GENERAL NOTES

- 1. THE PROJECT IS IN CONFORMANCE WITH THE LATEST HOWARD COUNTY STANDARDS UNLESS ALTERNATIVE COMPLIANCE HAVE BEEN APPROVED.
- 2. THE EXISTING TOPOGRAPHY SHOWN HEREON IS BASED ON A FIELD RUN SURVEY PREPARED BY ROBERT H. VOGEL ENGINEERING+TIMMONS GROUP INC., DATED JANUARY 2019.
- 3. THE PROJECT BOUNDARY IS BASED ON A BOUNDARY SURVEY PREPARED BY ROBERT H. VOGEL ENGINEERING+TIMMONS GROUP, INC., DATED JANUARY 2019.
- 4. THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL WHICH IS BASED UPON THE MARYLAND STATE PLANE COORDINATE SYSTEM. HOWARD COUNTY MONUMENT NOS. 31EF AND 0081 WERE USED FOR THIS PROJECT.
- 5. THE SUBJECT PROPERTY IS ZONED "R-ED" IN ACCORDANCE WITH THE 10/6/2013 COMPREHENSIVE ZONING PLAN AND AND IS SUBJECT TO THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS EFFECTIVE 10/2/03 PER COUNCIL BILL 75-2003.
- 6. NO GRADING, REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN THE REQUIRED WETLANDS, STREAM(S) OR THEIR BUFFERS, FOREST CONSERVATION EASEMENT AREAS AND 100—YEAR FLOODPLAIN.
- 7. THIS PROPERTY IS LOCATED WITHIN THE METROPOLITAN DISTRICT.
- 8. WATER FOR THIS PROJECT IS TO BE SERVICE CONNECTIONS FROM CONTRACT NO. 14-4080-D.
- 9. SEWER FOR THIS PROJECT IS TO BE SERVICE CONNECTIONS FROM CONTRACT NO. 14-4080-D.
- 10. EXISTING UTILITIES LOCATED FROM TOPOGRAPHIC SURVEY AND AS—BUILT DRAWINGS. CONTRACTOR SHALL LOCATE EXISTING UTILITIES WELL IN ADVANCE OF CONSTRUCTION ACTIVITIES AND TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING UTILITIES AND TO MAINTAIN UNINTERRUPTED SERVICE.
- 11. STEEP SLOPES 15% AND GREATER ARE SHOWN HEREON.
- 12. FOREST CONSERVATION OBLIGATIONS FOR THIS PROJECT SHALL BE ADDRESSED BY A FOREST CONSERVATION PLAN SUBMITTED WITH A SUBDIVISION OR SITE DEVELOPMENT PLAN.
- 13. WETLANDS AND STREAMS SHOWN ONSITE ARE BASED ON ECO-SCIENCE PROFESSIONALS, INC. C/O MR. JOHN CANOLES, FEBRUARY 2019.
- 14. IN ACCORDANCE WITH SECTION 16.121(A)(2) OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS, THE OPEN SPACE REQUIREMENTS FOR THIS R-ED PROJECT (6,000 SF MIN LOT SIZE) IS 50% OF GROSS AREA (9.085 AC. GROSS AREA \times 50% = 4.54 AC.+/-). REFER TO THE CONCEPTUAL OPEN SPACE LOTS.
- 15. GEOTECHNICAL INVESTIGATIONS SHALL COMPLETED AS PART OF THE PRELIMINARY EQUIVALENT SKETCH PLAN PACKAGE.
- 16. A NOISE STUDY IS NOT REQUIRED FOR THIS PROJECT.
- 17. FOREST STAND DELINEATION PLAN PREPARED BY ECO-SCIENCE PROFESSIONALS, INC. C/O MR. JOHN
- 18. LANDING ROAD IS CLASSIFIED AS A MINOR COLLECTOR. LANDING ROAD IS A HOWARD COUNTY SCENIC ROAD. NO IMPROVEMENTS ARE PROPOSED. GREEN DRAKE ROAD IS CLASSIFIED AS A 40' R/W ACCESS PLACE (F03-134). THE PROPOSED EXTENSIONS OF GREEN DRAKE ROAD SHALL CONFORM WITH GUIDELINES WITHIN THE DESIGN MANUAL / ACCESS STREET.
- 19. TO THE BEST OF THE OWNERS KNOWLEDGE, THERE ARE NO BURIAL GROUNDS / CEMETERIES LOCATED ON THIS PROPERTY. THE EXISTING HOME (1904 SDAT) IS CLASSIFIED AS A HISTORIC STRUCTURES. THE EXISTING HOME AND GARAGE ARE TO BE REMOVED.
- 20. THERE IS AN EXISTING HOUSE AND DETACHED GARAGE STRUCTURE ON THE PROPERTY.
- 21. THE PROPOSED UNITS SHALL HAVE AN AUTOMATIC FIRE PROTECTION SPRINKLER SYSTEM.
- 22. STORMWATER MANAGEMENT FOR THE PROJECT IS PROVIDED BY THE USE OF MICRO-SCALE PRACTICES IN ACCORDANCE WITH ENVIRONMENTAL SITE DESIGN CRITERIA. MICRO-SCALE PRACTICES INCLUDE M-8 BIOSWALES, M-6 MICRO-BIORETENTION, M-5 DRY WELLS AND M-2 SUBMERGED GRAVEL WETLAND. ON LOT FACILITIES WILL BE PRIVATELY OWNED AND MAINTAINED. MICRO-SCALE FACILITIES MANAGING ROAD RUNOFF SHALL BE DESIGNATED AS A PRIVATELY OWNED AND JOINTLY MAINTAINED FACILITIES (H.O.A. AND HOWARD COUNTY); HOWARD COUNTY WILL MAINTAIN OUTLET STRUCTURES AND PIPES WHILE THE H.O.A. SHALL MAINTAIN MULCH, WEEDING, PLANTINGS, PERFORATED UNDERDRAINS, FEEDER PIPES, AND ROUTINE SOIL REPLACEMENT.
- 23. APPROVAL OF THIS ENVIRONMENTAL CONCEPT PLAN (ECP) DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED SUBDIVISION PLAN/PLAT AND/OR SITE DEVELOPMENT PLAN AND/OR RED—LINE REVISION PLAN. REVIEW OF THIS PROJECT FOR COMPLIANCE WITH THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND THE HOWARD COUNTY ZONING REGULATIONS SHALL OCCUR AT THE SUBDIVISION PLAN/PLAT AND/OR SITE DEVELOPMENT PLAN AND/OR RED—LINE REVISION PROCESS. THE APPLICANT AND CONSULTANT SHOULD EXPECT ADDITIONAL AND MORE DETAILED REVIEW COMMENTS (INCLUDING COMMENTS THAT MAY ALTER THE OVERALL SITE DESIGN) AS THIS PROJECT PROGRESSES THROUGH THE PLAN REVIEW PROCESS.
- 24. IN ACCORDANCE WITH SECTION 16.121(A)(4) OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS, RECREATION OPEN SPACE FOR THIS R-ED PROJECT IS 300 SF / UNIT (18 X 300 = 5,400 SF).
- 25. A FLOODPLAIN STUDY WILL BE PERFORMED AT PRELIMINARY/SKETCH PLAN (SP) STAGE TO DETERMINE THE EXTENT OF THE 100 YEAR FLOODPLAIN, AND WHETHER FLOODPLAINS ARE PRESENT ON SITE.
- 26. APPROVAL OF THIS ENVIRONMENTAL CONCEPT PLAN (ECP) BY THE HOWARD SOIL CONSERVATION DISTRICT DOES NOT GRANT APPROVAL OF THE PROPOSED SEDIMENT CONTROL SCHEME.

