GENERAL NOTES

1. This site has been addressed by the Town of Occoquan as: 401 ELLICOTT STREET, OCCOQUAN VA (addresses for subdivision lots shall appear on the approved plat for recordation).
2. Addresses assigned are for the layout of individual businesses or dwelling units and are for exterior doors as shown on this plan only. Any deviation in design or layout will require that a revised plan be submitted to the Office of Mapping for re-addressing. It is the responsibility of the developer to inform the Town before a change in layout occurs and to submit complete and accurate information for re-addressing. The Town does not assume any responsibility where re-addressing is required even though tenants have already occupied a portion of the building.
3. Methods and materials used in the construction of the improvements herein shall conform to the current Town construction standards and specifications and/or current VDOT standards and specifications.
4. The contractor or developer is required to notify the Town of Occoquan in writing three (3) days prior to the beginning of the construction and specifically request inspection before beginning 703- 792-7070.
   - A. Installation of approved erosion control devices.
   - B. Clearing and Grading
   - C. Subgrade excavation.
   - D. Installing storm sewers or culverts.
   - E. Setting curb and gutter forms.
   - F. Placing curb and gutter.
   - G. Placing other concrete.
   - H. Placing gravel base.
   - I. Placing any bituminous surfacing.
   - *J. Installing water mains outside the Service Authority's boundaries.
   - *K. Installing sanitary sewer outside the Service Authority's boundaries.
5. Measures to control erosion and siltation, including detention ponds serving as silt basins during construction, must be provided prior to issuance of the site development permit. The approval of these plans in no way relieves the developer or his agent of the responsibilities contained in the Virginia Erosion and sediment Control Handbook.
6. A permit must be obtained from the Office of the Resident Engineer, Virginia Department of Transportation (VDOT) Prince William County, prior to construction in existing State right-of-way, 707-366-1900.
7. Approval of this plan does not guarantee issuance of an entrance permit by VDOT when such permit is required under State law.
8. The exact location of all guard rails will be determined by VDOT personnel. "A joint inspection will be held with the Developer, Town Representatives, and Representatives, of the Virginia Department of Transportation (VDOT) to determine if and where guard rail and/or paved ditches will be needed. The developer will be responsible for providing guardrail and paved ditches as determined by this joint inspection." Refer to Virginia Department of Transportation (VDOT) Guard Rail and Paved Ditch Specifications.
9. An approved set of plans and all applicable permits must be available at the construction site. Also, a representative of the developer must be available at all times.
10. Warning signs, markers, barricades or flagmen should be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).
11. All unsuitable material shall be removed from the construction limits of the roadway before placing embankment.
12. All pavement sections on the approved plans are based on a minimum CBR value of 10. CBR tests are to be performed by the engineer and submitted to the Town Planning Office for review prior to placement of base material. CBR values less than 10 will require submittal of revised pavement section.
13. All roadside ditches at grades of more than 5% shall be paved with cement concrete to the limits indicated on the plans and as required at the field inspection.
14. All springs shall be capped and piped to the nearest storm sewer manholes or curb inlet. The pipe shall be minimum 6" diameter and conform to VDOT standard SB-1.
15. All standard street name signs, traffic control devices, and street lights shall be installed by the developer when the first building unit is occupied.
16. Construction debris shall be containerized in accordance with the Virginia Litter Control Act; no less than one litter receptacle shall be provided at the construction site
17. The contractor shall provide adequate means of cleaning mud from trucks and/or other equipment prior to entering public streets, and it is the contractors responsibility to clean streets, allay dust, and to take whatever measures are necessary to insure that the streets are maintained in a clean, mud and dust free condition at all times.
18. * Notification shall be given to the appropriate utility Company (Service Authority, Virginia-American Water Company, or Dale Service Corporation) prior to construction of water and/or sanitary sewer lines. Information should also be obtained from the appropriate authority concerning permits, cut sheets, and connections to existing lines.
19. All sanitary sewers and water mains and appurtenances shall be constructed in accordance with the current standards and specifications of the Town and/or the Service Authority.
20. The developer and/or contractor shall be responsible to supply all utility companies with copies of plans that have been approved by the Town and advising them that all grading shall conform to the approved plans, and further that the utility companies shall be responsible for honoring these plans and the finished grades in the installation of their utility lines.
21. Contractors shall notify operators who maintain underground utility lines in the area of proposed excavating or blasting at least two (2) working days, but not more than ten (10) working days, prior to commencement of excavation or demolition. Names and telephone numbers of the operators underground utility lines in the Town of Occoquan appear below. These numbers shall also be used to serve in an emergency condition.

■ Washington Gas Light Co.
Virginia Power Co.
Northern Virginia Electric Co-op
Columbia Gas of Virginia
Continental Telephone of VA
Colonial Pipeline Co.
Transcontinental Gas Pipe Line Corp.

MISS UTILITY 1-800-257-7777

Service Authority 703-335-7900 (After hours-Emergency 335-7990)
Virginia-American Water 703-491-2136
Dale Service Corporation 703-494-4161

22. The location of existing utilities shown in these plans are taken from existing records. It shall be the contractors responsibility to verify the exact horizontal and vertical location of all existing utilities as needed prior to construction. The contractor shall inform the engineer of any conflicts arising from his existing utility verification and the proposed construction.
23. The developer will be responsible for any damage to the existing streets and utilities which occurs as a result of his construction project within or contiguous to the existing right-of-way.
24. All utilities placed under existing streets shall be bored or jacked.
25. When grading is proposed within easements of utilities, letters of permission from all involved companies must be provided to the Town's Planning Office prior to issuance of grading and/or site development permits.
26. The developer will be responsible for the relocation of any utilities which is required as a result of his project. The relocation should be done prior to construction.
27. Before burning, blasting, transportation or storage of explosives in the Town of Occoquan, a permit shall be obtained from the Fire Marshal's Office, 792-6360.
28. Fire and Rescue Services must be notified immediately (703-792-6810) in the event that unusual items such as tanks, cylinders, unidentified containers, etc. which could contain potentially hazardous materials are discovered or observed. All activities must cease and not be resumed until authorization to proceed is given by the Fire Marshal's Office.
29. Sidewalk underdrains shall be installed per Section 650.65 of the Design and Construction Standards Manual.
30. All walkways outside of the right-of-way limits will be maintained by the homeowners association.
31. Maintenance of the Storm Drainage or Storm Water Management facilities located therein shall be pursuant to Section 700 of the Town of Occoquan Design and Construction Standards Manual.
32. If units shown on this plan will be occupied in phases, a phasing plan must be approved by the engineering inspection branch prior to the issuance of any occupancy permits. (Detached single family subdivision exempt.)
33. These plans identify the location of all known gravesites. Gravesites shown on this plan will be protected in accordance with state law. In the event gravesites are discovered during construction, the Town Archaeologist must be notified immediately (792-6830). All activities must cease and not be resumed until authorization to proceed is given by the County Archaeologist.
34. Roof top mechanical equipment, if any, must be enclosed within a wall or similar screening barrier, designed in harmony with the building.
35. Individual sign permits will be required from the Zoning Office for all free standing and facade signs prior to erecting the signs.
36. All buffer areas shall be screened according to the Design and Construction Standards Manual.
37. For proffer statements and proffer analyses, see project booklet.
38. For waivers, see project booklet.
39. Anticipated sewage flows: 2,800 GPD
40. Anticipated fire flows: 2,500 GPM @ 38.45 PSI
41. Distance to nearest existing school or proposed school site: OCCOQUAN ELEMENTARY SCHOOL (0.9 MILES)

LEGEND

Item	Symbol	Item	Symbol
EXISTING INTERMEDIATE CONTOUR	32	FLOW LINE	
EXISTING INDEX CONTOUR	230	FENCELINE	x
PROPOSED CONTOUR	20	EXISTING UTILITY POLE	
EXISTING EDGE OF PAVEMENT	EX. E/P	PROPOSED UTILITY POLE	
PROPOSED EDGE OF PAVEMENT	PROP. E/P	EXISTING WATERLINE W/ TEE	V T
EXISTING CURB AND GUTTER	EX. C & G	PROPOSED WATERLINE W/ TEE	V T
PROPOSED CURB AND GUTTER	CG-6	EXISTING FIRE HYDRANT	
TRANSITION FROM CG-6 TO CG-6R	CG-6 CG-6R	PROPOSED FIRE HYDRANT	
EXISTING TELEPHONE LINE	T T	EXISTING WATER VALVE	V
PROPOSED TELEPHONE LINE	T	PROPOSED WATER VALVE	V
EXISTING STORM SEWER	EX. 15" RCP	PROPOSED WATER METER	
PROPOSED STORM SEWER	PROP. 15" RCP	EXISTING REDUCER	V
EXISTING SANITARY SEWER		PROPOSED REDUCER	V
PROPOSED SANITARY SEWER		STOP SIGN	
EXISTING ELECTRIC SERVICE	E E	HANDICAP RAMP (CG-12) DENOTES LOCATION OF STD VDOT CG-12 ... STANDARD RAMP CONSTRUCTION	
PROPOSED ELECTRIC SERVICE	E	PARKING INDICATOR INDICATES THE NUMBER OF TYPICAL PARKING SPACES	12
EXISTING GAS LINE	G G	TEST PIT LOCATION	
PROPOSED GAS LINE	G	CRITICAL SLOPE SLOPES TO BE SEEDED MULCHED & TACKED ... PRINCE WILLIAM COUNTY DESIGN & CONSTRUCTION STANDARDS MANUAL	
PROPERTY LINE		VEHICLES PER DAY COUNT	VPD
EASEMENT LINE		PROPOSED BUILDING ENTRANCE	
CENTERLINE		EXISTING STREET LIGHT	
LIMITS OF CLEARING AND GRADING		PROPOSED STREET LIGHT	
EXISTING SPOT ELEVATION	12.0	PROPOSED STREET NAME SIGN	
PROPOSED SPOT ELEVATION	12.50	PROPOSED SANITARY LATERAL CLEANOUT	
EXISTING TREE DRIP LINE		SANITARY MANHOLE IDENTIFIER	12
EXISTING TREE	15" OAK	STORM DRAIN STRUCTURE IDENTIFIER	12
PROPOSED TREE	OAK	TEST PIT REQUIRED	
YARD LIGHT			

RESPONSIBLE LAND DISTURBER INFORMATION

NAME: WILLIAM C. PUTMAN, PE
REGISTRATION NO.: 6013
ADDRESS: 12700 BLACK FOREST LANE,
SUITE 100 WOODBRIDGE, VA 22192
PHONE: 703-670-6400

*RLD INFORMATION SHALL BECOME NULL AND VOID UPON ISSUANCE OF THE LAND DISTURBANCE PERMIT ASSOCIATED WITH THIS PROJECT. OWNER SHALL PROVIDE UPDATED RLD INFORMATION TO THE TOWN OF OCCUQUAN, WITH A COPY TO THE ENGINEER, UPON ISSUANCE OF THE LAND DISTURBANCE PERMIT.

COMMONWEALTH OF VIRGINIA
LANCE K. KILBY
Lic. No. 055486
3/2/17
PROFESSIONAL ENGINEER

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

[redacted]

BURGESS & NIPLE
ENGINEERS SURVEYORS ■ PLANNERS ■ LANDSCAPE ARCHETECTS
12700 BLACK FOREST LANE, SUITE100, WOODBRIDGE,VA 22192
PH.(703) 670-6400 FAX (703) 670-6250

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 1 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

AS-BUILT CERTIFICATION
THE AS-BUILT SURVEY HAS BEEN REVIEWED, AND IN MY PROFESSIONAL OPINION BASED ON MY KNOWLEDGE, INFORMATION AND BELIEF, THE DESIGN ELEMENTS MEASURED BY THE AS-BUILT SURVEY COMPLY WITH THE APPROVED PLANS AND ANY DISCREPANCIES FROM THE APPROVED PLANS ARE WITHIN THE ACCEPTED TOLERANCES OF THE INDUSTRY, EXCEPT FOR ITEMS NOTED.

THIS REVIEW DOES NOT IMPLY IN ANY WAY THAT:
(1) INSPECTIONS WERE MADE DURING CONSTRUCTION.
(2) TO THE QUALITY OF WORK, OR
(3) TO ANY ELEMENT OR STRUCTURE NOT VISIBLE OR DEPICTED ON THE AS-BUILT SURVEY.

ALL EASEMENTS ARE RECORDED IN INSTR #201105090038693 AND INSTR #201303290032509 UNLESS OTHERWISE NOTED.

BOND ESTIMATE

ITEM	VDOT BOND	TOWN BOND
TOTAL CONSTRUCTION COST	$26,341.50	$130,741.50
ADMINISTRATIVE COST (15%)	$3,951.23	$19,611.23
INFLATION COST (3%)	$790.25	$3,922.25
TOTAL PERFORMANCE BOND AMOUNT	$31,082.97	$154,274.97
LANDSCAPING ESCROWS	$0.00	$13,845.00
TOTAL SILTATION AND EROSION CONTROL ESCROW	$0.00	$46,369.73

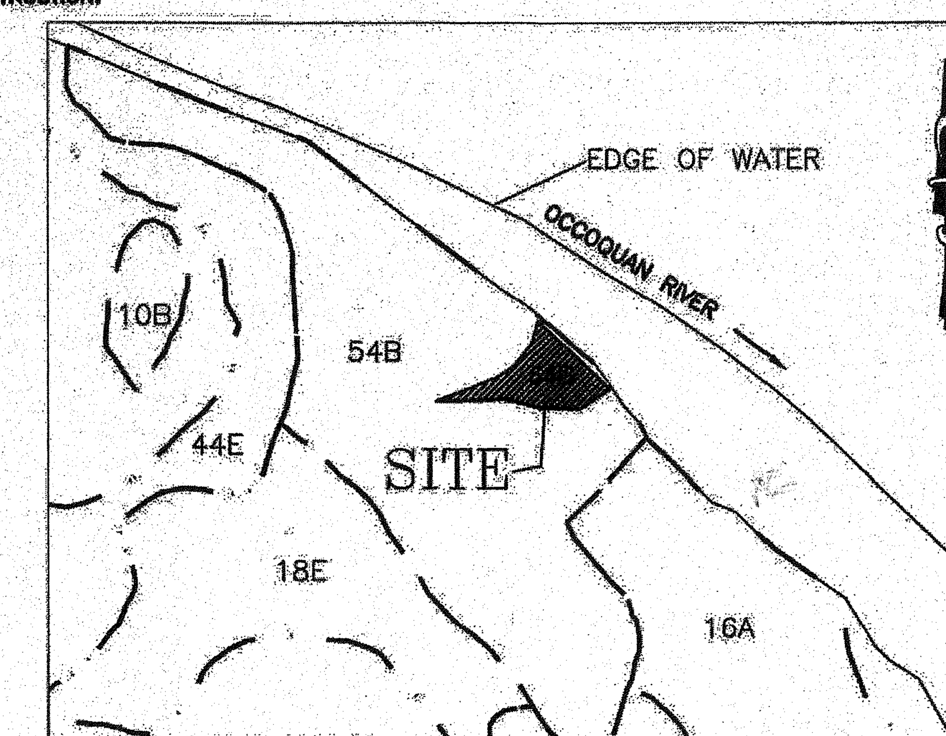
SURVEY AND TOPOGRAPHIC INFORMATION

1. Horizontal and vertical control surveys were performed by BURGESS & NIPLE in 2004 (Year).
2. All elevations must be referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).
3. Source of topographic mapping is AERIAL PHTOGRAPHY , BY AIR SURVEY dated MARCH 7,2002 .
4. Boundary survey was performed by BURGESS & NIPLE , dated AUGUST 20, 2004 .
5. The application of the professional's seal and signature as required by Section 1.14 of the STATE BOARD OF ARCHITECTS, PROFESSIONAL ENGINEERS, LAND SURVEYORS AND CERTIFIED LANDSCAPE ARCHITECTS RULES AND REGULATIONS shall be evidence that: the boundary data is correct to the best of the land surveyor's knowledge, and complies with the minimum standards and procedures of the said Board; the topographic information is accurate to within one-half of the contour interval, as shown. Application of the seal and signature indicates acceptance of responsibility for the work shown hereon.

SOILS MAP

SCALE 1"=400'

NOTE: DUE TO THE SEVERE ERODIBILITY AND PROBLEM SOILS PRESENT ON THIS SITE, A GEOTECHNICAL ENGINEER SHALL EXAMINE THE SITE AND PROVIDE RECOMMENDATIONS FOR THE PROPOSED CONSTRUCTION.



SOILS INFORMATION WAS OBTAINED FROM THE "SOIL SURVEY OF PRINCE WILLIAM COUNTY, VIRGINIA" ISSUED AUGUST 1989. SOILS INFORMATION PROVIDED HEREON IS FOR PLAN REVIEW PURPOSES ONLY AND IS NOT CERTIFIED BY BURGESS & NIPLE.

SOILS DATA

NO.	SOIL NAME	SOIL CAT.	SLOPE (%)	ERODIBILITY	PERMEABILITY	DEPTH TO BEDROCK	DEPTH TO WATER TABLE	SOIL STRUCTURE
54B	URBAN LAND-UDORTHENTS	II	0-7%	SLIGHT	MODERATE	–	–	D

REVISIONS

DATE	DESIGNER	NO.	DESCRIPTION

PROFESSIONAL SEAL & SIGNATURE

COMMONWEALTH OF VIRGINIA
WILLIAM C. PUTMAN
6013
PROFESSIONAL ENGINEER

THESE PLANS ARE IN CONFORMANCE WITH THE TOWN OF OCCOQUAN STANDARDS AND ORDINANCES. ANY DEVIATION OR CHANGE IN THESE PLANS SHALL BE APPROVED BY THE DIRECTOR OF PLANNING PRIOR TO CONSTRUCTION.

