GRACE TECH PARK PARCEL 'A'
WAREHOUSE BUILDING
ENVIRONMENTAL CONCEPT PLAN

GENERAL NOTES

1. EXISTING UTILITIES LOCATED FROM ROAD CONSTRUCTION PLANS, FIELD SURVEYS, PUBLIC WATER AND SEWER EXTENSION PLANS AND AVAILABLE RECORD DRAWINGS. APPROXIMATE LOCATION OF EXISTING UTILITIES ARE SHOWN FOR THE CONTRACTORS INFORMATION. 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. ANY DAMAGE INCURRED DUE TO CONTRACTOR'S OPERATION SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
2. THE EXISTING TOPOGRAPHY SHOWN HEREON IS A COMBINATION OF FIELD RUN SURVEY PREPARED BY ROBERT H. VOGEL ENGINEERING, INC; DATED FEBRUARY, 2016 AND AVAILABLE RECORD DRAWINGS.
3. COORDINATES AND ELEVATIONS ARE BASED ON MARYLAND COORDINATE SYSTEM – NAD83(1991) AS PROJECTED BY HOWARD COUNTY GEODETIC CONTROL STATIONS 35HA AND 35HB.
4. THE PROPERTY LINES SHOWN HEREON IS BASED ON A FIELD–RUN BOUNDARY SURVEY PERFORMED BY MORRIS & RITCHIE ASSOCIATES, INC. DATED NOVEMBER 2008 PLAT# 21234, RECORDED AUGUST 12, 2010.
5. EXISTING UTILITIES ARE BASED ON FIELD RUN SURVEYS BY A/1/DATA, DATED 9–23–11, AND MORRIS & RITCHIE ASSOCIATES DATED JULY 3, 2008, AND AVAILABLE RECORD DRAWINGS.
6. THE SUBJECT PROPERTY IS ZONED PEC PER THE 10/06/2013 COMPREHENSIVE ZONING PLAN.
7. WATER AND SEWER TO BE PRIVATE FROM PUBLIC WATER (CONT. 44–3283–D) AND PUBLIC SEWER (30–1002) MAINS.
8. TO THE BEST OF OUR KNOWLEDGE AND BELIEF THERE ARE NO BURIAL GROUNDS, CEMETERIES, OR HISTORIC STRUCTURES LOCATED ON THIS PROPERTY.
9. TO THE BEST OF OUR KNOWLEDGE AND BELIEF THERE ARE NO WOODED AREAS, 100–YEAR FLOODPLAIN, WETLANDS, STREAMS AND THEIR BUFFERS LOCATED WITHIN LOD.
10. ANY EXISTING STREET TREES DAMAGED OR DESTROYED DURING CONSTRUCTION WILL BE REPLACED BY THE CONTRACTOR.
11. A FOREST STAND DELINEATION AND WETLANDS INVESTIGATION WAS PREPARED BY ECO SCIENSE PROFESSIONALS, DATED APRIL 13, 2016.
12. THE FOREST CONSERVATION REQUIREMENTS IS BASED ON THE EXISTING PERVIOUS AREA WITHIN LIMIT OF DISTURBANCE (0.57 AC). THE FOREST OBLIGATION OF 0.09 AC IS MET BY THE PAYMENT OF ((0.09)(43,560)($0.75)=$2,940.30) HOWARD COUNTY FOREST CONSERVATION FUND FOR THE REFORESTATION OBLIGATION.
13. THIS PROJECT IS SUBJECT TO COMPLIANCE WITH THE AMENDED FIFTH EDITION OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS. DEVELOPMENT OR CONSTRUCTION ON THIS PROPERTY MUST COMPLY WITH SETBACK AND BUFFER REGULATIONS IN EFFECT AT THE TIME OF SUBMISSION OF THE SITE DEVELOPMENT PLAN, WAIVER PETITION APPLICATION OR BUILDING/ GRADING PERMIT APPLICATIONS.
14. FIRE LANES SHOULD BE PROVIDED IN THIS SITE TO ALLOW EMERGENCY VEHICLE ACCESS. EITHER FIRE LANE SIGNAGE SHOULD BE INSTALLED, OR THE CURBS SHOULD BE PAINTED IN RED AND STENCILED TO IDENTIFY THE ROAD AS A FIRE LANE.
15. STORMWATER MANAGEMENT FOR THIS PROJECT IS BEING PROVIDED BY ENVIRONMENTAL SITE DESIGN UTILIZING MICRO–BIORETENTION FACILITIES TO ACCOMMODATE THE TOTAL ESD VOLUME REQUIRED. FACILITIES TO BE PRIVATELY OWNED AND MAINTAINED.
16. THERE IS ONE SPECIMEN TREE WITHIN THE LOD WHICH IS TO BE REMOVED. A WAIVER WILL BE REQUIRED AT SDP PHASE FOR REMOVAL OF THE SPECIMEN TREE.
17. NO RARE, THREATENED OR ENDANGERED SPECIES OR THEIR HABITAT WERE OBSEREVED ON THE PROPERTY.
18. NO GRADING, REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN THE REQUIRED WETLANDS, STREAM(S) OR THEIR BUFFERS, AND FOREST CONSERVATION AREAS.

