
FOR COUNTY REVIEW

LandTech
Resources, Inc.
Surveying • Engineering • GPS

5810-F Mooretown Road, Williamsburg, VA 23188
Phone: (757) 565-1677 Fax: (757) 565-0782
web: landtechresources.com

BRUCE'S SUPER BODY SHOP
TWO WET PONDS
BMP RECORD DRAWING PLAN

County Plan Number - BMP ID Code:

James City County, Virginia

NO.	DATE	REVISION / COMMENT / NOTE

HENDERSON

INCORPORATED
GENERAL CONTRACTORS

5800 MOORETOWN ROAD
WILLIAMSBURG, VA 23188

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



LETTER OF TRANSMITTAL

DATE: 11/6/03

JOB#:

ATTENTION: Scott Thomas

RE: Bruce's Super Body Shop

TO:

James City County
101 Mounts Bay Rd.
Williamsburg, va

We are sending you:

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

Transmitted as checked below:

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

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

Remarks:

Copy To: Jim B, BS, JR, JT-file

Signed

Donna A. Chapman

SP.072.01



SHOPS

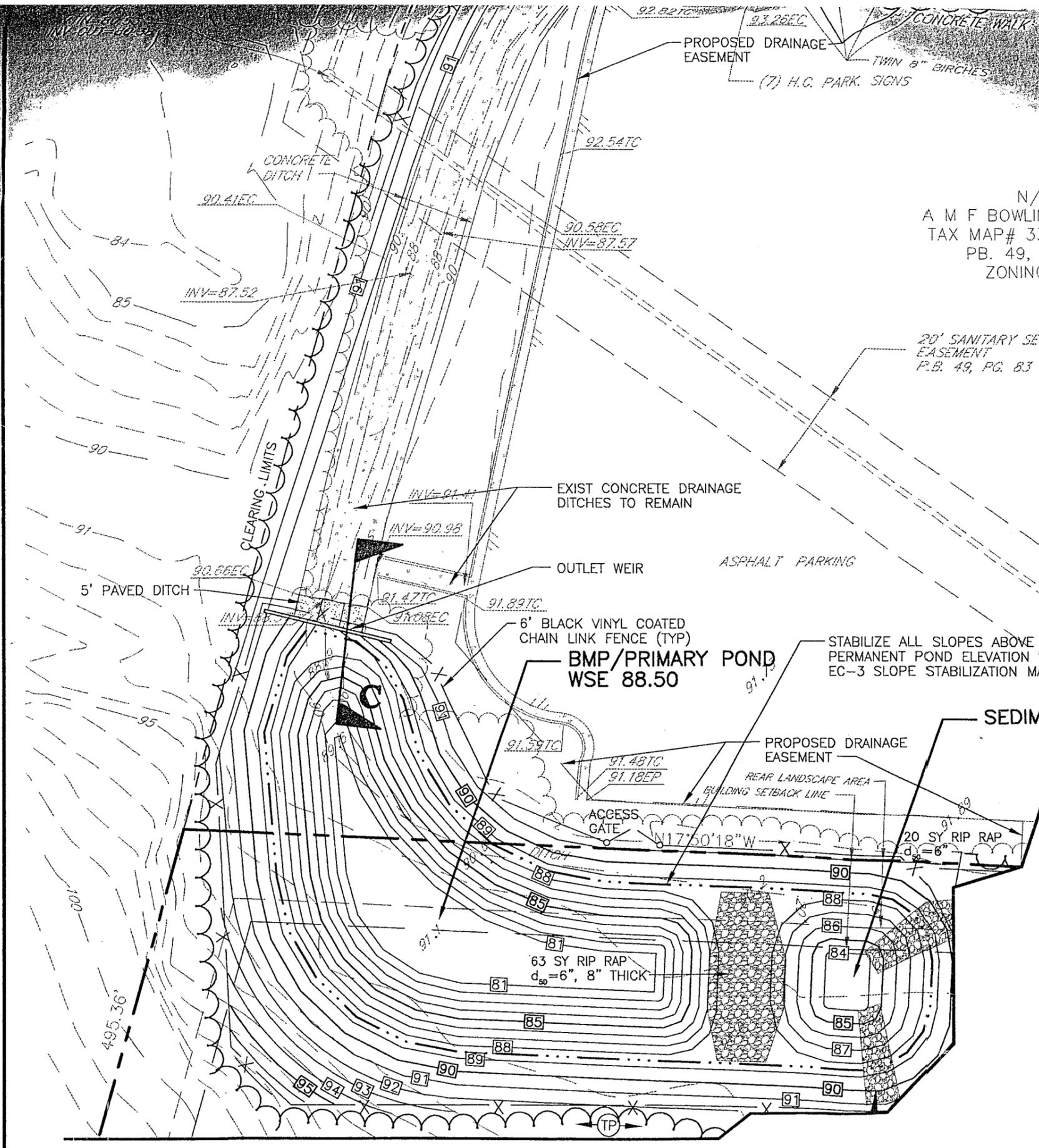
COUNTY OF JAMES CITY
FINAL SITE PLAN

APPROVALS	DATE
Fire Dept.	JD/JS 10-10-01
Health Dept.	CU/JS 7-20-01
VDOT	JWB/JS 12-4-01
Planning	m 3/7/02
Environ.	DEC/JS 12-7-01
Zoning Adm.	m 3/7/02
JCSA	SAG/JS 11-30-01
County Eng.	WNB/JS 8-1-01
REA	MS/JS 7-27-01
Other	LS/JS 2-14-02

LAND USE SUMMARY TABLE

ZONING:	B-1, GENERAL BUSINESS
TAX MAP AND PARCEL:	33-3-01-0-005A
USE:	AUTOMOBILE BODY AND FENDER REPAIR
GROSS SITE AREA:	5.2743 ACRES
PROJECT LIMITS:	2.71 ACRES (PART OF PARCEL SUBJECT TO SUP)
IMPERVIOUS AREA:	1.80 ACRES (34% OF GROSS SITE AREA)
	(67% OF CURRENT PROJECT LIMITS)
DISTURBED AREA:	3.17± ACRES
BUILDING SQUARE FOOTAGE:	
BODY SHOP:	13,020
PAINT SHOP:	6,751
ADMINISTRATION:	3,755
NET FLOOR AREA:	23,526 SQ.FT.
PAINT STORAGE:	800
TOTAL:	24,326 SQ.FT.
ACCESSORY STRUCTURE:	231 SQ.FT.
PERCENT OF PROJECT LIMITS COVERED BY BUILDINGS:	21%
MIN. LOT AREA:	NONE
MIN. LOT WIDTH:	NONE
MIN. FRONT YARD:	50 FEET
MIN. SIDE/REAR YARD:	20 FEET (10 FEET FOR ACCESSORY STRUCTURES)
MAX. BUILDING HEIGHT:	60 FEET
PROPOSED BUILDING HEIGHT:	41 FEET
MAX. BUILDING COVERAGE:	25% OF TOTAL LOT AREA
NUMBER OF FLOORS:	1 FLOOR
CLASSIFICATION USE GROUP:	B AND S1
CONSTRUCTION TYPE:	2C, FULLY SPRINKLERED
LANDSCAPED OPEN SPACE REQUIRED:	.85 ACRES± (30%)
LANDSCAPED OPEN SPACE PROVIDED:	.87 ACRES± (32%)
MIN. SIDE/REAR LANDSCAPED YARD:	15 FEET
PARKING REQUIRED:	95 SPACES (1 SPACE / 250 S.F. NET FLOOR AREA)
PARKING PROVIDED:	97 SPACES
DISABLED SPACES REQUIRED:	4 SPACES
DISABLED SPACES PROVIDED:	4 SPACES
R/W LANDSCAPE AREA REQUIRED:	6,000 SQ.FT. (30' X 200' LOT FRONTAGE)
R/W LANDSCAPE AREA PROVIDED:	MIN. 20 FEET: AVERAGE 38 FEET PLUS 35-FOOT CONSTRUCTION ZONE SETBACK FOR PRINCIPAL STRUCTURE

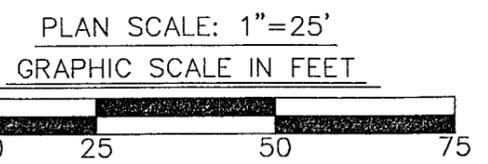
RESPONSIBLE LAND DISTURBER: STEPHEN ROMEO OR MARK RINALDI, LANDMARK DESIGN GROUP OR ALTERNATELY THE CONTRACTOR WILL PROVIDE A RESPONSIBLE



N/F
 A M F BOWLING CENTERS
 TAX MAP# 3330100005B
 PB. 49, PG. 83
 ZONING: B1

20' SANITARY SEWER
 EASEMENT
 P.B. 49, PG. 83

**MATCHLINE
 SEE SHEET C-4**



Bruce's Super Body Shops Storm Water Management Narrative:

The site of the proposed Bruce's Super Body Shops is near the intersection of Richmond R. Towne Road and lies within a sub watershed at the head of Chisel Run Creek in James City. Stormwater from this site currently drains into a detention pond on adjacent bowling alley property. Review of the boundaries and topography reveals no alternative flow path for drainage from this site. Any stormwater management improvements have to outlet through a system which was designed and constructed 15 years ago. No water quality issues were addressed or provided for in the original plan. The detention pond is severely over grown, and apparently was not constructed to the full design original plan.

It is the intent of this proposal to provide a facility which will address the water quality issues for Bruce's site and the future development of its residual land, but to upgrade the facilities to accommodate drainage from the adjacent properties within the watershed, consistent with the requirements of James City County.

The James City County BMP Point System for evaluating water quality BMP's leads to the following 6 point structural BMP.

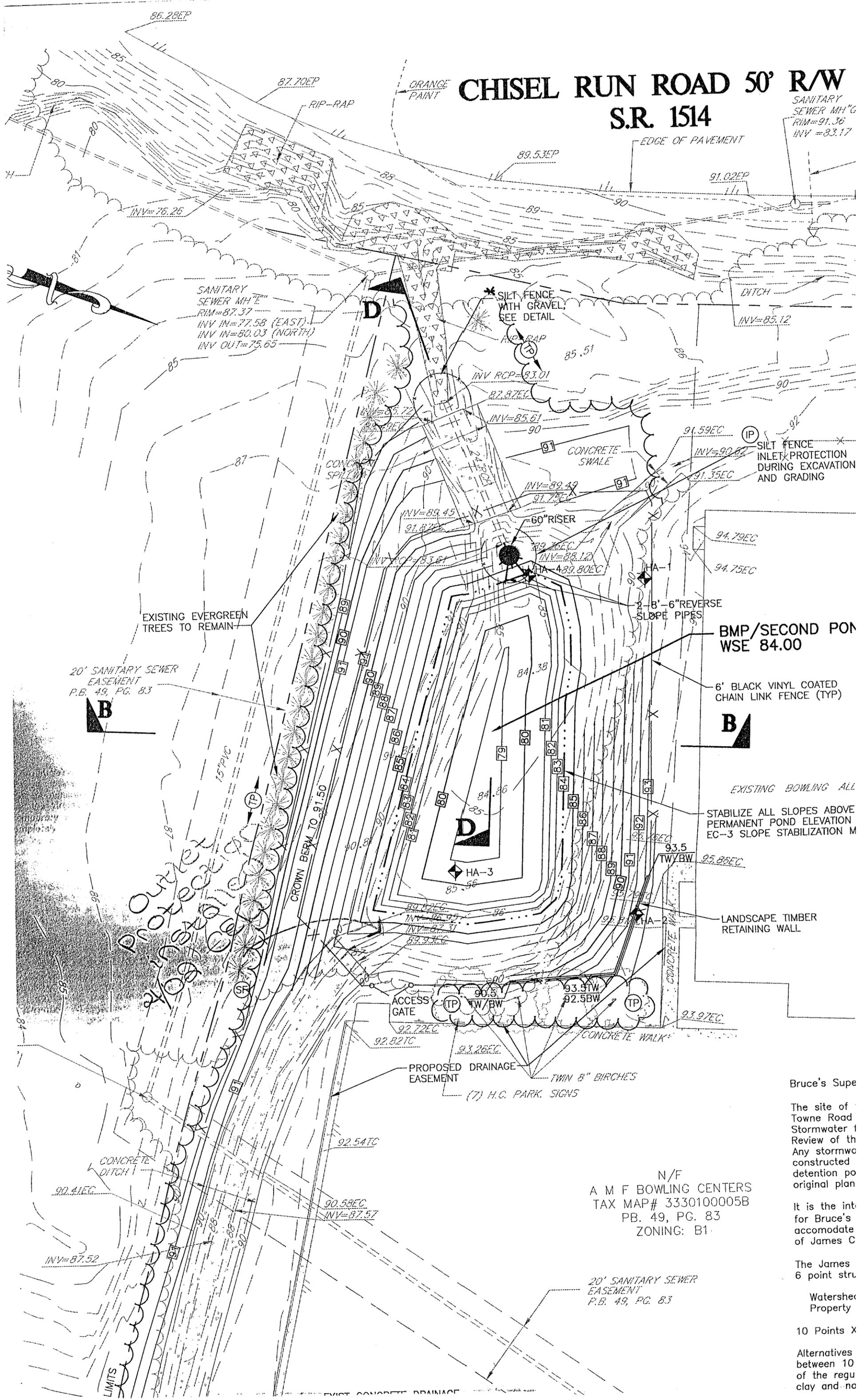
Watershed Area = 11.67 Acres
 Property Area = 5.8 Acres

10 Points X 5.8 Acres/11.67 Acres = 4.97 Points Required

Alternatives presented in the Physical Feasibility Matrix offer no specific guidance for a watershed between 10 and 25 Acres. Lacking specific guidelines, alternatives that would meet the spirit of the regulations were evaluated. Soils within the potential construction area were found to be clay and not suitable for a system incorporating infiltration. They are, however, suitable for a liner or the construction of a wet pond. Treatment volume requirements weighed against the cost and vertical constraints have ruled out the development of wetland systems. A system based on Group A "Small Wet Pond" design can meet the purpose and intent of the regulations. The pond is necessary to meet attenuation and quality volume requirements. The upper pond sediment forebay has a total volume of 26,513 cubic feet of permanent pool storage which meets requirements for all of the impervious area (1.33 acres existing and 0.6 X 5.8 = 3.48 acres and future) which lies above it. The lower pond when reconstructed provides a permanent pool of 14,732 cubic feet which satisfies the requirement for the 2.6 acres of impervious area added by the bowling alley property. Flow from the entire 11.67 acre watershed is attenuated and channel protection by the lower pond.

CHISEL RUN ROAD 50' R/W S.R. 1514

SANITARY SEWER MH "G"
RIM=91.36
INV=83.17



SANITARY SEWER MH "E"
RIM=87.37
INV IN=77.58 (EAST)
INV IN=80.03 (NORTH)
INV OUT=75.65

* SILT FENCE WITH GRAVEL, SEE DETAIL

DITCH
INV=85.12

* SILT FENCE INLET PROTECTION DURING EXCAVATION AND GRADING

EXISTING EVERGREEN TREES TO REMAIN

20' SANITARY SEWER EASEMENT
P.B. 49, PG. 83

BMP/SECOND POND WSE 84.00

6' BLACK VINYL COATED CHAIN LINK FENCE (TYP)

EXISTING BOWLING ALL

STABILIZE ALL SLOPES ABOVE PERMANENT POND ELEVATION
EC-3 SLOPE STABILIZATION M

LANDSCAPE TIMBER RETAINING WALL

ACCESS GATE

PROPOSED DRAINAGE EASEMENT

TWIN 8" BIRCHES

(7) H.C. PARK. SIGNS

N/F
A M F BOWLING CENTERS
TAX MAP# 3330100005B
PB. 49, PG. 83
ZONING: B1

20' SANITARY SEWER EASEMENT
P.B. 49, PG. 83

Bruce's Super

The site of Towne Road Stormwater 1 Review of the Any stormwater constructed detention pond original plan

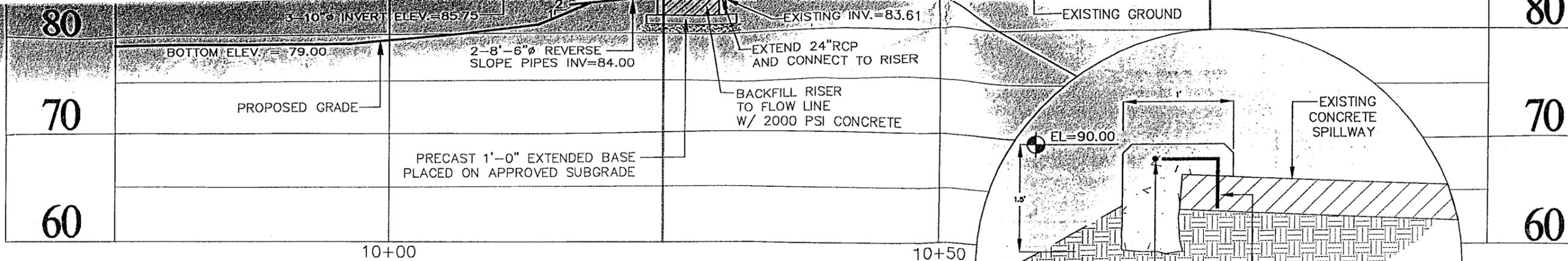
It is the intent for Bruce's accommodate of James C

The James 6 point structure

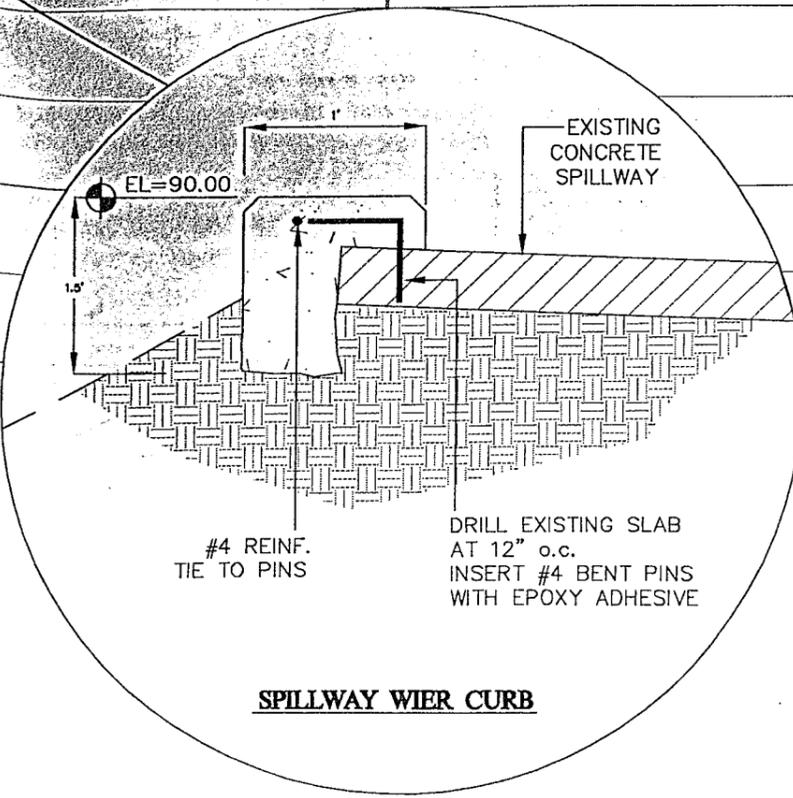
Watershed Property

10 Points X

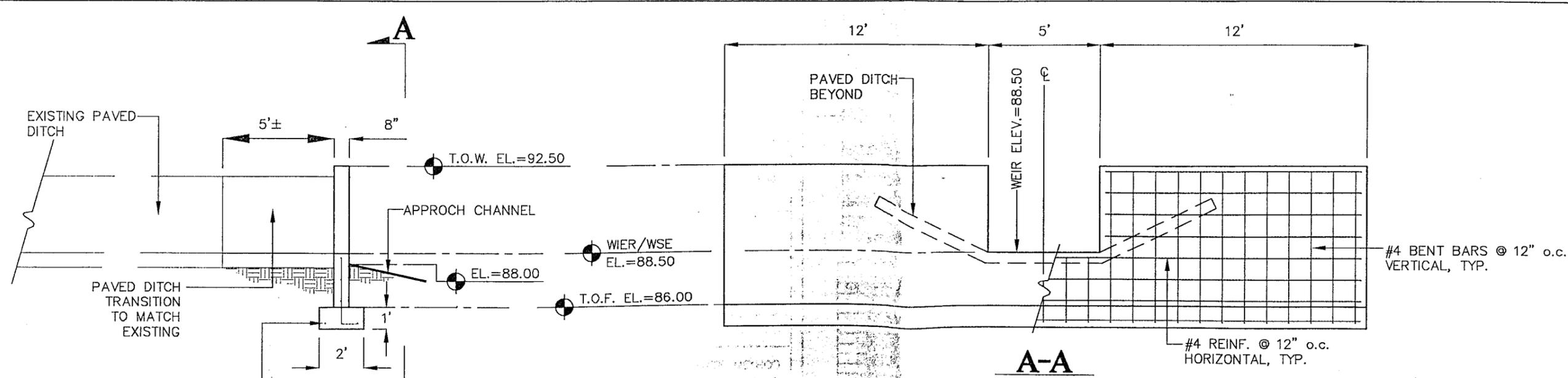
Alternatives between 10 of the regulated clay and no



BMP / RISER SECTION D-D
SCALE: 1"=10' HOR./VERT.



SPILLWAY WIER CURB



PRIMARY POND OUTLET WEIR SECTION C

SCALE: 1"=5'

PRIMARY POND WATER SURFACE ELEVATIONS

1 YR WSE	=	89.39
2 YR WSE	=	89.57
10 YR WSE	=	90.09
25 YR WSE	=	90.26
100 YR WSE	=	90.47

DRAWING STATUS	
Interface Review	
Client for Review	
Pre Approval Bidding	
COUNTY APPROVAL	
07/13/01	1st Submittal
10/08/01	2nd Submittal
	3rd Submittal
	Approved

BMP PLAN AND DETAILS

BRUCE'S SUPER BODY SHOPS

VIRGINIA

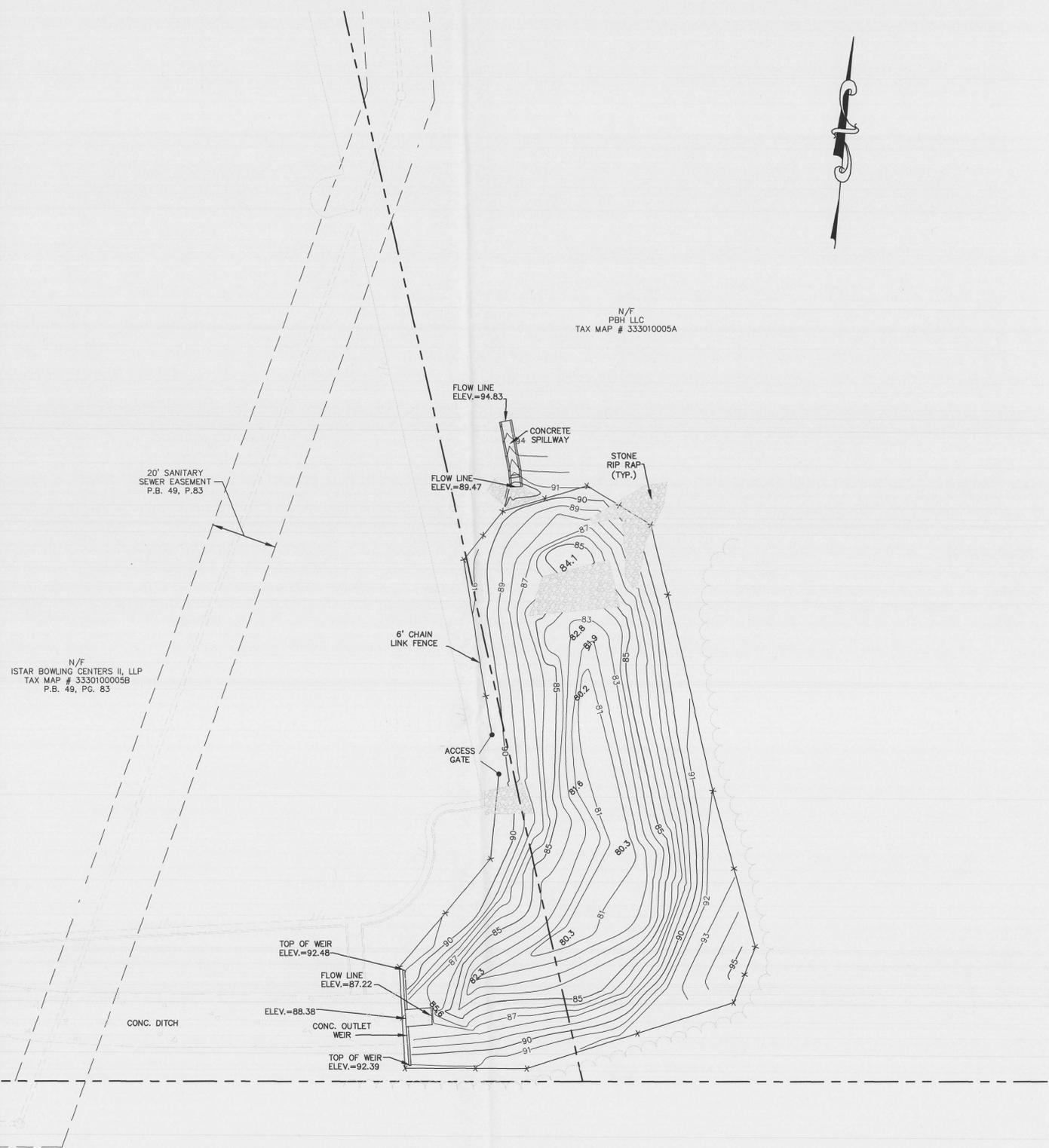
JAMES CITY COUNTY

Designed: RSP	Date: 07/13/01
Checked: RSP	Scale: 1"=25'
File Mgr./Drawn: ADR	CADD File name: BMP-DET.dwg
Project Number: 2000211-000.07	Dwg. File No.: 12530 W

Drawing Number **C-5**
5 OF 11

INSPECTION AND MAINTENANCE

1. INSPECT FOR SEDIMENT BUILDUP BY VISUAL OBSERVATION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN POND STORAGE AREAS. IF THE DEPTH OF SEDIMENT REACHES THE CLEANOUT ELEVATION OF 82.7 FEET IN THE PRIMARY POND AND/OR 80.2 FEET IN THE SECOND POND, REMOVAL IS REQUIRED. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN PRETREATMENT DEVICES, THE RISER BOTTOM AND OUTLET PIPES OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.
 (NOTE: CLEANOUT ELEVATION CORRESPONDS TO 10 PERCENT OF THE WATER QUALITY VOLUME)
2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT. TREES, SHRUBS AND WOODY VEGETATION ARE NOT TO BE PERMITTED TO GROW ALONG OR ANY PART OF THE EMBANKMENT THAT WAS CONSTRUCTED USING ENGINEERED (COMPACTED) FILLS.
3. PERFORM SOIL SAMPLING ON STABILIZED POND SOIL AREAS AT LEAST ONCE EVERY 4 YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY QUALIFIED INDEPENDENT SOIL TESTING LABORATORY SUCH AS VPI & SU. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME, FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME, FERTILIZE AND OVER SEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS OR REQUIREMENTS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).
5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST SPILLWAY FOR THE OBSERVANCE OF COLLECTED TRASH AND DEBRIS. IMMEDIATELY REMOVE ANY TRASH OR DEBRIS THAT PREVENTS THE MOVEMENT OF WATER. REMOVE ANY TRASH AND LITTER DOWNSTREAM AND AT THE STORM DRAIN OR CHANNEL INFLOW LOCATIONS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICES/WEIRS, OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING.
8. PERFORM YEARLY OBSERVATIONS OF PERIMETER AREAS SURROUNDING THE FACILITY TO ENSURE CHANGES IN LAND USE, TOPOGRAPHY OR ACCESS HAVE NOT OCCURRED AND DO NOT AFFECT THE OPERATION, MAINTENANCE, ACCESS OR SAFETY FEATURES AS PROVIDED. APPROPRIATE ACTION IS REQUIRED TO ENSURE ADEQUACY AND TO PROVIDE A CLEAR, SAFE PASSAGE FOR MAINTENANCE VEHICLES TO THE ENGINEERED EMBANKMENT AND PRINCIPAL FLOW CONTROL STRUCTURES.
9. INSPECT AND EXERCISE POND DRAIN VALVES, IF PROVIDED, ON A REGULAR BASIS.
10. RECORD KEEPING: THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
11. THE FACILITY SHALL NOT ACCEPT ADDITIONAL DRAINAGE OR BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT OR APPROVAL BY THE ENVIRONMENTAL DIVISION OF JAMES CITY COUNTY.

