# HIGH RIDGE PARK

HOWARD COUNTY CAPITAL PROJECT NO. N-3104

HOWARD COUNTY, MARYLAND

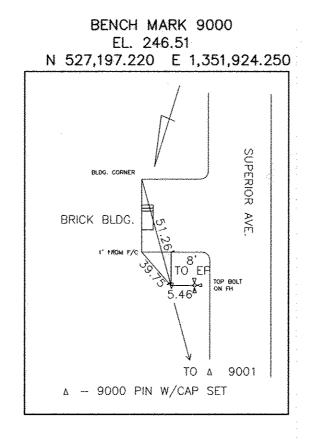
SITE DEVELOPMENT PLAN

#### GENERAL NOTES:

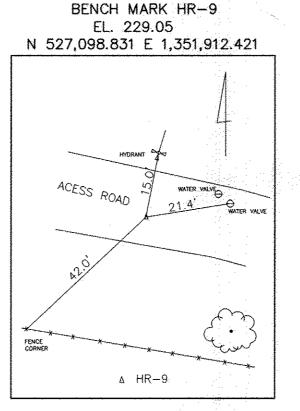
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS OF HOWARD COUNTY AND MSHA STANDARDS AND SPECIFICATIONS WHERE APPLICABLE.
- THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION INSPECTION DIVISION AT (410)313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK AND THE NATURAL RESOURCES & OPEN SPACE DIVISION, MARK RAAB, AT 410-313-4730.
- THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK.
- 4. ALL PLAN DIMENSIONS ARE TO THE EDGES OF PAVED SURFACES UNLESS OTHERWISE NOTED
- HORIZONTAL DATUM: MARYLAND STATE PLANE COORDINATE GRID. BASED ON NORTH AMERICAN ADJUSTMENT OF 1983.
- 6. VERTICAL DATUM: MEAN SEA LEVEL OF U.S.C. & G SURVEY (1929 ADJUSTMENT)
- TOPOGRAPHIC SURVEY PERFORMED BY FREDERICK WARD ASSOCIATES, INC. JANUARY 1997 AND URS CORPORATION APRIL 2004. COORDINATES USED REFER TO THE MARYLAND
- 8. PUBLIC WATER AND SEWER ARE AVAILABLE ON SITE, THE CONTRACT NUMBERS ARE 24-3818 FOR WATER AND 0030-S FOR SEWER, BOTH UTILITIES ARE IN THE LITTLE PATUXENT DRAINAGE AREA.
- EXISTING UTILITIES WERE FIELD LOCATED IN CONJUNCTION WITH THE TOPOGRAPHIC SURVEY.
- 10. THE KEY PLAN SHEET SHOWS THE ENTIRE PARK PROPERTY AT 1" = 200' SCALE, CONSTRUCTION WILL OCCUR ON PLAN SHEETS 3 THROUGH 8.
- A TRAFFIC CONTROL PLAN WILL NOT BE REQUIRED.
- 12. STORMWATER MANAGEMENT IS PROVIDED BY EXTENDED-DETENTION WITH A MICROPOOL & FOREBAY, BIO-RETENTION FACILITIES: AND TO BE OWNED AND MAINTAINED BY HOWARD COUNTY.
- WETLANDS DELINEATION AN WORK WITHIN WETLANDS, STREAMS AND RELATED BUFFERS BY FREDERICK WARD ASSOCIATES, OCTOBER, 1992. APPROVED BY MARYLAND DEPARTMENT OF THE ENVIRONMENT, APRIL 20, 1998 PERMIT No. 98-NT-0108/199862780 (EXPIRES 2005). A PERMIT MODIFICATION HAS BEEN SUBMITTED TO MDE &ACOE REQUESTING A TIME EXTENSION TO JAN. 2007 AND TO ADDRESS CHANGES IN WETLAND AND WETLAND BUFFER IMPACTS.
- 14. NO TRAFFIC STUDY IS REQUIRED FOR THIS PROJECT.
- 15. THE LIMITS OF THE 100 YEAR FLOOD PLAIN (PATUXENT RIVER) AS SHOWN HEREON ARE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL NO. 240044-0045 B EFFECTIVE DATE DECEMBER 4, 1986)
- 16. THE OBLIGATIONS OF FOREST CONSERVATION HAVE BEEN MET BY THE RETENTION OF 27.37 ACRES OF FOREST IN A FOREST CONSERVATION EASEMENT, PLAT OF EASEMENT #14613.
- 17. THIS PARK IS A 'CARRY IN-CARRY OUT' PARK, MEANING THAT PARK PATRONS ARE RESPONSIBLE FOR THEIR
- 18 NO CLEARING, GRADING, OR CONSTRUCTION IS PERMITTED WITHIN ANY WETLAND AREA, WETLAND BUFFER. FLOODPLAIN AREA, OR STREAM BUFFERS WITHOUT APPROVAL OF THE HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING.
- 19. THIS PROJECT IS SUBJECT TO WAIVER WP-04-123, WHICH WAIVES SECTION 16.144 OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS TO ALLOW FOR THE CONSOLIDATION OF EXISTING LOTS/PARCELS BY RECORDING AN ADJOINER DEED INSTEAD OF A STANDARD PLAT. THE ACTION WAS APPROVED ON MAY 20, 2004 SUBJECT TO THE FOLLOWING CONDITIONS:
  - a. IN THE EVENT THAT AN OWNER CLAIMS THE PROPERTY IDENTIFIED ON THE WAIVER EXHIBIT AS "JOHN MATTINGLY, LIBER WWW25, FOLIO 179" THEN THE DEPARTMENT OF PUBLIC WORKS SHALL PROVIDE ACCESS TO THAT PROPERTY, EITHER BY FEE-SIMPLE FRONTAGE ONTO A PUBLIC ROAD OR VIA AN ACCESS EASEMENT FROM A PUBLIC ROAD TO THAT PROPERTY. IN SIMILAR FASHION, IF ANY OTHER ADJOINING PARCEL SHOULD BE DEEMED TO BE LANDLOCKED WITHOUT PUBLIC ROAD FRONTAGE OR ACCESS TO A PUBLIC ROAD, THEN REASONABLE ACCESS SHALL BE PROVIDED TO THOSE PROPERTIES THROUGH THE SUBJECT PROPERTY.
  - b. THE DEED OF ADJOINDER SHALL BE RECORDED WITHIN 6 MONTHS OF APPROVAL OF THIS WAIVER (BY 11/20/2004). A COPY OF THE RECORDED DEED SHALL BE PROVIDED TO THE DEPARTMENT OF PLANNING AND ZONING AS SOON AS POSSIBLE.
  - c. ALL ENVIRONMENTAL FEATURES AND BUFFERS SHALL BE DELINEATED ON THE FUTURE SITE PLAN (THAT WILL SUPERCEDE SDP-00-34), WHICH WILL BE REVIEWED BY THE SUBDIVISION REVIEW COMMITTEE. AN ENVIRONMENTAL REPORT SHALL BE PROVIDED WITH THE SUBMISSION OF THAT
- 20. NO LANDSCAPE SURETY IS REQUIRED SINCE THIS IS A HOWARD COUNTY CAPITAL PROJECT.
- 21. THE DEPARTMENT OF RECREATION AND PARKS AGREES TO MAINTAIN THE BIORETENTION FACILITY AND STORMWATER MANAGEMENT POND.
- 22. A FLOODPLAIN STUDY FOR HA HA CREEK WAS PERFORMED AND APPROVED UNDER SDP-00-34. THE STUDY WAS UPDATED TO REFLECT MINOR CHANGES IN THE CULVERT CROSSING, WHICH RESULT IN INSIGNIFICANT CHANGES TO THE FLOOD PLAIN.

# MONUMENT STATION

# BENCH MARK 9001 EL. 229.76 N 527,197.220 E 1,351,615.140 REFERENCE MARKS = PK NAILS IN TREES 4' FROM 9000 Δ - 9001 PIN W/CAP SET



SCALE 1'' = 2000'



#### PARKING JUSTIFICATION

THE FOLLOWING PARKING REQUIREMENTS WERE PROVIDED BY THE DEPARTMENT OF RECREATION AND PARKS FOR HIGH RIDGE PARK:

4 PARKING SPACES TENNIS COURT BASKETBALL COURT PLAYGROUND PICNIC SHELTER 24 PICNIC TABLES 12 TRAIL USERS 12 TOTAL REQUIRED

TOTAL PROVIDED

NOTE: THE PARKING NEEDS FOR HIGH RIDGE PARK WILL TEND TO BE LIGHT AND SPORADIC SINCE IT WILL NOT HAVE ANY FORMAL ATHLETIC FIELDS. FORMAL ATHLETIC FIELDS TEND TO GENERATE A HIGHER PARKING REQUIREMENT PER SECTION 133 OF THE ZONING REGULATIONS.

#### INDEX OF DRAWINGS

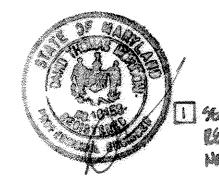
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SHEET NO.	TITLE	SHEET NO.	TITLE
T	COVER SHEET	27	STORMWATER MANAGEMENT PLAN AND DETAILS
2	KEY PLAN	28	BIORETENTION PLAN AND DETAILS
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SITE ANALYSIS DATA CHAP	<del>7</del> 1 -
TOTAL PROJECT AREA:	88.4 ACRES, 3,850,704 SQ. FT.
AREA OF PLAN SUBMISSION:	7.4
LIMIT OF DISTURBED AREA:	7,4 ACRES
PRESENT ZONING DESIGNATION:	R-20 & R-SC
PROPOSED USES FOR SITE:	PARK WITH BASKETBALL COURT, TENNIS COURT PICNIC, OPEN PLAY, COMFORT STATION & SHELTER
FLOOR SPACE ON EACH LEVEL OF BUILDING(S) PER USE:	N/A
TOTAL NUMBER OF UNITS ALLOWED FOR PROJECT AS SHOWN ON FINAL PLAT:	N/A
TOTAL NUMBER OF UNITS PROPOSED FOR SUBMISSION:	N/A
MAXIMUM NUMBER OF EMPLOYEE, TENANTS ON SITE PER USE:	N/A
NUMBER OF PARKING SPACES REQUIRED BY HOWARD COUNTY ZONING REGULATIONS AND/OR SDP CRITERIA:	N/A (SEE PARKING JUSTIFICATION - THIS SHEET)
NUMBER OF PARKING SPACES PROVIDED ON SITE (INCLUDE NUMBER OF HANDICAPPED PARKING SPACES):	70 TOTAL PARKING/INCLUDES 3 HANDICAPPED
OPEN SPACE ON SITE:	81.0 ACRES AND 92% OF GROSS AREA
AREA OF RECREATION OPEN SPACE REQUIRED BY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS ACRES:	REQUIRED N/A PROVIDED N/A
BUILDING CONVERAGE OF SITE:	0.04 ACRES AND < 1% OF GROSS AREA
APPLICABLE DPZ REFERENCES:	SDP-00-34, WP-04-123, RESOL,# 113-2004

CITE ANALYCIC DATA CHART

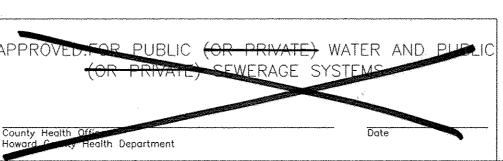
			ISDP	-00-34	, WP-04-	123, RESOL,# 11	3-200	
		Pal	MIT INFO	PMATIC	ON CHART	•		
Subdivision N	ame: jh Ridge l	<sup>D</sup> ark	Section Are	o: N/A	<del>-</del>	Lot/Parcel No. 50/364	Dee <b>6</b> 771	
Plat# or L/F 12345		Zoning R-20 & R-SC	Tax Map N 50	0.	Elec Distr	Census Tract	069.03	
Water Code	C06		Sewer Code	717090	O	·		
				ADDRE	SS CHART			
LOT/	PARCEL	- #		STREET ADDRESS				
50/364			10100 SUPERIOR AVENUE					
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#### Professional Certification. I hereby certify that those discurrents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. 16166 Earthanian Care 8-26-18



DEPARTMENT OF PLANNING AND ZONING

PARK, AT WHICH POINT IT MUST THEN COMPLY WITH ALL APPLICABLE SETBACKS.







DES: DTM/RKK DRN:RMC/HWC PROPOSED SHADE STRUCTURE DATE: 10/8/04 BY NO. DATE

23. THE ENVIRONMENTAL DISTURBANCES FOR THE ENTRANCE ARE CONSIDERED TO BE "ESSENTIAL" IN ACCORDANCE WITH SECTION 16.116(C) OF

THE ENTRANCE ROAD DOES NOT REQUIRE APPROVAL OF A VARIANCE. THE ROADWAY IS ALLOWED TO PASS THROUGH THE SETBACK AREA

25. BY RESOLUTION NO. 113-2004 DATED OCTOBER 4, 2004, A VARIANCE WAS GRANTED TO: (A) REDUCE THE REQUIRED 20-FOOT USE

WITHIN THE NARROW STRIP OF LAND FROM THE TERMINUS OF THE PUBLIC PORTION OF SUPERIOR AVENUE, INTO THE MAIN AREA OF THE

SETBACK FROM A PUBLIC STREET RIGHT-OF-WAY AS REQUIRED BY SECTION 110.D.4.b.(2) OF THE ZONING REGULATIONS TO 2 FEET FOR

THE CONSTRUCTION OF THE ROAD FILL RETAINING WALL; AND (B) REDUCE THE REQUIRED 20-FOOT USE SETBACK FROM A LOT LINE AS

REQUIRED BY SECTION 110.D.4.d.(2) OF THE ZONING REGULATIONS TO 2 FEET FOR THE CONSTRUCTION OF THE ROAD FILL RETAINING WALL.

THE SUBDIVISION REGULATIONS, SUBJECT TO ANY CONDITIONS OR DESIGN REQUIREMENTS IMPOSED BY SCD OR DED FOR THE PIPE CULVERT.

OWNER: HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045

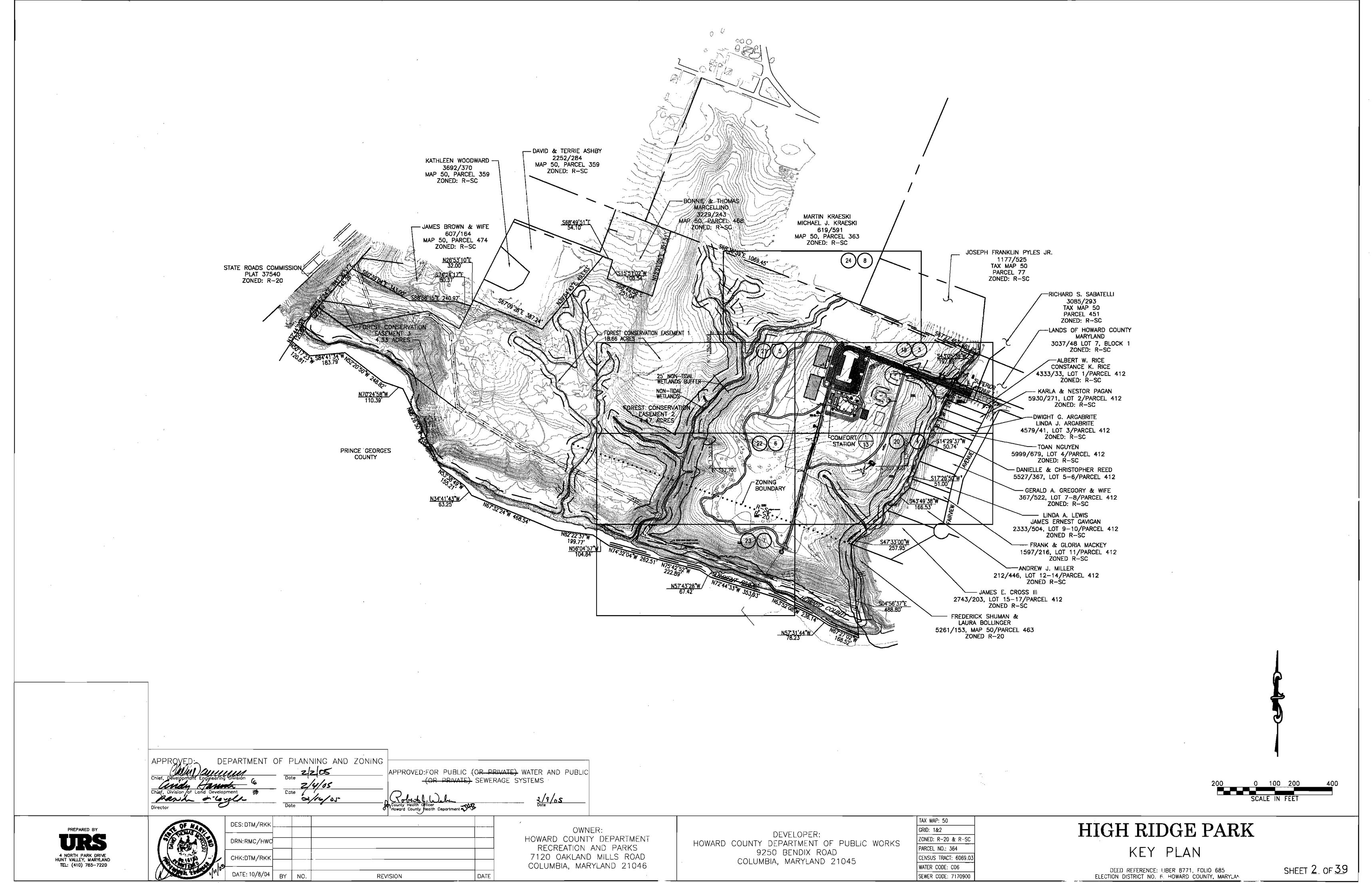
TAX MAP: 50 GRID: 1&2 ZONED: R-20 & R-S( PARCEL NO.: 364 CENSUS TRACT: 6069.0 WATER CODE: CO6

