

**GENERAL NOTES**

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS OF HOWARD COUNTY STANDARDS AND SPECIFICATIONS. ALL WORK AND MATERIALS SHALL COMPLY WITH O.S.H.A. STANDARDS.
- 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 CONTRACTOR'S 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.
- THE EXISTING TOPOGRAPHIC INFORMATION FROM HOWARD COUNTY GIS, COUNTY RECORDS, AND A FIELD TOPOGRAPHICAL SURVEY WITH TWO FOOT CONTOUR INTERVALS PERFORMED BY ROBERT H. VOGEL ENGINEERING, INC., DATED AUGUST 24, 2008. EXISTING UTILITIES WERE LOCATED FROM PREVIOUSLY APPROVED ROAD CONSTRUCTION PLAN, FIELD SURVEYS, PUBLIC WATER AND SEWER EXTENSION PLANS AND AVAILABLE RECORD DRAWINGS.
- COORDINATES AND ELEVATIONS ARE BASED ON MARYLAND COORDINATE SYSTEM - NAD83(1991) AS PROJECTED BY HOWARD COUNTY GEODETIC CONTROL STATIONS 34C2 (DESTROYED), UPDATED 0044, AND 0013.
- THE PROPERTY LINES SHOWN HEREON IS BASED ON RECORD PLAT 18119 AND A FIELD RUN BOUNDARY SURVEY PERFORMED BY MARKS-VOGEL ASSOCIATES, INC., DATED ON OR ABOUT MARCH 1993.
- ALL ELEVATIONS ARE TO FLOWLINE/BOTTOM OF CURB UNLESS OTHERWISE NOTED.
- THE GEOTECHNICAL ENGINEER TO CONFIRM PAVING SECTION PRIOR TO CONSTRUCTION. ALL PAVING TO BE PERFORMED PER GEOTECHNICAL RECOMMENDATIONS.
- THE SUBJECT PROPERTY IS ZONED B-2 PER THE OCTOBER 6, 2013 COMPREHENSIVE ZONING PLAN.
- PUBLIC WATER AVAILABLE THROUGH CONTRACT 44-3323-D, 44-4168-D. PUBLIC SEWER AVAILABLE THROUGH CONTRACT 30-3687-D.
- THERE ARE NO BURIAL GROUNDS, CEMETERIES, OR HISTORIC STRUCTURES LOCATED ON THIS PROPERTY.
- THERE IS NO 100YR FLOODPLAIN, WETLANDS, WETLAND BUFFERS, STREAMS, OR STREAM BUFFERS, OR STEEP SLOPES ON SITE.
- ANY EXISTING STREET TREES DAMAGED OR DESTROYED DURING CONSTRUCTION WILL BE REPLACED BY THE CONTRACTOR.
- THERE ARE NO SPECIMEN OR CHAMPION TREES WITHIN THE LUD.
- THE FOREST CONSERVATION REQUIREMENTS FOR PARCELS E-4 AND E-6 ARE PROVIDED IN CONJUNCTION WITH F-01-029. THE REQUIREMENT WAS FULFILLED WITH THE PURCHASE OF 5.28 ACRES OF AFFORESTATION CREDIT AT THE WINKLER FOREST MITIGATION BANK.
- 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.
- LANDSCAPING NOT PERMITTED WITHIN 7'-1/2' OF EACH SIDE OF THE FIRE DEPARTMENT CONNECTION. PROVIDE A CLEAR UNOBSTRUCTED ACCESS PATH TO THE FIRE DEPARTMENT CONNECTION. NFPA-1 131.4
- 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.
- ALL SIGN POSTS USED FOR TRAFFIC CONTROL SIGNS INSTALLED IN THE COUNTRY 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.
- ALL EXTERIOR LIGHTING TO COMPLY WITH THE REQUIREMENTS FOUND IN ZONING SECTION 134 OF THE HOWARD COUNTY ZONING REGULATIONS.
- STREET LIGHT PLACEMENT AND THE TYPE OF FIXTURE AND POLE SHALL BE IN ACCORDANCE WITH THE HOWARD COUNTY DESIGN MANUAL, VOLUME III (2006), SECTION 5.5.A. A MINIMUM OF 20' SHALL BE MAINTAINED BETWEEN ANY STREET LIGHT AND ANY TREE.
- STORMWATER MANAGEMENT FOR THIS PROJECT IS BEING PROVIDED BY ENVIRONMENTAL SITE DESIGN UTILIZING MICRO-BIOTENTION FACILITIES AND POROUS PAVING (WITH ADDITIONAL STONE DEPTH) TO ACCOMMODATE THE TOTAL ESD VOLUME REQUIRED. SWM FACILITIES TO BE PRIVATELY OWNED AND MAINTAINED.
- ALL ROOF LEADERS TO DRAIN INTO STORM DRAIN SYSTEM.
- TRASH AND RECYCLING COLLECTION TO BE PRIVATE.
- THE PROPOSED BUILDING WILL HAVE AN AUTOMATIC FIRE PROTECTION SPRINKLER SYSTEM.
- THE SUBJECT PROPERTY DOES NOT CONTAIN ANY ENVIRONMENTAL FEATURES, THEREFORE THERE IS NO DISTURBANCE TO ENVIRONMENTAL FEATURES.
- SIGNAGE SHALL BE PROVIDED ON THE BUILDING IDENTIFYING THE BUILDING ADDRESS, AND EACH SUITE SEPARATED BY LETTER.