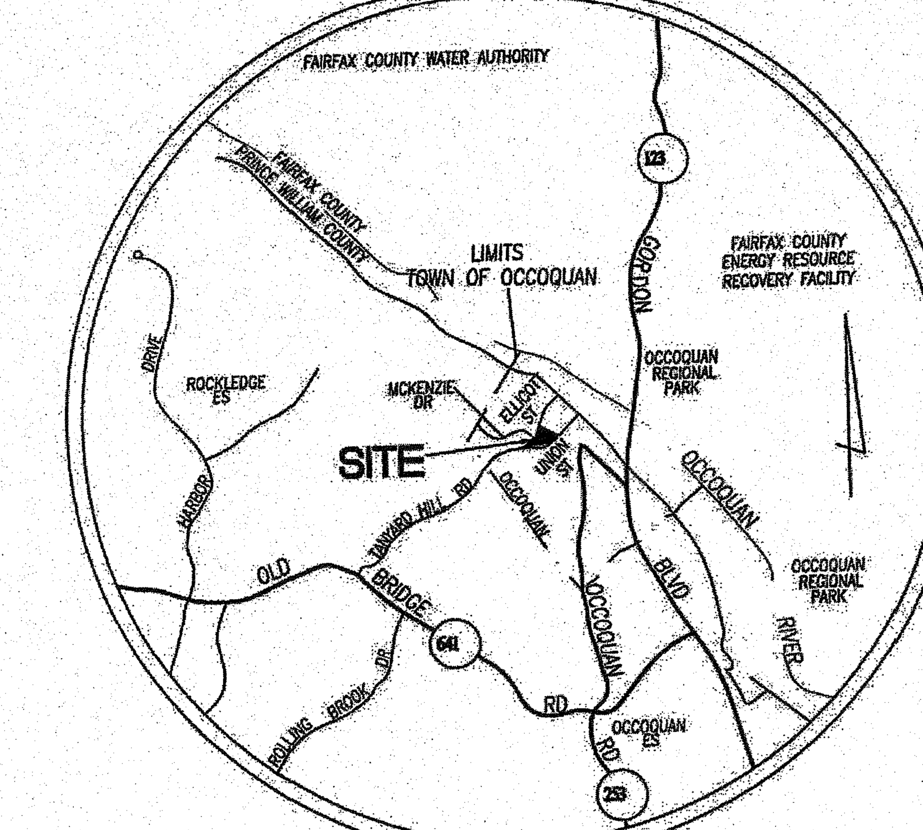
APPROVAL BLOCK

APPROVED
TOWN OF OCCOQUAN, VA

BY: ______ Mayor Date
BY: Ned a Maudell 4.19.17 Town Engineer / ASSIST. Date
BY: ______ Chair, Planning Commission Date

VICINITY MAP

SCALE: 1" = 2,000'



SHEET INDEX

AS-BUILT	Sheet Number	Sheet Title 1	Sheet Title 2
1	01	COVER SHEET	
	~~02~~	~~GENERAL NOTES & DETAILS~~	
	~~03~~	~~GENERAL NOTES & DETAILS~~	
	~~04~~	~~EXISTING CONDITIONS & DEMOLITION PLAN~~	
2	05	SITE PLAN	
3	05A	GRADING PLAN	Top Center
	~~05B~~	~~ROAD PLAN & PROFILE~~	~~ELLICOTT STREET~~
	~~05C~~	~~SITE GEOMETRY PLAN~~	
	~~06~~	~~EROSION & SEDIMENT CONTROL PLAN~~	~~PHASE 1~~
	~~07~~	~~EROSION & SEDIMENT CONTROL PLAN~~	~~PHASE 2~~
	~~08~~	~~EROSION & SEDIMENT CONTROL DETAILS~~	
	~~09~~	~~E & S MINIMUM STANDARDS~~	~~AND CHECKLIST~~
4	10	SANITARY SEWER, STORM DRAIN	AND WATER LINE PROFILES
	~~10A~~	~~ROOF DRAIN PROFILES~~	
	~~11~~	~~SIGHT DISTANCE PLAN AND PROFILE~~	
	~~12~~	~~PWCSA INFORMATION SHEET~~	
5	13	BMP MAP & COMPUTATIONS	
6	14	STORM WATER MANAGEMENT DETAILS	
7	15	STORM WATER MANAGEMENT DETAILS	
8	16	STORM WATER MANAGEMENT DETAILS	
9	17	SWM ROUTING	2 YR
10	18	SWM ROUTING	10 YR AND 100 YR
	~~19~~	~~LANDSCAPE PLAN~~	
	~~20~~	~~LANDSCAPE DETAILS~~	
	~~21~~	~~GEOTECHNICAL RECOMMENDATIONS~~	
	~~22~~	~~TOWN UNIT PRICE LIST~~	
	~~23~~	~~REVISED PRELIMINARY SITE PLAN~~	~~Top Center~~

TOWN OF OCCOQUAN

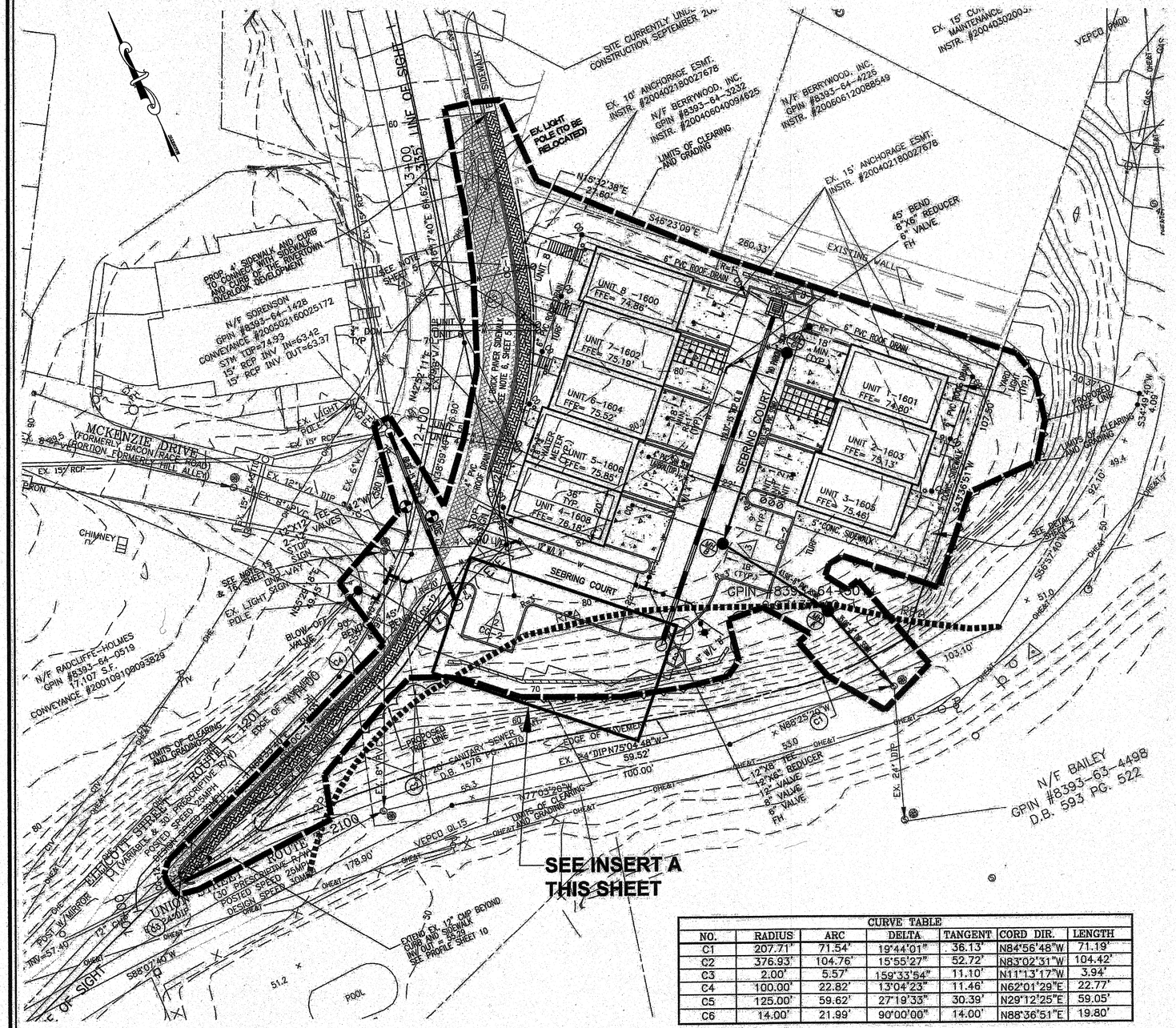
AS-BUILT SURVEY

COVER SHEET

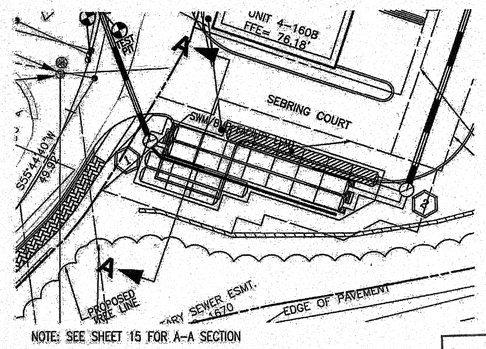
Project Name: **VISTAS AT OCCOQUAN**
Project Number: **PR43315**
Subdivision or Site Plan Name: **VISTAS AT OCCOQUAN**
Market Name: SAME
Plan Number: XX-XXXXX
Plan Type: FN-SP
Magisterial District: TOWN OF OCCOQUAN
Present Zoning & Use: ZONING R3 (HISTORIC)/ USE RESIDENTIAL
Date of Plan (Month, Day, Year): **April 20, 2007**
OWNER NAME LOWELL AND ANNE SAWYER
OWNER CONTACT
Address, Including Zip Code & Telephone No. P.O. BOX 96, OCCOQUAN VA 22125 PH. 703-494-3790
DEVELOPER ADDRESS
Developer: SEBRING, LLC BOB SIMMONS
Address, Including Zip Code & Telephone No. 8521 LEESBURG PIKE, SUITE 601, VIENNA, VA 22182 PH. 703-760-9344 FAX: 703-770-3691
Name, Address & Telephone No. of Engineer Architect or Surveyor certifying Plan: [redacted] BURGESS & NIPLE ENGINEERS ■ SURVEYORS ■ PLANNERS ■ LANDSCAPE ARCHITECTS 12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA 22192 PHONE (703) 670-6400 FAX (703) 670-6250
Parcel Identification Numbers: 8393-64-3014
Total Area: 0.971 ACRES Project Area: 0.70 ACRES Disturbed Area: 0.70Ac. Impervious Area: 0.36 Ac. BMP Storage/Acre: 3063 CF/AC
Related Plans Tracking Numbers (Including Rez. & S.U.P.): 8393-64-3014

Subdivision/Site Plan Name: **VISTAS AT OCCOQUAN**
File Number: **XX-XXXXXR00S03**

B&N EFP: P:\PR43315\RSSP-R00-S03



CURVE TABLE						
NO.	RADIUS	ARC	DELTA	TANGENT	CORD DIR.	LENGTH
C1	207.71'	71.54'	19°44'01"	36.13'	N84°56'48"W	71.19'
C2	376.93'	104.76'	15°55'27"	52.72'	N83°02'31"W	104.42'
C3	2.00'	5.57'	159°33'54"	11.10'	N11°13'17"W	3.94'
C4	100.00'	22.82'	13°04'23"	11.46'	N62°01'29"E	22.77'
C5	125.00'	59.62'	27°19'33"	30.39'	N29°12'25"E	59.05'
C6	14.00'	21.99'	90°00'00"	14.00'	N88°36'51"E	19.80'



NOTE: SEE SHEET 15 FOR A-A SECTION

INSERT A - SWM/BMP FACILITY

SCALE: 1" =20'

NOTES:

1. ALL TOWNHOUSE UNIT DRIVEWAYS SHALL BE CONSTRUCTED OF CONCRETE. SEE SITE PLAN.
2. ALL SANITARY SEWER CLEAN-OUTS IN PAVED AREAS ARE REQUIRED TO BE RATED FOR TRAFFIC LOADING.
3. ALL UTILITIES PLACED UNDER EXISTING STREETS SHALL BE BORED AND JACKED.
4. TURF SLOPES ARE NOT TO EXCEED 3.1:1.
5. STANDARD HANDRAILS SHALL BE PROVIDED AT ALL WALLS AS REQUIRED FOR BUILDING PERMITS.
6. BRICK PAVER SIDEWALK IS TO BE PLACED ON TOP OF 95% COMPACTED SUBGRADE.
7. A LETTER OF PERMISSION WILL BE OBTAINED FOR ANY OFFSITE GRADING BY OWNER PRIOR TO CONSTRUCTION.
8. A SEPARATE PERMIT SHALL BE REQUIRED FOR RETAINING WALL CONSTRUCTION.
9. THE HOMEOWNERS ASSOCIATION WILL MAINTAIN THE RETAINING WALL BEING PROPOSED IN THE RIGHT OF WAY.
10. A HOLD HARMLESS AGREEMENT SHALL BE REQUIRED FOR THE RETAINING WALL.
11. GARAGE UNITS SHALL BE USED STRICTLY FOR PARKING, AND SHALL NOT BE CONVERTED TO LIVING SPACE, AS REQUIRED BY THE HOMEOWNERS ASSOCIATION DECLARATION OF COVENANTS.
12. STORMTECH INSERTS PLACED INSIDE INLETS PROVIDE 50% PHOSPHOROUS REMOVAL.
13. THE BRICK PAVER SIDEWALK AND OC-1 CURB ARE NOT VDOT STANDARDS, THEREFORE WILL NOT BE MAINTAINED BY VDOT AND WOULD HAVE TO BE MAINTAINED BY THE TOWN OF OCCOQUAN OR THE HOMEOWNERS ASSOCIATION.
14. THE EXISTING WATER SERVICE LINE SHALL BE EXPOSED AT THE CORPORATION STOP, CUT, AND CRIMPED PER THE DIRECTIONS OF THE PWCSA INSPECTOR.
15. THE EXISTING LATERAL SHALL BE EXPOSED AT THE MAIN, CUT AND CAPPED PER THE PWCSA INSPECTOR. IF THE LATERAL IS CONNECTED TO THE MANHOLE IT SHALL BE REMOVED.
16. IF THE EXISTING SANITARY MANHOLE CANNOT BE REPAIRED NOR A NEW INVERT INSTALLED TO THE SATISFACTION OF THE PWCSA INSPECTOR, A NEW MANHOLE AND BASE SHALL BE PROVIDED.
17. WATER METERS FOR UNITS 5 THROUGH 8 SHALL CONNECT TO THE EXISTING 12" WATER MAIN LOCATED ALONG ELLICOTT STREET, THE WATER MAIN SHALL BE FIELD LOCATED.
18. YARD LIGHTS SHALL BE CONGRUENT WITH THOSE ELSE WHERE IN THE HISTORIC DISTRICT.
19. WATER METERS FOR UNITS 1,2, AND 3 SHALL BE PROVIDED WITH METAL TAGS WITHIN THE CROCKS STATING THE UNIT ADDRESS.

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Mayor Date

BY: _____ Town Engineer / Assist Date

BY: _____ Chair, Planning Commission Date

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 2 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

LEGEND

- CONCRETE SIDEWALK / DRIVEWAY
- BRICK PAVER SIDEWALK
- EXISTING RETAINING WALL
- PROPOSED RETAINING WALL
- ROAD WIDENING
- VEHICLE TURNAROUND AREA
- RESOURCE PROTECTION AREA (RPA)

GRAPHIC HORIZONTAL SCALE IN FEET
10 20 60
20 0 40

AS-BUILT SURVEY
FOR INFORMATION PURPOSES ONLY

BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-8400 FAX (703) 670-8250

NO.	REVISIONS	DATE
1		

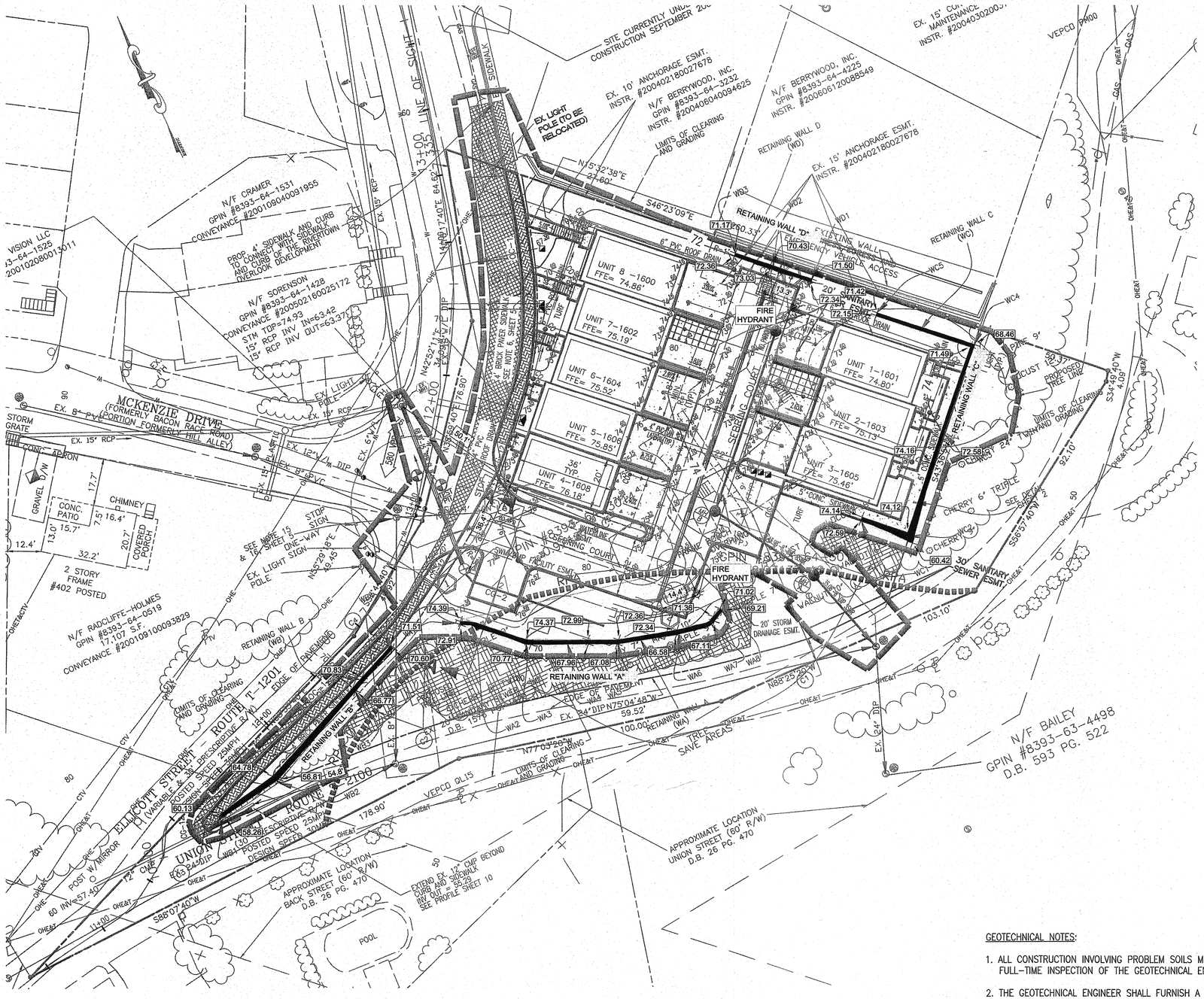
SITE PLAN

VISTAS AT OCCOQUAN

TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
WILLIAM PUTMAN
001 116107
PROFESSIONAL ENGINEER

DATE: 2007/04/20
SCALE: 1"=20'
DESIGN: DW DRAWN: YK
CHECK: DW CHECK: WCP
PWC FN: XX-XXXX
B&N FN: PR43316
SHEET: 05 OF 23
B&N FN: WC-4905



Wall Location	TW Elevation	BW Elevation
WA1	74.00	73.50
WA2	75.75	73.00
WA3	74.00	71.50
WA4	72.00	71.25
WA5	72.00	68.50
WA6	72.00	67.00
WA7	71.00	68.00
WA8	71.00	70.50

Wall Location	TW Elevation	BW Elevation
WB1	60.50	60.00
WB2	64.50	56.50
WB3	70.00	66.80
WB4	71.50	71.00

Wall Location	TW Elevation	BW Elevation
WC1	74.00	73.50
WC2	74.00	68.10
WC3	74.00	73.00
WC4	70.50	68.50
WC5	72.00	71.50

Wall Location	TW Elevation	BW Elevation
WD1	72.00	71.50
WD2	73.00	70.50
WD3	72.00	71.50

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Mayor Date

BY: Ed A Maxwell Town Engineer 4.19.17 Date

BY: _____ Chair, Planning Commission Date

CURVE TABLE						
NO.	RADIUS	ARC	DELTA	TANGENT	CORD DIR.	LENGTH
C1	207.71'	71.54'	19°44'01"	36.13'	N84°56'48"W	71.19'
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C4	100.00'	22.82'	13°04'23"	11.46'	N62°01'29"E	22.77'
C5	125.00'	59.62'	27°19'33"	30.39'	N29°12'25"E	59.05'
C6	14.00'	21.99'	90°00'00"	14.00'	N88°36'51"E	19.80'

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 3 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

AS-BUILT SURVEY

GEOTECHNICAL NOTES:

1. ALL CONSTRUCTION INVOLVING PROBLEM SOILS MUST BE PERFORMED UNDER THE FULL-TIME INSPECTION OF THE GEOTECHNICAL ENGINEER.
2. THE GEOTECHNICAL ENGINEER SHALL FURNISH A WRITTEN OPINION TO THE TOWN OF OCCOQUAN AS TO WHETHER OR NOT THE WORK HAS BEEN PERFORMED IN ACCORDANCE WITH THE APPROVED PLANS PRIOR TO THE ISSUANCE OF ANY OCCUPANCY OR USE PERMIT.
3. REVIEW AND APPROVAL OF THE PLANS, SPECIFICATIONS, AND REPORTS BY THE TOWN OF OCCOQUAN SHALL IN NO WAY RELIEVE THE DEVELOPER OF THE RESPONSIBILITY FOR THE DESIGN, CONSTRUCTION, AND PERFORMANCE OF THE STRUCTURES, PAVEMENT, AND SLOPES ON THE PROJECT AND DAMAGE TO THE SURROUNDING PROPERTIES.
4. DURING CONSTRUCTION, THE DEVELOPER SHALL EMPLOY A GEOTECHNICAL ENGINEER LICENSED IN THE STATE OF VIRGINIA TO INSPECT THE CONSTRUCTION OF THE RESIDENCES, RETAINING WALL, AND THE UNDERGROUND SWM FACILITY.
5. AS-BUILT PLANS SHALL BE PROVIDED AS REQUIRED.