ENVIRONMENTAL SITE DESIGN NARRATIVE:

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT

- . THE ENVIRONMENTAL AREAS FOR THIS SITE ARE LOCATED IN THE SOUTHWEST PORTION OF THE SITE INCLUDING A PERENNIAL STREAM AND NON—TIDAL WETLANDS. NO DISTURBANCE TO THESE ENVIRONMENTAL AREAS IS NECESSARY FOR THE PROPOSED DEVELOPMENT. THERE IS APPROXIMATELY 7.6 ACRES OF FOREST LOCATED ON THE PROPERTY. DISTURBANCES TO THE NATURAL RESOURCES WILL BE MINIMIZED TO THE
- 2. —THE SITE NATURALLY SLOPES TO THE SOUTH AND EAST WITH AN EXISTING RIDGE IN THE GENERAL MIDDLE OF THE SITE. THE SITE HAS BEEN DESIGNED TO MAINTAIN THE NATURAL DRAINAGE PATTERNS WITH A HIGH POINT IN THE PROPOSED ROAD ALONG THE EXISTING RIDGE. SOME OF THE RUNOFF TO THE EAST WILL BE PIPED TOWARD THE F-03-134 FACILITY KNOWN AS SWMF#2, HOWEVER THIS DIVERSION WILL SEND LESS AREA TO SWMF#2 THAN ORIGINALLY DESIGNED. THIS DIVERSION WILL ALSO DECREASE THE DRAINAGE AREA TO F-03-134 SWMF#1. THE PROPOSED SUBMERGED GRAVEL WETLAND IN THE SOUTHWEST PORTION OF THE SITE WILL PROVIDE ENVIRONMENTAL SITE DESIGN TREATMENT.

 —THE EXISTING DRAINAGE AREA TO POINT THE STREAM LEAVES THE SUBJECT PROPERTY IS 29AC±.

 —OTHER THAN THE DIVERSION DESCRIBED ABOVE, THERE ARE NO DRAMATIC CHANGES TO THE NATURAL
- 3. THE CONCEPTUAL REDUCTION IN IMPERVIOUS AREA THROUGH BETTER SITE DESIGN IS ACHIEVED THROUGH THE USE OF ENVIRONMENTAL SITE DESIGN (ESD) FOR THE PROJECT TO THE MAXIMUM EXTENT PRACTICABLE (MEP). THE RESULTS OF THE ENVIRONMENTAL SITE DESIGN FOR THIS PROJECT WILL REFLECT "WOODS IN GOOD CONDITION." THE ESD CONCEPT INCLUDES THE USE OF MICRO-BIORETENTION FACILITIES (M-6), DRYWELLS
- (M-5), AND A SUBMERGED GRAVEL WETLAND (M-2).

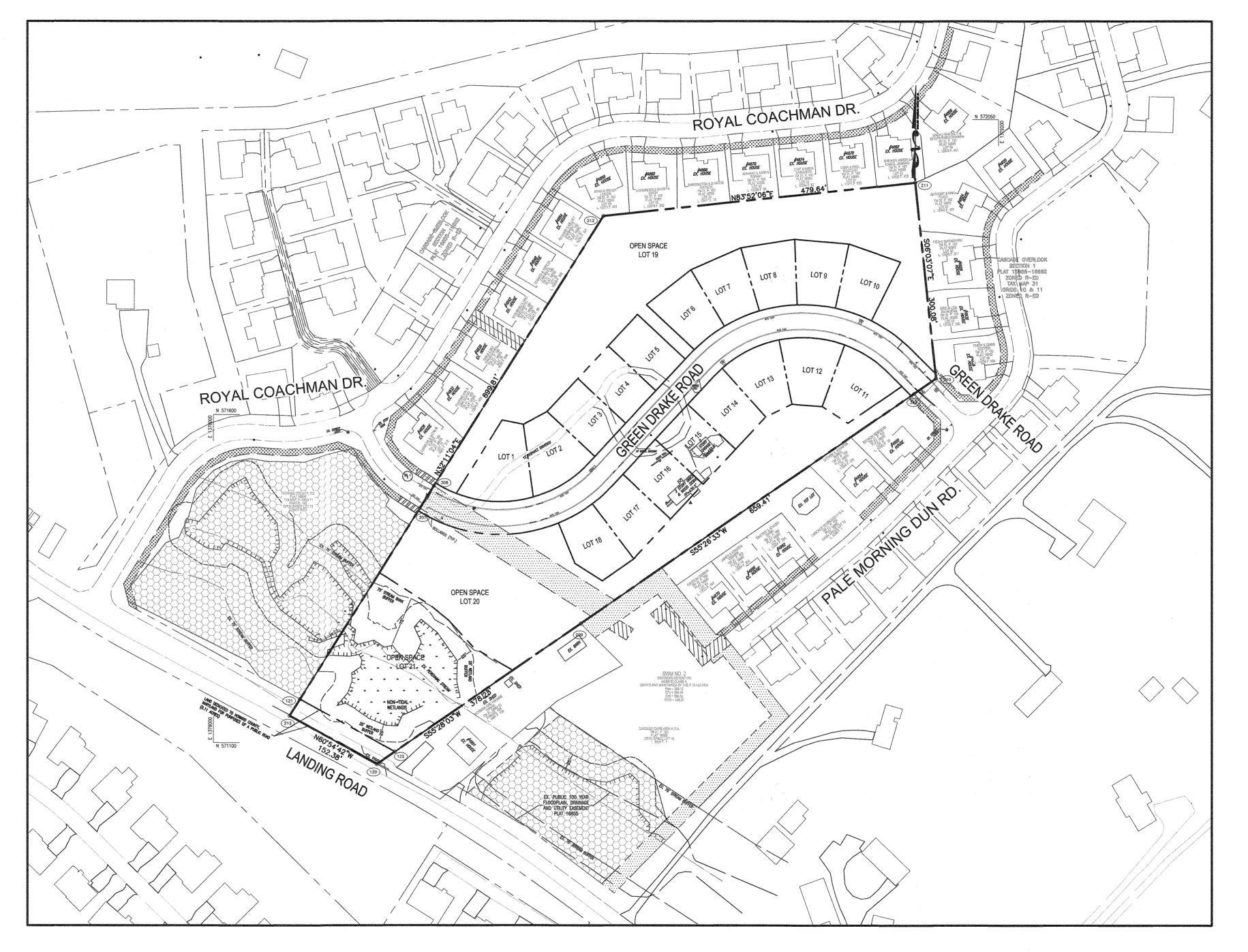
 4. SEDIMENT CONTROL FOR THIS SPECIFIC SITE PLAN WILL BE PROVIDED THROUGH THE USE OF A PROPOSED SEDIMENT TRAP, SEDIMENT BASIN, EARTH DIKES, AND SUPER SILT FENCE PERIMETER CONTROLS. SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH CURRENT REQUIREMENTS AND SHALL BE APPROVED BY THE HOWARD SOIL CONSERVATION DISTRICT DURING THE FUTURE SITE DEVELOPMENT PLAN PHASE OF THE
- 5. STORMWATER MANAGEMENT FOR THE PROJECT SHALL BE MET THROUGH THE USE OF MICRO-BIORETENTION FACILITIES (M-6), DRYWELLS (M-5), AND A SUBMERGED GRAVEL WETLAND (M-2). THE PROPOSED PRACTICES HAVE BEEN MAXIMIZED TO THE EXTENT PRACTICAL. THE CALCULATED RAINFALL TARGET (PE) FOR THIS
- PROJECT IS 1.58", AND THE TOTAL RUNOFF VOLUME (ESDV) REQUIRED IS 10,692 CUBIC FEET.

 3. AN ALTERNATIVE COMPLIANCE REQUEST FOR REMOVAL OF SPECIMEN TREES IS REQUIRED IN ORDER FOR THE PROPOSED DESIGN TO BE DEVELOPED. SIGNIFICANT DESIGN CHANGES MAY OCCUR BASED ON THE REVIEW OF THE PRELIMINARY EQUIVALENT SKETCH PLAN AND THE ALTERNATIVE COMPLIANCE REQUEST.