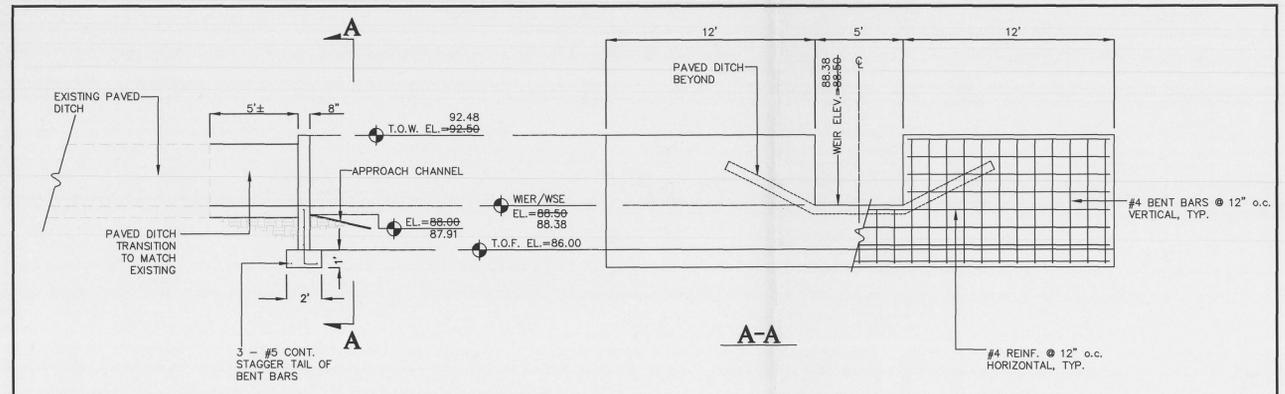
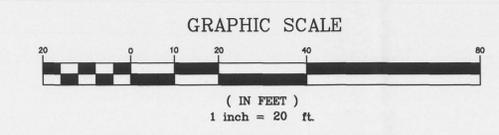


N/F
 ISTAR BOWLING CENTERS II, LLP
 TAX MAP # 333010005B
 P.B. 49, PG. 83

N/F
 PBH LLC
 TAX MAP # 333010005A

PRIMARY POND WATER SURFACE ELEVATIONS

1 YR WSE	= 89.39
2 YR WSE	= 89.57
10 YR WSE	= 90.09
25 YR WSE	= 90.26
100 YR WSE	= 90.47



PRIMARY POND OUTLET WEIR SECTION C
 SCALE: 1"=5'

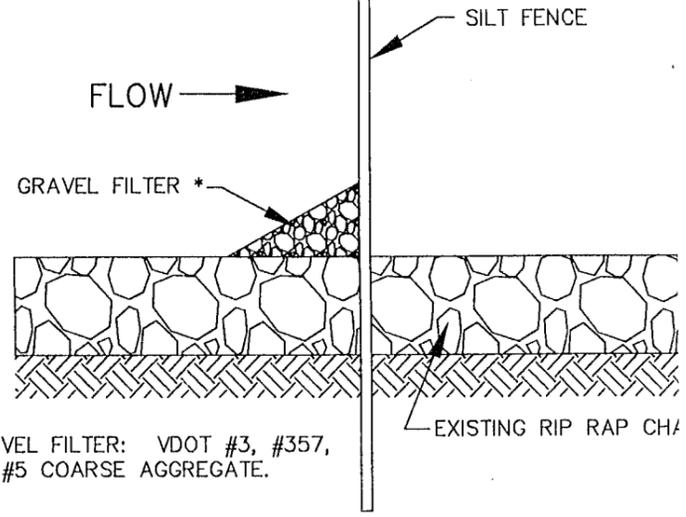
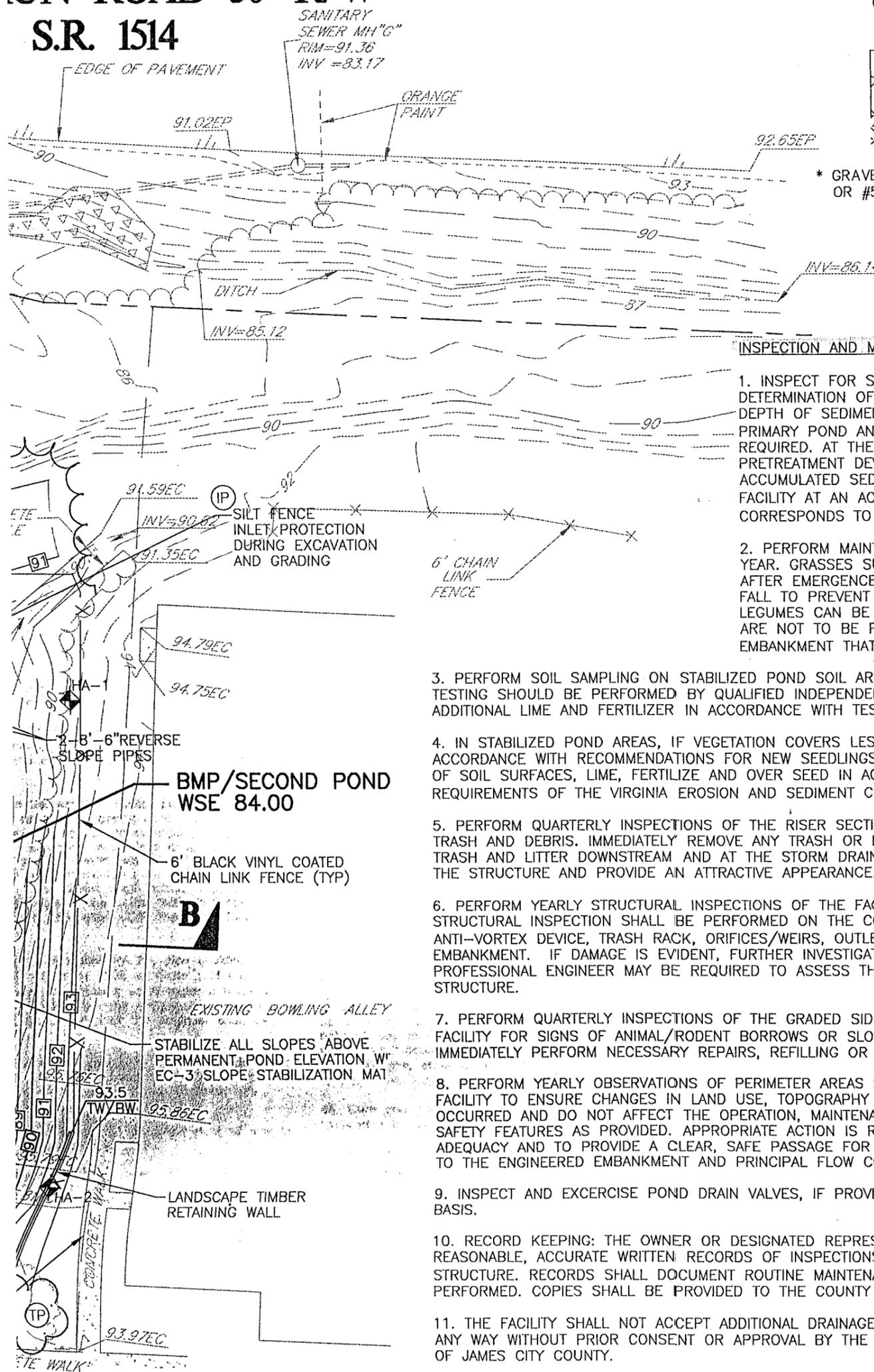
BMP RECORD DRAWING

BRUCE'S SUPER BODY SHOPS

JAMES CITY COUNTY VIRGINIA

Designed: LMDG	Date: 06/23/05
Checked: PF	Scale: AS-SHOWN
File Mgr./Drawn: AST	CADD File name: POND-TOPO
Project Number: 2000211-100.01	Dwg. File No.: 16156W
Drawing Number:	

UN ROAD 50' R/W
S.R. 1514



* GRAVEL FILTER: VDOT #3, #357, OR #5 COARSE AGGREGATE.

*** TEMPORARY OUTLET SILT FENCE SIMILAR TO STANDARD SILT FENCE INLET PROTECTION**
N.T.S.

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9. INSPECT AND EXERCISE POND DRAIN VALVES, IF PROVIDED, ON A REGULAR BASIS.
10. RECORD KEEPING: THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
11. THE FACILITY SHALL NOT ACCEPT ADDITIONAL DRAINAGE OR BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT OR APPROVAL BY THE ENVIRONMENTAL DIVISION OF JAMES CITY COUNTY.

	EL.85.75
100	
90	TOP OF RISER E
80	PERMANENT POOL
	BOTTOM E
70	
60	

Bruce's Super Body Shops Storm Water Management Narrative:

The site of the proposed Bruce's Super Body Shops is near the intersection of Richmond Road and Old Towne Road and lies within a sub watershed at the head of Chisel Run Creek in James City County. Stormwater from this site currently drains into a detention pond on adjacent bowling alley property. Review of the boundaries and topography reveals no alternative flow path for drainage from this site. Any stormwater management improvements have to outlet through a system which was designed and constructed 15 years ago. No water quality issues were addressed or provided for in the system. The detention pond is severely over grown and apparently was not constructed to the full dimensions of the original plan.

It is the intent of this proposal to provide a facility which will address the water quality issues not only for Bruce's site and the future development of its residual land, but to upgrade the facilities to accommodate drainage from the adjacent properties within the watershed, consistent with the requirements of James City County.

The James City County BMP Point System for evaluating water quality BMP's leads to the selection of a 6 point structural BMP.

Watershed Area = 11.67 Acres
Property Area = 5.8 Acres

10 Points X 5.8 Acres/11.67 Acres = 4.97 Points Required

Alternatives presented in the Physical Feasibility Matrix offer no specific guidance for a watershed between 10 and 25 Acres. Lacking specific guidelines, alternatives that would meet the spirit and intent of the regulations were evaluated. Soils within the potential construction area were found to be high in clay and not suitable for a system incorporating infiltration. They are, however, suitable for a pond liner or the construction of a wet pond. Treatment volume requirements weighed against the horizontal

N/F
F BOWLING CENTERS
MAP# 3330100005B
PB. 49, PG. 83
ZONING: B1

SANITARY SEWER
INLET
PG. 83



THE PURPOSE OF THE EROSION MEASURES SHOWN ON THESE PLANS SHALL BE TO PRECLUDE THE TRANSPORT OF ALL WATERBORNE SEDIMENTS RESULTING FROM CONSTRUCTION ACTIVITIES FROM ENTERING ONTO ADJACENT PROPERTIES OR STATE WATERS. IF FIELD INSPECTION REVEALS THE INADEQUACY OF THE PLAN TO CONFINE SEDIMENT TO THE PROJECT SITE, ALL APPROPRIATE MODIFICATIONS WILL BE MADE TO CORRECT ANY PLAN DEFICIENCIES. IN ADDITION TO THESE NOTES, ALL PROVISIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS SHALL APPLY TO THIS PROJECT.

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, 3RD EDITION, 1992. THE CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH ALL APPLICABLE MEASURES CONTAINED THEREIN THAT MAY BE PERTINENT TO THIS PROJECT, INCLUDING MINIMUM STANDARDS 1 THROUGH 19. IF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS FOUND TO BE INADEQUATE IN THE FIELD, THE MINIMUM STANDARDS WILL APPLY IN ADDITION TO THE PROVISIONS OF THE APPROVED PLAN.

2. AS A PERQUISITE TO APPROVAL OF AN EROSION AND SEDIMENT CONTROL PLAN FOR LAND-DISTURBING ACTIVITIES, THE NAME OF A RESPONSIBLE LAND-DISTURBER SHALL BE PROVIDED. THE RESPONSIBLE LAND-DISTURBER SHALL BE AN INDIVIDUAL WHO HOLDS A VALID CERTIFICATE OF COMPETENCE ISSUED BY THE VIRGINIA DEPARTMENT OF CONSERVATION AND IS DEFINED AS THE PERSON IN CHARGE OF AND RESPONSIBLE FOR CARRYING OUT THE LAND-DISTURBING ACTIVITY. PERMITS OR PLANS WITHOUT THIS INFORMATION ARE DEEMED INCOMPLETE AND WILL NOT BE APPROVED UNTIL PROPER NOTIFICATION IS RECEIVED. ALSO, IF THE PERSON DESIGNATED AS RESPONSIBLE LAND-DISTURBER CHANGES BETWEEN THE TIME OF PLAN APPROVAL AND THE SCHEDULED PRECONSTRUCTION MEETING, THE ENVIRONMENTAL DIVISION SHALL BE INFORMED OF THE CHANGE, IN WRITING, 24-HOURS IN ADVANCE OF THE PRECONSTRUCTION MEETING.

3. A PRECONSTRUCTION MEETING SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE DEVELOPER, THE PROJECT ENGINEER, THE RESPONSIBLE LAND-DISTURBER AND THE CONTRACTOR PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT. THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF CONSTRUCTION TO THE COUNTY FOR APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING. THE DESIGNATED RESPONSIBLE LAND-DISTURBER IS REQUIRED TO ATTEND THE PRECONSTRUCTION MEETING FOR THE PROJECT.

4. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED BY A TEMPORARY CONSTRUCTION ENTRANCE TO PREVENT TRACKING OF MUD ONTO PUBLIC RIGHT-OF-WAYS. AN ENTRANCE PERMIT FROM VDOT IS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN STATE 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 OWNER'S REPRESENTATIVE 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 BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 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.

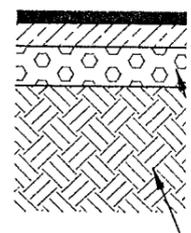
17. PAVED DITCHES SHALL BE REQUIRED WHEREVER ACCELERATED EROSION IS EVIDENT. PARTICULAR ATTENTION SHALL BE PAID TO THOSE AREAS WHERE GRADES EXCEED 3 PERCENT.

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.

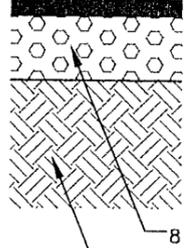
20. RECORD DRAWINGS (AS-BUILTS) AND CONSTRUCTION CERTIFICATIONS ARE BOTH REQUIRED FOR NEWLY CONSTRUCTED OR MODIFIED STORMWATER MANAGEMENT/BMP FACILITIES. CERTIFICATION ACTIVITIES SHALL BE ADEQUATELY COORDINATED AND PERFORMED BEFORE, DURING AND FOLLOWING CONSTRUCTION IN ACCORDANCE WITH THE CURRENT VERSION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



HEAVY P
 N.T.S.

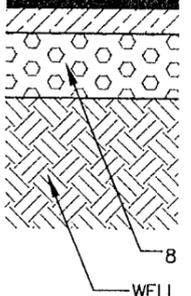
2" BIT. CONC. AS
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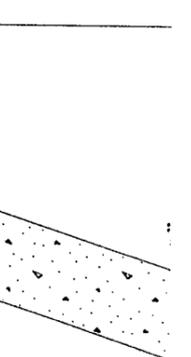
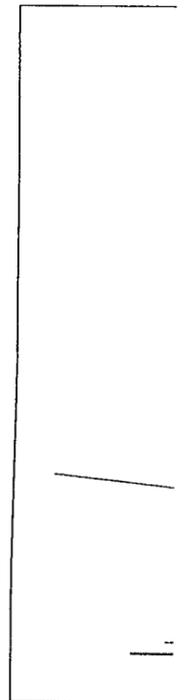
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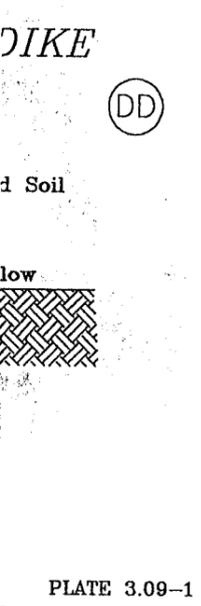


ENTRANCE
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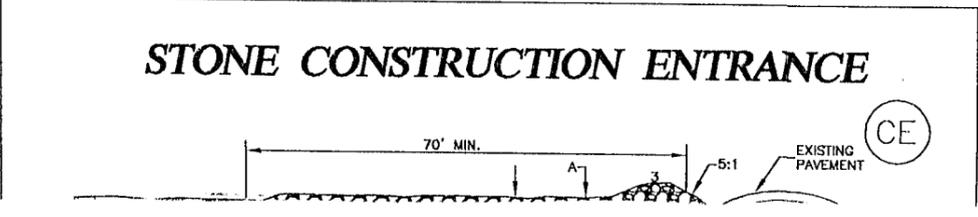
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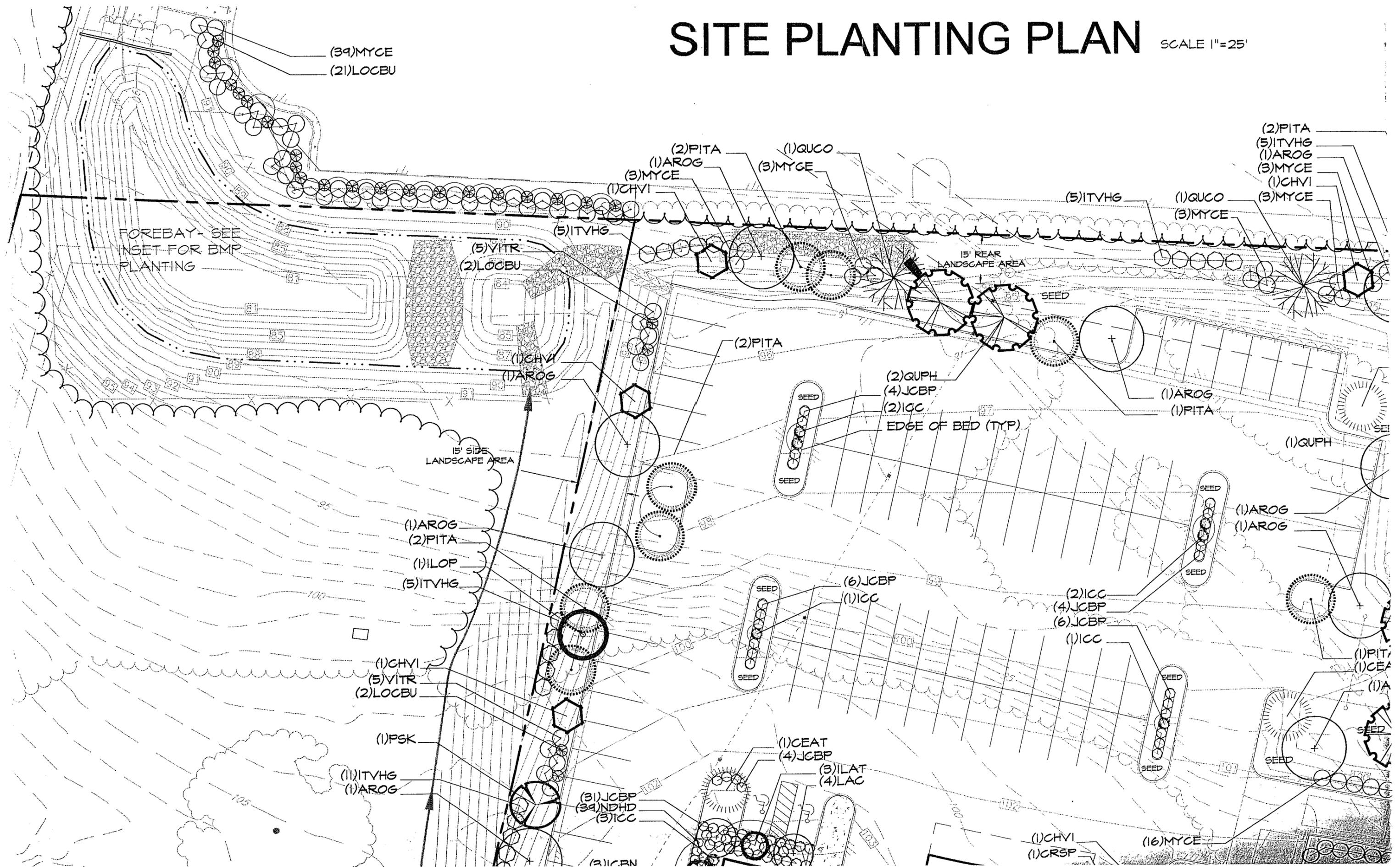
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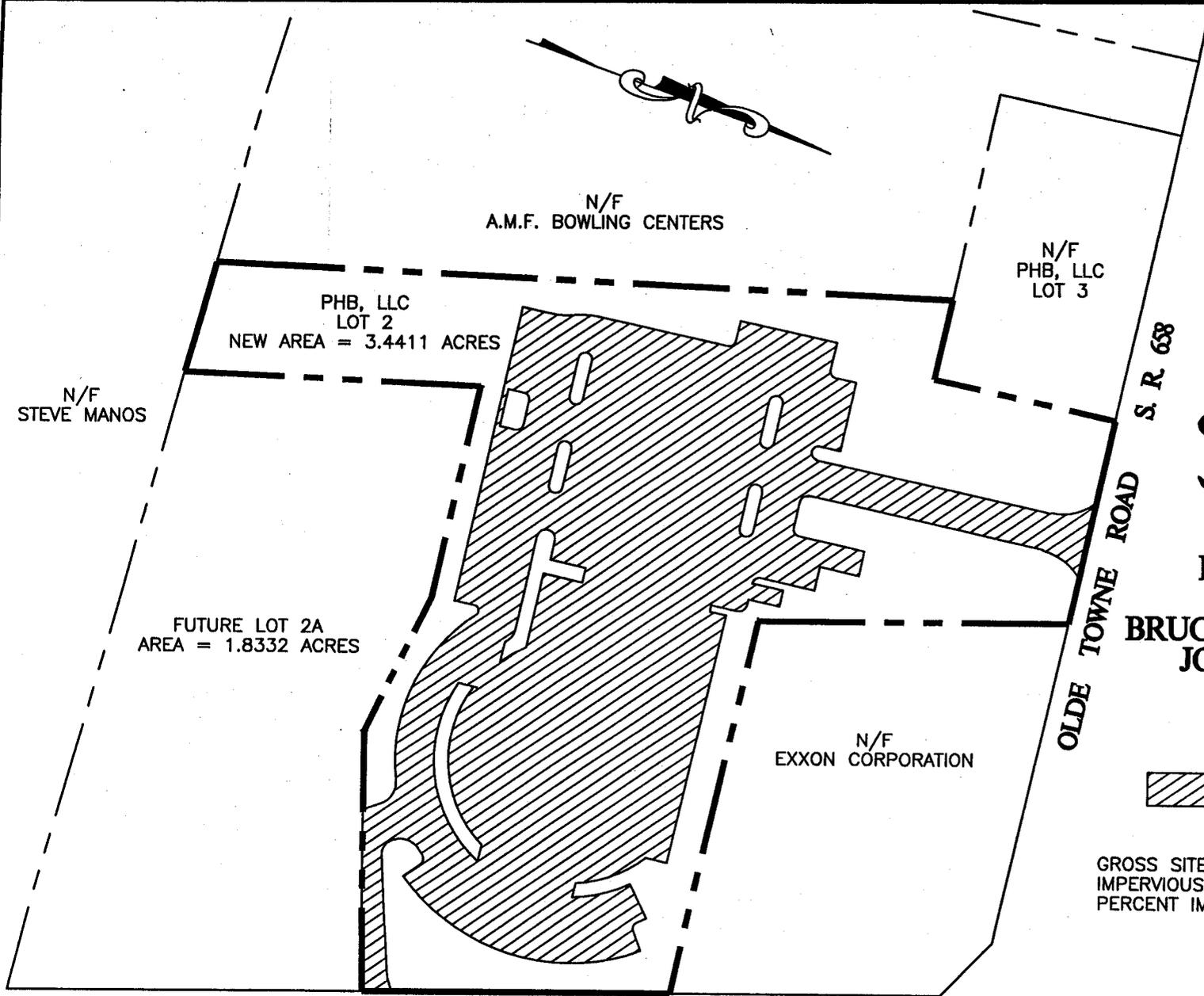


STONE CONSTRUCTION ENTRANCE

SITE PLANTING PLAN

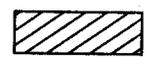
SCALE 1"=25'





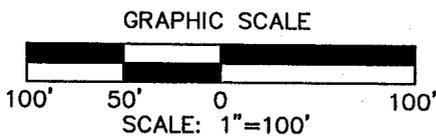
S-031-02

**EXHIBIT SHOWING
IMPERVIOUS COVER
FOR
BRUCE'S SUPER BODY SHOPS
JCC CASE NO. SP-72-01**

 IMPERVIOUS AREA

GROSS SITE AREA (LOT 2):	3.4411 ACRES
IMPERVIOUS AREA:	1.89 ACRES
PERCENT IMPERVIOUS:	55 %

RICHMOND ROAD U. S. ROUTE 60



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

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

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

SIR...
OR...

- 4. THIS PROPERTY IS TO BE SERVED BY PUBLIC WATER AND SEWER.
- 5. ALL NEW UTILITIES SHALL BE PLACED UNDERGROUND.
- 6. THE REFERENCES USED IN THE PREPARATION OF THIS SURVEY ARE:
P.B. 51 PAGE 24
D.B. 413 PAGE 196
D.B. 446 PAGE 59
P.B. 49 PAGE 83
D.B. 413 PAGE 211

7. COORDINATE VALUES SHOWN BASED ON JAMES CITY COUNTY GEODETIC CONTROL MONUMENT STA. NO. 323
N 3642969.652
E 11993484.723

SEE SITE PLAN, J.C.C. CASE NO. SP-72-01, APPROVED 03/07/02.
REFERENCE: SPECIAL USE PERMIT NO. SUP-5-01, APPROVED 5/8/01

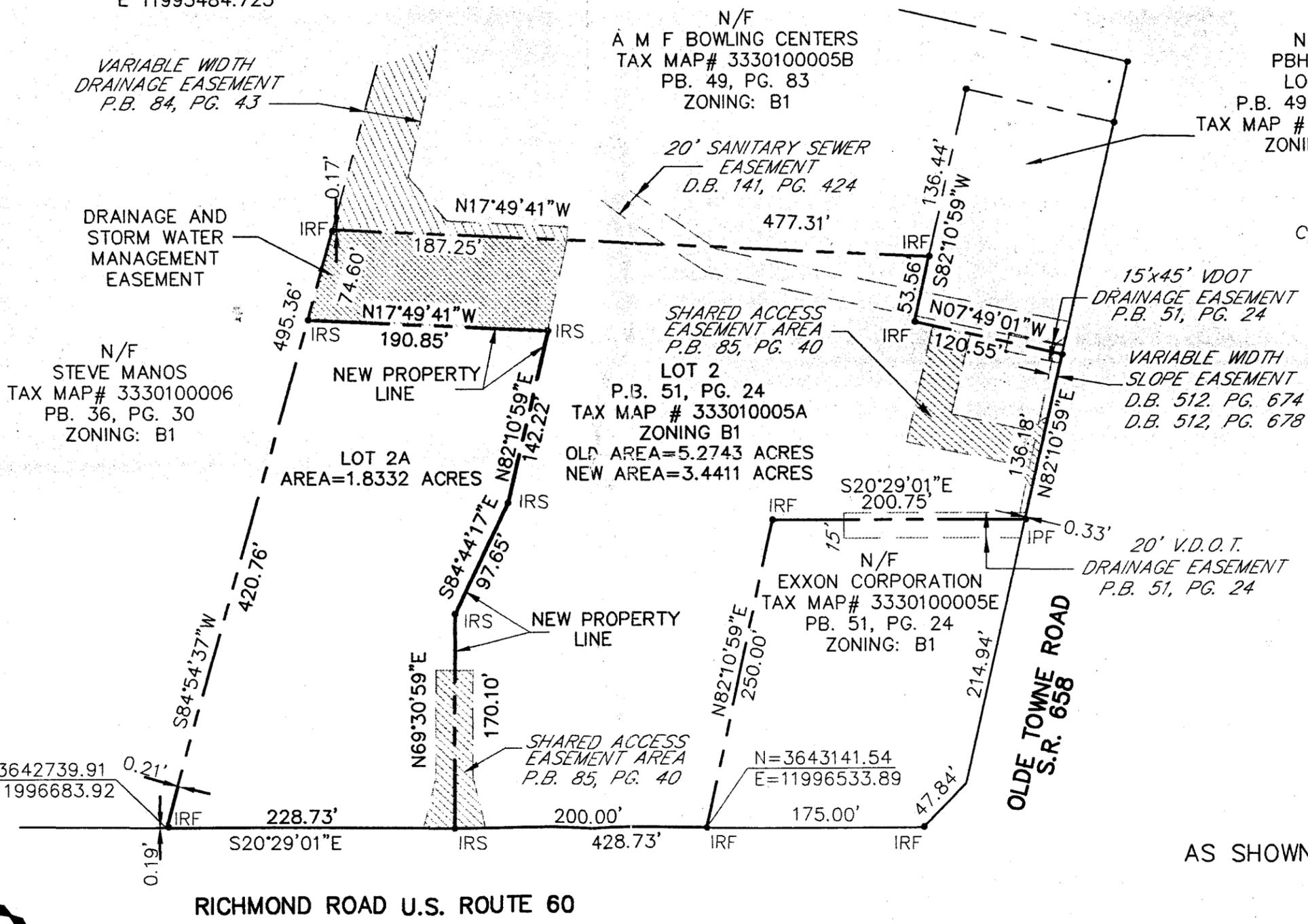
- 12. UNLESS OTHERWISE NOTED, ALL DRAINAGE EASEMENTS DESIGNATED ON THIS PLAT SHALL REMAIN PRIVATE.
- 13. NEW MONUMENTS WILL BE SET IN ACCORDANCE WITH SECTIONS 19-34 THRU 19-36 OF THE JAMES CITY COUNTY SUBDIVISION ORDINANCE.
- 14. SIGNS SHALL COMPLY WITH SECTIONS 24-65 THRU 24-79 OF THE JAMES CITY COUNTY ZONING ORDINANCE.
- 15. THIS PROPERTY CONTAINS NO RESOURCE PROTECTION AREAS, AS DEFINED BY JAMES CITY COUNTY'S CHESAPEAKE BAY PRESERVATION ORDINANCE.
- 16. THIS PROPERTY LIES WITHIN A RESOURCE MANAGEMENT AREA AND IS SUBJECT TO JAMES CITY COUNTY'S CHESAPEAKE BAY PRESERVATION ORDINANCE.

