BA 410-05 Tidewater at Port Covington
Site Plan

MSA-S-1829-4768

Comments
6/16/05

9/6/05

5/24/06

2/1/07 - MEO

10/27/10 initial cleaning DS.

STATE OF MARYLAND
CRITICAL AREA COMMISSION
CHESAPEAKE AND ATLANTIC COASTAL BAYS
1804 West Street, Suite 100, Annapolis, Maryland 21401
(410) 260-3460 Fax: (410) 974-5338
www.dnr.state.md.us/criticalarea/

February 1, 2007

Mr. Douglas B. McCoach III
Baltimore City Planning Commission
417 East Fayette Street, Eighth Floor
Baltimore, Maryland 21202-3416

RE: Floating Concrete Piers – Tidewater at Port Covington
BA 410-05

Dear Mr. McCoach:

I am writing in response to your letter dated January 29, 2007 regarding the proposed concrete pier system proposed for the Tidewater at Port Covington Project. Based on my discussions with Dawnn McCleary and Gary Letteron regarding the nature of these structures and the information provided by Bellingham Marine, Commission staff would consider these types of structures to be impervious when calculating the stormwater offset fee. As stated in your letter, the fee is based on the pollutant removal requirement calculated in accordance with the Critical Area 10% Rule Guidance Manual, and the area is considered pervious prior to installation and impervious after installation.

Commission staff would support the codification of this interpretation in the City's CAMP Manual in order to facilitate effective and consistent implementation of the stormwater quality standards on similar projects. Thank you for the opportunity to comment on this issue. If you have any questions, please contact me at (410) 260-3480.

Sincerely,

Mary R. Owens, Chief
Program Implementation Division

Cc: Bijan Yarjani
Beth Strommen
Duncan Stuart
Gary Letteron

STATE OF MARYLAND
CRITICAL AREA COMMISSION
CHESAPEAKE AND ATLANTIC COASTAL BAYS

1804 West Street, Suite 100, Annapolis, Maryland 21401
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www.dnr.state.md.us/criticalarea/

May 24, 2006

Mr. Gary Letteron
Baltimore City Department of Planning
417 East Fayette Street, 8th Floor
Baltimore, Maryland 21202

RE: Tidewater at Port Covington

Dear Mr. Letteron:

This office has reviewed the revised site plan and Worksheet A for the 10 % calculations. The applicant has satisfied the revised 10 % calculations and we have no additional comments. If there are any questions, please feel free to call me at (410) 260-3483.

Sincerely,

Dawnn McCleary
Natural Resources Planner

cc: Duncan Stuart
Regina Esslinger
BA 410-05

STATE OF MARYLAND
CRITICAL AREA COMMISSION
CHESAPEAKE AND ATLANTIC COASTAL BAYS
1804 West Street, Suite 100, Annapolis, Maryland 21401
(410) 260-3460 Fax: (410) 974-5338
www.dnr.state.md.us/criticalarea/

September 6, 2005

Mr. Gary Letteron
Baltimore City Department of Planning
417 East Fayette Street, 8th Floor
Baltimore, Maryland 21202

RE: Tidewater at Port Covington

Dear Mr. ~~Letteron~~ Gary:

We have received the revised site plan and 10% Rule calculations for the Tidewater at Port Covington project. The calculations are correct, and a fee-in-lieu payment is proposed. I note that the plans submitted to us in June 2005 showed two underground sand filters. The current application gives no indication as to why on site treatment is no longer proposed. As we discussed today, the local Critical Area regulations require an applicant to show that on site treatment is not feasible before fees in lieu can be considered. Without additional information regarding the sand filters, we cannot support the use of fees in lieu.

Thank you for the opportunity to review this project. Please call me if you have any questions.

Sincerely,

Regina A. Esslinger, Chief
Project Evaluation Division

RAE/jjd

cc: Ms. Dawnn McCleary
BA410-05

SHEILA DIXON
Mayor

DOUGLAS B. MCCOACH, III
Director

January 29, 2007

Ms. Mary Owens
Critical Area Commission
1804 West Street, Suite 100
Annapolis, MD 21401

RE: Slats vs. Floating Concrete Piers - Tidewater Marina

Dear Ms. Owens:

Please verify your previous determination for the enclosed drawings from Bellingham Marine dated May 5, 2005. As we understand your determination, these concrete flotation systems are considered impervious when calculating the Critical Area Stormwater offset fee. When filling out Worksheet A, their area is part of the site area both pre and post development, and this area is considered pervious before they are installed and impervious after they are installed.

Upon completion of your review and determination, we will codify this interpretation by including it in our CAMP Manual.

Thank you for your hard work and continued support. If you have any questions on this matter, please call Gary Letteron at (410) 396-4369.

Sincerely,

Douglas B. McCoach III, Director

Enclosure

cc: Bijan Yarjani
Beth Strommen
Duncan Stuart
Gary Letteron
File

AUG 15 2005

STV Incorporated
7125 Ambassador Road, Suite 200
Baltimore, Maryland 21244-2722
(410) 944-9112 fax:(410) 298-2794

August 11, 2005
21.00-3280-11984

Baltimore City Planning Department
Charles L. Benton, Jr. Building, 8th Floor
417 East Fayette Street
Baltimore, MD 21201

Attention: Mr. Otis Rolley, III
Director

Reference: Tidewater Yacht Service Center
321 Cromwell Street
Chesapeake Bay Critical Area Requirements

Dear Mr. Rolley,

Pursuant to our August 1, 2005 meeting with Mr. Duncan Stuart and Mr. Gary Letteron of your staff, we are writing to request your assistance in coordinating with the Chesapeake Bay Critical Area Commission to modify their current position regarding the evaluation of proposed piers associated with the Tidewater Yacht Service Center facility to be located at Port Covington. The proposed facility is a water-dependant use located in the Baltimore City Critical Area Management Program's designated Waterfront Industrial Area. The relocation of the Tidewater facility from its current location at 1020 Key Highway East was part of a land deal structured by the Baltimore Development Corporation to facilitate implementation of the Key Highway "Loop Road". The proposed Tidewater facility will assist Baltimore City in its efforts to retain local jobs and industry. We believe the Commission's current approach reflects an unjust approach to evaluating the impacts associated with pier development under the 10% Pollutant Removal Requirement, commonly referred to as the "10% Rule".

The Commission's current position is that the portion of the harbor that will be occupied by a proposed pier must be considered a pervious surface under the existing site conditions, which establishes the baseline for evaluating the impact of the proposed development. The proposed piers are considered an impervious surface resulting in mitigating for 100 percent of the conversion of a pervious to impervious surface plus the 10 percent removal requirement resulting in a total pollutant removal requirement of 110 percent. We agree that the 10 percent pollutant removal requirement being assessed on the piers is appropriate; however, utilizing the approach that a pier is converting a pervious surface to an impervious condition has a fairly dramatic, and in our opinion an unjust effect on the degree of mitigation required.

→ gaining State land, through

x Stuart
x Letteron
x Cole
x Ayer
x Coles
x Strohmen

STV Incorporated

Baltimore City Planning Department
Mr. Otis Rolley, III

August 11, 2005
Page 2

We contend that prior to development the harbor displays similar pollutant loading characteristics to an existing parking lot adjacent to the harbor. Under both scenarios, untreated phosphorus (the 10% Rule's surrogate pollutant) suspended in rain water is discharged into the harbor either directly or indirectly. Given that the hydraulic characteristics are similar, we believe the baseline for objectively evaluating the 10% Rule impacts should also be similar.

At your convenience we would like an opportunity to meet with you to discuss this matter in greater detail. Thank you in advance for your consideration in this matter.