SEWER CODE: 7170900

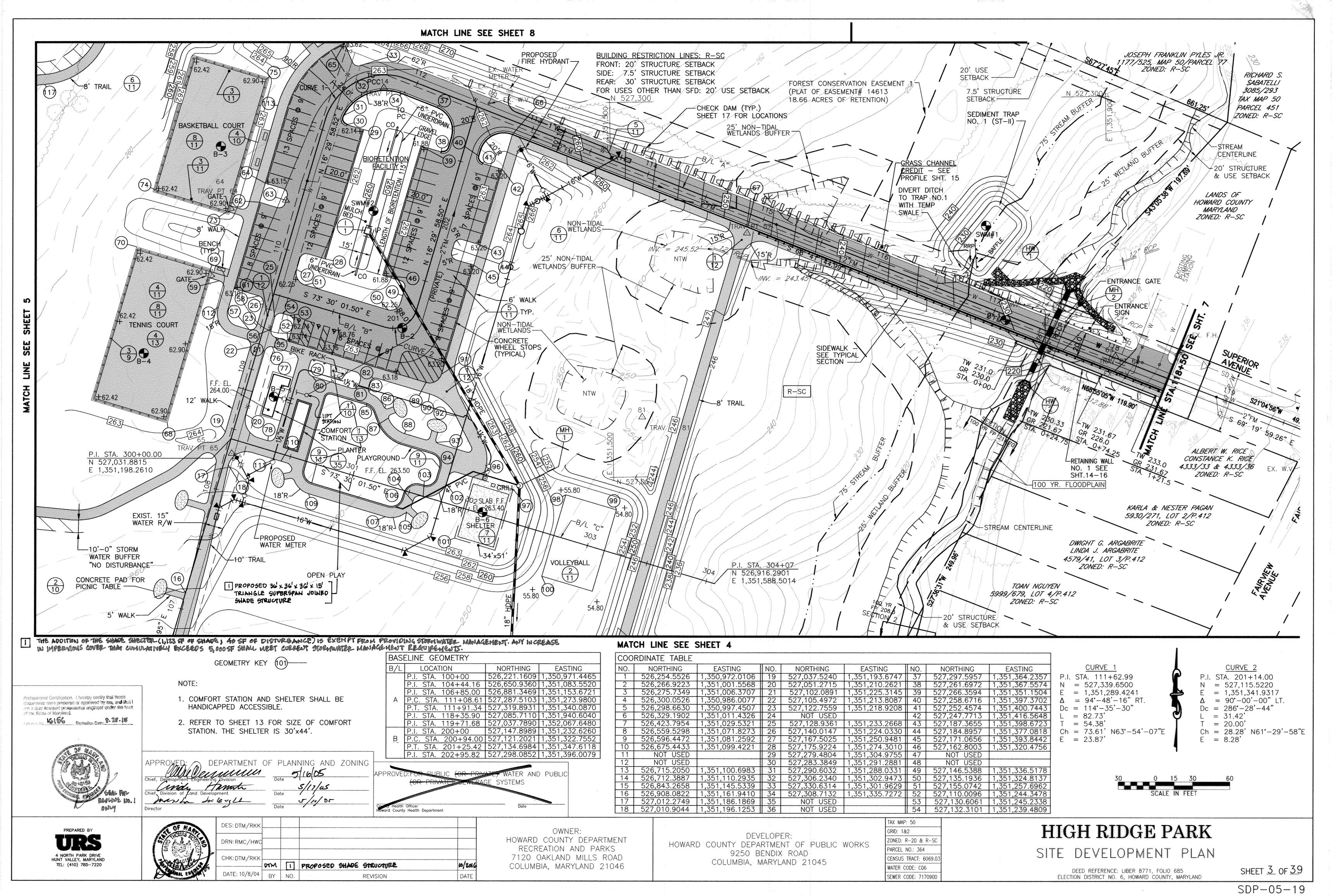
# HIGH RIDGE PARK

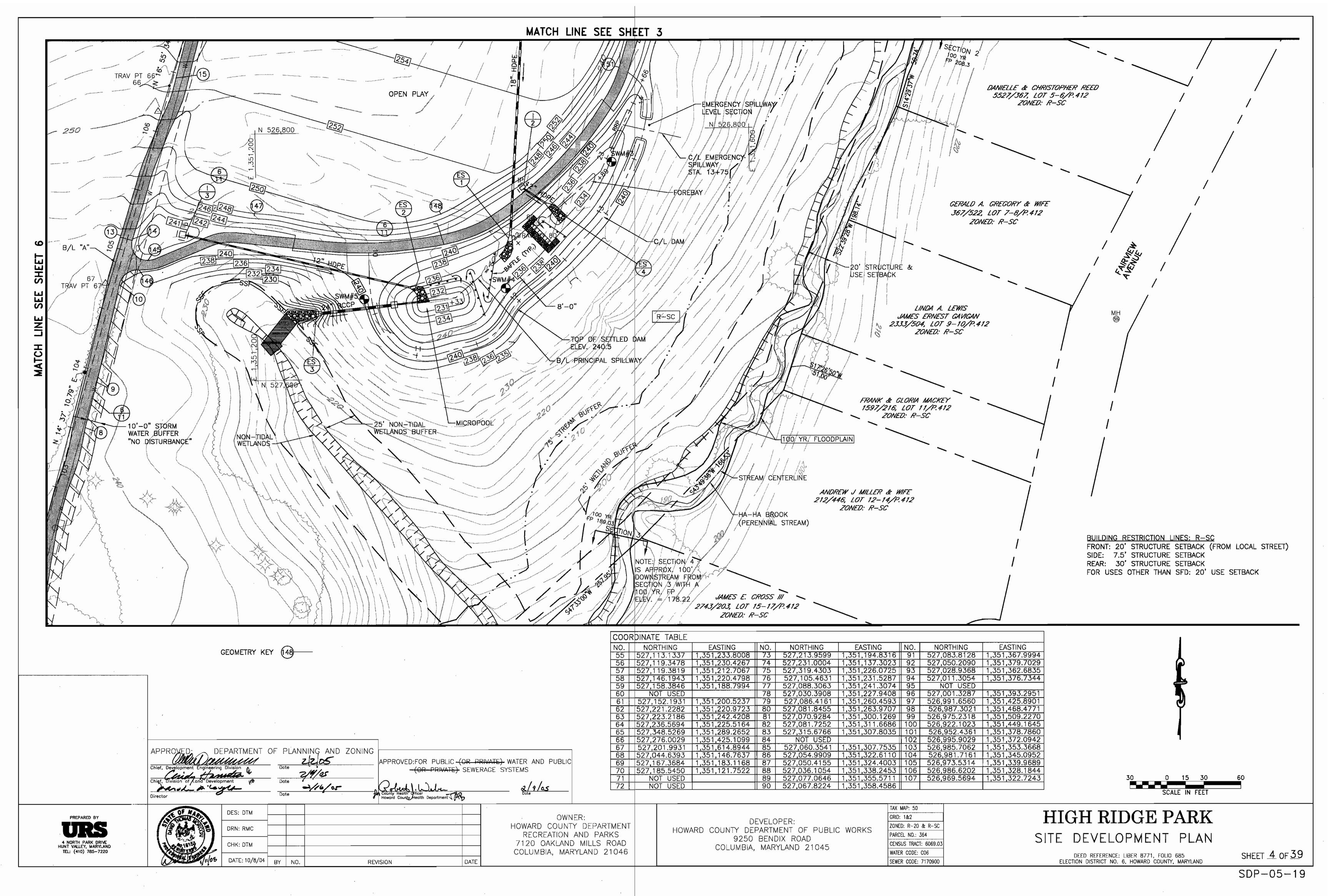
COVER SHEET

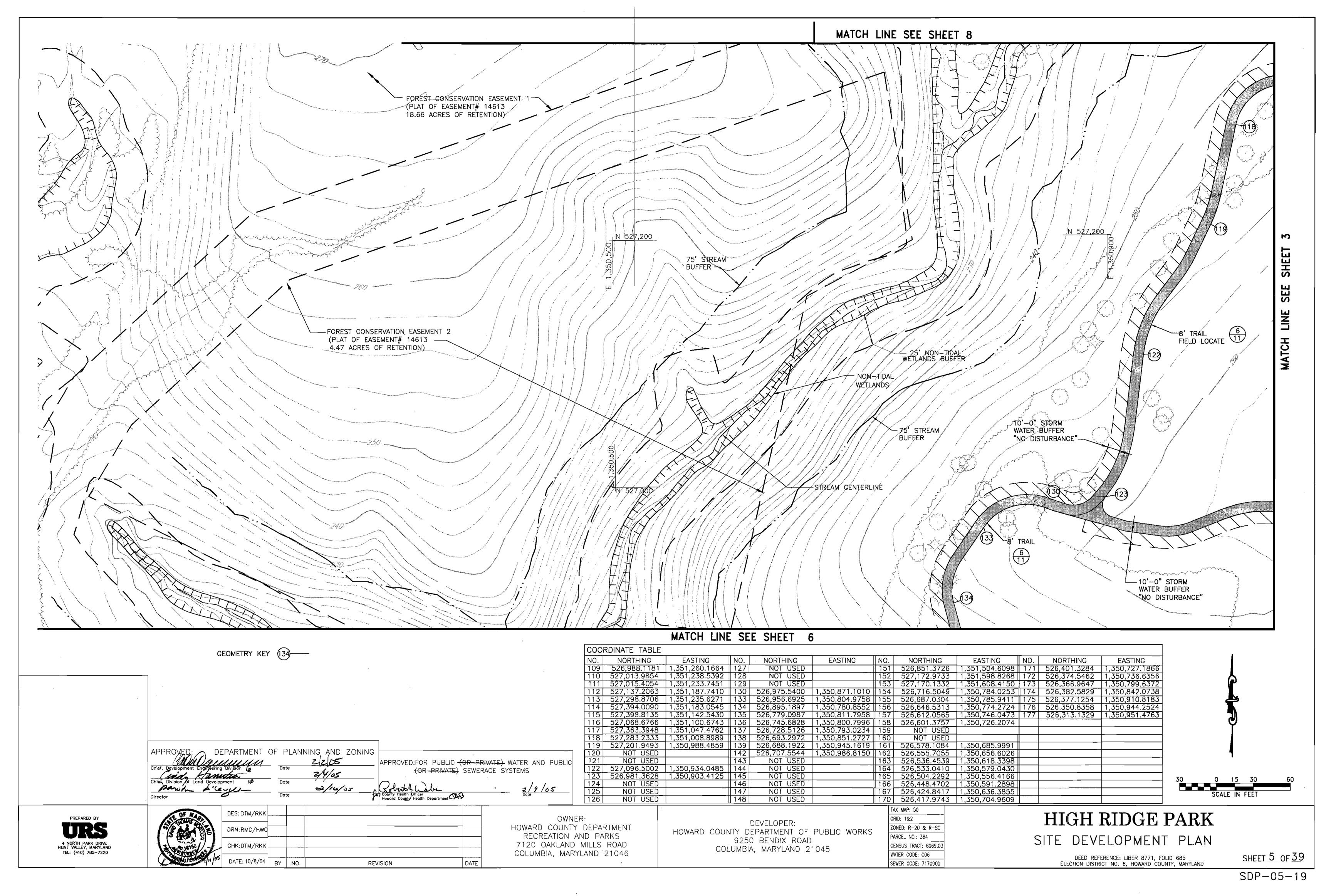
DEED REFERENCE: LIBER 8771, FOLIO 685 ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND

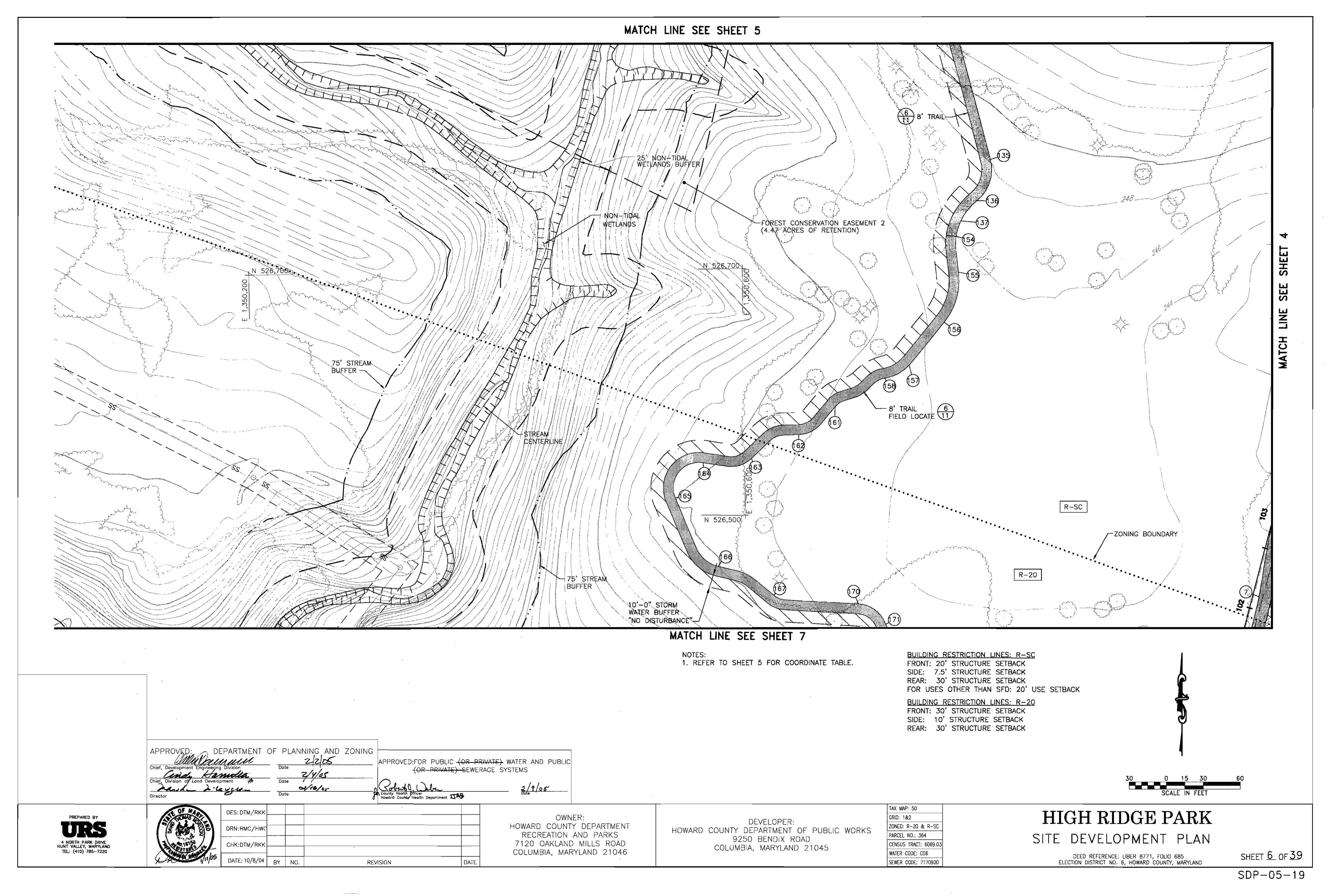


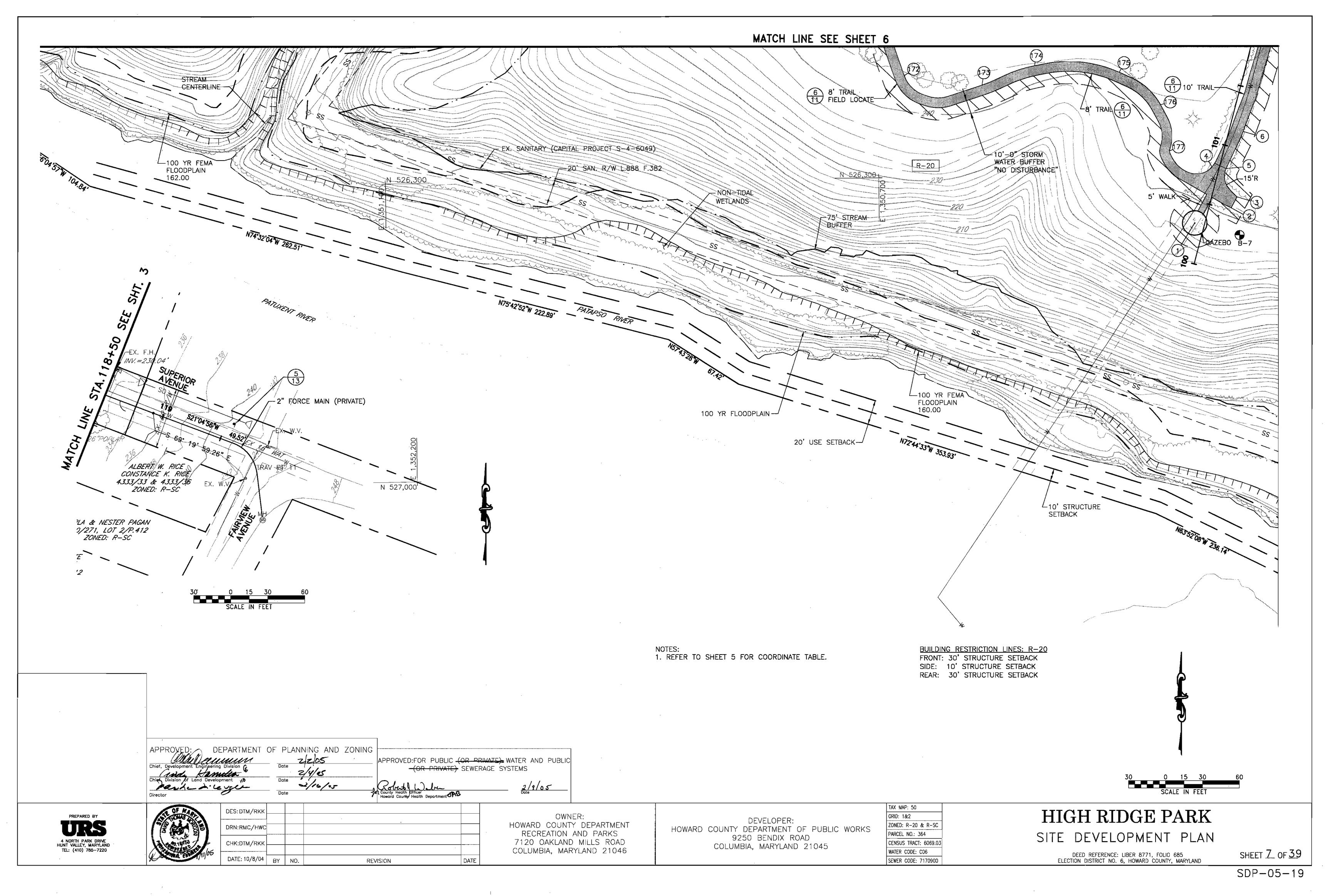
SDR-05-19

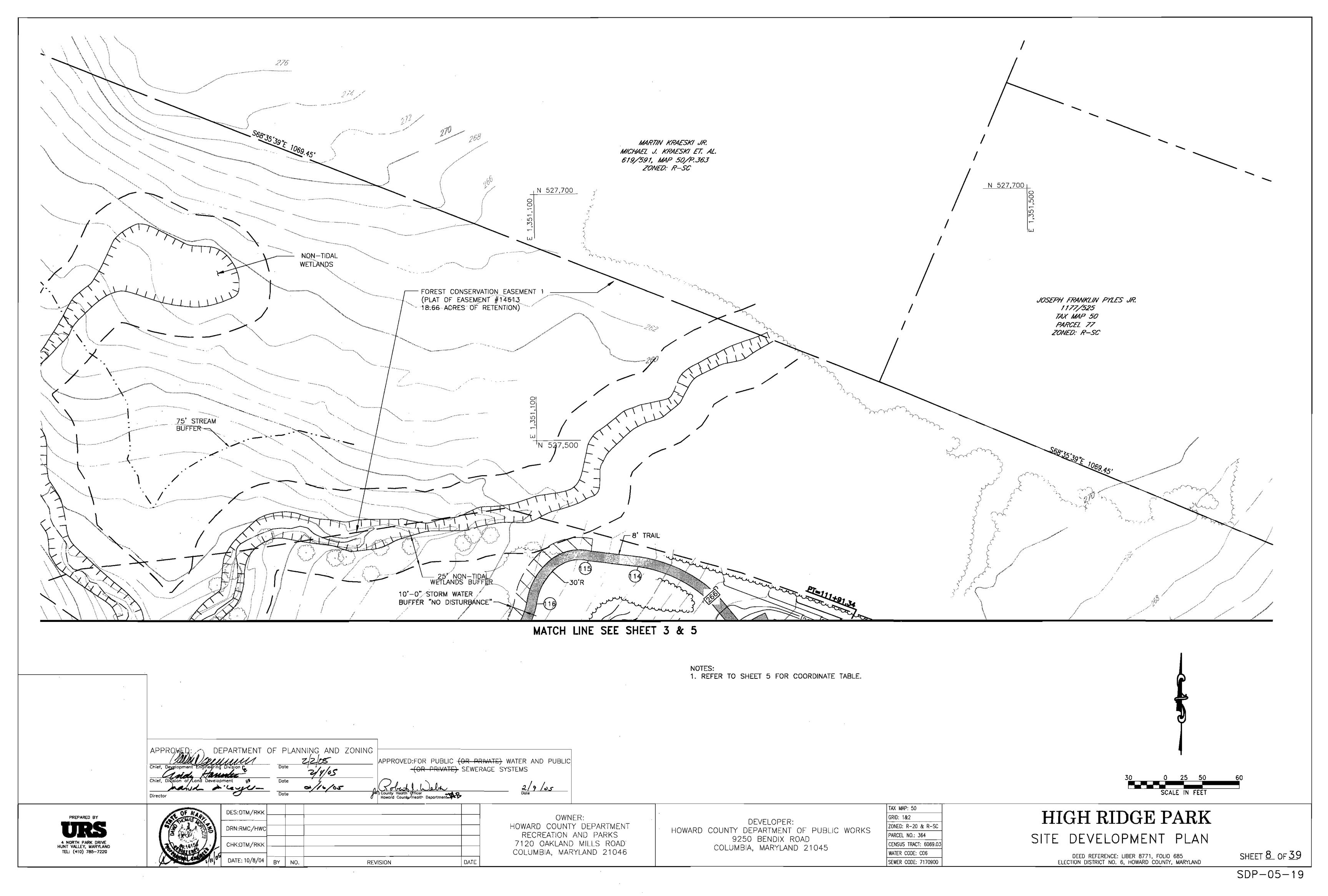


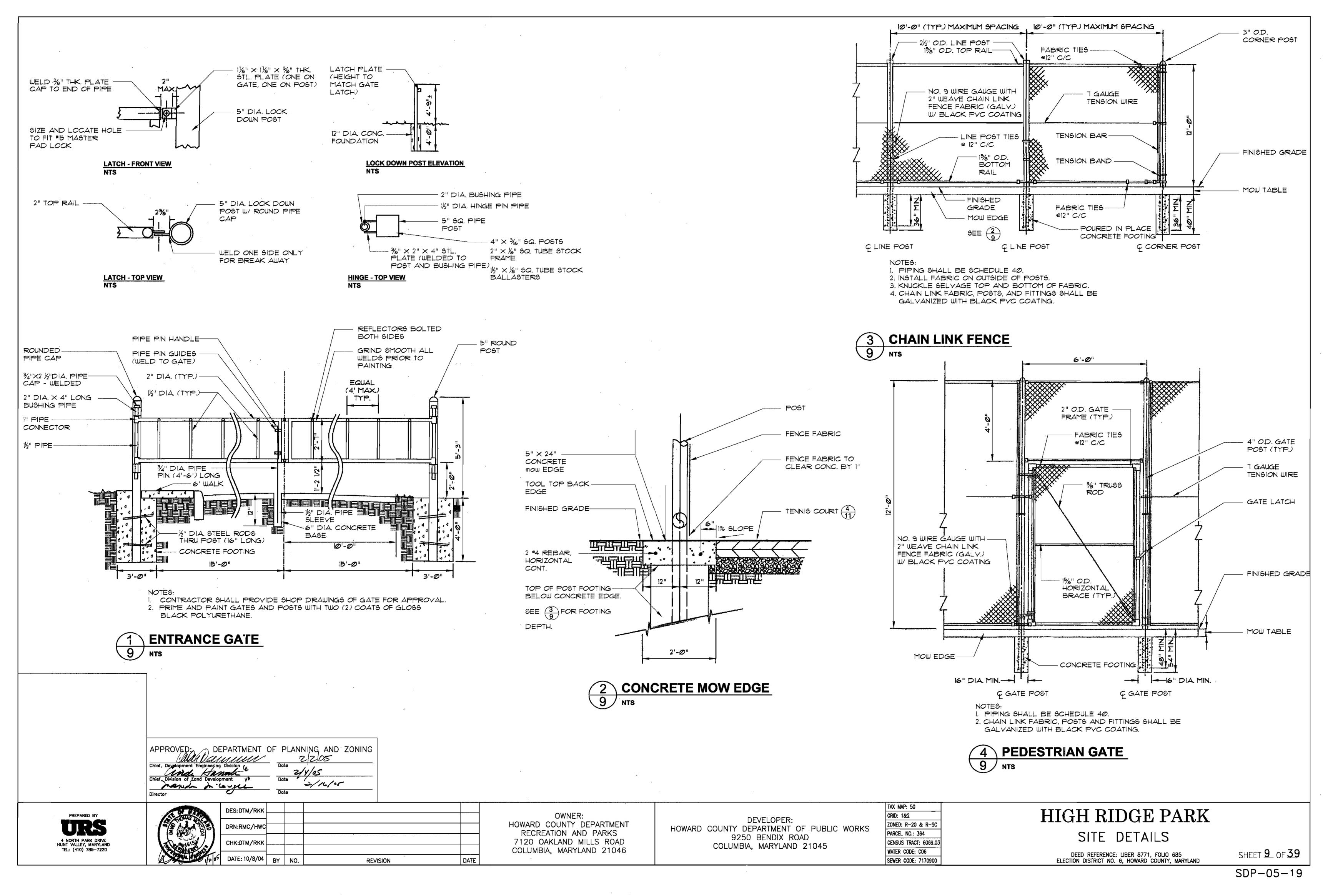


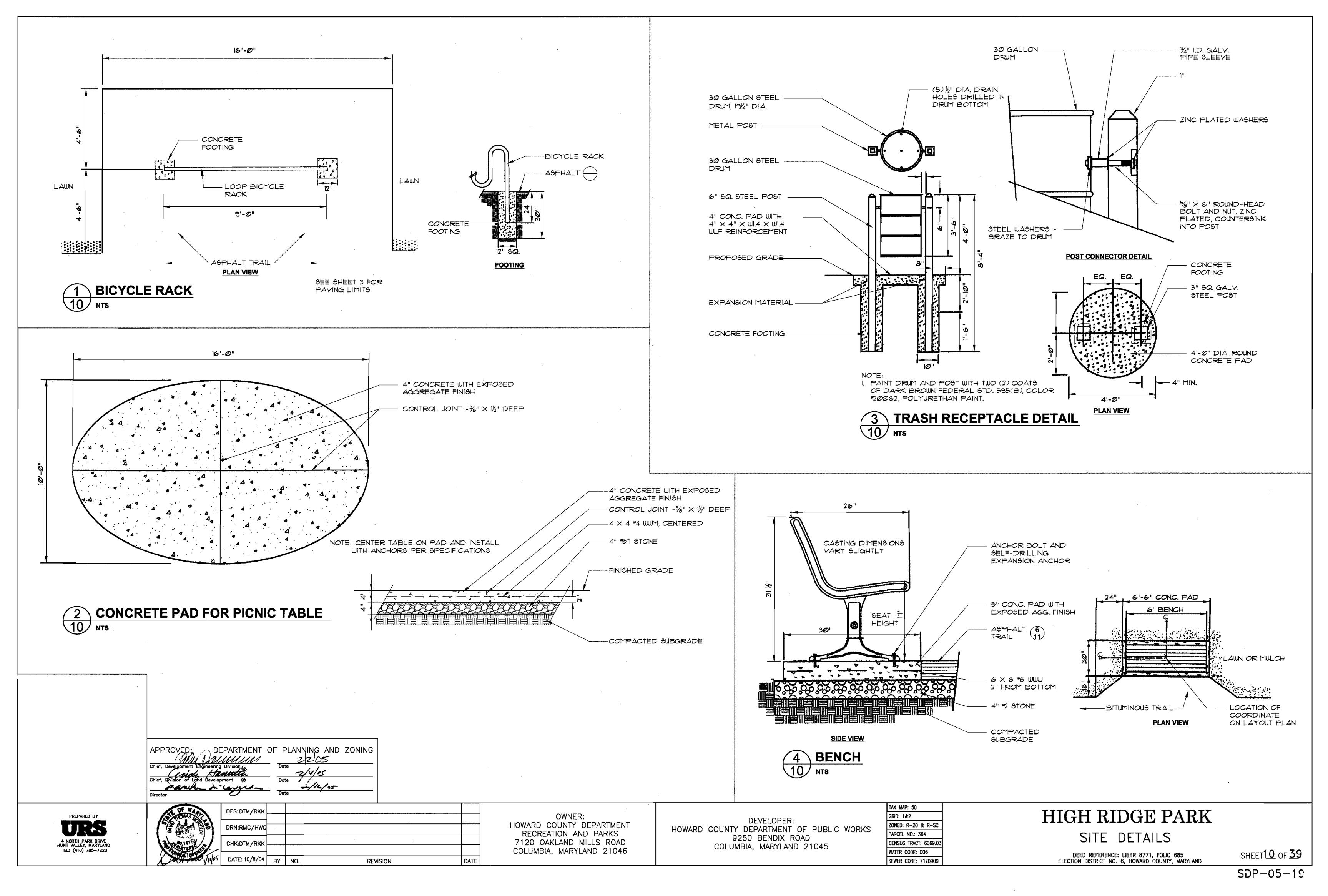


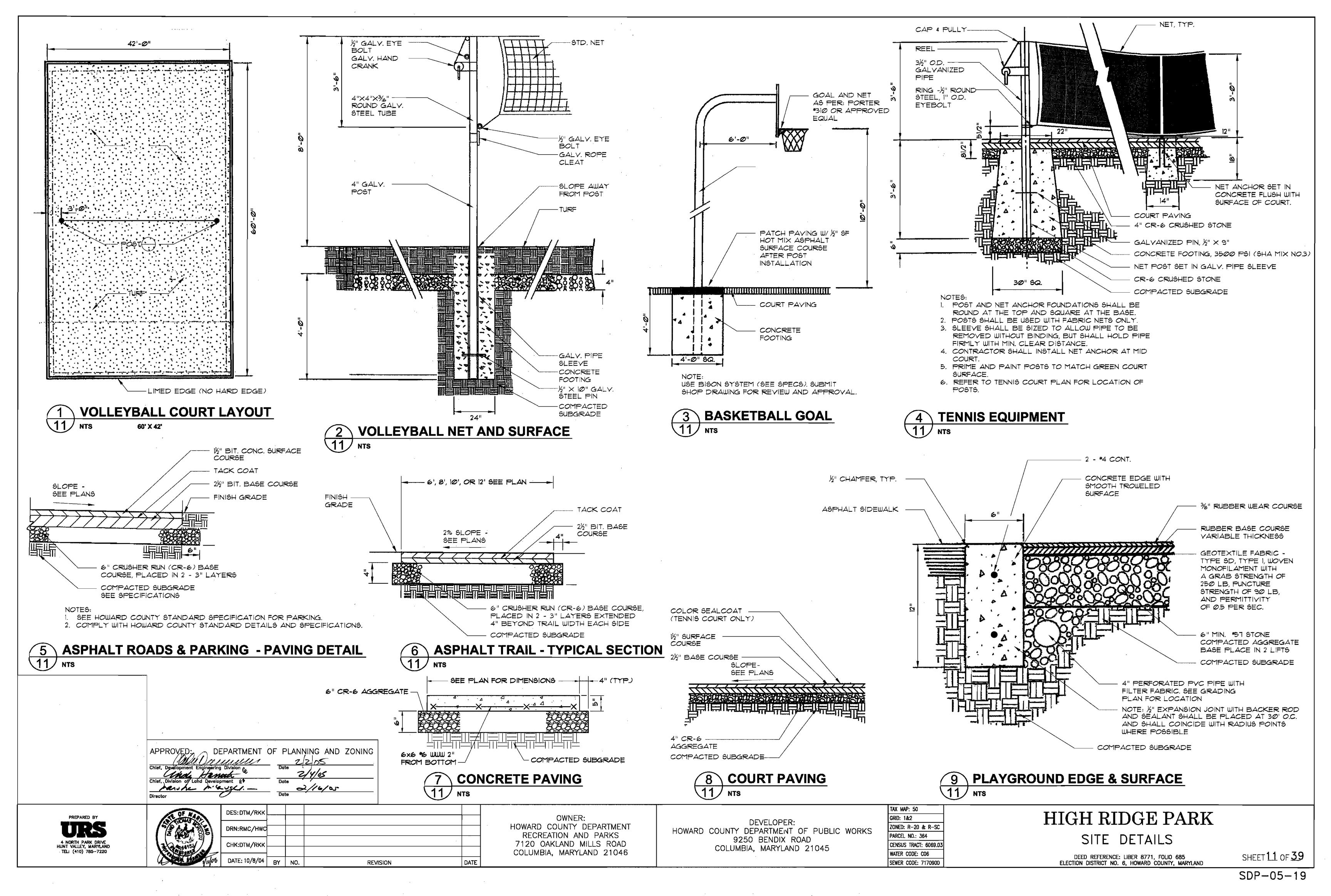


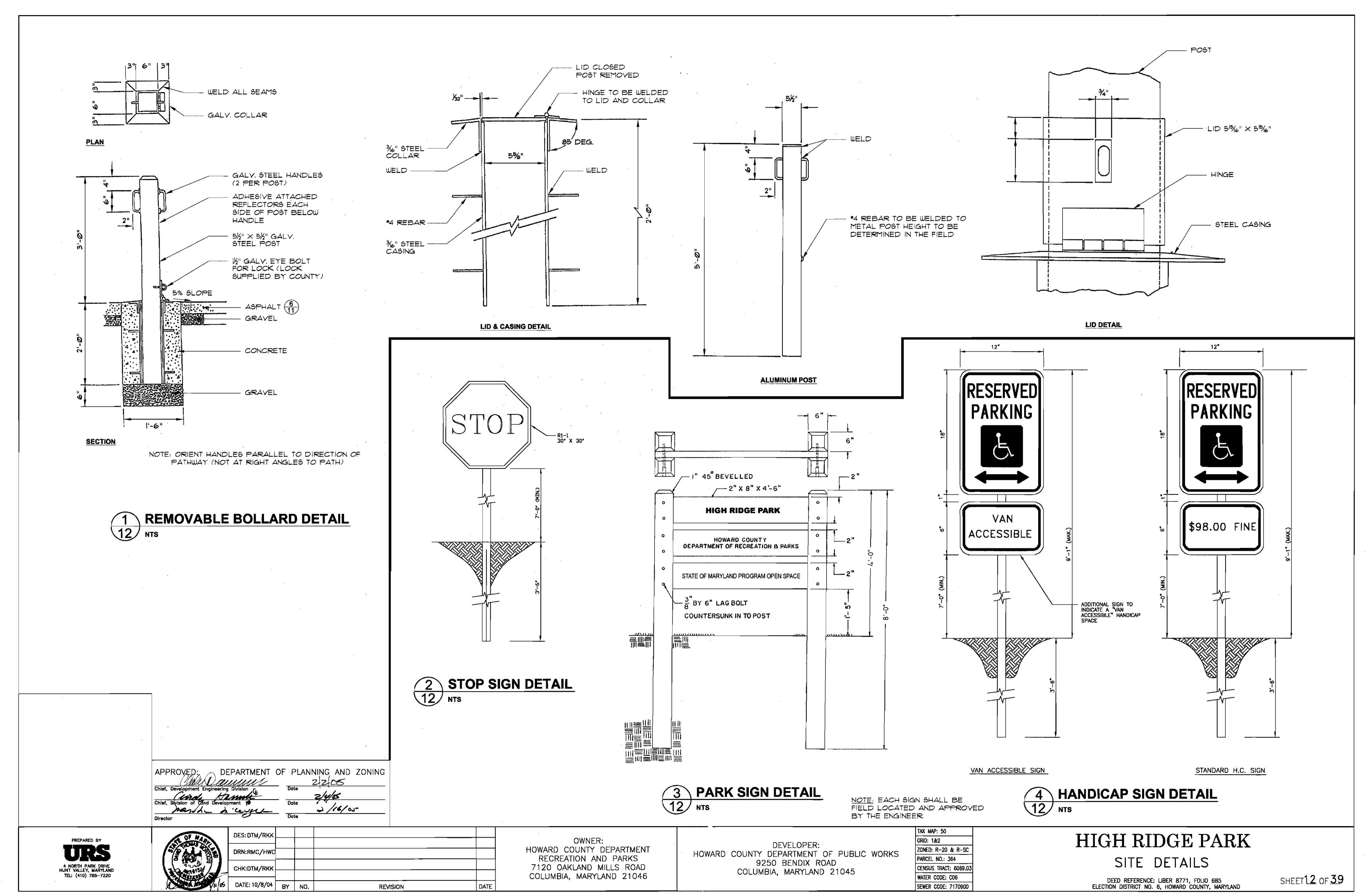


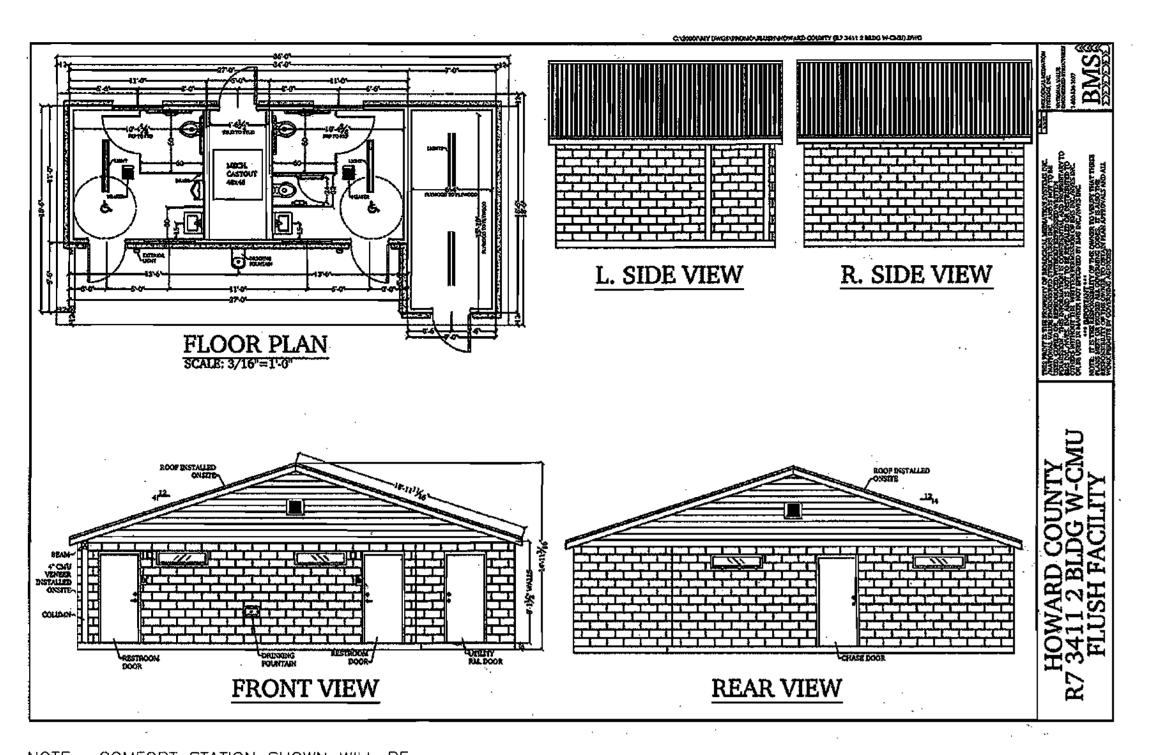










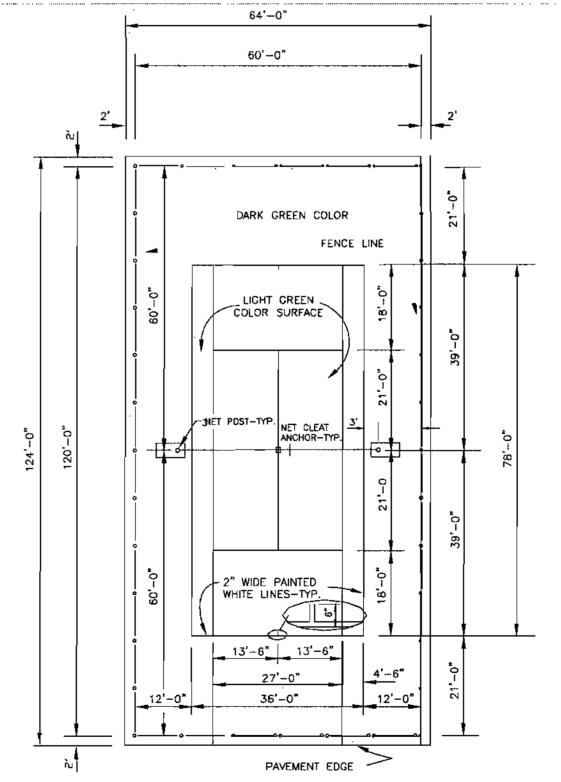


NOTE: COMFORT STATION SHOWN WILL BE CONSTRUCTED UNDER SEPARATE CONTRACT AND IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY.



PAVING LINE LIGHT GREEN DARK-I LIGHT GREEN 0 EDGE OF ASPHALT ----25′-0**″** 25'-0"

PLAN VIEW BASKETBALL COURT 13 итѕ

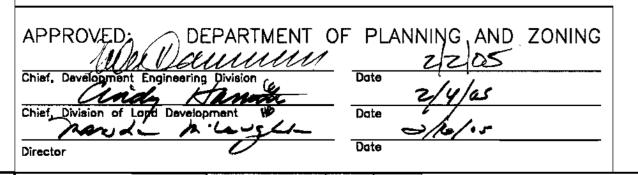


PROVIDE 1% SLOPE ACROSS COURT. GATES ARE TO BE LOCATED AS SHOWN ON SITE PLAN AND ARE TO SWING OUT. APPLY PROTECTIVE COLORCOATING ON SMOOTH ASPHALT SURFACE AT MANUFACTURER'S RECOM-

