FOREST CONSERVATION WORKSHEET
VERSION 1.0

NET TRACT AREA:

A. Total tract area.....=1.05
B. Area within 100 year floodplain.....=0.00
C. Area to remain in agricultural production.....=0.00
D. Net tract area.....=1.05

LAND USE CATEGORY:

(from table 3.2.1, page 40, Manual) Input the number "1" under the appropriate land use,zoning, and limit to only one entry.

ARA	MDR	IDA	HDR	MPD	CIA
0	0	0	1	0	0

E. Afforestation Threshold.....15% x D =0.16
F. Conservation Threshold.....20% x D =0.21

EXISTING FOREST COVER:

G. Existing forest cover (excluding floodplain).....=0.00
H. Area of forest above afforestation threshold.....=0.00
I. Area of forest above conservation threshold.....=0.00

BREAK EVEN POINT:

J. Forest retention above threshold with no mitigation.....=0.00
K. Clearing permitted without mitigation.....=0.00

PROPOSED FOREST CLEARING:

L. Total area of forest to be cleared.....=0.00
M. Total area of forest to be retained.....=0.00

PLANTING REQUIREMENTS:

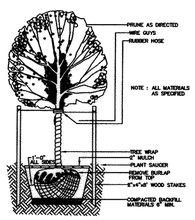
N. Reforestation for clearing above conservation threshold.....=0.00
P. Reforestation for clearing below conservation threshold.....=0.00
Q. Credit for retention above conservation threshold.....=0.00
R. Total reforestation required.....=0.00
S. Total afforestation required.....=0.16
T. Total reforestation and afforestation required.....=0.16

LEGEND

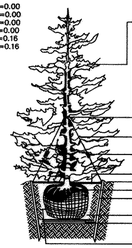
- DENOTES PROPOSED DRIVEWAY
- PRIVATE USE-IN-COMMON AND UTILITY EASEMENT
- EXISTING 10' UTILITY EASEMENT P.B.5, F.4
- (S) SANITARY MH
- EX. TREELINE
- LANDSCAPE PERIMETER EDGE
- MB-1 MICRO-BIORETENTION FACILITY
- LOD LIMIT OF DISTURBANCE
- SF SILT FENCE
- B-1 LOCATION OF SOIL BORING
- TPF TREE PROTECTION FENCE

SOILS DESCRIPTION

GbB– (B) – GLADSTONE LOAM , 3–8% SLOPES.
GbC– (B) – GLADSTONE LOAM, 8–15% SLOPES.
GmB– (C) – GLENVILLE SILT LOAM, 3–8% SLOPES.

