

| SHEET INDEX | |
|-------------|-----------------------------------|
| SHEET NO. | DESCRIPTION |
| 1 | TITLE SHEET |
| 2 | ENVIRONMENTAL CONCEPT PLAN |
| 3 | GRADING AND SEDIMENT CONTROL PLAN |
| 4 | STORMWATER MANAGEMENT DETAILS |
| 5 | SOILS AND DRAINAGE AREA MAP |

ENVIRONMENTAL CONCEPT PLAN

GTW'S WAVERLY WOODS

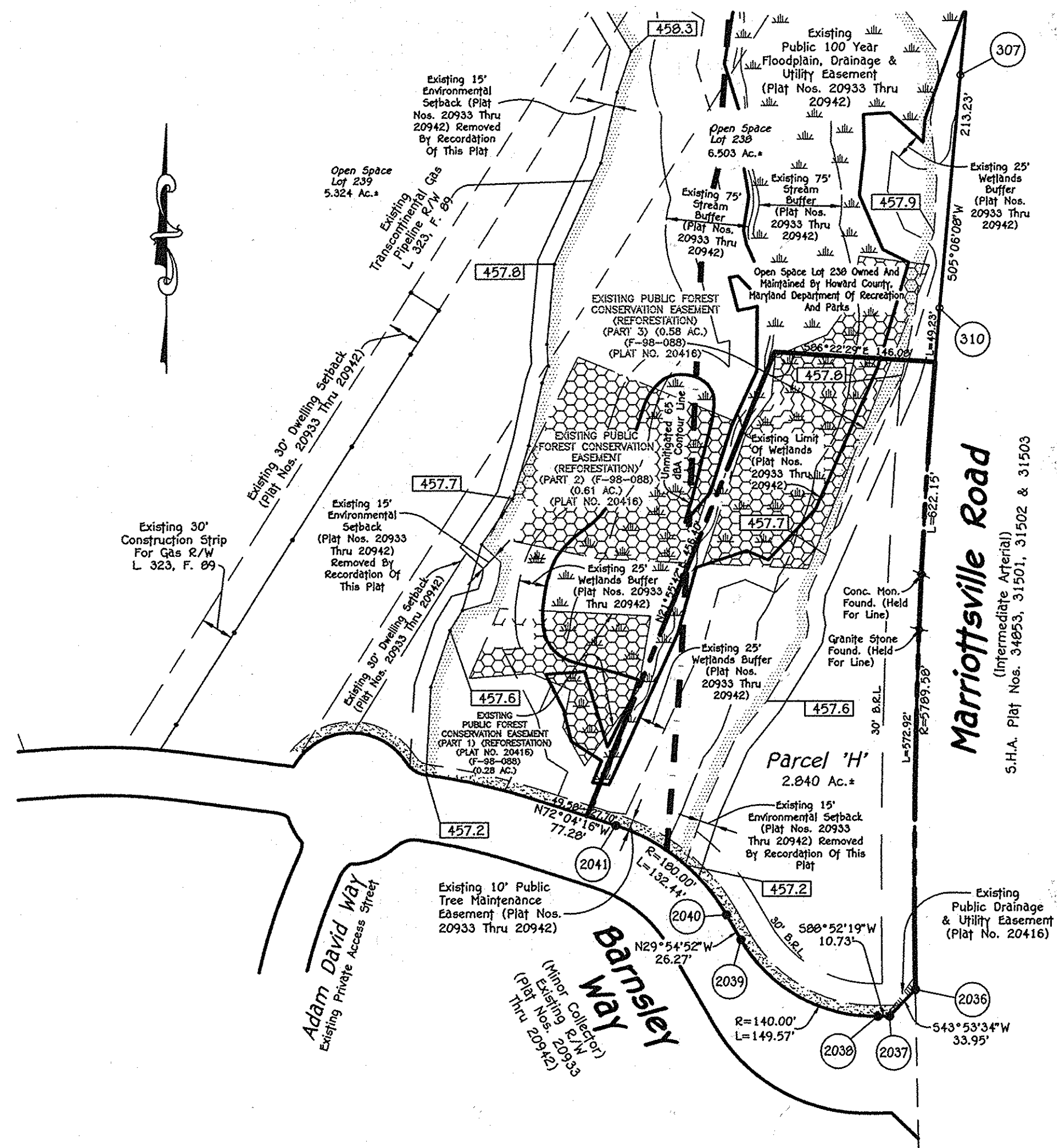
Parcel 'H', Plat No. 22951

Zoned: Pec

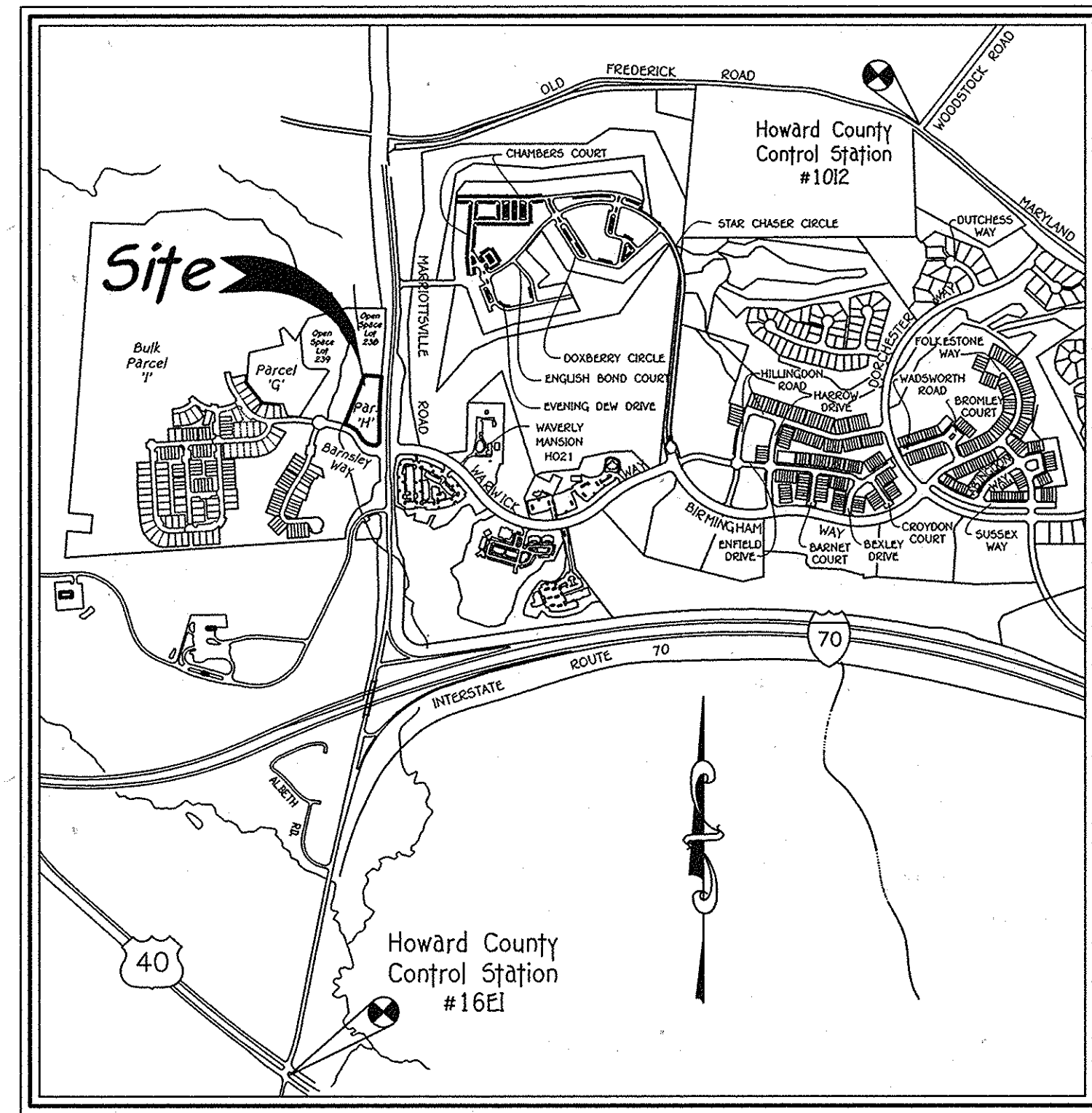
Tax Map No. 16 Grid No. 3 & 4

P/O Parcel No. 249

APPROVED: DEPARTMENT OF PLANNING AND ZONING
 Chief, Division of Land Development *[Signature]* 5-26-16
 Chief, Development Engineering Division *[Signature]* 6-6-16