Very truly yours,

STV INCORPORATED

Anthony J. Corteal, Jr.
Vice President

Addison H. Palmer, RLA, LEED AP
Associate

AHP/js

cc: Mr. Duncan Stuart
Mr. Gary Letteron
Mr. Bob Brandon
Ms. Larisa Salamacha
Mr. Phil Lee
Mr. Ken Green

STV Incorporated

7125 Ambassador Road, Suite 200
Baltimore, Maryland 21244-2722
(410) 944-9112 fax:(410) 298-2794

September 7, 2005
21.00-3385-11984

Baltimore City Planning Department
Charles L. Benton, Jr. Building, 8th Floor
417 East Fayette Street
Baltimore, Maryland 21201

Attention: Mr. Gary Letteron

Reference: Tidewater Yacht Service Center
Port Covington
321 Cromwell Street
Baltimore City, Maryland

Dear Gary:

Pursuant to our telephone conversation on Tuesday, September 6, 2005, STV Incorporated is providing this letter to document the impracticality of providing an on-site stormwater management facility at this time for the above-referenced project. The proposed Tidewater Yacht Service Center is a water-dependant use located in the Baltimore City Critical Area Management Program's designated Waterfront Industrial Area. The relocation of the Tidewater facility from its current location at 1020 Key Highway East was part of a land deal structured by the Baltimore Development Corporation to facilitate implementation of the Key Highway "Loop Road". The first phase of the project covered under Plans Review #830 is an interim phase to facilitate the relocation of Tidewater to meet their immediate needs. Subsequent permit(s) will be filed in the near future to complete the build-out of Tidewater's Port Covington facility.

Under this first interim phase, only 3.09+/- acres of the 7.83+/- acre site are being disturbed. The average elevation of the disturbed portion of the site is approximately elevation 11 and a significant portion is located within the 100-year floodplain. Unfortunately, any underground stormwater management facilities located within a sizable contributing drainage area will be impacted by tidal influence with an invert elevation below 6.0 and are not accepted by the Department of Public Works (DPW).

We are currently completing the civil and landscape design for the build-out phase. We are continuing to explore options for providing on-site stormwater management facilities under the build-out phase, and believe that incorporating a stormwater management facility under the latter phase will help ensure a well-integrated design yielding the greatest benefit to both the Owner and the environment.

I:\PROJECTS\03119\84\03119\84_000\20_Communications\21_Correspondence TO Client\3385ltr-2005.09.07 Letter.doc

STV Incorporated

Baltimore City Department of Planning
Mr. Gary Letteron

Lastly, we had understood from our August 1, 2005 meeting and subsequent conversations with you that calculation of the offset fees and payment would demonstrate a sign of good faith to facilitate release of the permit associated with Plans Review #830. The fees have been calculated based on a worse-case scenario in terms of the amount of the fees. Providing an on-site facility would reduce the fees although a formal, engineered design would not have been approved by DPW and could not be implemented.

For these reasons, we are requesting that the previously submitted stormwater offset fee calculations be approved.

Should you have any questions, or require any additional information, please do not hesitate to contact me at (410) 281-2916.

Very truly yours,

STV INCORPORATED

Addison H. Palmer, RLA
Associate

AHP/sn

cc: Mr. Bob Brandon
Ms. Larisa Salamacha
Mr. Tony Corteal, Jr.

I:\PROJECTS\0311984\0311984_0001\20_Communications\21_Correspondence TO Client\3385lpr-2005.09.07 Letteron.doc

TIDEWATER AT PORT COVINGTON

STORMWATER MANAGEMENT & CRITICAL AREA REPORT

321 CROMWELL STREET
BALTIMORE, MARYLAND

Page 3: Summary of CA offset fees

Page 8-11: Worksheet A

May 23, 2005
Revised February 22, 2006
Revised March 8, 2006
Revised March 23, 2006
Revised April 28, 2006

PREPARED BY

STV Incorporated

Engineers/ Planners/ Architects/ Construction Managers
7125 Ambassador Road
Baltimore, MD 21244-2722
(410) 944-9112

TABLE OF CONTENTS

I. INTRODUCTION

The scope of this study is to develop a stormwater management plan to account for the increase of runoff that will be generated by the anticipated future development throughout the Tidewater at Port Covington development. The future development must adhere to the regulations established by the Maryland Department of the Environment (MDE), Baltimore City Deparment of Public Works Enviromental Engineering Section and 2000 MDE design Manual.

II. DESCRIPTION OF PROJECT

The project site abuts Cromwell Street to the south, Gould Street to the north, McComas street to the west and Patapsco River Shorelines to the east. There is approximately fourteen feet of elevation change from the highest point in the study area to the lowest point. The entire project site is within the Chesapeake Bay Critical Area. Currently the 9.21-acre project site (including the area of the future piers) is vacant. Under existing conditions the site coverage is comprised of 3.16 acres of impervious surface area. The ultimate development condition will consist of a Marina Repair Facility Building with associated paved parking lot, Gravel Boat storage area, Concrete boat landing, Pavilion, Bathhouse, piers and associated landscaping.

III. SITE DRAINAGE AND LOCAL WATERSHEDS

As noted previously, the project site is located along the Patapsco River Shorelines. Currently the site's storm runoff sheet flows easterly to the tidal waters of the Patapsco River. Under redeveloped conditions, the storm water will be collected and conveyed via on-site storm drains and discharged into the tidal waters.

IV. CHANNEL AND OVERBANK FLOOD PROTECTION CRITERIA

The Urban Hydrology for Small Watersheds TR-55 methodology was used to compute pre- and post-development peak discharge at the design point. As can be seen in the peak discharge summary table, the peak runoff has moderately increased in the ultimate development conditions. As mentioned above the runoff from this site will be discharging directly to tidally influenced receiving waters (Patapsco River). This meets the requirements of quantitative management per section 3.3.B-4 of the Maryland Storm Water Management Guidelines for State and Federal Projects; therefore additional quantitative management should not be required.

PEAK DISCHARGE SUMMARY TABLE

STORM FREQUENCY (YR)	1	2	10	100
PRE-DEVELOPMENT PEAK RUNOFF	10.01 cfs	14.07 cfs	27.55 cfs	41.97 cfs
UTLIMATE - DEVELOPMENT PEAK RUNOFF	17.83 cfs	23.07 cfs	39.55 cfs	56.66 cfs
INCREASE IN PEAK RUNOFF	**7.82 cfs**	**9.00 cfs**	**12.00 cfs**	**14.69 cfs**

V. WATER QUALITY CRITERIA

Under redevelopment, regulations require a 20 percent reduction in impervious area below existing conditions or a water quality control device to meet the equivalent effect of reducing the impervious area by 20 percent in order to meet water quality requirements. Furthermore, water quality management must be provided for all new impervious surface areas. The 20 percent reduction is not a viable option given the site constraints.

The ultimate site grade will be ranging from elevation 6'+/- to elevation 18'+/-. The original intent was to address Best Management Practices requirements by way of an underground sand filter structure system for the entire project site. However, as part of Baltimore City Department of Public Works Stormwater Management Requirements, the sand filter structure invert can not be constructed lower than elevation 6.00. Therefore, a water quality sand filter structure has to be on the upper portion of the site to address water quality. This would limit the contributing impervious area draining to the sand filter structure. Moreover, in order to make the site usable for boat storage, the site must be designed with a gravel surface, which makes it difficult to get runoff to a sand filter facility. Therefore, for the reasons stated above, on behalf of our client, we are requesting a Hardship Waiver/Fee in-lieu of Best Management Practices for water quality management. A theoretical underground sand filter facility was sized and was based on the required water quality volume (see Appendix 'A' for plan titled "Theoretical Water Quality Sand Filter Structure"). A copy of the construction cost estimate for this theoretical facility is also enclosed as part of Appendix 'A'. Please note that the phosphorus removal offset fee (noted below) is greater than the SWM water quality offset fee. Therefore no additional SWM water quality offset fee should be required.

VI. CRITICAL AREA POLLUTANT REDUCTION REQUIREMENTS

As mentioned previously the entire project site is located within the 1000-foot Chesapeake Bay Critical Area. The Maryland State Critical Area Regulations require new developments and redevelopments within an IDA Zone to reduce pollutants running off the land by 10%, and that plant and animal habitat be protected and improved.

As previously noted, due to the ultimate site grade and proposed gravel surface, providing an underground sand filter facility is not feasible. For this reason our client is requesting to pay an offset fee in-lieu of the pollutant removal best management facility per Baltimore City Critical Area Management Program Section V, H-2. The fee is based on phosphorus loading removal at $35,000.00 per pound. Therefore the offset fee would be based on 8.02 pounds of phosphorus loading at $35,000.00 per pound, which will amount to $280,700.00. This amount shall be credited toward the water quality offset fee.