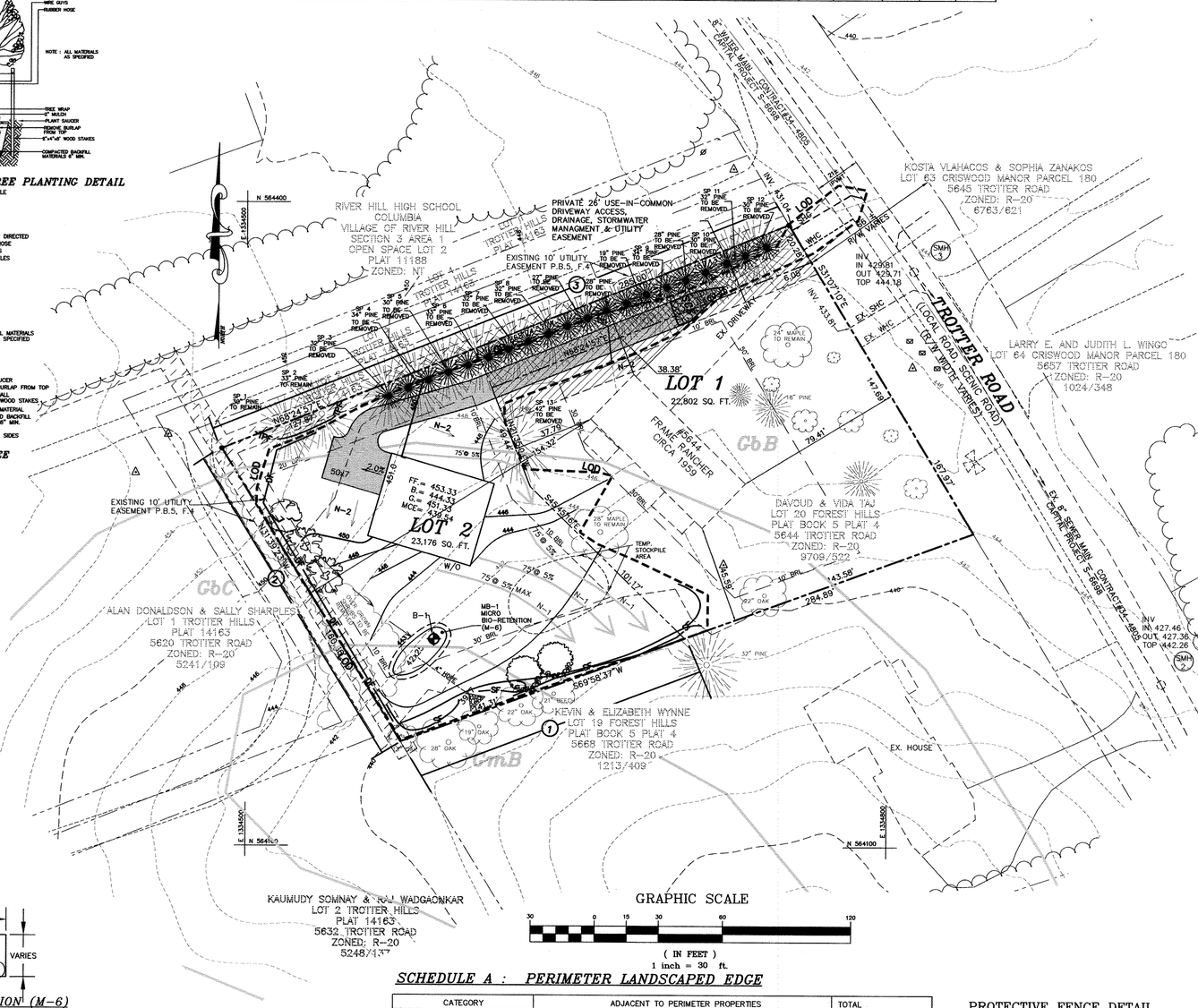


TYPICAL DECIDUOUS TREE PLANTING DETAIL
NOT TO SCALE



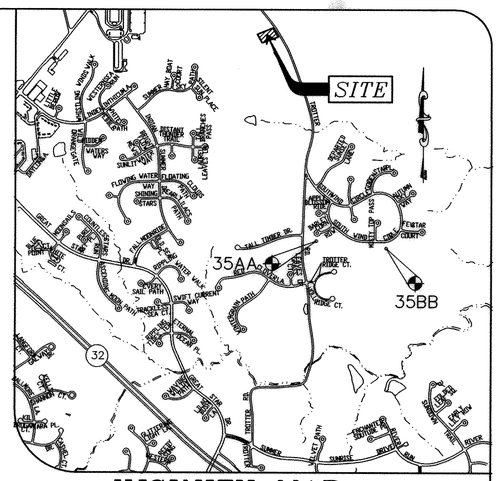
TYPICAL EVERGREEN TREE PLANTING DETAIL
NOT TO SCALE

STORMWATER MANAGEMENT PRACTICES																
LOT #	ADDRESS	GREEN ROOF A-1 (Y/N)	PERMEABLE PAVEMENTS A-2 (Y/N)	REINFORCED TURF A-3 (Y/N)	DISCONNECTION OF ROOFTOP RUNOFF N-1 (NUMBER)	DISCONNECTION OF NON-ROOFTOP RUNOFF N-2 (Y/N)	SHEETFLOW TO CONSERVATION AREAS N-3 (Y/N)	RAINWATER HARVESTING M-1 (NUMBER)	SUBMERGED GRAVEL WETLANDS M-2 (NUMBER)	LANDSCAPE INFILTRATION M-3 (NUMBER)	INFILTRATION BERMS M-4 (NUMBER)	DRY WELLS M-5 (NUMBER)	MICRO-BIORETENTION M-6 (NUMBER)	RAIN GARDENS M-7 (NUMBER)	SWALES M-8 (NUMBER)	ENHANCED FILTERS M-9 (NUMBER)
2	5640 TROTTER RD.				4	YES							1			



GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

VICINITY MAP



SCALE: 1"=1000'
ADC MAP 25, GRID E-8

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS OF HOWARD COUNTY PLUS MSHA STANDARDS AND SPECIFICATIONS IF APPLICABLE.
2. PROJECT BACKGROUND:
   LOCATION: TAX MAP : 35 PARCEL: 5 GRID: 2
   ELECTION DISTRICT : FIFTH
   ZONING: R-20
   PROPOSED USE FOR SITE : RESIDENTIAL
   TYPE OF PROPOSED UNIT : SFD
   DPZ FILE NOS: ECP-13-070
3. AREA TABULATION
   A. TOTAL TRACT AREA: 1.05 AC.±
   B. NUMBER OF PROPOSED BUILDABLE LOTS : 1
   C. NUMBER OF OPEN SPACE LOTS : 0
   D. AREA OF PUBLIC RIGHT-OF-WAY : 0 S.F.±
   E. AREA OF BUILDABLE LOTS : 1.05 AC. ±
4. ON-SITE TOPOGRAPHY SHOWN HEREON IS BASED ON A FIELD RUN SURVEY CONDUCTED BY MILDENBERG, BOENDER & ASSOCIATES ON OR ABOUT MAY 2013.
5. HORIZONTAL AND VERTICAL DATUMS ARE RELATED TO THE MARYLAND NAD 83 (HORZ) AND NGVD29 (VERT) AS PROJECTED FROM HOWARD COUNTY CONTROL STATIONS NO. 35AA & 35BB.
   STA. No. 35AA N 560,767.733, E1,335,483.839, EL 431.609
   STA. No. 35BB N 560,790.416, E 1,336,537.267, EL 394.975
6. PROJECT BOUNDARY IS BASED ON A FIELD RUN MONUMENTED BOUNDARY SURVEY PERFORMED BY MILDENBERG, BOENDER & ASSOC., INC. ON OR ABOUT MAY 2013.
7. THE PROPOSED SUBDIVISION WILL CONSIST OF SINGLE FAMILY DETACHED DWELLINGS.
8. THE SUBDIVISION IS IN THE METROPOLITAN DISTRICT.
9. STEEP SLOPES OVER 20,000 SQ. FT. IN AREA DO NOT EXIST ON SITE.
10. DRIVEWAYS SHALL BE PROVIDED PRIOR TO RESIDENTIAL OCCUPANCY TO ENSURE SAFE ACCESS FOR FIRE AND EMERGENCY VEHICLES PER THE FOLLOWING MINIMUM REQUIREMENTS:
    A) WIDTH – 12 FEET (16 FEET SERVING MORE THAN ONE RESIDENCE).
    B) SURFACE – 6 INCHES OF COMPACTED CRUSHER RUN BASE WITH TAR AND CHIP COATING.
    C) GEOMETRY – MAXIMUM 15% GRADE, MAXIMUM 10% GRADE CHANGE AND MINIMUM OF 45–FOOT TURNING RADIUS.
    D) STRUCTURES (CULVERT/BRIDGES) – CAPABLE OF SUPPORTING 25 GROSS TONS (H25 LOADING).
    E) DRAINAGE ELEMENTS – CAPABLE OF SAFELY PASSING 100–YEAR FLOOD WITH NO MORE THAN 1 FOOT DEPTH OVER DRIVEWAY SURFACE.
    F) STRUCTURE CLEARANCES – MINIMUM 12 FEET
    G) MAINTENANCE – SUFFICIENT TO ENSURE ALL WEATHER USE.
11. THE FOREST CONSERVATION OBLIGATIONS FOR THIS RESUBDIVISION IS PROVIDED BY A PAYMENT OF A FEE–IN–LIEU IN THE AMOUNT OF $5,227.20 FOR 0.16 ACRES (6,969.60 SQ FT.) OF AFFORESTATION.
12. THIS SUBDIVISION IS IN COMPLIANCE WITH SECTION 16.124 OF HOWARD COUNTY CODE AND THE LANDSCAPE MANUAL.
13. LANDSCAPING FOR THIS SUBDIVISION WILL BE DEFERRED UNTIL THE SITE DEVELOPMENT PLAN STAGE. FINANCIAL SURETY FOR THE REQUIRED LANDSCAPING WILL BE POSTED WITH THE GRADING PERMIT FOR LOT 2.
14. FOR FLAG OR PIPESTEM LOTS, REFUSE COLLECTION, SNOW REMOVAL AND ROAD MAINTENANCE ARE PROVIDED TO THE JUNCTION OF THE FLAG OR PIPESTEM LOT AND ROAD RIGHT–OF–WAY LINE AND NOT TO THE PIPESTEM LOT DRIVEWAY.
15. STORMWATER MANAGEMENT IS PROVIDED VIA ROOFTOP (N–1), NON–ROOFTOP (N–2) DISCONNECTION AND MICROBIORETENTION (M–6) FACILITIES.