# ANTWERPEN HYUNDAI

## PARCEL E-4 & E-6, HOLWECK SUBDIVISION

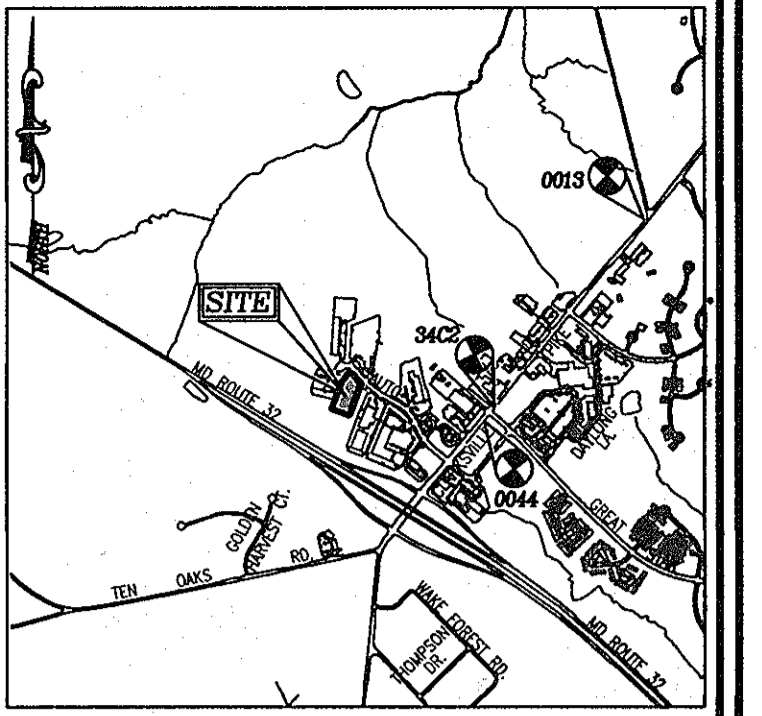
### E-4: L.9929/F.90; E-6 L.14177/F.86

### ZONED: B-2

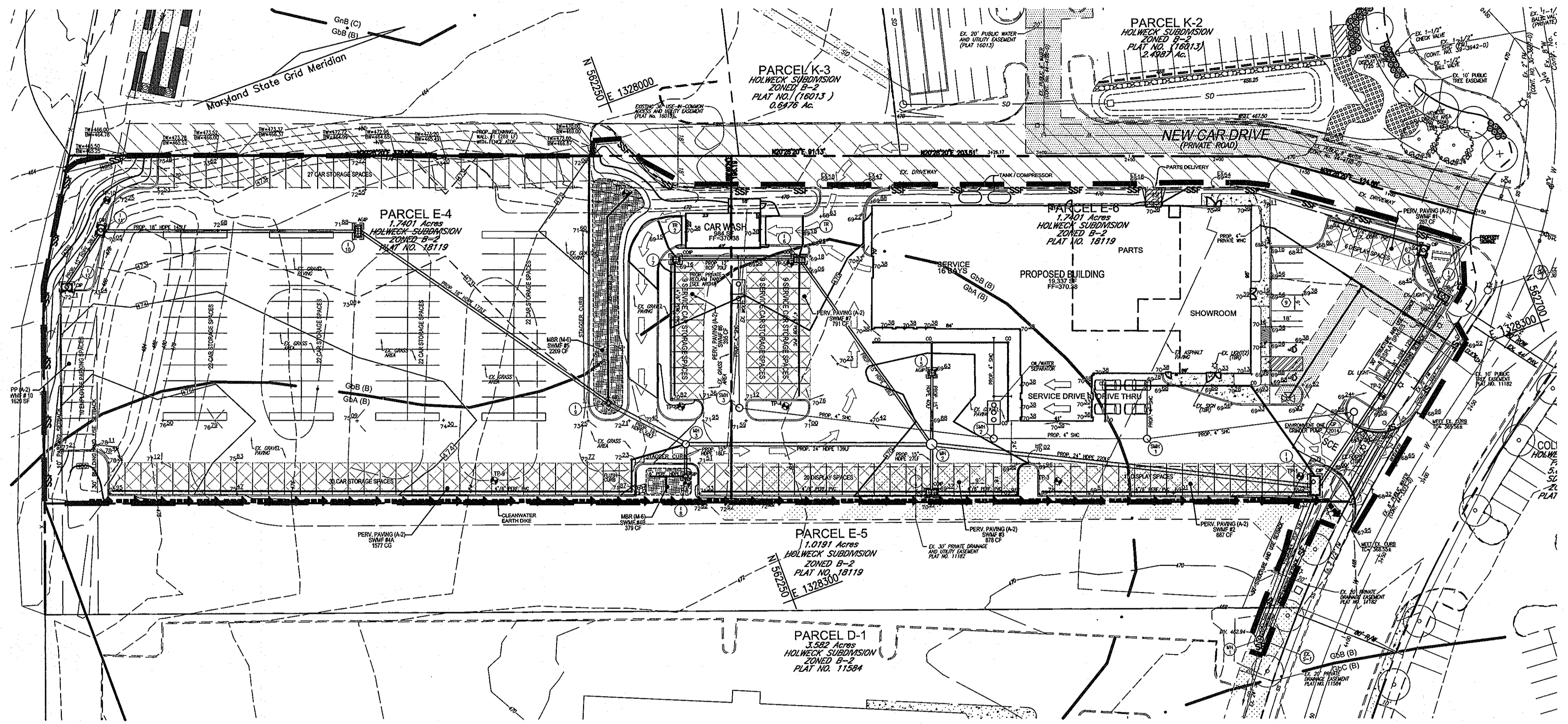
# ENVIRONMENTAL CONCEPT PLAN

**BENCHMARKS**

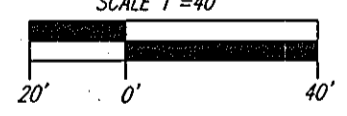
HOWARD COUNTY BENCHMARK 34C2 (DESTROYED)	N 562321.798	E 1329750.722	
UPDATED HOWARD COUNTY BENCHMARK 0044 (CONC. MON.)	N 562176.476	E 1329641.868	ELEV. 485.252
HOWARD COUNTY BENCHMARK 0013 (CONC. MON.)	N 561285.946	E 1331309.715	ELEV. 484.671



VICINITY MAP  
SCALE: 1"=2000'  
ADC MAP COORDINATE: 31/01



PLAN VIEW  
SCALE: 1"=40'



**SITE DATA**

LOCATION : CLARKSVILLE, MD.;  
TAX MAP 34, BLOCK 6, PARCEL 365, PARCELS E-4 & E-6  
5TH ELECTION DISTRICT  
PRESENT ZONING : B-2  
PARCEL AREA : 3.4802 AC. (E-4: 1.7401 AC.; E-6 1.7401 AC.)  
DPZ REFERENCES : F-94-38; F-98-144; F-99-205; SP-93-14; WP-93-90; ZB-947M;  
ZB-1008M; F-01-29; WP-03-41; PLAT 18119; F-06-079;  
WP-06-108; WP-07-004; SDP-07-019

USE OF STRUCTURES:  
BUILDING A - AUTO RETAIL SALES & SERVICE (19266.67 SF/0.4423 AC.)  
BUILDING B - CAR WASH (800 SF/0.184 AC.)  
BUILDING COVERAGE:  
BUILDING A: 19,267 SF (0.442 AC. OR 12.70%)  
BUILDING B: 800 SF (0.018 AC. OR 0.53%)  
TOTAL: 20,067 SF (0.46 AC. OR 13.22% OF GROSS AREA)  
PAVED PARKING LOT/AREA ON SITE: 99,745 SF (2.291 AC. OR 65.82% OF GROSS AREA)  
AREA OF LANDSCAPE ISLAND: 9,703 SF (0.223 AC. OR 6.41% OF GROSS AREA)  