NOTES:

1. MAXIMUM SLOPES ARE NOT TO EXCEED 3.1:1.
2. ALL RETAINING WALLS TO BE PROVIDED WITH STANDARD HANDRAILS.

LEGEND

- CONCRETE SIDEWALK / DRIVEWAY
- BRICK PAVER SIDEWALK
- EXISTING RETAINING WALL
- PROPOSED RETAINING WALL
- ROAD WIDENING
- RESOURCE PROTECTION AREA (RPA)

GRAPHIC HORIZONTAL SCALE IN FEET
10 20 60
20 0 40

BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-6400 FAX (703) 670-6250

DATE

REVISIONS

GRADING PLAN

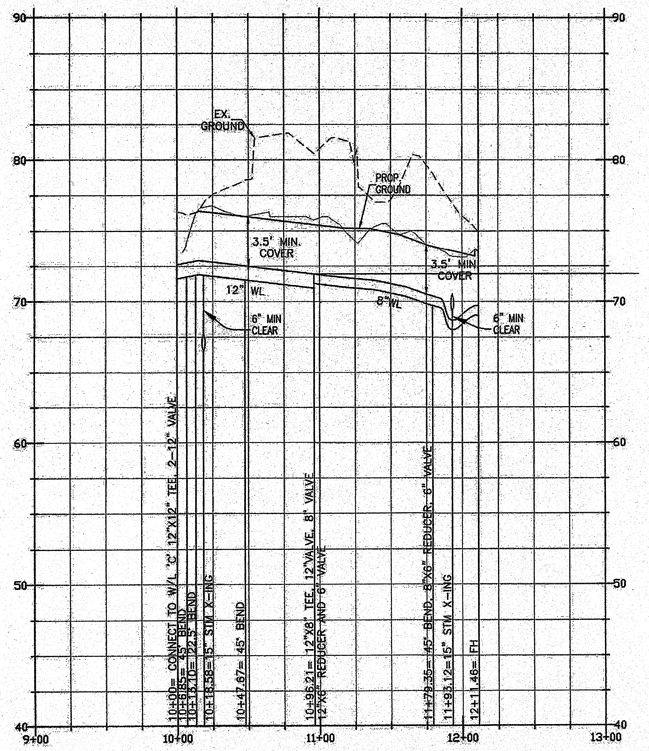
VISTAS AT OCCOQUAN

TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

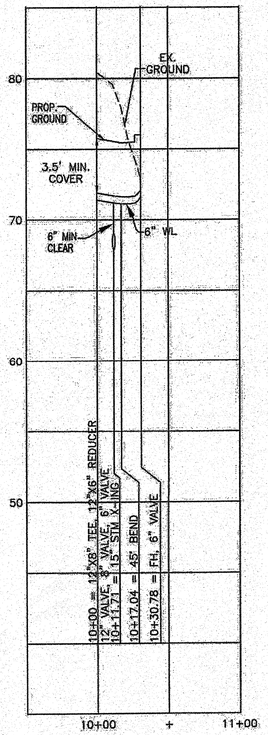
COMMONWEALTH OF VIRGINIA
WILLIAM C. PUTMAN II
6013
PROFESSIONAL ENGINEER

DATE: 2007/04/20
SCALE: 1"=20'
DESIGN: DW DRAWN: JGM
CHECK: WCP CHECK: WCP
FN: 8393-64-3014-R00-SD4
B&N FN: PR43316
SHEET: 05A OF 25
B&N FN: **WC-4905**

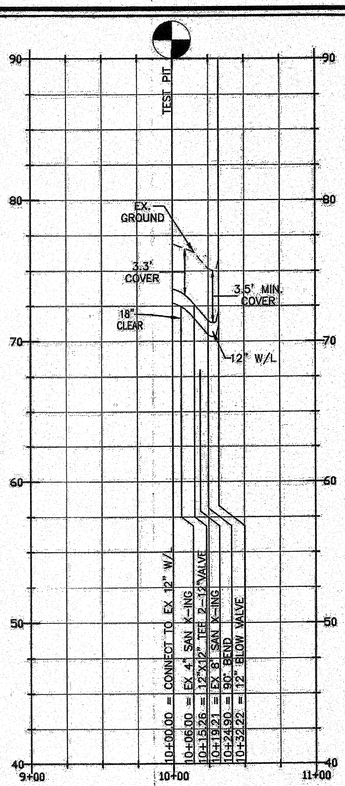
/02/28 11:12:33 Jett, Frank



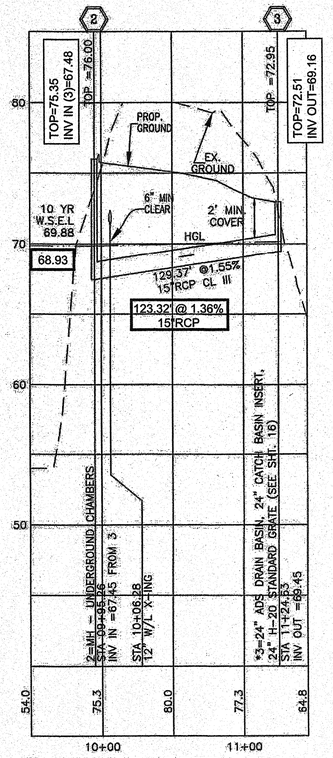
WATER LINE 'A' PROFILE



WATER LINE 'B' PROFILE

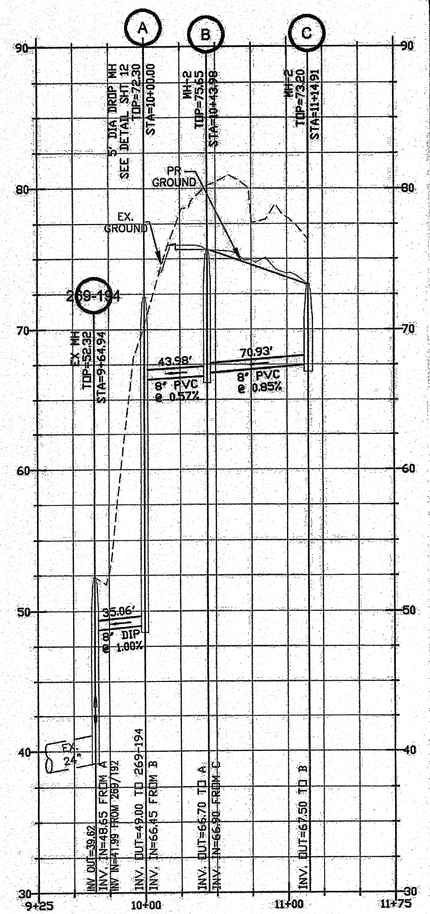


WATER LINE 'C' PROFILE



*ALL PRODUCTS ARE AVAILABLE FROM ADS.
24" ADS DRAIN BASIN (PART #2824AG)
24" STORM-PURE CATCH BAIN INSERT (PART #5524AGL30)
24" H-20 STANDARD GRATE (PART #2499CGS)

STM SEWER RUN MH 2-3



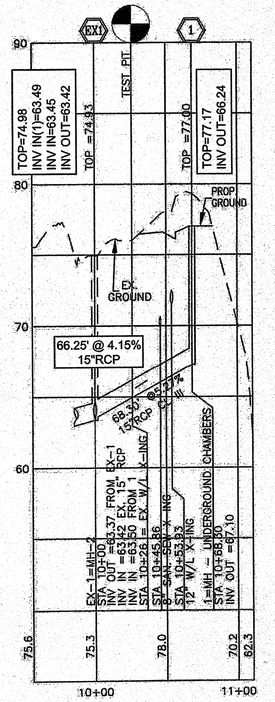
SANITARY FROM EX.269/191 TO MH C

NOTE:
SEE NOTE 24 ON SHEET #1 FOR CONNECTING PROPOSED UTILITIES TO EXISITING UTILITIES

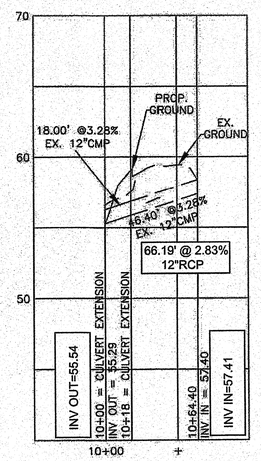
GRATE INLETS

#	TYPE	L LEN	STATION	DRAIN-AGE AREA ACRE	C	CxA	I IN/HR	Q INCR CFS	Q CARRY OVER CFS	Q GUTTER FLOW CFS	d FT
3	DI-7	–		0.26	0.90	0.23	5.75	1.35	0	1.35	0.20

NOTES: 50% CLOGGED ASSUMPTION HAS BEEN INCORRORATED INTO THE GRATE INLET COMPUTATIONS



STM SEWER RUN MH EX.1-1



12" CMP EXTENSION AT ELLICOTT STREET

VISTAS AT OCCOQUAN

STORM SEWER DESIGN COMPUTATIONS 10YR

FROM POINT	TO POINT	DRAIN. AREA ACRES	RUNOFF COEFF C	CA INCREM	CA ACCUM	INLET TIME MIN	RAINFALL INTENSITY 10 YRIN/HR	Q10 RUNOFF CFS	INVERT ELEV UPPER FT	INVERT ELEV LOWER FT	LENGTH FT	SLOPE FT/FT	DIA IN	n	CAPACITY CFS	VELOCITY FPS	FLOW TIME SEC	REMARKS
Roof	3	0.04	0.90	0.04	0.04													
3	2	0.27	0.90	0.24	0.28	5.0	7.27	2.0	69.16	67.48	123.3	0.0136	15	0.013	7.5	5.3	23.3	

HYDRAULIC GRADE LINE COMPUTATIONS

PROJECT:
COUNTY:

MANNING ROUGHNESS COEFFICIENT = 0.013 (RCP)

INLET #	OUTLET INVERT ELEV (FT)	OUTLET WATER SURFACE ELEV (FT)	OUTLET PIPE DIAM Do (IN)	OUTLET FLOW-RATE Qo (CFS)	OUTLET PIPE LENGTH Lo (FT)	FRIC-TION SLOPE Sfo (%)	FRIC-TION LOSS Hf (FT)	VELOCITY OUTLET PIPE Vo (FPS)	JUNCTION LOSS: CONTR. LOSS Ho (FT)	DISCHARGE INFLOW PIPE Qi (CFS)	VELOCITY INFLOW PIPE Vi (FPS)	MAX INFLOW PRODUCT Qi * Vi (FT^4/S^2)	INFLOW VELOCITY HEAD (Vi^2)/(2g) (FT)	MAX EXPAN. LOSS Hi (FT)	MAX ANGLE Ai (DEG)	LOSS COEFF K	MAX BEND LOSS Hb (FT)	TOTAL HEAD LOSS Ht (FT)	INLET CORRECT FACTOR 1.3 Ht (FT)	SHAPE CORRECT FACTOR 0.5 Ht (FT)	FINAL HEAD LOSS H (FT)	INLET WATER SURFACE ELEV (FT)	INLET RIM ELEV (FT)
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		(13)	(14)		(15)	(16)	(17)	(18)	(19)	(20)	(21)
3	67.48	66.93	15	2.04	129	0.10%	0.129	5.3	0.022	0.29	4.52	1.31	0.3172	0.032	90	0.70	0.222	0.276	0.358	0.179	0.309	69.24	72.95

DRAINAGE ANALYSIS

The calculation shown below shows a decrease in the runoff leaving the site to the north. The decrease in drainage is due to roof drains being used on the townhouse units to direct the water to the SWM facility. The sheet flow is within a swale in both the pre and post conditions which returns to overland flow before leaving the property. The low flow rate for the 10 year post, which is less than the preexisting 10 year flow should not have any detrimental affect on the downstream property.

		DRAIN. AREA ACRES	RUNOFF COEFF C	CA INCREM	CA ACCUM	TIME OF CONC.	RAINFALL INTENSITY 10 YRIN/HR	Q10 RUNOFF CFS
DA to Northern Portion of Site								
Pre		0.11	0.35	0.04	0.039	5.0	7.27	0.3
Post		0.05	0.63	0.03	0.032	5.0	7.27	0.2

COMMONWEALTH OF VIRGINIA
LANCE K. KILBY
Lic. No. 035486
PROFESSIONAL ENGINEER
2/2/17

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Mayor Date

BY: _____ Town Engineer / ASSIST Date

BY: _____ Chair, Planning Commission Date

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 4 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

GRAPHIC VERTICAL SCALE IN FEET
2.5 5 15
5 0 10

GRAPHIC HORIZONTAL SCALE IN FEET
25 50 150
50 0 100

AS-BUILT SURVEY

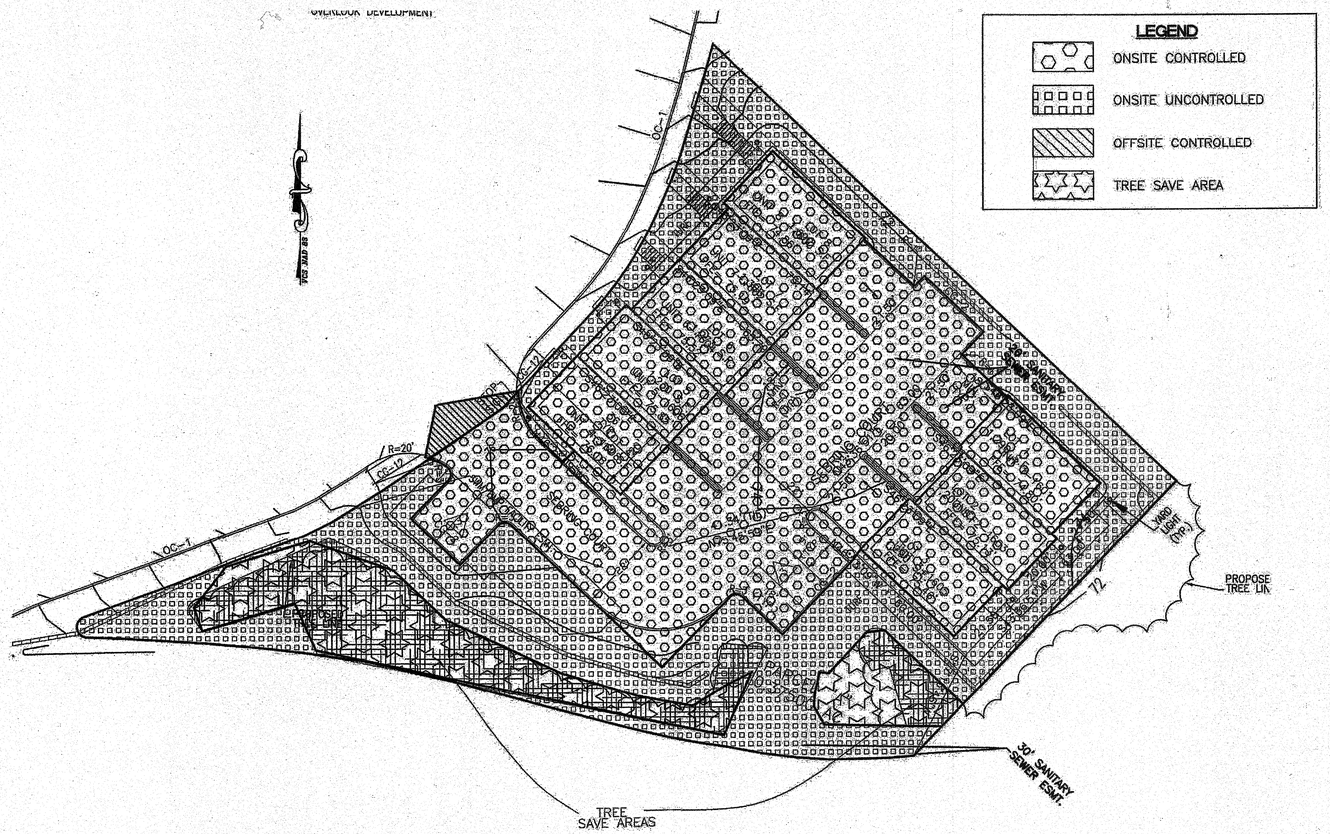
BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-6400 FAX (703) 670-6250

NO.	REVISIONS	DATE
1		

SANITARY SEWER, STORM DRAIN AND WATER LINE PROFILES
VISTAS AT OCCOQUAN
TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
WILLIAM C. PUTMAN
6613
5/16/17
PROFESSIONAL ENGINEER

DATE: 2007/04/20	
SCALE: H:1"=50', V:1"=5'	
DESIGN: DW	DRAWN: YK
CHECK: DW	CHECK: WCP
PWC FN: XX-XXXXX	
B&N PN: PR43315	
SHEET: 10 OF 23	
B&N FN: WC-4905	



LEGEND

- ONSITE CONTROLLED
- ONSITE UNCONTROLLED
- OFFSITE CONTROLLED
- TREE SAVE AREA

Underground Storage

V. STORAGE

Part 7: COMPUTE THE WEIGHTED C FACTOR FOR THE PROPOSED BMP FACILITY

(A) List the areas to be controlled by the proposed BMP.