16. A SITE DEVELOPMENT PLAN APPROVAL BY THE DEPARTMENT OF PLANNING AND ZONING IS REQUIRED PRIOR TO BUILDING PERMITS BEING ISSUED FOR THE CONSTRUCTION OF RESIDENTIAL DWELLINGS ON LOT 2.
17. THE OPEN SPACE REQUIREMENT FOR THIS RESUBDIVISION IS MET BY A PAYMENT OF FEE–IN–LIEU IN THE AMOUNT OF $1,500.00.
18. THERE IS AN EXISTING STRUCTURE ON LOT 1. NO NEW BUILDINGS, EXTENSIONS OR ADDITIONS TO THE EXISTING DWELLING ARE TO BE CONSTRUCTED AT A DISTANCE LESS THAN THE ZONING REGULATION REQUIREMENTS. ALL OTHER STRUCTURES WILL BE REMOVED, UNLESS OTHERWISE NOTED.
19. NO FOREST STAND OR WETLAND EXISTS ON SITE AS CERTIFIED BY MILDENBERG, BOENDER & ASSOC., INC. IN MAY, 2013.
20. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF ENGINEERING/CONSTRUCTION INSPECTION DIVISION AT (410)313–1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK.
21. THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1–800–257–7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK BEING DONE.
22. PROPERTY IS LOCATED WITHIN THE METROPOLITAN DISTRICT. PUBLIC WATER AND SEWER WILL BE UTILIZED UNDER CONTRACT # 34–4805.
23. EXISTING UTILITIES ARE BASED ON ACTUAL FIELD LOCATIONS, IN COMBINATION WITH EXISTING WATER AND SEWER CONTRACTS.
24. THERE IS NO FLOODPLAIN ON THIS SITE.
25. NO TRAFFIC STUDY IS REQUIRED FOR THIS PROJECT.
26. COMMUNITY MEETING FOR THIS PROJECT WAS HELD ON APRIL 1, 2013 AT 6:00 P.M. AT THE CLARKSVILLE FIRE STATION.
27. THIS PLAN IS SUBJECT TO WAIVER PETITION WP–14–074, WAIVING SECTION 16.1205(a)(7) OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS, WHICH REQUIRES TREES 30" IN DIAMETER OR LARGER BE LEFT IN AN UNDISTURBED CONDITION UPON SUBDIVISION, SITE DEVELOPMENT AND GRADING TO REMOVE 11 SPECIMEN TREES ON LOTS 1 AND 2. THIS WAIVER WAS APPROVED BY THE DIRECTOR OF THE DEPARTMENT OF PLANNING AND ZONING ON JANUARY 27, 2014. APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:
    1. A REVISED WAIVER EXHIBIT SHALL BE SUBMITTED SHOWING GREEN GIANT ARBORVITAE (THUJA PLICATA) TREES PLANTED EVERY 10' ON CENTER ALONG THE PROPERTY LINE, INSTEAD OF THE FOUR PROPOSED SHADE TREES. A MINIMUM OF 20 GREEN GIANT ARBORVITAE SHALL BE PLANTED.
    2. F–14–039 SHALL BE UPDATED TO DEPICT THE ARBORVITAE ALONG WITH AN UPDATED PLANTING SCHEDULE. SURETY FOR THIS ADDITIONAL LANDSCAPING WILL BE ADDRESSED WITH THE GRADING PERMIT FOR LOT 2 OF THIS PLAN.
    3. THE OTHER LARGER EXISTING TREES SHOWN ON LOTS 1 AND 2 SHALL BE RETAINED (TWO SPECIMEN PINE, 28" AND 24" MAPLES, 22" OAK, ETC.)
28. IN ACCORDANCE WITH SECTION 108.0.E OF THE 10/06/13 COMPREHENSIVE ZONING REGULATIONS, THIS SUBDIVISION IS SUBJECT TO MODERATE INCOME HOUSING UNITS. THE DEVELOPER WILL EXECUTE A MIHU AGREEMENT AND COVENANTS WITH THE HOWARD COUNTY HOUSING DEPARTMENT BEFORE THE FINAL PLAT RECEIVES SIGNATURE APPROVAL. THE MIHU OBLIGATION FOR THIS DEVELOPMENT WILL BE PROVIDED BY A PAYMENT OF FEE–IN–LIEU TO THE HOWARD COUNTY HOUSING DEPARTMENT FOR EACH UNIT OR PORTION OF THE UNITS REQUIRED BY THE DEVELOPMENT. THE MIHU AGREEMENT AND COVENANTS WILL BE RECORDED TOGETHER AT THE SAME TIME WITH THE FINAL PLAT AT THE LAND RECORDS OFFICE.

OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED DISCONNECTION OF ROOFTOP RUNOFF (N–1), DISCONNECTION OF NON–ROOFTOP RUNOFF (N–2)

MAINTENANCE OF AREAS RECEIVING DISCONNECTED RUNOFF IS GENERALLY NO DIFFERENT THAN THAT REQUIRED FOR OTHER LAWN OR LANDSCAPED AREAS. THE OWNER SHALL ENSURE THE AREAS RECEIVING RUNOFF ARE PROTECTED FROM FUTURE COMPACTION OF DEVELOPMENT OF IMPERVIOUS AREA. IN COMMERCIAL AREAS, FOOT TRAFFIC SHOULD BE DISCOURAGED AS WELL.

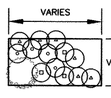
OPERATION AND MAINTENANCE SCHEDULE FOR MICRO–BIORETENTION (M–6)

A. THE OWNER SHALL MAINTAIN THE PLANT MATERIAL, MULCH LAYER AND SOIL LAYER ANNUALLY. MAINTENANCE OF MULCH AND SOIL IS LIMITED TO CORRECTING AREAS OF EROSION OR WASH OUT. ANY MULCH REPLACEMENT SHALL BE DONE IN THE SPRING. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL AND PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MARYLAND STORMWATER DESIGN MANUAL VOLUME II, TABLE A.4.1 AND 2.

B. THE OWNER SHALL PERFORM A PLANT IN THE SPRING AND IN THE FALL OF EACH YEAR. DURING THE INSPECTION, THE OWNER SHALL REMOVE DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, REPLACE DEAD PLANT MATERIAL WITH ACCEPTABLE REPLACEMENT PLANT MATERIAL, TREAT DISEASED TREES AND SHRUBS, AND REPLACE ALL DEFICIENT STAKES AND WIRES.

C. THE OWNER SHALL INSPECT THE MULCH EACH SPRING. THE MULCH SHALL BE REPLACED EVERY TWO TO THREE YEARS. THE PREVOUS MULCH LAYER SHALL BE REMOVED BEFORE THE NEW LAYER IS APPLIED.

D. THE OWNER SHALL CORRECT SOIL EROSION ON AN AS NEEDED BASIS, WITH A MINIMUM OF ONCE PER MONTH AND AFTER EACH HEAVY STORM..



MICRO–BIORETENTION (M–6) PLANTING DETAIL
N.T.S.

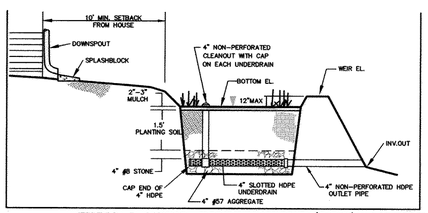
PLANT LIST

QUANTITY BR–1	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
1	○	ILEX GLABRA	INK BERRY	2' – 3' HT.
10	Ⓐ	LOBELIA SIPHILITICA	GREAT BLUE LOBELIA	1 GAL. CONTAINER
10	Ⓒ	ONOCLEA SENSIBILIS	SENSITIVE FERN	1 GAL. CONTAINER
10	Ⓔ	ASTER NOVAE–ANGLIAE	NEW ENGLAND ASTER	1 GAL. CONTAINER

TOTAL (BR–1): 30 PERENNIALS, 1 SHRUB
NOTE: APPROVED ALTERNATIVE PLANTS MAY BE USED.

OWNER/DEVELOPER

DAVOUD & VIDA TAJ
5839 TROTTER ROAD
CLARKSVILLE MARYLAND 21029
410–997–0296



TYPICAL MICRO–BIORETENTION (M–6) PROFILE
NTS

SCHEDULE A : PERIMETER LANDSCAPED EDGE

CATEGORY	ADJACENT TO PERIMETER PROPERTIES			TOTAL
LANDSCAPE TYPE	A (PERIMETER 1)	A (PERIMETER 2)	A (PERIMETER 3)*	
LINEAR FEET OF PERIMETER	141.31' LF	160.36 LF	285.00 LF	
CREDIT FOR EXISTING VEGETATION (YES, NO, LINEAR FEET)	NO	NO	YES	
NUMBER OF PLANTS REQUIRED SHADE TREES EVERGREEN TREES SHRUBS	2 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	3 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	5 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	10 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS
NUMBER OF PLANTS PROVIDED SHADE TREES EVERGREEN TREES OTHER TREES (2:1 SUBSTITUTION) SHRUBS (10:1 SUBSTITUTION)	2 SHADE TREES 0 EVERGREEN TREES 0 SUBSTITUTION TREES 0 SHRUBS	3 SHADE TREES 0 EVERGREEN TREES 0 SUBSTITUTION TREES 0 SHRUBS	0 SHADE TREES 20 EVERGREEN TREES 0 SUBSTITUTION TREES 0 SHRUBS	5 SHADE TREES 20 EVERGREEN TREES 0 SUBSTITUTION TREES 0 SHRUBS