VII. CRITICAL AREA BUFFER REQUIREMENTS

The City of Baltimore's Critical Area Management Program (CAMP) requires that a 100-foot vegetative buffer be established along the shoreline to protect and improve shoreline habitat and tidal waters of the Chesapeake Bay. As summarized in "Critical Area Buffer Requirements-Summary" in Appendix "A", a total of 55,488 square feet is within the 100-foot vegetative buffer line. However, due to the nature of this business, 44,677 square feet of area can not be vegetated. In accordance with Section V, H-2 of the Baltimore City Critical Area Management Program, the developer is requesting to contribute an offset fee in-lieu for the remaining buffer setback. A theoretical 100-foot setback buffer has been delineated on the proposed conditions drainage area map. The fee would be based on 44,677 square feet at $2.50 per square foot, for a total of $111,692.50.

VIII. SUMMARY OF FEES

SWM water quality offset fee: $115,200
Critical Area Pollutant Reduction offset fee: $280,700 (credit towards SWM water quality offset fee)
Critical Area Buffer offset fee: $111,692.50
Total offset fee: $392,392.50
The amount paid for one-half the total required fee for the scope of improvements covered under phase I: $165,504

The amount to be paid: $226,888.50

Worksheet 2: Runoff curve number and runoff

Project Tidewater Yatch Service Center By KPD Date Feb-06

Location Baltimore, Maryland Checked _____ Date _____

Circle one: Existing Developed Existing Drainage Area No. 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN* Table 2-2	CN* Fig. 2-3	CN* Fig. 2-4	Area ☐ acres ☐ mi^2 ☐ %	Product of CN x area
D	Brush (Fair Condition)	77			5.4	415.8
	Impervious(Paved parking lots, roofs, driveways, etc.)	98			3.16	309.68
* Use only one CN source per line.		Totals =			8.56	725.48

≈ 0.01338 mi^2

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{725.5}{8.56} =$ 84.75 , Use CN = **84.8**

2. Runoff

Storm # 1	Storm #2	Storm #3
See	Tr-20	Run

Frequency ..... yr

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

Runoff, Q ..... in

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

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Tidewater Yatch Service Center By KPD Date Feb-06

Location Baltimore, Maryland Checked _____ Date _____

Circle one: [Existing] Developed Existing Drainage Area, No.1

Circle one: T_c T_t through subarea _____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)		Segment ID	A-B	
1.	Surface description (table 3-1)		GRASS	
2.	Manning's roughness coeff., n (table 3-1)		0.24	
3.	Flow length, L (total L ≤ 300 ft)	ft	100	
4.	Two-yr 24-hr rainfall, P_2	in	3.2	
5.	Land slope, s	ft/ft	0.009	
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	0.327 + 0.000	= 0.327

Shallow concentrated flow		Segment ID	B-C	C-D
7.	Surface description (paved or unpaved)		UNPAVED	PAVED
8.	Flow length, L	ft	160	449
9.	Watercourse slope, s	ft/ft	0.031	0.013
10.	Average velocity, V (figure 3-1)	ft/s	2.8	2.3
11.	$T_t = \frac{L}{3600\, V}$ Compute T_t	hr	0.016 + 0.054	= 0.070

Channel flow		Segment ID		
12.	Cross sectional flow area, a	ft2		
13.	Wetted perimeter, P_w	ft		
14.	Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft		
15.	Channel slope, s	ft/ft		
16.	Manning's roughness coeff., n (table 3-1)			
17.	$V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s		
18.	Flow length, L	ft/s		
19.	$T_t = \frac{L}{3600\, V}$ Compute T_t	hr	0.000 + 0.000	= 0.000
20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		0.397
		Use		0.40 hr

Worksheet 2: Runoff curve number and runoff

Project Tidewater Yatch Service Center By KPD Date Feb-06

Location Baltimore, Maryland Checked _____ Date _____

Circle one: Existing Developed [Ultimate] Ultimate Drainage Area No. 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN* Table 2-2	CN* Fig. 2-3	CN* Fig. 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area
D	Grass - Good Condition	80			2.80	224
	Impervious(Paved parking lots, roofs, driveways, etc.)	98			6.41	628.18
* Use only one CN source per line.		Totals =			9.21	852.18

≃ 0.01439 mi²

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{852.2}{9.21} = 92.53$; Use CN = **92.5**

2. Runoff

Storm # 1	Storm #2	Storm #3
See	Tr-20	Run

Frequency ..... yr

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

Runoff, Q ..... in

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

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Tidewater Yatch Service Center By KPD Date Feb-06

Location Baltimore, Maryland Checked _____ Date _____

Circle one: Present Developed [Ultimate] Ultimate Drainage Area No. 1

Circle one: T_c T_t through subarea _____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)		Segment ID	A-B	
1.	Surface description (table 3-1)		GRASS	
2.	Manning's roughness coeff., n (table 3-1)		0.24	
3.	Flow length, L (total L ≤ 300 ft)	ft	100	
4.	Two-yr 24-hr rainfall, P_2	in	3.2	
5.	Land slope, s	ft/ft	0.02	
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr	0.238 + 0.000	= 0.238

Shallow concentrated flow		Segment ID	B-C	C-D
7.	Surface description (paved or unpaved)		UNPAVED	PAVED
8.	Flow length, L	ft	97	234
9.	Watercourse slope, s	ft/ft	0.011	0.025
10.	Average velocity, V (figure 3-1)	ft/s	1.7	3.2
11.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.016 + 0.020	= 0.036

Channel flow		Segment ID	D-E	
12.	Cross sectional flow area, a	ft2		
13.	Wetted perimeter, P_w	ft		
14.	Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		
15.	Channel slope, s	ft/ft		
16.	Manning's roughness coeff., n (table 3-1)			
17.	$V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s	5	
18.	Flow length, L	ft/s	395	
19.	$T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.022 + 0.000	= 0.022
20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		0.296
		Use		0.30 hr

(210-VI-TR-55, Second Ed., June 1986)

(7)

Worksheet A: Standard Application Process

Calculating Pollutant Removal Requirements[1]

Step 1: Calculate Existing and Proposed Site Imperviousness

A. Calculate Percent Imperviousness

1) Site Area within the Critical Area IDA, A = 9.21 acres

2) Site Impervious Surface Area, Existing and Proposed, (See Table 4.1 for details)

	(a) Existing (acres)	(b) Proposed (acres)
Roads		
Parking lots	1.78	0.26
Driveways	0.62	0.38
Sidewalks/paths		
Rooftops		
Decks GRAVEL		0.67
Swimming pools/ponds		3.71
Other (PIERS)	0.76	1.39
Impervious Surface Area	3.16	6.41

Note: reduced the amt. of Floating Piers

3) Imperviousness (I)

Existing Imperviousness, I_{pre} = Impervious Surface Area / Site Area
= (Step 2a) / (Step 1)
= (3.16) / (9.21)
= 34.31 %

Proposed Imperviousness, I_{post} = Impervious Surface Area / Site Area
= (Step 2b) / (Step 1)
= (6.41) / (9.21)
= 69.60 %

B. Define Development Category (circle)

1) New Development: Existing imperviousness less than 15% I *(Go to Step 2A)*

(2) Redevelopment: Existing imperviousness of 15% I or more *(Go to Step 2B)*

3) Single Lot Residential Development: Single lot being developed or improved; single family residential development; and more than 250 square feet of impervious area and associated disturbance (Go to Section 5, Residential Approach, for detailed criteria and requirements).

[1] NOTE: All acreage used in this worksheet refers to areas within the IDA of the Critical Area only.