SUBAREA DESIGNATION		C	ACRES	PRODUCT	
(1)	ONSITE CONTROLLED	0.90	0.33	0.30	
(3)	OFFSITE CONTROLLED	0.90	0.01	0.01	20%
(B)			0.34	0.31	
(C)	WEIGHTED AVERAGE C FACTOR=	0.90			

Part 8: DETERMINE THE STORAGE REQUIRED

(A) EXTENDED DETENTION DRY POND
Chart A6-40 value for BMP storage per acre
[(4375 x C) - 875]= 3063 CF/AC
Design 1 (48 hour drawdown) 0.34 x 3063 = 1,041 CF
39 CY

VI. OUTLET COMPUTATIONS

FROM THE ELEVATION-STORAGE CURVE h = 1.75 FT

(C) PEAK OUTFLOW RATE (Qp) AT THE MAXIMUM HEAD FOR A DRAWDOWN TIME OF 48 HRS:
Qp = S / (0.5 x 3600 x 48) = 0.01 CFS

(D) REQUIRED ORIFICE AREA (A)
A = Qp / [0.6 x (64.4 x h) ^ 0.5] = 0.0019 SF

(E) DIAMETER OF A CIRCULAR ORIFICE
d = 2 x (A / 3.14) ^ 0.5 = 0.05 FT
= 0.59 IN
USE 0.60 IN

DRAINAGE AREA A= 0.34 AC
C= 0.90
POND INVERT: 99.90
BASIN VOLUME

STORAGE VS. ELEVATION: PLANIMETER SCALE 1 ft/in

ELEV. (FT)	AREA (S in)	W.S. AREA (SF)	AVG W.S (SF)	INC. VOL (CF)	TOTAL VOL (CF)	TOTAL VOL (CF)
67.20	-	0	-	0	-	-
67.95	-	-	-	-	275	275
68.87	-	-	-	-	981	981
68.95	-	-	-	-	1,042	1,042
69.95	-	-	-	-	1,702	1,702
170.03	-	-	-	-	2,113	2,113

TOTAL VOLUME REQUIRED= 1,041 CF 1,088 CF
BMP ELEVATION: 68.95 FT ELEV=68.05
BMP ELEV- PD INV. ELEV.= 1.75 FT

Geotechnical Solutions, Inc.

Geotechnical Engineering
Environmental Consulting • Construction Materials

December 15, 2016

Mr. Jeff Beachy
HELPCOMM, INC.
8760 Virginia Meadows Drive
Manassas, Va. 20109

GSI Project No. CP-1146

Reference: Vistas at Occoquan
Town of Occoquan, Virginia

Dear Mr. Jeff:

Geotechnical Solutions, Inc. (GSI) has been retained by DR Horton Inc. to observe and inspect the AS-BUILT phase of the Vistas at Occoquan project. Samir Alqutri, Ph. D. P.E. is the Geotechnical Engineer of Record (GER) and the Special Inspections Engineer of Record (SIER) for the entire project. Additionally, GSI reviewed the AS-BUILT grading plans prepared by Burgess and Niple dated December 15, 2010.

Based on our review of the daily inspection reports, laboratory tests and AS-BUILT grading plans, we certify that the earthwork has been placed and the underground SWM Facility has been constructed in compliance with the approved project plans and Town of Occoquan requirements and specifications. This includes all retaining walls geotechnical elements, but is not limited to the type of material, compaction; depth and spacing of pilesipiers, location, length, spacing, strength and type of geogrid, and ground cover to protect the slope as specified, and any other stabilization measures as recommended in the approved geotechnical report. The GER certifies that the final slope is in accordance with the slope approved in the geotechnical report at the time of as-built plan submission.

Please contact us if you have any questions or require any additional information.

Respectfully submitted,
GEOTECHNICAL SOLUTIONS, INC.

Samir Alqutri, Ph. D., P.E.
Principal

Cc:
DR Horton – Ines Vega
Helpcomm - Rachel Lowman
Town Manager – Kirstyn Jovanovich
Zoning Administrator – Ned A Marshall
Town Engineer – Bruce Reese

COMMONWEALTH OF VIRGINIA — SAMIR A. ALQUTRI — Lic. No. 031071 — PROFESSIONAL ENGINEER — DEC 15 2016

3859 Centerview Drive, Suite 160, Chantilly, VA 20151 • 703-657-0014 • F: 703-657-0666 • www.geotechnical-solutions.com

Vistas @ Occoquan
BMP FACILITY DESIGN CALCULATIONS

Part 1A: WATER QUALITY NARRATIVE
THE WATER QUALITY CONTROL REQUIREMENT IS 50% PHOSPHOROUS REMOVAL WHICH IS ACHIEVED THROUGH AN UNDERGROUND DETENTION FACILITY AND INLET INSET. THE TOTAL SITE AREA IS 0.62 Ac. THE FACILITY ALSO PROVIDES PHOSPHOROUS REMOVAL FOR OFFSITE AREAS EQUALING: 0.01 ACRES

Part 1B: WATERSHED INFORMATION
LIST OF SUBAREAS AND "C" FACTORS USED

SUBAREA DESIGNATION AND DESCRIPTION	C	ACRES
(1) ONSITE CONTROLLED	0.90	0.27
(2) ONSITE UNCONTROLLED	0.40	0.12
(3) OFFSITE CONTROLLED	0.45	0.01
(4) TREE SAVE AREA CONTROLLED	0.35	0.00
(5) TREE SAVE AREA UNCONTROLLED	0.35	0.07
(6) ONSITE CONTROLLED	0.90	0.16
(7)	0.00	0.00
(8)	0.00	0.00

Part 2: COMPUTE WEIGHTED AVERAGE "C" FACTOR FOR THE SITE
(A) TOTAL AREA OF THE SITE 0.62 AC (SEE BMP NARRATIVE)

(B) SUBAREA DESIGNATION		C	X ACRES	= PRODUCT
(1)	ONSITE CONTROLLED	0.90	0.27	0.24
(2)	ONSITE UNCONTROLLED	0.40	0.12	0.05
(3)	OFFSITE CONTROLLED	0.00	0.00	0.00
(4)	TREE SAVE AREA CONTROLLED	0.35	0.00	0.00
(5)	TREE SAVE AREA UNCONTROLLED	0.35	0.07	0.02
(6)	ONSITE CONTROLLED	0.90	0.16	0.14
(7)	0.00	0.00	0.00	0.00
(8)	0.00	0.00	0.00	0.00
		TOTAL=	0.62	TOTAL= 0.46

(C) WEIGHTED AVERAGE "C" FACTOR FOR THE SITE= 0.46 / 0.6 = 0.74

Part 3: COMPUTE THE TOTAL PHOSPHORUS REMOVAL FOR THE SITE

SUB AREA		BMP TYPE	REMOVAL EFFICIENCY	OFF SITE	AREA RATIO	"C" FACTOR RATIO	PRODUCT
(1)	UG STORAGE	ONSITE CONTROLLED	50		0.27 / 0.62 = 0.44	0.90 / 0.74 = 1.21	26.44
(2)		NONE	0		0.12 / 0.62 = 0.19	0.40 / 0.74 = 0.54	0.00
(3)	UG STORAGE	OFFSITE CONTROLLED	50	0.20	0.01 / 0.62 = 0.02	0.45 / 0.74 = 0.61	0.10
(4)		TREE SAVE AREA CONTROLLED	100		0.00 / 0.62 = 0.00	1.00	0.00
(5)		TREE SAVE AREA UNCONTROLLED	100		0.07 / 0.62 = 0.11	1.00	11.29
(6)		ONSITE CONTROLLED	40		0.16 / 0.62 = 0.26	0.90 / 0.74 = 1.21	12.54
(7)			40		0.00 / 0.62 = 0.00	0.00 / 0.74 = 0.00	0.00
(8)			40	0.20	0.00 / 0.62 = 0.00	0.00 / 0.74 = 0.00	0.00
						(a) TOTAL SITE PHOSPHORUS REMOVAL =	50.37

Part 4: DETERMINE COMPLIANCE WITH PHOSPHORUS REMOVAL REQUIREMENT
(A) SELECT REQUIREMENT FOR THE ENTIRE SITE: (a)= 50 %
(B) If line 3(a) 50.37 >= Line 4(a) 50.0 then phosphorus removal requirement is satisfied.
YES

IV. SITE COVERAGE

Part 5: DETERMINE COMPLIANCE WITH SITE COVERAGE REQUIREMENT
Sum all the uncontrolled onsite areas and compute a weighted average "C" factor. Do not include qualifying open space.

SUBAREA DESIGNATION		C	X ACRES	= PRODUCT
(2)	ONSITE UNCONTROLLED	0.45	0.12	0.05

(A) TOTAL EQUIVALENT UNCONTROLLED AREA (a) TOTAL 0.05
(B) TOTAL UNCONTROLLED AREA (b) 0.12
(C) WEIGHTED AVERAGE C FACTOR (a)/(b)= (c) 0.45
(D) 100 X 0.12 / 0.62 = 19.4 %
If line 5(b) < 20% of line 2(a), then site coverage requirement is satisfied. Line 5(a) is the equivalent offsite area for which coverage may be required. 5(B) 0.1 < 20% OF 2(A)= 0.1 YES

Part 6: DETERMINE THE OFFSITE AREAS FOR WHICH COVERAGE IS REQUIRED
For the offsite areas listed in Part 1 which flow to proposed onsite BMPs compute the equivalent areas.

SUBAREA DESIGNATION		C	X		ACRES	= PRODUCT
(3)	OFFSITE CONTROLLED	0.45	X	0.20 X	0.01	0.00
(8)		0.00		0.20 X	0.00	0.00
	(SEE PART 3)			(a) TOTAL		0.0

If the equivalent offsite area, line 6(a),draining to all proposed facilities is greater than the equivalent uncontrolled area of the site shown in Line 5(a); then, the offsite area controlled by the proposed BMP facilities may be reduced until the two are equal. Otherwise, all uncontrolled offsite areas draining to the proposed BMP facilities must be included. All offsite areas thus reduced should be marked with and "*" wherever they appear in this computations.
6(A) : 0.00 >= 5(A) : 0.05 NO

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Mayor Date

BY: Ned A Marshall 4.4.17 Town Engineer / ASSIST Date

BY: _____ Chair, Planning Commission Date

COMMONWEALTH OF VIRGINIA — LANCE K. KILBY — Lic. No. 035486 — PROFESSIONAL ENGINEER — 3/2/17

COMMONWEALTH OF VIRGINIA — RICHARD E. ZIEMS — 3-2-2017 — Lic. No. 2077 — LAND SURVEYOR

AS–BUILT SURVEY
NOVEMBER 30, 2015
SHEET 5 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS–BUILT SURVEY.

AS-BUILT SURVEY
FOR INFORMATION PURPOSES ONLY

BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA 22192
PH. (703) 670-6400 FAX (703) 670-6250

NO.	REVISIONS	DATE
1		

BMP MAP & COMPUTATIONS

VISTAS AT OCCOQUAN

TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA — CLAIRE L. PUTMAN — 3013 — PROFESSIONAL ENGINEER

DATE:	2007/04/20
SCALE:	1"=20'
DESIGN:	DMW
DRAWN:	YK
CHECK:	MCP
CHECK:	DMW
PWC FN:	XX-XXXX
B&N PN:	PR43315
SHEET:	13 OF 23
B&N FN:	WC-4905

Storage Volume Calculations

Height of System (in)	Incremental Chamber (ft^3)	Incremental Stone (ft^3)	Incremental Chamber & Stone (ft^3)	Cumulative Chamber (ft^3)	Cumulative System (ft^3)	Elevation
45	0.00	1.13	1.13	78.27	2113.29	69.99
44	0.00	1.13	1.13	77.14	2082.78	69.91
43	0.00	1.13	1.13	76.01	2052.27	69.82
42	0.00	1.13	1.13	74.88	2021.76	69.74
41	0.00	1.13	1.13	73.75	1991.25	69.66
40	0.00	1.13	1.13	72.62	1960.74	69.57
39	0.05	1.10	1.15	71.49	1930.23	69.49
38	0.16	1.06	1.22	70.34	1899.18	69.41
37	0.28	1.01	1.29	69.12	1868.24	69.32
36	0.60	0.89	1.49	67.83	1831.41	69.24
35	0.80	0.81	1.61	66.34	1791.18	69.16
34	0.95	0.75	1.70	64.73	1747.71	69.07
33	1.07	0.70	1.77	63.03	1701.81	68.99
32	1.18	0.65	1.83	61.26	1654.02	68.91
31	1.27	0.62	1.89	59.43	1604.61	68.82
30	1.36	0.58	1.94	57.54	1553.58	68.74
29	1.45	0.55	2.00	55.60	1501.20	68.66
28	1.52	0.52	2.04	53.60	1447.20	68.57
27	1.58	0.49	2.07	51.56	1392.12	68.49
26	1.64	0.47	2.11	49.49	1336.23	68.41
25	1.70	0.45	2.15	47.38	1279.26	68.32
24	1.75	0.43	2.18	45.23	1221.21	68.24
23	1.80	0.41	2.21	43.05	1162.35	68.16
22	1.85	0.38	2.23	40.84	1102.68	68.07
21	1.89	0.37	2.26	38.61	1042.47	67.99
20	1.93	0.35	2.28	36.35	981.45	67.91
19	1.97	0.34	2.31	34.07	919.89	67.82
18	2.01	0.32	2.33	31.76	857.52	67.74
17	2.04	0.31	2.35	29.43	794.61	67.66
16	2.07	0.30	2.37	27.08	731.16	67.57
15	2.10	0.28	2.38	24.71	667.17	67.49
14	2.13	0.27	2.40	22.33	602.91	67.41
13	2.15	0.27	2.42	19.93	538.11	67.32
12	2.18	0.26	2.44	17.51	472.77	67.24
11	2.20	0.25	2.45	15.07	406.89	67.16
10	2.21	0.24	2.45	12.62	340.74	67.07
9	0.00	1.13	1.13	10.17	274.59	66.99
8	0.00	1.13	1.13	9.04	244.08	66.90
7	0.00	1.13	1.13	7.91	213.57	66.82
6	0.00	1.13	1.13	6.78	183.06	66.74
5	0.00	1.13	1.13	5.65	152.55	66.66
4	0.00	1.13	1.13	4.52	122.04	66.57
3	0.00	1.13	1.13	3.39	91.53	66.49
2	0.00	1.13	1.13	2.26	61.02	66.41
1	0.00	1.13	1.13	1.13	30.51	66.32
0	0.00	0.00	0.00	0.00	0.00	66.24

UNDERGROUND STORAGE

STORM WATER DETENTION COMPUTATIONS

TOTAL SITE AREA A= 0.62 Ac
OPEN SPACE A= 0.00 Ac
NEW AREA : A= 0.62 Ac

PRE-DEVELOPMENT RUNOFF

DRAINAGE AREA TO THE POND A= 0.62 Ac
TIME OF CONCENTRATION Tc= 5 min
RAINFALL INTENSITY I(2YR)= 5.45 in/hr
I(10YR)= 7.27 in/hr
I(100YR)= 9.84 in/hr

RUNOFF COEFFICIENT C(2YR)= 0.35
C(10YR)= 0.35

RUNOFF Q(2YR) = 0.35 * 5.45 * 0.62 = 1.2 cfs
Q(10YR)= 0.35 * 7.27 * 0.62 = 1.6 cfs
Q(100YR)= 1.25 * 0.35 * 9.84 * 0.62 = 2.7 cfs

POST-DEVELOPMENT RUNOFF

UNDETAINED A= 0.12 Ac C= 0.40
ONSITE TO UG STORAGE A= 0.43 Ac C= 0.90
OFF-SITE TO UG STORAGE A= 0.01 Ac C= 0.90

TIME OF CONCENTRATION Tc= 5 min
RAINFALL INTENSITY I(2YR)= 5.45 in/hr
I(10YR)= 7.27 in/hr
I(100YR)= 9.84 in/hr

ON-SITE UNDETAINED RUNOFF

Q(2YR) = 0.40 * 5.45 * 0.12 = 0.3 cfs
Q(10YR)= 0.40 * 7.27 * 0.12 = 0.3 cfs
Q(100YR)= 1.25 * 0.40 * 9.84 * 0.12 = 0.6 cfs

ONSITE DETAINED RUNOFF

Q(2YR) = 0.90 * 5.45 * 0.43 = 2.1 cfs
Q(10YR)= 0.90 * 7.27 * 0.43 = 2.8 cfs
Q(100YR)= 1.25 * 0.90 * 9.84 * 0.43 = 4.8 cfs

OFF-SITE DETAINED RUNOFF

Q(2YR) = 0.90 * 5.45 * 0.01 = 0.0 cfs
Q(10YR)= 0.90 * 7.27 * 0.01 = 0.1 cfs
Q(100YR)= 1.25 * 0.90 * 9.84 * 0.01 = 0.1 cfs

TOTAL RUNOFF TO POND

Q(2YR) = 2.2 cfs
Q(10YR)= 2.9 cfs
Q(100YR)= 4.9 cfs

ALLOWABLE RUNOFF

Q(ALLOW)=Q(PRE-DEVELOPED)-Q(UNDETAINED)+Q(OFFSITE)

Q(2YR) = 1.2 - 0.26 + 0.05 = 1.0 cfs
Q(10YR)= 1.6 - 0.35 + 0.07 = 1.3 cfs
Q(100YR)= 2.7 - 0.59 + 0.11 = 2.2 cfs

ROUTING RESULTS

Frequency (Yr)	2	10	100
Outflow (cfs)	0.49	0.85	2.09
Water Surface Elevation: (ft)	68.64	68.93	69.67

Q in (10 YR) -Q out (10YR)= 2.9 - 0.9 = 2.0
0.2 x Q in (10YR)= 0.2 x 2.9 = 0.6

SINCE THE ROUTED 2 AND 10 YEAR FLOWS ARE LESS THAN
THE MAXIMUM ALLOWABLE 2 AN 10 YEAR RUNOFF RESPECTIVELY
AND 2.0 > 0.6 (MORE THAN 20% REDUCTION),
THE REQUIRED DETENTION IS ACHIEVED.