SITE DATA

LOCATION: COLUMBIA, MD.; TAX MAP 35, BLOCK 21 & 22, P/O PARCEL 145
5TH ELECTION DISTRICT
PRESENT ZONING: PEC
TOTAL PARCEL AREA: 54.80 AC.
TOTAL PROJECT AREA: 0.96 AC. (LOD)
DPZ REFERENCES: SDP–84–255, SDP–84–256, SDP–85–206, SDP–87–032, SDP–87–042, SDP–87–237, SDP–88–42, SDP–88–193, ADP–90–037, SDP–90–116, SDP–94–051, SDP–91–090, SDP–93–024, SDP–93–025, SDP–94–029, SDP–95–014, SDP–95–017, PB–168, PB–267, PB–212, BA–83–54E, BA–85–30E, VP–82–92, VP–84–32, VP–84–70, S–87–36, WP–95–26, WP–00–52, WP–09–227, ECP–12–014, F–10–023, FDP–1, FDP–PEC–1–A, F–13–029.
USE OF STRUCTURE: WAREHOUSE BUILDING
TOTAL EXISTING IMPERVIOUS COVERAGEE: 0.39 AC.
TOTAL PROPOSED IMPERVIOUS COVERAGEE: 0.60 AC.
LIMIT OF DISTURBED AREA: 0.96 AC
WETLANDS ON SITE: 0.00 AC.
WETLAND BUFFERS ON SITE: 0.00 AC.
STREAMS AND THEIR BUFFERS ON SITE: 0.00 AC.
AREA OF ON–SITE 100 YEAR FLOODPLAIN: 0.00 AC.
AREA OF EXISTING FOREST ON SITE: 0.00 AC.
AREA OF STEEP SLOPES (15% OR GREATER): 0.00 AC
AREA OF ERODIBLE SOILS: 0.00 AC.
AREA MANAGED BY ESDV (*THIS PLAN): 42,000 SF OR 0.96 AC (LIMIT OF DISTURBANCE)
REDEVELOPMENT: 50% x 16,900 SF (EXISTING IMPERVIOUS)
NEW DEVELOPMENT: 9,352 SF (NEW IMPERVIOUS)
TOTAL ESDV REQUIRED=2,150 CF

ENVIRONMENTAL SITE DESIGN NARRATIVE

1. THERE IS AN EXISTING INTERMITTENT STREAM LOCATED WEST OF THE PARCEL 'A' PROPERTY LINE. THE STREAM FLOWS TO THE NORTH AND ULTIMATELY CONTRIBUTES TO THE MIDDLE PATUXENT RIVER. THERE ARE POCKETS OF WETLANDS ASSOCIATED WITH THE INTERMITTENT STREAM BUT THE STREAM, WETLANDS AND BUFFERS ARE NOT IMPACTED BY THE PROPOSED IMPROVEMENTS. SINCE THE LIMIT OF DISTURBANCE CONTAINS 40% EXISTING IMPERVIOUS THE SITE QUALIFIES FOR "REDEVELOPMENT". A WETLAND ASSESSMENT WAS PERFORMED AND THERE WERE NO WETLANDS IDENTIFIED IN THE VICINITY OF THE IMPROVEMENTS. THERE ARE NO STEEP SLOPES LOCATED IN THE PROJECT AREA. THERE ARE TWO VICINAL SPECIMEN TREES. SPECIMEN TREE 'A' WILL REMAIN AND IS OUTSIDE THE LIMIT OF DISTURBANCE. SPECIMEN TREE 'B' WILL BE REMOVED TO ACCOMMODATE THE PROPOSED PAVING AND TO MINIMIZE RISK TO THE NEARBY EQUIPMENT.

2. THE SITE AREA SLOPES EAST TO WEST AND CURRENTLY DISCHARGES DIRECTLY TO THE STREAM WITHOUT STORM WATER MANAGEMENT OR TREATMENT. THE PROPOSED GRADING AND ESDV PRACTICES WILL MAINTAIN THE EXISTING FLOW PATTERN.

3. THE REDEVELOPMENT OF THE SUBJECT AREA WILL PROVIDE 1" TREATMENT OF THE EXISTING IMPERVIOUS SURFACE AND FULL ESDV FOR THE NEW IMPERVIOUS SURFACES. THIS IS ACCOMPLISHED BY TWO PROPOSED BIO–RETENTION FACILITIES (M–6) WHICH WILL TREAT THE RUNOFF FROM THE PROPOSED WAREHOUSE BUILDING. THE BIO RETENTION FACILITIES WILL UTILIZE A WEIR OVERFLOW AND A PIPE UNDER DRAIN WHICH WILL DISCHARGE TO THE WEST. THE PROPOSED FACILITIES WILL BE PRIVATELY OWNED AND MAINTAINED.

4. SEDIMENT CONTROL FOR THIS SPECIFIC SITE PLAN WILL BE PROVIDED THROUGH THE USE OF PERIMETER CONTROLS INCLUDING SILT FENCE, SUPER SILT FENCE AND INLET PROTECTION. SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH THE CURRENT REQUIREMENTS AND SHALL BE APPROVED BY THE HOWARD SOIL CONSERVATION DISTRICT.