SITE MAP
SCALE: 1" = 100'



VICINITY MAP
SCALE: 1" = 1200'

Third Election District
Howard County, Maryland

| LEGEND | |
|-----------|-------------------------------|
| SYMBOL | DESCRIPTION |
| ---102--- | EXISTING CONTOUR 2' INTERVAL |
| ---100--- | EXISTING CONTOUR 10' INTERVAL |
| ---102--- | PROPOSED CONTOUR 2' INTERVAL |
| ---100--- | PROPOSED CONTOUR 10' INTERVAL |
| -SF- | SILT FENCE |
| --- | DRAINAGE LIMITS |
| L.O.D. | LIMIT OF DISTURBANCE |
| --- | EXISTING TREELINE |
| WB | WETLANDS BUFFER |
| --- | WETLANDS LIMITS |
| FP | FLOODPLAIN LIMITS |
| --- | STORMWATER MANAGEMENT DEVICE |
| --- | STORM DRAIN |
| ☆ | STREET LIGHT (existing) |
| ○ | TREE (existing) |
| --- | EXISTING FOREST CONSERVATION |

FISHER, COLLINS & CARTER, INC.
 CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
 CENTRAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL FILE
 ELICOTT CITY, MARYLAND 21042
 (410) 431-2295

ESD NARRATIVE:

1. THE EXISTING NATURAL RESOURCES ON-SITE CONSIST OF WETLANDS, STREAMS AND THEIR ASSOCIATED BUFFERS. THESE RESOURCES ARE BEING PROTECTED BY UTILIZING THE REQUIRED WETLAND BUFFERS AND STREAM BUFFERS FOR THESE FEATURES. THERE IS AN EXISTING FOREST AREA LOCATED ON-SITE.
2. THE SITE IMPROVEMENTS AND DEVELOPED AREA WILL MAINTAIN THE EXISTING DRAINAGE PATTERNS AS CLOSE AS POSSIBLE. NO STREAM IMPACTS ARE PROPOSED THAT WOULD ALTER ANY NATURAL FLOW PATTERNS.
3. THE REQUIRED EROSION AND SEDIMENT CONTROL MEASURES WILL BE IN ACCORDANCE WITH THE LATEST MDE STANDARDS AND SPECIFICATIONS UTILIZING SUPER SILT FENCE.
4. THE HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS WILL NOT ALLOW PERMEABLE PAVEMENT FOR PUBLIC ROADS AT THIS TIME. THE PROPOSED ESD'S FOR THIS PROJECT ARE: TWO (2) MICRO BIO-RETENTION FACILITIES (M-6) AND A GRASS SWALE (M-6) ALONG MARRIOTTVILLE ROAD.
5. THE PROPOSED ESD MEASURES SHOWN ON THIS PLAN MEET OR EXCEED THE REQUIRED PE OF 1.6-INCHES FOR THIS PROJECT TO THE MAXIMUM EXTENT PRACTICABLE. NO ADDITIONAL CHAPTER 3 DEVICES ARE PROPOSED AS ALTERNATIVES TO THE CHAPTER 5 ESD MEASURES AT THIS TIME.
6. THERE ARE NO STEEP SLOPES 25% AND GREATER LOCATED ON-SITE.
7. THERE IS AN EXISTING 100-YEAR FLOODPLAIN, DRAINAGE AND UTILITY EASEMENT WITHIN THE PROPERTY AND RECORDED IN PLAT NO'S 20933 - 20942.
8. THE 100-YEAR FEMA FLOODPLAIN HAS BEEN SHOWN ON SHEETS 2, 3 AND 5.