2-YR ROUTING

Peak Discharge	0.49 ft³/s
Time to Peak	0.583 hours
Hydrograph Volume	0.043 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.083 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.167	0.00	0.04	0.29	0.43	0.48	
0.583	0.49	0.47	0.44	0.41	0.38	
1.000	0.35	0.32	0.29	0.27	0.24	
1.417	0.22	0.20	0.17	0.15	0.13	
1.833	0.11	0.09	0.07	0.05	0.04	
2.250	0.03	0.02	0.02	0.01	0.01	
2.667	0.01	0.00	0.00	0.00	0.00	
3.083	0.00	0.00	(N/A)	(N/A)	(N/A)	

Requested Pond Water Surface Elevations	
Minimum (Headwater)	66.24 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	69.99 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	W1	Forward	CV	68.05	69.99
Culvert-Circular	CV	Forward	TW	66.24	69.99
Tailwater Settings	Tailwater			(N/A)	(N/A)

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	66.24 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.083 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	2.01 ft³/s	Time to Peak (Flow, In)	0.083 hours
Flow (Peak Outlet)	0.49 ft³/s	Time to Peak (Flow, Outlet)	0.583 hours

Elevation (Water Surface, Peak)	68.64 ft
Volume (Peak)	0.034 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.068 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.043 ac-ft
Volume (Retained)	0.025 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

10-YR ROUTING

Peak Discharge	0.85 ft³/s
Time to Peak	0.417 hours
Hydrograph Volume	0.065 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.083 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.167	0.00	0.43	0.71	0.85	0.81	
0.583	0.73	0.65	0.57	0.53	0.50	
1.000	0.46	0.42	0.39	0.36	0.32	
1.417	0.29	0.26	0.23	0.20	0.17	
1.833	0.14	0.11	0.09	0.06	0.05	
2.250	0.04	0.03	0.02	0.01	0.01	
2.667	0.01	0.01	0.00	0.00	0.00	
3.083	0.00	0.00	0.00	(N/A)	(N/A)	

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	66.24 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.083 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	2.68 ft³/s	Time to Peak (Flow, In)	0.083 hours
Flow (Peak Outlet)	0.85 ft³/s	Time to Peak (Flow, Outlet)	0.417 hours

Elevation (Water Surface, Peak)	68.93 ft
Volume (Peak)	0.038 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.090 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.065 ac-ft
Volume (Retained)	0.025 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

100-YR ROUTING

Peak Discharge	2.09 ft³/s
Time to Peak	0.250 hours
Hydrograph Volume	0.131 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.083 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.083	0.00	0.88	2.09	1.98	1.65	
0.500	1.38	1.22	1.10	0.99	0.90	
0.917	0.81	0.74	0.67	0.62	0.56	
1.333	0.53	0.49	0.45	0.40	0.35	
1.750	0.30	0.24	0.19	0.14	0.10	
2.167	0.08	0.06	0.04	0.03	0.02	
2.583	0.02	0.01	0.01	0.01	0.01	
3.000	0.00	0.00	0.00	0.00	0.00	
3.417	0.00	(N/A)	(N/A)	(N/A)	(N/A)	

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	66.24 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.083 hours

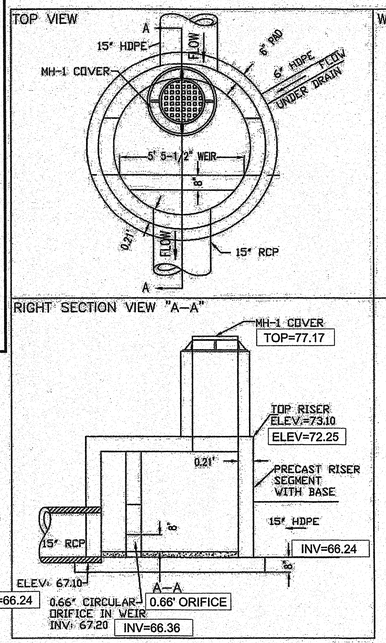
Inflow/Outflow Hydrograph Summary

Flow (Peak In)	4.54 ft³/s	Time to Peak (Flow, In)	0.083 hours
Flow (Peak Outlet)	2.09 ft³/s	Time to Peak (Flow, Outlet)	0.250 hours

Elevation (Water Surface, Peak)	69.67 ft
Volume (Peak)	0.046 ac-ft

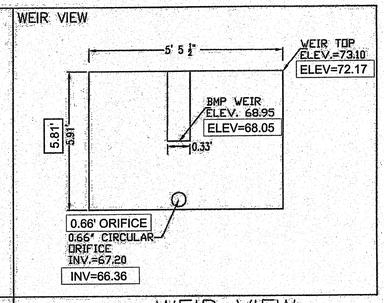
Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.156 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.131 ac-ft
Volume (Retained)	0.025 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %



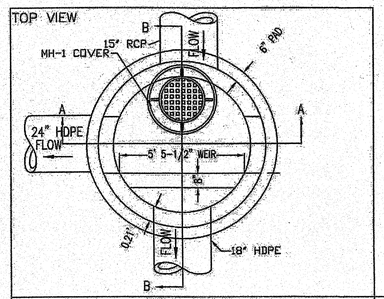
OUTLET CONTROL STRUCTURE #1

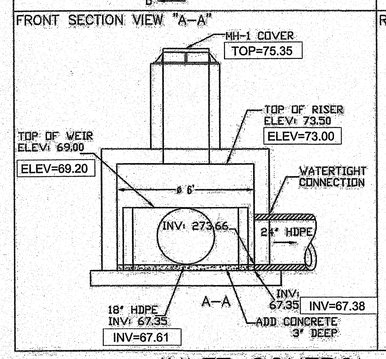
NOT TO SCALE



WEIR VIEW

NOT TO SCALE





INLET CONTROL STRUCTURE #2

NOT TO SCALE

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 6 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

COMMONWEALTH OF VIRGINIA
LANCE K. KILBY
Lic. No. 035486
PROFESSIONAL ENGINEER
2/2/17

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Date
Mayor

BY: _____ 4.19.17
Town Engineer / Assist Date

BY: _____ Date
Chair, Planning Commission

AS-BUILT SURVEY

BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-6400 FAX (703) 670-6250

DATE
REVISIONS

STORM WATER MANAGEMENT DETAILS

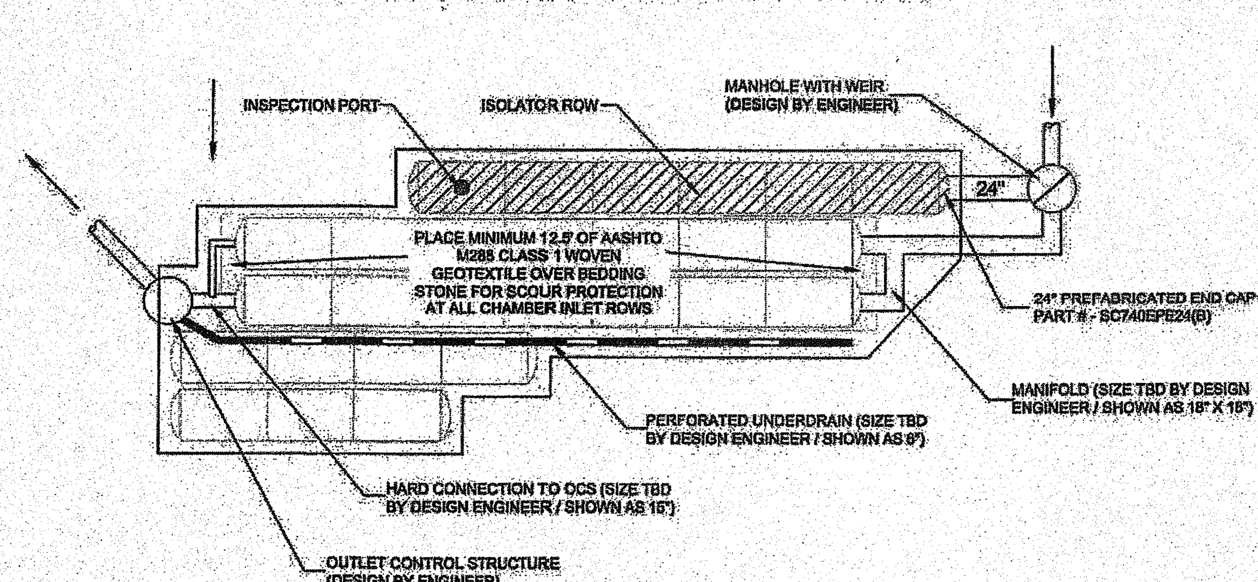
VISTAS AT OCCOQUAN

TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
LANCE K. KILBY
Lic. No. 035486
PROFESSIONAL ENGINEER
2/16/17

DATE: 2007/04/20	
SCALE: N/A	
DESIGN: DW	DRAWN: YK
CHECK: DW	CHECK: WCP
PWC FN: XX-XXXX	
B&N FN: PR4331E	
SHEET: 14 OF 23	
B&N FN: WC-4905	

27 SC-740 STORMTECH CHAMBERS
45.9 CF PER BARE CHAMBER - 1239 CF
STORAGE IN STONE (INCLUDING PERIMETER STONE) w/ 9" STONE BELOW CHAMBERS / 6" STONE ABOVE CHAMBERS / 40% STONE VOID - 458 CF
TOTAL STORAGE PROVIDED - 2113 CF



PROPOSED ELEVATIONS
BASE OF STONE / UNDERDRAIN INV - 67.20
BASE OF CHAMBER - 67.95
TOP OF CHAMBER - 70.53
TOP OF STONE - 70.95
MINIMUM COVER (18" FROM TOP OF CHAMBER TO BASE OF PAVEMENT) - 71.00
MAXIMUM COVER (96" FROM TOP OF CHAMBER TO FINISHED GRADE) - 77.50

STORMTECH LLC CONCEPTUAL PLAN DISCLAIMER
THIS STORMTECH CHAMBER SYSTEM LAYOUT WAS PRODUCED TO DEMONSTRATE A BED LAYOUT THAT WILL HANDLE THE DESIGN VOLUME LISTED ABOVE. THE SIZING, FIT AND APPLICABILITY OF THE STORMTECH CHAMBER SYSTEM FOR THIS SPECIFIC PROJECT HAS NOT BEEN DETERMINED. IT IS THE ULTIMATE RESPONSIBILITY OF THE DESIGN ENGINEER TO ASSURE THAT THE STORMWATER SYSTEM DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. STORMTECH PRODUCTS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH STORMTECH'S MINIMUM REQUIREMENTS. STORMTECH LLC DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS. THE DESIGNING ENGINEER IS RESPONSIBLE FOR ALL DESIGN DECISIONS.

* NOTE: CHAMBER SYSTEM DESIGN MUST BE IN ACCORDANCE WITH STORMTECH DESIGN MANUAL

StormTech — 20 Beaver Road, Suite 104, Wethersfield, CT 06109, Phone: 888-892-2694, Fax: 866-328-8401, www.stormtech.com

VISTAS @ OCCOQUAN

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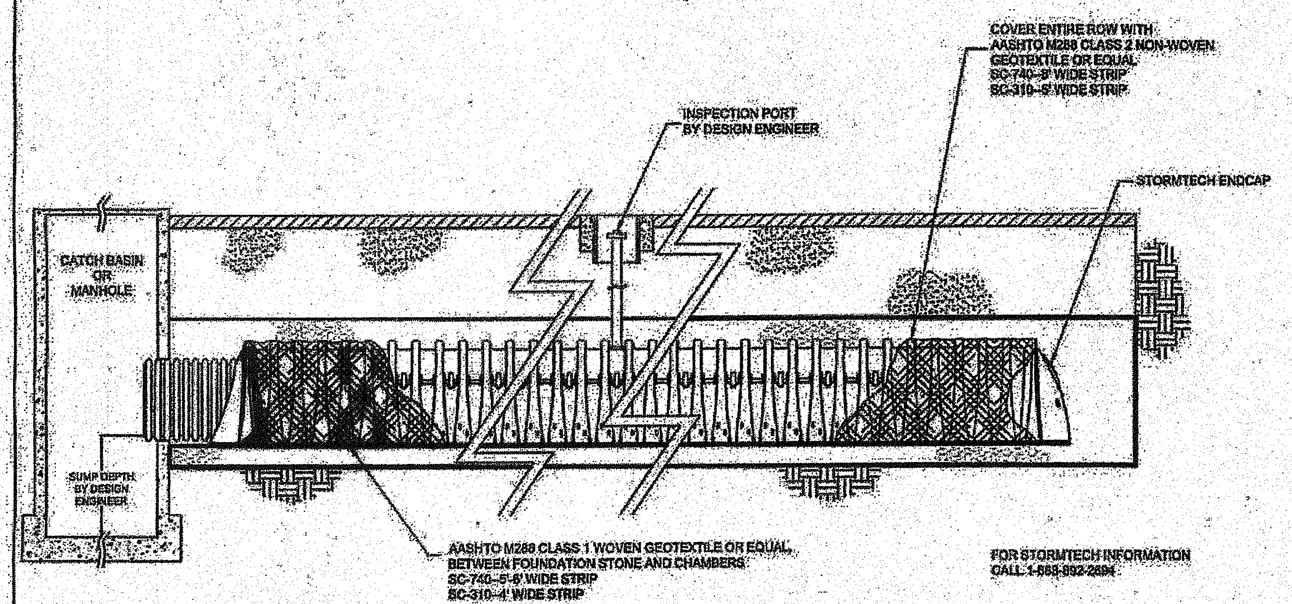
DATE: 11/10/2006	ACAD No.
DRAWN BY: MDK	SHEET OF



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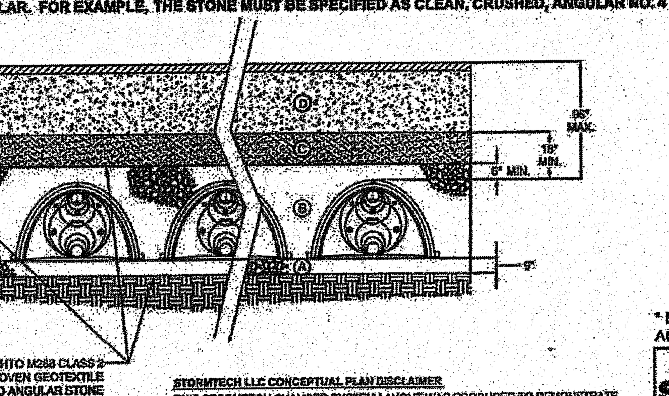
ISOLATOR ROW PROFILE VIEW

SCALE: NTS	CHECKED
DATE: 11/01/2005	ACAD No.
DRAWN BY:	SHEET OF

ACCEPTABLE FILL MATERIALS
STORMTECH SC-310 AND SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	AASHTO M43 DESIGNATION	AASHTO M145 DESIGNATION	COMPACTION/DENSITY REQUIREMENT
(D) FILL MATERIAL FROM 18" TO GRADE ABOVE CHAMBERS	ANY SOIL/ROCK MATERIALS, NATIVE SOILS OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	N/A	PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
(C) FILL MATERIAL FOR 6" TO 18" ELEVATION ABOVE CHAMBERS (24" FOR UNPAVED INSTALLATIONS)	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	A-1 A-2 A-3	COMPACT IN 6" LIFTS TO A MINIMUM 95% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 LBS. DYNAMIC FORCE NOT TO EXCEED 20,000 LBS.
(B) EMBEDMENT STONE SURROUNDING AND TO A 6" ELEVATION ABOVE CHAMBERS	CLEAN ANGULAR STONE WITH THE MAJORITY OF PARTICLES BETWEEN ¾ - 2 INCH	3, 357, 4, 467, 5, 56, 57	N/A	NO COMPACTION REQUIRED
(A) FOUNDATION STONE BELOW CHAMBERS	CLEAN ANGULAR STONE WITH THE MAJORITY OF PARTICLES BETWEEN ¾ - 2 INCH	3, 357, 4, 467, 5, 56, 57	N/A	PLATE COMPACT OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY

PLEASE NOTE: THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN CRUSHED ANGULAR. FOR EXAMPLE, THE STONE MUST BE SPECIFIED AS CLEAN, CRUSHED, ANGULAR NO. 4 STONE.



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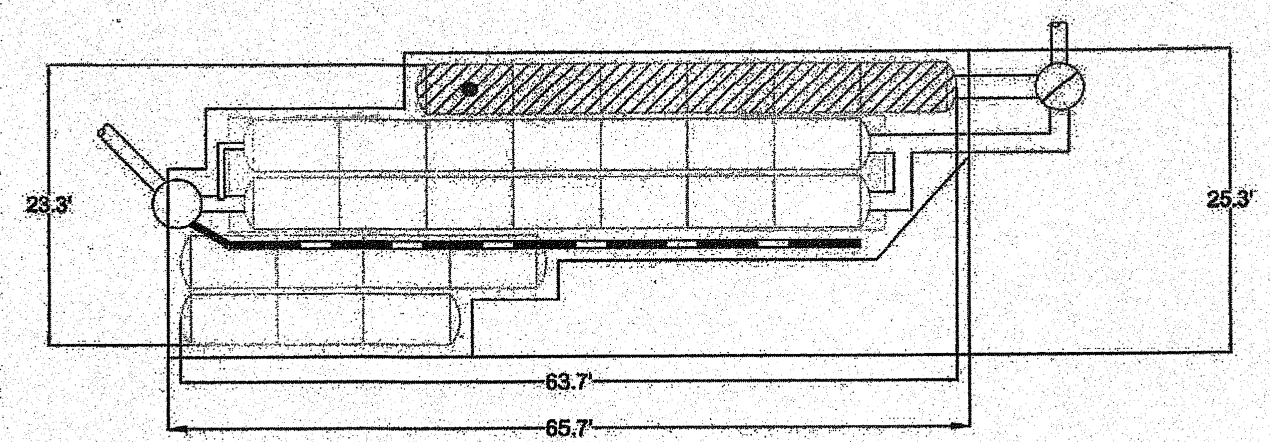
STORMTECH ACCEPTABLE FILL MATERIALS

SCALE: NTS	CHECKED
DATE: 11/01/2005	ACAD No.
DRAWN BY:	SHEET OF

27 SC-740 STORMTECH CHAMBERS
45.9 CF PER BARE CHAMBER - 1239 CF
STORAGE IN STONE (INCLUDING PERIMETER STONE) w/ 9" STONE BELOW CHAMBERS / 6" STONE ABOVE CHAMBERS / 40% STONE VOID - 458 CF
TOTAL STORAGE PROVIDED - 2113 CF



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VISTAS @ OCCOQUAN

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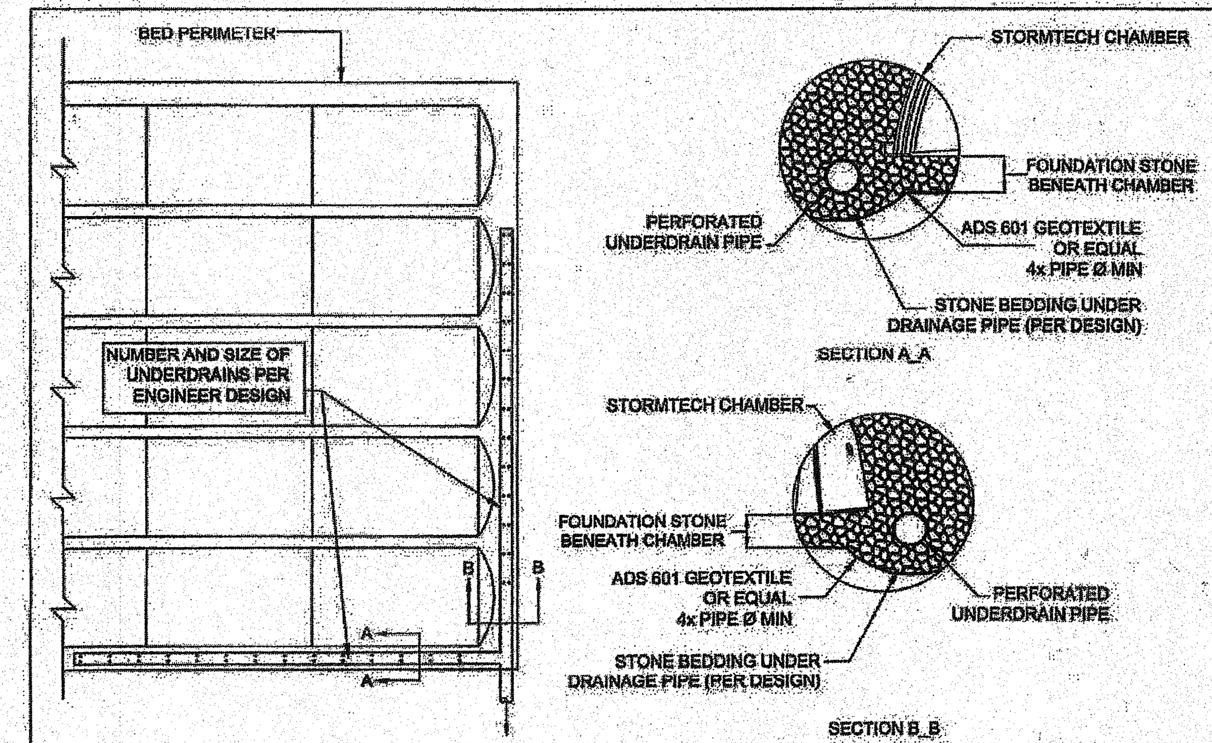
DATE: 11/10/2006	ACAD No.
DRAWN BY: MDK	SHEET OF