5. ENVIRONMENTAL SITE DESIGN FOR THIS PROJECT SHALL BE MET THROUGH THE USE OF 2 MICRO BIO RETENTION FACILITIES (M–6).

6. A WAIVER WILL BE REQUIRED FOR THE REMOVAL OF 1 SPECIMEN TREE.

LEGEND

EXISTING CURB AND GUTTER	EXISTING TREELINE
PROPOSED CURB AND GUTTER	PROPOSED TREELINE
EXISTING UTILITY POLE	PROPOSED STORM DRAIN
EXISTING LIGHT POLE	EXISTING STORMDRAIN LINE (SD)
EXISTING MAILBOX	EXISTING GAS LINE (G)
EXISTING SIGN	EXISTING ELECTRIC LINE (E)
EXISTING SANITARY MANHOLE	EXISTING UNDERGROUND LINE (UG)
EXISTING SANITARY LINE (S)	NEW PAVING AREA
EXISTING CLEANOUT (CO)	PROPERTY LINE
EXISTING FIRE HYDRANT (FH)	RIGHT–OF–WAY LINE
EXISTING WATER LINE (W)	EXISTING STREAM
EXISTING FENCE (x)	EXISTING STREAM BUFFER
	EXISTING WETLAND
	EXISTING WETLAND BUFFER

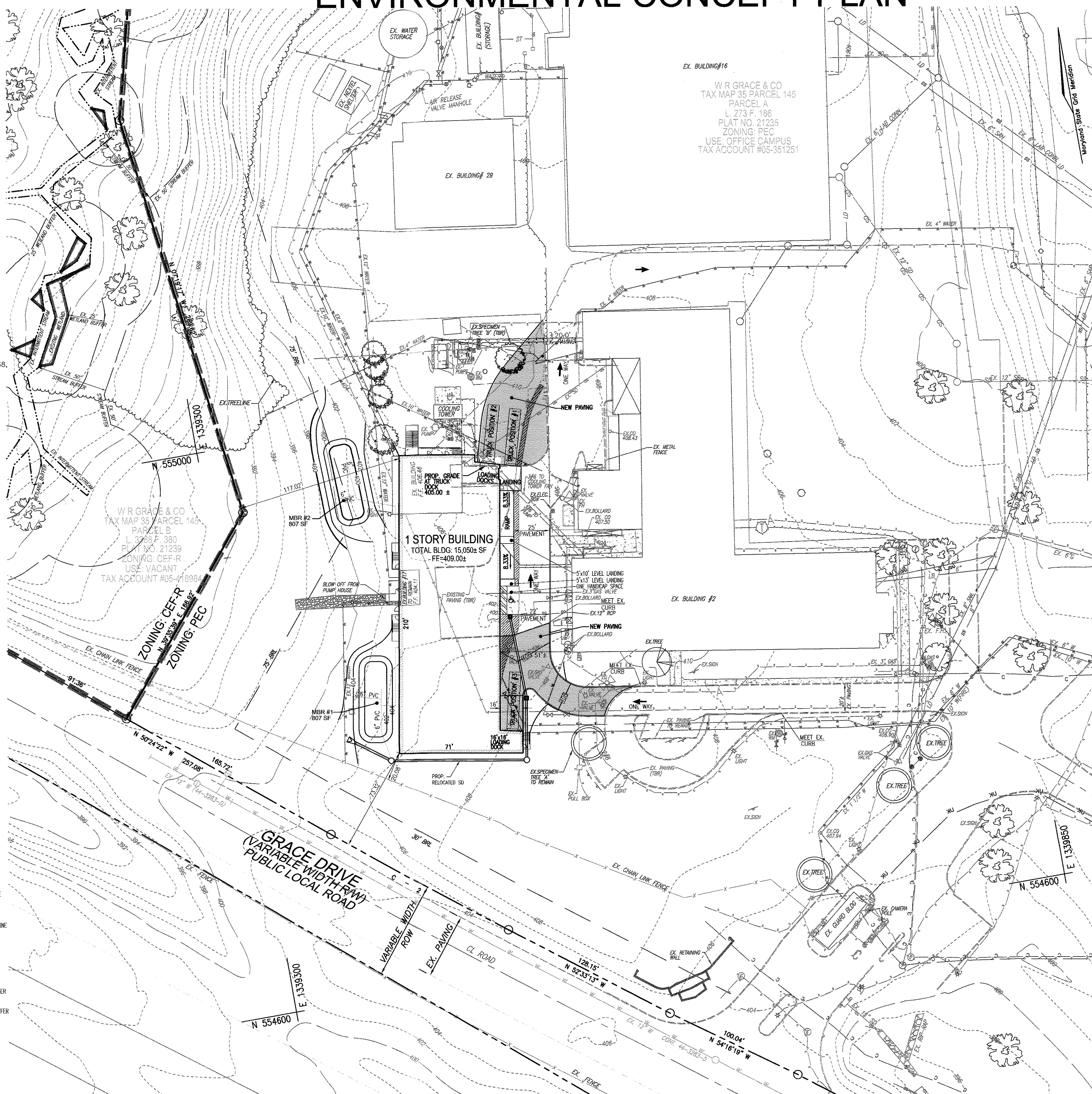
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 7·28·16