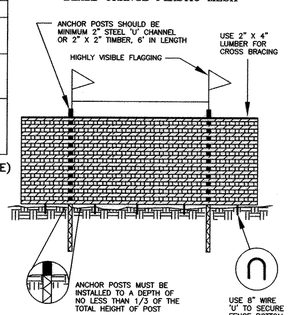
*PERIMETERS 3– CREDIT TAKEN FOR 2 MATURE EVERGREEN TREES. 20 PROPOSED GREEN GIANT (THUJA PLICATE) TREES TO BE PLANTED IN LIEU OF THE 11 EVERGREENS (SPECIMEN TREES) TO BE REMOVED.

LANDSCAPE REQUIREMENT PLANTING SCHEDULE

QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
2		ACER RUBRUM 'RED SUNSET' OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	RED SUNSET RED MAPLE OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	2 1/2" – 3" CAL.
2		QUERCUS RUBA 'RED OAK' OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	RED OAK OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	2 1/2" – 3" CAL.
1		PYRUS SARGENTII OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	SARGENT CHERRY OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	2 1/2" – 3" CAL.
20*		THUJA PLICATA OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	GREEN GIANT OR EQUIVALENT AS OUTLINED IN THE HOWARD COUNTY LANDSCAPE MANUAL.	6'–8' HEIGHT

TOTAL
25 TREES (5 SHADE TREES, 20 EVERGREEN TREES)
*THE 20 THUJA PLICATA TREES (GREEN GIANT) SHOULD BE 6–8 FEET TALL AT THE TIME OF PLANTING AND SHOULD BE BALLED AND BURLAPPED.

PROTECTIVE FENCE DETAIL
BLAZE ORANGE PLASTIC MESH



NOTES
1. FOREST PROTECTION DEVICE ONLY.
2. PROTECTION AREA SHALL BE SET AS PART OF THE REVIEW PROCESS.
3. BOUNDARIES OF RETENTION AREA SHOULD BE STAKED AND FLAGGED PRIOR TO INSTALLING DEVICE.
4. ROOT DAMAGE SHOULD BE AVOIDED.
5. PROTECTIVE SIGNAGE MAY ALSO BE USED.
6. DEVICE SHOULD BE MAINTAINED THROUGHOUT CONSTRUCTION.

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 3.19.14

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 3.19.14

STATE OF MARYLAND — R. JACOB HIKMAT — No. 17942 — PROFESSIONAL ENGINEER

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 17942, EXP DATE 9/3/14.

R. JACOB HIKMAT, P.E. — DATE 3/14/14

P:\13-007\DWG\MINOR SUB.DWG

project	date
13–007	MAR. 2014
illustration	engineering
MMM	MMM
scale	approval
1"=30'	RJH

no.	description	date
	revisions	

TAJ PROPERTY
LOTS 1 AND 2
TAX MAP 35, BLOCK 2, PARCEL 5
FIFTH ELECTION DISTRICT HOWARD COUNTY, MARYLAND
SUPPLEMENTAL PLAN

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997–0296 Fax. (410) 997–0298

1 OF 2

F–14–039

Base Course - The base course shall be AASHTO No. 3 or 4 course aggregate with an assumed open pore space of 30% (n = 0.30).

3. Reinforced Turf

Reinforced Grass Pavement (RGP) – Whether used with grass or gravel, the RGP thickness shall be at least 1¾" thick with a load capacity capable of supporting the traffic and vehicle types that will be carried.

B.4.C Specifications for Micro-Bioretention. Rain Gardens, Landscape Infiltration & Infiltration Berms

1. Material Specifications

The allowable materials to be used in these practices are detailed in Table B.4.1.

2. Filtering Media or Planting Soil

The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the micro-bioretention practice that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of Bermuda grass, Quackgrass, Johnson grass, or other noxious weeds as specified under COMAR 15.08.01.05.

The planting soil shall be tested and shall meet the following criteria:

- Soil Component - Loamy Sand or Sandy Loam (USDA Soil Textural Classification)
- Organic Content - Minimum 10% by dry weight (ASTM D 2974). In general, this can be met with a mixture of loamy sand (60%-65%) and compost (35% to 40%) or sandy loam (30%), coarse sand (30%), and compost (40%).
- Clay Content - Media shall have a clay content of less than 5%.
- pH Range – Should be between 5.5 - 7.0. Amendments (e.g., lime, iron sulfate plus sulfur) may be mixed into the soil to increase or decrease pH.