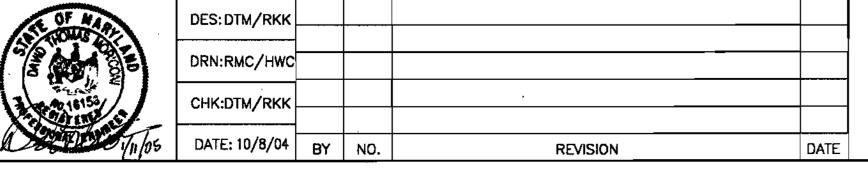
SERVICE COURTS. COLORCOAT SURFACE AFTER FENCE AND GATES HAVE BEEN INSTALLED. PROVIDE CHAIN AND LOCK NO. 204 AND 205. FOR GATES TO PROTECT THE COLORCOATED SURFACE FROM POSSIBLE VANDALISM.

ALL MEASUREMENTS FOR LINE STRIPING OF COURTS ARE TO THE OUTSIDE OF LINES, EXCEPT THOSE INVOLVING THE CENTER SERVICE LINE WHICH IS EQUALLY DIVIDED BETWEEN LEFT AND RIGHT FOR PAVEMENT SECTION AND NET POST ANCHOR DETAILS, SEE STANDARD NO. 203. FOR FENCE AND GATE DETAILS, SEE STANDARD

**TENNIS COURT - SINGLE** 







OWNER: HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

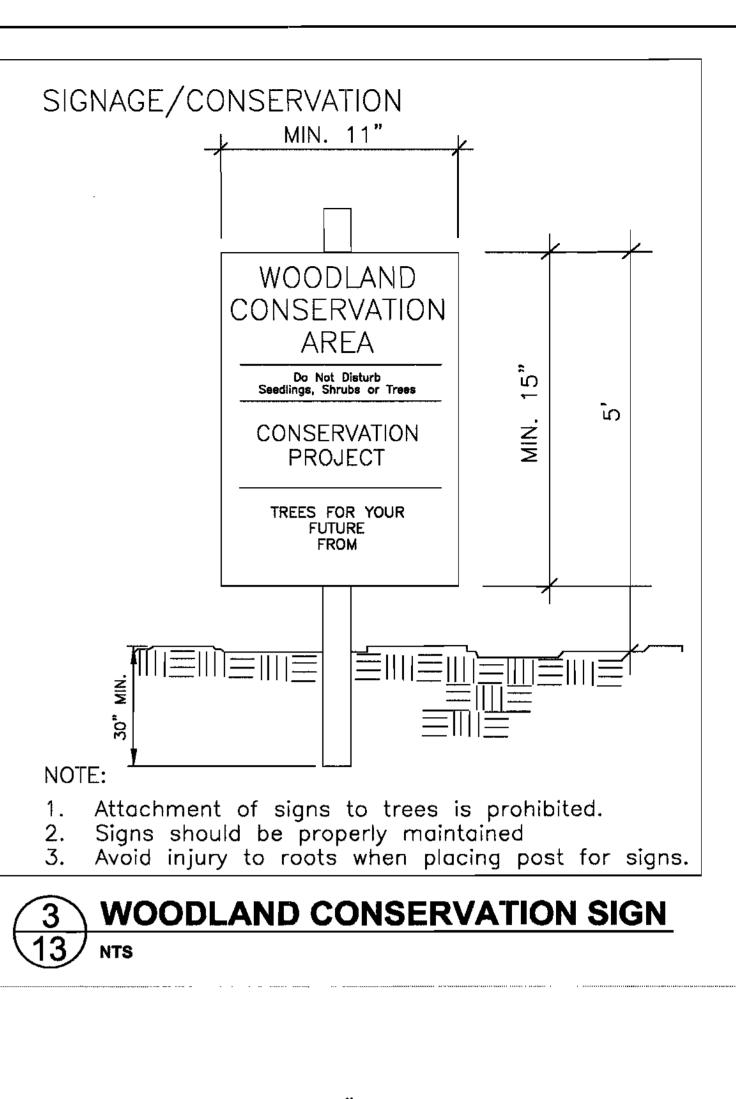
DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045

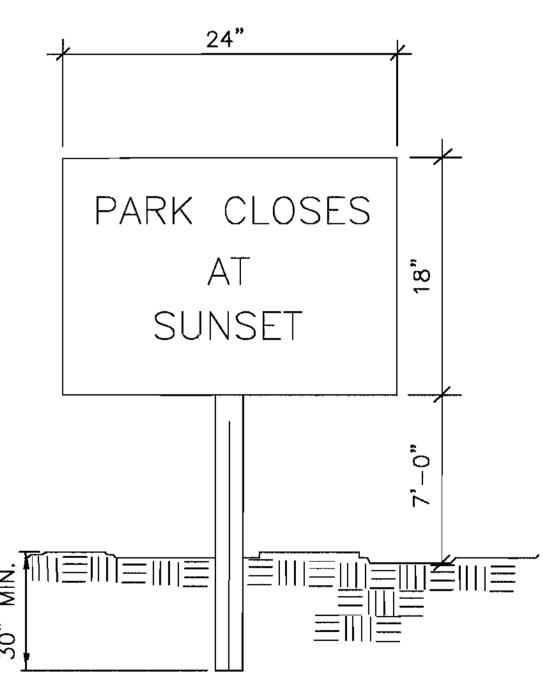
TAX MAP: 50 GRID: 1&2 ZONED: R-20 & R-SC PARCEL NO.: 364 CENSUS TRACT: 6069.03 WATER CODE: CO6