VICINITY

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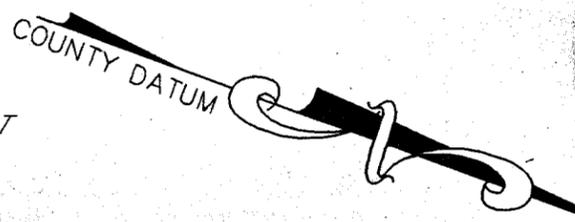
N/F
A M F BOWLING CENTERS
TAX MAP# 3330100005B
PB. 49, PG. 83
ZONING: B1

N/F
PBH LLC
LOT 3
P.B. 49, PG. 83
TAX MAP # 333010005D
ZONING B1

N/F
STEVE MANOS
TAX MAP# 3330100006
PB. 36, PG. 30
ZONING: B1

LOT 2
P.B. 51, PG. 24
TAX MAP # 333010005A
ZONING B1
OLD AREA=5.2743 ACRES
NEW AREA=3.4411 ACRES

N/F
EXXON CORPORATION
TAX MAP# 3330100005E
PB. 51, PG. 24
ZONING: B1



SBI-02

SUBDIVISION OF L
AS SHOWN ON PLAT OF SUBDIVISION O
PROPERTY OF
PBH, LLC

BERKELEY DISTR
JAMES CITY COUNTY,
DATE 03/10/02

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ITY, VIRGINIA



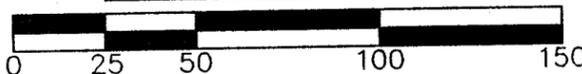
PLAT OF DRAINAGE EASEMENT

TO BE CONVEYED TO
W B B PARTNERS

FROM
A M F BOWLING CENTERS
BERKELEY DISTRICT
JAMES CITY COUNTY, VIRGINIA
SCALE: 1"=50' 07/02/01

COUNTY DATUM

PLAN SCALE: 1"=50'
GRAPHIC SCALE IN FEET



N/F
STEVE MANOS
TAX MAP# 3330100006
PB. 36, PG. 30

STATE OF VIRGINIA, COUNTY OF JAMES CITY

IN THE CLERK'S OFFICE OF THE CIRCUIT COURT FOR THE COUNTY OF
JAMES CITY THIS _____ DAY OF _____
2001, THIS MAP WAS PRESENTED AND ADMITTED TO THE RECORD AS THE
LAW DIRECTS.

TESTE: _____, CLERK

PLAT BOOK _____ PAGE _____

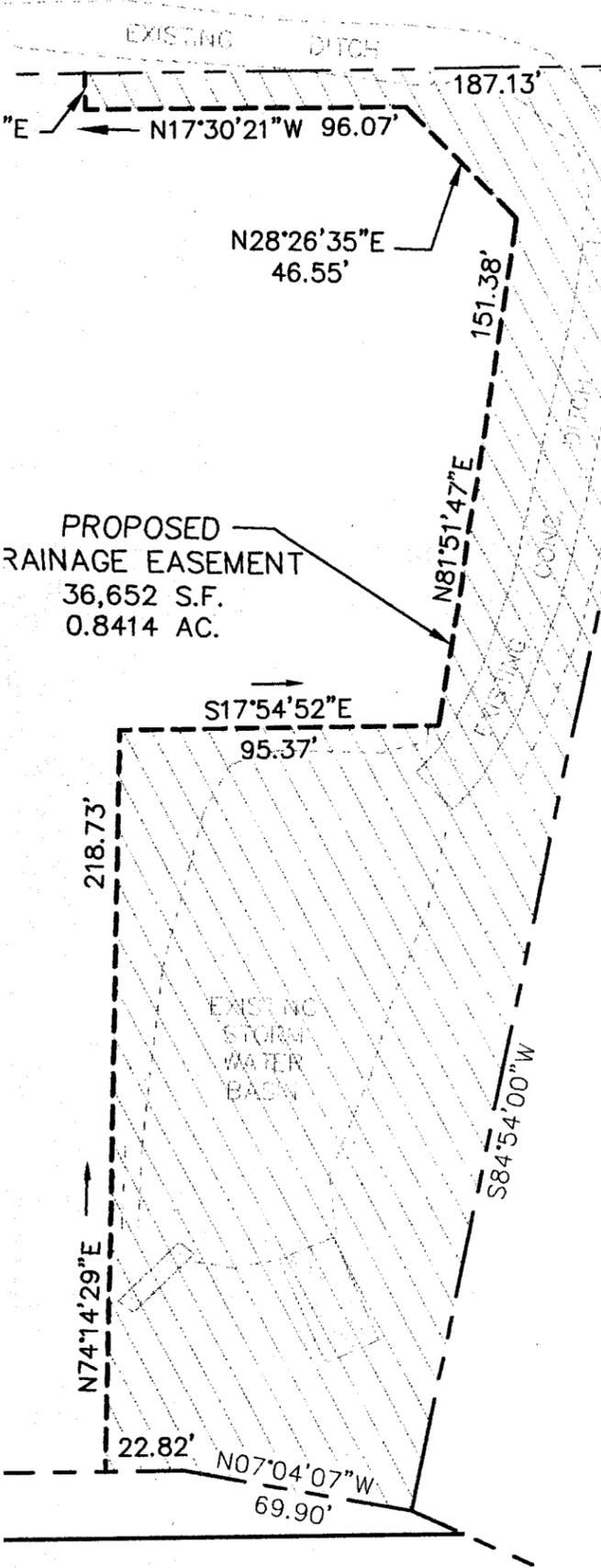
LANDMARK

DESIGN GROUP

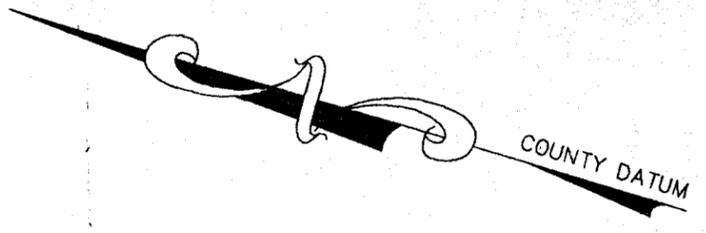
Engineers • Planners • Surveyors

4029 Ironbound Road
Suite 100
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Tel. (757) 253-2975
Fax (757) 229-0049
Email: lmdg@landmarkdgb.com

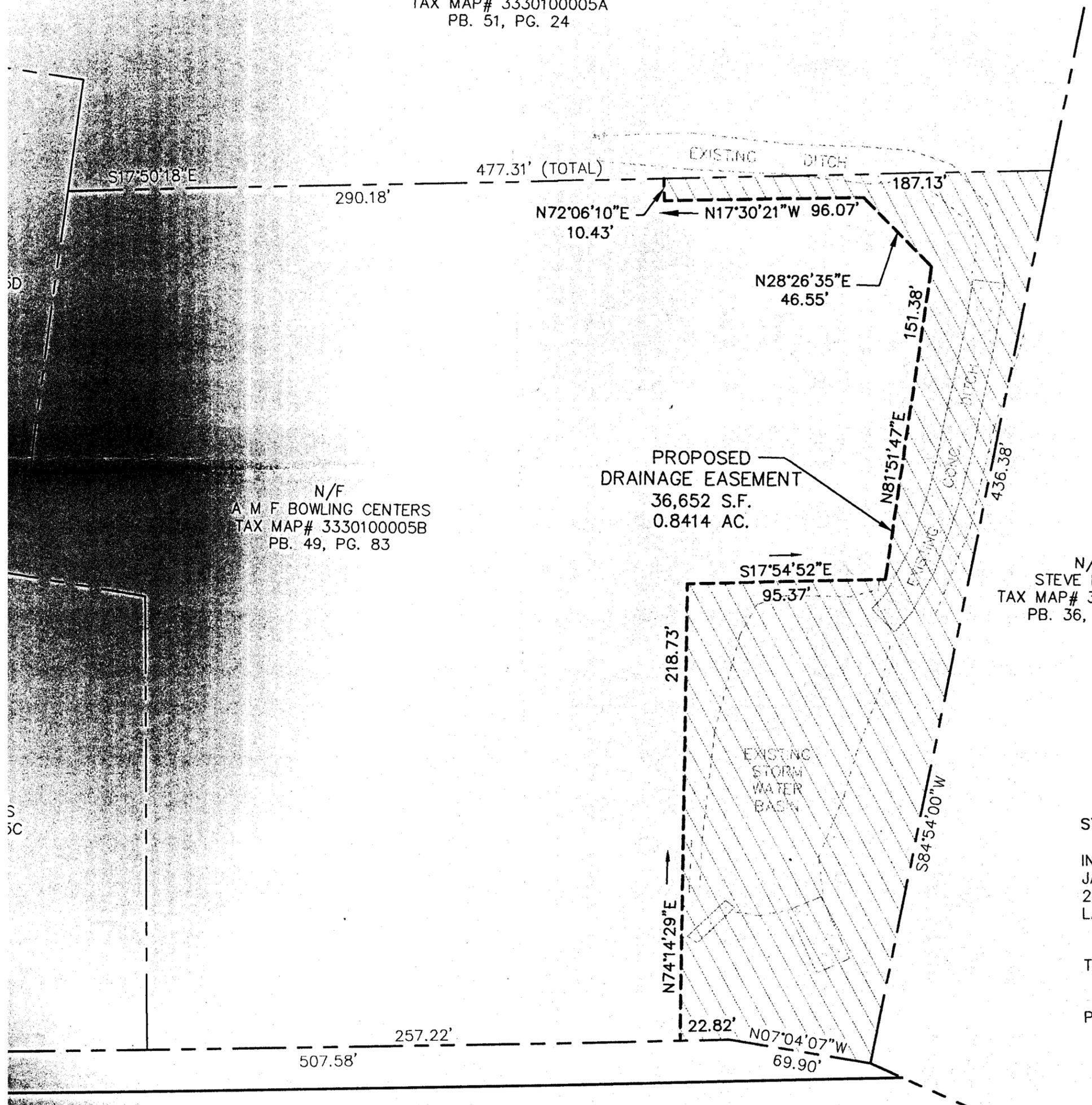
5544 Greenwich Road
Suite 200
Virginia Beach, VA 23462
Tel. (757) 473-2000
Fax (757) 497-7933



RICHMOND ROAD
U.S. ROUTE 60



N/F
W B B PARTNERS
TAX MAP# 3330100005A
PB. 51, PG. 24



N/F
A M F BOWLING CENTERS
TAX MAP# 3330100005B
PB. 49, PG. 83

PROPOSED
DRAINAGE EASEMENT
36,652 S.F.
0.8414 AC.

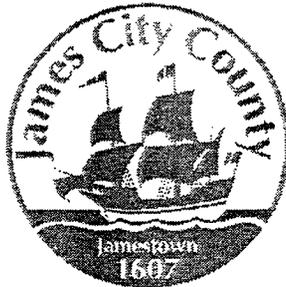
N/F
STEVE MAN
TAX MAP# 333C
PB. 36, PG.

STATE
IN TH
JAME:
2001,
LAW I

TESTE

PLAT

CHISEL RUN ROAD 50' R/W
S.R. 1514



James City County, Virginia
Environmental Division

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

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III. Narrative	3
IV. Calculations	4
Stormwater Management Design Plan	
I. General	5
II. Stormwater Conveyance Systems	7
III. Stormwater Management / BMP Facilities	8
IV. Outlet Protections	14
V. Additional Comments and Information	14

GENERAL INFORMATION

Project Name: BRUCE'S SUPER BODY SHOPS
Owner / Applicant: BRUCE'S SUPER BODY SHOPS, INC.
Plan Preparer: LANDMARK DESIGN GROUP Email: _____
Project Location: NEAR INTERSECTION OF RICHMOND ROAD + OLDE TOWNE ROAD
Tax Map / Parcel: 33-3-01-0-005A
County Plan No. (if known): _____
County BMP Type: SMALL WET POND (MODIFIED) (A-1)

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

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

Issue Date
March 1, 2001

**JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION**

EROSION AND SEDIMENT CONTROL PLAN CHECKLIST

I. GENERAL:

Yes No N/A

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

Unclear how sed.
basin is to function

II. SITE PLAN:

Yes No N/A

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

Yes No N/A

EXISTING SITE FEATURES including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.

SOILS MAP with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.

- where are 25%
slopes

ENVIRONMENTAL INVENTORY in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.

100-YEAR FLOODPLAIN LIMITS or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.

DRAINAGE AREAS for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.

CRITICAL EROSION AREAS which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.

DEVELOPMENT PLAN for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.

Sed trap basin

LOCATION OF PRACTICES proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.

?

TEMPORARY STOCKPILE AREAS or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.

OFFSITE LAND DISTURBING AREAS including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.

DETAILS or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.

Yes No N/A

- MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.
- TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.
- CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.
- PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.
- STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.
- PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

III. NARRATIVE:

Yes No N/A

- PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.
- EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.
- ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.
- OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.
- SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.
- CRITICAL AREAS* on the site which may have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

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

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

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

IV. CALCULATIONS:

Yes No N/A

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

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

**JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION**

STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST

I. GENERAL:

Yes No N/A

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

Yes No N/A

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

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

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

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

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

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

North arrow and plan legend.

Property lines.

Adjacent property information.

Existing site features and existing impervious cover areas.

Impervious cover tabulations.

Existing drainage facilities (natural or manmade).

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

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

Existing and proposed easement locations.

Yes No N/A

- Proposed site improvements and proposed impervious cover areas.
- Proposed stormwater conveyance, drainage and management facilities with appropriate labeled construction data and information.
- Proposed landscaping and seeding plans (disturbed areas, pond interior, etc.).
- Proposed slope stabilization areas (riprap, blankets, matings, walls, etc.).
- Delineation of permanent pools and the 1-, 2-, 10- and 100-year Design Water Surface Elevations.
- Delineation of ponding, headwater, surcharge or backwater areas which may affect adjacent existing or proposed buildings, structures or upstream adjacent properties.
- Test boring locations with reference surface elevations (if known).
- Risers, barrels, underdrains, overflows and outlet protections.
- Emergency spillway level section and outlet channel.
- Existing and proposed site utilities and protection measures.
- Erosion and sediment control measures (for site or BMP).
- Maintenance or access corridors to permanent stormwater management, BMP or drainage facilities.

II. STORMWATER CONVEYANCE SYSTEMS:

Yes No N/A

PLAN VIEWS

OPEN CHANNELS

- Storm drain lengths, sizes, types, classes and slopes for all segments. Label directly on plan or use structure/pipe schedule.
- Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.
- All structure numbers labeled.
- Adequate horizontal clearance from other site utilities or structures.

- PROFILES** generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas.

DETAILS

- Typical storm drain bedding details or reference note.
- Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).
- Inlet shaping detail or applicable reference note.
- Step detail or applicable reference note (if depth 4 ft. or more).
- Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.
- Outlet protections at all pipe outfalls.

Yes No N/A

STORMWATER CONVEYANCE SYSTEM COMPUTATIONS

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

III. STORMWATER MANAGEMENT / BMP FACILITIES:

Yes No N/A

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

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

FACILITY CONFIGURATION and MINIMUM SEPARATIONS

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

Yes No N/A

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

Yes No N/A

HYDRAULIC COMPUTATIONS

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

POND or RESERVOIR ROUTING

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

MISCELLANEOUS COMPUTATIONS

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

EXISTING DAM

Yes No N/A

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

Yes No N/A

-

GEOTECHNICAL REQUIREMENTS

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

NOTE:

WE HAVE PROCEEDED
ON THE BASIS OF
VERBAL REPORTS FROM
THE GEOTECHNICAL ENGINEER.
A COPY OF THE FINAL
WRITTEN REPORT WILL
BE FORWARDED WHEN
AVAILABLE.

-

PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS

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

Yes No N/A

CORE TRENCH

EXISTING

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

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

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

PRINCIPAL CONTROL STRUCTURE OUTLET BARREL

EXISTING

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

SEEPAGE CONTROL

EXISTING

NOT TO BE DISTURBED

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

ANTI-SEEP COLLARS

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

EXISTING ✓

FILTER DIAPHRAGMS

Design based on latest NRCS design methods and certified by a professional engineer.

Yes No N/A

ELEVATION AND DIMENSIONAL DESIGN DATA

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

CROSS SECTION THROUGH FACILITY

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

EMERGENCY SPILLWAY PROFILE

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

EXISTING ✓

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

Yes No N/A

CONSTRUCTION SPECIFICATIONS and NOTES

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

GEO TECH REPORT *

MAINTENANCE PROVISIONS

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

JOINT ACCESS
MAINTENANCE
AGREEMENT
FORTHCOMING

**Geotechnical Engineering Study
Bruce's Super Body Shop
U.S. Route 60 near Olde Towne Road
James City County, Virginia**

Project 01132057

SCHNABEL
ENGINEERING
ASSOCIATES



SP-072-01

Bruce's Super Body Shops

Supporting Engineering Documents



July 16, 2001

LMDG Project No. 2000211-000.07

The LandMark Design Group Inc.

4029 Ironbound Road, Suite 100

Williamsburg, VA 23188

(757) 253-2975

BRUCE'S SUPER BODY SHOPS

JULY 16, 2001

LMDG FILE NO. 2000211-000.07

SUPPORTING ENGINEERING DOCUMENTS

- **STORM DRAINAGE SYSTEMS**
 - **STORMWATER MANAGEMENT ANALYSIS**
 - **DRAINAGE AREA MAP**
 - **PRE-DEVELOPMENT DIAGRAM**
 - **PRE-DEVELOPMENT SUMMARY**
 - **POST-DEVELOPMENT DIAGRAM**
 - **POST-DEVELOPMENT SUMMARY**
 - **WATER BALANCE CALCULATION**
 - **STAGE STORAGE CURVES & TABLES**

- **EROSION AND SEDIMENT CONTROL**
 - **EROSION AND SEDIMENT CONTROL PLAN NARRATIVE**
 - **RIP RAP OUTFALL CALCULATIONS**
 - **SEDIMENT BASIN CALCULATIONS**
 - **SOILS MAP**

**STORM WATER
MANAGEMENT
ANALYSIS**

Bruce's Auto Body Storm Water Management Narrative:

The site of the proposed Bruce's Auto Body Shop is near the intersection of Richmond Road and Old Towne Road and lies within a sub watershed at the head of Chisel Run Creek in James City County. Storm water from this site currently drains into a detention pond on adjacent bowling alley property. Review of the boundaries and topography reveals no alternative flow path for drainage from this site. Any storm water management improvements have to outlet through a system which was designed and constructed 15 years ago. No water quality issues were addressed or provided for in the system. The detention pond is severely over grown and apparently was not constructed to the full dimensions of the original plan.

It is the intent of this proposal to provide a facility which will address the water quality issues not only for Bruce's site and the future development of its residual land, but to upgrade the facilities to accomodate drainage from the adjacent properties within the water shed, consistent with the requirements of James City County.

The James City County BMP Point System for evaluating water quality BMP's leads to the selection of a 6 point structural BMP.

Watershed Area = 11.67 Acres

Property Area = 5.8 Acres

10 Points X 5.8 Acres/11.67 Acres = 4.97 Points Required

Alternatives presented in the Physical Feasibility Matrix offer no specific guidance for a watershed between 10 and 25 Acres. Lacking specific guidelines, alternatives that would meet the spirit and intent of the regulations were evaluated. Soils within the potential construction area were found to be high in clay and not suitable for a system incorporating infiltration. They are, however, suitable for a pond liner or the construction of a wet pond. Treatment volume requirements weighed against the horizontal and vertical constraints have ruled out the development of wetland systems. A system based upon the Group A "Small Wet Pond" design can meet the purpose and intent of the regulations. The use of two ponds is necessary to meet attenuation and quality volume requirements. The upper pond with its sediment fore bay has a total volume of 26,513 cubic feet of permanent pool storage which satisfies the requirements for all of the impervious area (1.33 acres existing and 0.6 X 5.8 = 3.48 acres proposed and future) which lies above it. The lower pond when reconstructed provides a permanent pool volume of 14,732 cubic feet which satisfies the requirement for the 2.6 acres of impervious area which is added by the bowling alley property. Flow from the entire 11.67 acre watershed is attenuated for channel protection by the lower pond. The following presents our analysis and summarizes the results.

26513
14732

91245

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>
A-1 Wet Pond	6	x	11.67/5.8	=	12.07
		x		=	
		x		=	
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 12.07

B. NATURAL OPEN SPACE CREDIT

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

TOTAL NATURAL OPEN SPACE CREDIT: _____

C. TOTAL WEIGHTED POINTS

<u>Structural BMP Points</u>	+	<u>Natural Open Space Points</u>	=	<u>12.07</u>
				<u>Total</u>

Subject BRUCE'S

 Computed _____ Checked _____

LANDMARK DESIGN GROUP

Project # _____
 Client _____
 Date _____ Sheet # _____

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

WATER QUALITY VOLUME

EXISTING IMPERVIOUS SURFACE

① OLD TOWN ROAD .53 AC.
 EWELL EXXON .80 AC.
 1.33 AC.

② WILLIAMSBURG BOUL 2.6 AC.

TOTAL 3.93 AC.

PROPOSED BRUCE'S AUTO BODY SHOP

clarify DA to
 BMP + How large

③ 5.8 AC. X .60 = 3.48 AC. BBS is

TOTAL IMPERVIOUS 7.41 AC.

① & ③ FLOW TO PRIMARY POND ⇒

IMPERVIOUS $A_{1/3} = 4.81$ ACRE

4.81
 2.6
 7.41 ac

$$1.5''/in\ per\ ac \ WQV_{1/3} = .5 \times 4.81 \times \frac{43560}{12} = 8730 \text{ c.f.}$$

Req'd. VOLUME: A-1 BMP @ $3 \times WQV_{1/3} = 26,190 \text{ c.f.}$

② FLOWS INTO CONC. DITCH TO SECOND POND

IMPERVIOUS $A_2 = 2.6$ ACRE

$$WQV_2 = .5 \times 2.6 \times \frac{43560}{12} = 4719 \text{ c.f.}$$

Req'd. VOLUME: A-1 BMP @ $3 \times WQV_2 = 14,157 \text{ c.f.}$

3.48
 4.81
 2.6
 12.89

Subject _____

Computed _____ Checked _____



Project # _____
Client _____
Date _____ Sheet # _____

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

PRIMARY POND:

SEDIMENT FOREBAY @ EL. 88.5

VOLUME = 2798 c.f.

PRIMARY POND @ EL. 88.5

VOLUME = 23,587 c.f.

TOTAL AVAILABLE 26,385 ok

SECOND POND: @ EL. 84.0

VOLUME = 14732 c.f. ok

**WATER BALANCE
CALCULATIONS**

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

WATER BALANCE

SOILS INDICATE NEGLIGIBLE INFILTRATION.

DA = 11.67 AC. CN = 88 $P_2 = 3.5 \frac{IN}{HR}$

CALCULATE SCS RUNOFF

$S = \frac{1000}{CN} - 10 = \frac{1000}{88} - 10 = 1.36$

$Q = \frac{(P - .25)^2}{P + .8S} = \frac{(3.5 - .25 \times 1.36)^2}{3.5 + .8 \times 1.36} = 2.27 \text{ IN}$

UPPER POND: SA = $6450 / 43560 = .15 \text{ AC.}$

LOWER POND: SA = $4617 / 43560 = .11 \text{ AC.}$

WILLIAMS BURG PRECIP JULY 4.96 IN

EVAP JULY 6.14 } JUL-AUG AVG.
 AUG 5.61 } 5.88 IN/MO.