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 7·26·16

SHEET INDEX

DESCRIPTION	SHEET NO.
COVER SHEET, ECP PLAN	1 OF 2
SWM DRAINAGE AREA MAP, SWM DETAILS	2 OF 2

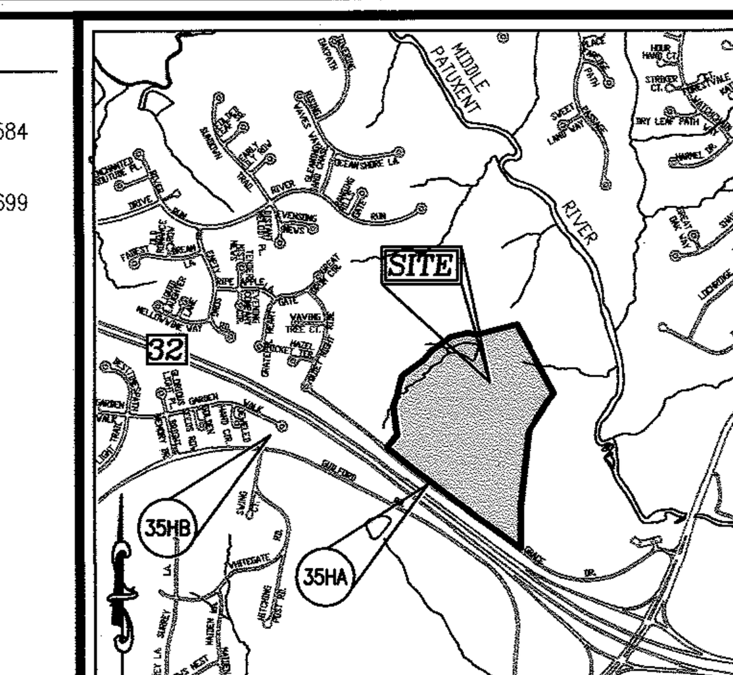


PLAN VIEW
SCALE: 1"=40'

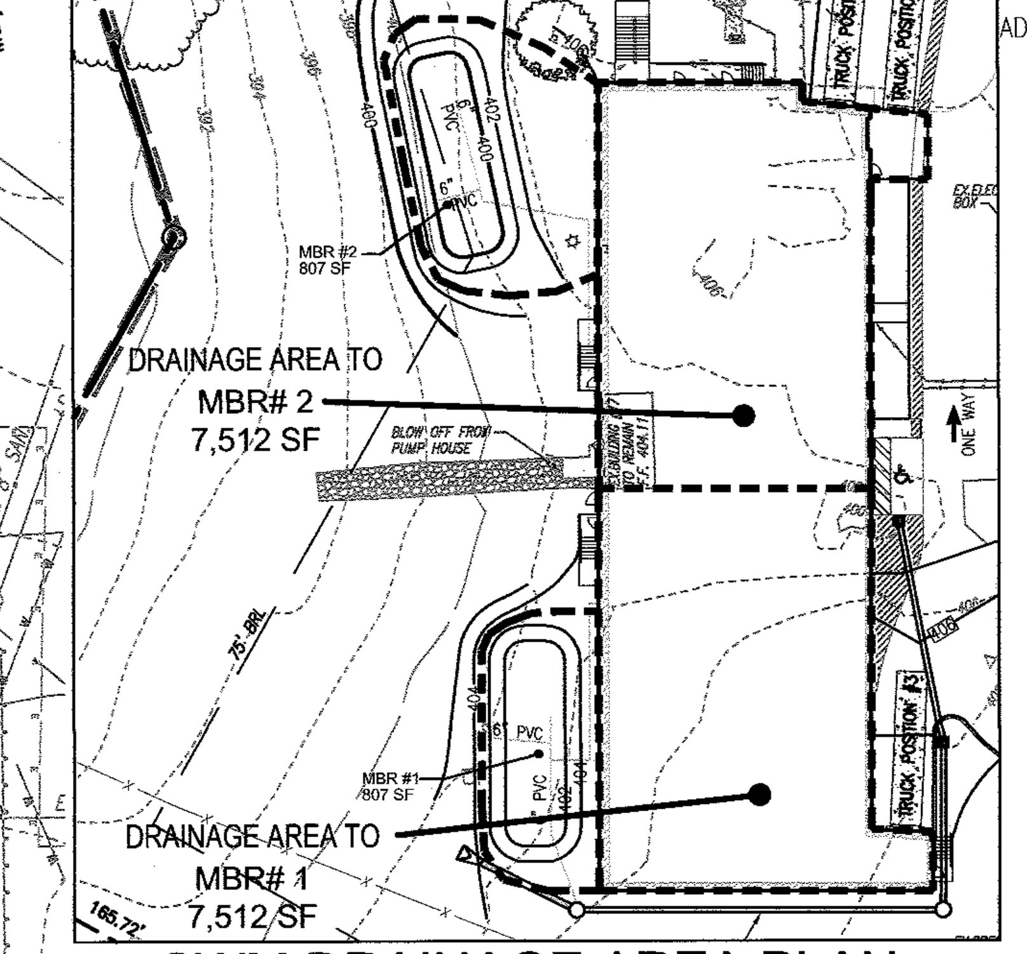
GRAPHIC SCALE 1"=40'