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UNDERDRAIN DETAIL

SCALE: NTS	CHECKED
DATE: 11/01/2005	ACAD No.
DRAWN BY:	SHEET OF

STORMTECH GENERAL NOTES

1. STORMTECH LLC ("STORMTECH") REQUIRES INSTALLING CONTRACTORS TO USE AND UNDERSTAND STORMTECH'S LATEST INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING SYSTEM INSTALLATION.
2. OUR TECHNICAL SERVICES DEPARTMENT OFFERS INSTALLATION CONSULTATIONS TO INSTALLING CONTRACTORS. CONTACT OUR TECHNICAL SERVICES REPRESENTATIVE AT LEAST 30 DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE A PRE-INSTALLATION CONSULTATION. OUR REPRESENTATIVES CAN THEN ANSWER QUESTIONS OR ADDRESS COMMENTS ON THE STORMTECH CHAMBER SYSTEM AND INFORM THE INSTALLING CONTRACTOR OF THE MINIMUM INSTALLATION REQUIREMENTS BEFORE BEGINNING THE SYSTEM'S CONSTRUCTION. CALL 1-888-892-2694 TO SPEAK TO A TECHNICAL SERVICE REPRESENTATIVE OR VISIT WWW.STORMTECH.COM TO RECEIVE A COPY OF OUR INSTALLATION INSTRUCTIONS.
3. STORMTECH'S REQUIREMENTS FOR SYSTEMS WITH PAVEMENT DESIGN (ASPHALT, CONCRETE PAVERS, ETC.): MINIMUM COVER IS 18 INCHES NOT INCLUDING PAVEMENT; MAXIMUM COVER IS 96 INCHES INCLUDING PAVEMENT. FOR INSTALLATIONS THAT DO NOT INCLUDE PAVEMENT, WHERE RUTTING FROM VEHICLES MAY OCCUR, MINIMUM REQUIRED COVER IS 24 INCHES, MAXIMUM COVER IS 96 INCHES.
4. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE DESIGN ENGINEER.
5. AASHTO M288 CLASS 2 NON-WOVEN GEOTEXTILE (FILTER FABRIC) MUST BE USED AS INDICATED IN THE PROJECT PLANS.
6. STONE PLACEMENT BETWEEN CHAMBERS ROWS AND AROUND PERIMETER MUST FOLLOW INSTRUCTIONS AS INDICATED IN THE MOST CURRENT VERSION OF STORMTECH'S INSTALLATION INSTRUCTIONS.
7. BACKFILLING OVER THE CHAMBERS MUST FOLLOW REQUIREMENTS AS INDICATED IN THE MOST CURRENT VERSION OF STORMTECH'S INSTALLATION INSTRUCTIONS.
8. THE CONTRACTOR MUST REFER TO STORMTECH'S INSTALLATION INSTRUCTIONS FOR A TABLE OF ACCEPTABLE VEHICLE LOADS AT VARIOUS DEPTHS OF COVER. THIS INFORMATION IS ALSO AVAILABLE AT STORMTECH'S WEBSITE: WWW.STORMTECH.COM. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING VEHICLES THAT EXCEED STORMTECH'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE STORMWATER SYSTEM. TEMPORARY FENCING, WARNING TAPE AND APPROPRIATELY LOCATED SIGNS ARE COMMONLY USED TO PREVENT UNAUTHORIZED VEHICLES FROM ENTERING SENSITIVE CONSTRUCTION AREAS.
9. THE CONTRACTOR MUST APPLY EROSION AND SEDIMENT CONTROL MEASURES TO PROTECT THE STORMWATER SYSTEM DURING ALL PHASES OF SITE CONSTRUCTION PER LOCAL CODES AND DESIGN ENGINEER'S SPECIFICATIONS.
10. STORMTECH PRODUCT WARRANTY IS LIMITED. SEE CURRENT PRODUCT WARRANTY FOR DETAILS. TO ACQUIRE A COPY CALL STORMTECH AT 1-888-892-2694 OR VISIT WWW.STORMTECH.COM.

STORMTECH LLC CONCEPTUAL PLAN DISCLAIMER
THIS STORMTECH CHAMBER SYSTEM LAYOUT WAS PRODUCED TO DEMONSTRATE A BED LAYOUT THAT WILL HANDLE THE DESIGN VOLUME LISTED ABOVE. THE SIZING, FIT AND APPLICABILITY OF THE STORMTECH CHAMBER SYSTEM FOR THIS SPECIFIC PROJECT HAS NOT BEEN DETERMINED. IT IS THE ULTIMATE RESPONSIBILITY OF THE DESIGN ENGINEER TO ASSURE THAT THE STORMWATER SYSTEM DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. STORMTECH PRODUCTS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH STORMTECH'S MINIMUM REQUIREMENTS. STORMTECH LLC DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS. THE DESIGN ENGINEER IS RESPONSIBLE FOR ALL DESIGN DECISIONS.

* NOTE: CHAMBER SYSTEM DESIGN MUST BE IN ACCORDANCE WITH STORMTECH DESIGN MANUAL

STORMTECH GENERAL NOTES

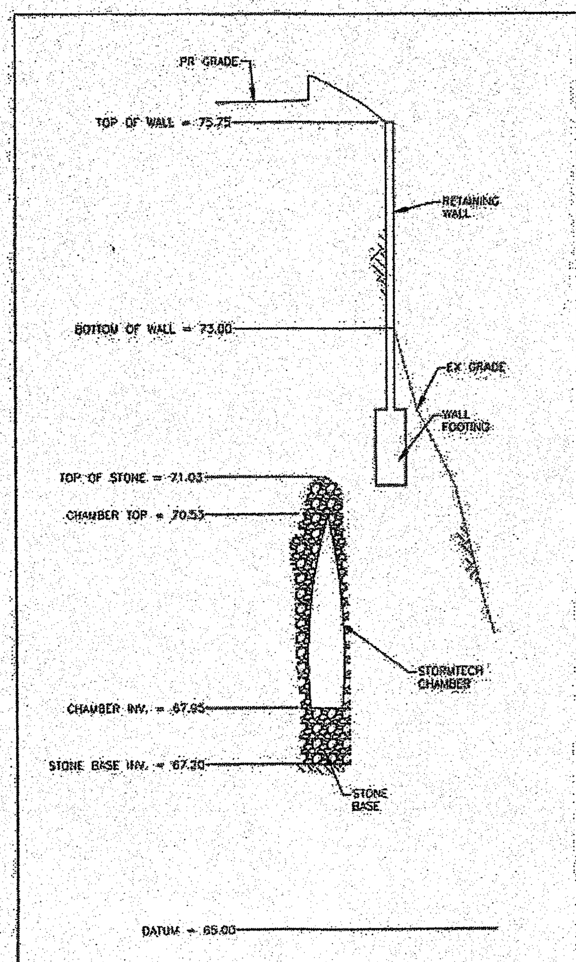
SCALE: NTS	CHECKED
DATE: 11/01/2005	ACAD No.
DRAWN BY:	SHEET OF

APPROVED
TOWN OF OCCOQUAN, VA

BY: ____________________
Mayor Date

BY: Ned a Mandell 4.19.17
Town Engineer/ASS.ST Date

BY: ____________________
Chair, Planning Commission Date



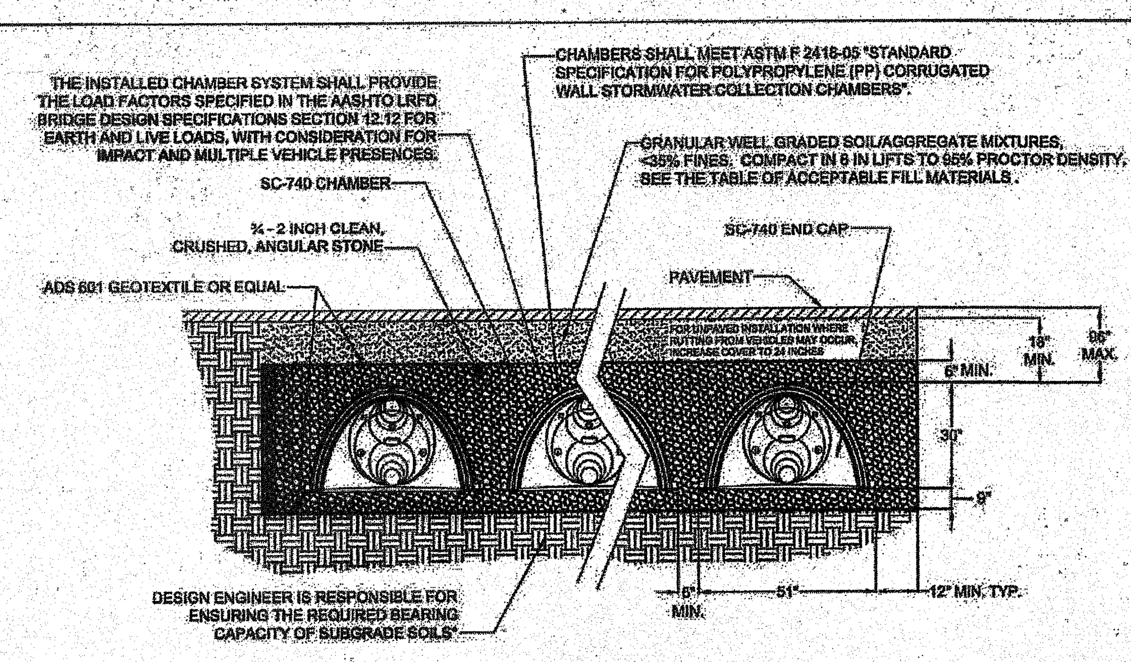
STORM CHAMBER AND RETAINING WALL SECTION A-A
SCALE: H: 1"=20', V: 1"=2'

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 7 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

AS-BUILT SURVEY
FOR INFORMATION PURPOSES ONLY



THIS CROSS SECTION DETAILS THE REQUIREMENTS NECESSARY TO SATISFY THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS USING STORMTECH CHAMBERS

FOR STORMTECH INFORMATION CALL 1-888-892-2694

*SEE STORMTECH DESIGN MANUAL

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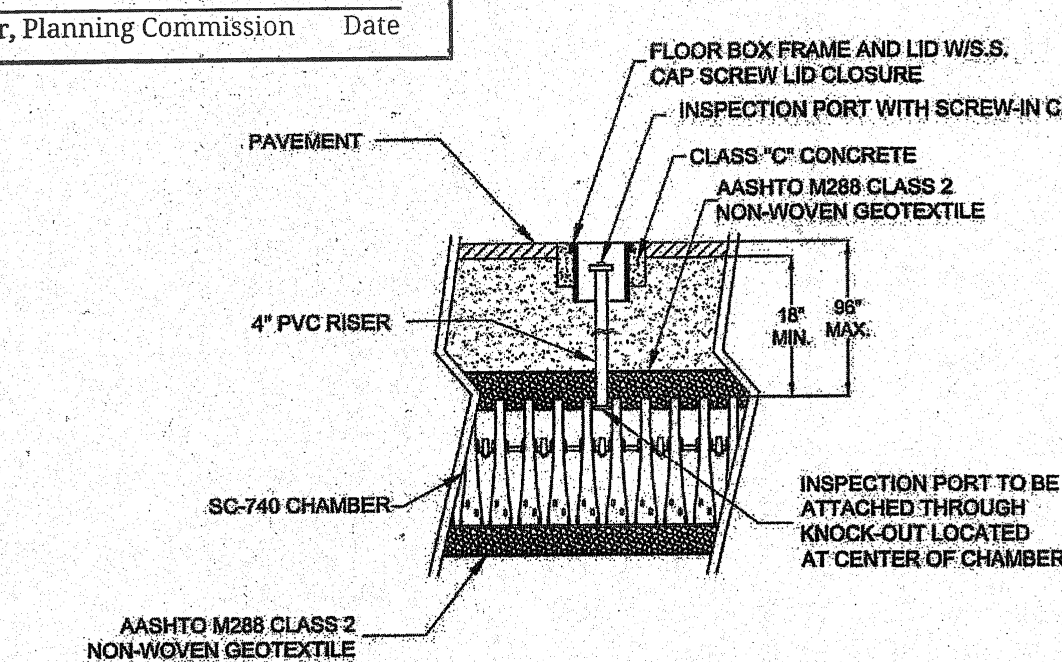
STORMTECH SC-740 CROSS SECTION

SCALE: NTS	CHECKED
DATE: 11/01/2005	ACAD No.
DRAWN BY:	SHEET OF



FOR STORMTECH INFORMATION CALL 1-888-892-2694

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SC-740 INSPECTION PORT DETAIL

SCALE: NTS	CHECKED
DATE: 11/01/2005	ACAD No.
DRAWN BY:	SHEET OF

[redacted]
BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-6400 FAX (703) 670-6250

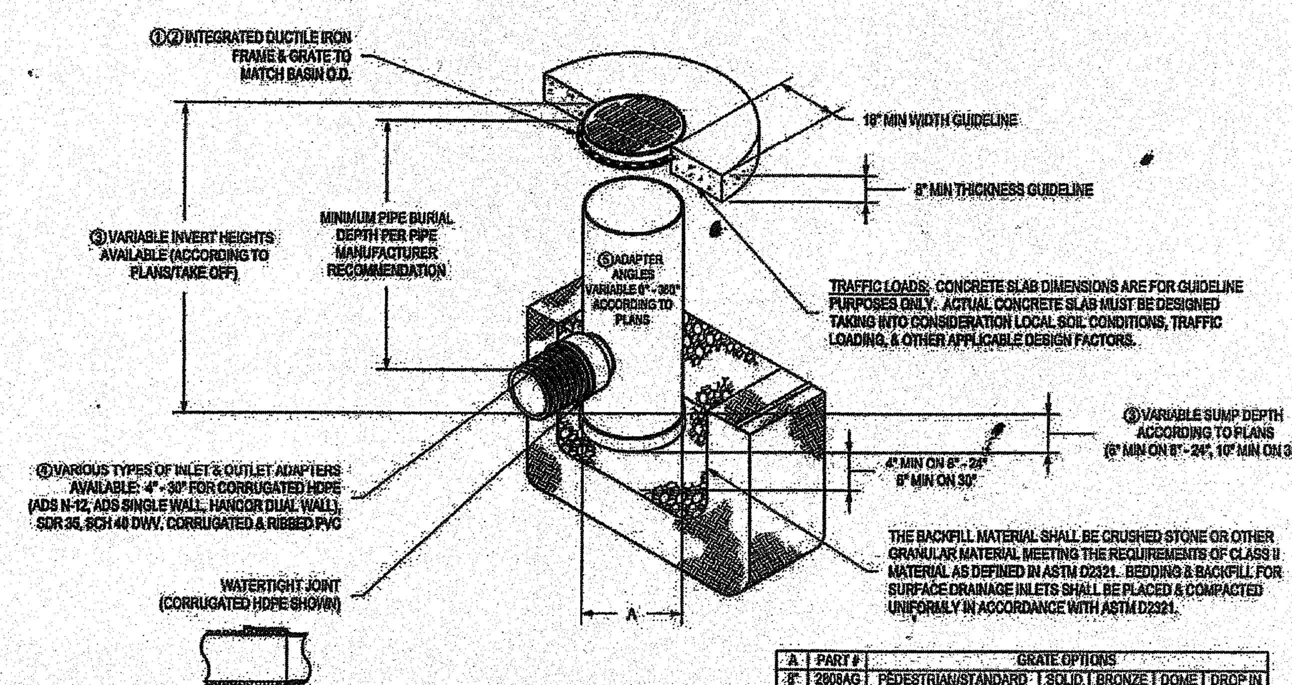
REVISIONS | DATE

STORM WATER MANAGEMENT DETAILS
VISTAS AT OCCOQUAN
TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
WILLIAM PUTMAN
6013
PROFESSIONAL ENGINEER

DATE: 2007/04/20	
SCALE: AS SHOWN	
DESIGN: DW	DRAWN: YK
CHECK: DW	CHECK: WCP
PWC FN: XX-XXXXX	
B&N PN: PR433TE	
SHEET: 15 OF 23	
B&N FN: WC-4905	

NYLOPLAST DRAIN BASIN

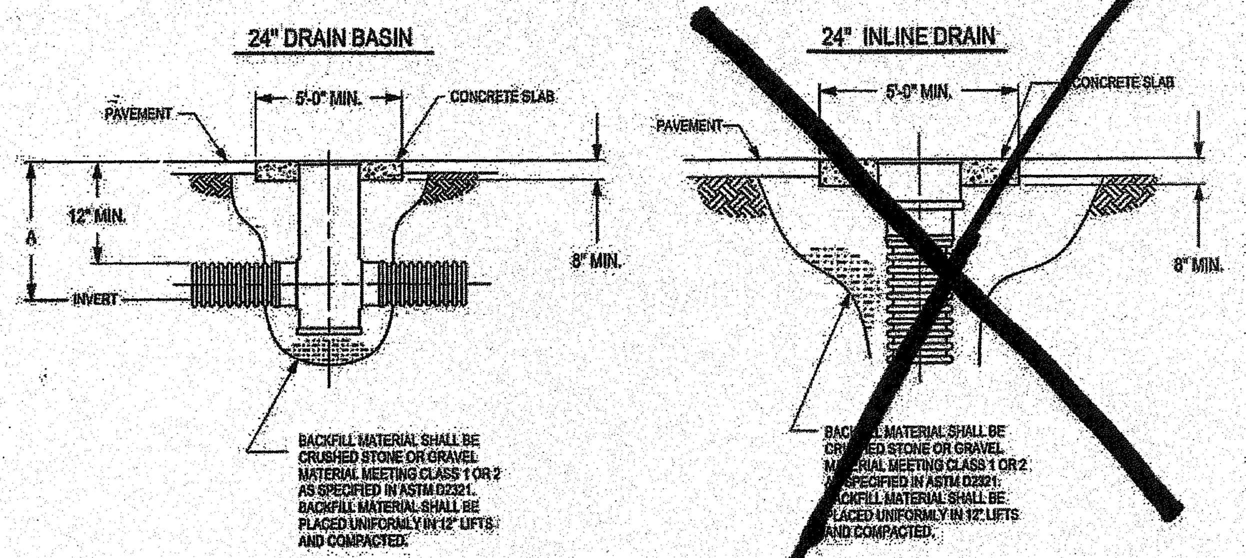


A	PART #	GRATE OPTIONS					
8"	2808AG	PEDESTRIAN/STANDARD		SOLID	BRONZE	DOME	DROP IN
10"	2810AG	PEDESTRIAN/STANDARD		SOLID	BRONZE	DOME	DROP IN
12"	2812AG	PEDESTRIAN	STANDARD	SOLID	BRONZE	DOME	DROP IN
15"	2815AG	PEDESTRIAN	STANDARD	SOLID	BRONZE	DOME	DROP IN
18"	2818AG	PEDESTRIAN	STANDARD	SOLID	N/A	DOME	DROP IN
24"	2824AG	PEDESTRIAN	STANDARD	SOLID	N/A	DOME	DROP IN
30"	2830AG	PEDESTRIAN	STANDARD	SOLID	N/A	DOME	N/A