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. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS / BUREAU OF ENGINEERING / CONSTRUCTION INSPECTION DIVISION AT 410-313-1800 AT LEAST (5) WORKING DAYS PRIOR TO THE START OF WORK.
3. THE CONTRACTOR SHALL NOTIFY "MSS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK BEING DONE.
4. THIS SUBDIVISION PLAN IS SUBJECT TO THE AMENDED FIFTH EDITION OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND THE 10-06-13 ZONING REGULATIONS PER COUNCIL BILL NO. 28-2013. DEVELOPMENT OR CONSTRUCTION ON THESE LOTS OR PARCELS MUST COMPLY WITH SETBACKS AND BUFFER REGULATIONS IN EFFECT AT THE TIME OF SUBMISSION OF A BUILDING OR GRADING PERMIT APPLICATION.
5. COORDINATES BASED ON NAD83 MARYLAND COORDINATE SYSTEM AS PROJECTED BY HOWARD COUNTY GEODETIC CONTROL STATIONS NO. 1012 AND NO. 16E1
 STA. 1012N 801.650.1777, E 1.3453387950, ELEVATION 445.50
 STA. 16E1N 993.250.9322, E 1.3401927110, ELEVATION 509.92
6. PARCEL 'H' ZONED PEC PER 10/06/13 COMPREHENSIVE ZONING PLAN.
7. BACKGROUND INFORMATION:
 a. SUBDIVISION NAME: GTW'S WAVERLY WOODS
 b. TAX MAP NO.: 16
 c. PARCELS NO.:
 d. ZONING: PEC
 e. ELECTION DISTRICT: R08D
 f. GROSS AREA OF THIS SUBMISSION = 2.840 ACRES - PARCEL 'H'
 g. NUMBER OF PARCELS: 1
 h. NUMBER OF OPEN SPACE LOTS: 0
 i. AREA OF PARCELS: 2.840 ACRES
 j. AREA OF NON-CREATED OPEN SPACE LOTS = 0
 k. AREA OF PUBLIC ROADWAY TO BE DEDICATED: 0.00 ACRES
 l. PREVIOUS FILE NUMBERS: 5-94-027, 5-04-013, 2B CASE NO. 1027 H, 2B CASE NO. 329 H, 2B CASE NO. 381, F-01-091, F-01-093, F-01-146, F-01-147, F-06-159, P-06-010, W-95-023, F-09-027, F-09-027C, 50P-09-037, 50P-09-039, W-09-210, F-10-113, F-12-072, F-12-069, F-13-067.
 m. AREA OF FLOODPLAIN = 0.00 AC (THIS SUBMISSION)
 n. AREA OF 25% OR GREATER SLOPES = 0.00 AC (THIS SUBMISSION)
8. ALL FILL AREAS WITHIN ROADWAYS AND UNDER STRUCTURES SHALL BE COMPACTED TO A MINIMUM OF 95% COMPACTION OF AASHTO T-180.
9. THE NOISE STUDY FOR THIS PROJECT WAS PREPARED BY HARS GROUP DATED MARCH, 2008 AND WAS APPROVED UNDER THE 5-06-013 PLAN DATED JANUARY 17, 2008. A REVISED NOISE STUDY WAS PREPARED BY HARS GROUP DATED MAY, 2008 AND APPROVED UNDER F-08-010 ON DECEMBER 03, 2008.
10. EXISTING WATER IS PUBLIC (CONTRACT NO. 24-4380-0) EXISTING SEWER IS PUBLIC (CONTRACT NO. 20-4068-0)
11. SOILS INFORMATION: HOWARD COUNTY SOILS MAP NO. 12.
12. BOUNDARY OUTLINE BASED ON FIELD RUN SURVEY PERFORMED BY FISHER COLLINS AND CARTER, INC. DATED AUGUST, 1990.
13. TOPOGRAPHIC CONTOURS BASED ON AERIAL SURVEY PERFORMED BY HARFORD AERIAL SURVEYS, INC. DATED JANUARY, 2008 AND SUPPLEMENTED WITH FIELD RUN TOPOGRAPHY PREPARED BY FISHER COLLINS AND CARTER, INC. DATED MAY, 2014.
14. STORMWATER MANAGEMENT WILL BE PROVIDED IN ACCORDANCE WITH THE 2007 MDE, CHAPTER 5 REGULATIONS AND THE LATEST HOWARD COUNTY DESIGN MANUAL, VOL. 1, CHAPTER 5 ADOPTED ON OR ABOUT MAY 4, 2010. RESERVOIR VOLUME WILL BE PROVIDED THROUGH THE USE OF TWO STONE RESERVOIRS. WATER QUALITY VOLUME WILL BE PROVIDED BY MICRO BIO-RETENTION FACILITIES. OVERBANK FLOOD PROTECTION VOLUME AND EXTREME FLOOD VOLUMES ARE NOT REQUIRED FOR THIS SITE. ALL STONE RESERVOIR & MICRO BIO-RETENTION STORMWATER MANAGEMENT FACILITIES WILL BE PRIVATELY OWNED AND MAINTAINED BY A COMMERCIAL ASSOCIATION. THE STREET TREES, PERFORATED UNDERDRAINS, FEEDERS, PLANTINGS AND SWALES WILL BE PRIVATELY OWNED AND MAINTAINED BY A COMMERCIAL ASSOCIATION. HOWARD COUNTY WILL ONLY MAINTAIN THE INLET STRUCTURE WITHIN THE MICRO BIO-RETENTION FACILITIES ADJACENT TO THE RIGHT-OF-WAY.
15. THERE ARE NO SPECIEM TREES ON PARCEL 'H'.
16. FLOODPLAIN LIMITS SHOWN FOR THE OVERALL OXFORD SQUARE PROJECT WAS PREPARED BY WHITMAN REQUART AND ASSOCIATES AND IS DELINEATED ON PLAT 9924 (F-91-069). FOR THE LIMITS OF THIS SUBMISSION, NO FLOODPLAIN LIMITS ARE DELINEATED.
17. THE FOREST CONSERVATION ACT REQUIREMENTS FOR THIS PROJECT HAVE BEEN MET WITH F-09-057, GTW WAVERLY WOODS, SECTION 14.
18. FOREST STAND DELINEATION PREPARED BY ENVIRONMENTAL SYSTEMS ANALYSIS, INC. AND APPROVED ON NOVEMBER 30, 1993 UNDER 5-94-07.
19. THIS PROPERTY IS LOCATED WITHIN THE METROPOLITAN DISTRICT.
20. NO CEMETERIES OR HISTORIC STRUCTURES EXIST WITHIN THIS SUBDIVISION.
21. STREET LIGHT PLACEMENT AND THE TYPE OF FIXTURES AND POLES SHALL BE IN ACCORDANCE WITH THE HOWARD COUNTY DESIGN MANUAL VOLUME II (2006), SECTION 5.5.A. A MINIMUM SPACING OF 20' SHALL BE MAINTAINED BETWEEN ANY STREET LIGHT AND ANY STREET TREE.
22. TRAFFIC CONTROL DEVICES:
 a) THE 81-1 (STOP) SIGNS AND THE STREET NAME SIGN (SNS) ASSEMBLIES FOR THIS DEVELOPMENT MUST BE INSTALLED BEFORE THE BASE PAVING IS COMPLETED.
 b) THE TRAFFIC CONTROL DEVICE LOCATIONS (SIGNS & PAVING MARKINGS) SHOWN ON THE PLANS ARE APPROXIMATE AND MUST BE FIELD APPROVED BY THE HOWARD COUNTY TRAFFIC DIVISION (410-313-5752) PRIOR TO THE INSTALLATION OF ANY OF THESE TRAFFIC CONTROL DEVICES.
 c) ALL TRAFFIC CONTROL DEVICES AND THEIR LOCATIONS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE "MARYLAND MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD).
 d) ALL SIGN POSTS USED FOR TRAFFIC CONTROL, SIGNS INSTALLED IN THE COUNTY RIGHT-OF-WAY SHALL BE MOUNTED ON A 2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE POST (14 GAUGE) INSERTED INTO A 2-1/2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE SLEEVE (12 GAUGE) - 3' LONG. A GALVANIZED STEEL POLE CAP SHALL BE MOUNTED ON TOP OF EACH POST.
23. THE TRAFFIC STUDY WAS PREPARED BY THE TRAFFIC GROUP AND APPROVED ON NOVEMBER 30, 2003, AS PART OF 5-94-07 AND AMENDED UNDER 5-06-13 AND APPROVED ON JANUARY 17, 2008. THE TRAFFIC STUDY FOR PARCELS 'Q' AND 'H' WILL BE PROVIDED AT THE SITE DEVELOPMENT STAGE.
24. NO CLEARING, GRADING OR CONSTRUCTION IS PERMITTED WITHIN THE WETLANDS, STREAMS OR THEIR REQUIRED BUFFERS UNLESS THE ACTIVITIES ARE CONSIDERED NECESSARY OR WAIVED ARE APPROVED BY THE DEPARTMENT OF PLANNING AND ZONING.
25. THE ORIGINAL WETLANDS REPORT PREPARED BY ENVIRONMENTAL SYSTEMS ANALYSIS, INC. WAS APPROVED WITH 5-94-07 ON NOVEMBER 30, 1993 AND HAS BEEN RE-CERTIFIED BY ECO-SCIENCE PROFESSIONALS, INC. DATED APRIL, 2006 AND APPROVED WITH 5-06-013 ON JANUARY 17, 2008.
26. APPROVAL OF THIS ECP DOES NOT CONSTITUTE APPROVAL OF SUBSEQUENT SUBDIVISION PLANS, SITE DEVELOPMENT PLANS OR REVISIONS, FOREST CONSERVATION PLANS OR GRADING OR BUILDING PERMITS. THE APPLICANT AND CONSULTANT SHOULD EXPECT ADDITIONAL AND MORE DETAILED COMMENTS THAT MAY ALTER THE SITE DESIGN AS THE DEVELOPMENT PLAN PROGRESSES THROUGH THE PLAN REVIEW AND/OR PERMIT APPLICATION PROCESS IN ACCORDANCE WITH THE SUBDIVISION, LAND DEVELOPMENT, ZONING, REGULATIONS AND FOREST CONSERVATION REQUIREMENTS.

CONCEPT DESIGN SUMMARY INFORMATION:

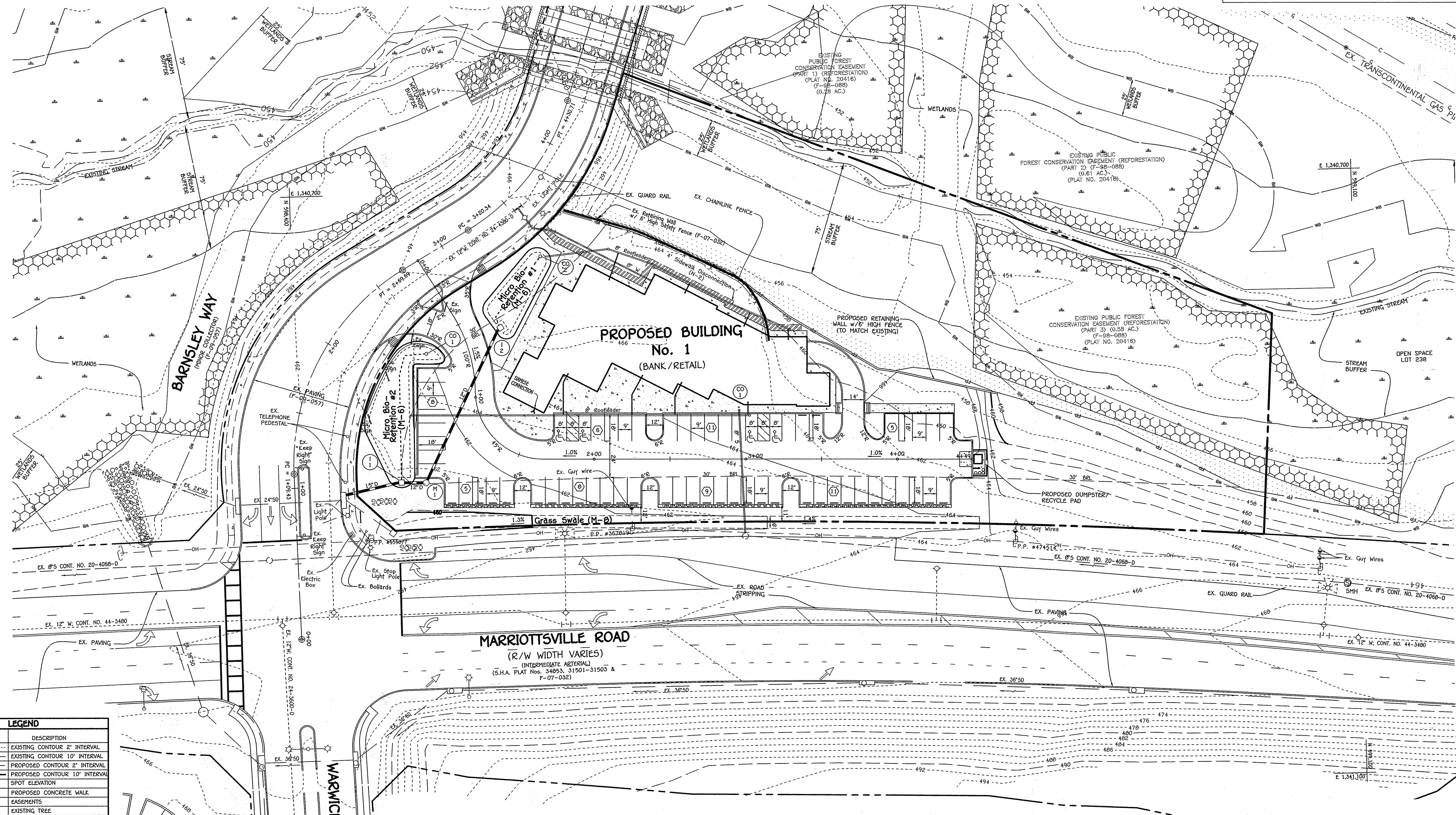
| | |
|---|---|
| GROSS AREA | = 2.840 AC. (PARCEL 'H') |
| DEVELOPABLE AREA/L.O.D. | = 1.38 ACRES |
| PROPOSED % IMPERVIOUS | = 33.5% ACTUAL (USE 35% IN CALCULATIONS = 0.48 ACRES) |
| AREA OF 15% OR GREATER SLOPES | = 0.00 ACRES |
| FOREST AREA | = 0.00 ACRES |
| FLOODPLAIN AREA (INCLUDES FEMA EXISTING 100-YEAR & DRAINAGE & UTILITY EASEMENT) | = 1.18 ACRES |
| GREEN OPEN SPACE AREA | = 0.00 ACRES |
| WETLAND/WETLAND BUFFER AREA | = 0.02 ACRES OUTSIDE FLOODPLAIN (0.76 ACRES TOTAL) |
| ERODIBLE SOIL AREA | = 2.82 ACRES (PRE F-07-032) THIS SITE HAS BEEN FILLED UNDER F-07-032. |
| TARGET Pe | = 1.8 INCHES |
| TARGET ESDVOL. REQUIREMENT | = 0.033 AC. FT. OR 1,437 CU. FT. |
| WITH THE USE OF 2 (M-6) MICRO BIO-RETENTION FACILITIES OUR TARGET ESDVOL. HAS BEEN ADJUSTED TO 8,143 CU.FT. | |
| TOTAL ESDVOL. PROVIDED | = 8,297 CU.FT. |

- NOTE:
 1. SINCE THE ENVIRONMENTAL CONCEPT PLAN DOES NOT REQUIRE BORINGS OR GEOTECHNICAL ANALYSIS, THE GROUNDWATER TABLE DEPTH AND ANY ROCK FORMATIONS HAVE NOT BEEN VERIFIED. A FULL GEOTECHNICAL ANALYSIS WILL ACCOMPANY THE SITE PLAN AT WHICH TIME THE PLAN CAN BE REVISED AS NECESSARY.
 2. AT THE SDP PHASE A P.E. #18 WILL BE USED FOR THE DESIGN OF SW.M.



"Professional certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20740, Expiration Date 2-22-17."

TITLE SHEET
GTW's Waverly Woods
 Parcel 'H'
 Zoned: PEC
 Tax Map No.: 16 Grid No.: 3&4 P/O Parcel No.: 249
 3rd Election District Howard County, Maryland
 Scale: As Shown
 Date: October 6, 2015
 Sheet 1 of 5

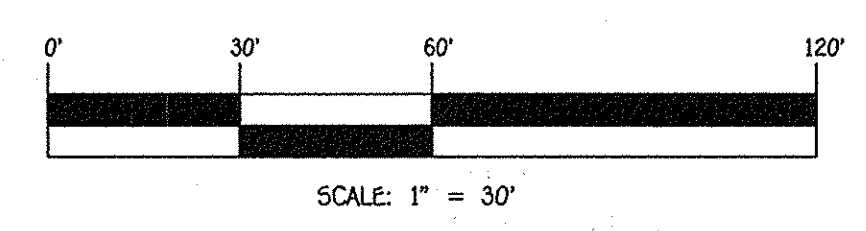


| SYMBOL | DESCRIPTION |
|-------------|----------------------------------|
| --- 100 --- | EXISTING CONTOUR 2' INTERVAL |
| --- 500 --- | EXISTING CONTOUR 10' INTERVAL |
| --- 460 --- | PROPOSED CONTOUR 2' INTERVAL |
| --- 500 --- | PROPOSED CONTOUR 10' INTERVAL |
| + 62.33 | SPOT ELEVATION |
| [Symbol] | PROPOSED CONCRETE WALK EASEMENTS |
| [Symbol] | EXISTING TREE |
| [Symbol] | PROPOSED STORM DRAINS |
| [Symbol] | EXISTING WATER MAIN |
| [Symbol] | EXISTING SEWER MAIN |
| [Symbol] | PROPOSED SEWER MAIN |
| [Symbol] | EXISTING FLOODPLAIN |
| [Symbol] | EXISTING WETLAND BUFFER |
| [Symbol] | EXISTING TREE LINE |

FISHER, COLLINS & CARTER, INC.
 CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
 CENTRAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
 ELICOTT CITY, MARYLAND 21042
 (410) 461-2999

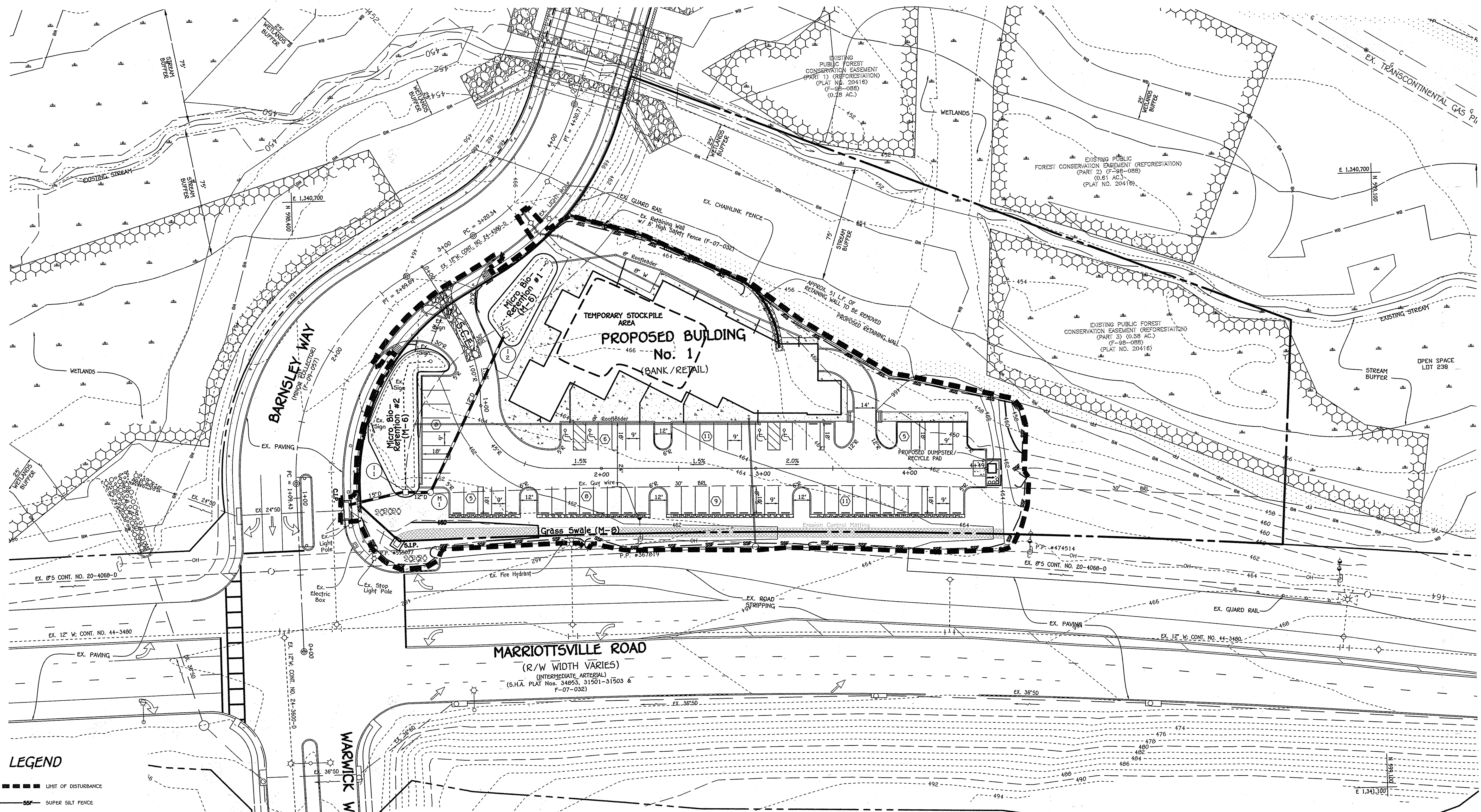
Owner
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443-367-0422)