There shall be at least one soil test per project. Each test shall consist of both the standard soil test for pH, and additional tests of organic matter, and soluble salts. A textural analysis is required from the site stockpiled topsoil. If topsoil is imported, then a texture analysis shall be performed for each location where the topsoil was excavated.

3. Compaction

It is very important to minimize compaction of both the base of bioretention practices and the required backfill. When possible, use excavation hoes to remove original soil. If practices are

excavated using a loader, the contractor should use wide track or marsh track equipment, or light equipment with turf type tires. Use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high-pressure tires will cause excessive compaction resulting in reduced infiltration rates and is not acceptable. Compaction will significantly contribute to design failure.

Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are to refracture the soil profile through the 12 inch compaction zone. Substitute methods must be approved by the engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.

Rototill 2 to 3 inches of sand into the base of the bioretention facility before backfilling the optional sand layer. Pump any ponded water before preparing (rototilling) base.

When backfilling the topsoil over the sand layer, first place 3 to 4 inches of topsoil over the sand, then rototill the sand/topsoil to create a gradation zone. Backfill the remainder of the topsoil to final grade.

When backfilling the bioretention facility, place soil in lifts 12" to 18". Do not use heavy equipment within the bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Grade bioretention materials with light equipment such as a compact loader or a dozer/loader with marsh tracks.

4. Plant Material

Recommended plant material for micro-bioretention practices can be found in Appendix A, Section A.2.3.

5. Plant Installation

Compost is a better organic material source, is less likely to float, and should be placed in the invert and other low areas. Mulch should be placed in surrounding to a uniform thickness of 2" to 3". Shredded or chipped hardwood mulch is the only accepted mulch. Pine mulch and wood chips will float and move to the perimeter of the bioretention area during a storm event and are not acceptable. Shredded mulch must be well aged (6 to 12 months) for acceptance.

Rootstock of the plant material shall be kept moist during transport and on-site storage. The plant root ball should be planted so 1/8th of the ball is above final grade surface. The diameter of the planting pit shall be at least six inches larger than the diameter of the planting ball. Set and maintain the plant straight during the entire planting process. Thoroughly water ground bed cover after installation.

Trees shall be braced using 2" by 2" stakes only as necessary and for the first growing season only. Stakes are to be equally spaced on the outside of the tree ball.

Grasses and legume seed should be drilled into the soil to a depth of at least one inch. Grass and legume plugs shall be planted following the non-grass ground cover planting specifications.

The topsoil specifications provide enough organic material to adequately supply nutrients from natural cycling. The primary function of the bioretention structure is to improve water quality. Adding fertilizers defeats, or at a minimum, impedes this goal. Only add fertilizer if wood chips or mulch are used to amend the soil. Rototill urea fertilizer at a rate of 2 pounds per 1000 square feet.

6. Underdrains

Underdrains should meet the following criteria:

- Pipe- Should be 4" to 6" diameter, slotted or perforated rigid plastic pipe (ASTMF 758, Type PS 28, or AASHTO-M-278) in a gravel layer. The preferred material is slotted, 4" rigid pipe (e.g., PVC or HDPE).
- Perforations - If perforated pipe is used, perforations should be ⅜" diameter located 6" on center with a minimum of four holes per row. Pipe shall be wrapped with a ¼" (No. 4 or 4x4) galvanized hardware cloth.
- Gravel – The gravel layer (No. 57 stone preferred) shall be at least 3" thick above and below the underdrain.
- The main collector pipe shall be at a minimum 0.5% slope.
- A rigid, non-perforated observation well must be provided (one per every 1,0000 square feet) to provide a clean-out port and monitor performance of the filter.
- A 4" layer of pea gravel (⅛" to ⅜" stone) shall be located between the filter media and underdrain to prevent migration of fines into the underdrain. This layer may be considered part of the filter bed when bed thickness exceeds 24".

The main collector pipe for underdrain systems shall be constructed at a minimum slope of 0.5%. Observation wells and/or clean-out pipes must be provided (one minimum per every 1000 square feet of surface area).