ENVIRONMENTAL CONCEPT PLAN CASCADE RIDGE

LOTS 1-18 AND OPEN SPACE LOTS 19 - 21

PARCEL 474 (L. 362 / F. 260) 7330 GREEN DRAKE RD ELKRIDGE, MD 21075



LOCATION MAP SCALE: 1"=100" 100" 200" 300

Stormwater Management Information Lot/Parcel Number | Facility Name & Number Practice Type (Quantity) Public Private HOA Maintains Open Space Lot 19 MBR 1 M-6 MICRO-BIORETENTION (1) NO YES M-6 MICRO-BIORETENTION (1) NO YES **GRAVEL WETLAND 1** M-2 SUBMERGED GRAVEL WETLAND (1) Open Space Lot 20 MBR 3 M-6 MICRO-BIORETENTION (1) NO YES YES MBR 4 M-6 MICRO-BIORETENTION (1) NO YES YES M-6 MICRO-BIORETENTION (1) NO YES

SITE ANALYSIS DATA CHART

- A. TOTAL PROJECT AREA:
 B. AREA OF PLAN SUBMISSION:
 C. AREA OF WETLANDS AND BUFFERS:
 D. AREA OF FLOODPLAIN:
- E. AREA OF FOREST: F. AREA OF STEEP SLOPES (25% & GREATER): G. ERODIBLE SOILS:
- H. LIMIT OF DISTURBED AREA:

 I. PROPOSED USES FOR SITE AND STRUCTURES:

 J. GREEN OPEN AREA:
- K. PROPOSED IMPERVIOUS AREA:
 L. PRESENT ZONING DESIGNATION:
 M. DPZ FILE REFERENCES:

9.085 AC.
9.085 AC.
0.82 AC.
0.00 AC+/7.6 AC.
APPROX. 0.05 AC.+/5.92 AC. WITHIN LOD
303,339 S.F. OR 6.96 AC.
RESIDENTIAL SINGLE FAMILY DETACHED (SFD) HOME

RESIDENTIAL SINGLE FAMILY DETACHED (SFD) HOMES 7.29 AC. 1.79 AC. R-ED (MIN 6,000 SF LOT) SP-19-004

OWNER/DEVELOPER

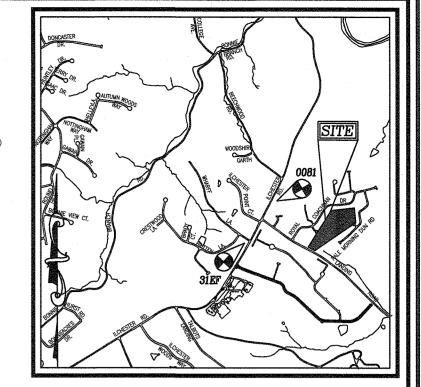
JOHN NEELS

7330 GREEN DRAKE ROAD
ELKRIDGE, MD 21075
C/O KAREN MARTIN
(410) 869-0134

BENCHMARKS

HOWARD COUNTY CONTROL STATION 31EF (CONC. MON.)
N 571267.917 E 1376907.417 ELEV. 469.471
LOCATION: INTERSECTION OF ILCHESTER ROAD AND
WHARFF LANE

HOWARD COUNTY CONTROL STATION 0081 (CONC. MON.)
N 572335.338 E 1377504.092 ELEV. 477.92
LOCATION: ILCHESTER ROAD SOUTH OF BEECHWOOD ROAD



VICINITY MAP SCALE: 1"=2,000'

| ADC MAP COORDINATE: | MAP 28, GRID 5E |
|---------------------|-----------------|
| SHEET INDEX | |
| DESCRIPTION | SHEET NO. |
| | 1 OF 7 |

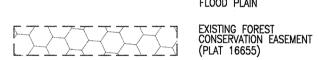
| SHEET NO. |
|-----------|
| 1 OF 7 |
| 2 OF 7 |
| 3 OF 7 |
| 4 OF 7 |
| 5 OF 7 |
| 6 OF 7 |
| 7 OF 7 |
| |

LEGEND:

| PROPERTY LINE |
|------------------------|
| RIGHT-OF-WAY LINE |
| ADJACENT PROPERTY LINI |
| EXISTING PAVING |

CENTERLINE OF EXISTING STREAM

EXISTING WETLANDS EXISTING WETLAND BUFFER



PROPOSED CURB

| ON-LOT STO | ORMWATER MANAGEMENT PR | ACTICES |
|---------------|------------------------|---------|
| | " | M-5 |
| Lot Number | Address | Drywel |
| Lot 1 | GREEN DRAKE ROAD | 1 |
| Lot 2 | GREEN DRAKE ROAD | 1 |
| Lot 3 | GREEN DRAKE ROAD | 1 |
| Lot 4 | GREEN DRAKE ROAD | 2 |
| Lot 5 | GREEN DRAKE ROAD | 2 |
| Lot 6 | GREEN DRAKE ROAD | 2 |
| Lot 7 | GREEN DRAKE ROAD | 2 |
| Lot 8 | GREEN DRAKE ROAD | 2 |
| Lot 9 | GREEN DRAKE ROAD | 2 |
| Lot 10 | GREEN DRAKE ROAD | 2 |
| Lot 11 | GREEN DRAKE ROAD | 1 |
| Lot 12 | GREEN DRAKE ROAD | 2 |
| Lot 13 | GREEN DRAKE ROAD | 2 |
| Lot 14 | GREEN DRAKE ROAD | 2 |
| Lot 15 | GREEN DRAKE ROAD | 2 |
| Lot 16 | GREEN DRAKE ROAD | 2 |
| Lot 17 | GREEN DRAKE ROAD | 1 |
| Lot 18 | GREEN DRAKE ROAD | 1 |