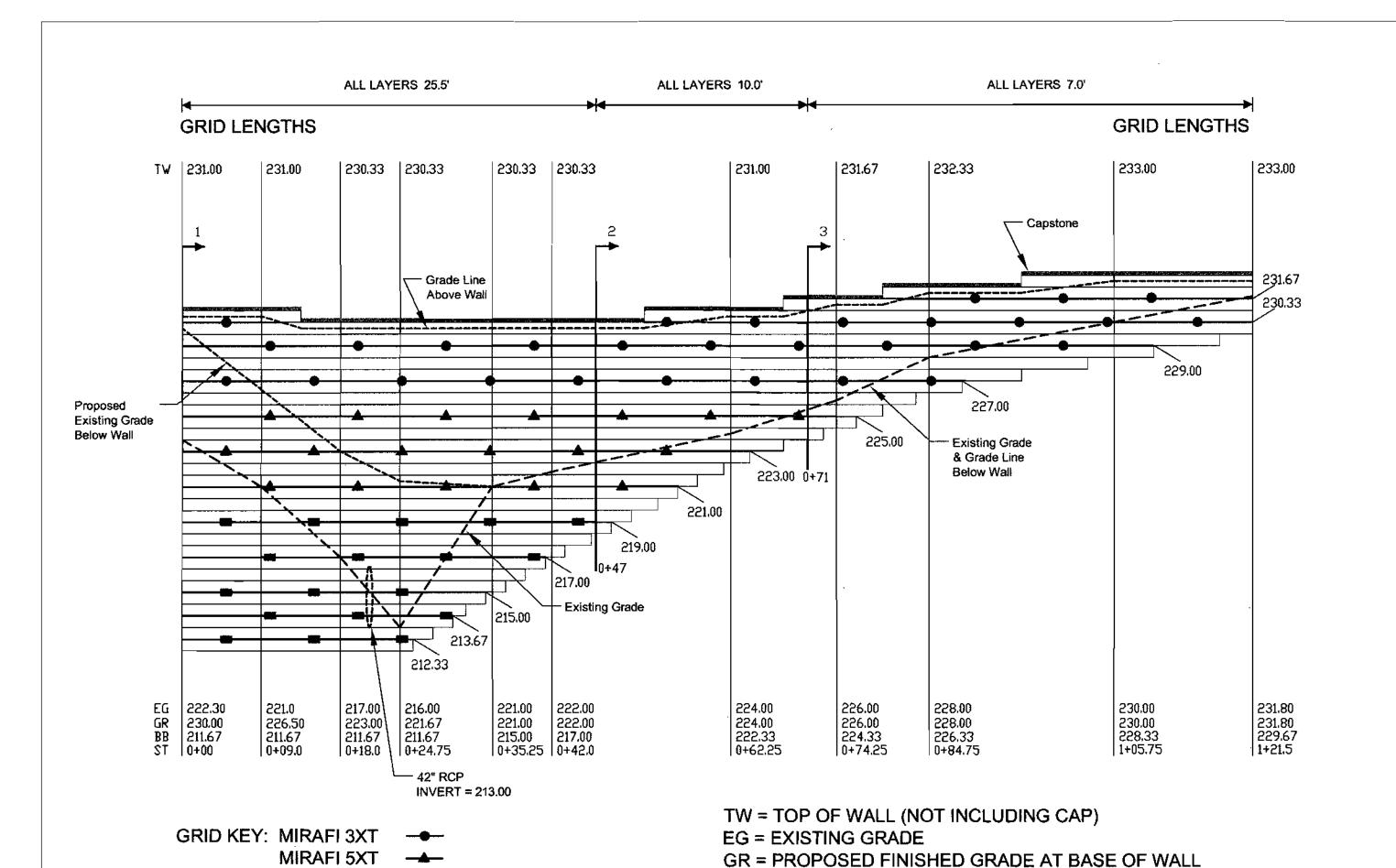
# HIGH RIDGE PARK SITE DETAILS

DEED REFERENCE: LIBER 8771, FOLIO 685
ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND

SHEET 13 OF 39

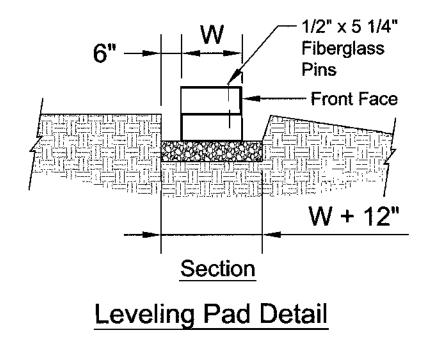






SCALE: HORIZONTAL SCALE VERTICAL SCALE 1"=

MIRAFI 7XT

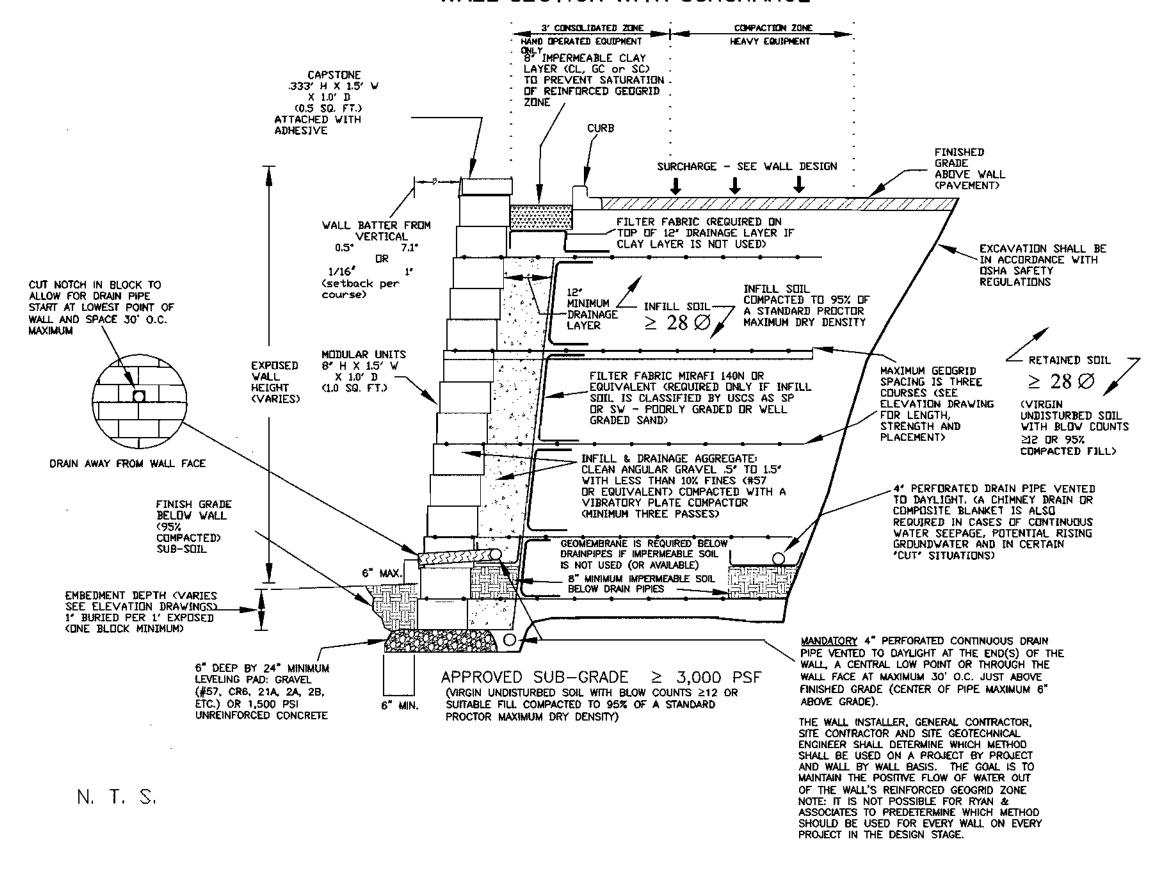


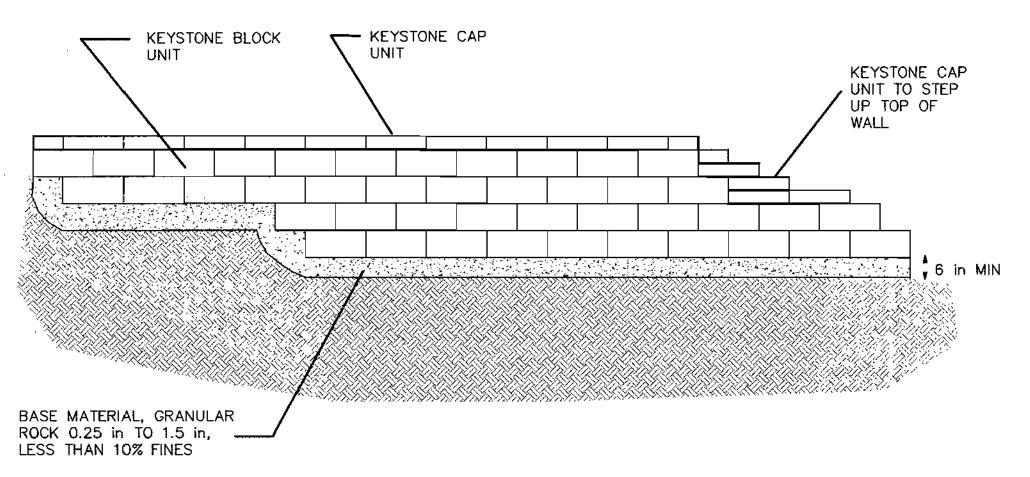
BB = BOTTOM OF BLOCK / TOP OF LEVELING PAD

ST = WALL STATION

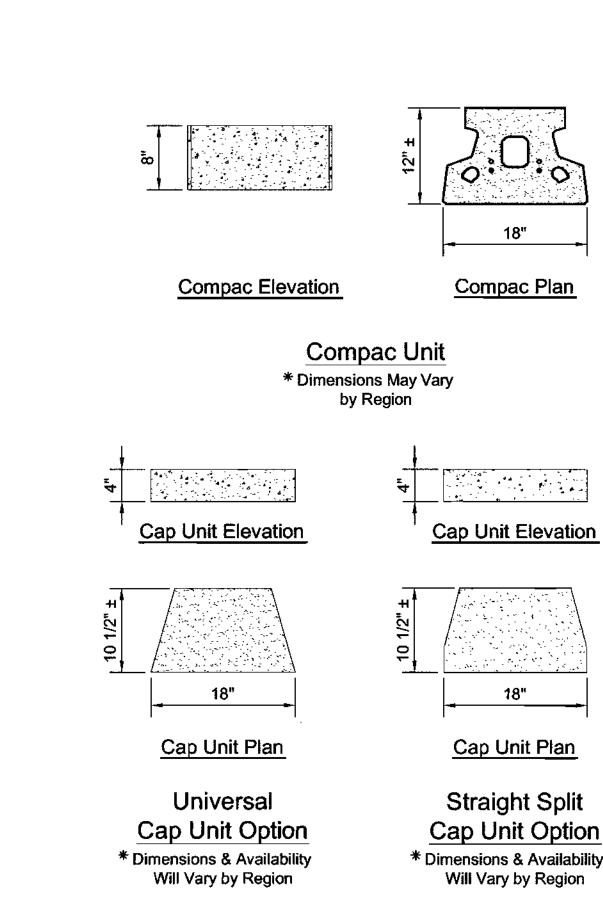
# KEYSTONE COMPAC

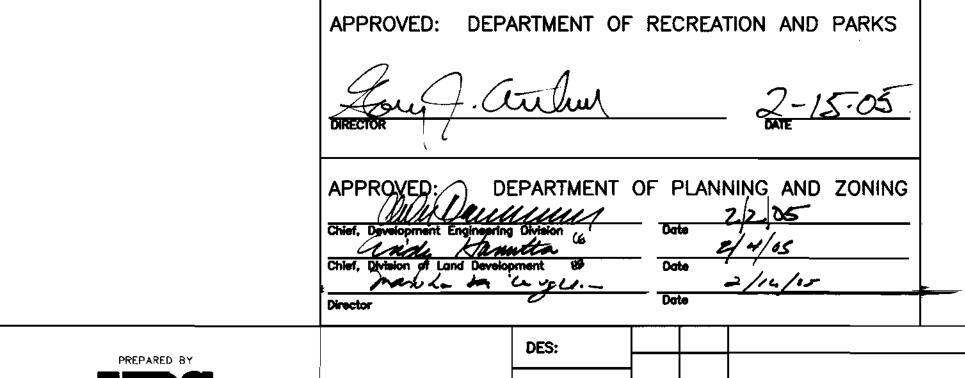
WALL SECTION WITH SURCHARGE





KEYSTONE STEP DOWN TYPICAL DETAIL





CHK:

4 NORTH PARK DRIVE HUNT VALLEY, MARYLAND

TEL: (410) 785-7220

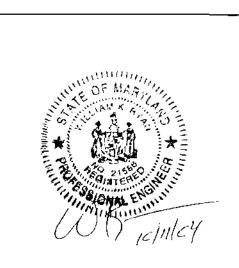
OWNER: HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046 DATE: 8/3/04 BY NO. DATE REVISION

DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045

TAX MAP: 50 GRID: 1&2 ZONED: R-20 & R-SC PARCEL NO.: 3G4 CENSUS TRACT: 6069.03 WATER CODE: CO6

SEWER CODE: 7170900

**RYAN & ASSOCIATES** RETAINING WALL DIVISION PHONE 717-262-4242 FAX 717-262-4245 29 SOUTH MAIN STREET, SUITE A CHAMBERSBURG, PA 17201



18"

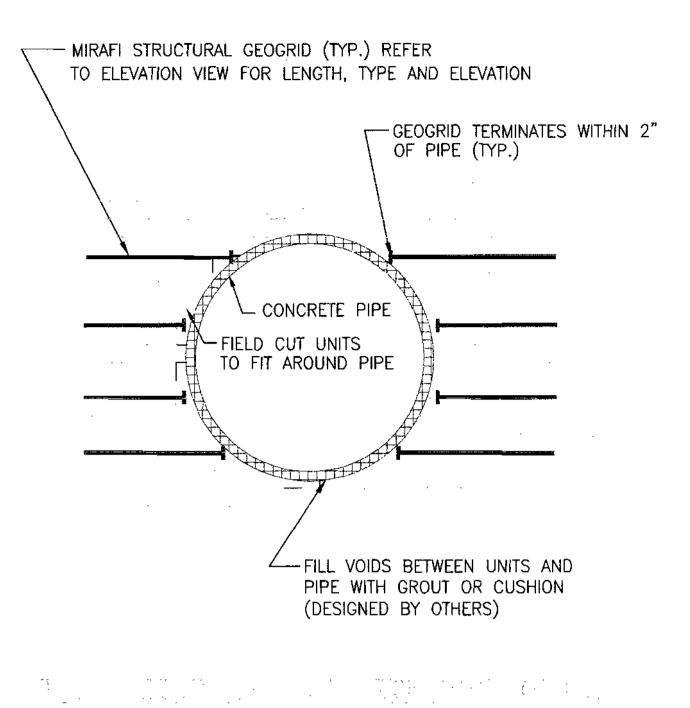
18"

Professional Engr. No. 21586

HIGH RIDGE PARK

RETAINING WALL DETAILS DEED REFERENCE: LIBER 977 FOUO 685\_ ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND

SHEET 14 OF 39



|MATERIAL ESTIMATE\*: **GEOGRID TYPE:** Mirafi 3XT, 5XT & 7XT BLOCK TYPE: Keystone Compac II CU. YDS. SQ. YDS, SQ. YDS. (1 S. F.) (.5 S. F.) CU. YDS. LEVELING TOTAL 3XT 5XT 7XT DRAIN PAD WALL CAPS\*\* GRID GRID GRAVEL GRAVEL LENGTH SQ. FT. BLOCK **PINS** GRID 90 2,549 575 535 605 83 1,400 1,355 121

NOTE: Quantities have been increased by the following percentages: block & caps 3%, geogrid 15% & gravel 5%. \*\*Cap quantity is based on one unit for each step down transition on the top of the wall

\* Ryan & Associates is not responsible for extras or shortages based on this take-off. The recipient is responsible for verifying the accuracy of this design by reviewing the site/ grading lplan for this project or by taking field measurements.