BENCHMARKS

HOWARD COUNTY BENCHMARK 35HA
N 553966.7457 E 1340476.9524 ELEV.: 404.584
HOWARD COUNTY BENCHMARK 35HB
N 554836.4156 E 1337888.3861 ELEV.: 449.699

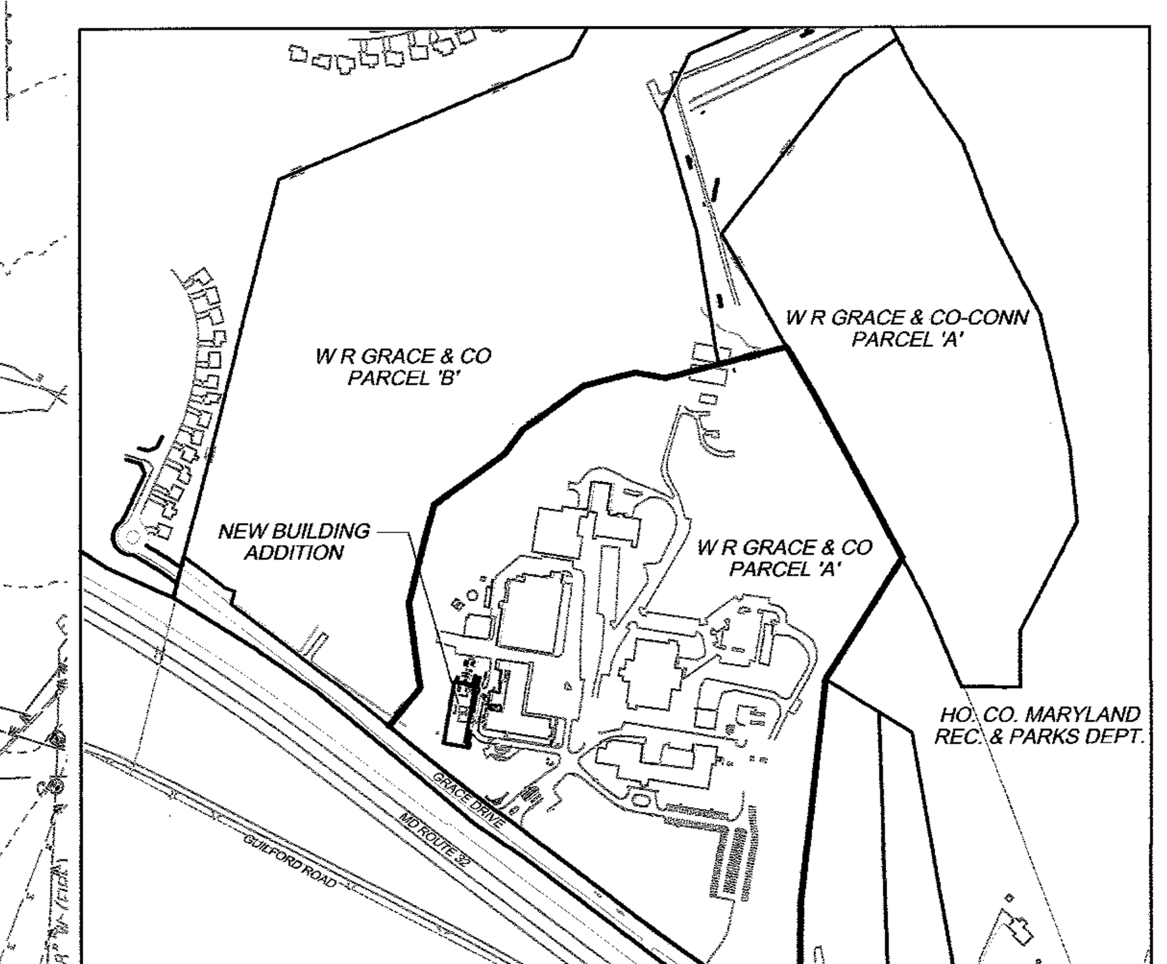


VICINITY MAP
SCALE: 1"=2000'
ADC MAP COORDINATE: 4934 E–9/10, F–9/10 & 5052 F–1



SWM DRAINAGE AREA PLAN
SCALE: 1"=50'

SCALE 1"=50'



LOCATION PLAN (NTS)

OWNER/DEVELOPER

W R GRACE & CO.
7500 GRACE DR
COLUMBIA, MD 21044–4098
(410) 531–4000

NO.	REVISION	DATE

ENVIRONMENTAL CONCEPT PLAN

COVER SHEET

GRACE TECH PARK, PARCEL 'A'
WAREHOUSE BUILDING

TAX MAP: 35 GRID: 21, 22
5TH ELECTION DISTRICT

P/O PARCEL: 145 ZONING: PEC
HOWARD COUNTY, MARYLAND

ROBERT H. VOGEL ENGINEERING, INC.
ENGINEERS • SURVEYORS • PLANNERS
8407 MAIN STREET
ELLICOTT CITY, MD 21043
TEL: 410.461.7666
FAX: 410.461.8961