UPPER POND: W.S. = 8.33
 INFLOW = $\frac{4.96 \times 8.33 \times 2.27}{12 \times 3.5} = 2.23 \text{ AC.FT.}$

OUTFLOW $.15 \times \frac{6.14}{12} = .08 \text{ AC.FT.}$

NET: $2.23 - .08 = 2.15 \text{ AC.FT. OK}$

45 JUL-AUG DROUGHT

$5.88 \text{ IN/MO} / 31 = .19 \text{ IN/DAY}$

45 day $\times .19 \text{ IN/DAY} = 8.54 \text{ IN LOSS}$

$.15 \times \frac{8.54}{12} = .11 \text{ AC.FT. LOSS}$

Subject BRUCE'S
WATER BALANCE

Computed _____ Checked _____

LANDMARK DESIGN GROUP

Project # _____

Client _____

Date 7/13 Sheet # 2/F2

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

LOWER POND:

$$WS = 3.34 + \text{UPPER POND OUT}$$

INFLOW:

$$\frac{4.96 \times 3.34}{12} \times \frac{2.27}{35} + 2.15 = 3.05 \text{ Ac. Ft.}$$

OUTFLOW:

$$\frac{11 \times 6.14}{12} = .06 \text{ Ac. Ft.}$$

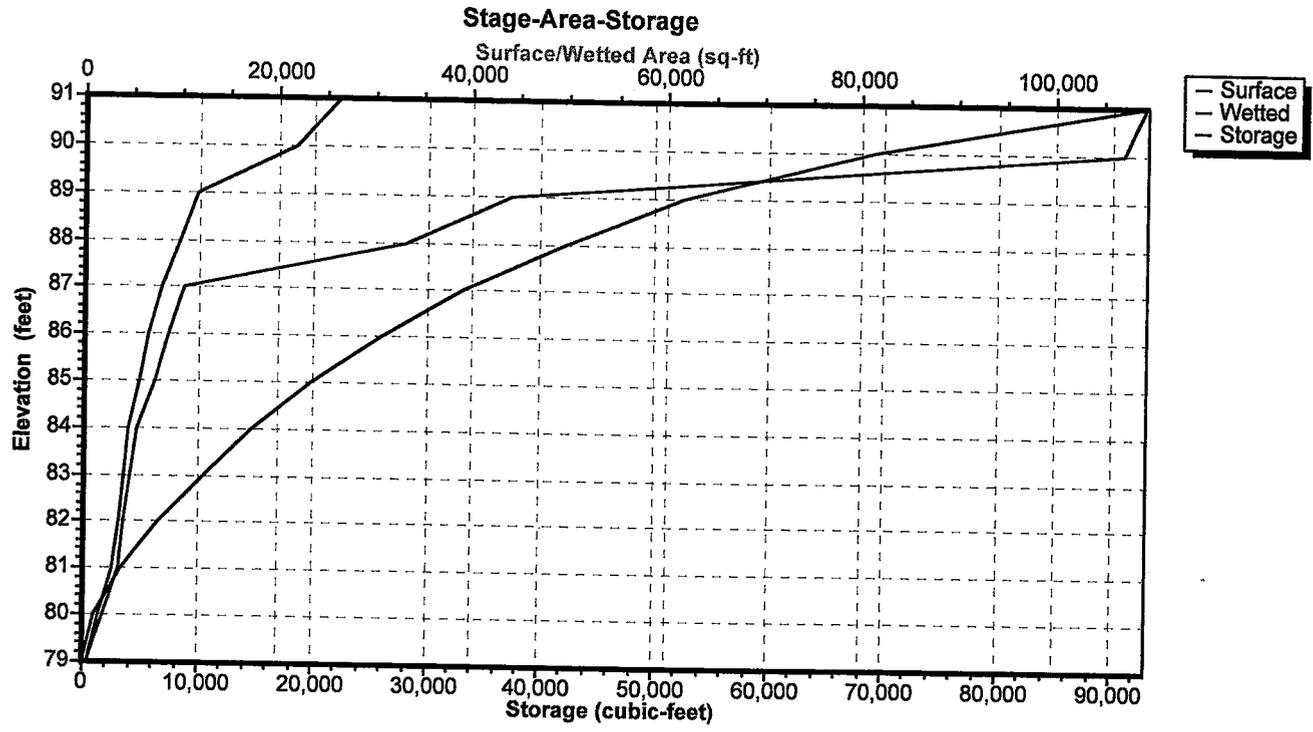
$$\text{NET: } 3.05 - .06 = + 2.99 \text{ OK}$$

45 Jul-Aug Drought:

$$11 \times \frac{8.54}{12} = .08 \text{ Ac. Ft. Less}$$

**STAGE STORAGE
CURVES AND TABLES**

Pond BMP: Revised BMP



A1 BMP Bruce's Auto Body

Type II 24-hr Rainfall=5.80" (AMC=2)

Prepared by LandMark Design Group, Inc.

Page 2

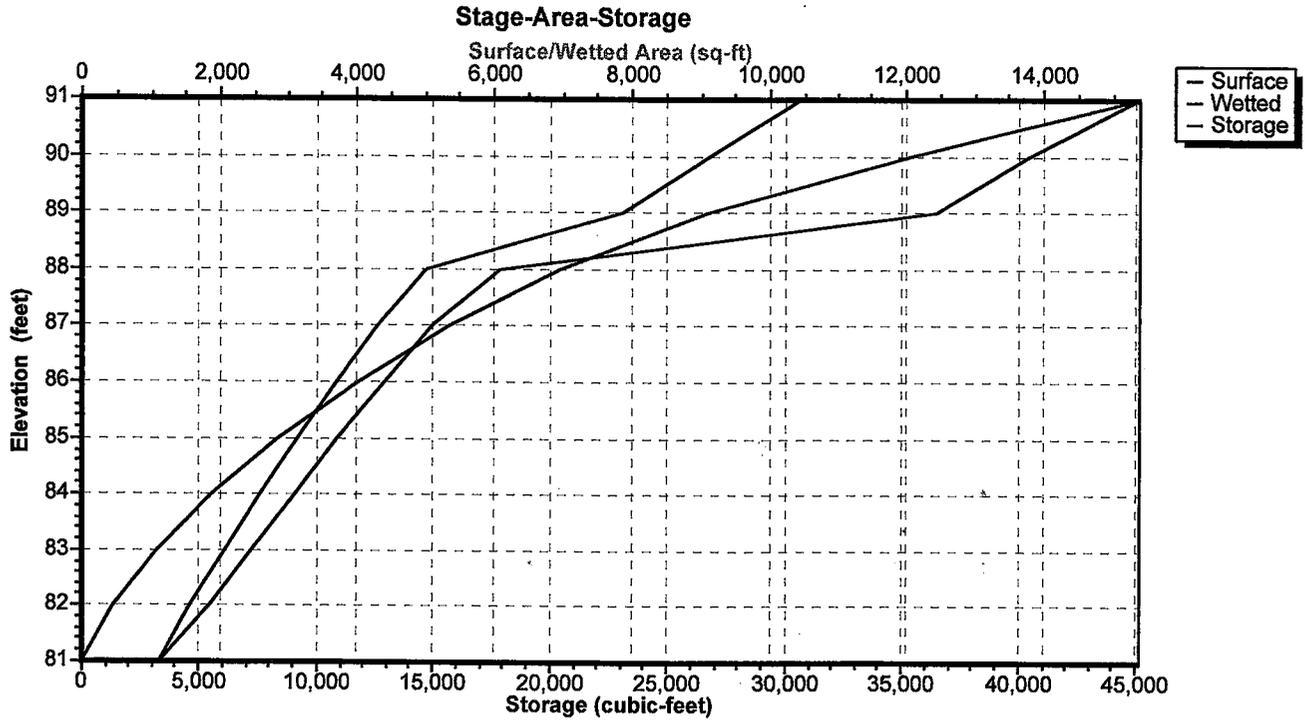
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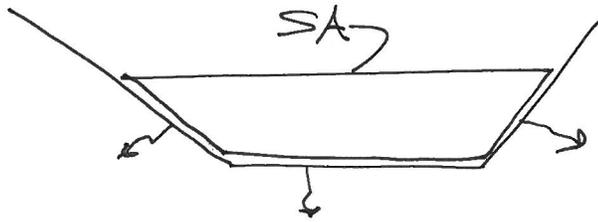
07/13/2001

Pond BMP: Revised BMP

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
79.00	471	471	0
79.30	836	930	305
79.60	1,200	1,388	610
79.90	1,565	1,847	914
80.20	1,953	2,307	1,480
80.50	2,353	2,769	2,176
80.80	2,753	3,231	2,873
81.10	3,071	3,600	3,664
81.40	3,223	3,784	4,645
81.70	3,376	3,968	5,626
82.00	3,528	4,152	6,608
82.30	3,687	4,346	7,745
82.60	3,846	4,540	8,882
82.90	4,005	4,734	10,019
83.20	4,170	4,935	11,264
83.50	4,338	5,139	12,565
83.80	4,505	5,344	13,865
84.10	4,721	5,657	15,245
84.40	5,034	6,187	16,784
84.70	5,347	6,718	18,323
85.00	5,660	7,248	19,862
85.30	5,962	7,628	21,708
85.60	6,263	8,008	23,555
85.90	6,565	8,387	25,402
86.20	6,899	8,842	27,466
86.50	7,249	9,334	29,638
86.80	7,599	9,825	31,810
87.10	8,015	12,450	34,131
87.40	8,560	19,342	36,749
87.70	9,106	26,233	39,367
88.00	9,651	33,124	41,985
88.30	10,214	36,420	45,157
88.60	10,776	39,717	48,329
88.90	11,339	43,013	51,502
89.20	13,590	56,714	55,842
89.50	16,686	75,617	60,766
89.80	19,781	94,520	65,690
90.10	22,286	107,342	71,374
90.40	23,608	108,002	78,578
90.70	24,930	108,661	85,783
91.00	26,252	109,321	92,987

Pond POND: BMP Primary Pond





A1 BMP Bruce's Auto Body

Type II 24-hr Rainfall=5.80" (AMC=2)

Prepared by LandMark Design Group, Inc.

Page 4

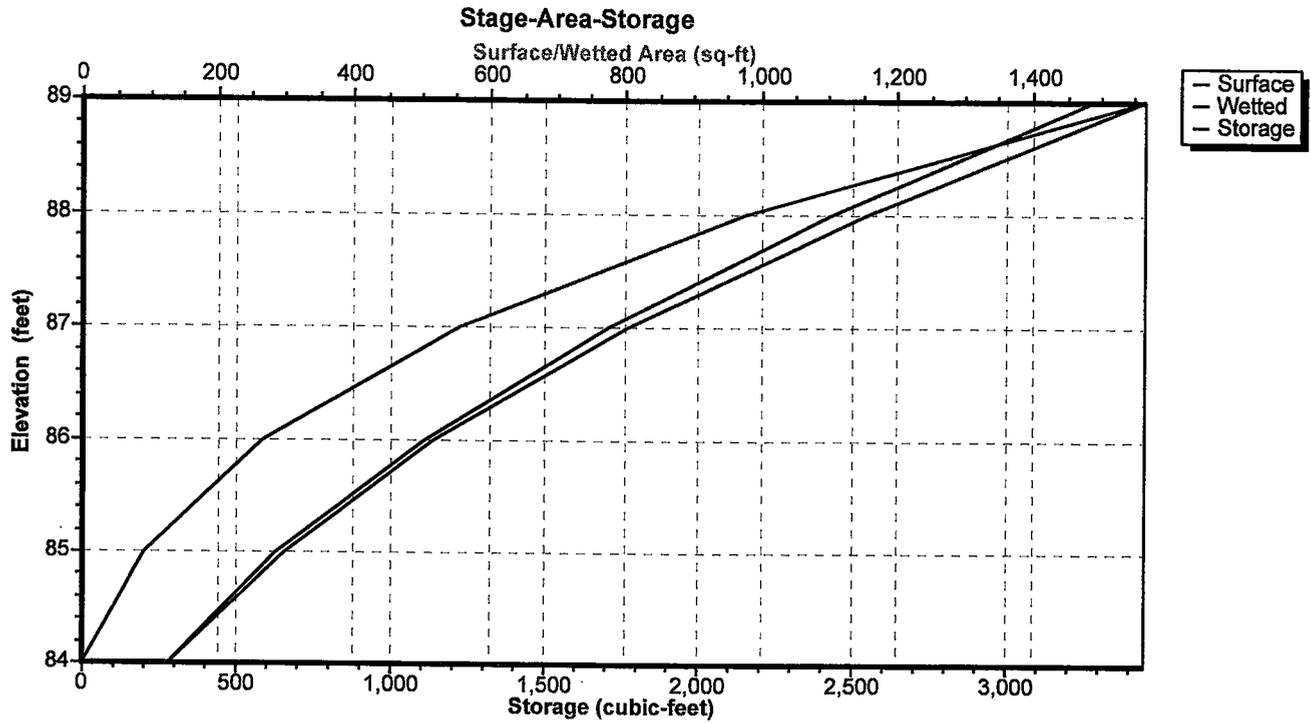
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07/13/2001

Pond POND: BMP Primary Pond

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
81.00	1,117	1,117	0
81.20	1,208	1,261	268
81.40	1,299	1,404	535
81.60	1,389	1,548	803
81.80	1,480	1,692	1,070
82.00	1,571	1,835	1,338
82.20	1,670	1,961	1,700
82.40	1,769	2,086	2,063
82.60	1,869	2,212	2,426
82.80	1,968	2,337	2,788
83.00	2,067	2,463	3,151
83.20	2,171	2,588	3,615
83.40	2,274	2,714	4,079
83.60	2,378	2,839	4,544
83.80	2,481	2,965	5,008
84.00	2,585	3,091	5,472
84.20	2,694	3,215	6,043
84.40	2,804	3,339	6,614
84.60	2,913	3,464	7,185
84.80	3,023	3,588	7,755
85.00	3,132	3,712	8,326
85.20	3,247	3,851	9,009
85.40	3,362	3,990	9,692
85.60	3,476	4,128	10,375
85.80	3,591	4,267	11,058
86.00	3,706	4,406	11,741
86.20	3,827	4,542	12,542
86.40	3,949	4,679	13,343
86.60	4,070	4,816	14,145
86.80	4,192	4,953	14,946
87.00	4,313	5,089	15,747
87.20	4,449	5,289	16,677
87.40	4,585	5,489	17,607
87.60	4,722	5,689	18,536
87.80	4,858	5,888	19,466
88.00	4,994	6,088	20,396
88.20	5,571	7,359	21,672
88.40	6,148	8,630	22,949
88.60	6,724	9,901	24,225
88.80	7,301	11,171	25,501
89.00	7,878	12,442	26,778
89.20	8,128	12,708	28,477
89.40	8,378	12,974	30,176
89.60	8,629	13,240	31,875
89.80	8,879	13,506	33,574
90.00	9,129	13,771	35,273
90.20	9,392	14,091	37,229
90.40	9,655	14,410	39,185
90.60	9,917	14,729	41,141
90.80	10,180	15,048	43,096
91.00	10,443	15,367	45,052

Pond SFB: Sediment fore bay



Pond SFB: Sediment fore bay

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
84.00	126	126	0
84.10	142	143	20
84.20	158	160	40
84.30	174	177	60
84.40	190	194	80
84.50	206	211	100
84.60	221	228	120
84.70	237	245	140
84.80	253	262	160
84.90	269	279	180
85.00	285	296	200
85.10	307	318	239
85.20	328	340	278
85.30	350	362	317
85.40	371	384	355
85.50	393	406	394
85.60	415	427	433
85.70	436	449	472
85.80	458	471	511
85.90	479	493	549
86.00	501	515	588
86.10	528	544	651
86.20	555	573	715
86.30	583	601	778
86.40	610	630	841
86.50	637	659	904
86.60	664	688	967
86.70	691	717	1,031
86.80	719	745	1,094
86.90	746	774	1,157
87.00	773	803	1,220
87.10	806	838	1,313
87.20	839	873	1,407
87.30	872	908	1,500
87.40	905	943	1,593
87.50	938	977	1,687
87.60	970	1,012	1,780
87.70	1,003	1,047	1,873
87.80	1,036	1,082	1,966
87.90	1,069	1,117	2,060
88.00	1,102	1,152	2,153
88.10	1,141	1,193	2,282
88.20	1,179	1,234	2,411
88.30	1,218	1,275	2,540
88.40	1,256	1,316	2,669
88.50	1,295	1,357	2,798 ✓
88.60	1,334	1,397	2,927
88.70	1,372	1,438	3,056
88.80	1,411	1,479	3,185
88.90	1,449	1,520	3,314
89.00	1,488	1,561	3,443

**OPEN CHANNEL
CALCULATIONS
2 YEAR AND 10 YEAR**

**BRUCE'S SUPER BODY SHOPS
JAME CITY COUNTY, VIRGINIA**

**EROSION AND SEDIMENT CONTROL PLAN NARRATIVE
JULY 2001**

PROJECT DESCRIPTION

Bruce's Super Body Shops is a proposed automobile body and fender repair facility located on the west side of Richmond Road (Route 60), approximately 250' south of the intersection of Olde Towne Road (S.R. 658). The total parcel encompasses 5.27 acres, of which 2.83 acres are depicted on the plans as part of parcel subject to a special use permit. The project proposes a 24,526 square foot building with an 11' x 21' accessory structure and 95 parking spaces to serve the facility. Two entrances are proposed, one each on Richmond Road and Olde Towne Road. As shown on the site plan, approximately 3.17 acres will be disturbed on site for the proposed building, parking areas, utility installation and drainage facilities; and 0.68 acre will be disturbed off site for stormwater management. The subject property is identified as Tax Map 33-3, Parcel 1-5A.

EXISTING SITE CONDITIONS

Portions of the project site is undeveloped and moderately wooded with light understory. These areas can be characterized as a mature mixed hardwood and softwood forest. The remainder of the site area contains existing gravel driveways and utilities which once served residential houses on the project site. The driveways and utilities affecting site construction will be removed to accommodate the new construction. The landform in the general area is moderately sloping to rolling with slopes ranging from 3-30%.

SOILS

The predominant soil types which are within the overall project construction areas are Emporia complex, Kempsville-Emporia fine sandy loams, and Slagle fine sandy loam, as depicted on soil mapping contained in the USDA - Soil Conservation Service, Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.

Emporia complex appears on side slopes along drainageways. Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 45-50 inches and is yellowish brown loam with mostly strong brown mottles in the upper parts; yellowish brown, firm sandy clay loam with

strong brown and gray mottles in the middle part; and mottled gray and brown, firm sandy clay loam in the lower part. The substratum is variegated gray, brown, and red, firm sandy clay loam to a depth of at least 75 inches. In this Emporia soil, permeability is moderate in the upper part of the subsoil and moderately slow to slow in the lower part. The available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has moderate shrink-swell potential. A perched high water table is at a depth of 3 to 4 ½ feet in winter and spring. This soil is in capability subclass VIIe. The hydrologic soil group for this soil is C.

Kempsville fine sandy loam is deep, gently sloping, and well drained. It is on broad uplands and side slopes. Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 10 inches thick. The subsoil extends to a depth of 55 inches. It is yellowish brown and strong brown fine sandy loam and sandy clay loam to a depth of 32 inches; and below that depth, it is mottled fine sandy loam that is somewhat firm and compact over yellowish brown fine sandy loam to a depth of at least 68 inches. The permeability of this Kempsville soil is moderate, and available water capacity is moderate. The erosion hazard is moderate. The subsoil has low shrink-swell potential. This soil is in capability subclass Iie. The hydrologic soil group for this soil is B.

Slagle fine sandy loam is deep, gently sloping, and moderately well drained. It is on terraces and side slopes on the uplands. Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 5 inches thick. The subsoil extends to a depth of 50 inches. It is mostly mottled yellowish brown clay loam to a depth of 25 inches. Below this depth, the subsoil is mostly mottled clay loam and sandy clay loam. In this Slagle soil, permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. The available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a moderate shrink-swell potential. This soil is in capability subclass Iie. The hydrologic soil group for this soil is C.

CRITICAL EROSION AREAS

The soils identified on the site suggest a moderate erosion hazard. No critical erosion areas have been identified on this site. All disturbed areas not to be paved will be stabilized by vegetative practices.

EROSION AND SEDIMENT CONTROL MEASURES

Unless otherwise indicated, all vegetative and structural erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the Virginia Erosion and Sediment Control Handbook, 1992, and in accordance with James City County Standards.

STRUCTURAL PRACTICE:

The following practices are shown on the grading, drainage and erosion control plan sheets and detailed on erosion control details sheet.

1. TEMPORARY CONSTRUCTION ENTRANCE (3.02)

Temporary construction entrances will be installed at the various work areas shown on the plans.

2. CONSTRUCTION ROAD STABILIZATION (3.03)

New parking areas shall receive the proposed base course of gravel immediately following grading and sub base preparation.

3. SILT FENCE (3.05)

Silt fence will be installed where shown on the plan.

4. CULVERT INLET PROTECTION (3.08)

Culvert inlet protection will be installed for all pipe inlets where shown on the plan.

5. TEMPORARY FILL DIVERSION (3.10)

Temporary fill diversions shall be constructed at the top of all fill areas at the end of each workday as needed.

6. OUTLET PROTECTION (3.18)

Outlet protection shall be placed at all drainage outfalls.

7. TREE PROTECTION (3.38)

Tree protection fencing or other suitable devices shall be placed along the "limits of clearing" to protect desirable trees from mechanical and other injury during land disturbing and construction activity.

VEGETATIVE PRACTICES:

1. TOPSOIL STOCKPILE

Topsoil shall be stripped from areas to be cleared and graded and stockpiled for later use. Stockpile locations shall be approved by the Owner.

2. TEMPORARY SEEDING (3.31)

All distributed areas on-site will be seeded with a fast-germinating, temporary vegetation immediately following grading or where exposed soil surfaces will not be brought to final grade for a period of time exceeding 15 days. Selection of the appropriate seed mixture as recommended by the Virginia Erosion and Sediment Control Handbook, 1992 will depend on the time of year it is to be applied.

MANAGEMENT STRATEGIES AND CONSTRUCTION SEQUENCE

1. Establish tree protection/clearing limits flagging and install silt fence at perimeter of work areas as indicated on the plans.
2. Clear sufficient areas to allow for the placement of the construction entrances. The construction entrances shall be in place immediately (no longer than 24 hours) following clearing activities, and be in place before commencing specified demolition and removal.
3. Upon inspection and approval of the construction entrances by the County, clear sufficient areas to allow modifications to the existing detention pond and construction of Temporary Sediment Basin #1.
4. After detention pond modifications have been completed and the BMP and temporary sediment basin are in place, functional, and stabilized, commence remaining specified clearing and demolition.
5. If temporary stockpiles are used, the contractor shall install silt fences at the base to prevent sediment runoff. Stockpiles shall not be placed within any easement, or between the right-of-way and the building setback line.
6. Construction of the storm drainage system shall commence immediately after a work area has been cleared and is free of all roots, stumps, and debris or specified demolition completed. Install erosion and sediment control devices, including the storm drain outfall protection, culvert inlet protection, etc.
7. After the storm drainage system within a work area is in place, the contractor shall rough grade the site and prepare the subgrade for the improved areas. Provide culvert inlet protection as soon as practical.

8. Install sewer and water utilities, curb and gutter, base materials and pavement surface courses.
9. Provide permanent seeding as required. Permanent seeding may take place at prior phases as deemed appropriate.
10. Temporary sediment basin shall be removed and the area regraded with proposed permanent BMP grading after JCC Environmental Division approval. During all phases of construction, the contractor shall perform daily inspection of the BMP outfall and all receiving drainage outfalls for sediment transport from Bruce's Super Body Shops construction. Accumulated sediment build up is to be removed and disposed of on-site after each storm event. The contractor will be responsible for any additional sediment controls and removal of sediment caused by Bruce's Super Body Shops construction.

PERMANENT STABILIZATION

All areas disturbed by grading will be stabilized with permanent seeding immediately following finish grading. Seeding will be done according to Std. and Spec. 3.32 of the Virginia erosion and Sediment Control Handbook, 1992. Permanently seeded areas shall be protected during establishment with straw mulch.

MAINTENANCE

Maintenance of temporary erosion and sediment control devices is the responsibility of the developer. In general, all erosion and sediment control measures will be checked weekly and after each significant rainfall. Silt fencing shall be inspected immediately after each rainfall and at least daily during prolonged rainfall for undermining or repair. All seeded areas will be checked to insure a good stand of grass is maintained. Seeded areas deficient shall be reseeded as necessary.

COST ESTIMATE

The Contractor will furnish an estimate of costs for erosion and sediment control to the County.

**RIP RAP OUTFALL
CALCULATIONS**

A1 BMP Bruce's Auto Body

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Type II 24-hr Rainfall=5.80" (AMC=2)

Page 1

07/13/2001

Reach 2R: Parking Lot Culvert

?

Inflow = 12.56 cfs @ 11.90 hrs, Volume= 0.948 af
Outflow = 12.07 cfs @ 11.92 hrs, Volume= 0.948 af, Atten= 4%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-45.00 hrs, dt= 0.08 hrs
Max. Velocity= 7.3 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 1.8 min

Peak Depth= 1.06'

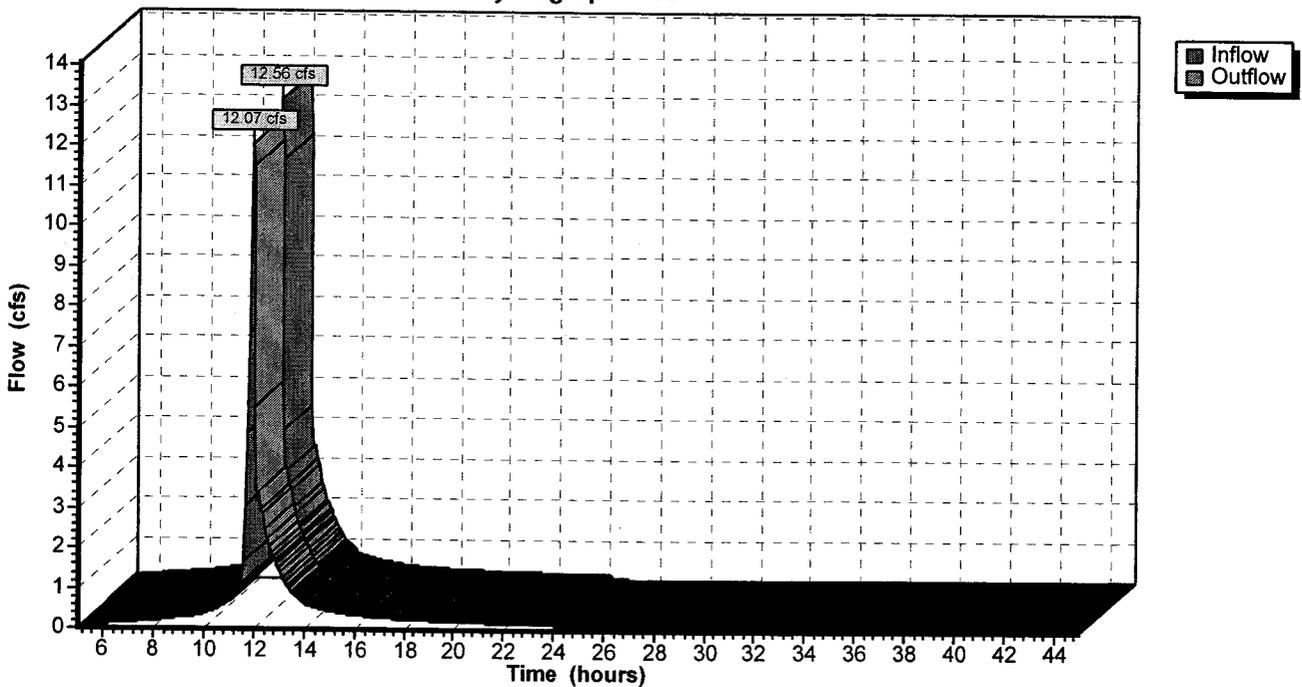
Capacity at bank full= 22.62 cfs

Inlet Invert= 93.20', Outlet Invert= 91.20'

24.0" Diameter Pipe n= 0.013 Length= 200.0' Slope= 0.0100 '/'

Reach 2R: Parking Lot Culvert

Hydrograph Plot



What is da?

When does Q come from?