CROSS SECTION DETAILS & FACTORS OF SAFETY:							
SECTION	<u>STATION</u>	TOTAL WALL <u>HEIGHT</u>	LOAD APPLIED	SLIDING minimum 1.50	OVERTURNING minimum 2.00	BEARING CAPACITY minimum 2.50	BEARING PRESSURE PSF
1	0+00 TO 0+47	19.33'	300 PSF LIVE LOAD	2.65	10.71	12.05	2,994
2	0+47 TO 0+71	12.00'	300 PSF LIVE LOAD	1.68	3.68	5.61	2,157
3	0+71 TO 1+21.5	8.00'	300 PSF LIVE LOAD	1.62	3.44	5.89	1,460

DEPARTMENT OF RECREATION AND PARKS 2-15-05 DEPARTMENT OF PLANNING AND ZONING -2/16/05

GENERAL NOTES

1. SOIL PARAMETERS: Ryan & Associates (RA) has reviewed the "Geotechnical investigation" report for this site dated 09/09/2004 prepared by Marshall Engineering, Inc. The in-situ soils are classified as ML (sandy silt and sandy clayey silts), SM-SC (silty to clayey, fine to medium sand) and SP-SM (poorly graded sand—silty sand). Based on this report, an internal angle of friction of 28° was used for the soils in the retaining wall design. This is for a worst case ML (sandy silt, clayey silt/silt) soil type. CH (fat clay), CL (lean clay), MH (elastic silt) and OH/OL/PT (organic) soils are not acceptable for wall construction. If these unsuitable soils are encountered they must be removed and replaced with soils that meet or exceed the design friction angle of 28". An average value of the three proctors was used for the soil unit weight of 139.8 PCF (maximum wet density). The maximum wet density of 139.8 PCF was used for the foundation soils and a value of 132.8 PCF (average maximum wet density less 5% for 95%) compaction) was used for the infill and retained soils. Fluctuations in unit weights of 5 PCF higher or lower will not affect this design, however if the unit weights vary by more than 5 PCF RA must be notified so that the cross sections can be rerun to verify that all factors of safety are still met. Soil moisture must be within (2% of optimum to obtain proper compaction results (no exceptions). No cohesion was used in any of the calculations. If possible, sandy soils (SC, SM and SP) should be stockpiled and used for wall backfill, since these soils have a higher friction angle, are more "free—draining" and are less sensitive to moisture.

2. SPECIFICATIONS: Construction and materials must conform to the attached "Ryan & Associates segmental retaining wall specifications and installation

3. BEARING CAPACITY: The sub-grade (the soils under the wall's gravel leveling pad and the soils under the wall's reinforced geogrid zone) must be tested by the site geotechnical engineer prior to wall construction and have minimum allowable bearing capacity of 3,000 PSF. The actual bearing pressure exerted by each specific wall section is shown on the "Cross Section Details and Factors of Safety" table so that the site geotechnical engineer may determine specifically how to handle any areas where low bearing capacity soils are encountered on an individual wall section basis. Areas of the sub-grade that do not meet these maximum pressures will require undercutting and/or geogrid reinforcing. The sub-grades must be virgin (natural undisturbed soil with blow counts ≥12).

4. CONSTRUCTION OVERSIGHT: The construction of this wall must be performed under the observation/review of a Maryland Registered Professional Engineer or their designated representative to ensure that it is built in accordance with the RA General Notes and Specifications. A registered professional geotechnical/structural engineer must certify all wall construction.

5. GEOGRIDS: This wall was designed with Mirafi 3XT, 5XT & 7XT geogrids which have LTDS (Long Term Design Strengths) of 1558, 2234 & 2961 respectively. All geogrid substitutions must have prior approval of RA.

6. REAR DRAIN TILES: Due to Howard County requirements, a rear drainpipe is required at the back of the wall's reinforced geogrid zone. This is in addition to the mandatory 4" drainpipe at the front of the wall (within the gravel leveling pad or behind the at grade course— depending which drainpipe position is exercised). The rear drainpipe shall be surrounded by a minimum of 6" of clean gravel (#57 or equivalent) and shall have perpendicular solid pipes that run forward and connect to the front drainage system with crosses or tees.

7. DESIGN SOFTWARE: Internal and external wall calculations were performed with Keywall 2004 design software (version 3.3.1.181). A table has been included ("Cross Section Details and Factors of Safety") which has the following information: section locations (area of wall referenced), total wall heights, loads applied, factors of safety (for sliding, overturning and bearing capacity) and bearing pressures (the weight exerted by the wall structure block and geogrid zone). Factors of safety of 1.5 were also met for: geogrid pullout (from the soil and from the block), geogrid overstress (geogrid rupture) and connection (block to geogrid).

8. GLOBAL STABILITY: Due to Howard County requirements, a global stability analysis was done at the maximum height of the wall (station 0+18). The analysis verified that the geogrid lengths met a factor of safety of 1.3. RA did the analysis with 28° soils and 0# of cohesion (for the worst case scenario of fine—grained ML soils). A copy of the global stability analysis is included in the 81/2" X 11" submittal.

9. WALL BATTER: This wall was designed with the blocks having no batter (0.0°). This was done so that the 0.5° near vertical batter (front pin position: 1/16" setback per block course) may be used if desired and will allow for some construction tolerance. However, the 7.1° batter (rear pin position: 1" setback per block course) is strongly recommended by RA since it is more conservative (yields higher factors of safety) and allows for more construction tolerance. If the near vertical batter is used the wall installer should lay the base course tilted back a minimum of 1/4" to compensate for movement during construction (from compaction equipment and the geogrid losing its slack) to ensure that the wall does not go beyond vertical (have a negative batter). It is important for the wall installer and the civil engineer/surveyor to predetermine the wall's batter during stake out. The base of the wall will need to be moved forward if there are critical dimensions that need to be met on the high side of the wall.

10. "RCP" STORMWATER PIPE INTERSECTING THE WALL: The civil plan shows an RCP (reinforced concrete pipe) pipe intersecting the wall at approximate wall station 0+21.3. Since this is a structural pipe it should be able to be worked around without additional means of support. However, it should be verified by the pipe manufacturer that it can withstand the load of the wall (maximum bearing pressure of 2,994 PSF). The blocks may be cut to fit around the pipe and the voids filled with type "M" mortar or non-shrink grout, or a concrete collar can be cast around it. If a concrete collar is cast in place, its top elevation must coincide with a top of block elevation to eliminate the horizontal cutting of blocks. NOTE: RA is not responsible for wall failure that results from this pipe leaking water and saturating the wall's reinforced geogrid zone. It is imperative that the site contractor adequately seals all joints in these structures.

11. CIVIL PLAN: This design package is based on the civil plan electronic files (prepared by The URS Corporation) provided to RA via the email dated 09/14/2004. A Partial copy of this plan has been included in the 8 1/2" X 11" submittal to show the RA wall numbering and stationing.

12. WALL PROFILE: The elevation drawing is done to represent the grade changes necessary on the civil plan and was done in even block course increments of .667' (8"). Minor field changes may be necessary by the wall installer. Lineal footage may be added or subtracted as needed if the wall's height is equal to or less than the design height. If the wall needs to be raised in height, RA shall be notified and new structural cross sections must be provided before the installer proceeds. The cap height of .333' (4") is not accounted for on the profile elevations however its height may have been used in some cases to achieve the desired TW elevations.

13. BLOCK SYSTEM: This design is valid only for the Keystone Compac II block systems. Each segmental wall system has unique dimensions, connection devices and interacts differently with geogrids; therefore other block types may not be substituted without partial or total redesigns.

14. FACTORS OF SAFETY: The following factors of safety have been met in this design: Sliding 1.5, Overturning 2.0, Bearing Capacity 2.0, Geogrid Overstress 1.5, Geogrid Pullout 1.5 (from the soil and from the block) and Global Stability 1.3.

15. SPECIAL HOWARD COUNTY RETAINING WALL SPECIFICATIONS:

A. The retaining wall shall only be constructed under the observation of a Registered Professional Engineer and a (NICET, WACEL, or equivalent) certified

B. The required bearing pressure beneath the foating of the wall shall be verified in the field by a certified soils technician. Testing documentation shall be provided to the Howard County Inspector prior to the start of construction. The required test procedure shall be the Dynamic Cone

C. The suitability of the fill material shall be confirmed by the on-site soils technician. Each eight inch lift must be compacted to 95% Standard Proctor Density and the testing report shall be made available to the Howard County Inspector upon completion of the construction.

D. For walls over ten feet in height, one soil boring is required every 100 feet along the length of the wall, copies of the boring reports shall be provided to the Howard County Inspector prior to the start of construction.

16. EMBEDMENT: Wall embedment varies from two to twenty-seven blocks (burying to virgin and eliminating "step-downs"). The exact amount of buried blocks can be determined by subtracting the "BB" elevation from the "GR" elevation on the RA profile drawings.

17. SEPARATE 81/2" X 11" SUBMITTAL: These 24" X 36" sheets were done in conjunction with an 81/2" X 11" submittal. The cross section calculations and the global stability analysis are included in the 8 1/2" X 11" submittal.

> **RYAN & ASSOCIATES** RETAINING WALL DIVISION 29 SOUTH MAIN STREET, SUITE A

PHONE 717-262-4242 FAX 717-262-4245 CHAMBERSBURG, PA 17201

Professional Engr. No. 21586

HIGH RIDGE PARK RETAINING WALL DETAILS

SHEET 15 OF 39

PREPARED BY 4 NORTH PARK DRIVE HUNT VALLEY, MARYLAND TEL: (410) 785-7220

DES: DRN: CHK: DATE: 8/3/04 NO. DATE REVISION

OWNER: HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045

TAX MAP: 50

ZONED: R-20 & R-SC

CENSUS TRACT: 6069,03

PARCEL NO.: 364

WATER CODE: CO6

SEWER CODE: 7170900

GRID: 1&2

SPECIFICATIONS FOR SEGMENTAL RETAINING WALL SYSTEMS

PART 1: GENERAL

#### 1.01 Description

A. Work includes furnishing and installing segmental retaining wall (SRW) Units to the lines and grades designated on the Final Design prepared by Ryan & Associates (RA). Also included are furnishing and installing appurtenant materials required for construction of the retaining wall as shown on the RA Final Design.

#### 1.02 Reference Standard

A. ASTM C 140—
B. ASTM D 4595—

Width Strip Method.

C. ASTM D 5262—

D. GRI:GG1—
E. GRI:GG5—
F. ASTM D 698—

G. ASTM D 422—

Sampling and Testing Concrete Masonry Units
Tensile Properties of Geotextiles by the Wide—
Width Strip Method.

Test Method for Evaluating the Unconfined Creep
Behavior of Geo— Grids
Single Rib Geogrid Tensile Strength
Geogrid Pullout
Moisture Density Relationship for Soils, Standard
Method
Gradation of Soils

G. ASTM D 422H. ASTM 4318I. ASTM 3034Specification for Polyvinyl Chloride (PVC) Plastic

J. ASTM D 1248- Specification for Corrugated Plastic Pipe

#### 1.03 Design Standards

A. The following factors of safety must have been met in this design: Sliding 1.5, Overturning 2.0, Bearing Capacity 2.0, Geogrid Overstress 1.5, Geogrid Connection (between the black and the geogrid) and Geogrid Pullout 1.5 (from the black and from the soil).

#### PART 2: MATERIALS & DESIGN PARAMETERS

#### 2.01 Segmental Retaining Wall Units

A. SRW Units shall be machine formed, Portland Cement concrete blocks specifically designed for retaining wall applications. The SRW Unit currently approved for this project is:

#### Keystone Compac II as manufactured by Betco Block & Products

NOTE: Where Keystone specifications and reference documents conflict with these specifications the RA specifications hold precedence.

B. SRW Units shall be sound and free of cracks or other defects that would interfere with the proper placing of the units or significantly impair the strength or permanence of the structure. Cracking or excessive chipping may be grounds for rejection. Units showing cracks longer than 1/2 inch shall not be used within the wall. Units showing chips visible at a distance of 30 feet from the wall shall not be used within the wall.

C. Concrete used to manufacture SRW Units shall have a minimum 28 days compressive strength of 3,000 PSI and a maximum moisture absorption rate, by weight, of 8% as determined in accordance with ASTM C 140. Compressive strength test specimens shall conform to the saw—cut coupon provisions of Section 5.2.4 of ASTM C 140 with the following exception: Coupon shall be taken from the least dimension of the unit of a size and shape representing the geometry of the unit as a whole.

D. SRW Units molded dimensions shall not differ more than  $\pm 1/8$  inch from that specified, except height which shall be  $\pm 1/16$  inch as measured in accordance with ASTM C 140.

#### 2.02 Geosynthetic Reinforcement

A. Geosynthetic reinforcement shall consist of geogrids as indicated on the RA Final Design. No geogrid substitutions shall be permitted without the prior approval of RA (a partial redesign may be necessary if geogrids are substituted). NOTE: it is always acceptable to substitute a higher strength geogrid (of the same manufacturer) for a lower strength geogrid.

#### 2.03 Connector

A. Shear connectors shall be 1/2 inch diameter thermoset isopthalic polyester resin-pultruded fiberglass reinforcement rods or equivalents to provide connection between vertically and horizontally adjacent units. Strength of shear connectors between vertical adjacent units shall be applicable over a design temperature of 10 degrees F to +100 degrees F. These connectors shall be capable of holding the geogrid in the proper design position during geogrid pre-tensioning and backfilling. The pins have several positions. The rear pin position results in a 1" setback and a 7.1° batter and the center pin position results in a near vertical setback with an approximate positive batter of 0.5°. The batter for which RA designed this wall will be stated in the RA Final Design General Notes and on the structural cross sections. It is always acceptable to change from the near vertical batter to 7.1° since it is more conservative (yields higher factors of safety); however the cross sections will a negative page of the page of

A. Material for the leveling pad shall consist of compacted gravel or unreinforced concrete. Typical gravels used for this leveling pad are #57, CR6, 21A, 2A modified, 2B, RC6, RC57, etc. Lean un-reinforced concrete with a strength

#### 2.05 Drainage Aggregate

A. Drainage aggregate shall be clean angular gravel (#57 or equivalent) with a size of 1/2 inch to 1 1/2 inches and less than 10% fines (passing the #200 sieve). Rounded "pea gravel" type aggregate is not permissible since it does not have the necessary frictional properties. Recycled gravel may be used if it meets the above criterian.

#### 2.06 Drainage Pipe

A. The drainage collection pipe shall be a 4 inch perforated or slotted PVC or corrugated HDPE pipe.

# 2.07 Infill Soil: within the reinforced geogrid zone A. The soils used must meet or exceed the friction angle stated in the RA Final Design (in the General Notes, on the typical wall section and on the structural cross sections). The reinforced material shall be free of debris and organic

typical wall section and on the structural cross sections). The reinforced material shall be free of debris and organic material (i.e.— no plants, roots, sod, top soil, trash, wood, etc.). The infill soil shall not consist of CH (fat clay), MH (elastic silt) or OH/OL/PT (organic) soils. All soils used for wall infill must always meet the following requirements, regardless of the friction angle: maximum liquid limit of 40, maximum optimum moisture of 20%, maximum of 75% passing the #200 sieve (minimum of 25% retained on the #200 sieve) and minimum dry unit weight of 105 PCF. Soil moisture must be within 2% of optimum for proper compaction results (no exceptions).

B. Rocks may be used as infill material as long as they have a maximum size of 6 inches and a mean diameter of 3 inches. Recycled concrete is permissible for infill except with certain polyester geogrids in water applications. In the case of water applications the geogrid manufacturer shall be consulted to see if the alkali in the recycled material will cause corrosive damage to their geogrid.

C. Select gravel (classified by USCS as GP or GW) is normally an acceptable substitution in the event suitable soils (those meeting RA's and the site geotechnical engineer's requirements) are not readily available. However, the unit weights of gravel can vary widely (clean gravel is typically 105 PCF and "crusher run" gravel is typically 135 PCF) so RA must be notified so that revised sections can be run prior to making any substitutions. In some cases clean gravel actually requires longer geogrid because of its extremely light unit weight (typically 105 PCF).