Step 2: Calculate the Predevelopment Load (L_{pre})

A. New Development

L_{pre} = (0.5) (A)

= (0.5) (_____)

= _____ lbs /year of total phosphorus

Where:

L_{pre} = Average annual load of total phosphorus exported from the site prior to development (lbs/year)
0.5 = Annual total phosphorus load from undeveloped lands (lbs/acre/year)
A = Area of the site within the Critical Area IDA (acres)

B. Redevelopment

L_{pre} = (R_v) (C) (A) (8.16)

R_v = 0.05 + 0.009 (I_{pre})

= 0.05 + 0.009 (37.31) = 0.36 OK

L_{pre} = (0.36) (0.30) (9.21) (8.16)

= 8.12 lbs/year of total phosphorus

Where:

L_{pre} = Average annual load of total phosphorus exported from the site prior to development (lbs/year)
R_v = Runoff coefficient, which expresses the fraction of rainfall which is converted into runoff
I_{pre} = Pre-development (existing) site imperviousness (i.e., I = 75 if site is 75% impervious)
C = Flow-weighted mean concentration of the pollutant (total phosphorus) in urban runoff (mg/l) = 0.30 mg/l
A = Area of the site within the Critical Area IDA (acres)
8.16 = Includes regional constants and unit conversion factors

Step 3: Calculate the Post-Development Load (L_{post})

A. **New Development and Redevelopment:**

L_{post} = (R_v) (C) (A) (8.16)

R_v = 0.05 + 0.009 (I_{post})

= 0.05 + 0.009 (69.60) = 0.68

L_{post} = (0.68) (0.30) (9.21) (8.16)

= 15.33 lbs/year of total phosphorus OK

Where:

L_{post} = Average annual load of total phosphorus exported from the post-development site (lbs/year)

R_v = Runoff coefficient, which expresses the fraction of rainfall which is converted into runoff

I_{post} = Post-development (proposed) site imperviousness (i.e., I = 75 if site is 75% impervious)

C = Flow-weighted mean concentration of the pollutant (total phosphorus) in urban runoff (mg/l) = 0.30 mg/l

A = Area of the site within the Critical Area IDA (acres)

8.16 = Includes regional constants and unit conversion factors

Step 4: Calculate the Pollutant Removal Requirement (RR)

RR = L_{post} - (0.9) (L_{pre})

= (15.33) - (0.9) (8.12) = 0.9 x 8.12 = 7.308

= 8.02 lbs/year of total phosphorus OK

15.33
7.308

Where:

RR = Pollutant removal requirement (lbs/year)

L_{post} = Average annual load of total phosphorus exported from the post-development site (lbs/year)

L_{pre} = Average annual load of total phosphorus exported from the site prior to development (lbs/year)

Step 5: Identify Feasible BMP(s)

Select BMP Options using the screening matrices provided in the Chapter 4 of the 2000 Maryland Stormwater Design Manual. Calculate the load removed for each option.

BMP Type	(L_{post})	x	(BMP_{RE})	x	(% DA Served)	=	LR
_____	_____	x	_____	x	_____	=	_____ lbs/year
_____	_____	x	_____	x	_____	=	_____ lbs/year
_____	_____	x	_____	x	_____	=	_____ lbs/year
_____	_____	x	_____	x	_____	=	_____ lbs/year

Load Removed, LR (total) = _____ lbs/year

Pollutant Removal Requirement, RR (from Step 4) = _____ lbs/year

Where:

Load Removed, LR	=	Annual total phosphorus load removed by the proposed BMP (lbs/year)
L_{post}	=	Average annual load of total phosphorus exported from the post-development site (lbs/year)
BMP_{RE}	=	BMP removal efficiency for total phosphorus, Table 4.8 (%)
% DA Served	=	Fraction of the site area within the critical area IDA served by the BMP (%)
RR	=	Pollutant removal requirement (lbs/year)

If the Load Removed is equal to or greater than the Pollutant Removal Requirement computed in Step 4, then the on-site BMP complies with the 10% Rule.

Has the RR (pollutant removal requirement) been met? ☐ **Yes** ☐ **No**

AN OFFSET FEE WILL BE PAID IN-LIEU OF BEST MANAGEMENT PRACTICE. THE FEE WOULD AMOUNT TO,

$ 35,000 PER LB X 8.02 LB

= $ 280,700

```
*******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*******************

JOB TR-20                              FULLPRINT          SUMMARY   NOPLOTS
TITLE 001  TIDEWATER AT PORT COVINGTON          F.N:12197.DAT  BY:KPD 02/04/2006
TITLE      1,2,10 AND 100 YEAR EXISTING AND POST DEVELOPMENT PEAK RUNOFF
 6 RUNOFF 1 001        1 0.01338      84.8        0.40                    EX DA 1
 6 RUNOFF 1 002        2 0.01439      92.5        0.30                    PR DA 1
   ENDATA
 7 INCREM 6              0.10
 7 COMPUT 7 001    002   0.0          2.6         1.0         2 2  01  01
   ENDCMP 1
 7 COMPUT 7 001    002   0.0          3.2         1.0         2 2  01  02
   ENDCMP 1
 7 COMPUT 7 001    002   0.0          5.1         1.0         2 2  01  10
   ENDCMP 1
 7 COMPUT 7 001    002   0.0          7.1         1.0         2 2  01  99
   ENDCMP 1
   ENDJOB 2
0*********************************END OF 80-80 LIST*********************************

 MAIN - UNEXPECTED RECORD FOUND(IGNORED) >>>
1                                                                              <<<


 TR20 XEQ 03-17-06  13:39          TIDEWATER AT PORT COVINGTON    F.N:12197.DAT  BY:KPD 02/04/2006                    JOB  1   PASS    1
      REV PC 09/83(.2)             1,2,10 AND 100 YEAR EXISTING AND POST DEVELOPMENT PEAK RUNOFF                       PAGE   1


 EXECUTIVE CONTROL OPERATION INCREM
+                                  MAIN TIME INCREMENT =    .10 HOURS                                          RECORD ID

 EXECUTIVE CONTROL OPERATION COMPUT
+                                  FROM XSECTION   1                                                           RECORD ID
+                                                  TO XSECTION   2
        STARTING TIME =    .00    RAIN DEPTH =  2.60    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
        ALTERNATE NO.= 1          STORM NO.= 1    MAIN TIME INCREMENT =    .10 HOURS

 OPERATION RUNOFF   CROSS SECTION   1
           OUTPUT HYDROGRAPH=  1
           AREA=     .01 SQ MI   INPUT RUNOFF CURVE= 85.   TIME OF CONCENTRATION=    .40 HOURS
           INTERNAL HYDROGRAPH TIME INCREMENT=  .0533 HOURS

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.14                          10.01                       (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.25 WATERSHED INCHES,     10.75 CFS-HRS,      .89 ACRE-FEET;   BASEFLOW =     .00 CFS

 OPERATION RUNOFF   CROSS SECTION   2
           OUTPUT HYDROGRAPH=  2
```


(12)

AREA= .01 SQ MI INPUT RUNOFF CURVE= 93. TIME OF CONCENTRATION= .30 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0400 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.08	17.83	

RUNOFF VOLUME ABOVE BASEFLOW = 1.83 WATERSHED INCHES, 16.98 CFS-HRS, 1.40 ACRE-FEET; BASEFLOW = .00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP
+ COMPUTATIONS COMPLETED FOR PASS 1 RECORD ID

1

TR20 XEQ 03-17-06 13:39 TIDEWATER AT PORT COVINGTON F.N:12197.DAT BY:KPD 02/04/2006 JOB 1 PASS 2
REV PC 09/83(.2) 1,2,10 AND 100 YEAR EXISTING AND POST DEVELOPMENT PEAK RUNOFF PAGE 2

EXECUTIVE CONTROL OPERATION COMPUT
+ FROM XSECTION 1 RECORD ID
+ TO XSECTION 2
STARTING TIME = .00 RAIN DEPTH = 3.20 RAIN DURATION= 1.00 RAIN TABLE NO.= 2 ANT. MOIST. COND= 2
ALTERNATE NO.= 1 STORM NO.= 2 MAIN TIME INCREMENT = .10 HOURS

OPERATION RUNOFF CROSS SECTION 1
OUTPUT HYDROGRAPH= 1
AREA= .01 SQ MI INPUT RUNOFF CURVE= 85. TIME OF CONCENTRATION= .40 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0533 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.13	14.07	

RUNOFF VOLUME ABOVE BASEFLOW = 1.74 WATERSHED INCHES, 15.04 CFS-HRS, 1.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 2
OUTPUT HYDROGRAPH= 2
AREA= .01 SQ MI INPUT RUNOFF CURVE= 93. TIME OF CONCENTRATION= .30 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0400 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.07	23.07	

RUNOFF VOLUME ABOVE BASEFLOW = 2.40 WATERSHED INCHES, 22.26 CFS-HRS, 1.84 ACRE-FEET; BASEFLOW = .00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP
+ COMPUTATIONS COMPLETED FOR PASS 2 RECORD ID