Developer
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443-367-0422)

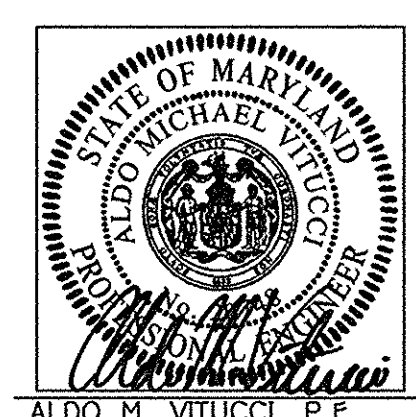
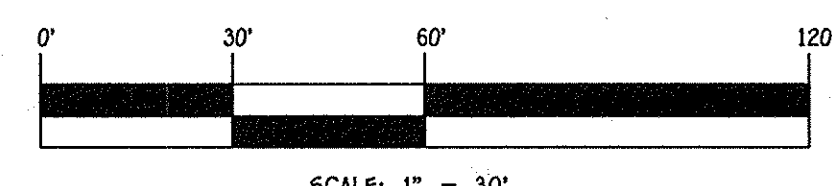


ALDO M. VITUCCI, P.E.
 5/10/16
 "Professional certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-17."

ENVIRONMENTAL CONCEPT PLAN
GTW's Waverly Woods
Parcel 'H'
 Zoned: PEC
 Tax Map No.: 16 Grid No.: 3&4 P/O Parcel No.: 249
 3rd Election District Howard County, Maryland
 Scale: As Shown
 Date: October 6, 2015
 Sheet 2 Of 5



- LEGEND**
- LIMIT OF DISTURBANCE
 - SUPER SILT FENCE
 - S.I.P. STANDARD INLET PROTECTION
 - C.I.P. CURB INLET PROTECTION
 - STABILIZED CONSTRUCTION ENTRANCE



ALDO M. VITUCCI, P.E.
 "Professional certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-17."

FISHER, COLLINS & CARTER, INC.
 CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
 CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PARK
 ELICOTT CITY, MARYLAND 21042
 (410) 461-5995

Owner
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443)-367-0422

Developer
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443)-367-0422

SCHEMATIC GRADING & SEDIMENT CONTROL PLAN
GTW's Waverly Woods
Parcel 'H'
 Zoned: PEC
 Tax Map No.: 16 Grid No.: 3&4 P/O Parcel No.: 249
 3rd Election District Howard County, Maryland
 Scale: As Shown
 Date: October 6, 2015
 Sheet 3 Of 5

OPERATION AND MAINTENANCE SCHEDULE FOR BIO-RETENTION AREAS (M-6)

- 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.
- The owner shall perform a plant in the spring and in the fall 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.
- The owner shall inspect the mulch each spring. The mulch shall be replaced every two to three years. The previous mulch layer shall be removed before the new layer is applied.
- The owner shall correct soil erosion on an as needed basis, with a minimum of once per month and after each heavy storm.

Infiltration and Filter System Construction Specifications

Infiltration and filter systems either take advantage of existing permeable soils or create a permeable medium such as sand for WC₂ and D₆ v. In some instances where permeability is great, these practices may be used for D₆ as well. The most common systems include infiltration trenches, infiltration basins, sand filters, and gravel filters.

When properly planted, vegetation will filter and enhance the functioning of these systems. For example, pre-treatment buffers will trap sediments that often are bound with phosphorus and metals. Vegetation planted in the facility will aid in nutrient uptake and water storage. Additionally, plant roots will provide aeration for stormwater to permeate soil for groundwater recharge. Finally, successful plantings provide aesthetic value and wildlife habitat making these practices more desirable to the public.

- Design Considerations:**
- Provide a minimum of 20 feet of base sediments to settle out before reaching the facility, thereby reducing the possibility of clogging.
 - Determine areas that will be adjacent with water and water table depth so that appropriate plants may be selected (filtration will be similar to bio-retention facilities, see figure A.5 and Table A.4 for planting material guidance).
 - Provide basins to avoid deep drop heights should be avoided in systems where filter fabric is used as part of facility design.
 - Test soil conditions to determine if soil conditions are appropriate.
 - Plants shall be located so that access is possible for structure maintenance.
 - Stabilize heavy flow areas with erosion control mats or soil.
 - Temporarily divert flows from seeded areas until vegetation is established.
 - See Table A.5 for additional design considerations.

Bio-retention

Soil Bed Characteristics
The characteristics of the soil for the bio-retention facility are perhaps as important as the facility location, size, and treatment volume. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through absorption and microbial activity within the soil profile. Therefore, soils must balance their chemical and physical properties to support biotic communities above and below ground.

The planting soil should be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should be less than 25% by volume (Environmental Quality Resources (EQ2), 1996; Engineering Technology Inc. and Biohabitats, Inc. (CB&B), 1993). Soils should fall within the C₁ to C₂ classifications of the Unified Soil Classification System (USCS). A permeability of at least 1.0 feet per day (0.07"/hr) is required to conservative value of 0.5 feet per day in used for design. The soil should be free of stones, stumps, roots or other woody material over 1" in diameter. Branch or seeds from noxious weeds (e.g., Johnson Grass, Hogweed, Nutsedge, and Canada Thistle or other noxious weeds as specified under COMAR 15.08.01.02) should not be present in the soil.

Placement of the planting soil should be in 12 to 18 lifts that are loosely compacted (tamped lightly with a backhoe bucket or trowel by dozer tracks). The specific characteristics are presented in Table A.3.

| Parameter | Value |
|-------------------------------|---------------------------|
| pH range | 5.2 to 7.00 |
| Organic matter | 1.5 to 4.0% (by weight) |
| Magnesium | 35 lbs. per acre, minimum |
| Phosphorus (phosphate - P2O5) | 75 lbs. per acre, minimum |
| Potassium (potash - K2O) | 85 lbs. per acre, minimum |
| Soluble salts | 500 ppm |
| Clay | 10 to 25 % |
| Silt | 30 to 55 % |
| Sand | 35 to 60% |

Mulch Layer

The mulch layer plays an important role in the performance of the bio-retention system. The mulch layer helps maintain soil moisture and avoids surface sealing, which reduces permeability. Mulch helps prevent erosion, and provides a micro-environment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments, which remain suspended after the primary pretreatment.

The mulch layer should be standard landscape style, single or double shredded hardwood mulch or chips. The mulch layer should be well aged (composted or stored for at least 12 months), uniform in color, and free of other materials, such as weed seeds, soil, roots, etc. The mulch should be applied to a maximum depth of three inches. Grass clippings should not be used as a mulch material.