CIRCULAR CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

July 13, 2001

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=====
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DESCRIPTION	PROGRAM INPUT DATA	VALUE
Flow Rate (cfs).....		12.56
Channel Bottom Slope (ft/ft).....		0.01
Manning's Roughness Coefficient (n-value).....		0.013
Channel Diameter (ft).....		2.0

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DESCRIPTION	COMPUTATION RESULTS	VALUE
Normal Depth (ft).....		1.06
Flow Velocity (fps).....		7.39
Froude Number.....		1.412
Velocity Head (ft).....		0.85
Energy Head (ft).....		1.91
Cross-Sectional Area of Flow (sq ft).....		1.7
Top Width of Flow (ft).....		2.0

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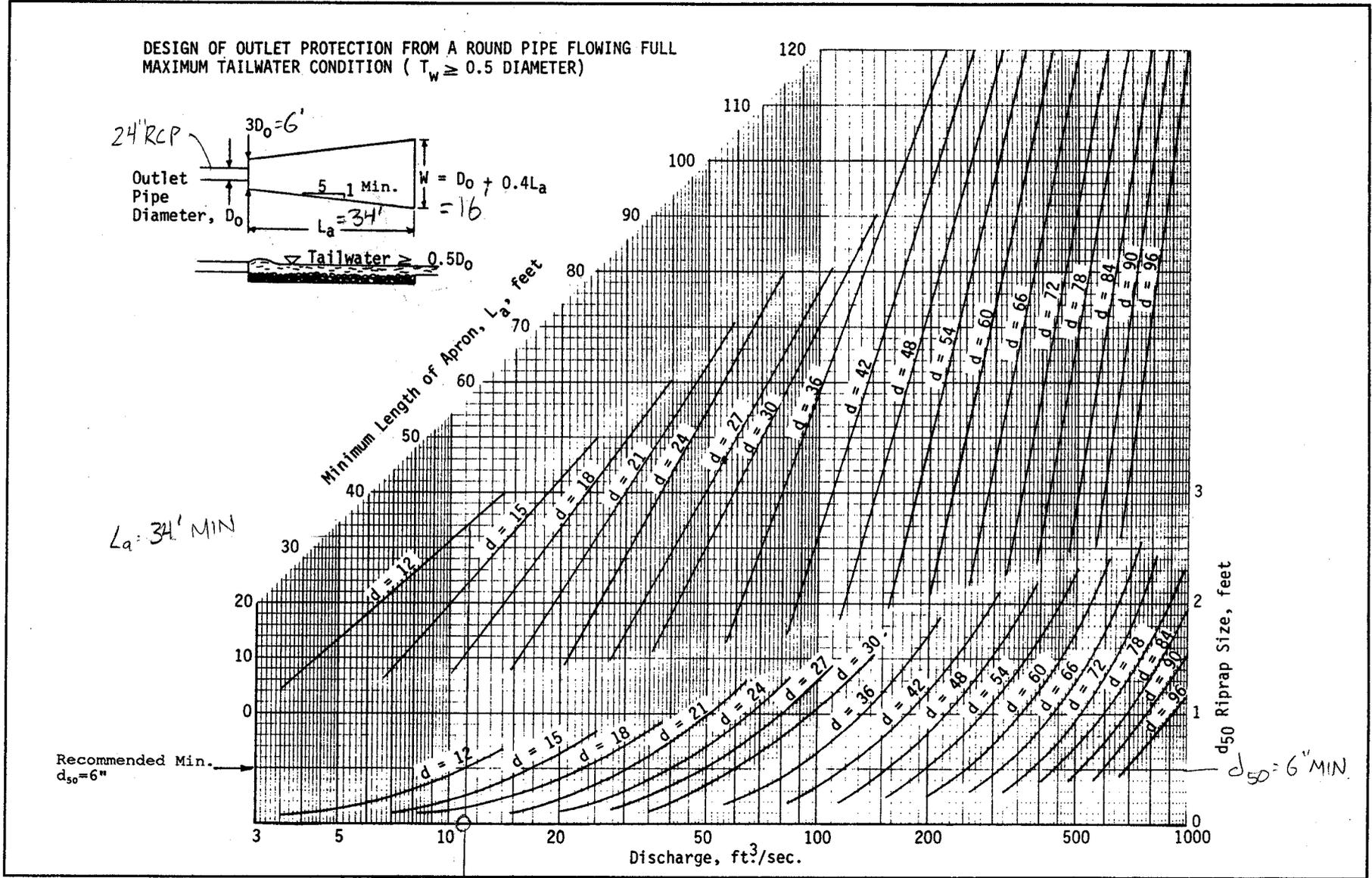
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Phone: (281) 440-3787, Fax: (281) 440-4742, Email: software@dodson-hydro.com
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REACH 2R

Source: USDA-SCS

III - 165

Plate 3.18-4



1992

3.18

Reach 8R: Entrance Culvert

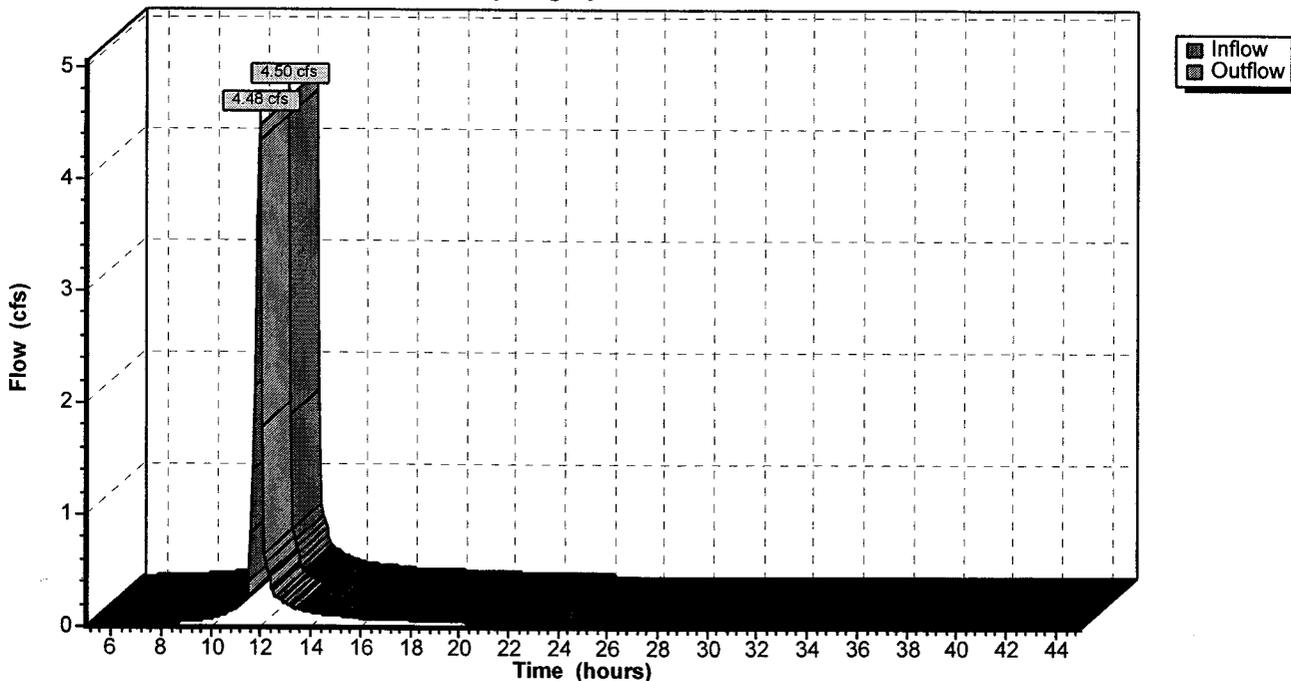
Inflow = 4.50 cfs @ 11.94 hrs, Volume= 0.220 af
Outflow = 4.48 cfs @ 11.94 hrs, Volume= 0.220 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-45.00 hrs, dt= 0.08 hrs
Max. Velocity= 7.8 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.59'
Capacity at bank full= 9.96 cfs
Inlet Invert= 100.00', Outlet Invert= 99.05'
15.0" Diameter Pipe n= 0.013 Length= 40.0' Slope= 0.0238 '/'

Reach 8R: Entrance Culvert

Hydrograph Plot



CIRCULAR CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

July 13, 2001

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=====
```

DESCRIPTION	PROGRAM INPUT DATA	VALUE
Flow Rate (cfs).....		4.5
Channel Bottom Slope (ft/ft).....		0.0238
Manning's Roughness Coefficient (n-value).....		0.013
Channel Diameter (ft).....		1.25

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=====
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DESCRIPTION	COMPUTATION RESULTS	VALUE
Normal Depth (ft).....		0.59
Flow Velocity (fps).....		7.91
Froude Number.....		2.067
Velocity Head (ft).....		0.97
Energy Head (ft).....		1.56
Cross-Sectional Area of Flow (sq ft).....		0.57
Top Width of Flow (ft).....		1.25

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=====
```

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Phone: (281) 440-3787, Fax: (281) 440-4742, Email: software@dodson-hydro.com
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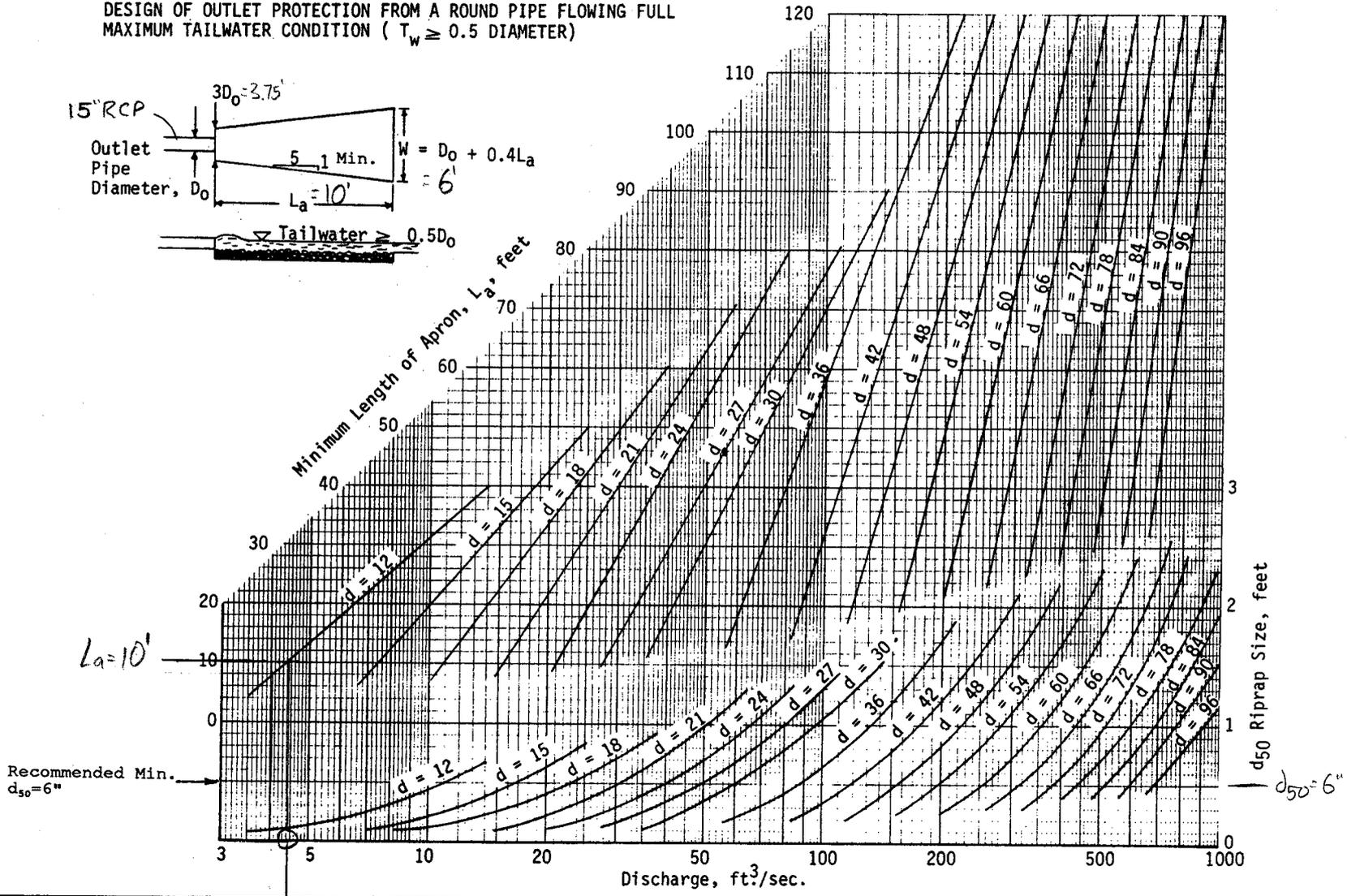
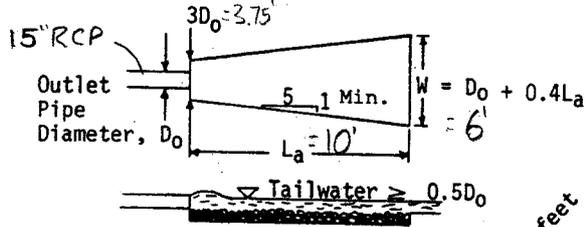
REACH BR

Source: USDA-SCS

III - 165

Plate 3.18-4

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MAXIMUM TAILWATER CONDITION ($T_w \geq 0.5$ DIAMETER)



1992

3.18

A1 BMP Bruce's Auto Body

Prepared by LandMark Design Group, Inc.

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Type II 24-hr Rainfall=5.80" (AMC=2)

Page 3

07/13/2001

Reach 10R: Culvert

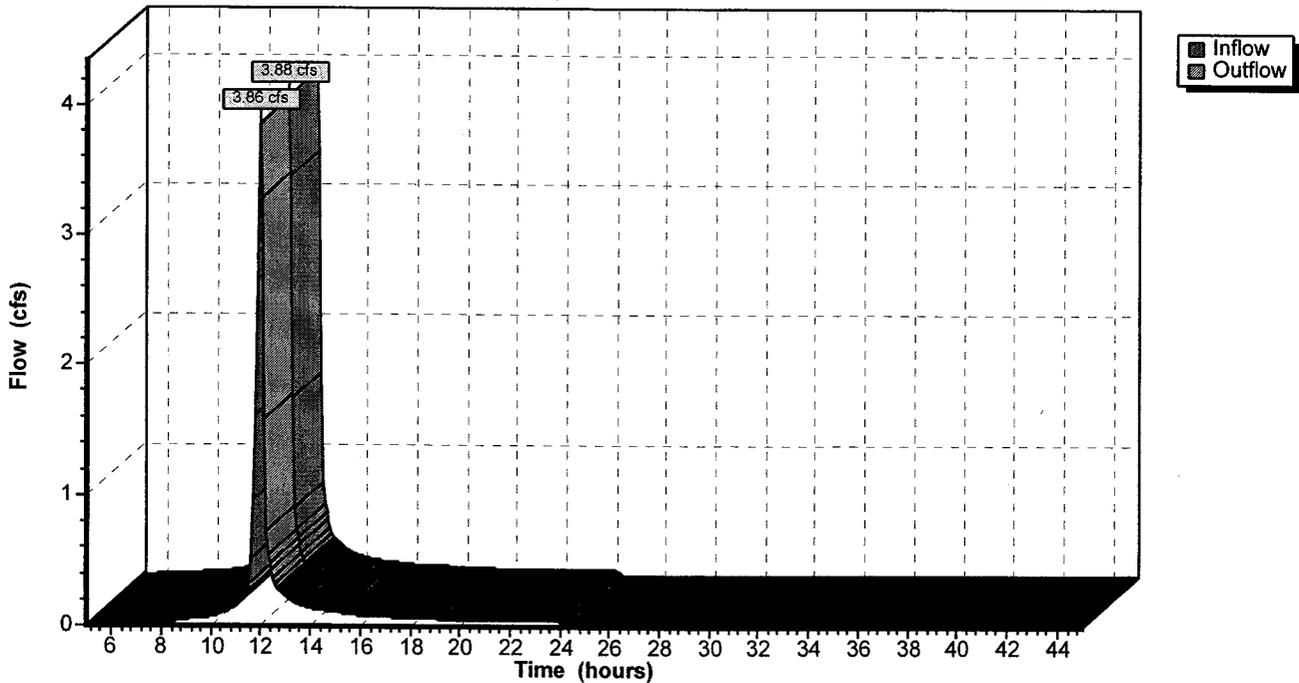
Inflow = 3.88 cfs @ 11.97 hrs, Volume= 0.220 af
Outflow = 3.86 cfs @ 11.97 hrs, Volume= 0.220 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-45.00 hrs, dt= 0.08 hrs
Max. Velocity= 11.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.5 fps, Avg. Travel Time= 0.2 min

Peak Depth= 0.40'
Capacity at bank full= 17.69 cfs
Inlet Invert= 94.00', Outlet Invert= 91.00'
15.0" Diameter Pipe n= 0.013 Length= 40.0' Slope= 0.0750 '/'

Reach 10R: Culvert

Hydrograph Plot



CIRCULAR CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

?

July 13, 2001

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DESCRIPTION	PROGRAM INPUT DATA	VALUE
Flow Rate (cfs).....		3.88
Channel Bottom Slope (ft/ft).....		0.0238
Manning's Roughness Coefficient (n-value).....		0.013
Channel Diameter (ft).....		1.25

=====

DESCRIPTION	COMPUTATION RESULTS	VALUE
Normal Depth (ft).....		0.54
Flow Velocity (fps).....		7.62
Froude Number.....		2.094
Velocity Head (ft).....		0.9
Energy Head (ft).....		1.44
Cross-Sectional Area of Flow (sq ft).....		0.51
Top Width of Flow (ft).....		1.24

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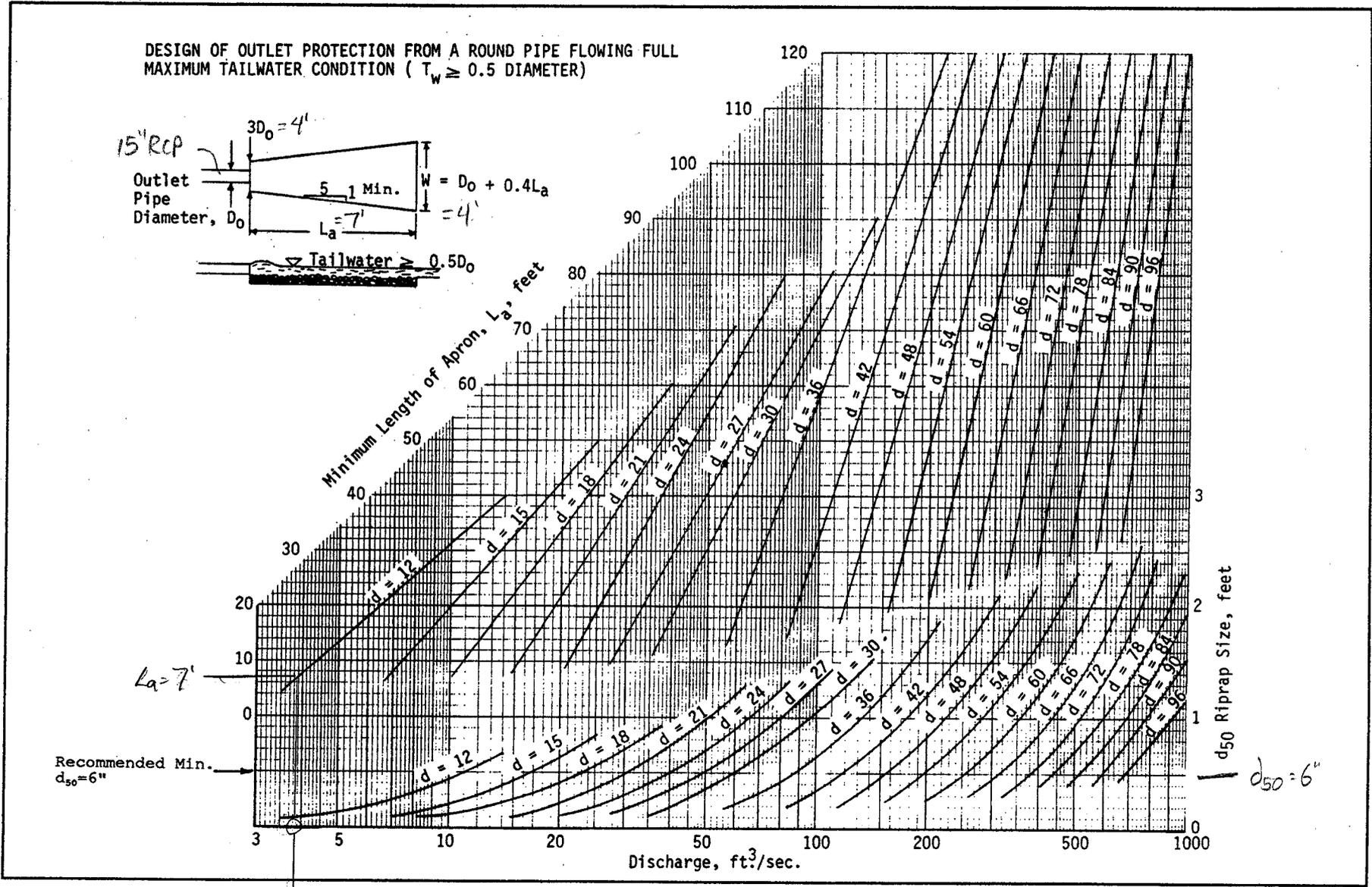
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REACH 10R

Source: USDA-SCS

III - 165

Plate 3.18-4



1992

3.18

**SEDIMENT BASIN
CALCULATIONS**

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project BRUCE'S SUPER BODY SHOPS

Basin # SB1 Location JAMES CITY COUNTY, VA

Total area draining to basin: $\frac{8.33}{9.33?}$ acres. vs 11.67

Basin Volume Design

Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{8.33} \text{ acres} = \underline{558} \text{ cu. yds.} \quad 15120 \text{ c.f.}$$

2. Available basin volume = $\frac{737}{19907 \text{ c.f. } \checkmark}$ cu. yds. at elevation $\frac{23,500}{88.5}$. (From storage - elevation curve)

3. Excavate $\underline{1400^{\pm}}$ cu. yds. to obtain required volume*.

* Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

$$33 \text{ cu. yds.} \times \underline{8.33} \text{ acres} = \underline{275} \text{ cu. yds.}$$

5. Elevation corresponding to cleanout level = 86.1.

(From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 2.4 ft. (Min. = 1.0 ft.)

Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{8.33} \text{ acres} = \underline{558} \text{ cu. yds.} \quad 15120 \text{ c.f.}$$

8. Total available basin volume at crest of riser* = 1276 cu. yds. at elevation 90.50. (From Storage - Elevation Curve)

$$\frac{34,000 - 19,900}{14,100 \text{ ft}^3} = 40,100 \text{ ft}^3$$

* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 6 in.

10. Diameter of flexible tubing = 8 in. (diameter of dewatering orifice plus 2 inches).

~~USE 6x6 FEES~~

Preliminary Design Elevations

11. Crest of Riser = 90.50

Top of Dam = 92.0

Design High Water = 91.41 @ Q_{25} 91.65 @ Q_{100}

Upstream Toe of Dam = EXCAVATED 88.0

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{W_e} = \frac{150}{40} \approx 3.75$

If > 2, baffles are not required _____

If < 2, baffles are required _____

Runoff

13. $Q_2 = \underline{14.46}$ cfs (From Chapter 5)

14. $Q_{25} = \underline{41.89}$ cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2 = \underline{na}$ cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25} = \underline{na}$ cfs. (riser and barrel)

16. With emergency spillway:

Assumed available head (h) = _____ ft. (Using Q_2)

$h = \text{Crest of Emergency Spillway Elevation} - \text{Crest of Riser Elevation}$

Without emergency spillway:

Assumed available head (h) = _____ ft. (Using Q_{25})

$h = \text{Design High Water Elevation} - \text{Crest of Riser Elevation}$

17. Riser diameter (D_r) = _____ in. Actual head (h) = _____ ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = _____ ft.

Head (H) on barrel through embankment = _____ ft.

(From Plate 3.14-7).

19. Barrel diameter = _____ in.

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

Diameter = _____ inches.

Height = _____ inches.

(From Table 3.14-D).

REFER TO ATTACHED ROUTING ANALYSIS OVER FLOW PROTECTION PROVIDED BY DOWN STREAM POND.

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p =$ _____ cfs.

22. Bottom width (b) = _____ ft.; the slope of the exit channel (s) = _____ ft./foot; and the minimum length of the exit channel (x) = _____ ft.

(From Table 3.14-C).

REFER TO ROUTING ATTACHED

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = _____ ft.
- Slope of upstream face of embankment (Z) = _____ :1.
- Slope of principal spillway barrel (S_b) = _____ %
- Length of barrel in saturated zone (L_s) = _____ ft.
24. Number of collars required = _____ dimensions = _____
- (from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 92.0 BERM
- Design High Water = 90.5
- Emergency Spillway Crest = 90.6
- Principal Spillway Crest = 90.50
- Dewatering Orifice Invert = 88.50
- Cleanout Elevation = 86.1
- Elevation of Upstream Toe of Dam
or Excavated Bottom of "Wet Storage
Area" (if excavation was performed) = 84.0 EXCAVATED

Pond SB1: Sediment Basin

Inflow = 19.61 cfs @ 11.96 hrs, Volume= 1.391 af
 Outflow = 14.46 cfs @ 12.11 hrs, Volume= 1.389 af, Atten= 26%, Lag= 8.7 min
 Primary = 9.89 cfs @ 12.11 hrs, Volume= 1.333 af
 Secondary = 4.57 cfs @ 12.11 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 5.00-45.00 hrs, dt= 0.10 hrs

Starting Elev= 88.50' Storage= 19,907 cf

Peak Elev= 90.85' Storage= 37,416 cf

Plug-Flow detention time= 270.5 min calculated for 0.930 af (67% of inflow)

Storage and wetted areas determined by Irregular sections

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
84.00	2,907	287.0	0	0	2,907
85.00	3,538	303.0	3,217	3,217	3,714
86.00	4,196	317.0	3,862	7,080	4,471
87.00	4,877	331.0	4,532	11,612	5,262
88.00	5,591	346.0	5,230	16,842	6,139
89.00	6,685	367.0	6,130	22,972	7,382
90.00	7,842	389.0	7,256	30,228	8,759
91.00	9,067	409.0	8,447	38,675	10,090
92.00	10,334	429.0	9,694	48,368	11,488

Primary OutFlow (Free Discharge)

- 1=Culvert
- 2=Orifice/Grate
- 3=Orifice/Grate

Secondary OutFlow (Free Discharge)

- 4=Broad-Crested Rectangular Weir

#	Routing	Invert	Outlet Devices
1	Primary	88.50'	18.0" x 40.0' long Culvert Ke= 0.500 Outlet Invert= 88.40' S= 0.0025 '/' n= 0.010 Cc= 0.900
2	Device 1	88.50'	6.0" Vert. Orifice/Grate X 2.00 Limited to weir flow C= 0.600
3	Device 1	90.50'	48.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Secondary	90.60'	15.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2. Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65

Pond SB1: Sediment Basin

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
84.00	2,907	2,907	0
84.20	3,033	3,068	643
84.40	3,159	3,230	1,287
84.60	3,286	3,391	1,930
84.80	3,412	3,553	2,574
85.00	3,538	3,714	3,217
85.20	3,670	3,865	3,990
85.40	3,801	4,017	4,762
85.60	3,933	4,168	5,535
85.80	4,064	4,320	6,307
86.00	4,196	4,471	7,080
86.20	4,332	4,629	7,986
86.40	4,468	4,788	8,893
86.60	4,605	4,946	9,799
86.80	4,741	5,104	10,705
87.00	4,877	5,262	11,612
87.20	5,020	5,438	12,658
87.40	5,163	5,613	13,704
87.60	5,305	5,788	14,750
87.80	5,448	5,963	15,796
88.00	5,591	6,139	16,842
88.20	5,810	6,387	18,068
88.40	6,029	6,636	19,294
88.60	6,247	6,885	20,520
88.80	6,466	7,134	21,746
89.00	6,685	7,382	22,972
89.20	6,916	7,658	24,423
89.40	7,148	7,933	25,874
89.60	7,379	8,208	27,325
89.80	7,611	8,483	28,776
90.00	7,842	8,759	30,228
90.20	8,087	9,025	31,917
90.40	8,332	9,291	33,606
90.60	8,577	9,558	35,296
90.80	8,822	9,824	36,985
91.00	9,067	10,090	38,675
91.20	9,320	10,370	40,613
91.40	9,574	10,649	42,552
91.60	9,827	10,929	44,491
91.80	10,081	11,208	46,429
92.00	10,334	11,488	48,368

Pond SB1: Sediment Basin

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
5.00	0.00	19,907	88.50	0.00	0.00	0.00
6.00	0.10	20,172	88.54	0.01	0.01	0.00
7.00	0.14	20,529	88.60	0.04	0.04	0.00
8.00	0.18	20,886	88.66	0.09	0.09	0.00
9.00	0.29	21,260	88.72	0.17	0.17	0.00
10.00	0.41	21,644	88.78	0.29	0.29	0.00
11.00	0.79	22,290	88.89	0.53	0.53	0.00
12.00	18.91	35,791	90.66	5.81	5.25	0.56
13.00	1.74	34,076	90.46	2.47	2.47	0.00
14.00	0.97	30,364	90.02	2.13	2.13	0.00
15.00	0.74	26,586	89.50	1.64	1.64	0.00
16.00	0.57	23,909	89.13	1.16	1.16	0.00
17.00	0.49	22,591	88.94	0.66	0.66	0.00
18.00	0.44	22,223	88.88	0.50	0.50	0.00
19.00	0.38	22,034	88.85	0.43	0.43	0.00
20.00	0.32	21,873	88.82	0.36	0.36	0.00
21.00	0.30	21,760	88.80	0.32	0.32	0.00
22.00	0.29	21,701	88.79	0.30	0.30	0.00
23.00	0.28	21,655	88.79	0.29	0.29	0.00
24.00	0.26	21,612	88.78	0.28	0.28	0.00
25.00	0.02	21,100	88.69	0.14	0.14	0.00
26.00	0.01	20,785	88.64	0.07	0.07	0.00
27.00	0.01	20,604	88.61	0.05	0.05	0.00
28.00	0.00	20,476	88.59	0.03	0.03	0.00
29.00	0.00	20,385	88.58	0.02	0.02	0.00
30.00	0.00	20,321	88.57	0.02	0.02	0.00
31.00	0.00	20,277	88.56	0.01	0.01	0.00
32.00	0.00	20,241	88.55	0.01	0.01	0.00
33.00	0.00	20,209	88.55	0.01	0.01	0.00
34.00	0.00	20,179	88.54	0.01	0.01	0.00
35.00	0.00	20,152	88.54	0.01	0.01	0.00
36.00	0.00	20,127	88.54	0.01	0.01	0.00
37.00	0.00	20,104	88.53	0.01	0.01	0.00
38.00	0.00	20,084	88.53	0.01	0.01	0.00
39.00	0.00	20,066	88.53	0.00	0.00	0.00
40.00	0.00	20,050	88.52	0.00	0.00	0.00
41.00	0.00	20,035	88.52	0.00	0.00	0.00
42.00	0.00	20,022	88.52	0.00	0.00	0.00
43.00	0.00	20,010	88.52	0.00	0.00	0.00
44.00	0.00	19,999	88.52	0.00	0.00	0.00
45.00	0.00	19,990	88.51	0.00	0.00	0.00

6.4"

Sediment Basin BMP Bruce's Auto Body Type II 24-hr Rainfall=~~5.80~~" (AMC=2)

Prepared by LandMark Design Group, Inc.