NO. REVISION DATE

TOTALS

ENVIRONMENTAL CONCEPT PLAN COVER SHEET

CASCADE RIDGE LOTS 1-18 AND OPEN SPACE LOTS 19 - 21

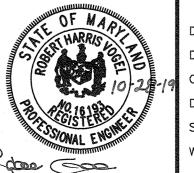
PARCEL: 474
TAX MAP: 31 GRID: 11
1ST ELECTION DISTRICT

VOGEL ENGINEERING

ZONED: R-E
L. 362 / F. 26
HOWARD COUNTY, MARYLAN

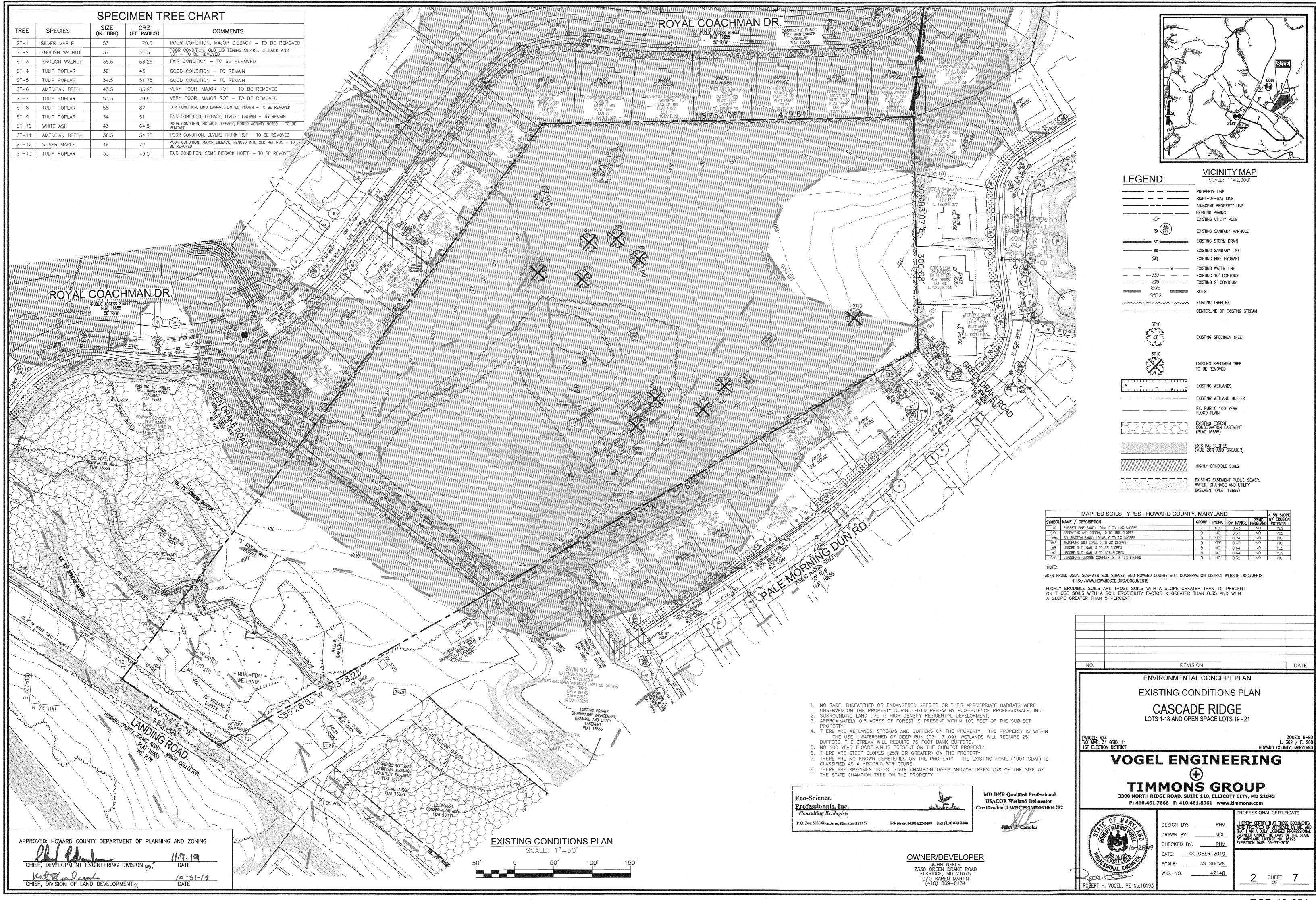
TIMMONS GROUP

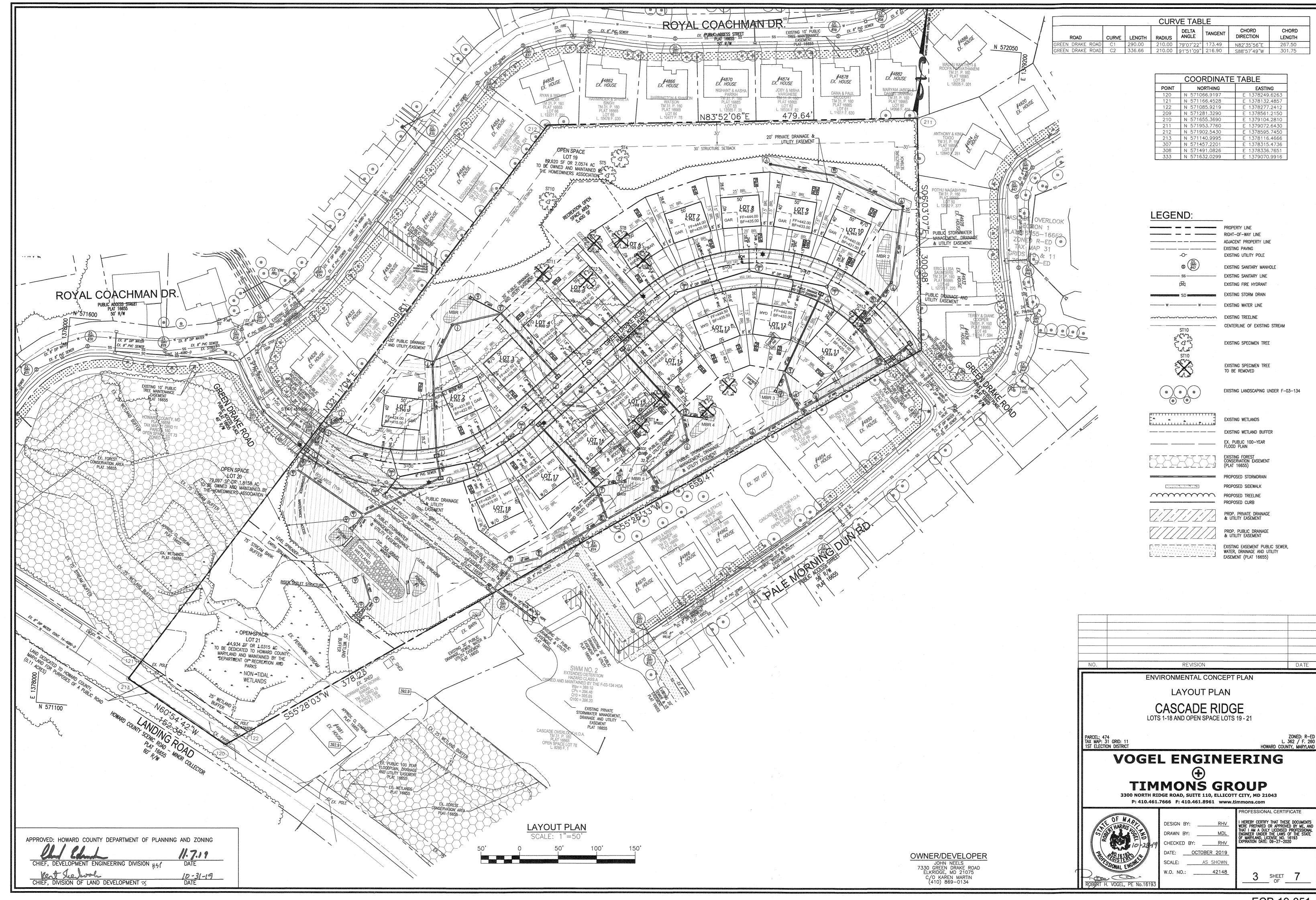
3300 NORTH RIDGE ROAD, SUITE 110, ELLICOTT CITY, MD 2: P: 410.461.7666 F: 410.461.8961 www.timmons.com