LIMIT OF DISTURBED AREA: 3.33 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): 1.54 AC.  
\*IMPERVIOUS AREA : 1.32 AC.  
\*GREEN AREA: 0.22 AC.

**ENVIRONMENTAL SITE DESIGN NARRATIVE**

- THE PROPERTY DOES NOT CONTAIN ANY FOREST, WETLANDS, STREAMS OR 100 YEAR FLOODPLAIN. THERE ARE NO ENVIRONMENTAL FEATURES IMPACTED AND THE CONCEPT PLAN PROVIDES FOR THE SAFE DISCHARGE OF THE TREATED RUNOFF.
- THE SITE GENERALLY SLOPES FROM SOUTHWEST TO NORTHEAST. THE PROPOSED DEVELOPMENT WILL HAVE NO CHANGE IN THE EXISTING CHARACTER OF THE EXISTING NATURAL FLOW PATTERNS.
- THE CONCEPTUAL REDUCTION IN IMPERVIOUS AREA THROUGH BETTER SITE DESIGN IS ACHIEVED THROUGH THE ENVIRONMENTAL SITE DESIGN (ESD) FOR THE PROJECT TO THE MAXIMUM EXTENT PRACTICABLE (MEP). THE ESD CONCEPT PROPOSES THE USE OF A MICRO-BIOTENTION FACILITIES (M-6) AND PERVIOUS PAVING (A-2), THE MBS (M-2) AND PERVIOUS PAVING (A-2) WILL DISCHARGE INTO THE EXISTING STORM DRAIN SYSTEM. THE PROPOSED ESD PRACTICES SHALL BE PRIVATELY OWNED AND MAINTAINED.
- SEDIMENT CONTROL FOR THIS SPECIFIC SITE PLAN WILL BE PROVIDED THROUGH THE USE OF PERIMETER CONTROLS (SILT FENCE, SUPER SILT FENCE & EARTH DIKES) AND INLET PROTECTION. SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH THE CURRENT REQUIREMENTS AND SHALL BE APPROVED BY THE HOWARD SOIL CONSERVATION DISTRICT.
- AS STATED IN #3 ABOVE, STORMWATER MANAGEMENT FOR THE PROJECT SHALL BE MET THROUGH THE USE OF A MICRO BIOTENTION FACILITY (M-6) AND PERVIOUS PAVING (A-2).
- NO WAIVERS ARE ANTICIPATED TO FULFILL THIS CONCEPT.