1

TR20 XEQ 03-17-06 13:39 TIDEWATER AT PORT COVINGTON F.N:12197.DAT BY:KPD 02/04/2006 JOB 1 PASS 3

```
 EXECUTIVE CONTROL OPERATION COMPUT
+                                  FROM XSECTION   1                                                    RECORD ID
+                                                                  TO XSECTION   2
        STARTING TIME =    .00     RAIN DEPTH =  5.10    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
        ALTERNATE NO.= 1           STORM NO.=10    MAIN TIME INCREMENT =    .10 HOURS

 OPERATION RUNOFF   CROSS SECTION   1
           OUTPUT HYDROGRAPH=  1
           AREA=     .01 SQ MI   INPUT RUNOFF CURVE= 85.    TIME OF CONCENTRATION=    .40 HOURS
           INTERNAL HYDROGRAPH TIME INCREMENT=  .0533 HOURS

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.13                          27.55                       (RUNOFF)

   RUNOFF VOLUME ABOVE BASEFLOW =  3.44 WATERSHED INCHES,     29.71 CFS-HRS,     2.46 ACRE-FEET;   BASEFLOW =     .00 CFS

 OPERATION RUNOFF   CROSS SECTION   2
           OUTPUT HYDROGRAPH=  2
           AREA=     .01 SQ MI   INPUT RUNOFF CURVE= 93.    TIME OF CONCENTRATION=    .30 HOURS
           INTERNAL HYDROGRAPH TIME INCREMENT=  .0400 HOURS

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.07                          39.55                       (RUNOFF)

   RUNOFF VOLUME ABOVE BASEFLOW =  4.24 WATERSHED INCHES,     39.38 CFS-HRS,     3.25 ACRE-FEET;   BASEFLOW =     .00 CFS

 EXECUTIVE CONTROL OPERATION ENDCMP
+                                  COMPUTATIONS COMPLETED FOR PASS   3                                  RECORD ID

1


 TR20 XEQ 03-17-06  13:39        TIDEWATER AT PORT COVINGTON     F.N:12197.DAT  BY:KPD 02/04/2006          JOB  1   PASS   4
      REV PC 09/83(.2)           1,2,10 AND 100 YEAR EXISTING AND POST DEVELOPMENT PEAK RUNOFF                 PAGE   4


 EXECUTIVE CONTROL OPERATION COMPUT
+                                  FROM XSECTION   1                                                    RECORD ID
+                                                                  TO XSECTION   2
        STARTING TIME =    .00     RAIN DEPTH =  7.10    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
        ALTERNATE NO.= 1           STORM NO.=99    MAIN TIME INCREMENT =    .10 HOURS

 OPERATION RUNOFF   CROSS SECTION   1
           OUTPUT HYDROGRAPH=  1
           AREA=     .01 SQ MI   INPUT RUNOFF CURVE= 85.    TIME OF CONCENTRATION=    .40 HOURS
           INTERNAL HYDROGRAPH TIME INCREMENT=  .0533 HOURS

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
```

12.12 41.97 (RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.33 WATERSHED INCHES, 45.99 CFS-HRS, 3.80 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 2
OUTPUT HYDROGRAPH= 2
AREA= .01 SQ MI INPUT RUNOFF CURVE= 93. TIME OF CONCENTRATION= .30 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0400 HOURS

PEAK TIME(HRS) PEAK DISCHARGE(CFS) PEAK ELEVATION(FEET)
12.07 56.66 (RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 6.21 WATERSHED INCHES, 57.67 CFS-HRS, 4.77 ACRE-FEET; BASEFLOW = .00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP
+ COMPUTATIONS COMPLETED FOR PASS 4 RECORD ID

EXECUTIVE CONTROL OPERATION ENDJOB
1 RECORD ID

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 1													
XSECTION 1	RUNOFF	.01	2	2	.10	.0	2.60	24.00	1.25	---	12.14	10.01	748.5
XSECTION 2	RUNOFF	.01	2	2	.10	.0	2.60	24.00	1.83	---	12.08	17.83	1238.9
ALTERNATE 1 STORM 2													
XSECTION 1	RUNOFF	.01	2	2	.10	.0	3.20	24.00	1.74	---	12.13	14.07	1051.8
XSECTION 2	RUNOFF	.01	2	2	.10	.0	3.20	24.00	2.40	---	12.07	23.07	1603.4
ALTERNATE 1 STORM 10													
XSECTION 1	RUNOFF	.01	2	2	.10	.0	5.10	24.00	3.44	---	12.13	27.55	2058.8
XSECTION 2	RUNOFF	.01	2	2	.10	.0	5.10	24.00	4.24	---	12.07	39.55	2748.2
ALTERNATE 1 STORM 99													
XSECTION 1	RUNOFF	.01	2	2	.10	.0	7.10	24.00	5.33	---	12.12	41.97	3136.7
XSECTION 2	RUNOFF	.01	2	2	.10	.0	7.10	24.00	6.21	---	12.07	56.66	3937.3

TR20 XEQ 03-17-06 13:39 TIDEWATER AT PORT COVINGTON F.N:12197.DAT BY:KPD 02/04/2006 JOB 1 SUMMARY
REV PC 09/83(.2) 1,2,10 AND 100 YEAR EXISTING AND POST DEVELOPMENT PEAK RUNOFF PAGE 6

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1	2	10	99
0 XSECTION 1	.01				
+ ALTERNATE 1		10.01	14.07	27.55	41.97
0 XSECTION 2	.01				
+ ALTERNATE 1		17.83	23.07	39.55	56.66

1END OF 1 JOBS IN THIS RUN

(91)

WATER QUALITY CALCULATIONS

GOAL: To size a Theoretical Underground SWM sand filter structure.

Data:

Total Project Site Area =						=	9.21000 ac	= 401,188 s.f.
A_{ex} = Total existing Impervious area						=	3.16000 ac	= 137,650 s.f.
Existing Impervious Area which is Anticipated to be Disturbed under Redevelopment						=	3.02000 ac	= 131,551 s.f.
Reduction in Impervious Area at 20% of Existing Impervious area (as per MDE requirements)						=	0.60400 ac	= 26,310 s.f.
								0.000 s.f.
$A_{I_{prop}}$ = Impervious Area under proposed Redevelopment						=	6.41000 ac	279,220 s.f.
Increase in Impervious Area						=	3.250 ac	141,570 s.f.
Liable Impervious Area for Water Quality =			(	0.60400 ac	)+(3.250 ac)	=	3.85400 ac	= 167,880 s.f.
Drainage Area Contributing to the Facility						=	9.2100 ac.	= 401,188 s.f.
I = percent Impervious Area =		(	Ai	)/(	A	)(100	)]=	
I = percent Impervious Area =		(	3.85400 ac.	)/(	9.210 ac	)(100	)]=	41.85 %
R_v = Volumetric Runoff Coeff. =		(	0.05	+[(	0.009	)(I	)]=	
R_v = Volumetric Runoff Coeff. =		(	0.05	+[(	0.009	)(41.85	)]=	0.43 (from design manual, page 2.2)
P = Precipitation Depth =								1.0 in. (From design manual, page 2.3)

COMPUTE WATER QUALITY VOLUME REQUIRED:

WQv = Water Quality Volume =								
WQv = Water Quality Volume =	(	P	)(	R_v	)(A)/ 12			
	(	1.0 in.	)(	0.42661	)(9.210 ac)/ 12	=	0.32743 ac ft	= 14262.63 c.f.

Filtering Pretreatment Criteria (Chapter 3, section 3.4.3): Dry or wet pretreatment equivalent to at least 25% of the computed WQv shall be provided prior to filter media. The typical method is a sedimentation basin that has a length to with ratio of 2:1.

Filtering Treatment Criteria (Chapter 3, section 3.4.4): The entire treatment system (including pretreatment) shall temporarily hold at least 75% of the WQv prior to filtration.

COMPUTE REQUIRED TEMPORARY STORAGE

V_{temp} = Volume of Temporary Storage Required =						
V_{temp} = Volume of Temporary Storage Required =	(	0.75	)(	WQv	)=	
	(	0.75	)(	14262.63 cf	)=	10696.97 cf (required)

COMPUTE REQUIRED PRE-TREATMENT VOLUME:

V_p = Pre-treatment volume required =							
V_p = Pre-treatment volume required =	(	0.25	)(	WQv	)=		
	(	0.25	)(	14262.63 cf	)=	3565.66 cf (required)	
42 ft (L) 30.00 ft (W) 3.00 ft (D)					=	3,780 cf (provided)	**Okay**

Note: the depth is measured from bottom of the the pretreatment sediment chamber up to crest elevation of the weir wall. This includes the depth of wet pool and depth of volume above the wet pool. Therefore, total depth would be 5'.