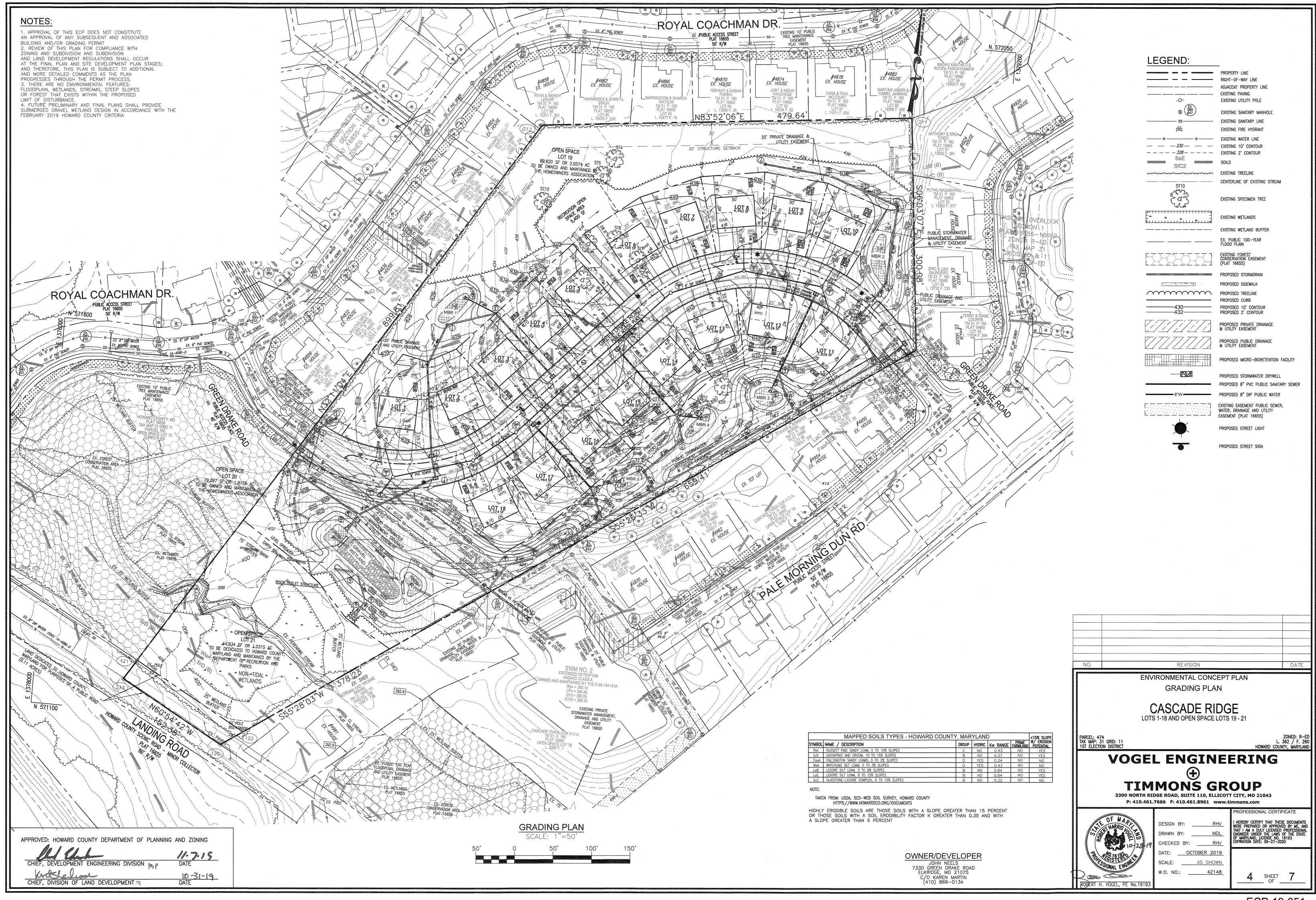


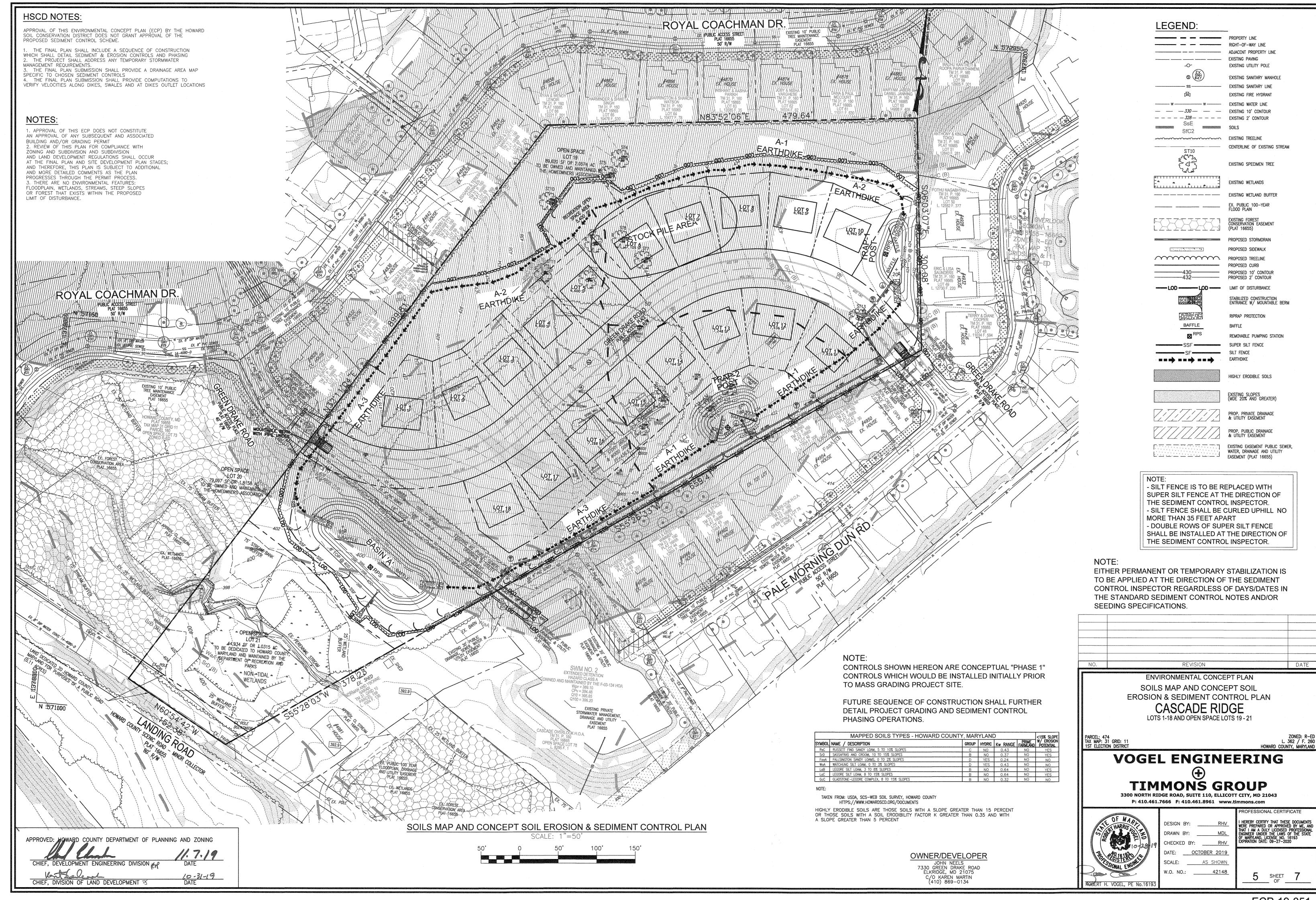
ROBERT H. VOGEL, PE No.1619

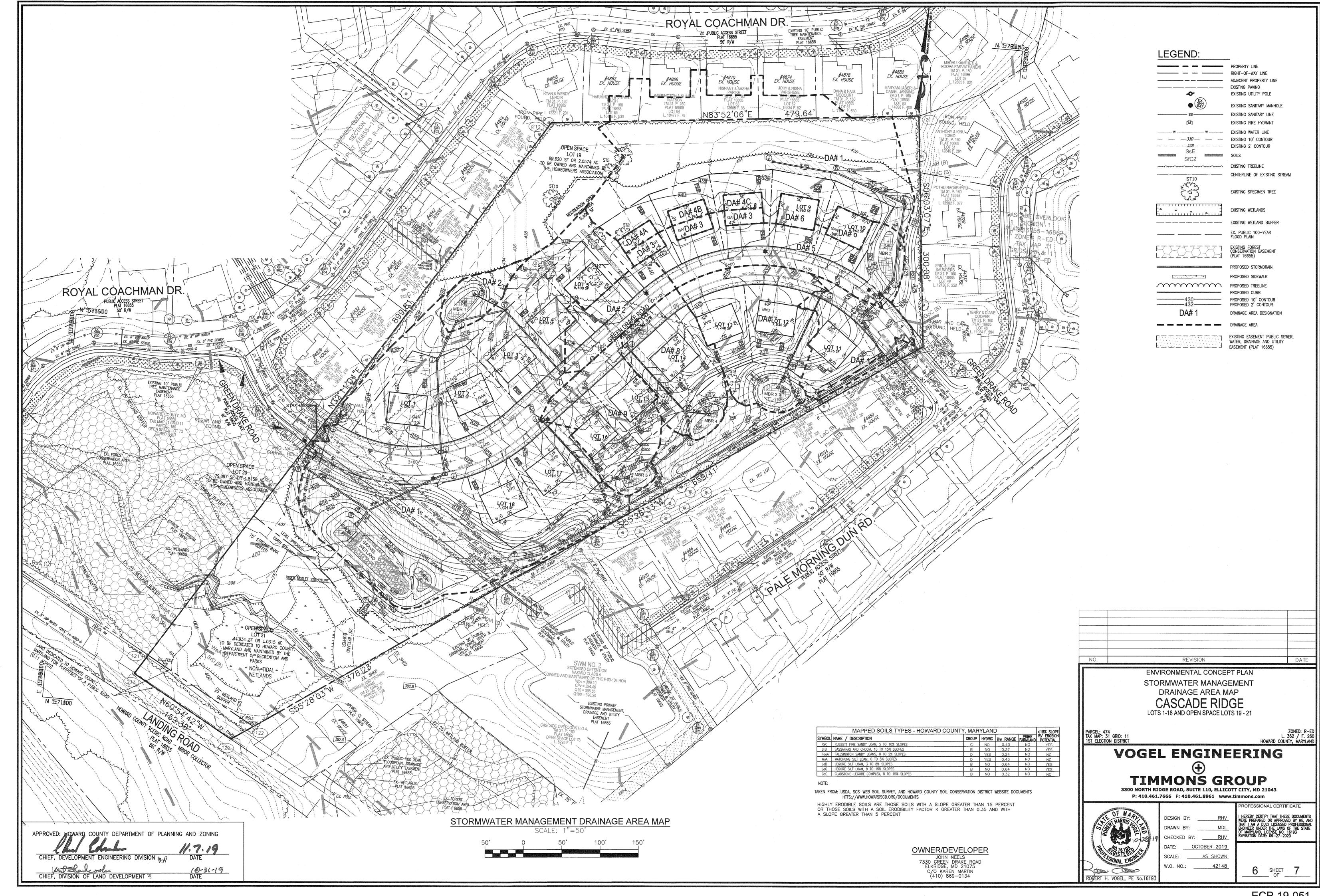
| RHV | I HE WER |
|-------------|------------------------------|
| MDL | THAT ENGI |
| RHV | OF I EXPI |
| CTOBER 2019 | |
| AS SHOWN | |
| 42148 | |
| | MDL RHV CTOBER 2019 AS SHOWN |