**LEGEND**

EXISTING CONTOUR	EXISTING FENCE
PROPOSED CONTOUR	PROPERTY LINE
EXISTING CURB AND GUTTER	RIGHT-OF-WAY LINE
PROPOSED CURB AND GUTTER	SOILS BOUNDARY
EXISTING UTILITY POLE	LIMIT OF DISTURBANCE
EXISTING LIGHT POLE	PROPOSED SIDEWALK
EXISTING MAILBOX	EXISTING TREELINE
EXISTING SIGN	PROPOSED TREELINE
EXISTING SANITARY MANHOLE	PROPOSED STORM DRAIN
EXISTING SANITARY LINE	PROPOSED STORM DRAIN INLET
EXISTING CLEANOUT	PROPOSED PERMEABLE PAVEMENT
EXISTING FIRE HYDRANT	
EXISTING WATER LINE	

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Chad Elmer* 2-7-14  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

*Val J. Landwehr* 2/04/14  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

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

**OWNER/PETITIONER**  
ANTOY LLC  
12420 AUTO DRIVE  
CLARKSVILLE, MD. 21029  
(410) 531-5700

NO.	REVISION	DATE

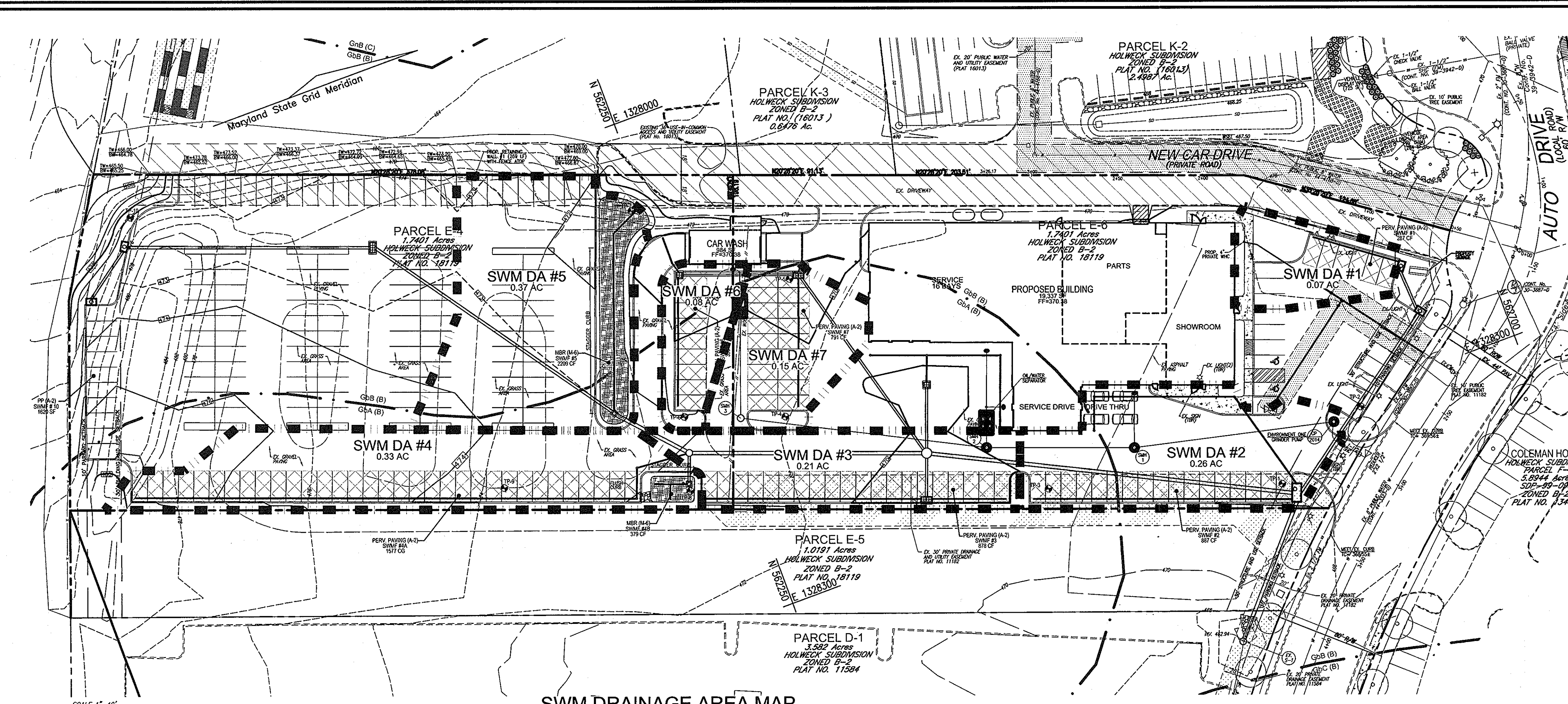
ENVIRONMENTAL CONCEPT PLAN  
**COVER SHEET AND ENVIRONMENTAL CONCEPT PLAN**  
ANTWERPEN HYUNDAI  
PARCEL E-4 & E-6, HOLWECK SUBDIVISION  
E-4: L.9929/F.90; E-6 L.14177/F.86  
TAX MAP 34 BLOCK 06 5TH ELECTION DISTRICT  
ZONED: B-2  
PARCEL 365 HOWARD COUNTY, MARYLAND

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

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 NUMBER 16183 EXPIRATION DATE: 09-27-2014