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HydroCAD® 5.95 s/n 001766 © 1986-2001 Applied Microcomputer Systems

07/11/2001

Pond SB1: Sediment Basin

Inflow = 39.30 cfs @ 11.96 hrs, Volume= 2.740 af
 Outflow = 36.86 cfs @ 12.01 hrs, Volume= 2.738 af, Atten= 6%, Lag= 3.3 min
 Primary = 12.16 cfs @ 12.01 hrs, Volume= 2.212 af
 Secondary = 24.70 cfs @ 12.01 hrs, Volume= 0.525 af

Routing by Stor-Ind method, Time Span= 5.00-45.00 hrs, dt= 0.10 hrs

Starting Elev= 88.50' Storage= 19,907 cf

Peak Elev= 91.32' Storage= 41,786 cf

Plug-Flow detention time= 170.4 min calculated for 2.281 af (83% of inflow)

Storage and wetted areas determined by Irregular sections

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
84.00	2,907	287.0	0	0	2,907
85.00	3,538	303.0	3,217	3,217	3,714
86.00	4,196	317.0	3,862	7,080	4,471
87.00	4,877	331.0	4,532	11,612	5,262
88.00	5,591	346.0	5,230	16,842	6,139
89.00	6,685	367.0	6,130	22,972	7,382
90.00	7,842	389.0	7,256	30,228	8,759
91.00	9,067	409.0	8,447	38,675	10,090
92.00	10,334	429.0	9,694	48,368	11,488

Primary OutFlow (Free Discharge)

- ← 1=Culvert
- ↑ 2=Orifice/Grate
- └ 3=Orifice/Grate

Secondary OutFlow (Free Discharge)

- ← 4=Broad-Crested Rectangular Weir

#	Routing	Invert	Outlet Devices
1	Primary	88.50'	18.0" x 40.0' long Culvert Ke= 0.500 Outlet Invert= 88.40' S= 0.0025 ' n= 0.010 Cc= 0.900
2	Device 1	88.50'	6.0" Vert. Orifice/Grate X 2.00 Limited to weir flow C= 0.600
3	Device 1	90.50'	48.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Secondary	90.60'	15.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2. Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65

Pond SB1: Sediment Basin

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
5.00	0.00	19,907	88.50	0.00	0.00	0.00
6.00	0.24	20,522	88.60	0.04	0.04	0.00
7.00	0.33	21,208	88.71	0.16	0.16	0.00
8.00	0.40	21,687	88.79	0.30	0.30	0.00
9.00	0.62	22,141	88.86	0.47	0.47	0.00
10.00	0.87	22,640	88.95	0.69	0.69	0.00
11.00	1.77	23,862	89.12	1.15	1.15	0.00
12.00	37.46	41,762	91.32	36.73	12.15	24.58
13.00	3.48	35,229	90.59	3.73	3.73	0.00
14.00	1.81	33,852	90.43	2.45	2.45	0.00
15.00	1.36	31,036	90.10	2.19	2.19	0.00
16.00	1.05	28,065	89.70	1.84	1.84	0.00
17.00	0.91	25,586	89.36	1.48	1.48	0.00
18.00	0.80	23,923	89.13	1.17	1.17	0.00
19.00	0.69	22,979	89.00	0.85	0.85	0.00
20.00	0.59	22,596	88.94	0.67	0.67	0.00
21.00	0.55	22,407	88.91	0.58	0.58	0.00
22.00	0.53	22,329	88.90	0.55	0.55	0.00
23.00	0.51	22,276	88.89	0.52	0.52	0.00
24.00	0.47	22,224	88.88	0.50	0.50	0.00
25.00	0.02	21,365	88.74	0.20	0.20	0.00
26.00	0.01	20,917	88.66	0.10	0.10	0.00
27.00	0.01	20,689	88.63	0.06	0.06	0.00
28.00	0.01	20,537	88.60	0.04	0.04	0.00
29.00	0.00	20,428	88.59	0.03	0.03	0.00
30.00	0.00	20,352	88.57	0.02	0.02	0.00
31.00	0.00	20,298	88.56	0.01	0.01	0.00
32.00	0.00	20,260	88.56	0.01	0.01	0.00
33.00	0.00	20,226	88.55	0.01	0.01	0.00
34.00	0.00	20,195	88.55	0.01	0.01	0.00
35.00	0.00	20,166	88.54	0.01	0.01	0.00
36.00	0.00	20,140	88.54	0.01	0.01	0.00
37.00	0.00	20,116	88.53	0.01	0.01	0.00
38.00	0.00	20,095	88.53	0.01	0.01	0.00
39.00	0.00	20,076	88.53	0.01	0.01	0.00
40.00	0.00	20,058	88.52	0.00	0.00	0.00
41.00	0.00	20,043	88.52	0.00	0.00	0.00
42.00	0.00	20,029	88.52	0.00	0.00	0.00
43.00	0.00	20,016	88.52	0.00	0.00	0.00
44.00	0.00	20,005	88.52	0.00	0.00	0.00
45.00	0.00	19,995	88.51	0.00	0.00	0.00

July 19, 2001

Mr. Paul Hutchins
Bruce's Super Body Shops
2551 Homeview Drive
Richmond, Virginia 23294

Subject: Project 01132057, Geotechnical Engineering Report,
Bruce's Super Body Shop, Olde Towne Road near U. S.
Route 60, James City County, Virginia

Dear Mr. Hutchins:

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

INTRODUCTION

The scope of this study is as defined in our proposal No. 01132057 dated June 15, 2001 and accepted June 19, 2001. Our services included subsurface exploration, field engineering, soil laboratory testing and development of geotechnical engineering recommendations. The objective of this study is to evaluate the subsurface conditions and to provide recommendations regarding the design of foundations, earthwork, asphalt pavement, and stormwater detention ponds (BMP) for this project.

SITE DESCRIPTION

The site is located east of the existing AMF Williamsburg Lanes bowling facility and south of the existing Exxon station on Olde Towne Road in James City County, Virginia. The site is generally a level, sparsely wooded area, with grades from about El 107 along U.S. Route 60 to the east to about El 91 along the western boundary. To service the development of this site, an existing BMP pond, which is south of the AMF bowling facility, is to be enlarged and a new BMP pond will be added in the southwest corner of the property. We understand that both BMP ponds, originally proposed as infiltration ponds, will be retention ponds.

We obtained the site information through our site visits and from an undated topographic site plan prepared by LandMark Design Group.

PROPOSED CONSTRUCTION

The proposed construction is a new automotive repair facility about 185 by 130 ft in plan dimension. Based on information provided by the structural engineer, Steve Applegate, P.E., the one-story, high-bay building is to be a column and wall bearing structure with column loads of up to 150 kips and wall loads of about 3 kips/ft. We have anticipated that approximately 6 ft of fill will be required to grade the site in the parking area and approximately 3 ft of fill will be required in the building pad area. On-site parking for cars and light trucks is to be provided. The existing BMP pond on the AMF site is to be modified to include development from this site. Modifications include deepening the pond approximately 6 ft. This will require regrading the existing slopes to about 2.5H:1V.

SUBSURFACE CONDITIONS

Data Collection Techniques

Fishburne Drilling, Inc. of Chesapeake, Virginia drilled seven borings at this site under our observation. In addition, personnel from our office drilled four hand auger probes during our site visits. Specific observations, remarks, and logs for the borings and hand augers, classification criteria, and sampling protocols are included in Appendix A. Approximate boring and hand auger locations are shown in Figures A1 and A2, respectively, in Appendix A. Soil samples will be retained up to 45 days beyond the issuance of this report, unless other disposition is requested.

Our geotechnical laboratory conducted tests on selected samples obtained in the borings and hand augers. This testing aided in the classification of soils encountered in the subsurface exploration and provided data for use in the development of foundation and earthwork recommendations. The natural moisture content values of selected soil samples are shown in the logs in Appendix A. The results of the remaining laboratory tests are presented in Appendix B.

Generalized Subsurface Stratigraphy

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

Topsoil: Topsoil, forest litter and rootmat were encountered at all the boring locations and in Hand Auger HA-2, with depths varying from approximately 0.4 to 1.4 feet.

Stratum A: Stratum A consists of FILL soils encountered in Boring B-7 and Hand Augers HA-2, HA-3, and HA-4 to depths of 0.8 to 6.0 ft. The soils consist of medium to hard consistency lean clay FILL containing gravel, asphalt fragments, root fragments, and other organic matter.

Stratum B: Stratum B consists of generally loose to firm density CLAYEY SAND (SC) and SILTY SAND (SM) alluvial soils. This stratum was typically encountered below the ground surface and Stratum C, as well as interlayered with the soils of Stratum C. This stratum represents the coarse-grained soils of the Windsor Formation.

Laboratory tests conducted on samples representing Stratum B indicate the fines portion of these soils exhibit low to medium potential for moisture-related volume change (shrink/swell behavior).

Stratum C: Stratum C generally consists of soft to very stiff consistency FAT CLAY (CH) and LEAN CLAY (CL). This stratum was typically encountered interlayered with the soils of Stratum B. This stratum represents the fine-grained soils of the Windsor Formation.

Laboratory tests conducted on samples representing Stratum C indicate these soils exhibit medium to high potential for moisture-related volume change (shrink/swell behavior).

A California Bearing Ratio (CBR) test was conducted on a bulk sample of lean clay from this stratum. A laboratory CBR value of 16.2 with a swell value of 0.2 percent was obtained for this soil type. Natural moisture content values of Stratum C soils tested in our laboratory varied from 21.0 to 25.4 percent. The optimum moisture content for compaction of these soils is 10.3 percent.

Ground Water

Water level readings obtained in the borings during and after completion are noted in the logs. We encountered ground water during drilling in two of the borings (B-1 and B-6) at depths of approximately 18.0 and 9.0 ft, respectively, between El 83.3 to 82.3. Following removal of the augers, Borings B-1 through B-5 caved at depths of approximately 14.3 to 18.0 ft. Note that Borings B-6 and B-7 did cave dry at depths of approximately 7.0 to

7.8 ft. Approximately 21 to 24 hours after completion of boring activities, water level readings were obtained in open bore holes at depths of 5.8 to 15.9 ft. The borings and hand augers were backfilled upon completion for safety.

Ground water levels on the logs show our estimate of the hydrostatic water table at the time the borings were drilled. Some of the higher water levels recorded on the logs may represent a perched ground water condition. Perched ground water can occur when surface water infiltration is retarded by a lower permeability layer, such as the clays of Stratum C. Perched ground water could occur at other locations on site and at higher elevations than those recorded on the logs. Fluctuations in the hydrostatic water table should be anticipated depending upon variations in precipitation, surface runoff, pumping, evaporation, stream levels, and similar factors.

Note that perched water was encountered over the Stratum C clays in Hand Auger Probes HA-3 and HA-4, performed in the floor of the existing BMP pond. Percolation tests were not performed in the area due to the perched water. We believe that the fine-grained soils of Stratum C would have exhibited a very slow percolation rate, unsuited for an infiltration pond.

GEOTECHNICAL RECOMMENDATIONS

Our geotechnical engineering analysis was based on the information developed from our subsurface exploration and soil laboratory testing, along with the project development plans, site plans and structural loading furnished to our office. Shallow spread footings are recommended for support of the proposed automotive repair facility based on our analysis. Detailed recommendations are provided in the following sections of the report.

Earthwork and Grading

Subgrades to receive compacted structural fill for building or pavement support should be stripped of vegetation, topsoil, and organic matter. Our subsurface exploration indicated topsoil to depths of 0.4 to 1.4 ft below the ground surface. However, stripping of wooded or previously cultivated sites typically results in some disturbance and contamination of near-surface soils, particularly during periods of wet weather. Accordingly, we recommend an average topsoil stripping depth of 1.0 ft be considered for the site during the project planning, with possibly thicker depths of topsoil removal in localized areas.

Loose density natural sands and soft consistency clays and silts were encountered in Borings B-1 and B-4 to depths of about 2 to 3 ft below the ground surface. These near-

surface soils may not be considered suitable for support of the proposed structure. In fill areas, these soils should be undercut to expose suitable subgrade soils. This undercut should extend at least 4 ft horizontally beyond the projected building dimensions. Before any undercutting below design subgrade level, the stripped subgrades should be proofrolled with a loaded dump truck (or motorgrader) to evaluate their suitability to support the compacted structural fill. Areas that exhibit excessive pumping, weaving, or rutting should be excavated and replaced with additional compacted structural fill. Final pavement subgrades should also be proofrolled to evaluate their suitability to support the pavement. The Geotechnical Engineer should evaluate the suitability of the actual fill subgrades in the field. Evaluation techniques may include probing with a penetrometer, observation of proofrolling, drilling hand augers, observing test pits, or a combination of these methods.

The soft or loose near-surface soils could possibly be recompacted if earthwork is performed in the drier, warmer summer months. However, some scarifying and drying may be needed to compact these soils.

If stripping and earthwork operations are performed during an extended period of warm, dry weather, the non-organic portions of the undercut materials could possibly be reused as compacted structural fill. The use of these materials as compacted structural fill will depend on the soil moisture content, and the Contractor's ability to limit contamination of these materials with organic matter during stripping and undercutting.

Undercut volumes should be evaluated by cross sectioning. Other methods of calculating volumes of undercut, such as counting trucks, are less accurate and generally result in additional expense.

Compacted structural fill should consist of material classifying CH, CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D-2487. Non-organic, on-site soils are expected to meet this criterion. If off-site borrow soils are needed, they should classify SC, SM, SP, SW, GC, GM, GP or GW per ASTM D-2487.

Successful reuse of the excavated, on-site soils as compacted structural fill will depend on the natural moisture content of soils encountered during excavation. Natural moisture content values of Stratum C soils tested in our laboratory varied from about 10.7 to 15.1 percent above optimum for the soil types tested. Accordingly, we anticipate that scarifying and drying of portions of the on-site soils will be needed before the recommended compaction can be achieved. Drying of these soils will likely result in some delay, and drying may not be possible during late fall, winter and early spring.

Accordingly, we recommend that the earthwork be performed during the warmer, drier times of the year from about May to October.

Compacted structural fill should be placed in maximum 8-inch thick horizontal, loose lifts and should be compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor. Compacted structural fill subgrades steeper than 4H:1V should be benched to allow placement of horizontal lifts.

Compacted structural fill should extend at least 4.0 ft beyond the building perimeter and at least 1.0 ft beyond the pavement limits. Compacted structural fill slopes should not be designed and built steeper than 2.5H:1V.

Spread Footings

Shallow spread footings are considered suitable for support of the proposed structure. Footings should be supported on suitable natural soils of Strata B and C, and on compacted structural fill. Footings may be designed for a net allowable soil bearing pressure of 2,000 psf. This bearing pressure provides a factor of safety of at least 3.0 against general shear failure. Minimum widths of 16 and 24 inches should be maintained for wall and column footings, respectively, for shear considerations.

Interior footing grades may be set at nominal depths below the floor slab. The laboratory testing performed on selected samples of Stratum C indicate that the medium to high plasticity soils of this stratum exhibit a medium to high potential for moisture-related volume change. Accordingly, we recommend exterior footings be set a minimum depth of 3 ft below final exterior grade. This depth is also considered adequate for frost protection.

Settlements of shallow foundations supported on suitable natural soils and on properly placed compacted structural fill are not expected to exceed about 1.0 inch. Differential settlements between similarly loaded footings are not expected to exceed about half this value.

Footing concrete should be placed as soon as possible after excavation to limit the potential for moisture changes at foundation levels. Similarly, foundation walls should be backfilled as soon as possible to reduce the potential for infiltration of water into the soils beneath the footings. Backfill should be placed as compacted structural fill.

Final grades should allow positive drainage away from the structure, so that water does not accumulate around the foundation. In addition, gutters and downspouts should be provided to collect and convey roof water well away from the building. Trees should be removed from within 25 ft of the building and should not be planted within the same area.

We have evaluated the Seismic Site Coefficient (S) for this site according to BOCA 1610.3.1 (1999). We recommend an S value of 1.2 be used for seismic design at this site.

Floor Slabs

Floor slabs may be supported on suitable natural soils or on compacted structural fill. Floor slabs may be designed using a modulus of subgrade reaction, k, of 240 pci.

Floor slab subgrades should be recompacted immediately before placing moisture barrier materials to repair any disturbance that may occur due to construction operations. Footing and utility excavations should be backfilled with compacted structural fill since floors will be slab on grade. Compaction requirements are the same as described herein compacted structural fill.

A 4-inch crushed stone or washed gravel capillary moisture barrier should underlie floor slabs on grade. Moisture barrier material should consist of VDOT No. 57 crushed stone and should be compacted in place by at least two passes with suitable vibratory compaction equipment.

Pavements

Pavement subgrades should be prepared, and compacted structural fill for pavement support should be placed and compacted as previously described herein. Dense-graded aggregate placed as pavement base course should be compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor. Dense-graded aggregate should be placed in maximum 8-inch thick loose lifts.

The recommended pavement sections were designed according to the VDOT Vaswani design method for flexible pavements based on a design CBR value of 10.8. This design CBR value represents two-thirds of the average laboratory value. A resiliency factor of 2.5 was also used in this design method.

The traffic volumes considered in our analysis were 1600 vehicles per day in the driveways and service roadways and 400 vehicles per day in automobile parking spaces. These traffic volumes include approximately 20 percent heavy truck traffic and have been adjusted accordingly.

Our analysis considers proper grading to provide runoff from the pavement surface and beyond the limits of paved areas will be provided. The following pavement sections are recommended:

Automobile Parking Areas - Type I Section

Asphalt Concrete Surface Course, VDOT SM-2A	= 2 inches
Dense-Graded Aggregate Base Course, VDOT 21B	= 8 inches

Driveways and Service Roadways - Type II Section

Asphalt Concrete Surface Course, VDOT SM-2A	= 1½ inches
Asphalt Concrete Base Course, VDOT BM-3	= 3 inches
Dense-Graded Aggregate Base Course, VDOT 21B	= 8 inches

The Type I Section should be used only in automobile parking areas. The Type II Section should be used where truck traffic or high traffic volumes are anticipated.

We recommend that reinforced concrete pavement be used in dumpster pad and dumpster approach pad areas. These pads may be designed based on a modulus of subgrade reaction value, k, of 240 pci.

Adequate control of surface drainage will be a very important consideration for the overall development related to the pavement design. Pavement drainage ditches should be provided in cut areas where grades slope toward the pavement. The invert grade of ditches should be at least 1 ft below the pavement subgrade level. The area surrounding pavements should be graded to direct surface water away from paved areas. Utility excavations within pavement areas should be backfilled with compacted structural fill.

Existing and New BMPs

Development of the existing BMP pond south of the bowling facility includes lowering the floor of the pond from about El 85 to El 79, and regrading the existing 2H:1V slopes

to 3H:1V. The top of the regraded slopes will be about 10 ft from the south wall of the bowling facility.

Based on the soil types encountered in the hand augers performed adjacent to the building and in the existing pond floor, ~~we believe that the proposed development to the existing BMP pond will not adversely affect the existing building.~~ Slopes should not be graded steeper than 3H:1V and the top of the slope should be at least 10ft from the building.

ok per plan - plan acceptable

The clay soils of Stratum C excavated from the existing BMP pond may be used as a liner in the new BMP pond to be constructed east of the existing pond. The liner soils should be placed in a minimum 6 inch thick compacted layer. Liner soils should be compacted to at least 93 percent of maximum dry density at a moisture content of -1 to +3 percent of optimum. ~~The compacted liner soil should be covered by a layer of topsoil at least 12 inches thick to reduce drying and cracking of the liner soils.~~

The soils excavated for the new and reconstructed BMPs may also be used as compacted structural fill where they meet the recommendations provided in the Earthwork section of this report. It may be necessary to scarify and dry some of these soils before adequate compaction can be obtained.

CONSTRUCTION CONSIDERATIONS

Earthwork

The soils at this site primarily consist of moderately to highly plastic clays and silts. These soils are moisture sensitive and will readily become disturbed by construction traffic on exposed surfaces of wet subgrades. We recommend avoiding wet weather site preparation and grading activities. If wet weather work is performed, the quantities of disturbed soils to be excavated can be expected to increase.

The on-site soils are susceptible to moisture changes, will be easily disturbed and difficult to compact under wet weather conditions. Drying and reworking of the soils are likely to be difficult during wetter winter months. We recommend that the earthwork phases of this project be performed during the warmer, drier times of the year to limit the potential for disturbance of on-site soils.

Traffic on stripped or undercut subgrades should be limited to reduce disturbance of underlying soils. Also, using lightweight, track-mounted dozer equipment for stripping will limit the disturbance of underlying soils, and may reduce the undercut volume

needed. The Contractor should be responsible for reworking of subgrades and compacted structural fill that were initially considered suitable but were later disturbed by equipment and/or weather.

Site drainage should be provided to maintain subgrades free of water and to avoid saturation and disturbance of the subgrade soils before placing compacted structural fill, pavement base course or moisture barrier material. This will be important during all phases of the construction work. Weakened subgrade soils should be recompact, or removed and replaced as recommended by the Geotechnical Engineer.

Subgrades and the upper portions of compacted structural fills below floor slabs, pavements or other soil-supported structures can be easily disturbed due to weather conditions and construction operations. Accordingly, disturbed areas should be recompact before placing additional fill, moisture barrier or base course materials.

Perched groundwater may be encountered in the building pad area during excavation for utilities, based on water level readings and our observations. Accordingly, temporary dewatering such as trenching and/or pumping from sumps may be needed to control the surface and/or ground water.

Spread Footings

Care should be exercised during excavation for spread footings so that as little disturbance as possible occurs at the foundation level. Loose or soft soils should be carefully cleaned from the bottom of the excavation before placing concrete. Actual footing subgrades should be observed during construction by the Geotechnical Engineer to evaluate whether subgrade soils are as recommended in this report. Where unsuitable soils are encountered in the footing excavations, they should be undercut and replaced with compacted structural fill, lean concrete, or flowable fill. Open-graded crushed stone should not be used to backfill undercut footing excavations.

Engineering Services during Construction

The engineering recommendations provided in this report are based on the information obtained from the subsurface exploration and laboratory testing. However, unlike other engineering materials such as steel and concrete, the extent and properties of geologic materials may vary significantly. Therefore, conditions on the site may vary between the discrete locations observed at the time of our subsurface exploration.

The nature and extent of variations between borings may not become evident until during construction. To account for this variability, professional observation, monitoring and testing of actual subsurface conditions during construction should be provided as an extension of our engineering services. These services will also help in evaluating the Contractor's conformance with the plans and specifications. Because of our unique position to understand the intent of the geotechnical engineering recommendations, retaining us for these services will allow us to provide consistent service through the project construction.

General Specification Recommendations

An allowance should be established to account for possible additional costs that may be required to construct earthwork and foundations as recommended in this report. Additional costs may be incurred for various reasons including variation of soil between borings, greater than anticipated unsuitable soils, need for borrow fill material, wet on-site soils, obstructions, rock excavation, temporary dewatering, etc.

We recommend that the construction contract include unit prices for scarifying and drying wet and/or loose subgrade soils, and provide an allowance for this work. In addition, the construction contract should include an allowance for undercutting soft or loose, near-surface soils and replacement with compacted structural fill. Add/deduct unit prices should also be established in the contract so adjustments for the actual volume of undercut can be made.

The project specifications should indicate the Contractor's responsibility for providing adequate site drainage during construction. Inadequate drainage will most likely lead to disturbance of soils by construction traffic and increased volume of undercut.

This report may be made available to prospective bidders for informational purposes. We recommend that the project specifications contain the following statement:

"A geotechnical engineering report has been prepared for this project by Schnabel Engineering Associates. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed represent the Geotechnical Engineer's interpretation of the subsurface conditions, tests, and the results of analyses conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, before bidding, independent exploration, tests and analyses. This report may be examined by bidders at the office of the Owner or copies may be obtained from the Owner at nominal charge."

Boring and hand auger data included in Appendix A should be included in the contract documents.

LIMITATIONS

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

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project. Our recommendations are based on information on the site and proposed construction as described in this report. Substantial changes in loads, locations or grades should be brought to our attention so we can modify our recommendations as needed. We would appreciate an opportunity to review the plans and specifications as they pertain to the recommendations contained in this report and to submit our comments to you based on this review.

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

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

Sincerely,
SCHNABEL ENGINEERING ASSOCIATES, INC.



Gregory M. Nataluk, E.I.T.
Senior Project Engineer



Gilbert T. Seese, P.E.
Senior Associate

GMN:GTS:kgr

Appendix A: Subsurface Exploration Data
Appendix B: Soil Laboratory Test results



c: BOB Architects
Attn: Bob Steele

SMA Engineers
Attn: Steve Applegate, P.E.

LandMark Design Group
Attn: Dick Phillips, P.E.

SUBSURFACE EXPLORATION DATA

Subsurface Exploration Procedures
General Notes for Subsurface Exploration Logs
Identification of Soil
Boring Logs, B-1 through B-7
Hand Auger Logs, HA-1 through HA-4
Location Plans, Figures A1 and A2

SUBSURFACE EXPLORATION PROCEDURES

Boring Procedures

Drillers advanced the borings using mud rotary drilling or hollow-stem augers. A plug device was used to block off the center opening in the hollow-stem auger to prevent cuttings from entering the augers during drilling. At the designated depth, drillers removed the plug and performed the Standard Penetration Test. Water or drilling fluid was introduced into the mud rotary borings to maintain an open bore hole when indicated on individual logs. Water level data are indicated on the logs.

Standard Penetration Test Results

The numbers in the Sampling Data column of the boring logs represent Standard Penetration Test (SPT) results. Each number represents the blows needed to drive a 2-inch O.D., 1-3/8 inch I.D. split-spoon sampler 6 inches, using a 140-pound hammer falling 30 inches. The sampler is typically driven a total of 18 inches. The first 6 inches are considered a seating interval. The total of the number of blows for the second and third 6-inch intervals is the SPT "N value". The Standard Penetration Test is conducted according to ASTM D-1586.

Hand Augers

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

Soil Classification Criteria

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

Pocket Penetrometer Results

The values following "PP=" in the sampling data column of the logs represent pocket penetrometer readings. Pocket penetrometer readings provide an estimate of the unconfined compressive strength of fine-grained soils.

Boring and Hand Auger Locations and Elevations

Our personnel staked the borings and hand augers by taping from existing site features and structures. Approximate boring and hand auger locations are shown in Figure A1. Ground surface elevations at the boring and hand auger locations were scaled from the undated site plan by LandMark Design Group. These locations and elevations should be considered no more accurate than the methods and plans used to obtain them.

SCHNABEL ENGINEERING ASSOCIATES, INC.