STATE OF MARYLAND — ROBERT HARRIS VOGEL — No. 16193 — REGISTERED PROFESSIONAL ENGINEER

ROBERT H. VOGEL, PE No.16193

DESIGN BY:	RHV
DRAWN BY:	KG
CHECKED BY:	RHV
DATE:	JUNE 2016
SCALE:	AS SHOWN
W.O. NO.:	15–20

PROFESSIONAL CERTIFICATE

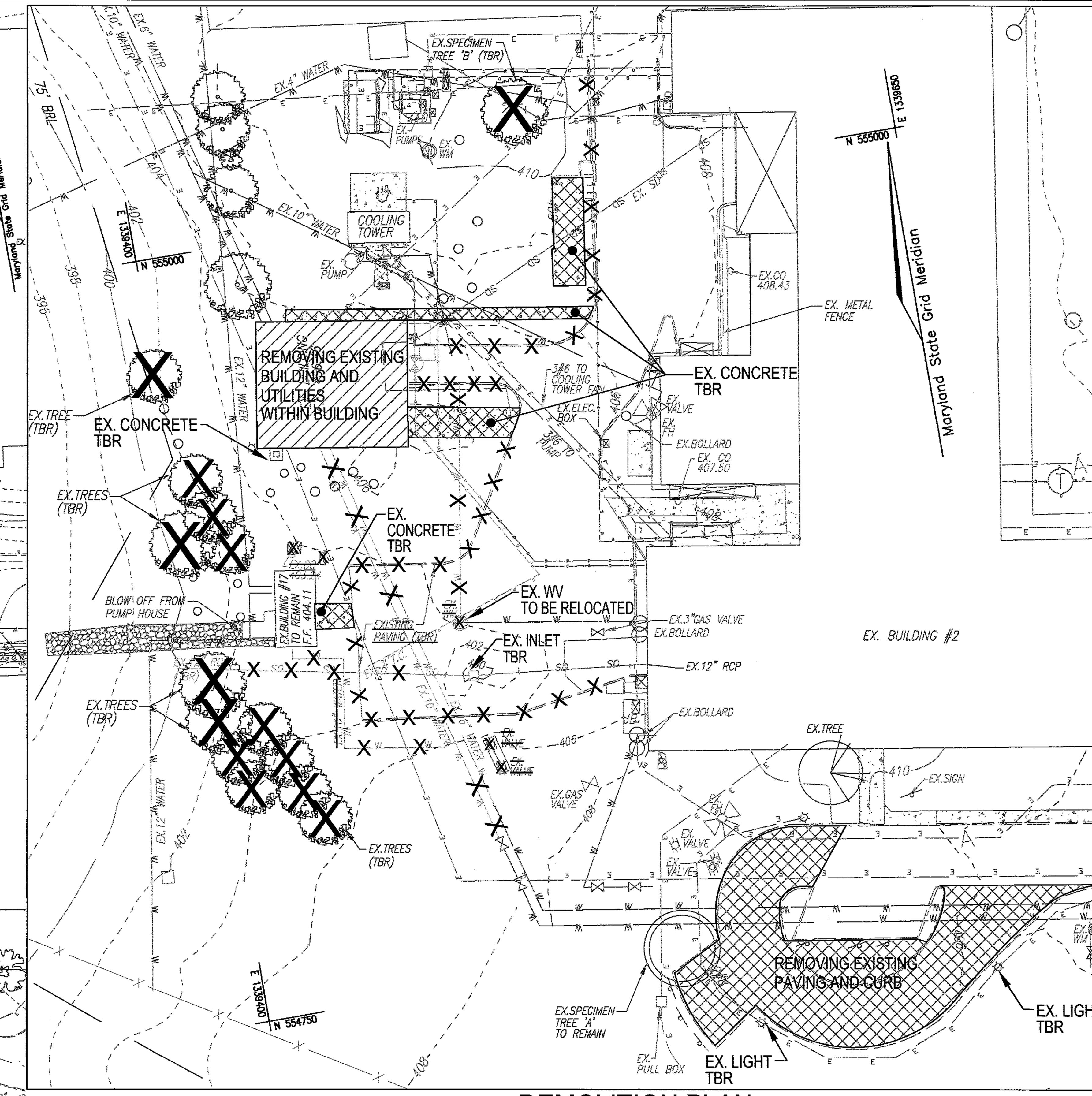
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 16193 EXPIRATION DATE: 09–27–2016