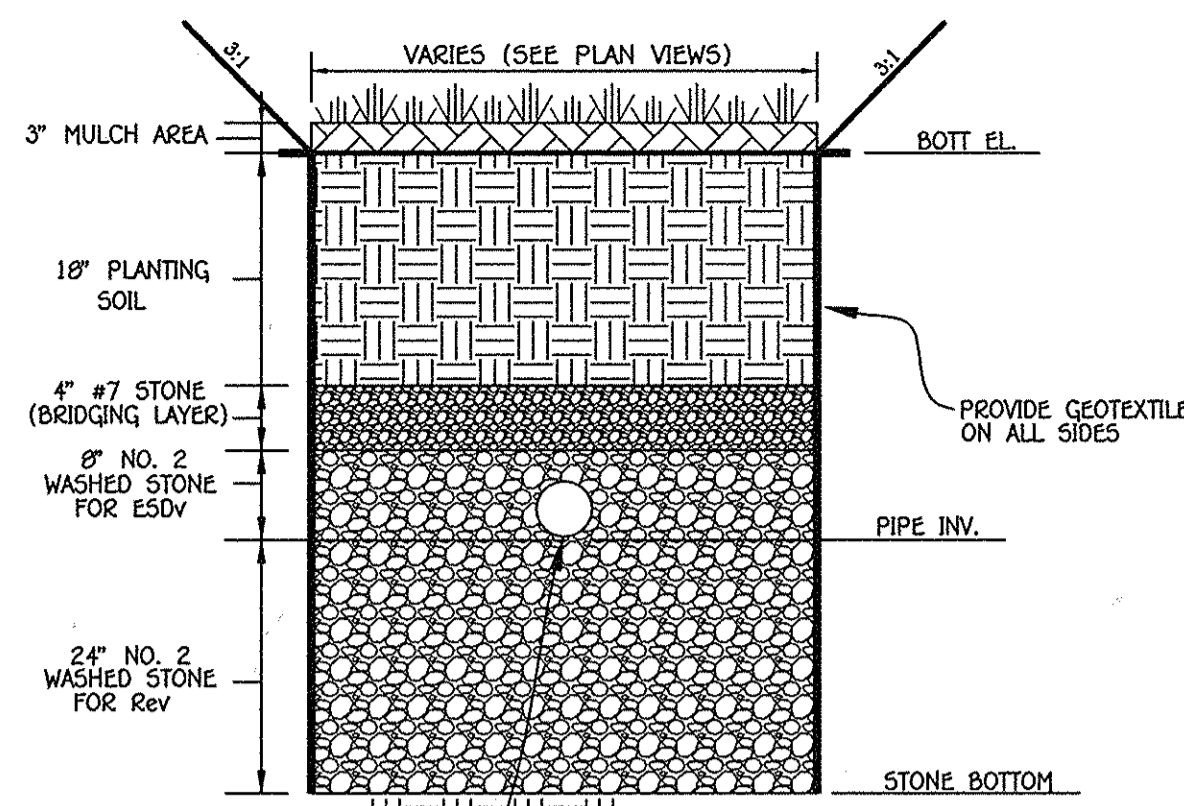
Planting Guidance

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bio-retention simulates an upland-species ecosystem. The community should be dominated by trees, but have a distinct community of understory trees, shrubs and herbaceous materials. By creating a diverse, dense plant cover, a bio-retention facility will be able to treat stormwater runoff and withstand urban stresses from insects, diseases, drought, temperature, wind, and exposure.

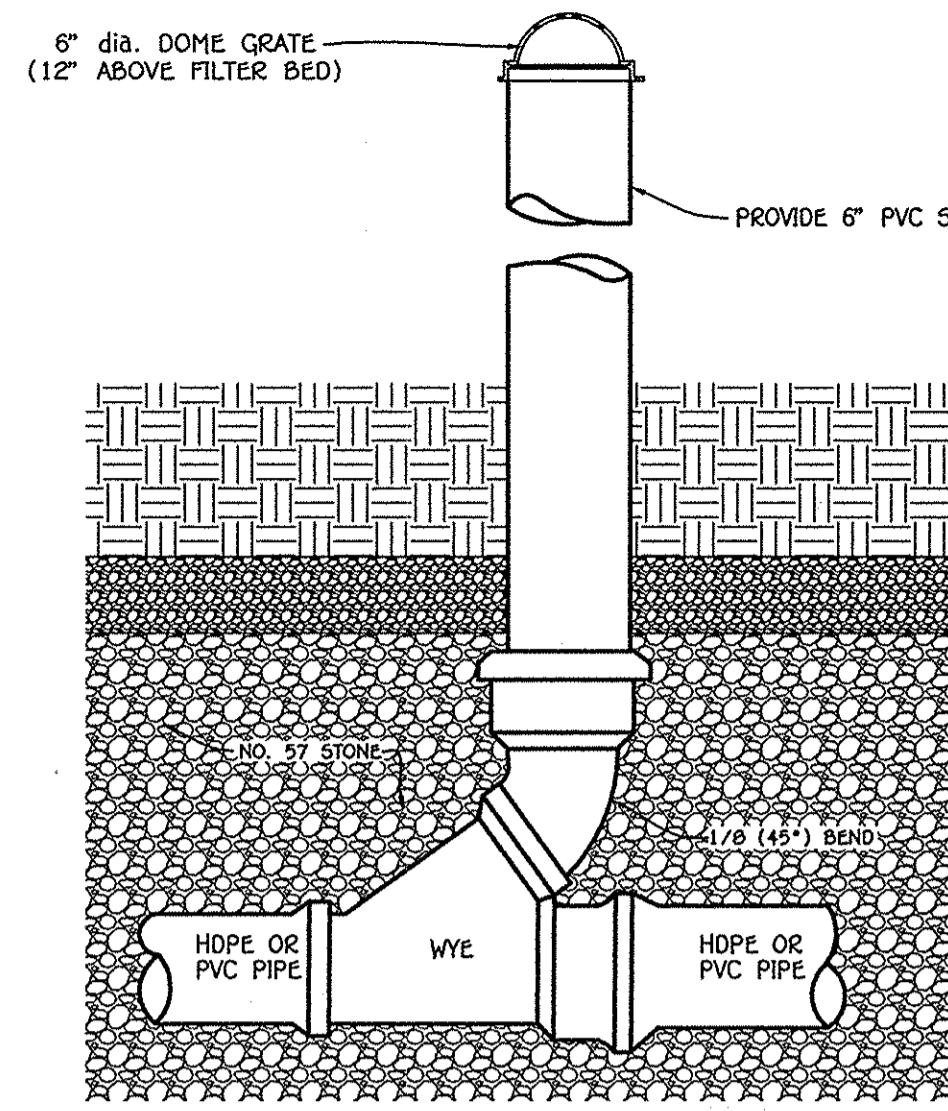
The proper selection and installation of plant material is key to a successful system. There are essentially three zones within a bio-retention facility (Figure A.5). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports plants that like drier soil conditions, but can still tolerate occasional inundation by water. The outer edge is the highest elevation and generally supports plants adapted to drier conditions. A sample of appropriate plant materials for bio-retention facilities are included in Table A.4. The layout of plant material should be flexible, but should follow the general principles described in Table A.5. The objective is to have a system, which resembles a random, and natural plant layout, while maintaining optimal conditions for plant establishment and growth. For a more extensive bio-retention plan, consult COMAR, 1993 or Clayer and Schaefer, 1997.

OPERATION AND MAINTENANCE SCHEDULE FOR COMMERCIAL ASSOCIATION OWNED & MAINTAINED BIO-RETENTION AREAS (M-6)

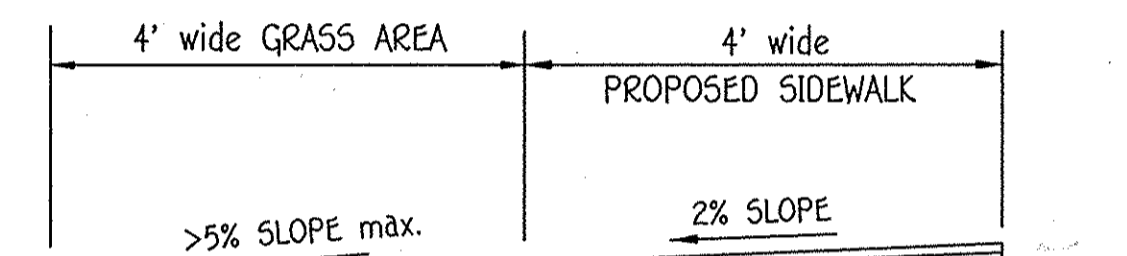
- The owner shall maintain the plant material, mulch layer and soil layer annually. Maintenance of mulch and soil is limited to correcting areas of erosion or wash out. Any mulch replacement shall be done in the spring. Plant material shall be checked for disease and insect infestation and maintenance 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.
- The owner shall perform a plant in the spring and in the fall 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.
- The owner shall inspect the mulch each spring. The mulch shall be replaced every two to three years. The previous mulch layer shall be removed before the new layer is applied.
- The owner shall correct soil erosion on an as needed basis, with a minimum of once per month and after each heavy storm.
- The owner shall maintain all observation wells, clean-outs and perforated underdrains.
- Filter material must be replaced when water remains on the surface of the filter bed for more than 24 hours following a 1 or 2 year storm event or more than 48 hours following a 10 year storm event.