DESIGN BY: DZE  
DRAWN BY: DZE/JER  
CHECKED BY: RHY  
DATE: JAN 2014  
SCALE: AS SHOWN  
S.W.O. NO.: 12-48

1 SHEET OF 2



**SWM DRAINAGE AREA MAP**  
SCALE: 1" = 40'

**Table B.4.1 Materials Specifications for Micro-Bioretentation, Rain Gardens & Landscape Infiltration**

Material	Specification	Size	Notes
Planting soil	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%) & 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)	n/a	
Mulch	shredded hardwood	n/a	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	FE Type 1 nonwoven
Gravel (underdrains and infiltration berm)	AASHTO M-43	NO. 57 OR NO. 6 AGGREGATE (1/2" 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 underdrain pipes. Performed pipe shall be wrapped with 1/4-inch galvanized hardware cloth.
Placed in place concrete (if required)	MSEA Min No. 3, F = 3000 psi @ 28 days, normal weight, air-entrained, reinforcing to meet ASTM-A615-60	n/a	on-site testing of placed-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 standard requires design drawings sealed and approved by a professional structural engineer licensed in the State of Maryland - design to include meeting ACI Code 308.8R99; vertical loading (10-10 or 10-20); allowable horizontal loading based on soil pressures; and analysis of potential cracking. Sand substitutions such as Dishase and Graystone (AASHTO) #10 are not acceptable. No calcium sulfonated or diatomic sand substitutions are acceptable. No "rock dust" can be used for sand.
Sand	AASHTO-M-6 or ASTM-C-33	0.075" to 0.04"	

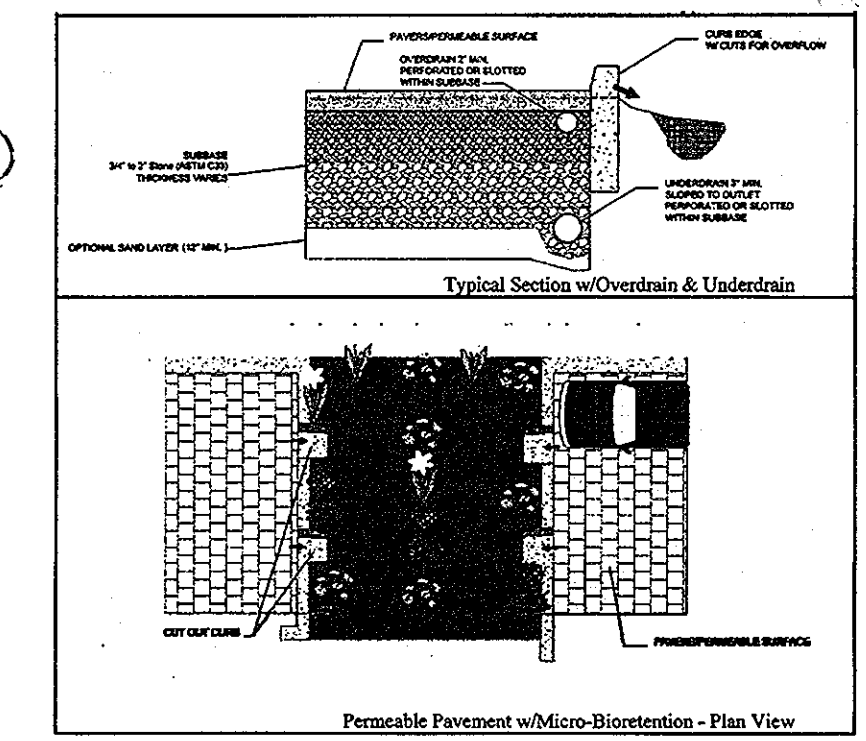
**LEGEND:**

- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED SPOT ELEVATION
- EXISTING SPOT ELEVATION
- EXISTING CURB AND GUTTER
- PROPOSED CURB AND GUTTER
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING MAILBOX
- EXISTING SIGN
- EXISTING SANITARY MANHOLE
- EXISTING SANITARY LINE
- EXISTING CLEANOUT
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN INLET
- EXISTING TREES (FIELD LOCATED)
- EXISTING TREELINE (FIELD LOCATED)
- EXISTING FENCE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- SOILS BOUNDARY
- PROPOSED SIDEWALK
- PROPOSED PERMEABLE PAVEMENT

**ANTWERPEN HYUNDAI**

Pe = 2.60  
ESDv = (Pe/Rv)A/12  
Rv = 0.05(0.009A)<sup>0.2</sup>  
Vmin = L\* rainfall  
Vmax = 1yr rainfall \* 2.6'

DA	% IMPERV	Rv	DA	ESDv	MINIMUM REQ. VOLUME	MAXIMUM VOLUME	VOLUME PROVIDED*	IMPERV AREA	GREEN AREA	
1	69	0.67	0.10	621	239	621	287	0.068	0.051	
2	91	0.87	0.26	2161	831	2161	887	0.240	0.024	
3	93	0.89	0.21	1743	670	1743	878	0.194	0.015	
4	85	0.82	0.33	2511	966	2511	1956	0.277	0.049	
5	81	0.78	0.37	2736	1052	2736	2209	0.301	0.071	
6	73	0.71	0.48	3531	212	3531	395	0.060	0.022	
7	93	0.88	0.15	1268	488	1268	791	0.141	0.011	
<b>TOTAL ESDv BY SUBAREA</b>					<b>11590</b>	<b>4458</b>	<b>11590</b>	<b>7403</b>	<b>1.281</b>	<b>0.223</b>



**PERMEABLE PAVEMENT (A-2) DETAIL**  
NOT TO SCALE

DA	% IMPERV	Rv	DA	ESDv	MINIMUM REQ. VOLUME	MAXIMUM VOLUME	VOLUME PROVIDED*	IMPERV AREA	GREEN AREA
1	69	0.67	0.10	621	239	621	287	0.068	0.051
2	91	0.87	0.26	2161	831	2161	887	0.240	0.024
3	93	0.89	0.21	1743	670	1743	878	0.194	0.015
4	85	0.82	0.33	2511	966	2511	1956	0.277	0.049
5	81	0.78	0.37	2736	1052	2736	2209	0.301	0.071
6	73	0.71	0.48	3531	212	3531	395	0.060	0.022
7	93	0.88	0.15	1268	488	1268	791	0.141	0.011

\* Provided Volume is less than ESDv Require because Micro-Bioretentation utilized in each subarea at the rate of 75%.