7. Miscellaneous

These practices may not be constructed until all contributing drainage area has been stabilized

13 007

GEOTECHNICAL ENVIRONMENTAL TESTING
GE&T CONSULTANTS, INC.
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December 7, 2013

Mildenberg, Boender & Associates, Inc.
6800 Deerpath Road, Suite 150
Elkridge, Maryland 21075

Attn: Ms. Maya M. Mildenberg
Vice President

Ref: Limited Subsurface Exploration
Proposed Development
Taj Property
Howard County, Maryland
GE&T Project No. G-230

Dear Ms. Mildenberg:

On November 30th, 2013, **GE&T Consultants, Inc.** utilized a hand auger to bore one (1) soil borings at the location shown on the attached Hand-Auger Location Map. The purpose of the hand auger was to evaluate the presence/absence of bedrock and groundwater at the location shown, within 5± ft below existing site grades. The number, location, and depth of the boring were determined by others and the boring was staked-out in the field by others.

Our field observations are summarized in Table 1 below:

Boring No.	Depth to Groundwater (in)	Depth to hand-auger Refusal (ft)	Termination Depth (in)
B-1	N/A	N/A	67

Note: All depths are below existing site grades

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It should be noted that the actual level of groundwater and the amount and level of perched water should be anticipated to fluctuate through the year, depending on variations in precipitation, surface run-off, infiltration, site topography, drainage, and other factors not evident at the time of our exploration. GE&T can not be responsible for changes in groundwater conditions at the site due to seasonal variations and changes caused by other factors such as grading operations at the site.

GE&T appreciates the opportunity to provide this geotechnical engineering service to you. Should you have any questions regarding this letter report, or require additional services, please feel free to contact our office.

Sincerely,

GE&T Consultants, Inc.

[signature]

Mounir Abouzakhm, PE

STATE OF MARYLAND MOUNIR A. ABOUZAKHM No. 194… REGISTERED PROFESSIONAL ENGINEER

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Table B.4.1 Materials Specifications for Micro-Bioretention, Rain Gardens & Landscape Infiltration-			
Material	**Specification**	**Size**	**Notes**
Plantings	see Appendix A, Table A.4	n/a	plantings are site-specific
Planting soil [2' to 4' deep]	loamy sand (60 - 65%) & compost (35 – 40%) or sandy loam (30%), coarse sand (30%) & compost (40%)	n/a	USDA soil types loamy sand or sandy loam; clay content < 5%
Organic content	Min. 10% by dry weight (ASTM D 2974)		
Mulch	shredded hardwood		aged 6 months, minimum; no pine or wood chips
Pea gravel diaphragm	pea gravel: ASTM-D-448	NO. 8 OR NO. 9 (1/8" TO 3/8")	
Curtain drain	ornamental stone: washed cobbles	stone: 2" to 5"	
Geotextile		n/a	PE Type 1 nonwoven
Gravel (underdrains and infiltration berms)	AASHTO M-43	NO. 57 OR NO. 6 AGGREGATE (3/8" to 3/4")	
Underdrain piping	F 758, Type PS 28 or AASHTO M-278	4" to 6" rigid schedule 40 PVC or SDR35	Slotted or perforated pipe; 3/8" perf. @ 6" on center, 4 holes per row; minimum of 3" of gravel over pipes; not necessary underneath pipes. Perforated pipe shall be wrapped with ¼-inch galvanized hardware cloth
Poured in place concrete (if required)	MSHA Mix No. 3; f'_c = 3500 psi @ 28 days, normal weight, air-entrained; reinforcing to meet ASTM-615-60	n/a	on-site testing of poured-in-place concrete required: 28 day strength and slump test; all concrete design (cast-in-place or pre-cast) *not using previously approved State or local standards* requires design drawings sealed and approved by a professional structural engineer licensed in the State of Maryland - design to include meeting ACI Code 350.R/89; vertical loading [H-10 or H-20]; allowable horizontal loading (based on soil pressures); and analysis of potential cracking
Sand	AASHTO-M-6 or ASTM-C-33	0.02" to 0.04"	Sand substitutions such as Diabase and Graystone (**AASHTO)** #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.

APPROVED: DEPARTMENT OF PLANNING AND ZONING

Chad Edmondson 3.19.14
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

[signature] 3-19-14
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

STATE OF MARYLAND R. JACOB HIKMAT No. 17942 PROFESSIONAL ENGINEER

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 17942, EXP DATE 9/3/14.

R. JACOB HIKMAT, P.E. 3/14/14
DATE

P:\13-007\DWG\MINOR SUB.DWG

project	date
13-007	MAR. 2014
illustration	engineering
MMM	MMM
scale	approval
1"=30'	RJH

no.	description	date
	revisions	

TAJ PROPERTY
LOTS 1 AND 2
TAX MAP 35, LOT 20, BLOCK 2, PARCEL 5
FIFTH ELECTION DISTRICT HOWARD COUNTY, MARYLAND
SUPPLEMENTAL PLAN

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

F-14-039