APPENDIX B.4.C SPECIFICATIONS FOR MICRO-BIORETENTION. RAIN GARDEN, LANDSCAPE INFILTRATION & INFILTRATION BERMS

1. MATERIAL SPECIFICATIONS THE ALLOWABLE MATERIALS TO BE USED IN THESE PRACTICES ARE DETAILED IN TABLE B.4.1.

* CLAY CONTENT - MEDIA SHALL HAVE A CLAY CONTENT OF LESS THAN 5%.

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 CONTEN - 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%).

* PH RANGE - SHOULD BE BETWEEN 5.5 - 7.0. AMENDMENTS (E.G., LIME, IRON SULFATE PLUS SULFUR) MAY BE MIXED IN TO 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.

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 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

COMPACTION CAN BE ALLEVIATED AT THE BASE OF THE BIORETENTION FACILITY BY USING A PRIMARY TILLING OPERATION SUCH AS CHISEL PLOW. RIPPER. OR SUBSOILER. THESE TILLING OPERATIONS ARE TO REFRACTURI 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.

INFILTRATION RATES AND IS NOT ACCEPTABLE, COMPACTION WILL SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE

ROTOTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENION FACILITY BEFORE BACKFILLING THE OPTIONAL SAND LAYER. PUMP ANY PONDED WATER BEFORE PREPARING (ROTOTILLING) BASE. WHEN BACKFILLING HE 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.

RECOMMENDED PLANT MATERIAL FOR MICRO-BIORETENTION PRACTICES CAN BE FOUND IN APPENDIX A, SECTION

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 DIAMFTER 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

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 OF HDPE).
- * PERFORATIONS IF PERFORATED PIPE IS USED, PERFORATIONS SHOULD BE 3/8" DIAMETER LOCATED 6" ON CENTER WITH A MINIMUM OF FOUR HOLES PER ROW. PIPE SHALL BE WRAPPED WITH A 1/4" (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 (1/8" TO 3/8" STONE) SHALL BE LOCATED BETWEEN THE FILTER MEDIA AND
- UNDERDRAIN TO PREVENT MIGRATION OF FINES IN TO THE UNDERDRAIN. THIS LAYER MAY BE CONSIDERED PART OF THE FILTER BED WHEN BED THICKNESS EXCEEDS 24". THIS 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

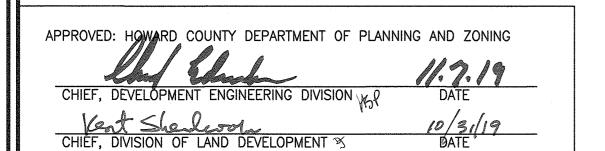
THESE PRACTICES MAY NOT BE CONSTRUCTED UNTIL ALL CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED.

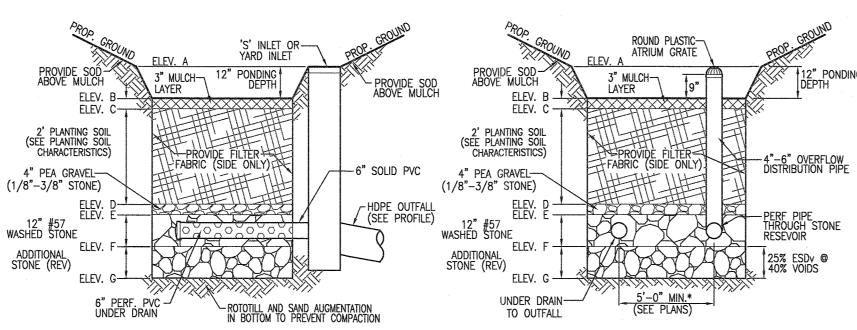
Appendix B.4. Construction Specifications for Environmental Site Design Practices

| 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 I 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 ½-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 |

OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED STORMWATER DRY WELLS (M-5)

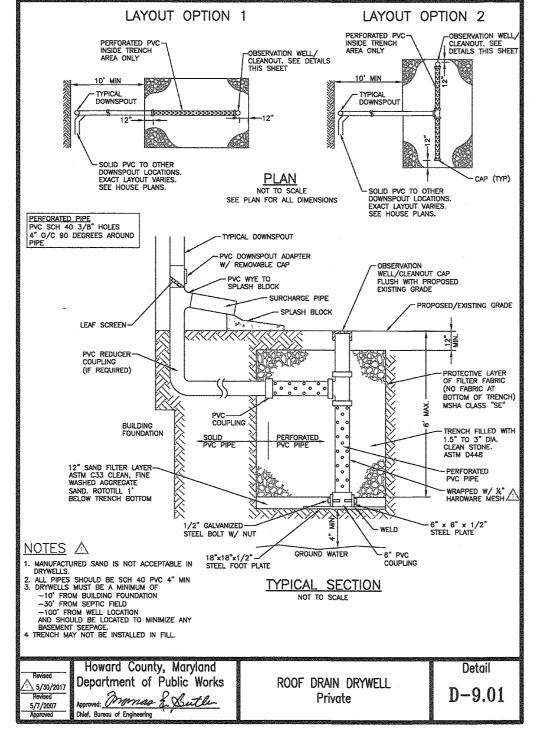
- 1. THE MONITORING WELLS AND STRUCTURES SHALL BE INSPECTED ON A QUARTERLY BASIS AND AFTER EVERY LARGE STORM EVENT.
- WATER LEVELS AND SEDIMENT BUILD UP IN THE MONITORING WELLS SHALL BE RECORDED OVER A PERIOD OF SEVERAL DAYS TO INSURE TRENCH DRAINAGE
- 3. A LOG BOOK SHALL BE MAINTAINED TO DETERMINE THE RATE AT WHICH THE FACILITY DRAINS.
- 4. WHEN THE FACILITY BECOMES CLOGGED SO THAT IT DOES NOT DRAIN DOWN WITHIN THE 72 HOUR TIME PERIOD, CORRECTIVE ACTION SHALL
- 5. THE MAINTENANCE LOG BOOK SHALL BE AVAILABLE TO HOWARD COUNTY FOR INSPECTION TO INSURE COMPLIANCE WITH OPERATION AND MAINTENANCE CRITERIA.
- 6. ONCE THE PERFORMANCE CHARACTERISTICS OF THE INFILTRATION FACILITY HAVE BEEN VERIFIED, THE MONITORING SCHEDULE CAN BE REDUCED TO AN ANNUAL BASIS UNLESS THE PERFORMANCE DATA INDICATES THAT A MORE FREQUENT SCHEDULE IS REQUIRED.