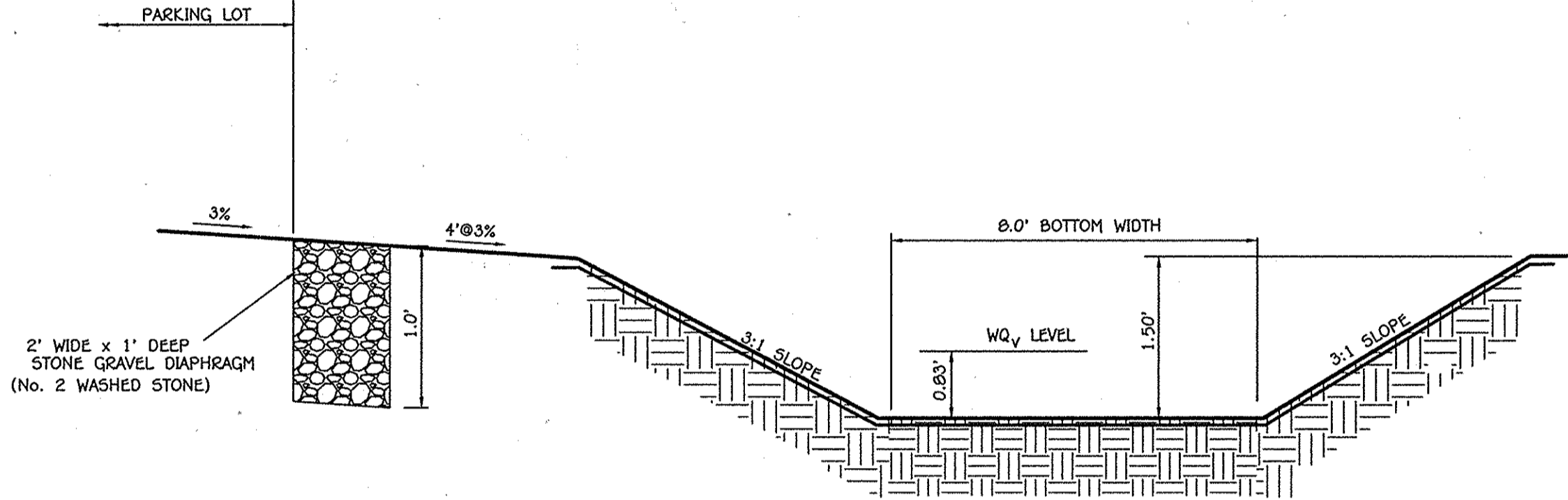
TYPICAL BIO-RETENTION (M-6) SECTION
NO SCALE



TYPICAL CLEAN-OUT DETAIL
NO SCALE



TYPICAL SIDEWALK SECTION FOR NON-ROOFTOP DISCONNECT CREDIT (N-2)
NO SCALE



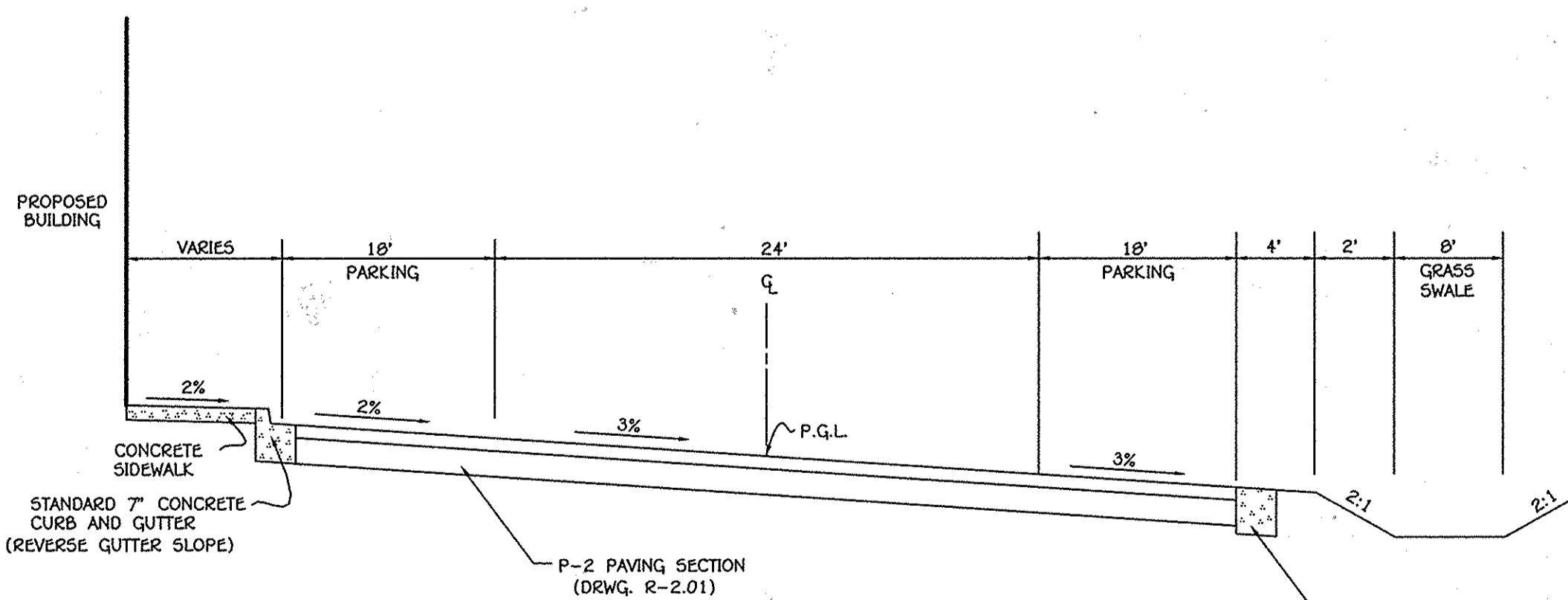
GRASS SWALE CROSS SECTION (M-8)
NO SCALE

DESIGN DATA

Q10 = 7.50 c.f.s.
V10 = 0.86 f.p.s.
Slope = 1.34%
n = 0.15

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

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



TYPICAL PARKING LOT SECTION
NO SCALE

OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED OPEN CHANNEL SYSTEMS GRASS SWALES AND WET SWALES, (M-8)

- The open channel system shall be inspected annually and after major storms. Inspections shall be performed during wet weather to determine if the facility is functioning properly.
- The open channel shall be mowed a minimum of as needed during the growing season to maintain a maximum grass height of less than 6 inches.
- Debris and litter shall be removed during regular mowing operations and as needed.
- Visible signs of erosion in the open channel system shall be repaired as soon as it is noticed.
- Remove silt in the open channel system when it exceeds 25% of the original WQV.
- Inspect check dams twice a year for structural integrity. Restore check dams to original condition as applicable.

APPROVED: DEPARTMENT OF PLANNING AND ZONING
 Chief, Division of Land Development
 Chief, Development Engineering Division

5-26-16
 DATE
 6-6-16
 DATE



ALDO M. VITUCCI, P.E.
 Date: 5/19/16
 "Professional certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-17."