#### 2.08 Retained Soil: the area beyond the infill soil and extending to a distance that is twice the wall's exposed height

A. This soil must meet or exceed the friction angle stated in the RA Final Design (in the General Notes, on the typical wall section and on the structural cross sections). This soil must be virgin (natural undisturbed with blow counts ≥12) or suitable fill (friction angle ≥ the RA Final Design requirement) compacted to 95% of a standard proctor maximum

2.09 Foundation Soil: the soil under the wall's gravel leveling pad and the soil under the reinforced geogrid zone

A. The foundation soil must meet or exceed the minimum allowable bearing capacity stated in the RA Final Design (in the General Notes and on the typical wall section). The sub—grade must be virgin (natural undisturbed with blow counts ≥12) or suitable fill (friction angle ≥ the RA Final Design requirement) compacted to 95% of a standard proctor maximum dry density.

#### 2.10 Soil Investigation

A. RA recommends that every retaining wall design be preceded by an in-situ soil investigation by a licensed geotechnical engineer. However, if the owner and/or wall installer elects not to have an investigation conducted RA may assume soil design parameters based on: published data by the Soil Conservation Service (soil maps), a verbal description by the owner and/or wall installer or by RA's previous experience in certain geographic areas. It must be understood that the owner and/or wall installer bears full responsibility to the election not to have an investigation performed.

#### 2.11 Site History & Information

A. Many factors other than soil information affect the performance and design of the retaining wall. RA relies on information provided by the owner and/or wall installer when designing a retaining wall. RA bears no responsibility if the owner and/or wall installer omit critical information required to properly design the wall. Information critical to wall design from the site consist of: topographic features (such as slopes), soil types, utilities, storm water management, structures (including buildings, other existing or proposed walls, swimming pools, etc.), site geological phenomenon, groundwater, loads with the wall's zone of influence (such as driveways, patios, roadways, sidewalks, etc.) and any other readily known site factors that could potentially impact the RA Final Design.

#### 3.01 Inspection

PART 3: CONSTRUCTION

A. RA considers all retaining walls to be critical structures, meaning most walls require a considerable financial investment by the owner and failure of a wall will negatively impact a property both financially and from a public safety perspective. The owner or owner's representative is responsible for verifying that the wall installer meets all of the requirements of the RA Final Design (as stated in these specifications and the project's General Notes). This includes all submittals for materials and design, qualifications and proper installation of the wall system. All walls with an exposed height of 4 feet or greater, or those that require building permits, must have the construction certified by a licensed geotechnical/ structural engineer registered in the jurisdiction of the project. Additionally, after the wall has been completed it is highly recommended that it be surveyed to establish the wall's current horizontal and vertical alignment.

B. The wall installer's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

C. RA provides construction oversight on some retaining wall projects. RA verifies general compliance with the RA Final Design; however, it is the wall installer's ultimate responsibility to construct the structure properly in accordance with the RA Final Design. RA's liability is limited to the amount of our fees for the scope of work provided for the wall designs and construction oversight.

A. The wall installer shall excavate to the lines and grades shown on the RA Final Design and the project's civil plans. The wall installer shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted soil (friction angle (RA

design parameters) or gravel as directed by the site geotechnical engineer.

B. The wall installer shall verify location of existing structures and utilities prior to excavation. The wall installer shall ensure that all surrounding structures are protected from the effects of wall excavation. Excavation support (shoring), if required, is the responsibility of the wall installer. All excavation must be conducted in accordance with OSHA (federal) and state safety regulations. All work to construct the wall must be in accordance with 29CFR1926 sub-part P (OSHA Excavation Safety Requirements).

#### 3.03 Foundation Preparation

A. Following excavation, the foundation soils (under the wall's gravel leveling pad and under the wall's reinforced geogrid zone) shall be examined by the site geotechnical engineer to assure that the actual foundation soil strength meets or exceeds the minimum allowable bearing capacity in the RA Final Design (stated in the General Notes and shown on the typical wall section). Soils that do not meet the required strength shall be removed and replaced with approved select structural fill or gravel and be compacted to 95% of a standard proctor maximum dry density for the full depth.

B. In cases of poor bearing capacity or fill soils, an enlarged geogrid reinforced leveling pad may be required. This typically consists of a 1 foot deep X 4 foot wide leveling pad with geogrid under (on the sub-grade) and within the gravel (6 inches above the sub-grade). The sub-grade must be compacted with a "J-Tamp" or "Jumping Jack" type compactor with a minimum of three passes prior to geogrid placement. These extra measures will increase the soil's bearing capacity by a minimum of 1,000 PSF (RA shall be consulted if the soil's bearing capacity needs to be increased by more than 1,000 PSF).

### A. The leveling pad shall be placed so that its top elevation is the same as the bottom of block ("BB") elevation on the RA Final Design profile drawing. It shall have a minimum thickness of 6 inches and a minimum width of 2 feet. The leveling pad should, at

a minimum, extend laterally at least a distance of 6 inches from the toe and heel of the lower most SRW Unit.

B. The leveling pad material shall be compacted to 95% of a standard proctor maximum dry density with a vibratory plate compactor to provide a firm level-bearing surface on which to place the first course of SRW Units. A thin layer (not to exceed 1/2 inch) of well-graded sand or stone dust may be used to smooth the top of the leveling pad.

## A. All SRW Units shall be installed at the proper elevation and orientation as shown on the RA Final Design profile drawing and in conjunction with the project's civil plans. The SRW Units shall be installed in general accordance with the manufacturer's recommendations (RA's Final Design shall govern in any conflict between the two requirements).

B. The first course of SRW Units shall be placed on the leveling pad. The units shall be leveled side—to—side, front—to—rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important for accurate and acceptable results. Alignment may be done by means of a string line or an offset from the base line to the backs of the blocks. SRW units shall have a minimum 4 inch overlap of units on each successive course so that the wall is interlocked and continuous. No horizontal gaps greater than 1/4 inch between the faces of adjacent units are permitted.

C. Because the wall has a setback, its batter must be predetermined during the stake out process by the civil engineer/surveyor and wall installer. If there are critical dimensions that must be met on the high side of the wall then the base (at the toe) will need to be moved forward to compensate.

D. Lay out of curves and corners shall be installed in accordance with the civil plans and the RA Final Design. Construction techniques for curves and corners shall be in general accordance with the SRW manufacturer's installation guidelines. In general, all tangent angles shown on the civil drawings should be changed into curves to enhance the wall's strength and appearance. Continuous vertical joints are not recommended. Inside and outside 90° corners may be constructed without compromising the wall's integrity if they are properly interlocked. Inside corners should be constructed so that the SRW Units interlock (according to manufacturer's recommendations) and outside corners should incorporate special corner blacks when possible. If special outside corner blacks are not available from the black manufacturer for this project then the manufacturer's guidelines for building structural outside corners shall be followed. If gluing is necessary only industrial grade adhesives or seplants designed for concrete—to—concrete applications may be used (adhesives designed for plastic or wood applications are not acceptable).

#### E. Clean all excess debris from the tops of the SRW Units and install the next course.

F. Repeat procedures to extent of wall height.

G. A ±2° tolerance is permitted horizontally for wall batter (block setback). In no case shall a wall go beyond vertical (have a negative batter). Walls shall be built level (not with grade), however a +1.5 inch tolerance over a 10 foot distance is permitted vertically (as checked from left to right along the wall).

DATE

H. Embedment shall be a minimum of 1 inch buried for every 1 foot of wall exposed with one block minimum when the front slope is 4:1 or greater (more level). Walls constructed on 3:1 front slopes or less (more steep) require additional buried blocks. See the profile drawing in the RA Final Design for the exact amount of embedment (the amount of buried block can be determined at each wall station by subtracting the "BB" elevations from the "GR" elevations).

#### 3.06 Geogrid Reinforcement Placement

A All geogrid reinforcement shall be installed at the proper elevation, length and strength as shown on the profile and structural cross sections in the RA Final Design. Partial geogrid coverage is not acceptable: no gaps shall be present between geogrid layers. 100% coverage is required, however it is not necessary to overlap the geogrid pieces. The geogrid shall be laid horizontally on the compacted infill soil and on top of the concrete SRW Units. The geogrid must be embedded into the SRW Units to the face. The wall installer shall verify that the orientation of the geogrid is in accordance with the geogrid manufacturer's recommendations. The highest strength direction of the geogrid must be perpendicular to the wall face (the geogrid must not be laid parallel to the wall—cannot be rolled out with the wall).

B. Geogrid reinforcement layers shall be one continuous piece for their entire embedment length. Overlapping of the geogrid in the design strength direction (perpendicular to the wall face) is not permitted.

C. Tracked construction equipment shall not be operated directly on the geogrid. A minimum of 6 inches of backfill is required prior to operation of tracked vehicles over the geogrid. Turning should be kept to a minimum. Rubber—tired equipment may pass over the geogrid reinforcement at slow speeds (less than 5 MPH).

D. The geogrid shall be in tension and free of wrinkles prior to placement of the infill soil. Naminal tension shall be applied to the geogrid and secured in place with staples, stakes or by hand until it is covered by 6 inches of infill soil.

E. For inside & outside corners and inside & outside curves the geogrid shall be placed according to the manufacturer's instructions to provide total geogrid coverage. On outside corners the geogrid should be shifted up or down one course and alternated so that the geogrid comes into the reinforced geogrid zone from both legs of the 90° angle. Geogrid layers should never be placed on top of one another: there must be a minimum of 3 inches of compacted infill soil between geogrid layers.

#### 3.07 Wall Drainage

A. Drainage aggregate (clean gravel such as #57 or equivalent) shall be installed behind the entire wall face from the first course below grade to one course from the top of the wall. The drainage gravel shall be placed to a minimum thickness of 12 inches behind the SRW Units. Drainage gravel shall also fill all voids between and within (if hollow) the SRW Units. SRW Units must be filled with drainage aggregate in one course lifts (SRW Units may not be stacked in two or three course lifts and then have the gravel dumped in from the top through multiple courses). An impermeable clay layer (CL, GC or SC) shall be placed on top of the 12" drainage layer. If clayey soils are not readily available, a layer of filter fabric (Mirafi 140N or equivalent) shall be placed on top of the gravel (below the topsoil) to prevent the downward migration of fines.

B. Drainpipes are mandatory and shall be vented through the wall face at maximum intervals of 40 feet on center (no more than 6 inches above finished grade). The pipes must maintain positive flow of water outside the reinforced geogrid zone. The drainpipes should be checked by the owner on a regular basis to ensure that they remain open (not blocked, filled in, grown over, pinched, etc.).

C. A rear drainpipe is required for this wall because of the "cut" situation (the potential exists for stormwater to enter the interface between the reinforced geogrid zone and the retained zone) and because low permeable soils (CL— lean clay & ML—silt) will be used for infill soil. This rear drainpipe shall be surrounded by a minimum of 6 inches of clean gravel in all directions (#57 or equivalent). This rear drainpipe must be vented through the wall face at maximum intervals of 40' O.C.

D. Chimney drains (a second 12 inch layer of drainage aggregate within the rear 1 foot of the reinforced geogrid zone or directly behind the reinforced geogrid zone) must be installed when groundwater is present or likely (to an elevation that is a minimum of 1 foot above predicted levels as given by the site geotechnical engineer), when stated in the RA Final Design or when required by the site geotechnical engineer.

E. All drainage zone aggregate shall be compacted to 95% of a standard proctor maximum dry density with a vibratory plate compactor (minimum of three passes).

#### 3.08 Backfill Placement A The infill exil shall be placed as shown in the PA Final Decian in the maximum com-

A. The infill soil shall be placed as shown in the RA Final Design in the maximum compacted lift thickness of 10 inches and shall be compacted to a minimum of 95% of a standard proctor maximum dry density (ASTM D 698) at a moisture content within 2% of optimum (no exceptions). The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geogrid and the SRW units. Compaction testing shall be done at 25%, 50%, 75% and 100% of the wall height or as specified by the site geotechnical engineer.

B. Only a vibratory plate or small—scale vibratory smooth drum compactor equipment shall be allowed within 3 feet of the front of the wall face. Compaction within the 3 feet behind the wall face shall be achieved by at least three (3) passes of the lightweight mechanical plate compactor or roller. Heavy equipment (such as track hoes, ride on rollers, pans, etc.) must be kept back a minimum of 3 feet from the rear of the wall.

C. At the end of each day's operation, the wall installer shall slope the last level of backfill away from the wall facing to direct water runoff away from the wall face.

D. At completion of wall construction if final grading, paving, landscaping and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary grading shall be provided to ensure that water runoff is not allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

E. Filter fabric (Mirafi 140N or equivalent) is required when the infill soil is classified as poorly graded sand (SP) or well graded sand (SW) since these soils are non-cohesive and could potentially slough, clogging the gravel drainage layer. Filter fabric is optional between the 12 inch gravel drainage layer and the compacted infill soil if the backfill soils are clayey (CL or SC), gravelly (GC, GM, GP or GW) or silty (ML or SM).

A. SRW caps shall be properly aligned and glued (for safety reasons) to the underlying SRW Units with a flexible high—strength concrete adhesive or sealant designed for "concrete to concrete" applications (not for plastic or wood). Rigid adhesive or mortar is not acceptable.

#### 3.10 Water Applications

A. When walls are installed in water applications (such as storm water ponds, streams, bulkheads, areas adjacent to flood plains, etc.) all clean gravel must be used as infill up to 1 foot above the 100 year flood elevation, the high water level or the top of berm/spillway. This gravel must be free draining and have less than 10% fines (#57 or equivalent). Filter fabric (Mirafi 140N or equivalent) must go in front of the buried block, under the leveling pad, behind the reinforced geogrid zone (vertically up to the extent of the gravel infill) and on top of the gravel infill (horizontally). This is required to prevent the migration of fines into the gravel infill. Rip rap is required in front of the bottom three courses on walls installed in tidal waters. Rip rap is also required when indicated on the civil plans and where pipes with active water flow exit through the

#### 3.11 Rails, Fences & Other Structures

A. The scope of RA for this project does not include fence or railing designs. Typical details have been given to provide general guidelines for the installation of fences, guardrails and railings behind walls. RA cannot give specific details because the type, placement and height of fences and rails vary widely and because the requirements are different depending on the municipality and regulatory authority. RA can provide a project specific fence or rail detail and structural design for an additional fee if given exact information (material type and size and manufacturer's specifications and installation guidelines).

8. Open fences and railings not subject to wind loads (minimum of 50% open and maximum of 50% solid) may be placed directly behind the wall or in the wall (can be placed in the blocks only if they are a hollow system and if the cores and web alignment will accept the posts) as long as they are not subject to vehicular impact. Solid or semi-solid fences that are subject to wind loads must be kept back a minimum of 3 feet from the rear of the wall to prevent loading of the wall.

#### 3.10 Water Applications

A. When walls are installed in water applications (such as storm water ponds, streams, bulkheads, areas adjacent to flood plains, etc.) all clean gravel must be used as infill up to 1 foot above the 100 year flood elevation, the high water level or the top of berm/spillway. This gravel must be free draining and have less than 10% fines (#57 or equivalent). Filter fabric (Mirafi 140N or equivalent) must go in front of the buried block, under the leveling pad, behind the reinforced geogrid zone (vertically up to the extent of the gravel infill) and on top of the gravel infill (horizontally). This is required to prevent the migration of fines into the gravel infill. Rip rap is required in front of the bottom three courses on walls installed in tidal waters. Rip rap is also required when indicated on the civil plans and where pipes with active water flow exit through the wall.

C. Guardrails subject to vehicular impact must be kept back a minimum of 3 feet from the rear of the wall to prevent loading of the wall. Guardrails may be placed closer than this 3 foot minimum only if a barrier (such as curbing, wheel stops, etc.) is in place to

prevent vehicular impact (the overhang of vehicles must be considered when determining this).

D. Light post foundations, sign foundations and similar structures subject to wind loads must be kept back a minimum of 3 feet from the rear of the wall to prevent loading of the wall.

E. In cases where these 3 foot minimum distances cannot be met due to restraints on the site, additional analyses will need to be done to determine methods of stabilization. RA can provide these designs for an additional fee.

#### 3.12 Storm Structures & Utilities

A. Reinforced Concrete Pipes (RCP) may pass through the leveling pad or wall structure without compromising the design. The SRW units may be cut to fit around the pipe and the voids filled with non—shrink grout or type "M" mortar. A concrete collar may be cast around the structure if desired. When a collar is cast, the top of the collar shall line up with an even block course to maintain proper gligament and neat workmapship.