CHECK MINIMUM SURFACE AREA OF PRE-TREATMENT (REQUIRED)

Asf = Surface Area for Full Sedimentation Basin =							
Asf = Surface Area for Full Sedimentation Basin =	(	0.066	)(	WQv	)=	(From design manual, Page 3.39)	
	(	0.066	)(	14262.63 cf	)=	941.33 sq. ft. (required)	
42 ft (L) 30.00 ft (W)						1,260 sq. ft. (provided)	

COMPUTE REQUIRED FILTER BED AREA

d_f = Depth of Filter Bed = 2.00 ft
k = Coefficient of Permeability = 3.5 ft/day (From design manual, Page 3.40)
h_f = Head Above Filter Bed 0.50 ft (use average)
t_f = Time to Drain Filter Bed = 1.67 days (From design manual, Page 3.40)
n= Porosity of Sand 0.4

A_f = (WQv x d_f)/[(K x h_f + d_f x t_f)]=
Af = (14262.63 cf x 2.00 ft)/[(3.5 ft/day x 0.50 ft + 2.00 ft. x 1.67 days)]= 1952.11 sq. ft.
105 ft (L) 30 ft (W) 3150 sq. ft. (provided) **Okay**

WATER QUALITY VOLUME PROVIDED IS AS FOLLOW:

1). Pretreatment volume propvided (wet pool and volume above wet pool) :

a. Volume of wet pool = (Depth of pool x Width x Length)
Volume of wet pool = (3 ft x 30 ft x 42 ft)= 3780 cf
d= 3.00 ft.
w= 30.00 ft.
l= 42.00 ft.

b. Volume above wet pool = (1.0 ft x 30 ft x 42 ft)= 1260 cf
d= 1.00 ft.
w= 30.00 ft.
l= 42.00 ft.

2). Temporary ponding volume provided above surface area of filtering system (V_{temp}):

V_{temp} = (surface area of sand filter)(depth of temp. ponding above filter bed)
V_{temp} = (3150 sq. ft. x 1.00 ft) = 3,150 cf

3. Temporary volume provided within the filter bed (V_f):

V_f = (surface area of surface sand filter)(depth of filter bed)(porosity of sand filter)
V_f = (3,150 sq. ft. x 2.00 ft x 0.4) = 2,520 cf

CHECK TEMPORARY VOLUME OF STORAGE PROVIDED:

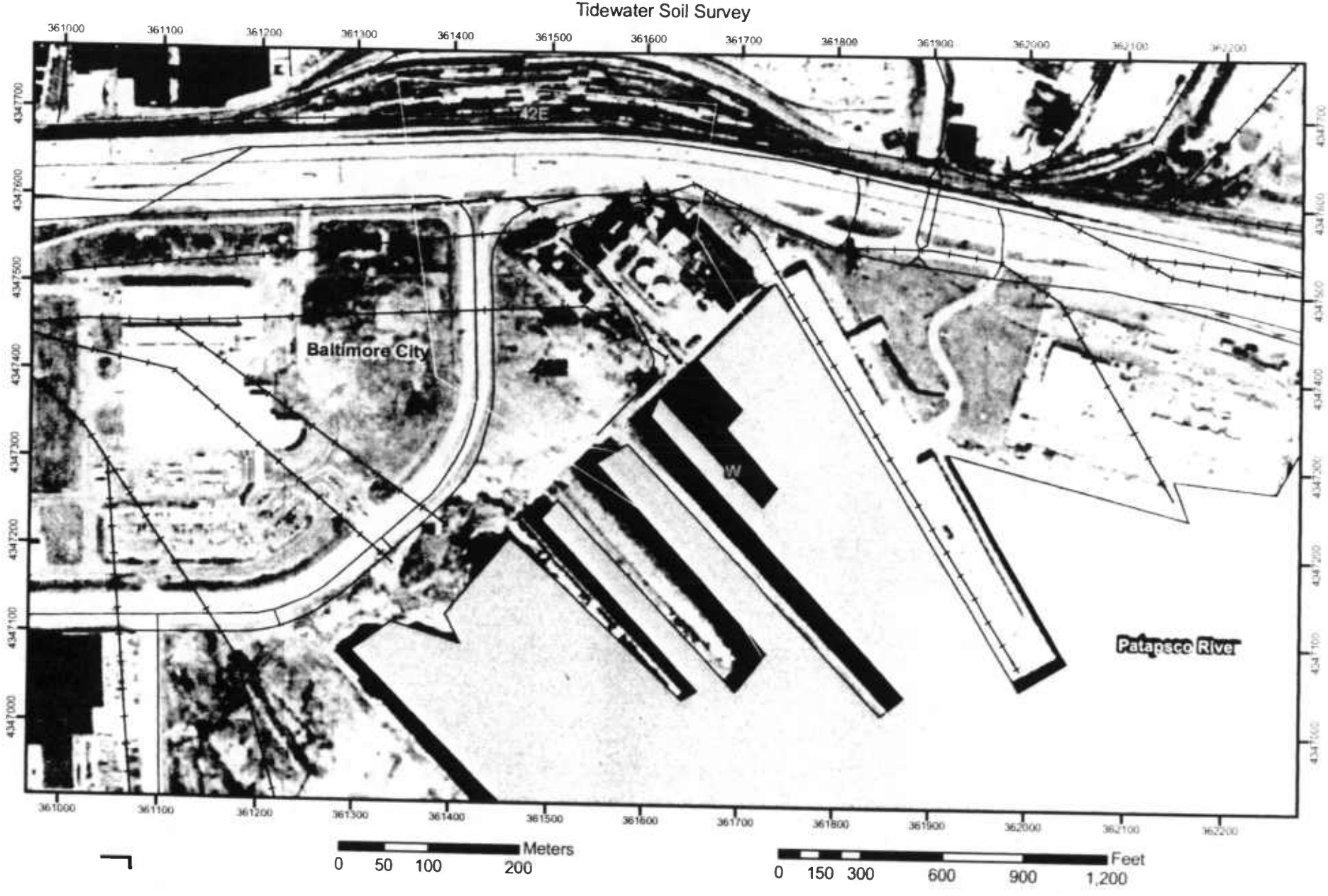
Total volume of storage provided = (V_p)+(V_p)+(V_{temp})+(V_f)=
Total temporary volume of storage provided = (3,780 cf)+(1,260 cf)+(3,150 cf)+(2,520 cf)= 10,710 cf 0.2459 ac-ft (provided)

Thus: 10,710 cf (provided) > 10697 cf (required temp. storage at 75% of WQv) **Okay**

Thus: **theoretically** pretreatment and treatment requirement have been met.

APPENDIX "A"

SOIL SURVEY OF CITY OF BALTIMORE, MARYLAND



USDA Natural Resources Conservation Service

Tidewater Soil Survey

MAP LEGEND

- Soil Map Units
- Cities
- Detailed Counties
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans

MAP INFORMATION

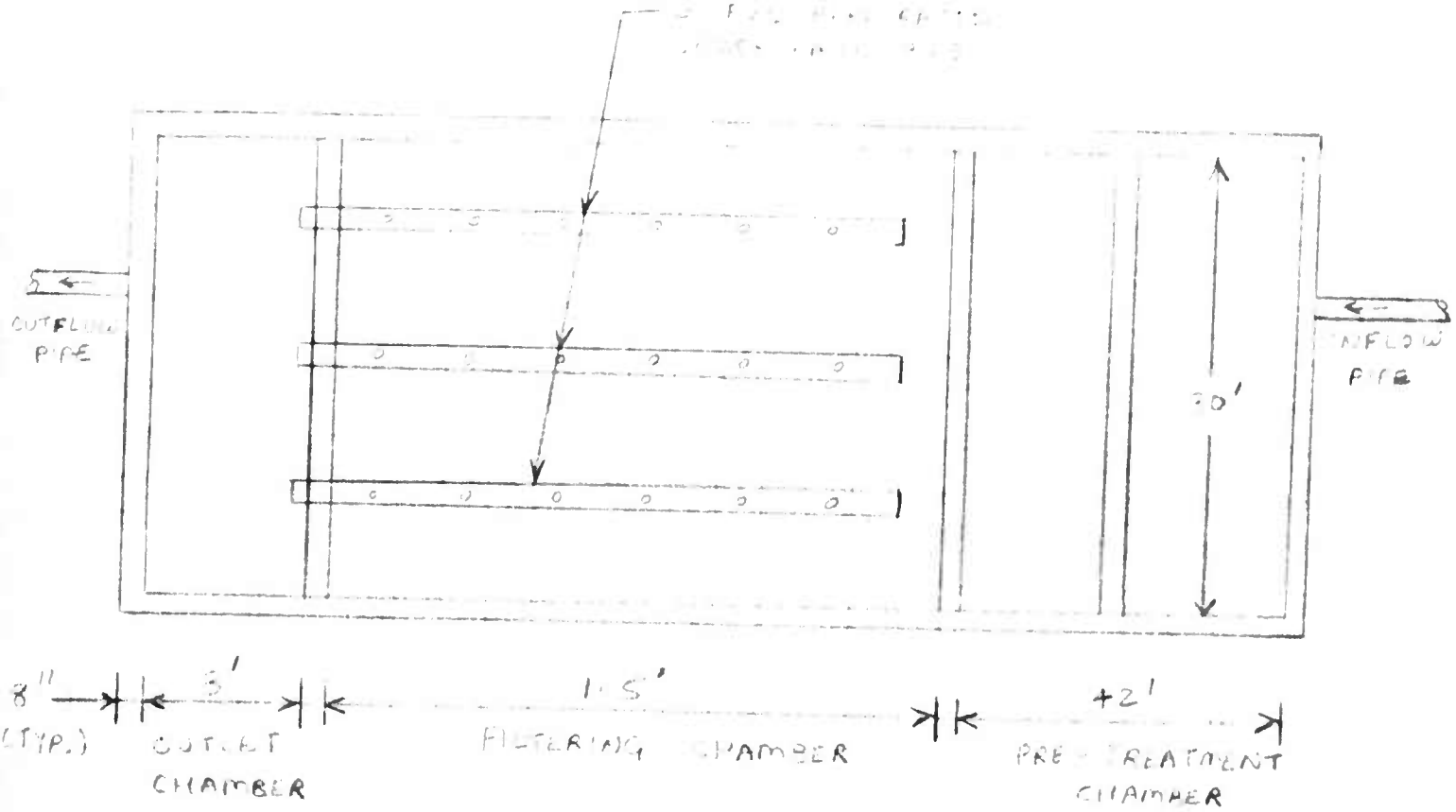
Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 18

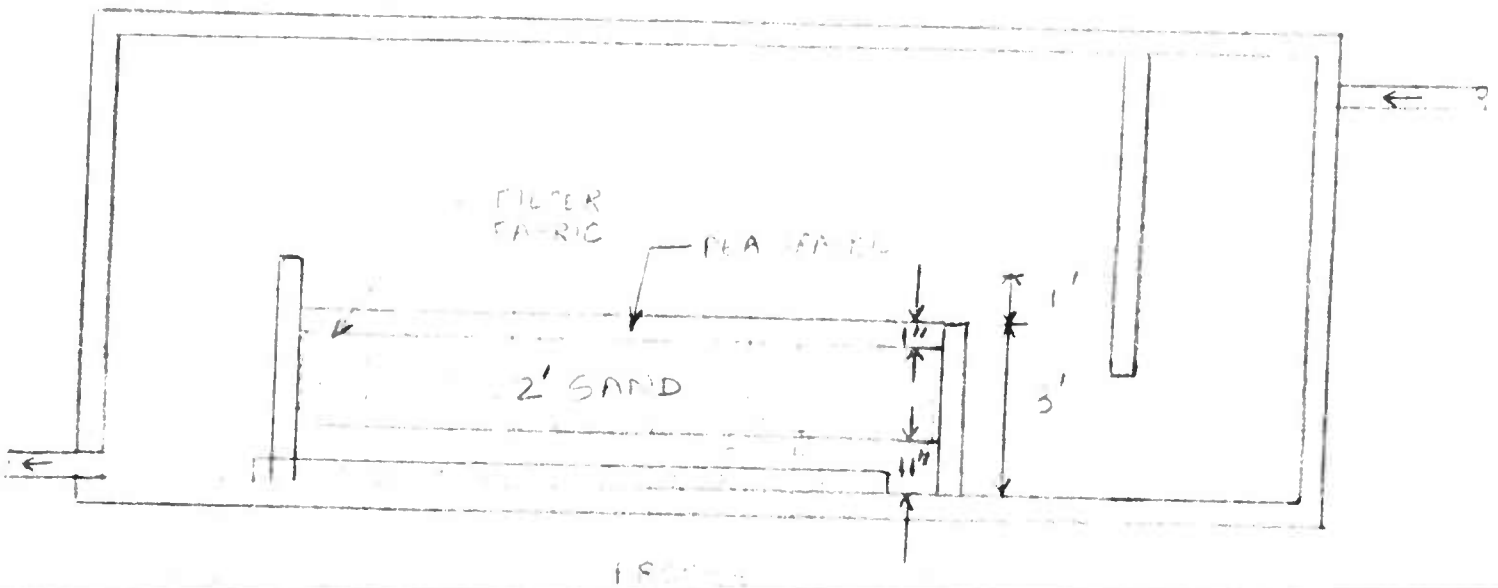
Soil Survey Area: City of Baltimore, Maryland
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:12000

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

CLIENT	STV INCORPORATED			
PROJECT TIDEWATER @ PORT COVINGTON	MADE	CHK.	REV.	JOB NO. 0312197
SUBJECT THEORETICAL UNDERGROUND	KPD			SHT. NO.
SAND FILTER STRUCTURE	01/30/06		03/23/06	1.



PLAN
N.T.S.