① - 8" - 30" GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE 8" - 15" BRONZE GRATES
② - 12" - 30" FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
③ - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065
④ - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
⑤ - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012, 7001-110-013, & 7001-110-014.
6 - GRATES SHALL MEET H-10 LOAD RATING FOR 12" - 24" PED
7 - GRATES SHALL MEET H-20 LOAD RATING FOR 30" PED & 12" - 30" STD & SOLID
8 - ALL BRONZE GRATES, DROP IN GRATES, & 8" & 10" PED/STD GRATES & SOLID COVERS ARE RATED FOR LIGHT DUTY APPLICATIONS ONLY
9 - DOME GRATES HAVE NO LOAD RATING

DRAWN BY EBC	MATERIAL	**Nyloplast**	3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com
DATE 1-23-06			
APPD BY CJA	PROJECT NO./NAME	TITLE DRAIN BASIN WITH STANDARD GRATE QUICK SPEC INSTALLATION DETAIL	
DATE 1-23-06			
DWG SIZE A	SCALE 1:40 SHEET 1 OF 1	DWG NO. 7001-110-144	REV D

PART # 2824AG



PIPE SIZE	A (ADS N-12 PIPE)
4"	17.00"
6"	19.00"
8"	21.00"
10"	24.00"
12"	26.00"
15"	29.00"
18"	32.00"
24"	39.00"

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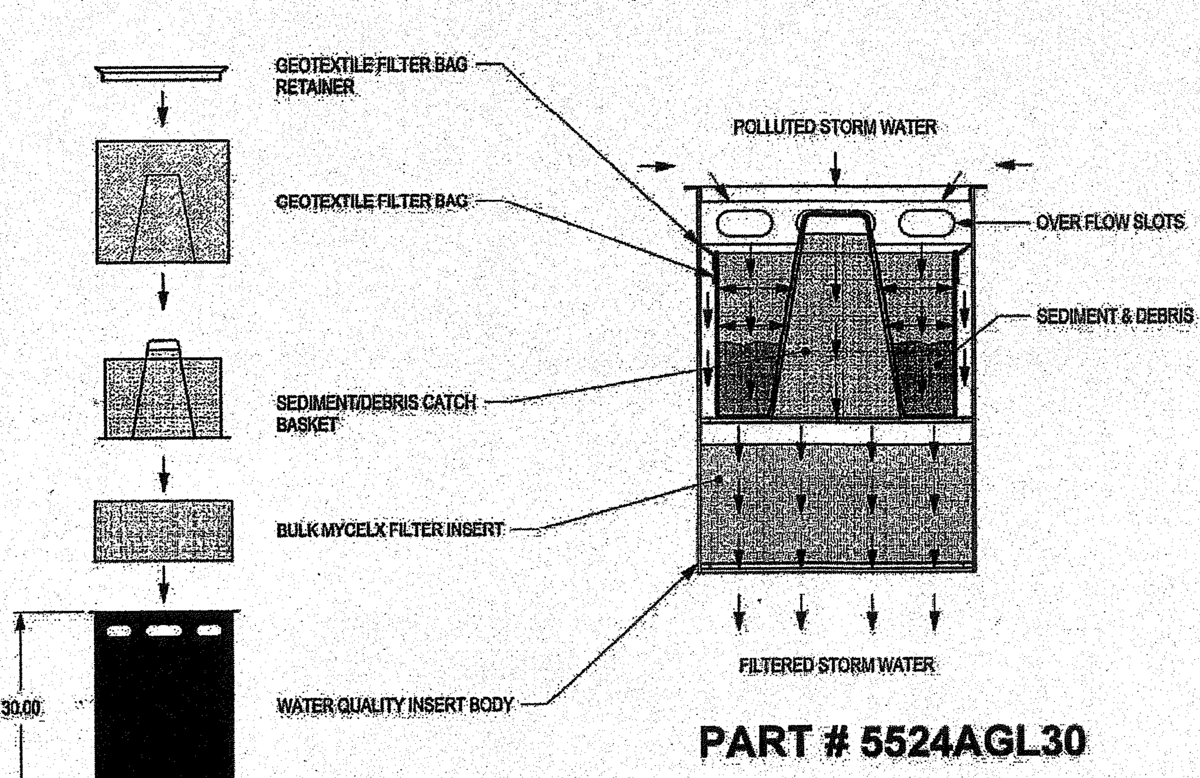
	APPD BY CJA / DATE 19FEB01	PROJECT NO./NAME DRAIN BASIN / INLINE DRAIN	TITLE 24" H-25 (HEAVY TRAFFIC) INSTALLATION	
	DWG SIZE A	SCALE 1:100 SHEET 1 OF 1	DWG NO. 7001-110-053	REV D

REV	REVISION DECRIPTION	DRAWN BY	DATE	APPD BY	DATE



PART # 5524AGL30

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	APPD BY CJA / DATE 10-9-03	PROJECT NO./NAME	TITLE DROP-IN WATER QUALITY DRAIN BASIN INSERT CONCEPT - STYLE B	
	DWG SIZE A	SCALE NTS SHEET 1 OF 1	DWG NO. 7007-110-001	REV A

STORMTECH PRODUCT SPECIFICATIONS

1.0 GENERAL
1.1 STORMTECH CHAMBERS ARE DESIGNED TO CONTROL STORMWATER RUNOFF. AS A SUBSURFACE RETENTION SYSTEM, STORMTECH CHAMBERS RETAIN AND ALLOW EFFECTIVE INFILTRATION OF WATER INTO THE SOIL. AS A SUBSURFACE DETENTION SYSTEM, STORMTECH CHAMBERS DETAIN AND ALLOW FOR THE METERED FLOW OF WATER TO AN OUTFALL.

2.0 CHAMBER PARAMETERS
2.1 THE CHAMBER SHALL BE INJECTION MOLDED OF POLYPROPYLENE RESIN TO BE INHERENTLY RESISTANT TO ENVIRONMENTAL STRESS CRACKING (ESCR), AND TO MAINTAIN ADEQUATE STIFFNESS THROUGH HIGHER TEMPERATURES EXPERIENCED DURING INSTALLATION AND SERVICE.

2.2 THE NOMINAL CHAMBER DIMENSIONS OF THE STORMTECH SC-740 SHALL BE 30.0 INCHES TALL, 51.0 INCHES WIDE AND 90.7 INCHES LONG. THE NOMINAL CHAMBER DIMENSIONS OF THE STORMTECH SC-310 SHALL BE 16.0 INCHES TALL, 34.0 INCHES WIDE AND 90.7 INCHES LONG. THE INSTALLED LENGTH OF A JOINED CHAMBER SHALL BE 85.4 INCHES.

2.3 THE CHAMBER SHALL HAVE A CONTINUOUSLY CURVED SECTION PROFILE.

2.4 THE CHAMBER SHALL BE OPEN-BOTTOMED.

2.5 THE CHAMBER SHALL INCORPORATE AN OVERLAPPING CORRUGATION JOINT SYSTEM TO ALLOW CHAMBER ROWS OF ALMOST ANY LENGTH TO BE CREATED. THE OVERLAPPING CORRUGATION JOINT SYSTEM SHALL BE EFFECTIVE WHILE ALLOWING A CHAMBER TO BE TRIMMED TO SHORTEN ITS OVERALL LENGTH.

2.6 THE NOMINAL STORAGE VOLUME OF A JOINED STORMTECH SC-740 CHAMBER SHALL BE 74.9 CUBIC FEET PER CHAMBER WHEN INSTALLED PER STORMTECH'S TYPICAL DETAILS (INCLUDES THE VOLUME OF CRUSHED ANGULAR STONE WITH AN ASSUMED 40% POROSITY). THIS EQUATES TO 2.2 CUBIC FEET OF STORAGE/SQUARE FOOT OF BED. THE NOMINAL STORAGE VOLUME OF AN INSTALLED STORMTECH SC-310 CHAMBER SHALL BE 31.0 CUBIC FEET PER CHAMBER WHEN INSTALLED PER STORMTECH'S TYPICAL DETAILS (INCLUDES THE VOLUME OF CRUSHED ANGULAR STONE WITH AN ASSUMED 40% POROSITY). THIS EQUATES TO 1.3 CUBIC FEET OF STORAGE/SQUARE FOOT OF BED.

2.7 THE CHAMBER SHALL HAVE FORTY-EIGHT ORIFICES PENETRATING THE SIDEWALLS TO ALLOW FOR LATERAL CONVEYANCE OF WATER.

2.8 THE CHAMBER SHALL HAVE TWO ORIFICES NEAR ITS TOP TO ALLOW FOR EQUALIZATION OF AIR PRESSURE BETWEEN ITS INTERIOR AND EXTERIOR.

2.9 THE CHAMBER SHALL HAVE BOTH OF ITS ENDS OPEN TO ALLOW FOR UNIMPEDED HYDRAULIC FLOWS AND VISUAL INSPECTIONS DOWN A ROW'S ENTIRE LENGTH.

2.10 THE CHAMBER SHALL HAVE 14 CORRUGATIONS.

2.11 THE CHAMBER SHALL HAVE A CIRCULAR, INDENTED, FLAT SURFACE ON THE TOP OF THE CHAMBER FOR AN OPTIONAL 4-INCH INSPECTION PORT.

2.12 THE CHAMBER SHALL BE ANALYZED AND DESIGNED USING AASHTO METHODS FOR THERMOPLASTIC CULVERTS CONTAINED IN THE LRFD BRIDGE DESIGN SPECIFICATIONS, 2ND EDITION, INCLUDING INTERIM SPECIFICATIONS THROUGH 2001. DESIGN LIVE LOAD SHALL BE THE AASHTO HS20 TRUCK. DESIGN SHALL CONSIDER EARTH AND LIVE LOADS AS APPROPRIATE FOR THE MINIMUM TO MAXIMUM SPECIFIED DEPTH OF FILL.

2.13 THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2000 CERTIFIED FACILITY.

3.0 END CAP PARAMETERS
3.1 END CAPS WITH PREFABRICATED PIPE CONNECTIONS SHALL BE INJECTION MOLDED FROM POLYETHYLENE RESIN.

3.2 THE END CAP SHALL BE DESIGNED TO FIT INTO ANY CORRUGATION OF A CHAMBER, WHICH ALLOWS: CAPPING A CHAMBER THAT HAS ITS LENGTH TRIMMED; SEGMENTING ROWS INTO STORAGE BASINS OF VARIOUS LENGTHS.

3.3 THE END CAP SHALL HAVE SAW GUIDES TO ALLOW EASY CUTTING FOR VARIOUS DIAMETERS OF PIPE THAT MAY BE USED TO INLET THE SYSTEM.

3.4 THE END CAP SHALL HAVE EXCESS STRUCTURAL ADEQUACIES TO ALLOW CUTTING AN ORIFICE OF ANY SIZE AT ANY INVERT ELEVATION.

3.5 THE PRIMARY FACE OF AN END CAP SHALL BE CURVED OUTWARD TO RESIST HORIZONTAL LOADS GENERATED NEAR THE EDGES OF BEDS.

3.6 THE END CAP SHALL BE MANUFACTURED IN AN ISO 9001:2000 CERTIFIED FACILITY.

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StormTech Subsurface Stormwater Management	20 Beaver Road, Suite 104 Wethersfield, CT 06109 Phone: 888-892-2694 Fax: 866-328-8401 www.stormtech.com
STORMTECH PRODUCT SPECIFICATIONS	
SCALE: NTS	CHECKED
DATE: 8/15/2006	ACAD No.
DRAWN BY:	SHEET OF

STORMWATER CHAMBER SPECIFICATIONS

1. Chambers shall be StormTech SC-740, SC-310 or approved equal.
2. Chambers shall conform to the requirements of ASTM F2418-05, "Standard Specification for Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers".
3. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels.
4. The structural design of the chambers, the structural backfill and the installation requirements shall ensure that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met for: 1) long-duration dead loads and 2) short-duration live loads, based on the AASHTO Design Truck with consideration for impact and multiple vehicle presences.
5. Only chambers that are approved by the engineer will be allowed. The contractor shall submit (3 sets) of the following to the engineer for approval before delivering chambers to the project site:
   a. A structural evaluation by a registered structural engineer that demonstrates that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM 2418-05 must be used as part of the AASHTO structural evaluation to verify long-term performance.
   b. A certification by the manufacturer that the chambers are in accordance with ASTM F2418-05.
6. Chambers shall be produced at an ISO 9001 certified manufacturing facility.
7. All design specifications for chambers shall be in accordance with the manufacturer's latest design manual.
8. The installation of chambers shall be in accordance with the manufacturer's latest installation instructions.

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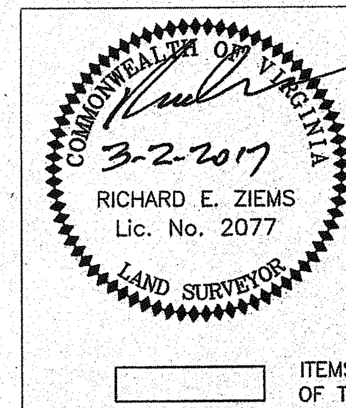
STORMWATER CHAMBER SPECIFICATIONS	
SCALE: NTS	CHECKED
DATE: 11/16/2005	ACAD No.
DRAWN BY:	SHEET OF

APPROVED
TOWN OF OCCOQUAN, VA

BY: ____________________
Mayor Date

BY: Ad a Mawell 4.19.17
Town Engineer/ ASSIST. Date

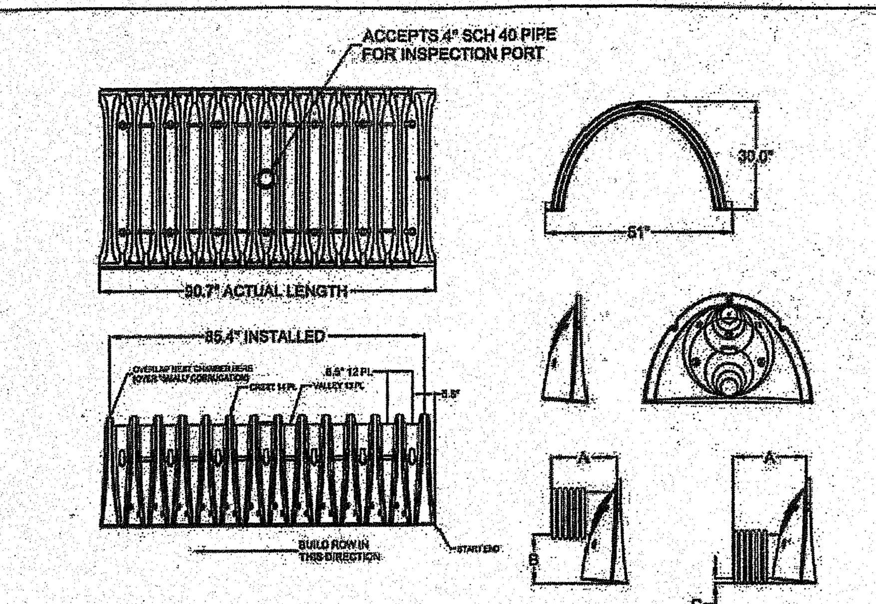
BY: ____________________
Chair, Planning Commission Date



AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 8 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

AS-BUILT SURVEY
FOR INFORMATION
PURPOSES ONLY



NOMINAL CHAMBER SPECIFICATIONS
SIZE (W x H x INSTALLED LENGTH) - 51.0" x 30.0" x 85.4"
CHAMBER STORAGE - 45.9 CUBIC FEET
MINIMUM INSTALLED STORAGE - 74.9 CUBIC FEET
WEIGHT - 75 LBS.

STUBS AT TOP OF END CAP FOR PARTS NUMBERS ENDING WITH "T"

STUBS AT BOTTOM OF END CAP FOR PARTS NUMBERS ENDING WITH "B"

PART #	CHAMBER	PIPE SIZE	A	B	C
SC740EPE06T	SC-740	6 in (150 mm)	10.90 in (277 mm)	18.50 in (470 mm)	N/A
SC740EPE06B	SC-740	6 in (150 mm)	10.90 in (277 mm)	N/A	0.50 in (13 mm)
SC740EPE08T	SC-740	8 in (200 mm)	12.20 in (310 mm)	17.50 in (445 mm)	N/A
SC740EPE08B	SC-740	8 in (200 mm)	12.20 in (310 mm)	N/A	0.60 in (15 mm)
SC740EPE10T	SC-740	10 in (250 mm)	13.40 in (340 mm)	15.50 in (394 mm)	N/A
SC740EPE10B	SC-740	10 in (250 mm)	13.40 in (340 mm)	N/A	0.70 in (18 mm)
SC740EPE12T	SC-740	12 in (300 mm)	14.70 in (373 mm)	12.50 in (318 mm)	N/A
SC740EPE12B	SC-740	12 in (300 mm)	14.70 in (373 mm)	N/A	1.20 in (30 mm)
SC740EPE15T	SC-740	15 in (375 mm)	18.40 in (467 mm)	9.00 in (229 mm)	N/A
SC740EPE15B	SC-740	15 in (375 mm)	18.40 in (467 mm)	N/A	1.30 in (33 mm)
SC740EPE18T	SC-740	18 in (450 mm)	19.70 in (500 mm)	5.00 in (127 mm)	N/A
SC740EPE18B	SC-740	18 in (450 mm)	19.70 in (500 mm)	N/A	1.60 in (41 mm)
* SC740EPE24B	SC-740	24 in (600 mm)	18.50 in (470 mm)	N/A	0.10 in (3 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL.

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75". BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SETS LEVEL.