**OPERATION AND MAINTENANCE SCHEDULE FOR LANDSCAPE 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, 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.

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.

**OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED PERMEABLE PAVEMENT (A-2)**

1. THE OWNER SHALL PERIODICALLY SWEEP (OR VACUUM POROUS CONCRETE PAVEMENT) THE PAVEMENT SURFACES TO REDUCE SEDIMENT ACCUMULATION AND ENSURE CONTINUED SURFACE POROSITY. SWEEPING SHOULD BE PERFORMED AT LEAST TWICE ANNUALLY WITH A COMMERCIAL CLEANING UNIT, WASHING OR COMPRESSED AIR UNITS SHOULD NOT BE USED TO PERFORM SURFACE CLEANING.

2. THE OWNER SHALL PERIODICALLY CLEAN DRAINAGE PIPES, INLETS, STONE EDGE DRAINS AND OTHER STRUCTURES WITHIN OR DRAINING TO THE SUBBASE.

3. THE OWNER SHALL USE DECISERS IN MODERATION. DECISERS SHOULD BE NON-TOXIC AND BE APPLIED EITHER AS CALCIUM MAGNESIUM ACETATE OR AS PHTHIC ACID.

4. THE OWNER SHALL ENSURE SNOW PLOWING IS PERFORMED CAREFULLY WITH BLADES SET ONE INCH ABOVE THE SURFACE. PLOWED SNOW PILES AND SNOWMELT SHOULD NOT BE DIRECTED TO PERMEABLE PAVEMENT.

**SOILS LEGEND**  
HOWARD COUNTY SOILS MAP #16

SYMBOL	NAME / DESCRIPTION	GROUP
GbA	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES	B
GbB	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES	B

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Chad E. Johnson* 2-7-14  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

*K. J. St. John* 2/24/14  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

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

1. MATERIAL SPECIFICATIONS AND INSTALLATION. THE DESIGNER IS RESPONSIBLE FOR THE AVAILABLE 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 HINDERANCE 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 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 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 UNDERDRAIN. IF PRACTICES ARE EXCAVATED USING LOADERS, THE CONTRACTOR SHOULD USE WIDE TRACK OR MARSH TRACK EQUIPMENT OR LIGHT EQUIPMENT WITH TURF TIRE TYRES. USE OF EQUIPMENT WITH NARROW TRACKS OR NARROW TYRES, RUBBER TYRES WITH LARGE LUGS, OR HIGH-PRESSURE TIRES, CAN 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 RIPPER, BACKLIFTOR. THESE TILLING OPERATIONS ARE TO RESTRUCTURE 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.

ROTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENTION FACILITY BEFORE BACKFILLING THE OPTIONAL SAND LAYER. PUMP ANY POWDED WATER BEFORE PREPARING (ROTILLING) 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". SHREDED OR CHIPPED HARDWOOD MULCH IS THE ONLY ACCEPTED MULCH. FINE MULCH AND WOOD CHIPS WILL FLOAT AND MOVE TO THE PERIMETER OF THE BIORETENTION AREA. DURING A STORM EVENT AND ARE NOT ACCEPTABLE. SHREDED MULCH MUST BE WELL AGED (6 TO 12 MONTHS) FOR ACCEPTANCE. ROOTSTOCK OF THE PLANT MATERIAL SHALL BE KEPT MOST DURING TRANSPORT AND ON-SITE STORAGE. THE PLANTING SOIL SHOULD BE PLANTED SO 1/8TH OF THE DRAIN IS ABOVE FINE, GRADE SURFACE. THE DIAMETER OF THE PLANTING PIT SHALL BE AT LEAST SIX INCHES LARGER THAN THE DIAMETER OF THE PLANTING SET AND MAINTAIN THE STRAIGHT THROUGH 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 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 DEFERS, 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 (ASTM F 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 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 1,000 SQUARE FEET) TO PROVIDE A CLEAN-OUT POINT 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.

**B.4.B SPECIFICATIONS FOR PERMEABLE PAVEMENTS & REINFORCED TURF**

THESE SPECIFICATIONS INCLUDE INFORMATION ON ACCEPTABLE MATERIALS FOR TYPICAL APPLICATIONS AND ARE NOT EXCLUSIVE OR LIMITING. THE DESIGNER IS RESPONSIBLE FOR DEVELOPING SPECIFICATIONS FOR INDIVIDUAL PROJECTS AND SPECIFIC CONDITIONS.

1. PERVIOUS CONCRETE SPECIFICATIONS. DESIGN THICKNESS - PERVIOUS CONCRETE APPLICATIONS SHALL BE DESIGNED SO THAT THE THICKNESS OF THE CONCRETE SLAB SHALL SUPPORT THE TRAFFIC AND VEHICLE TYPES THAT WILL BE CARRIED. APPLICATIONS MAY BE DESIGNED USING EITHER STANDARD PAVEMENT PROCEDURES (E.G., AASHTO, ACI 308.8R, ACI 308.8R) OR USING STRUCTURAL VALUES DERIVED FROM FLEXIBLE PAVEMENT DESIGN PROCEDURES.