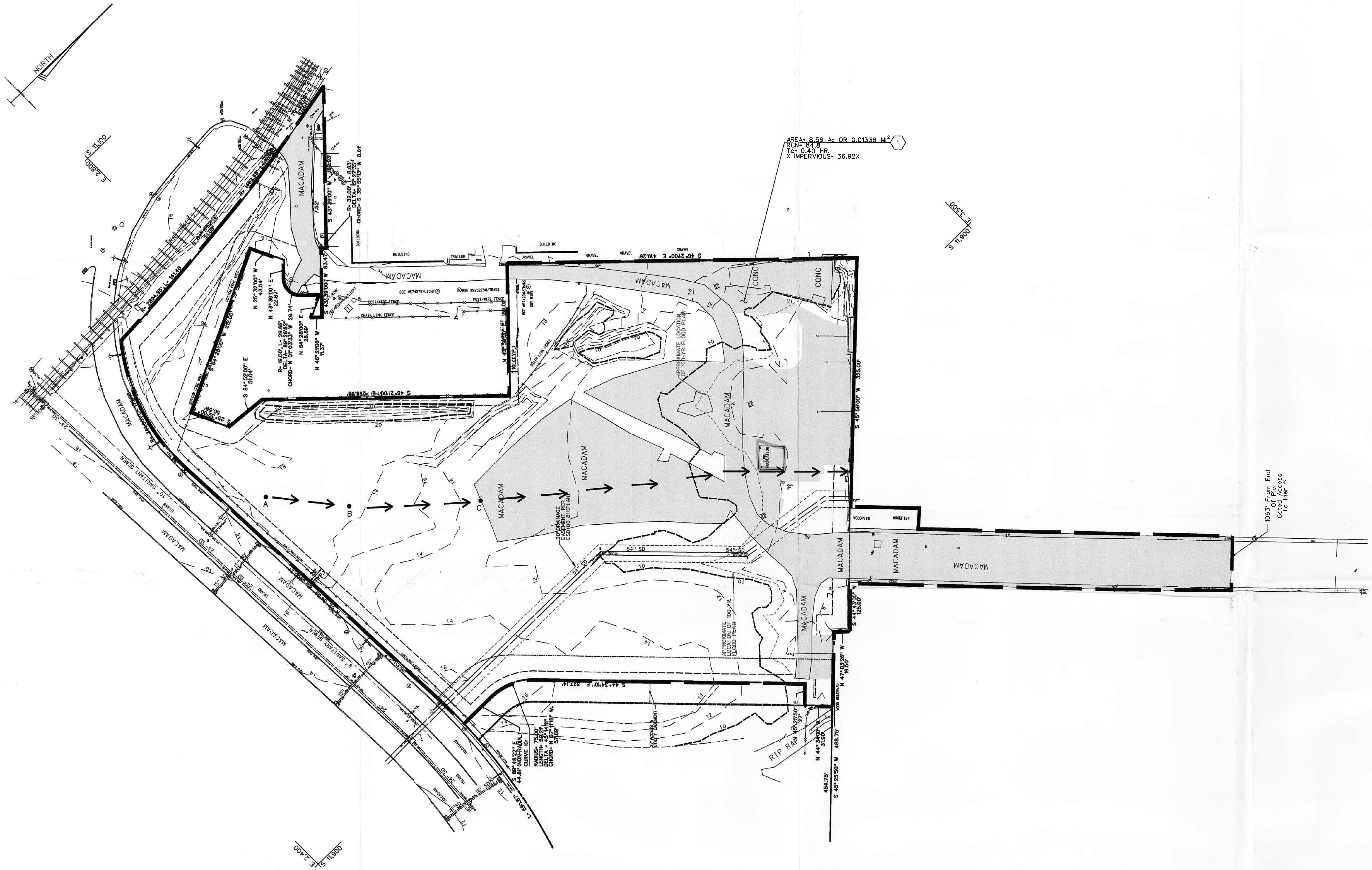


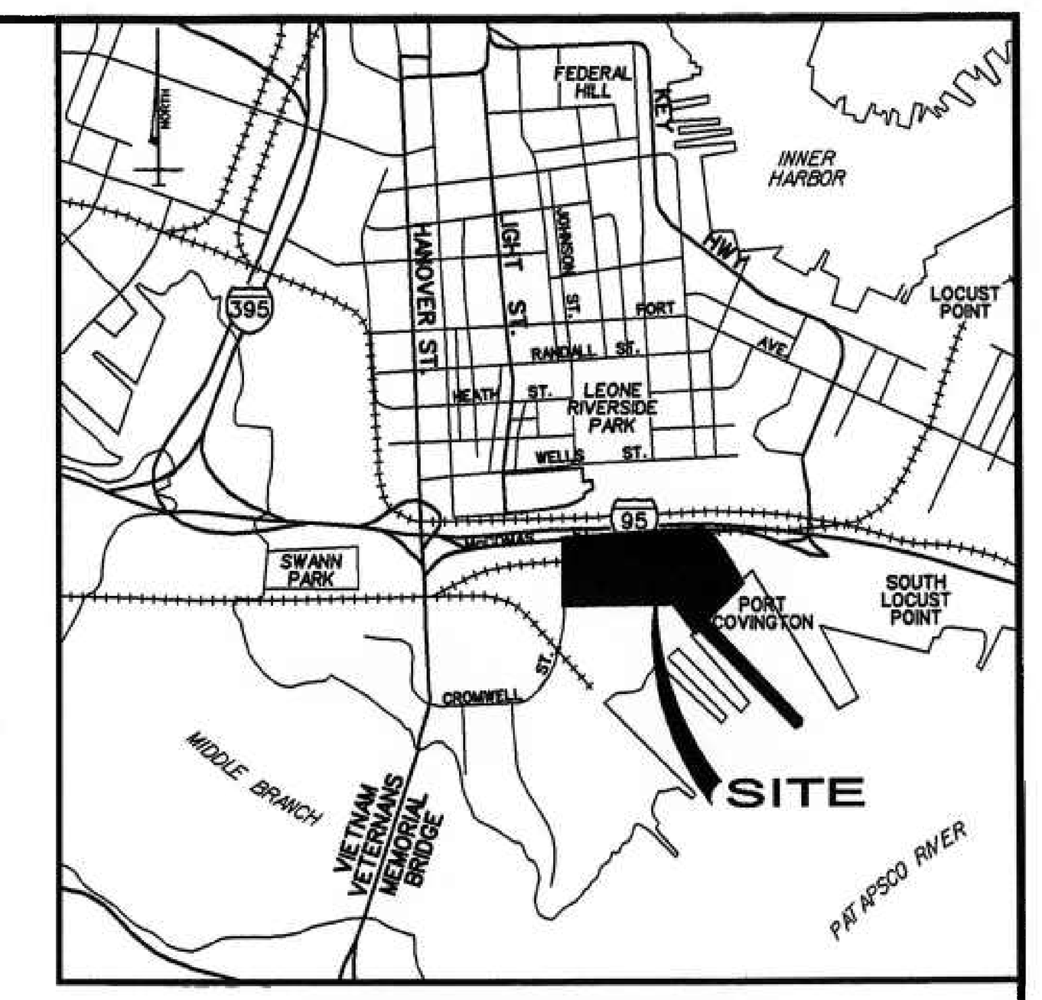
STV Incorporated
7125 Ambassador Road
Baltimore, Maryland 21244-2722
Tel. (410) 944-9112
Fax: (410) 298-2794

Project Name: **Tidewater @ Port Covington**
Project No.: 312197
Computed By: KPD
Checked By:
Date: 2/10/2006 Sheet No.:1

ENGINEER'S OPINION OF DEVELOPMENT COST ESTIMATE
FOR
TIDEWATER @ PORT COVINGTON
THEORETICAL SAND FILTER STRUCTURE

Item No.	Item Description	Unit	Approx. Quantity	Unit Price	Total Price
1	EXCAVATION	C.Y.	700	10.00	7,000.00
2	INCLUDING THE INLET/DIVERSION STRUCTURE	LS	-	75,000.00	75,000.00
3	30" MANHOLE FRAM AND COVER	EA	3	400.00	1,200.00
4	24" MANHOLE FRAM AND COVER	EA	1	400.00	400.00
5	PERFORATED PVC PIPES	L.F.	340	20.00	6,800.00
6	12" OULET PVC PIPE	L.F.	60	30.00	1,800.00
7	3" DEWATERING VALVE	EA	1	200.00	200.00
8	ASTM C-33 SAND	TON	260	30.00	7,800.00
9	ASSHTO-M-43 GRAVEL	TON	110	30.00	3,300.00
10	FILTER FABRIC	S.Y.	600	2.00	1,200.00
	TOTAL ESTIMATE COST				$104,700.00
	10% CONTINGENCY				$10,470.00
	TOTAL COST ESTIMATED				$115,170.00
	USE				**$115,200.00**





VICINITY MAP
SCALE:1" = 2,000'

LEGEND:

— — 6 — —	EXISTING CONTOUR
3.8	EXISTING SPOT ELEVATION
- - - - -	100 YEAR FLOOD PLAIN
3.16 Ac	EXISTING IMPERVIOUS AREA PER FIELD INSPECTION ON 08/18/05
▬▬ ▬▬	DRAINAGE AREA LINE
A•→ → →	TIME OF CONCENTRATION LINE

RECEIVED
MAY 3 2006
CRITICAL AREA COMMISSION
Chesapeake & Atlantic Coastal Bays

I:\PROJECTS\0312197\0312197_0001\Drawings\CIV\SM01POV.dgn
04/28/2006 01:51:24 PM

STV Incorporated
engineers / architects / planners / scientists / construction managers
7125 Ambassador Road Baltimore, MD 21244-2722 (410) 944-9112

REVISIONS

NO.	DATE	DESCRIPTION
1.	3/23/06	REVISED PER AGENCY COMMENTS

GRAPHIC SCALE
150 100 50 0 50 100 150

PLAN PREPARATION

DRAWN BY:	SRB	DATE:	FEBRUARY 16,2006
DESIGNED BY:	KPD	SCALE:	1" = 50'
CHECKED BY:	DSS		61-0312197

STORMWATER MANAGEMENT
DRAINAGE AREA MAP, EXISTING CONDITIONS

TIDEWATER @ PORT COVINGTON
321 CROMWELL STREET
BALTIMORE, MD, 21230
WARD 24 - SECTION 6 - BLOCK 1053 - LOT 011A

DRAWING NO.

SHEET NO.
1 of 2