GENERAL NOTES FOR SUBSURFACE EXPLORATION LOGS

1. Numbers in sampling data column next to Standard Penetration Test (SPT) symbols indicate blows required to drive a 2 inch O.D., 1-3/8 inch I.D. sampling spoon 6 inches using a 140 pound hammer falling 30 inches. The Standard Penetration Test (SPT) N value is the number of blows required to drive the sampler 12 inches, after a 6 inch seating interval. The Standard Penetration Test is performed in accordance with ASTM-1586.
2. Visual classification of soil is in accordance with terminology set forth in "Identification of Soil." The ASTM D-2487 group symbols (e.g. CL) shown in the classification column are based on visual observations.
3. Estimated ground water levels indicated by ▽; these levels are only estimates from available data and may vary with precipitation, porosity of the soil, site topography, etc.
4. Refusal at the surface of rock, boulder, or obstruction is defined as an SPT resistance of 100 blows for 2 inches or less of penetration.
5. The logs and related information depict subsurface conditions only at the specific locations and at the particular time when drilled or excavated. Soil conditions at other locations may differ from conditions occurring at these locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at the test boring, test pit and/or hand auger locations.
6. The stratification lines represent the approximate boundary between soil and rock types as obtained from the subsurface exploration. Some variation may also be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on these logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
7. Key to symbols and abbreviations:

■ 5+10+15	Standard Penetration Test
■ 3T 24/18	2" or 3" Undisturbed Tube Sample Length Pushed/Recovery (in inches)
W	Water Content
PM	Presssuremeter Test (in Remarks Column)
Do	Ditto
WOW	Water Observation Well
PP	Pocket Penetrometer Reading (TSF)
FID (OVA)	Flame Ionization Detector Reading (PPM)
PID	Photoionization Detector Reading (PPM)
GP	Geostick Penetration Reading (inches)

SCHNABEL ENGINEERING ASSOCIATES, INC.

Consulting Geotechnical Engineers

IDENTIFICATION OF SOILS

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

SYMBOL GROUP NAME

Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels – More than 50% of coarse fraction retained on No. 4 sieve Coarse, ¾" to 3" Fine, No. 4 to ¾"	Clean Gravels Less than 5% fines	GW	Well graded gravel
		Gravels with fines More than 12% fines	GP	Poorly graded gravel
			GM	Silty gravel
	Sands – 50% or more of coarse fraction passes No. 4 sieve Coarse, No. 40 to No. 4 Medium, No. 40 to No. 10 Fine, No. 200 to No. 40	Clean Sands Less than 5% fines	GC	Clayey gravel
			SW	Well-graded sand
		Sands with fines More than 12% fines	SP	Poorly graded sand
SM	Silty sand			
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays – Liquid Limit less than 50 Low to medium plasticity	Inorganic	SC	Clayey sand
			CL	Lean clay
		Organic	ML	Silt
			OL	Organic clay
	Silts and Clays – Liquid Limit 50 or more Medium to high plasticity	Inorganic	OH	Organic silt
			CH	Fat clay
		Organic	MH	Elastic silt
			OH	Organic clay
Highly Organic Soils	Primarily organic matter, dark in color and organic odor	PT	Organic silt	
			Peat	

II. DEFINITION OF MINOR SOIL COMPONENT PROPORTIONS

Examples

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

III. GLOSSARY OF MISCELLANEOUS TERMS

- SYMBOLS** Unified Soil Classification Symbols are shown above as group symbols. Dual symbols are used for borderline classifications.
- BOULDERS & COBBLES** Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inch size.
- DISINTEGRATED ROCK** Residual rock materials with a standard penetration resistance (SPT) between 60 blows per foot and refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.
- ROCK FRAGMENTS** Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.
- QUARTZ** A hard silica mineral often found in residual soils.
- IRONITE** Iron oxide deposited within a soil layer forming cemented deposits.
- CEMENTED SAND** Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other materials.
- MICA** A soft plate of silica mineral found in many rocks, and in residual or transported soil derived therefrom.
- ORGANIC MATERIALS** Topsoil Surface soils that support plant life and which contain considerable amounts of organic matter;
 Organic Matter Soil containing organic colloids throughout its structure;
 Lignite Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).
- FILL** Man-made deposit containing soil, rock and often foreign matter.
- PROBABLE FILL** Soils which contain no visually detected foreign matter but which are suspect with regard to origin.
- LENSES** 0 to ½ inch seam of minor soil component.
- LAYERS** ½ to 12 inch seam of minor soil component.
- POCKET** Discontinuous body of minor soil component.
- COLOR SHADES** Light to dark to indicate substantial difference in color.
- MOISTURE CONDITIONS** Wet, moist or dry to indicate visual appearance of specimen.



TEST BORING LOG
 Project: Bruce's Super Body Shop
 Olde Towne Road and Richmond Road
 James City County, Virginia

Boring Number: **B-1**
 Contract Number: 01132057
 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
 Chesapeake, Virginia
Boring Foreman: R. Ross
Drilling Method: 2 15/16" O.D. Roller Bit (Mud Rotary)
Drilling Equipment: CME-75
SEA Representative: J. Hollowell
Dates Started: 6/19/01 **Finished:** 6/19/01
Location: See Location Plan, Figure A2
Ground Surface Elevation: 101.3± (feet)

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
Encountered	6/19	--	18.0'	---	---
Completion	6/19	10:25	---	---	---
Casing Pulled	6/19	10:29	3.0'	---	17.5'
24 hours	6/20	11:12	15.4'	---	15.4'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.9	Cultivated topsoil		100.4	B		1+2+1+1		
2.0	Fine clayey sand, moist - dark brown	SC	99.3			SPT		
	Fine to coarse sandy fat clay					1+1+2+1	PP=2.25tsf	
	do, brown, tan and red brown	CH		C	5	SPT	PP=3.25tsf	
	do, tan, red brown and brown					3+5+8+8		
8.0	Fine clayey sand, moist - brown		93.3			SPT	PP=3.5tsf	
						11+13+15+14		
						SPT		
		SC				6+6+8+10		WINDSOR FORMATION
						SPT		
				B		5+9+11+10		
						SPT		
17.0	Fine silty sand, wet - red brown		84.3					
		SM				6+13+10+10		
20.0	Boring Terminated at 20.0 ft		81.3			SPT		

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:
 1. Boring backfilled upon 24 hour ground water measurement.

Boring Contractor: Fishburne Drilling, Inc.
 Chesapeake, Virginia
Boring Foreman: R. Ross
Drilling Method: 2 15/16" O.D. Roller Bit (Mud Rotary)
Drilling Equipment: CME-75
SEA Representative: J. Hollowell
Dates Started: 6/19/01 **Finished:** 6/19/01
Location: See Location Plan, Figure A2
Ground Surface Elevation: 98.9± (feet)

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
Encountered	6/19	--	--	--	--
Completion	6/19	11:33	--	--	--
Casing Pulled	6/19	11:37	5.5'	--	17.6'
24 hours	6/20	11:15	14.0'	--	14.8'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS	
					DEPTH	DATA			
0.7	Forest litter, rootmat and topsoil		98.2			2+3+3+6			
	Lean clay, with sand, moist - brown and tan	CL	98.2	C		SPT	PP=3.5tsf	WINDSOR FORMATION	
	do, brown, tan and red brown					4+7+10+12	PP=74.5tsf		
4.0	Fine to medium clayey sand, moist - red brown, tan and brown	SC	94.9	5		SPT			
						5+9+11+12			
						13+10+13+12			
8.0	Fine silty sand, moist - red brown and brown	SM	90.9	B		SPT			
	do, contains clayey sand pockets					6+9+7+9			
						10	SPT		
						15	SPT		6+6+6+8
	do, brown					SPT			
20.0	Boring Terminated at 20.0 ft		78.9		20	SPT			

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:

- Boring backfilled upon 24 hour ground water measurement.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: R. Ross Drilling Method: 2 15/16" O.D. Roller Bit (Mud Rotary) Drilling Equipment: CME-75 SEA Representative: J. Hollowell Dates Started: 6/19/01 Finished: 6/19/01 Location: See Location Plan, Figure A1 Ground Surface Elevation: 102.1± (feet)	Groundwater Observations					
	Date	Time	Depth	Casing	Caved	
	Encountered	6/19	--	---	---	---
	Completion	6/19	12:07	---	---	---
	Casing Pulled	6/19	12:15	7.0'	---	17.0'
	24 hours	6/20	11:22	14.3'	---	14.3'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.4	Topsoil		101.7			3+4+4+4		
2.0	Fine clayey sand, moist - brown	SC	100.1	B		SPT	PP=3.0tsf	
	Lean clay with sand, contains root fragments, moist - brown	CL		C		5+6+7+8		
					5	SPT	PP=2.75tsf	
						2+3+3+2		
6.0	Fine clayey sand, moist - brown, tan and red brown		96.1			SPT		
	do, red brown and brown					8+9+11+12		
						SPT		
					10	SPT		
		SC						WINDSOR FORMATION
	do, contains silty sand lenses			B		6+8+10+9		
						SPT		
					15			
17.0	Fine silty sand, moist - red brown and brown	SM	85.1			6+8+10+11		
						SPT		
20.0	Boring Terminated at 20.0 ft		82.1		20			

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:

- Boring backfilled upon 24 hour ground water measurement.

Boring Contractor: Fishburne Drilling, Inc.
 Chesapeake, Virginia

Boring Foreman: R. Ross

Drilling Method: 2 15/16" O.D. Roller Bit (Mud Rotary)

Drilling Equipment: CME-75

SEA Representative: J. Hollowell

Dates Started: 6/19/01 **Finished:** 6/19/01

Location: See Location Plan, Figure A1

Ground Surface Elevation: 103.8± (feet)

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
Encountered	6/19	--	--	--	--
Completion	6/19	9:57	--	--	--
Casing Pulled	6/19	10:02	2.9'	--	18.0'
24 hours	6/20	11:50	5.8'	--	15.7'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.9	Cultivated topsoil		102.9			2+2+1+2		
	Lean clay with sand, moist - brown do, red brown and brown	CL		C		SPT 2+5+7+10	PP=1.75tsf PP=3.0tsf	
4.0	Fine to medium clayey sand, moist - brown, red brown and tan	SC	99.8	B	5	SPT 2+3+7+8		
						SPT 9+10+13+11		
8.0	Fine sandy lean clay, moist - red brown and brown	CL	95.8	C	10	SPT 3+4+5+7	PP=1.5tsf	WINDSOR FORMATION
12.0	Fine silty sand, contains clayey sand lenses, moist - red brown and brown	SM	91.8	B	15	7+7+8+8 SPT		
17.0	Fine to medium clayey sand, moist - red brown, tan and brown	SC	86.8			3+4+5+7 SPT		
20.0	Boring Terminated at 20.0 ft		83.8		20			

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:
 1. Boring backfilled upon 24 hour ground water measurement.

Boring Contractor: Fishburne Drilling, Inc.
Chesapeake, Virginia

Boring Foreman: R. Ross

Drilling Method: 2 15/16" O.D. Roller Bit (Mud Rotary)

Drilling Equipment: CME-75

SEA Representative: J. Hollowell

Dates Started: 6/19/01 Finished: 6/19/01

Location: See Location Plan, Figure A1

Ground Surface Elevation: 101.1± (feet)

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
Encountered	6/19	--	--	--	--
Completion	6/19	11:01	--	--	--
Casing Pulled	6/19	11:05	4.8'	--	17.6'
24 hours	6/20	11:45	15.9'	--	16.3'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.7	Topsoil		100.4	B		3+6+5+5		
	Fine clayey sand, moist - dark brown	SC				SPT		
2.0	Lean clay with sand, moist - brown and tan	CL	99.1	C		3+3+3+4	PP=1.0tsf	
						SPT		
4.0	Fine to medium clayey sand, moist - brown and red brown	SC	97.1	B	5	4+6+7+7		
						SPT		
6.0	Fine sandy lean clay, moist - brown and tan	CL	95.1	C		9+9+12+14	PP=45.0tsf	
						SPT		
8.0	Fine clayey sand, moist - brown, red brown and tan	SC	93.1			5+9+7+7		
					10	SPT		WINDSOR FORMATION
12.0	Fine silty sand, moist - red brown and brown		89.1	B		6+5+6+7		
					15	SPT		
	do, red brown	SM				4+5+4+5		
						SPT		
20.0	Boring Terminated at 20.0 ft		81.1		20			

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:
1. Boring backfilled upon 24 hour ground water measurement.



Project: Bruce's Super Body Shop
 Olde Towne Road and Richmond Road
 James City County, Virginia

Boring Number: B-6
Contract Number: 01132057
Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
 Chesapeake, Virginia
Boring Foreman: R. Ross
Drilling Method: 3 3/4" I.D. Hollow Stem Auger
Drilling Equipment: CME-75
SEA Representative: J. Hollowell
Dates Started: 6/19/01 **Finished:** 6/19/01
Location: See Location Plan, Figure A1
Ground Surface Elevation: 91.3± (feet)

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
Encountered	6/19	2:20	9.0'	--	--
Completion	6/19	2:20	DRY	--	--
Casing Pulled	6/19	2:23	DRY	--	7.8'
21 hours	6/20	11:22	DRY	--	7.3'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
1.4	Forest litter, rootmat and topsoil		89.9	B		3+8+5+3		WINDSOR FORMATION
2.0	Fine clayey sand, moist - brown	SC	89.3			SPT	PP=1.0tsf	
	Lean clay with sand, moist - brown	CL		C		2+2+3+4		
4.0	Fine clayey sand, moist - brown, tan and red brown		87.3			SPT		
	do, fine to medium	SC			5	2+2+2+4		
						SPT		
8.0	Fine silty sand, contains lean clay lenses, wet - red brown	SM	83.3	B		4+5+5+6		
						SPT		
10.0	Boring Terminated at 10.0 ft		81.3		10	3+3+4+5		
						SPT		

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:
 1. Boring backfilled upon 21 hour ground water measurement.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: R. Ross Drilling Method: 3 3/4" I.D. Hollow Stem Auger Drilling Equipment: CME-75 SEA Representative: J. Hollowell Dates Started: 6/19/01 Finished: 6/19/01 Location: See Location Plan, Figure A1 Ground Surface Elevation: 102.0± (feet)	Groundwater Observations																																										
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Date</th> <th>Time</th> <th>Depth</th> <th>Casing</th> <th>Caved</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Encountered</td> <td style="text-align: center;">6/19</td> <td style="text-align: center;">--</td> <td style="text-align: center;">---</td> <td style="text-align: center;">---</td> <td style="text-align: center;">---</td> </tr> <tr> <td style="text-align: center;">Completion</td> <td style="text-align: center;">6/19</td> <td style="text-align: center;">1:36</td> <td style="text-align: center;">DRY</td> <td style="text-align: center;">---</td> <td style="text-align: center;">---</td> </tr> <tr> <td style="text-align: center;">Casing Pulled</td> <td style="text-align: center;">6/19</td> <td style="text-align: center;">1:48</td> <td style="text-align: center;">DRY</td> <td style="text-align: center;">--</td> <td style="text-align: center;">7.0'</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Date	Time	Depth	Casing	Caved	Encountered	6/19	--	---	---	---	Completion	6/19	1:36	DRY	---	---	Casing Pulled	6/19	1:48	DRY	--	7.0'																		
	Date	Time	Depth	Casing	Caved																																						
Encountered	6/19	--	---	---	---																																						
Completion	6/19	1:36	DRY	---	---																																						
Casing Pulled	6/19	1:48	DRY	--	7.0'																																						

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.8	Forest litter, rootmat and topsoil		101.2			4+6+9+14		
2.0	Lean clay with sand FILL, contains gravel and root fragments, moist - brown and dark brown	FILL	100.0			SPT		
	Lean clay with sand FILL, moist - brown and tan do, asphalt fragments	FILL		A		12+17+18+26		FILL
						SPT		
					5	37+48+16+22		
						SPT		
6.0	Lean clay with sand, moist - brown	CL	96.0	C		25+22+18+19	PP>4.5tsf	
8.0	Fine to medium silty sand, contains sladed rock fragments, moist - red brown	SM	94.0	B		SPT		WINDSOR FORMATION
						17+19+17+15		
10.0	Boring Terminated at 10.0 ft		92.0		10	SPT		

TEST BORING LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:
 1. Boring backfilled upon 24 hour ground water measurement.

Excavation Equipment: CME-75

Location: See Location Plan, Figure A2

SEA Representative: J. Hollowell

Date: 6/21/01

Ground Surface Elevation: 92.0± (feet)

Groundwater Elevation: Not Encountered

DEPTH (ft)	ELEV. (ft)	STRATA DESCRIPTION	STRATUM	REMARKS
1.8	90.2	Loose density, fine to medium silty sand (SM), wet - dark brown	B	GP=4-1/2"
				GP=1"
	Firm density, fine to coarse clayey sand (SC), moist - brown, red brown and tan	GP=3/4"		
	do, fine	GP=3/4"		
		GP=1/2"		
5.0	87.0	Hand Auger Terminated at 5.0 ft		GP=1-1/4"

TEST PIT LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:

- Hand Auger backfilled upon completion.

Excavation Equipment: CME-75

Location: See Location Plan, Figure A2

SEA Representative: J. Hollowell

Date: 6/21/01

Ground Surface Elevation: 94.0± (feet)

Groundwater Elevation: Not Encountered

DEPTH (ft)	ELEV. (ft)	STRATA DESCRIPTION	STRATUM	REMARKS
0.5	93.5	Topsoil	A	FILL
0.8	93.2	Medium stiff consistency, fine sandy lean clay FILL, contains root fragments and organic matter, moist - brown, dark brown, red brown and tan Firm density, fine to medium silty sand FILL, moist - dark brown		
2.1	91.9	Soft consistency, lean clay with sand FILL, moist - brown, red brown and tan		
2.8	91.2	do, contains silty sand lenses, dark gray and brown Firm density, fine to medium silty sand FILL, contains organic matter, moist - dark brown		
4.8	89.2	do, contains clayey sand pockets, dark brown and brown	B	WINDSOR FORMATION
5.0	89.0	Firm density, fine silty sand (SM), moist - dark brown Hand Auger Terminated at 5.0 ft		

TEST PIT LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:

1. Hand Auger backfilled upon completion.

Excavation Equipment: CME-75
SEA Representative: J. Hollowell
Date: 6/21/01

Location: See Location Plan, Figure A2
Ground Surface Elevation: 84.6± (feet)
Groundwater Elevation: Not Encountered

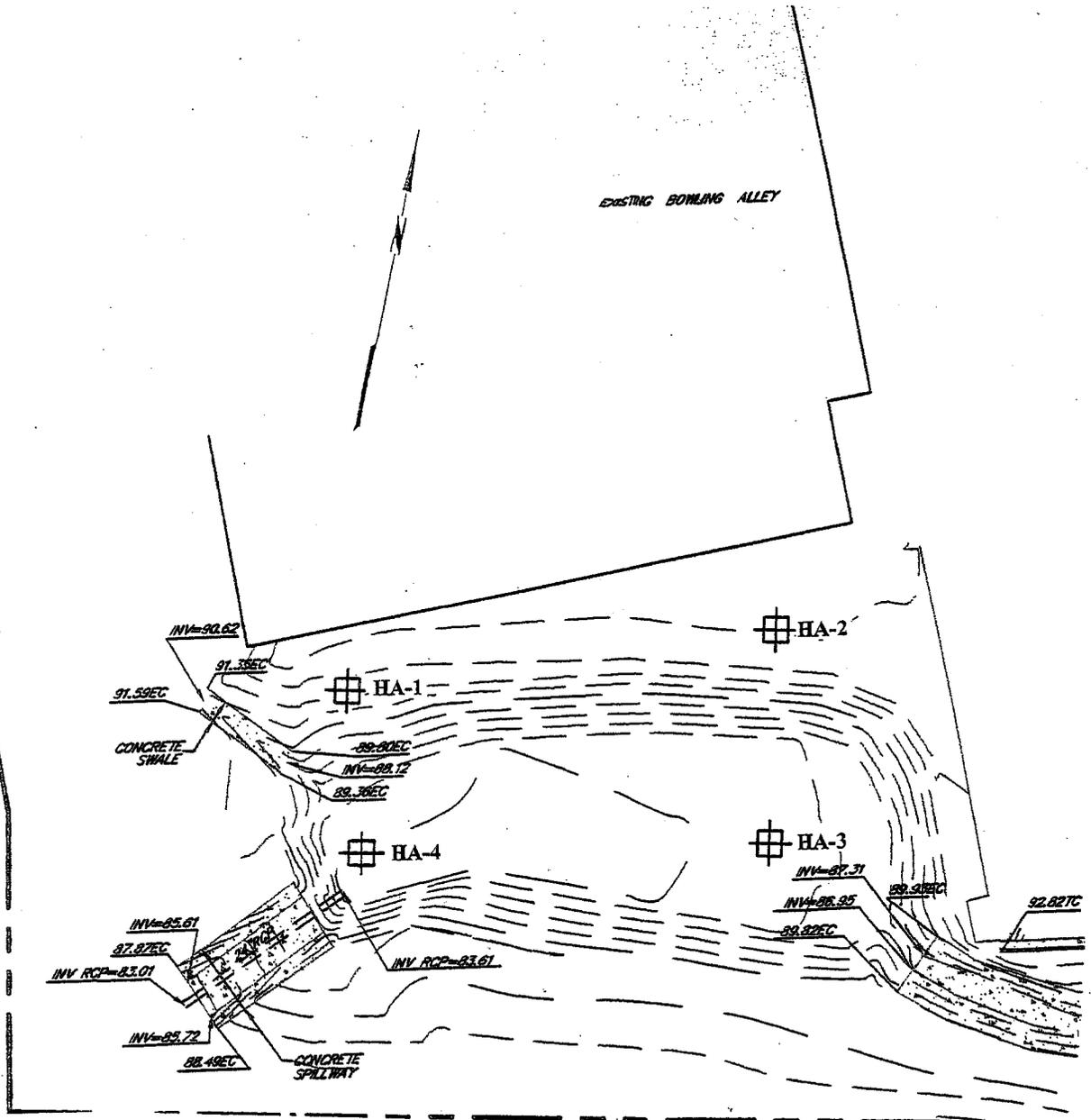
DEPTH (ft)	ELEV. (ft)	STRATA DESCRIPTION	STRATUM	REMARKS
0.8	83.8	Very loose density, fine silty sand FILL, contains organic matter, wet - dark brown	A	FILL
1.2	83.4	Firm density fine to medium clayey sand (SC), contains organic matter, moist - dark brown, brown and tan	B	WINDSOR FORMATION
		Stiff consistency, fat clay with sand (CH), moist - tan, brown and red brown	C	
2.7	81.9	Firm density, fine clayey sand (SC), contains fat clay and silty sand lenses, moist - red brown, tan and brown	B	
5.0	79.6	Hand Auger Terminated at 5.0 ft		

TEST PIT LOG 01132057.GPJ SCHNABEL.GDT 7/18/01

Comments:

1. Hand Auger backfilled upon completion.

ATTACHMENT A



LEGEND

⊠ HA-1 APPROXIMATE HAND AUGER LOCATION



BRUCE'S SUPER BODY SHOP

JAMES CITY COUNTY, VA

**HAND AUGER
LOCATION
PLAN**

Scale:	Date:	
1" = 40'	07/01	
Drawn by:	Checked by:	Revised Date:
K. ROSS	G. NATALUK	
Contract No.:	Figure:	Revised Date:
01132057	A2	

Appendix B

SOIL LABORATORY TESTING

Summary of Soil Laboratory Tests (1 page)

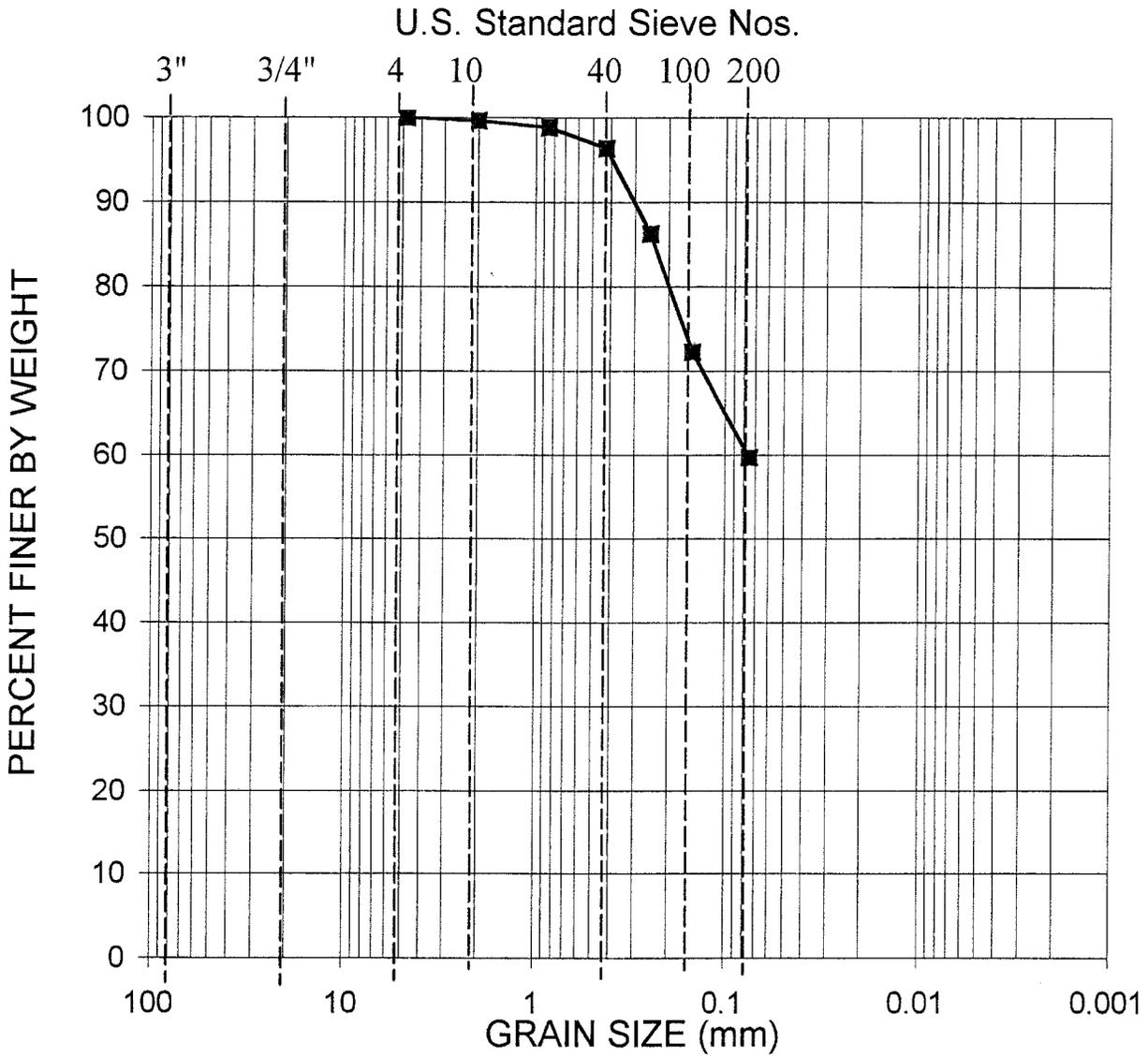
Gradation Test Curve (1 page)

Moisture Density Relationship (1 page)

SUMMARY OF SOIL LABORATORY TESTS

BORING	B-1	B-6	HA-1	HA-3
DEPTH	4'-6'	1.4'-8'	1.8'-3.2'	1.4'-2.7'
SAMPLE TYPE	JAR	BULK	JAR	JAR
STRATUM	C	C	B	C
SAMPLE DESCRIPTION	FINE TO COARSE SANDY FAT CLAY (CH), BROWN	FINE TO COARSE SANDY LEAN CLAY (CL) (A-4), BROWN	FINE TO COARSE CLAYEY SAND (SC), BROWN	FAT CLAY (CH), TRACE SAND, BROWN
NATURAL MOISTURE CONTENT (%)	23.4	21.0	18.8	25.4
NATURAL WET DENSITY (pcf)	--	--	--	--
LIQUID LIMIT	52	24	33	54
PLASTIC LIMIT	22	14	15	21
PLASTICITY INDEX	30	10	18	33
GRADATION DATA				
(% FINER THAN SIEVE)				
3/4"	--	100.0	--	--
NO. 4	--	100.0	--	--
NO. 40	97.6	96.4	97.8	97.7
NO. 200	52.0	59.7	78.3	88.2
MOISTURE DENSITY RELATION DATA (ASTM D-698)				
MAXIMUM DRY DENSITY (pcf)	--	122.8	--	--
OPTIMUM MOISTURE CONTENT (%)	--	10.3	--	--
CBR TEST DATA (VTM-8)				
BEFORE SOAK CBR	--	18.5	--	--
AFTER SOAK CBR	--	16.2	--	--
% SWELL	--	0.2	--	--
COMPACTED SAMPLE DRY DENSITY (pcf)	--	124.6	--	--
COMPACTED SAMPLE MOISTURE CONTENT (%)	--	10.3	--	--
REMARKS		SEE GRADATION CURVE AND MOISTURE DENSITY RELATIONSHIP		