DETAIL SHEET
GTW's Waverly Woods
 Parcel 'H'

Zoned: PEC
 Tax Map No.: 16
 Grid No.: 3&4
 P/O Parcel No.: 249
 3rd Election District
 Howard County, Maryland
 Scale: As Shown
 Date: October 6, 2015
 Sheet 4 of 5

FISHER, COLLINS & CARTER, INC.
 CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
 CENTRAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
 ELLICOTT CITY, MARYLAND 21042
 (410) 461-2899

Owner
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443-367-0422)

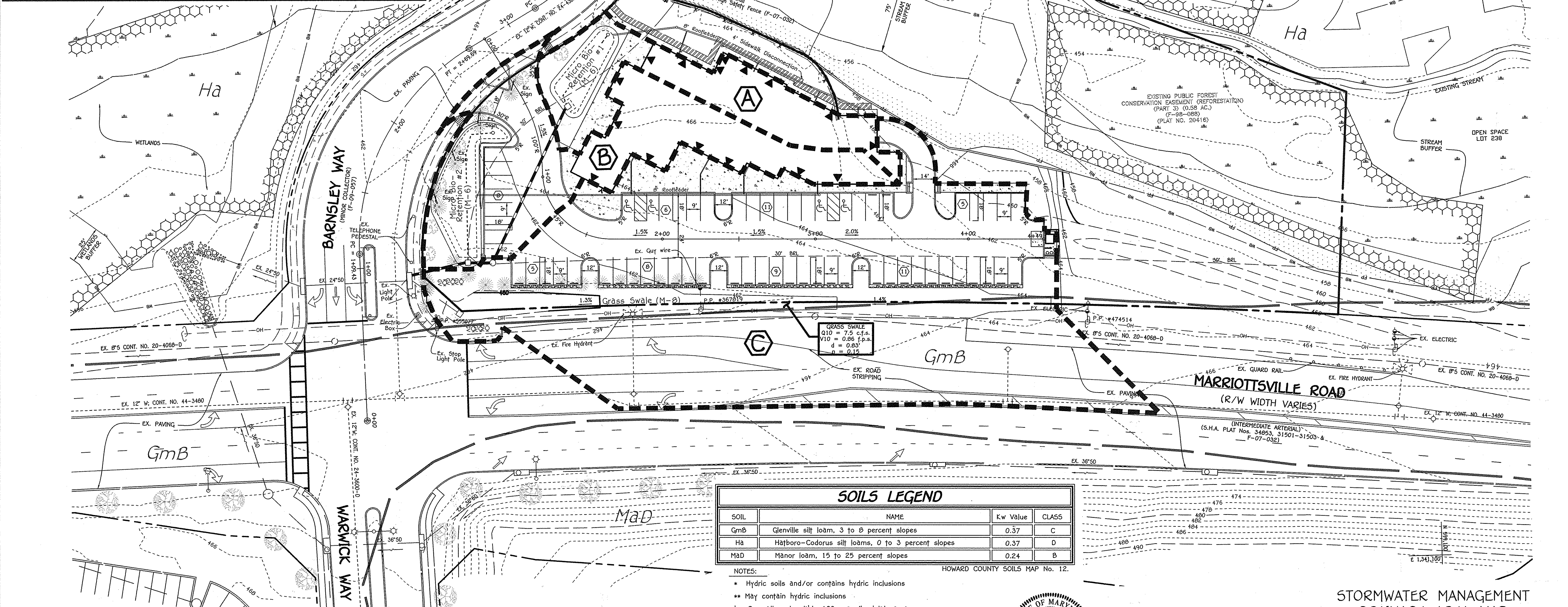
Developer
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443-367-0422)

WAVERLY WOODS - BARNESLEY WAY RETAIL CENTER
 ESD SUMMARY TABLE No. 1

DATA SUMMARY OF PROJECT ECP 16-
 Gross Area of Site: 2.84 Acres
 Developable Area: 1.38 Acres
 Pre-Developed Conditions Composite RCNw: 77
 Target PE (for overall project): 1.8 Inches
 Target ESDvol (for overall project): 0.033 Ac. Ft. 1,437 Cu. Ft.

Date: 10-07-15
 Page 1 of 1

| ESD No. | Area (Sq. Ft.) | Imp. Area | Lawn Area | % of Total Site Area | ESD Practice | Filter Area Prov. (AF) | 100% ESDvol Required (CF) | ESD Surface Stor. Prov. | ESD Stone/Sand Filter Media | Rev Prov. (CF) | ESDvol Prov. (CF) | % IMP Prov. | PE |
|---------|----------------|-----------|-----------|----------------------|--------------|------------------------|---------------------------|-------------------------|-----------------------------|----------------|-------------------|-------------|-----|
| 1 | 8605 | 5663 | 2942 | 14.31 | M-6 | 918 | 739 | 775 | N/A | 734 | 775 | 66% | 2.1 |
| 2 | 16117 | 12632 | 3485 | 26.81 | M-6 | 1719 | 1635 | 1528 | N/A | 1382 | 1528 | 78% | 1.9 |
| 3 | 56192 | 44431 | 11761 | 93.47 | M-8 | 8984 | 5789 | 5994 | N/A | N/A | 5994 | 79% | 2.0 |
| Sub | 80914 | 62726 | 18188 | (sq. ft.) | | 11621 | 6143 | 8297 | 0 | 2116 | 8297 | | |
| Total | 1.86 | 1.44 | 0.42 | (acres) | | | | 102% | 0% | 102% | 102% | | |



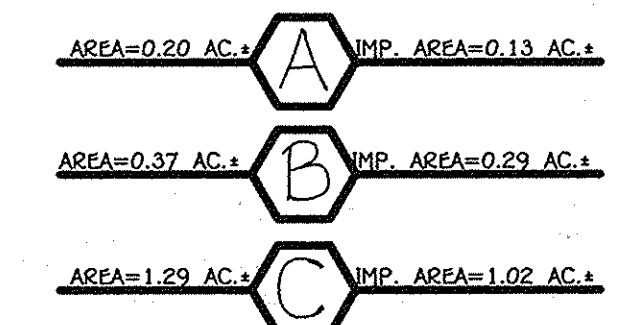
SOILS LEGEND

| SOIL | NAME | Kw Value | CLASS |
|------|---|----------|-------|
| GmB | Glenville silt loam, 3 to 8 percent slopes | 0.37 | C |
| Ha | Hatboro-Codorus silt loams, 0 to 3 percent slopes | 0.37 | D |
| MaD | Manor loam, 15 to 25 percent slopes | 0.24 | B |

NOTES:
 * Hydric soils and/or contains hydric inclusions
 ** May contain hydric inclusions
 † Generally only within 100-year floodplain areas

HOWARD COUNTY SOILS MAP No. 12.

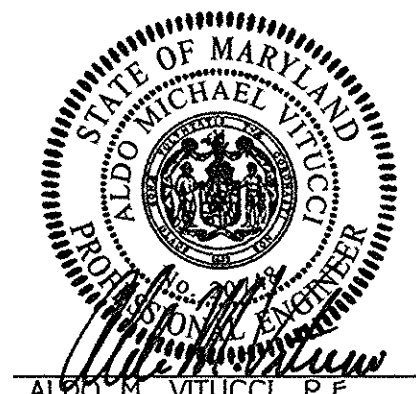
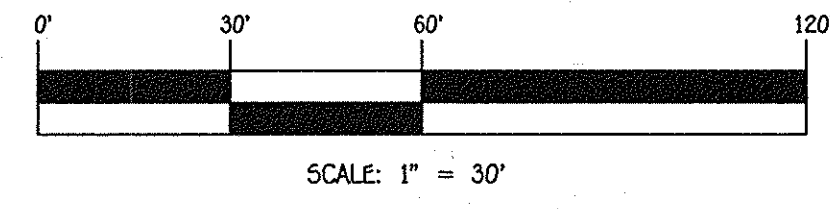
DRAINAGE AREA DATA



FISHER, COLLINS & CARTER, INC.
 CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
 CENTENNIAL SQUARE OFFICE, PAGE 1 - 10272 BALTIMORE NATIONAL PIKE
 ELICOTT CITY, MARYLAND 21042
 (410) 481-2992

Owner
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443-367-0422)

Developer
 Waverly Woods Development Corporation
 c/o Land Design And Development, Inc.
 5300 Dorsey Hall Drive, Suite 102
 Ellicott City, Maryland 21042
 (443-367-0422)



ALBERTO M. VITUCCI, P.E.
 s/vitucci
 Date

"Professional certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-17."

STORMWATER MANAGEMENT DRAINAGE AREA MAP
GTW's Waverly Woods Parcel 'H'

Zoned: PEC
 Grid No.: 38.4 P/O Parcel No.: 249
 3rd Election District Howard County, Maryland
 Scale: As Shown
 Date: October 6, 2015
 Sheet 5 of 5

Tax Map No.: 16
 3rd Election District Howard County, Maryland