MIX & INSTALLATION - TRADITIONAL PORTLAND CEMENTS (ASTM C 150, C 1157) MAY BE USED IN PERVIOUS CONCRETE APPLICATIONS. PHOSPHORUS ADMIXTURES MAY ALSO BE USED. MATERIALS SHOULD BE TESTED (E.G., TRIAL BATCHING) PRIOR TO CONSTRUCTION SO THAT CRITICAL PROPERTIES (E.G., SETTING TIME, RATE OF STRENGTH DEVELOPMENT, POROSITY, FERTILIZABILITY) CAN BE DETERMINED.

AGGREGATE - PERVIOUS CONCRETE CONTAINS A LIMITED FINE AGGREGATE CONTENT. COMMONLY USED GRADATIONS INCLUDE ASTM C 33 NO. 87 (3/4" IN. TO NO. 4); NO. 8 (3/8" IN. TO NO.16) AND NO. 89 (3/8" IN. TO NO.50) SIEVES. SINGLE-SIZED AGGREGATE (UP TO 1 INCH) MAY ALSO BE USED.

WATER IMPORTANT - WATER-TO-CEMENT RATIOS BETWEEN 0.27 AND 0.30 ARE USED ROUTINELY WITH PROPER INCLUSION OF CHEMICAL ADMIXTURES. WATER QUALITY SHOULD MEET ACI 308.8. AS A GENERAL RULE, POTABLE WATER SHOULD BE USED ALTHOUGH RECYCLED CONCRETE PRODUCTION WATER MEETING ASTM C 94 OR AASHTO M 157 MAY ALSO BE USED.

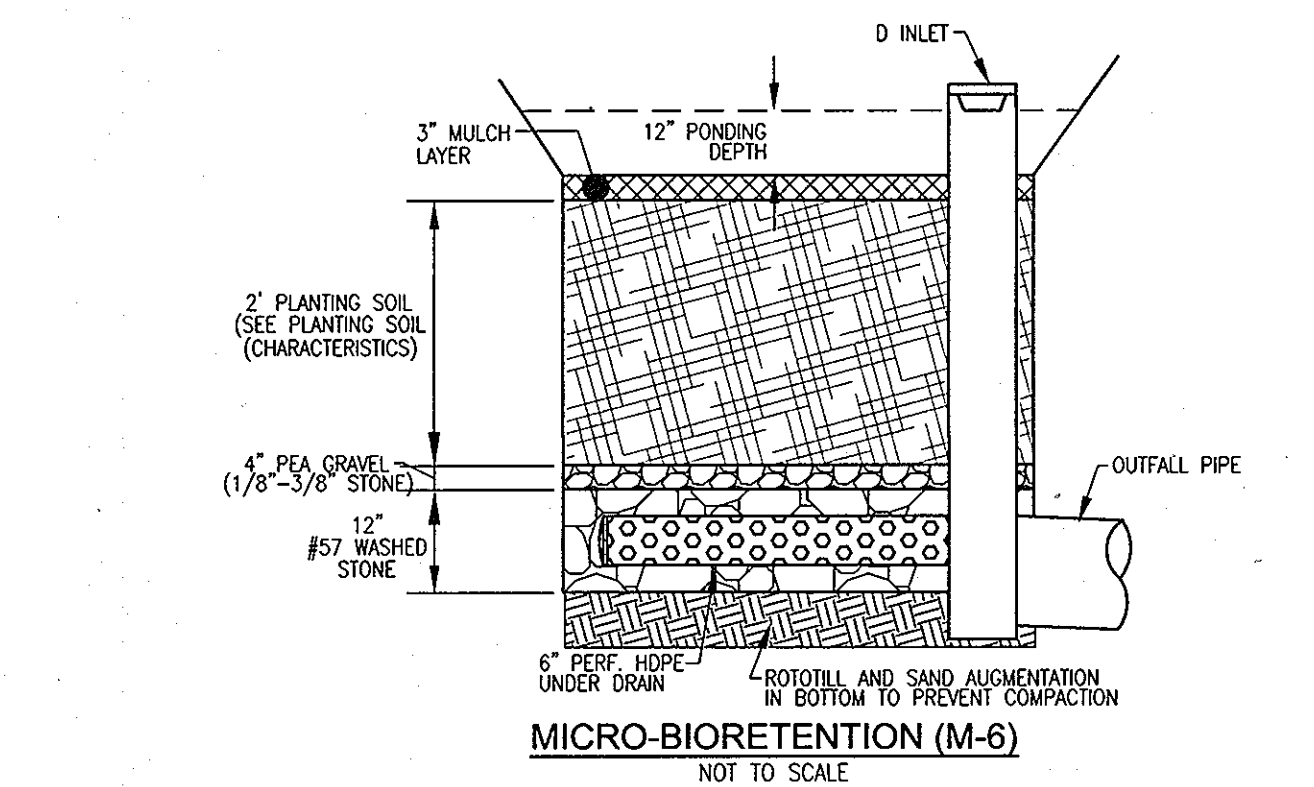
ADMIXTURES - CHEMICAL ADMIXTURES (E.G., RETARDERS OR HYDRATION-STABILIZERS) ARE USED TO OBTAIN SPECIAL PROPERTIES IN PERVIOUS CONCRETE. USE OF ADMIXTURES SHOULD MEET ASTM C 494 (CHEMICAL ADMIXTURES) AND ASTM C 260 (AIR ENTRAINING ADMIXTURES) AND CLOSELY FOLLOW MANUFACTURER'S RECOMMENDATIONS. BASE COURSE - THE BASE COURSE SHALL BE AASHTO NO. 3 OR 4 COURSE AGGREGATE WITH AN ASSUMED OPEN PORE SPACE OF 30% (n=0.30).