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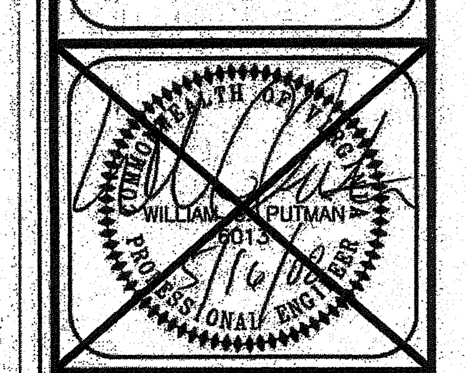
StormTech Subsurface Stormwater Management	20 Beaver Road, Suite 104 Wethersfield, CT 06109 Phone: 888-892-2694 Fax: 866-328-8401 www.stormtech.com
SC-740 TECHNICAL SPECIFICATIONS	
SCALE: NTS	CHECKED
DATE: 8/15/2006	ACAD No.
DRAWN BY:	SHEET OF

BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-6400 FAX (703) 670-6250

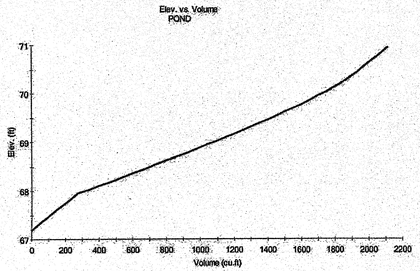
REVISIONS	DATE

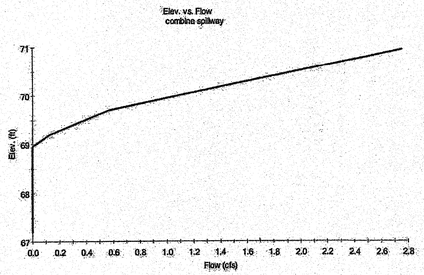
STORM WATER MANAGEMENT DETAILS
VISTAS AT OCCOQUAN
TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

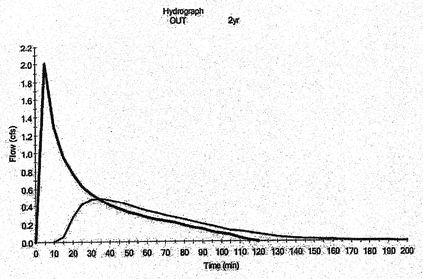


DATE: 2007/04/20	
SCALE: N/A	
DESIGN: DW	DRAWN: YK
CHECK: DW	CHECK: WCP
PWC FN: XX-XXXXX	
B&N PN: PR43316	
SHEET: 16 OF 23	
B&N FN: WC-4905	

Storage Volume Calculations						
Height of System (in)	Incremental Chamber (ft^3)	Incremental Stone (ft^3)	Incremental Chamber & Stone (ft^3)	Cumulative Chamber (ft^3)	Cumulative System (ft^3)	Elevation
45	0.00	1.13	1.13	78.27	2113.29	70.95
44	0.00	1.13	1.13	77.14	2062.78	70.87
43	0.00	1.13	1.13	76.01	2062.27	70.78
42	0.00	1.13	1.13	74.88	2021.76	70.70
41	0.00	1.13	1.13	73.75	1991.25	70.62
40	0.00	1.13	1.13	72.62	1960.74	70.53
39	0.05	1.10	1.15	71.49	1930.23	70.45
38	0.16	1.06	1.22	70.34	1898.18	70.37
37	0.28	1.01	1.29	69.12	1868.24	70.28
36	0.60	0.89	1.49	67.83	1831.41	70.20
35	0.80	0.81	1.61	66.34	1791.18	70.12
34	0.95	0.75	1.70	64.73	1747.71	70.03
33	1.07	0.70	1.77	63.03	1701.81	69.95
32	1.18	0.65	1.83	61.26	1654.02	69.87
31	1.27	0.62	1.89	59.43	1604.61	69.78
30	1.38	0.58	1.94	57.54	1553.58	69.70
29	1.45	0.55	2.00	55.60	1501.20	69.62
28	1.52	0.52	2.04	53.60	1447.20	69.53
27	1.58	0.49	2.07	51.56	1392.12	69.45
26	1.64	0.47	2.11	49.49	1336.23	69.37
25	1.70	0.45	2.15	47.38	1279.26	69.28
24	1.75	0.43	2.18	45.23	1221.21	69.20
23	1.80	0.41	2.21	43.05	1162.35	69.12
22	1.85	0.38	2.23	40.84	1102.68	69.03
21	1.89	0.37	2.26	38.61	1042.47	68.95
20	1.93	0.35	2.28	36.36	981.46	68.87
19	1.97	0.34	2.31	34.07	919.86	68.78
18	2.01	0.32	2.33	31.76	857.52	68.70
17	2.04	0.31	2.36	29.43	794.61	68.62
16	2.07	0.30	2.37	27.08	731.16	68.53
15	2.10	0.28	2.38	24.71	667.17	68.45
14	2.13	0.27	2.40	22.33	602.91	68.37
13	2.15	0.27	2.42	19.93	538.11	68.28
12	2.18	0.26	2.44	17.51	472.77	68.20
11	2.20	0.25	2.45	15.07	406.89	68.12
10	2.21	0.24	2.45	12.62	340.74	68.03
9	0.00	1.13	1.13	10.17	274.59	67.95
8	0.00	1.13	1.13	9.04	244.08	67.87
7	0.00	1.13	1.13	7.91	213.57	67.78
6	0.00	1.13	1.13	6.78	183.06	67.70
5	0.00	1.13	1.13	5.65	152.55	67.62
4	0.00	1.13	1.13	4.52	122.04	67.53
3	0.00	1.13	1.13	3.39	91.53	67.45
2	0.00	1.13	1.13	2.26	61.02	67.37
1	0.00	1.13	1.13	1.13	30.51	67.28
0	0.00	0.00	0.00	0.00	0.00	67.20







REQUESTED POND WS ELEVATIONS:

Min. Elev.= 67.20 ft
Increment = .50 ft
Max. Elev.= 70.95 ft

OUTLET CONNECTIVITY

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	El, ft	E2, ft
Weir-Rectangular	W1	--->	CV	68.950	70.950
Culvert-Circular	CV	--->	TW	67.100	70.950

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = W1
Structure Type = Weir-Rectangular

# of Openings = 1
Crest Elev. = 68.95 ft
Weir Length = .33 ft
Weir Coeff. = 3.000000

Weir TW effects (Use adjustment equation)

OUTLET STRUCTURE INPUT DATA

Structure ID = CV
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = 1.2500 ft
Upstream Invert = 67.10 ft
Dnstream Invert = 63.50 ft
Horiz. Length = 68.30 ft
Barrel Length = 68.39 ft
Barrel Slope = .05271 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .5000 (forward entrance loss)
Kb = .023225 (per ft of full flow)
Kr = .5000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...
Equation form = 1
Inlet Control K = .0098
Inlet Control M = 2.0000
Inlet Control c = .03980
Inlet Control Y = .6700
T1 ratio (HW/D) = 1.157
T2 ratio (HW/D) = 1.304
Slope Factor = -.050

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
Interpolate between flows at T1 & T2...
At T1 Elev = 68.55 ft ---> Flow = 4.80 cfs
At T2 Elev = 68.73 ft ---> Flow = 5.49 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 20
Min. TW tolerance = .50 ft
Max. TW tolerance = .50 ft
Min. HW tolerance = .50 ft
Max. HW tolerance = .50 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

HYG file =

HYG ID = HYG 2
HYG Tag = 2yr

Peak Discharge = 2.01 cfs
Time to Peak = 5.00 min
HYG Volume = 2958 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	2.01	1.30	.96	.77
25.00	.63	.54	.47	.41	.37
50.00	.33	.30	.27	.25	.23
75.00	.21	.18	.16	.14	.11
100.00	.09	.07	.04	.02	.00

DIVERTED HYDROGRAPH...
HYG file =
HYG ID = OUT
HYG Tag = 2yr

Peak Discharge = .49 cfs
Time to Peak = 35.00 min
HYG Volume = 1912 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time min					
10.00	.00	.06	.28	.42	.48
35.00	.49	.47	.44	.41	.38
60.00	.35	.32	.29	.27	.24
85.00	.22	.20	.17	.15	.12
110.00	.11	.10	.08	.06	.05
135.00	.04	.03	.03	.02	.02
160.00	.01	.01	.01	.01	.01
185.00	.01	.00	.00	.00	

LEVEL POOL ROUTING SUMMARY

HYG Dir = T:\43315\RSSP-R00-S02\calc\Pond Pack\
Inflow HYG file = NONE STORED - POND IN 2yr
Outflow HYG file = NONE STORED - POND OUT 2yr

Pond Node Data = POND
Pond Volume Data = POND
Pond Outlet Data = combine spillway

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 67.20 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 5.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow = 2.01 cfs at 5.00 min
Peak Outflow = .49 cfs at 35.00 min

Peak Elevation = 69.60 ft
Peak Storage = 1491 cu.ft

MASS BALANCE (cu.ft)

+ Initial Vol = 0
+ HYG Vol IN = 2958
- Infiltration = 0
- HYG Vol OUT = 1912
- Retained Vol = 1047

Unrouted Vol = 0 cu.ft (.007% of Inflow Volume)

NOTE: AS-BUILT INFORMATION SHOWN ON SHEET 6.

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Mayor Date

BY: Rd G Maxwell 4.6.17 Town Engineer / ASSIST Date

BY: _____ Chair, Planning Commission Date

COMMONWEALTH OF VIRGINIA
3-2-2017
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 9 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

AS-BUILT SURVEY
FOR INFORMATION PURPOSES ONLY

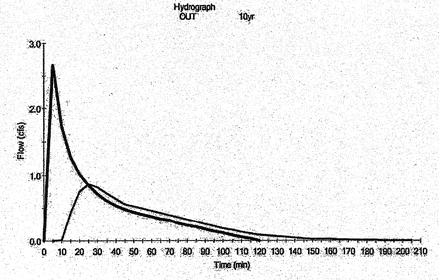
BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA, 22192
PH. (703) 670-8400 FAX (703) 670-8250

NO.	REVISIONS	DATE
1		

SWM ROUTING
2 YR
VISTAS AT OCCOQUAN
TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
WILLIAM B. PUTMAN
5013
PROFESSIONAL ENGINEER

DATE: 2007/04/20
SCALE: N/A
DESIGN: DMW DRAWN: SP
CHECK: WCP CHECK: DMW
PWC FN: XXXXXXXX
B&N FN: PR43315
SHEET: 17 OF 23
B&N FN: WC-4905



HYG file =

HYG ID = HYG 10
HYG Tag = 10yr

Peak Discharge =	2.68 cfs
Time to Peak =	5.00 min
HYG Volume =	3939 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	2.68	1.73	1.28	1.02
25.00	.85	.72	.62	.54	.48
50.00	.44	.40	.37	.34	.31
75.00	.27	.24	.21	.18	.15
100.00	.12	.09	.06	.03	.00

DIVERTED HYDROGRAPH...

HYG file =
HYG ID = OUT
HYG Tag = 10yr

Peak Discharge =	.87 cfs
Time to Peak =	25.00 min
HYG Volume =	2893 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time min					
5.00	.00	.01	.43	.76	.87
30.00	.82	.72	.63	.56	.53
55.00	.49	.46	.42	.39	.36
80.00	.32	.29	.26	.23	.20
105.00	.17	.13	.11	.09	.08
130.00	.06	.05	.04	.03	.03
155.00	.02	.02	.01	.01	.01
180.00	.01	.01	.00	.00	.00
205.00	.00				

LEVEL POOL ROUTING SUMMARY

HYG Dir = T:\43315\RSSP-R00-S02\calc\Pond Pack\
Inflow HYG file = NONE STORED - POND IN 10yr
Outflow HYG file = NONE STORED - POND OUT 10yr

Pond Node Data = POND
Pond Volume Data = POND
Pond Outlet Data = combine spillway

No Infiltration

INITIAL CONDITIONS

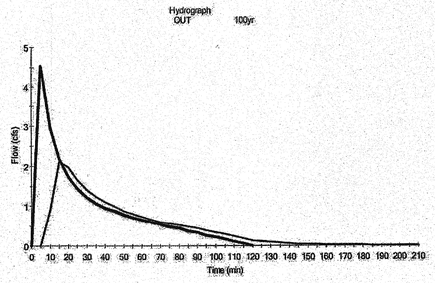
Starting WS Elev	=	67.20 ft
Starting Volume	=	0 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	5.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	2.68 cfs	at	5.00 min
Peak Outflow	=	.87 cfs	at	25.00 min
Peak Elevation	=	69.88 ft		
Peak Storage	=	1658 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	0
+ HYG Vol IN	=	3939
- Infiltration	=	0
- HYG Vol OUT	=	2893
- Retained Vol	=	1046
Unrouted Vol	=	0 cu.ft (.005% of Inflow Volume)



HYG file =

HYG ID = HYG 100
HYG Tag = 100yr

Peak Discharge =	4.54 cfs
Time to Peak =	5.00 min
HYG Volume =	6807 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	4.54	2.94	2.18	1.73
25.00	1.44	1.22	1.07	.95	.87
50.00	.78	.71	.65	.60	.54
75.00	.49	.44	.38	.33	.27
100.00	.22	.17	.11	.06	.00

DIVERTED HYDROGRAPH...

HYG file =
HYG ID = OUT
HYG Tag = 100yr

Peak Discharge =	2.11 cfs
Time to Peak =	15.00 min
HYG Volume =	5760 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time min					
5.00	.00	.91	2.11	1.98	1.65
30.00	1.39	1.24	1.10	.98	.88
55.00	.80	.72	.66	.60	.56
80.00	.53	.49	.44	.40	.34
105.00	.29	.24	.19	.14	.11
130.00	.09	.07	.06	.05	.04
155.00	.03	.02	.02	.02	.01
180.00	.01	.01	.01	.01	.00
205.00	.00	.00			

LEVEL POOL ROUTING SUMMARY

HYG Dir = T:\43315\RSSP-R00-S02\calc\Pond Pack\
Inflow HYG file = NONE STORED - POND IN 100yr
Outflow HYG file = NONE STORED - POND OUT 100yr

Pond Node Data = POND
Pond Volume Data = POND
Pond Outlet Data = combine spillway

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	67.20 ft
Starting Volume	=	0 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	5.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	4.54 cfs	at	5.00 min
Peak Outflow	=	2.11 cfs	at	15.00 min
Peak Elevation	=	70.59 ft		
Peak Storage	=	1982 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	0
+ HYG Vol IN	=	6807
- Infiltration	=	0
- HYG Vol OUT	=	5760
- Retained Vol	=	1047
Unrouted Vol	=	0 cu.ft (.003% of Inflow Volume)

UNDERGROUND STORAG

STORM WATER DETENTION COMPUTATIONS

TOTAL SITE AREA A= 0.62 Ac
OPEN SPACE A= 0.00 Ac
NEW AREA : A= 0.62 Ac

PRE-DEVELOPMENT RUNOFF

DRAINAGE AREA TO THE POND A= 0.62 Ac
TIME OF CONCENTRATION Tc= 5 min
RAINFALL INTENSITY I(2YR)= 5.45 in/hr
I(10YR)= 7.27 in/hr
I(25YR)= 8.27 in/hr
I(100YR)= 9.84 in/hr

RUNOFF COEFFICIENT C(2YR)= 0.35
C(10YR AND 25 YR)= 0.35

RUNOFF						
	Q(2YR) =		0.35 *	5.45 *	0.62 =	1.2 cfs
	Q(10YR)=		0.35 *	7.27 *	0.62 =	1.6 cfs
	Q(100YR)=	1.25 *	0.35 *	9.84 *	0.62 =	2.7 cfs

POST-DEVELOPMENT RUNOFF

UNDETAINED A= 0.12 Ac C= 0.40
ONSITE TO UG STORAGE A= 0.43 Ac C= 0.90
OFF-SITE TO UG STORAG A= 0.01 Ac C= 0.90

TIME OF CONCENTRATION Tc= 5 min
RAINFALL INTENSITY I(2YR)= 5.45 in/hr
I(10YR)= 7.27 in/hr
I(25YR)= 8.27 in/hr
I(100YR)= 9.84 in/hr

ON-SITE UNDETAINED RUNOFF

Q(2YR) =		0.40 *	5.45 *	0.12 =	0.3 cfs
Q(10YR)=		0.40 *	7.27 *	0.12 =	0.3 cfs
Q(100YR)=	1.25 *	0.40 *	9.84 *	0.12 =	0.6 cfs

ONSITE DETAINED RUNOFF

Q(2YR) =		0.90 *	5.45 *	0.43 =	2.1 cfs
Q(10YR)=		0.90 *	7.27 *	0.43 =	2.8 cfs
Q(100YR)=	1.25 *	0.90 *	9.84 *	0.43 =	4.6 cfs

OFF-SITE DETAINED RUNOFF

Q(2YR) =		0.90 *	5.45 *	0.01 =	0.0 cfs
Q(10YR)=		0.90 *	7.27 *	0.01 =	0.1 cfs
Q(100YR)=	1.25 *	0.90 *	9.84 *	0.01 =	0.1 cfs

TOTAL RUNOFF TO POND

Q(2YR) = 2.2 cfs
Q(10YR)= 2.9 cfs
Q(100YR)= 4.9 cfs

ALLOWABLE RUNOFF

Q(ALLOW)=Q(PRE-DEVELOPED)-Q(UNDETAINED)+Q(OFFSITE)

Q(2YR) =	1.2 -	0.26 +	0.05 =	1.0 cfs
Q(10YR)=	1.6 -	0.35 +	0.07 =	1.3 cfs
Q(100YR)=	2.7 -	0.59 +	0.11 =	2.2 cfs

ROUTING RESULTS

Frequency (Yr)	2	10		100
Outflow (cfs)	0.49	0.87		2.11
Water Surface Elevation: (ft)	69.60	69.88		70.59

Q in (10 YR) -Q out (10YR)= 2.9 - 0.9 = 2.0
0.2 x Q in (10YR)= 0.2 x 2.9 = 0.6

SINCE THE ROUTED 2, 10 AND 25 YEAR FLOWS ARE LESS THAN THE MAXIMUM ALLOWABLE 2, 10 AND 25 YEAR RUNOFF RESPECTIVELY AND 2.0 > 0.6 (MORE THAN 20% REDUCTION), THE REQUIRED DETENTION IS ACHIEVED.

NOTE: AS-BUILT INFORMATION SHOWN ON SHEET 6.

APPROVED
TOWN OF OCCOQUAN, VA

BY: _____ Mayor Date

BY: _____ Town Engineer / Assist. Date 4.19.17

BY: _____ Chair, Planning Commission Date

COMMONWEALTH OF VIRGINIA
3-2-17
RICHARD E. ZIEMS
Lic. No. 2077
LAND SURVEYOR

AS-BUILT SURVEY
NOVEMBER 30, 2015
SHEET 10 OF 10
REVISED: NOVEMBER 1, 2016

ITEMS BOXED ARE THE RESULTS OF THE AS-BUILT SURVEY.

AS-BUILT SURVEY
FOR INFORMATION
PURPOSES ONLY

BURGESS & NIPLE
12700 BLACK FOREST LANE, SUITE 100, WOODBRIDGE, VA. 22192
PH. (703) 670-6400 FAX (703) 670-6250

REVISIONS | DATE

SWM ROUTING
10 YR AND 100 YR
VISTAS AT OCCOQUAN
TOWN OF OCCOQUAN
PRINCE WILLIAM COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
WILLIAM PUTMAN
5/16/17
PROFESSIONAL ENGINEER

DATE: 2007/04/20
SCALE: N/A
DESIGN: DMW DRAWN: SP
CHECK: CHECK: DMW
PWC FN: XX-XXXX
B&N FN: PR43315
SHEET: 18 OF 23
B&N FN: WC-4905