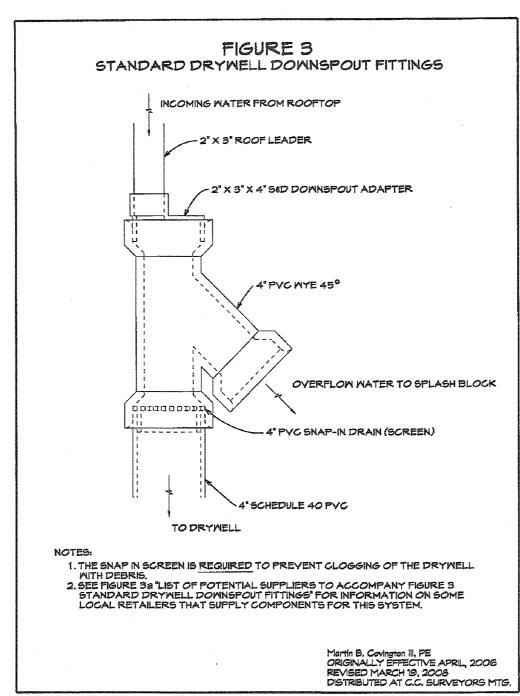




MICRO-BIORETENTION (UNDERDRAIN) (M-6) MICRO-BIORETENTION (OVERFLOW) (M-6)

- ONLY THE SIDES OF MICROBIORETENTION ARE TO BE WRAPPED IN FILTER FABRIC. FILTER FABRIC BETWEEN LAYER OR AT THE BOTTOM OF THE MICROBIORETNTION WILL CAUSE THE MBR TO FAIL, AND THEREFORE SHALL NOT BE INSTALLED.
- 2. WRAP THE PERFORATED MBR UNDERDRAIN PIPE WITH 1/4" MESH (4x4) OR SMALLER GALVANIZED HARDWARE CLOTH
- 3. PROVIDE 5' MINIMUM SPACING BETWEEN UNDER DRAIN AND PERFORATED PIPE THROUGH STONE RESIVOIR OR SPACE PIPE EQUALLY ACROSS BOTTOM FOR SMALL BIOS. (SEE PLANS)





SUBMERGED GRAVEL WETLAND W/ PEA GRAVEL WINDOW PLAN VIEW Inflow - If inflow is perpendicular to level appender, rip rop aplash pad will be necessary Pea gravel window (20% of L) -Outlet pipe system planting zone

Win L = 15 ft.

PROFILE VIEW (#8 or #9) (20% of L) Pea gravel window (#8 or #9) (20% of L) 4 in. min -Max ponding depth 2 ft. Min ponding depth 1 f gravei (#8 er #3) Vertical collection pipe perforated in gravel only, min # = 4 in. 24 in. thick, #57 _Geotextile keyed in along Horizontal collection pipe, min ø = 4 in.

SUBMERGED GRAVEL WETLAND W/

PEA GRAVEL WINDOW

Outlet and riser structure

Min 3 in above bottom of facility

M-2. SUBMERGED GRAVEL WETLANDS

-Min L = 15 ft.---

CONSTRUCTION CRITERIA: THE FOLLOWING ITEMS SHOULD BE ADDRESSED DURING THE CONSTRUCTION OF PROJECTS WITH SUBMERGED GRAVEL WETLANDS:

1. SITE DISTURBANCE: ALL ON-SITE DISTURBED AREAS SHOULD BE STABILIZED PRIOR TO ALLOWING RUNOFF TO ENTER THE NEWLY CONSTRUCTED WETLAND.

2. EROSION AND SEDIMENT CONTROL: THE PROPOSED LOCATION OF A SUBMERGED GRAVEL WETLAND SHALL BE PROTECTED DURING CONSTRUCTION. SURFACE RUNOFF SHALL BE DIVERTED AWAY FROM THE PRACTICE DURING GRADING OPERATIONS. FLOW SPLITTERS AND OTHER CONVEYANCE INFRASTRUCTURE SHALL BE BLOCKED.

WETLAND CONSTRUCTION SHALL BE PERFORMED WITH LIGHTWEIGHT, WIDE-TRACKED EQUIPMENT TO

AREA. ANY PUMPING OPERATIONS SHALL DISCHARGE FILTERED WATER TO A STABLE OUTLET. 3. GRAVEL MEDIA: THE AGGREGATE SHALL BE COMPOSED OF AN 18 TO 48 INCH LAYER OF CLEAN WASHED, UNIFORMLY GRADED MATERIAL WITH A POROSITY OF 40%. ROUNDED BANK RUN GRAVEL IS

MINIMIZE DISTURBANCE AND COMPACTION. EXCAVATED MATERIALS SHALL BE PLACED IN A CONTAINED

REGULAR INSPECTIONS SHALL BE MADE DURING THE FOLLOWING STAGES OF CONSTRUCTION:

RECOMMENDED (E.G., ASTM D448 4,5, OR 6 STONE OR EQUAL).

- DURING EXCAVATION TO SUBGRADE.
- DURING PLACEMENT OF BACKFILL OF PERFORATED INLET PIPE AND OBSERVATION WELLS.
- DURING PLACEMENT OF GEOTEXTILES AND ALL FILTER MEDIA. DURING CONSTRUCTION OF ANY APPURTENANT CONVEYANCE SYSTEMS SUCH AS DIVERSION STRUCTURES, INLETS, OUTLETS, AND FLOW DISTRIBUTION STRUCTURES.
- UPON COMPLETION OF FINAL GRADING AND ESTABLISHMENT OF PERMANENT STABILIZATION, AND BEFORE ALLOWING RUNOFF TO ENTER

THE SPRING. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MARYLAND STORMWATER DESIGN MANUAL, VOLUME II, TABLE A.4.1 AND 2. 2. 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.

OPERATION AND MAINTENANCE SCHEDULE FOR LANSCAPE INFILTRATION (M-3), MICRO-BIORETENTION (M-6)

RAIN GARDENS (M-7), BIORETENTION SWALE (M-8),

AND ENHANCED FILTERS (M-9)