SHEET 1 OF 2

ECP-16-055

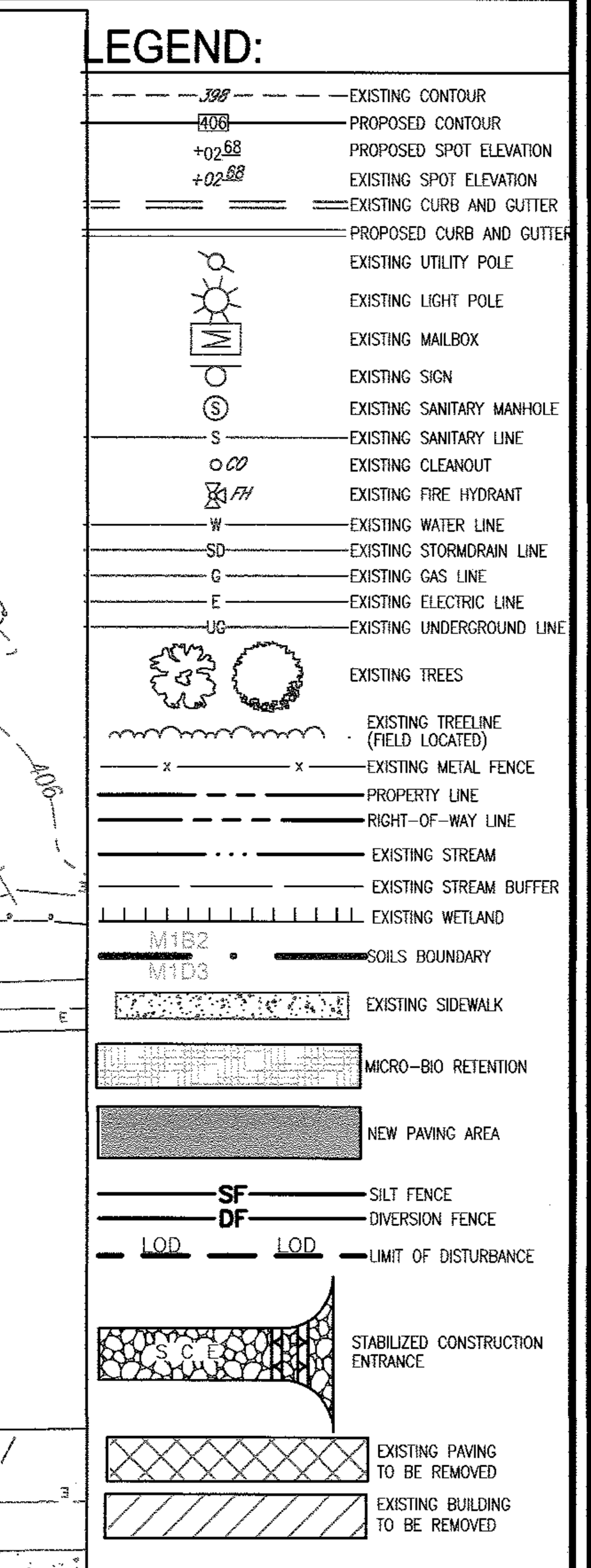
PLAN VIEW

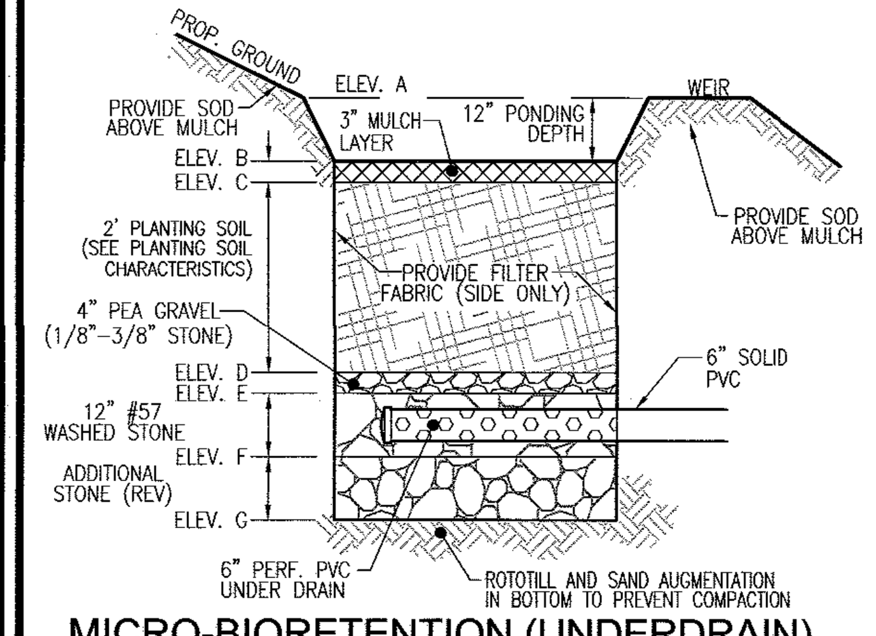
SCALE: 1"=50'