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



GRAVEL	SAND	SILT OR CLAY
--------	------	--------------

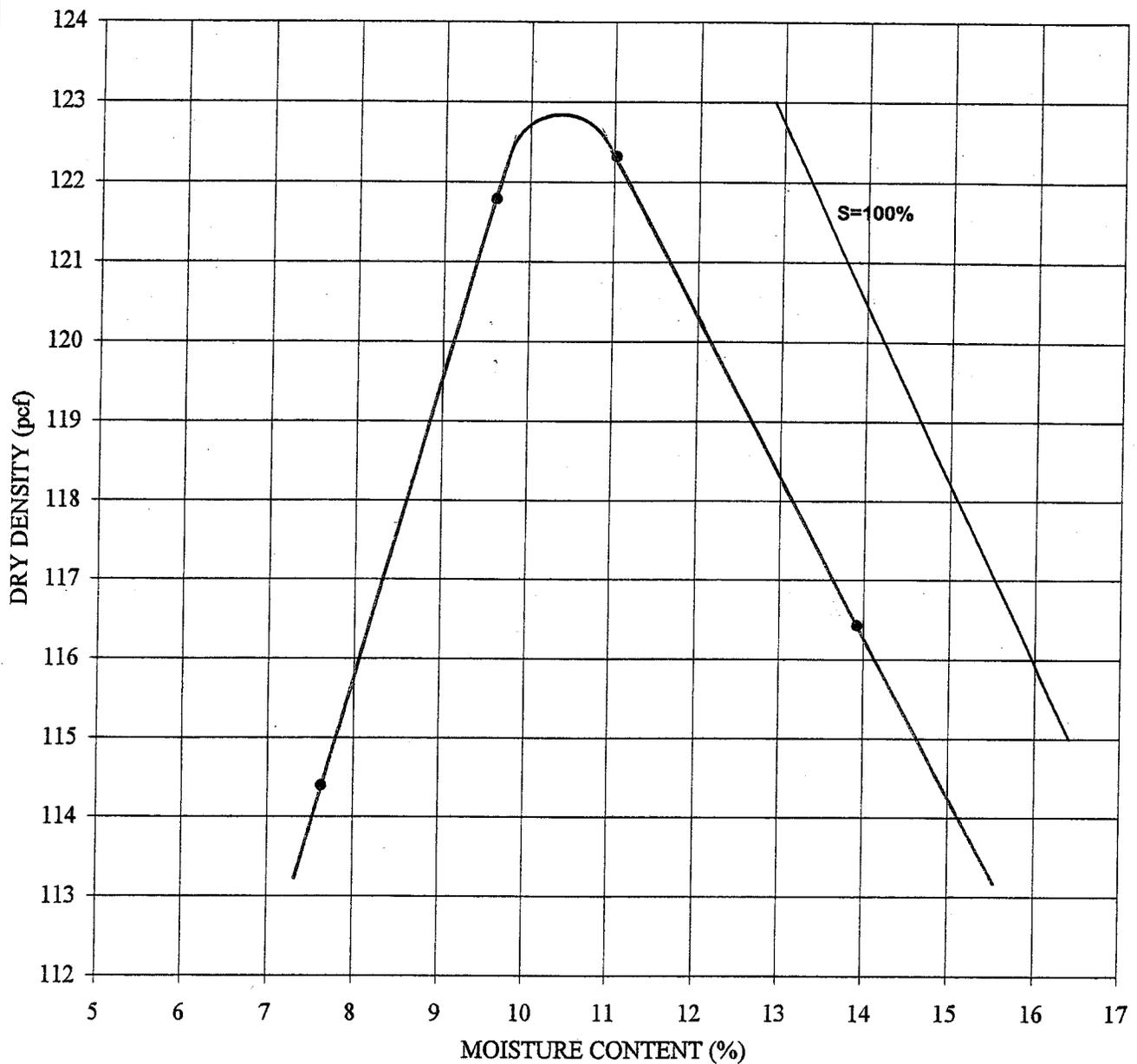
Key	Sample	Depth(ft.)	Sample Description	Class.	LL	PI
■	B-6	1.4'-8'	FINE TO COARSE SANDY LEAN CLAY, BROWN	CL, A-4	24	10

Schnabel Engineering

GRADATION CURVES

Project: Bruce's Super Body Shop,
James City County, Virginia

Contract No. 01132057



Sample Description:

FINE TO COARSE SANDY LEAN CLAY, BROWN

Classification: CL, A-4

Sample Number: B-6

Sample Depth (Ft.): 1.4'-8'

Sample Source:

ON-SITE

Assumed Specific Gravity: 2.64

Liquid Limit (LL): 24

Plasticity Index (PI): 10

Max. Dry Density (pcf): 122.8

Opt. Moist. Content (%): 10.3

Schnabel
Engineering

MOISTURE-DENSITY RELATION

Specification: VTM-1

Project:

Bruce's Super Body Shop
James City County, Virginia

Contract No.: 01132057

Scott Thomas

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

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

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

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

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

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

Donna, Happy New Year!!!!!!

joan

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

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

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

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

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

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

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

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

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

Joan,

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

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

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

Larry S. Barry, P.E., President
Norman H. Mason, L.S., VP
Vaughn B. Rinner, C.L.A.
Elizabeth J. Anderson, P.E.
Kenneth A. Dierks
Robert P. Kerr, R.E.P., P.W.S.

LANDMARK DESIGN GROUP

Clayton E. Massey, P.E.
Charles R. Orsborne, L.S.
Stephen A. Romeo, L.S.
Mark W. Strickland, P.E.
William R. Turner, Jr., A.I.C.P.
A. Gary Webb, P.E.

November 14, 2001

Mr. Darryl E. Cook
Environmental Director
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784

Subject: Bruce's Super Body Shops – Case No. SP-72-01
LandMark Design Group # 2000211-000.07
Waiver of Channel Protection Storage Volume

Dear Darryl:

Any storm water management facility for the Bruce's Super Body Shops property would have to be routed through or around the existing detention pond on the Williamsburg Bowling property. The foot print of the existing pond can not be expanded and the county sanitary sewer crosses the site at an elevation which restricts the depth of any out fall from the Bruce's property. These are among the severe horizontal and vertical limitations which encumber this project and prevent the development of the storage volume necessary to meet the Channel Protection Volume criteria set forth in current James City County guidelines. We believe we have addressed the intent of the channel protection criteria by attenuating flows to control channel depth and velocity to near Predevelopment levels for all storm events. Please refer to the Summary of Peak Values included with the Revised Stormwater Calculations.

Please consider this our request for the waiver of the channel protection volume criteria for this work.

Should you have any questions or wish to discuss this further, please call.

Very truly yours,

The LandMark Design Group Inc.


Richard S. Phillips, P.E.
Senior Associate

RSP/mch

CC: File 2000211-000.07

Larry S. Barry, P.E., President
Norman H. Mason, L.S., VP
Vaughn B. Rinner, C.L.A.
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Mark W. Strickland, P.E.
William R. Turner, Jr., A.I.C.P.
A. Gary Webb, P.E.

October 9, 2001

Mr. Darryl E. Cook
Environmental Director
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784



Re: Bruce's Super Body Shops – Case No. SP-72-01
LandMark Design Group # 2000211-000.07
Waiver of Channel Protection Storage Volume

Dear Darryl:

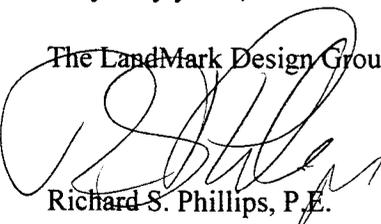
Plans which are currently under review involve the Bruce's Super Body Shops site plan near the intersection of Richmond Road and Olde Towne Road. A waiver of the Channel Protection Storage Volume requirement is being requested. The Summary of Peak Values included with the Revised Stormwater Calculations demonstrates that Peak discharges are attenuated to control channel depth and velocity to near Predevelopment levels for all storm events.

Please consider this our request for the waiver of the channel protection volume restriction for this work.

Should you have any questions or wish to discuss this further, please call.

Very truly yours,

The LandMark Design Group Inc.


Richard S. Phillips, P.E.
Senior Associate

RSP/mch

Cc: File 2000211-000.07

Scott Thomas

From: Scott Thomas
Sent: Tuesday, March 02, 2004 12:47 PM
To: 'Bill Strack'
Subject: RE: Bruce's Super Body Shop

I performed a final inspection today (03/02/04). I was not aware that the site was under notice by Gerry. Anyways I proceeded forward with my final inspection. Although this isn't my usual process, add these items to the punchlist for the BMP end of things. Usually I issue a letter formally to address record drawing and field-related (construction) issues for the BMP.

Field BMP items:

- Continue with providing the concrete apron at the weir wall per the plan (and per the inspection report/Gerry's directive);
- Clean all trash from the north (back) end of the basin.
- Dress up the riprap at the end of the flume from the Williamsburg Bowl parking lot. This is approximately in the middle of the forebay basin. Some of the riprap has sunken and it is beginning to erode the side slopes.

It appears the record drawings (asbuilts) and construction certification are in order. Have LandTech Resources forward me a reproducible (mylar, etc.) of the asbuilt drawing. Once this is done, I can sign off from my end (the BMP). Concurrently, once Gerry's site issues are also addressed the bond can be released/reduced.

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

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

From: Bill Strack [mailto:bills@hendersoninc.com]
Sent: Tuesday, March 02, 2004 10:42 AM
To: Donna Chapman; Scott Thomas
Cc: Julie Russell
Subject: RE: Bruce's Super Body Shop

Scott we are doing a few punch items today. Should be 100% as of Wednesday.
 Thanks

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

From: Donna Chapman
Sent: Monday, March 01, 2004 10:43 AM
To: Scott Thomas (scottt@james-city.va.us)
Cc: Bill Strack; Julie Russell
Subject: Bruce's Super Body Shop

Scott,
 We faxed a copy of the BMP Construction Certification letter on this project to your office on 2/19/04.
 Can you offer an update on when we might expect a release on this one?
 Is there anything else you need from us to help expedite this process?
 Thanks for your help.

3/2/2004



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

SP-72-01
GAN 3330100005A

County BMP ID Code (if known): PC190

Name of Facility: Bruce's Super Body Shop BMP No.: 1 of 1 Date: 3/02/07
 Location: 5521 Richmond Road Automobile Body + Fender Repair

Name of Owner: _____

Name of Inspector: Scott J. Thomas

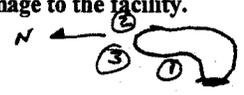
Type of Facility: Pretreatment Sediment Forebay (drains to PC142 Bowling Alley)

Weather Conditions: Sunny, Warm 60's Type: Final Inspection County BMP Inspection Program Owner Inspection

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

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

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



Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes: <u>25' LONG WEIR WALL, 8" THICK; 5' HIGH</u>				
Grass Height	NA			
Vegetation Condition	NA			
Tree Growth	NA			
Erosion	✓			
Trash & Debris	✓			
Seepage	✓			
Fencing or Benches				<u>OUTLETS TO TRAPEZOID SHAPED CONC. CHANNEL 4' BW, 3' DEEP</u>
Interior Landscaping/Planted Areas: <input checked="" type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation				
Vegetated Conditions	✓			<u>EC-2 MATTING; 2H' IV SS SPARSE BUT STABLE</u>
Trash & Debris	✓			<u>SOME AT WALL + BANK</u>
Floating Material	✓			
Erosion	✓			<u>SOME ON SS; MINOR</u>
Sediment	✓			
Dead Plant	✓			
Aesthetics	✓			<u>NOT THE BEST BUT OK</u>
Other				
Notes: <u>SERVES PARKING LOT + BUILDING BRUCES SDS + WMBG BOWL.</u>				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: <input checked="" type="checkbox"/> Permanent Pool (Retention Basin) <input type="checkbox"/> Shallow Marsh (Detention Basin) <input type="checkbox"/> None, Dry (Detention Basin)				
Shoreline Erosion	✓			SOMO.
Algae	✓			MUCK BENEATH P.P.
Trash & Debris	✓			BACK AREA - TRASH
Sediment	✓			NOT AN ISSUE
Aesthetics	✓			
Other	✓			EST 3-5' DEEP.
Inflows (Describe Types/Locations): ① CURB CUT W/RET VOLUME BOWL ② RIPRAP EAST CHANNEL ③ PIPE-PAVED FLUME WEST				
Condition of Structure	✓			
Erosion	✓			None, major; outfalls intact
Trash and Debris		✓		TRASH BACK END #1 + #2
Sediment	✓			
Outlet Protection	✓			EG-10#2
Other				30x50 STILLING BASIN NORTH END
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type): WEIR WALL, 8" THICK, 5'W x 4' HGH WEIR				
Condition of Structure	✓			
Corrosion	✓			
Trash and Debris	✓			
Sediment	✓			
Vegetation	✓			
Other	✓			Approach apron missing but being constructed this day.
Principal Outlet Structure - Barrel, Conduit, etc. : WEIR WALL, CONCRETE				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris	✓			
Erosion/Sediment	✓			
Outlet Protection	✓			Downstream paved channel good condition
Other	✓			
Emergency Spillway (Overflow): N/A WEIR WALL ACTS AS EMERG SPILLWAY				
Vegetation				
Lining				
Erosion				
Trash & Debris				
Other				
Notes: DRAINS TO D/S EXIST BMP PC 112 @ WILLIAMSBURG BOWL. Mobilizations to exist BMP appear performed per plan.				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			SUSCEPTIBLE
Animal Burrows	✓			
Graffiti	✓			
Other	✓			
Surrounding Perimeter Conditions: 6' HIGH BLACK SAFETY FENCE AROUND BMP				
Land Uses	✓			NORTH-BOWLING ALLEY PARKING; SOUTH-WOODS EAST WOODS - WEST BOWL PARKING
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			
Access /Maintenance Roads or Paths	✓			WMBG BOWL PARKING LOT
Other				

Remarks:



- CLEAN TRASH NORTH BACK END OF BASIN.
- FINISH APPROACH WALL. (45°)
- VEG KIND OF SPARSE BUT ACCEPTABLE, EC-2 MATTED SLOPES.
- FINISH WEIR WALL LANDSCAPING
- ADD RIPRAP TO INFLOW FROM WMBG BOWL PARKING LOT.

Overall Environmental Division Internal Rating: 3 (FOREBAY ONLY)

Signature: *Scott Thomas P.E.*
 Title: CIVIL ENGINEER ENV DIV

Date: 03/02/04

James City County Stormwater Division Stormwater Management Facility (SWMF) Inspection Report

Score Definitions: 0-N/A, 1-Adequate, 2-Routine Maintenance, 3-Non-routine repair, 4-Urgent repair(s), item has failed or is failing.

BMP ID # PC042 PIN 3330100005B Responsible Party: PBH LLC

Site Address: 5544 OLDE TOWNE ROAD District: 3

Location (other):

Date: 3/8/2010 Inspector: TC

(3 or 4 requires attention):

Structure Type: Retention

Total Score 2

Criteria	Score	Comments: (Listed below are the items/tasks that should be rectified/ completed prior to re-inspection)
1. Forebay Score:	0	
2. Inlet(s):	2	The inlet channel located at the rear of the bowling alley is eroded Remove woody vegetation within 10' of inlets
*3. Outlet:	2	Remove woody vegetation within 10' of outlet Remove woody vegetation and debris within 10' of outfall of outlet Investigate and repair erosion located at outlet
*4. Principal Spillway:	2	Investigate and repair subsidence around principal spillway Reattach drop T's onto principal spillway structure, drop T's should be in a verticle position not horizontal
5. Emergency Spillway:	2	Remove woody vegetation within 10' of emergency spillway Debris in spillway
6. Basin Bottom and Side Slopes:	2	Reestablish ground cover Allow grass to grow on side slopes to a height of 8 inches
7. Safety Devices:	1	
*8. Embankments:	2	Woody vegetation within 10' of embankment
*9. Structural Components:	1	
*10. Media:	0	

James City County Stormwater Division Stormwater Management Facility (SWMF) Inspection Report

Score Definitions: 0-N/A, 1-Adequate, 2-Routine Maintenance, 3-Non-routine repair, 4-Urgent repair(s), item has failed or is failing.

Criteria	Score	Comments: (Listed below are the items/tasks that should be rectified/ completed prior to re-inspection)
11. Routine Maintenance:	2	Remove trash and debris from SWMF
12. Condition of Aquatic Environment:	2	Excessive algae growth
13. Vegetation:	1	
*14. Storage Volume:	1	
15. Debris/Sediment Accumulation:	1	
16. Standing Water:	1	
17. Safety and Aquatic Bench:	0	
18. Side Slope Vegetation:	2	Areas of erosion Ground cover missing
19. Other:	0	

Checked below identify corrective work required on your stormwater management facility.

- Remove all trees and other woody vegetation from the embankment (earthen dam) and also within 10' of the toe of the embankment slope.
- Remove all trees and other woody vegetation from within 10' of the principal spillway, any principal inlet devices, and the principal outfall.
- Remove all trees and other woody vegetation from within 10' of any inlet structures, such as: pipes, end sections, concrete channels, flumes, rip rap channels, etc.
- Remove all trees and other woody vegetation from within the emergency spillway and also from within 10' of the spillway.
- Investigate the cause of any settlement, sink holes, subsidence, or erosion, noted on the report and develop and implement an appropriate plan to correct the deficiencies noted permanently.
- Remove all accumulated sediment, leaves and debris from within any pipes, end sections, concrete channels, emergency spillways, flumes, rip rap channels, etc. and dispose of the material in an appropriate method and location.
- Stabilize any disturbed, unstable, denuded or bare soil areas, by installing top soil and planting a permanent grass seed to establish an effective grass ground cover over these areas.
- All grassed areas of the BMP such as: access roads, emergency spillways, embankments (earthen dam), or other non-treed areas, shall be maintained at a minimum grass height of 8", and should not be subjected to low mowing.
- Trees and woody vegetation should be cut flush with the ground, and smaller trees and limbs (less than 4" dia) may be processed with a wood chipper and dispersed in natural areas.

James City County Stormwater Division Stormwater Management Facility (SWMF) Inspection Report

Score Definitions: 0-N/A, 1-Adequate, 2-Routine Maintenance, 3-Non-routine repair, 4-Urgent repair(s), item has failed or is failing.

BMP ID # **PC190** PIN **3330100005H** Responsible Party: **PBH LLC**

Site Address: **5521 RICHMOND ROAD** District: **3**

Location (other):

Date: **5/12/2010** Inspector: **TC**

(3 or 4 requires attention):

Structure Type: **Retention**

Total Score **4**

Criteria	Score	Comments: (Listed below are the items/tasks that should be rectified/ completed prior to re-inspection)
1. Forebay Score:	2	Remove vegetation, sediment, and debris (trash) at the toe of concrete flume (at the rear corner of Bruce's parking lot). Erosion and undercutting, place more riprap at the toe of concrete flume
2. Inlet(s):	4	Inlet channel on the bowling alley side severely eroded
*3. Outlet:	1	
*4. Principal Spillway:	2	Remove woody vegetation (in and adjacent to) within 10' of principal spillway paved channel
5. Emergency Spillway:	0	
6. Basin Bottom and Side Slopes:	2	Stabilize side slope on East side of pond
7. Safety Devices:	1	
*8. Embankments:	1	
*9. Structural Components:	1	
*10. Media:	0	

James City County Stormwater Division Stormwater Management Facility (SWMF) Inspection Report

Score Definitions: 0-N/A, 1-Adequate, 2-Routine Maintenance, 3-Non-routine repair, 4-Urgent repair(s), item has failed or is failing.

Criteria	Score	Comments: (Listed below are the items/tasks that should be rectified/ completed prior to re-inspection)
11. Routine Maintenance:	4	Remove trash and debris
12. Condition of Aquatic Environment:	1	
13. Vegetation:	1	
*14. Storage Volume:	1	
15. Debris/Sediment Accumulation:	1	
16. Standing Water:	1	
17. Safety and Aquatic Bench:	0	
18. Side Slope Vegetation:	1	
19. Other:		

Checked below identify corrective work required on your stormwater management facility.

- Remove all trees and other woody vegetation from the embankment (earthen dam) and also within 10' of the toe of the embankment slope.
- Remove all trees and other woody vegetation from within 10' of the principal spillway, any principal inlet devices, and the principal outfall.
- Remove all trees and other woody vegetation from within 10' of any inlet structures, such as: pipes, end sections, concrete channels, flumes, rip rap channels, etc.
- Remove all trees and other woody vegetation from within the emergency spillway and also from within 10' of the spillway.
- Investigate the cause of any settlement, sink holes, subsidence, or erosion, noted on the report and develop and implement an appropriate plan to correct the deficiencies noted permanently.
- Remove all accumulated sediment, leaves and debris from within any pipes, end sections, concrete channels, emergency spillways, flumes, rip rap channels, etc. and dispose of the material in an appropriate method and location.
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- Trees and woody vegetation should be cut flush with the ground, and smaller trees and limbs (less than 4" dia) may be processed with a wood chipper and dispersed in natural areas.



ENGINEERING CONSULTING SERVICES, LTD.

108 Ingram Road
Suite 1
Williamsburg, VA 23188
(757) 229-6877

Fax Cover Sheet

Date: February 17, 2004

of Pages (incl. cover) 3

To:

Mr. Bill Strack
Henderson, Inc.
5800 Mooretown Road
P O Box BM
Williamsburg, VA 23187

Phone: (757) 565-1090

Fax: (757) 564-9120

From: Mike Galli

Re: BMP Certification
ECS Job # 07:5581 — Bruce Super Body Shop

Originals to Follow Via:

- Mail
- FedEx/UPS
- Courier
- N/A

Remarks: Urgent Reply ASAP For Your Review Please Comment

Bill, here is our BMP Construction Certification Letter. Did you get Landmark to do a survey certification?

259-4032

Scott Thomas,

Bmp cert. for
BRUCES attached. ⁵⁶⁵1090

Please call with any issue
or fax to 564-9120!

Thanks for your help

Julie cc Bills
Donna-Bond
File-JR

ENVIRONMENTAL DIVISION REVIEW COMMENTS
BRUCE'S SUPER BODY SHOP

SP-072-01
August 10, 2001

MOW/DEC

General:

1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
2. Water and sewer inspection fees, as applicable, must be paid in full prior to issuance of a Land Disturbing Permit.
3. Responsible Land-Disturber Notification. Provide the name of an individual who will be in charge of and responsible for carrying out the land-disturbing activity. Permits or plans without this information are deemed incomplete and not approved until proper notification is received.
- A. A Geotechnical Report is referenced on the plan. Please provide that report to aid in the plan review.
5. Record Drawing and Construction Certification. The stormwater management/BMP facility as proposed for this project will require submission, review and approval of a record drawing (as-built) and construction certification prior to release of the posted bond/surety. Provide notes on the plan accordingly to ensure this activity is adequately coordinated and performed during and following construction in accordance with current County guidelines.
6. Interim Certification. Due to the dual purpose function of the sediment basin as a BMP (primary pond), interim construction certification will be required. Refer to current County guidelines for requirements.
7. Retaining Wall. Provide top and bottom spot elevations for the timber retaining wall at the secondary BMP on each end and at the bend as a minimum.
8. Tree Protection. Provide tree protection around the birch trees at the retaining wall by the secondary pond.

Chesapeake Bay Preservation:

9. Delineate Steep Slope Areas. The plan states on sheet C-1 that 25% and steeper slopes are within the limits of construction. Section 23-10(2) of the Chesapeake Bay Preservation Ordinance requires delineation of areas with slopes 25 percent or greater. Please delineate these slopes and if steep slope areas are impacted, submit in writing a request for an exception to disturb these slopes.
10. Percent Impervious. Section 23-9(b)(1)(b) of the Chesapeake Bay Preservation Ordinance states that impervious cover shall not exceed 60 percent of the site. The site tabulation for the project states that 68% of the site is to be impervious but the calculations state that the site is proposed to be 60% impervious. Please clarify which figure is correct and if the 68% figure is correct, then the site area for Bruce's will need to be increased to reduce the impervious cover to 60% or less.

Erosion & Sediment Control Plan:

11. Standard E&SC Notes. Replace the Erosion Control Notes on sheet C-7 with revised James City County Erosion Control Notes dated 7/06/01. Contact the Environmental Division at 757-253-6670 if you need a current copy of the standard notes.
12. E&SC Narrative. Provide the erosion and sediment control plan narrative on the plan.
13. Sequence of Construction. Add in the placement and stabilization of diversion dikes as they are primary controls for the site.
14. Silt fence. Provide silt fence along the west boundary of the site beginning at the end of the

ENVIRONMENTAL DIVISION REVIEW COMMENTS
BRUCE'S SUPER BODY SHOP

SP-072-01

November 5, 2001 MDW/DCC

Note: the comments are numbered in accordance with the original review comments dated August 10, 2001, for ease of reference.

Chesapeake Bay Preservation:

10. Percent Impervious. The site is proposed as 67% impervious which exceeds the 60% maximum allowed under the Chesapeake Bay Ordinance. In the response letter, it is proposed that when the subdivision of this parcel occurs that either a parcel for Bruce's site will be created such that the 60% impervious cover is not exceeded or that the remaining portion of the subdivided parcel will have a limit placed on it such that 60% impervious cover will not be exceeded for the total original 5.27 acre parcel. This would meet the intent of the Ordinance in concept, however, tracking of this condition will be necessary to ensure that it is fulfilled and this tracking unnecessarily complicates the situation. Therefore, the Bruce's site needs to be sized such that the 60% requirement is met on its own site to simply the issue.

Erosion & Sediment Control Plan:

13. Not adequately addressed. Sequence of Construction. Add in the placement and stabilization of diversion dikes as they are primary controls for the site.
19. Safety Fence. Either include in the sequence of construction that the permanent fence will be installed with the construction of BMP 1 and with the modifications to BMP 2. If it is not possible to install the permanent fence at these early stages of construction, then temporary orange fencing shall be required. Ensure that this is stated on the plan.

Stormwater Management / Drainage:

23. Offsite Channel Adequacy. Submit adequacy analyses for the receiving drainage channel from the second pond. Adequacy computations are required to verify the channels is adequate for velocity based on the 2-year event and for capacity based on the 10-year event.
24. Stream Channel Protection. Based on the physical constraints that exist for this site as described in a meeting with the project engineer, a variance will be granted from James City County's channel protection criteria that requires 24-hour extended detention of the runoff from the 1-year frequency storm (post-developed). A letter was submitted requesting that variance but additional justification relating to the horizontal and vertical constraints need to be include in the variance request letter to support the granting of the variance. Any variance granted from the Environmental Division from this criteria shall be documented on the plan and should be affixed or referenced to in the design or erosion and sediment control plan set, preferably the cover sheet.
30. Alternate Channel Lining. Below 2R and 4R, there is a riprap channel that is about 90 feet long. The calculations provided show that only about 35 feet of riprap is necessary to protect the outlet from erosion. For the remaining 55 feet, change the riprap to an EC-3 liner material.

BMP Outreach Program –

Background: To provide a basic overview of our BMP program and an introduction to BMP maintenance and responsibilities of BMP owners. One idea is to make the session less than two hours and informal.

The primary goals should be to:

1. Provide a brief overview of our BMP program and outline the responsibilities of the owner.
2. Provide a short question and answer period.
3. Get input from attendees on areas of concern as guidance for future training.
4. Disseminate information about our online services and other source of information.

II. Target dates:

- a. February 29th - Mail out invitations to 100 owners from our BMP database. A general invitation may be publish in the Gazette, etc.
- b. March 20th or 27th – present class at the Community Center, Saturday afternoon. Attendance expected to be approximately 10-30.

III. Course Outline:

- a. Why BMP's?
What their purpose, why are they required?
- b. What are BMP's?
There are different kinds but they all serve to improve water quality. They all have a means to collect water, treat water and release water. They are designed to treat a specific area and to handle calculated volumes of water.
- c. How are they designed, who designs them, who builds them?
- d. What happens after they are built?
- e. The County's role.
 1. Our BMP program of inspections.
- f. The Owner's role.
 1. Routine annual maintenance.
 2. Non-routine maintenance and repairs.
- g. General components of a BMP.