2. PERMEABLE INTERLOCKING CONCRETE PAVEMENTS (PICP). PAVEMENT BLOCKS - BLOCKS SHOULD BE EITHER 3/4" OR 4 IN. THICK, AND MEET ASTM C 936 OR CSA A231.2 REQUIREMENTS. APPLICATIONS SHOULD HAVE 20% OR MORE (40% PREFERRED) OF THE SURFACE AREA OPEN. INSTALLATION SHOULD FOLLOW MANUFACTURER'S INSTRUCTIONS, EXCEPT THAT INFILL AND BASE COURSE MATERIALS AND DIMENSIONS SPECIFIED IN THIS APPENDIX SHALL BE FOLLOWED.

INFILL MATERIALS AND LEVELING COURSE - OPENINGS SHALL BE FILLED WITH ASTM C-33 GRADED SAND OR SANDY LOAM. PICP BLOCKS SHALL BE PLACED ON A ONE-INCH THICK LEVELING COURSE OF ASTM C-33 SAND.

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 1-3/4" THICK WITH A LOAD CAPACITY CAPABLE OF SUPPORTING THE TRAFFIC AND VEHICLE TYPES THAT WILL BE CARRIED.



**MICRO-BIORETENTION (M-6)**  
NOT TO SCALE

**ENVIRONMENTAL SITE DESIGN PRACTICE**

DRAINAGE AREA #	AREA TREATED	FACILITY NUMBER	PERMEABLE PAVEMENT (A-2)	ADD UNDER PAVE (A-2)	PERVIOUS SIDEWALK (A-2)	LANDSCAPE INFILTRATION (M-3)	SWALE (M-8)	TRENCH (M-6)	ADD UNDER MBR (M-6)	ESDv VOLUME	
1	3195	SWM#1	191	96	0	0	0	0	0	287	
		SUBTOTAL 1	191	96	0	0	0	0	0	287	
2	11465	SWM#2	540	347	0	0	0	0	0	887	
		SUBTOTAL 2	540	347	0	0	0	0	0	887	
3	9071	SWM#3	635	243	0	0	0	0	0	878	
		SUBTOTAL 3	635	243	0	0	0	0	0	878	
4	14218	SWM#4	1048	529	0	0	0	0	0	1577	
		SUBTOTAL 4	1048	529	0	0	0	0	0	1577	
5	16241	SWM#5	0	0	0	0	0	0	0	2209	
		SUBTOTAL 5	0	0	0	0	0	0	0	2209	
6	3578	SWM#6	296	109	0	0	0	0	0	395	
		SUBTOTAL 6	296	109	0	0	0	0	0	395	
7	6614	SWM#7	572	219	0	0	0	0	0	791	
		SUBTOTAL 7	572	219	0	0	0	0	0	791	
		TOTALS:	3272	1543	0	0	0	0	0	7403	
		TOTAL AREA	64412	5F						7403	
			1.48	AC							

**NOTES:**

1. APPROVAL OF THIS ENVIRONMENTAL CONCEPT PLAN DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED SUBDIVISION, SITE DEVELOPMENT PLAN AND/OR BUILDING AND GRADING PERMIT.

2. REVIEW OF THIS PLAN FOR COMPLIANCE WITH ZONING AND SUBDIVISION AND LAND DEVELOPMENT REGULATIONS SHALL OCCUR AT THE SUBDIVISION, SITE DEVELOPMENT PLAN AND/OR PERMIT STAGES; THEREFORE, THIS PLAN IS SUBJECT TO ADDITIONAL AND MORE DETAILED COMMENTS AS THE PLAN IS PROCESSED THROUGH THESE STAGES.

3. THERE ARE NO ENVIRONMENTAL FEATURES: FLOODPLAIN, WETLANDS, STREAMS, STEEP SLOPES OR FOREST THAT EXISTS ON THIS PROPERTY OR WITHIN THE DEVELOPED AREA.

NO. REVISION DATE

**ENVIRONMENTAL CONCEPT PLAN**

**SWM DRAINAGE AREA MAP**

**NOTES AND DETAILS**

**ANTWERPEN HYUNDAI**

**PARCEL E-4 & E-6, HOLWEC SUBDIVISION**

E-4: 1.9929ZONED: B-2 1417771.66

TAX MAP 34 BLOCK 06 PARCEL 365  
5TH ELECTION DISTRICT HOWARD COUNTY, MARYLAND

**ROBERT H. VOGEL ENGINEERING, INC.**  
ENGINEERS • SURVEYORS • PLANNERS

8407 MAIN STREET  
ELICOTT CITY, MD 21043  
TEL: 410.461.7666  
FAX: 410.461.8961

**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. EXPIRATION DATE: 09-27-2014

DESIGN BY: DZE  
DRAWN BY: DZE/JER  
CHECKED BY: RHV  
DATE: JAN 2014  
SCALE: AS SHOWN  
W.O. NO.: 12-48

2 SHEET OF 2

**OWNER/PETITIONER**

ANTOY LLC  
12420 AUTO DRIVE  
CLARKSVILLE, MD, 21029  
(410) 531-5700