DEMOLITION PLAN

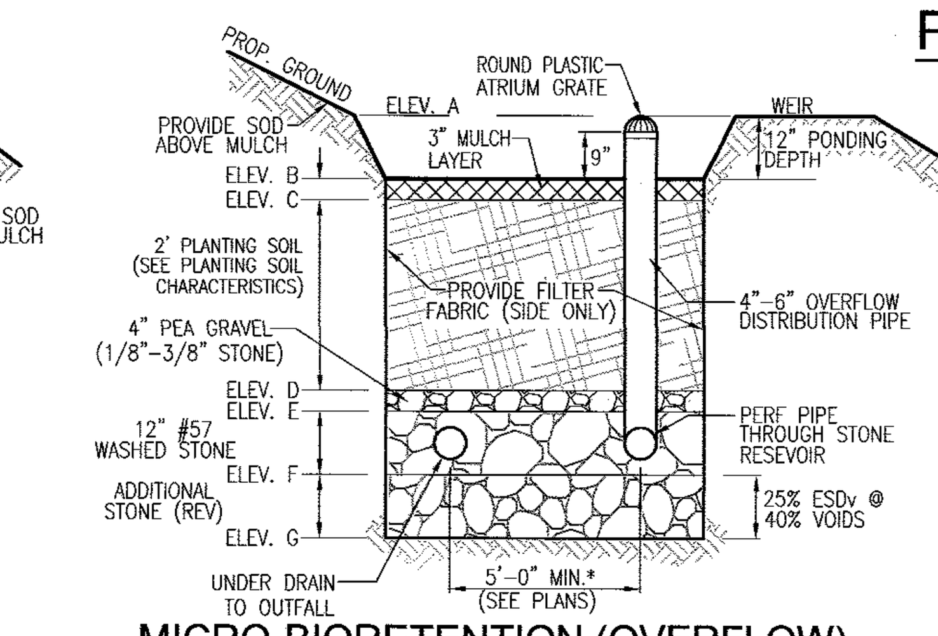
SCALE: 1"=30'





MICRO-BIORETENTION (UNDERDRAIN)

NOT TO SCALE



MICRO-BIORETENTION (OVERFLOW)

NOT TO SCALE

MICRO BIO RETENTION NOTES:

1. 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 THERFORE 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 RESERVOIR OR SPACE PIPE EQUALLY ACROSS BOTTOM FOR SMALL BIOS. (SEE PLANS)

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

[signature] 7-28-16
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE

[signature] 7-26-16
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE

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

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.

SOILS LEGEND
HOWARD COUNTY SOILS MAP #17 & 23

SYMBOL	NAME/DESCRIPTION	SOIL TYPE	ERODIBLE	'K' VALUE	HYDRIC
GgB	GLENELG LOAM, 3-8% SLOPES	B	NO	0.28	NO
GhB	GLENELG-URBAN LAND COMPLEX, 0-8% SLOPES	B	NO	0.28	NO

SOILS NOTE:

HIGHLY ERODIBLE SOILS ARE THOSE SOILS WITH A SLOPE GREATER THAN15 PERCENT OR THOSE SOILS WITH A SOIL ERODIBILITY FACTOR K GREATER THAN 0.35 AND WITH A SLOPE GREATER THAN 5 PERCENT.

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)

1. THE OWNER SHALL MAINTAIN THE PLANT MATERIAL, MULTCH 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 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.

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.

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.

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%).
* 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 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.

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 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 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 BIORETENION 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 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.

NOTES:

1. APPROVAL OF THIS ECP DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED BUILDING AND/OR GRADING PERMIT
2. REVIEW OF THIS PLAN FOR COMPLIANCE WITH ZONING AND SUBDIVISION AND LAND DEVELOPMENT REGULATIONS SHALL OCCUR AT THE PERMIT STAGES; AND THEREFORE, THIS PLAN IS SUBJECT TO ADDITIONAL AND MORE DETAILED COMMENTS AS THE PLAN PROGRESSES THROUGH THE PERMIT PROCESS.
3. THERE IS A CLASS INTERMITTENT STREAM WHICH CROSSES THE NORTHWEST CORNER OF THE SITE AND HAS A 50' STREAM BUFFER. A WETLAND ASSESSMENT FOUND NO WETLANDS ON SITE. THE TOPOGRAPHY DOES NOT RESULT IN ANY STEEP SLOPES. ACCORDING TO CURRENT DFIRM APPROVED BY FEMA AND HOWARD COUNTY, THERE IS NO 100YR FLOODPLAIN LOCATED ON THIS PROPERTY.

OWNER/DEVELOPER

W R GRACE & CO.
7500 GRACE DR
COLUMBIA, MD 21044-4098
(410) 531-4000

NO.	REVISION	DATE

ENVIRONMENTAL CONCEPT PLAN

STORMWATER MANAGEMENT DRAINAGE AREA MAP; SWM DETAILS

GRACE TECH PARK, PARCEL 'A'
WAREHOUSE BUILDING

TAX MAP: 35 GRID: 21, 22 — P/O PARCEL: 145 ZONING: PEC
5TH ELECTION DISTRICT — HOWARD COUNTY, MARYLAND

ROBERT H. VOGEL ENGINEERING, INC.
ENGINEERS • SURVEYORS • PLANNERS
8407 MAIN STREET
ELLICOTT CITY, MD 21043
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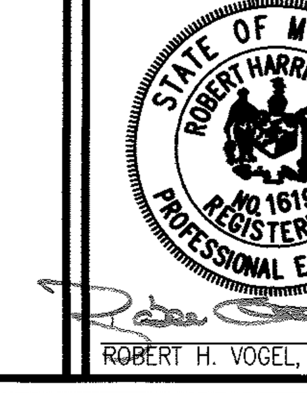
FAX: 410.461.8961



ROBERT H. VOGEL, PE No.16193

DESIGN BY:	RHV
DRAWN BY:	KG
CHECKED BY:	RHV
DATE:	JUNE 2016
SCALE:	AS SHOWN
W.O. NO.:	15-20

PROFESSIONAL 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: 09-27-2016

ECP-16-055