AREAS OF EROSION OR WASH OUT. ANY MULCH REPLACEMENT SHALL BE DONE IN

1. THE OWNER SHALL MAINTAIN THE PLANT MATERIAL, MULTCH LAYER AND SOIL

LAYER ANNUALLY. MAINTENANCE OF MULCH AND SOIL IS LIMITED TO CORRECTING

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

SITE IMPERVIOUS: ESTIMATED Rv=0.05+0.009XI V min=1.0" rainfall (1.0x0.95xA)/12 Vmax= 1yr rainfall=2.6" (2.6x0.95xA)/12 VOLUME | VOLUME | PROVIDED* AREA 1 0.1679 4.33 2637 6856 4435 24687 0.57 13.10 3.76 MICROSCALE GRAVEL WETLAND LOT 1,2,3, 4, 5, 19, 11, 17 & 18 3326 SF SGW @ 1.0 PONDING +ROAD R/W 0.02 0.9500 0.02 1000 0.00 MICROSCALE PRAC. (DRY WELL) HALF LOT 1 HOUSE 100.00 1000 0.9500 0.02 1000 0.02 0.00 88 CF FOR EACH (5x11x4) DRYWELL 100.00 1000 206 HALF LOT 2 HOUSE 1000 0.02 0.02 HALF LOT 3 HOUSE LOT 4 HOUSE 0.9500 2000 0.05 158 2000 0.05 0.9500 158 2000 0.05 LOT 5 HOUSE 100.00 2000 0.05 HALF LOT 11 HOUSE 0.9500 1000 1000 0.02 100.00 0.02 1000 0.02 HALF LOT 17 HOUSE 100.00 0.9500 1000 0.02 100.00 0.9500 1000 0.02 79 123 1000 0.02 HALF LOT 18 HOUSE TOTAL 5314 5315 AREA 2 0.3356 0.32 393 1023 610 892 4464 0.10 0.22 MICROSCALE MICRO-BIO RETENTION 31.73 14068 FRONT 4-6 +ROAD R/W 892 669 SF MICRO BIO 0.02 0.9500 1000 HALF LOT 6 HOUSE 100.00 0.9500 1000 79 1000 0.02 0.00 88 CF FOR EACH (5x11x4) DRYWELL HALF LOT 7 HOUSE 0.02 206 123 100.00 0.9500 1000 1000 0.02 0.02 79 206 0.00 HALF LOT 8 HOUSE 123 TOTAL AREAS 4 0.9500 0.02 1000 0.02 0.00 MICROSCALE PRAC. (DRY WELL) 4A HALF LOT 6 HOUS 0.9500 1000 0.02 4B HALF LOT 7 HOUS 100.00 1000 0.02 0.00 130 CF FOR EACH (9x9x4) DRYWELL 100.00 0.9500 1000 0.02 206 123 130 1000 0.02 0.00 4C HALF LOT 8 HOUSE TOTAL 368 FRONT 7-10 0.3991 0.46 665 1729 1031 1197 7757 0.18 0.28 MICROSCALE MICRO-BIO RETENTION +ROAD R/W 1197 897.75 SF MICRO BIO AREA 6 0.05 158 288 2000 0.05 LOT 9 HOUSE 100.00 0.9500 2000 412 0.00 MICROSCALE PRAC. (DRY WELL) 158 LOT 10 HOUSE 100.00 0.9500 2000 0.05 412 288 2000 0.05 245 TOTAL 144 CF FOR EACH (9x10x4) DRYWELL 919 0.10 0.36 MICROSCALE MICRO-BIO RETENTION 0.2432 405 627 4287 0.46 1052 LOTS 12-13 919 689.25 SF MICRO BIO +ROAD R/W 49.95 0.4996 2000 0.05 83 216 129 176 999 0.02 LOT 12 HOUSE 0.02 MICROSCALE PRAC. (DRY WELL) 0.5000 2000 83 217 LOT 13 HOUSE 50.00 0.05 129 176 1000 0.02 0.02 88 CF FOR EACH (5x11x4) DRYWELL TOTAL 886 1271 AREA 8 0.1911 14451 0.33 230 598 2265 0.05 0.28 MICROSCALE MICRO-BIO RETENTION LOT 14 +ROAD R/W 0.05 158 412 0.9500 2000 176 0.05 0.00 MICROSCALE PRAC. (DRY WELL) 2000 LOTS 14 100.00 88 CF FOR EACH (5x11x4) DRYWELL TOTAL 0.2307 0.41 3582 **0.08** LOTS 15-16 +ROAD R/W 683 512.25 SF MICRO BIO 0.05 158 176 2000 0.05 0.00 MICROSCALE PRAC. (DRY WELL) 158 100.00 0.9500 2000 0.05 412 245 176 2000 0.05 0.00 88 CF FOR EACH (5x11x4) DRYWELL LOT 16 TOTAL 1022 1035 MEASURED PROJECT 11713 24.62 0.2716 304802 7.00 TOTALS 75041

CASCADE RIDGE - ECP ESDv COMPUTATIONS

303359 SF

DEVELOPED / SITE AREA:

TARGET Pe:

- (1) PROVIDE "GRAVEL JACKET" THROUGH SOIL LAYER TO KEEP SOIL FROM MIGRATING
- IN TO GRAVEL LAYER. (2) SLOTTED RIGID PVC OR HDPE OR PERFORATED SCH 40 PVC PIPE TO BE WRAPPED W/ 1/4" GALVANIZED HARDWARE CLOTH OR

EQUAL MATERIAL, SEE APPENDIX B.4.C.

WETLAND SOIL SPECIFICATIONS

THE SURFACE INFILTRATION RATES OF THE GRAVEL WETLAND SOIL SHOULD BE SIMILAR TO A LOW HYDRAULIC CONDUCTIVITY WETLAND SOIL $(0.1-0.01 \text{ FT/DAY} = 3.5 \text{ X} 10^5 \text{ CM/SEC TO}$ 3.5 X 10⁶ CM/SEC)). THIS SOIL CAN BE MANUFACTURED USING COMPOST, SAND, AND SOME FINE SOILS TO BLEND TO A HIGH % ORGANIC MATTER CONTENT SOIL (>15% ORGANIC MATTER). AVOID USING CLAY CONTENTS IN EXCESS OF 15% BECAUSE OF POTENTIAL MIGRATION OF FINES INTO SUBSURFACE GRAVEL LAYER DO NOT USE GEOTEXTILES BETWEEN THE HORIZONTAL LAYERS OF THIS SYSTEM AS THEY WILL CLOG DUE TO FINES AND MAY RESTRICT ROOT GROWTH.

IMPERVIOUS LINER:

- IF NATIVE A LOW HYDRAULIC CONDUCTIVITY NATIVE SOIL IS NOT PRESENT BELOW THE GRAVEL LAYER, A LOW PERMEABILITY LINER OR SOIL SHOULD BE USED TO:
- MINIMIZE INFILTRATION - PRESERVE HORIZONTAL FLOW IN THE GRAVEL, MAINTAIN THE WETLAND PLANTS. IF GEOTECHNICAL TESTS CONFIRM THE NEED FOR A LINER, ACCEPTABLE OPTIONS INCLUDE: (A) 6 TO 12 INCHES (15 - 30 CM) OF CLAY SOIL (MINIMUM 15% PASSING THE #200
- SIEVE AND A MINIMUM PERMEABILITY OF "1 X 10⁵ CM/SEC), (B) A 30 ML HDPE LINER. (C) BENTONITE,
- (D) USE OF CHEMICAL ADDITIVES (SEE NRCS AGRICULTURAL HANDBOOK NO. 386, DATED 1961, OR ENGINEERING FIELD MANUAL), (E) A DESIGN PREPARED BY A PROFESSIONAL

OWNER/DEVELOPER

7330 GREEN DRAKE ROAD ELKRIDGE, MD 21075

C/O KAREN MARTIN (410) 869-0134

- EROSION MATTING TO BOTTOM OF GROUND -UNDISTURBED TYPICAL SPILLWAY SECTION NOT TO SCALE 0.3 _ EX. GROUND TYPICAL SPILLWAY PROFILE **DETAILS OF WEIR OUTLET** NOT TO SCALE

MICRO-BIORETENTION

PARCEL: 474
TAX MAP: 31 GRID: 11
1ST ELECTION DISTRICT

| , | | |
|-------|----------------------------|------|
| ` ` | | |
| NO. | REVISION | DATE |
| | ENVIRONMENTAL CONCEPT PLAN | |
| a e · | FNVIKUNIMENTAL CUNCEPTELAN | |

ENVIRONMENTAL CONCEPT PLAN STORMWATER MANAGEMENT DETAILS

CASCADE RIDGE

LOTS 1-18 AND OPEN SPACE LOTS 19 - 21

VOGEL ENGINEERING

TIMMONS GROUP 3300 NORTH RIDGE ROAD, SUITE 110, ELLICOTT CITY, MD 21043

P: 410.461.7666 F: 410.461.8961 www.timmons.com

Appr Cases

ROBERT H. VOGEL, PE No.1619

DESIGN BY: DRAWN BY: CHECKED BY: DATE: OCTOBER 2019 SCALE: AS SHOWN W.O. NO.: 42148

ROFESSIONAL CERTIFICATE 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. 16193 EXPIRATION DATE: 09-27-2020 MDL

SHEET ___ OF _

L. 362 / F. 26

HOWARD COUNTY, MARYLAN