8. The wall may not bear on plastic or steel pipes (such as ADS, CMP, HDPE, PVC, SLCPP, etc.) or utilities (such as electric, gas, phone lines, sewer or water lines, etc.). Grade beams or lintels must be used to bridge these non-load bearing structures. If a specific grade beam or lintel is not specified in the RA Final Design, RA shall be consulted to determine the size, strength and reinforcing of the grade beam or lintel. If these non-load bearing pipes or utilities are located at minimum of 42 inches below the wall's leveling pad then a grade beam or lintel is not necessary.

C. Concrete starm structures may be located behind a wall and be within the reinforced geogrid zone as dictated by the project's civil drawings. If the structure(s) cannot be moved out of the reinforced geogrid zone and the geogrid cannot be installed to its full design length the following shall apply. On small structures (such as collection boxes, concrete pipes less than 18 inches, inlets, manholes, etc.) it is acceptable to shorten the geogrid from the design length and meet the structure. The area between the wall and structure where the geogrid has been shortened must be filled with gravel (#57 or equivalent) and not soil. The gravel must be compacted to 95% of a standard proctor maximum dry density with a vibratory plate compactor. On large structures and in cases where pipes parallel the wall for long distances, RA shall be consulted to determine the impact on the wall before allowing this to be

D. The wall's integrity may be compromised if pipes or structures burst or develop leaks and allow water or fluids to saturate the reinforced geogrid zone. RA is not responsible for wall failure that results from pipes or structures that burst or leak and allow water or fluids to saturate the reinforced geogrid zone.

#### 3.13 Construction Adjacent to Completed Wall

A. The owner or owner's representative is responsible for ensuring that construction adjacent to the wall by others does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of three feet behind the back of the wall face. Equipment with wheel loads in excess of 150 PSF live load shall not be operated with 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the general contractor or owner to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

B. Care must be taken when installing appurtenances (such as generators, transformers, etc.) or utilities within the reinforced geogrid zone of the wall. The compaction integrity of the reinforced geogrid zone must be maintained, both below and beside (ground) the appurtenance or utility. Neglecting to do so may cause hydrostatic pressure and wall failure.

#### 3.14 Storm Water Managemen

A. The segmental retaining wall is not a storm water management structure. The wall can accommodate the rainfall above the reinforced geogrid zone but not the watershed (including the retained zone). Therefore it is absolutely essential that surface water be prevented from entering (and ultimately saturating) the reinforced geogrid zone. This is usually accomplished by the site engineer (owner's civil engineer) grading the surface behind the wall to direct surface water to swales that divert the water around the wall ends, to inlets or over the top of the wall through scuppers. If water is directed to the wall (such as applications with back slopes), the top 8 inches of compacted fill over the reinforced geogrid zone must have impermeable soil (such as CL, GC or SC). If clayey soils are not readily available an underlying geomembrane (geosynthetic liner) may also be used. This geomembrane shall be Mirafi G200N, Stratadrain or equivalent. It shall extend downward vertically a minimum of 3 feet behind the reinforced geogrid zone, be laid horizontally on top of the reinforced geogrid zone with a maximum slope of 10:1 and extend forward into the 12 inch gravel drainage layer.

B. The site geotechnical engineer is responsible for verifying the stability of slopes on the project. RA's scope includes only wall the design, not the evaluation of back slopes (above walls) or front slopes (at the base of walls). RA performs global stability analyses on walls that rest on major front slopes, however only the wall is analyzed, not the actual slopes above or below the wall. It is the responsibility of the site geotechnical engineer to determine if the site soils are able to sustain the proposed grades. If not, they shall determine and specify the additional reinforcement that is necessary to provide the proper slope stability and prevent erosion.

C. The general contractor, owner, site contractor and/or wall installer must provide for proper wall drainage to prevent the buildup of hydrostatic pressures over the service life of the structure. In the event additional water is introduced into the general wall area, either above or below grade, the RA Final Design will be invalid (the exception is "water applications" where clean gravel is used for infill and it is wrapped in filter fabric and the design intent is for the wall to be interacting with water).

#### 3.15 Post Construction Responsibilities

A. Retaining walls are a substantial financial investment. Therefore it is in the owner's best interest that a wall maintenance budget be established within the overall property management budget to monitor and provide preventative maintenance. Retaining wall maintenance, at a minimum, should consist of: checking drainage, inspecting for settling and surveying to verify alignment and batter. This service should be by qualified personnel under the supervision of a licensed geotechnical/structural engineer. RA can provide this service for an additional fee.

B. RA SHOULD BE NOTIFIED AS SOON AS REASONABLY POSSIBLE IF THE RETAINING WALL EXHIBITS CONDITIONS CONTRARY TO THE RA FINAL DESIGN SO THAT RA MAY BE CONSULTED TO PROTECT THE OWNER'S INVESTMENT.

#### END OF SECTION Revised 03-10-04

The information contained herein is proprietary and is the sole property of RA. It is only intended for use on this project. Reuse of these drawings, sketches, and design computations in any manner is strictly prohibited without written approval from RA. Any other use is subject to penalty of law. (c)

APPROVED: DEPARTMENT OF RECREATION AND PARKS

DIRECTOR

DEPARTMENT OF PLANNING AND ZONING

Chief, Development Engineering Division (Control of Date)

Chief, Silvision of Light Development (S)

Date

Date

Date

Date

DES:

DRN:

CHK:

DATE: 8/3/04 BY NO. REVISION

OWNER:
HOWARD COUNTY DEPARTMENT
RECREATION AND PARKS
7120 OAKLAND MILLS ROAD
COLUMBIA, MARYLAND 21046

DEVELOPER:
HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS
9250 BENDIX ROAD
COLUMBIA, MARYLAND 21045

TAX MAP: 50
GRID: 1&2
ZONED: R-20 & R-SC
PARCEL NO.: 364CENSUS TRACT: 6069.03
WATER CODE: CO6
SEWER CODE: 7170900

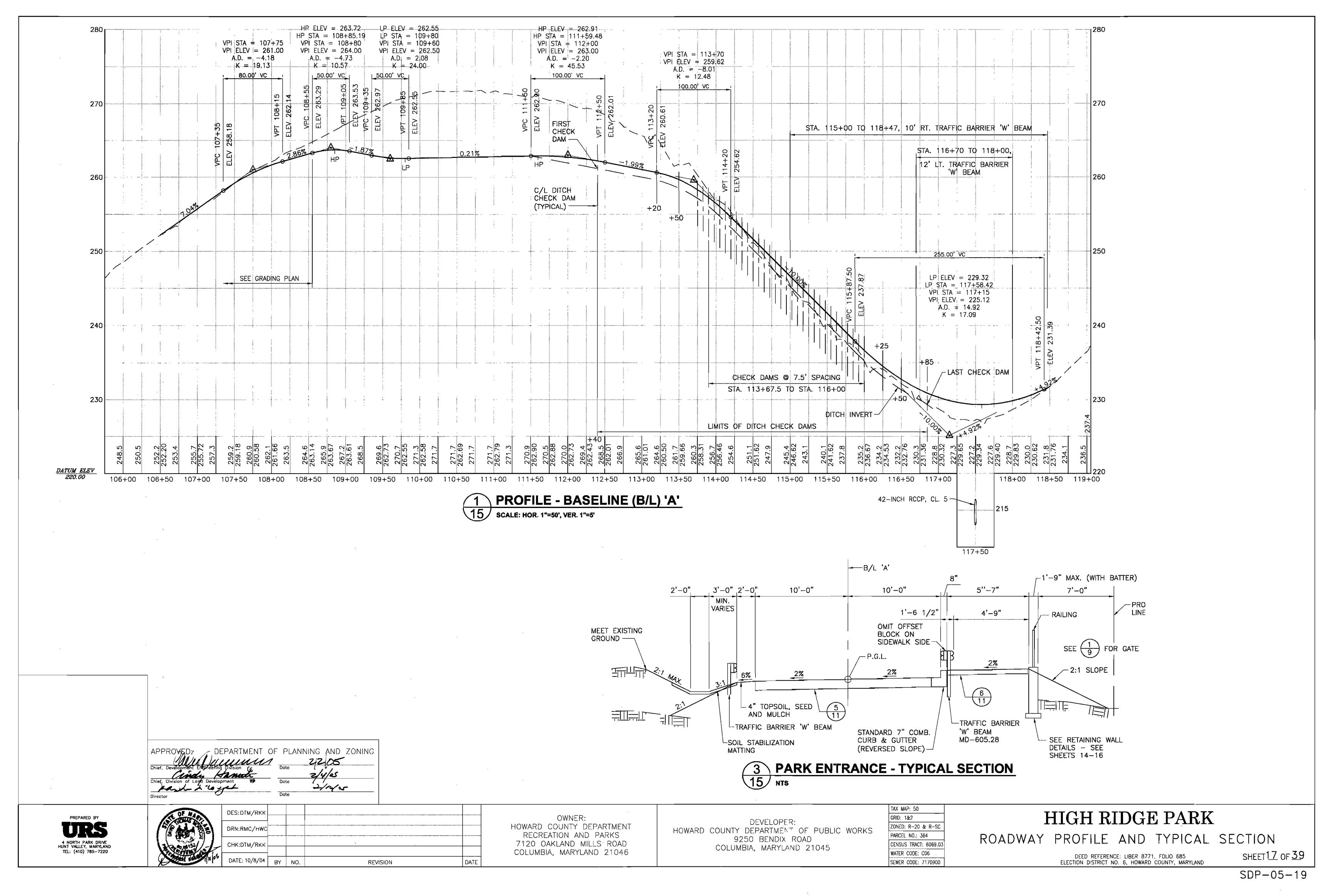
RYAN & ASSOCIATES
A Division of WKR Consulting, Inc.
RETAINING WALL DIVISION
PHONE 717-262-4242 FAX 717-262-4245
29 SOUTH MAIN STREET, SUITE A
CHAMBERSBURG, PA 17201

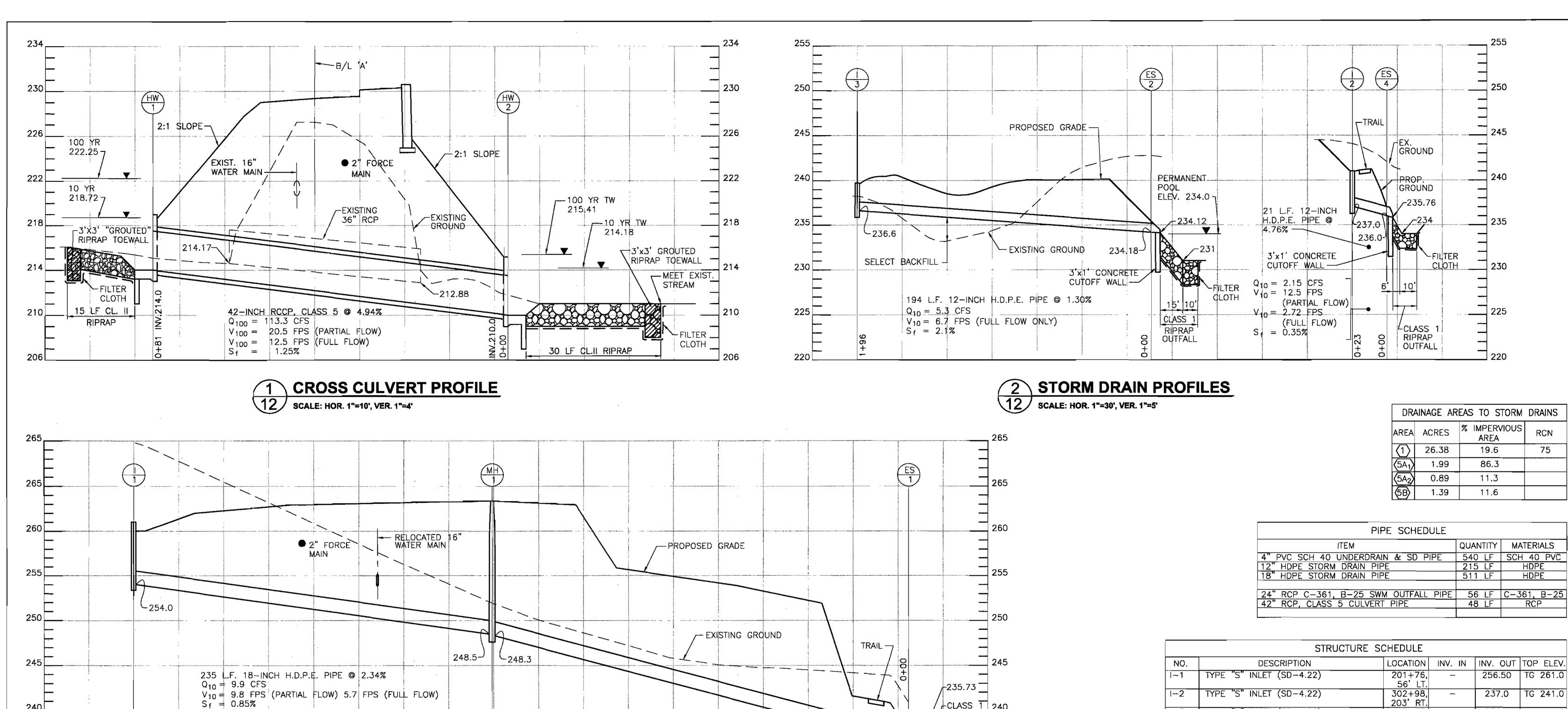


Professional Engr. No. 21586

HIGH RIDGE PARK
RETAINING WALL DETAILS

DEED REFERENCE: LIBER 8771 FOLIO 685
ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND



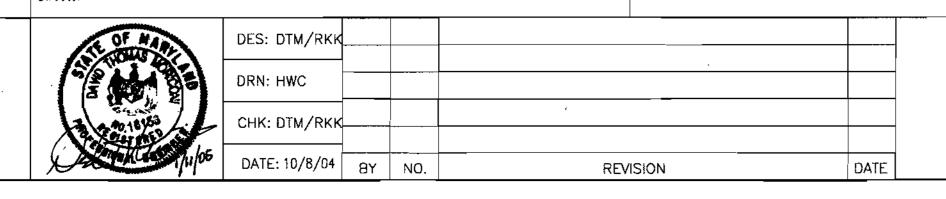


STRUCTURE SCHEDULE					
NO.	DESCRIPTION	LOCATION	INV. IN	INV. OUT	TOP ELEV.
11	TYPE "S" INLET (SD-4.22)	201+76, 56'LT.	_	256.50	TG 261.0
1-2	TYPE "S" INLET (SD-4.22)	302+98, 203'RT.	***	237.0	TG 241.0
1–3	TYPE "S" INLET (SD-4.22)	105+25, 46'RT.	_	236.6	TG 239.5
<b>N</b> (1) (1)	OTTO DO	700.74	0.40.5	0.40.7	
MH 1	STANDARD PRECAST MH (G-5.12)	302+34, 30'LT.	248.5	248.3	263.4
MH 2	STANDARD PRECAST MH (G-5.12)	117+62.5, 29'LT.	215.49	215.30	225.5
ES-1	18" CMP END SECTION (SD 5.61)	-	_	235.73	_
ES-2	12" CMP END SECTION (SD 5.61)		_	234.12	
ES-3	24" CONCRETE END SECTION (SD 5.52)		_	227.9	_
ES-4	12" CMP END SECTION (SD 5.61)			235.76	
HW-1	TYPE 'A' HEADWALL-CIRCULAR (SD5.11)	117+50.5, 36'LT.	214.00	_	<del></del>
HW-2	TYPE 'A' HEADWALL-CIRCULAR (SD5.11)	117+46, 45' RT.		210.0	

#### NOTES:

- 1. ALL HIGH DENSITY POLYETHYLENE PIPE (HDPE) SHALL MEET AASHTO M-252 TYPES, M294 TYPE S AND ASTM RESPECTIVELY.
- 2. ALL PIPE PLACED IN FILL SHALL COMPLY WITH AASHTO T-180.





APPROVED: DEPARTMENT OF PLANNING AND ZONING

Chief Personal Engineering Official Park

Par

OWNER: HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

276 L.F. 18-INCH H.D.P.E. PIPE @ 4.46%

 $V_{10} = 12.5$  FPS (PARTIAL FLOW) 5.2 FPS (FULL FLOW)  $S_f = 0.75\%$ 

 $Q_{10} = 9.3 \text{ CHS}$ 

3 STORM DRAIN PROFILE

12 | SCALE: HOR. 1"=30", VER. 1"=5"

DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045

CLASS 1 240

OUTFALL

20'

**FILTER** 

CLOTH-

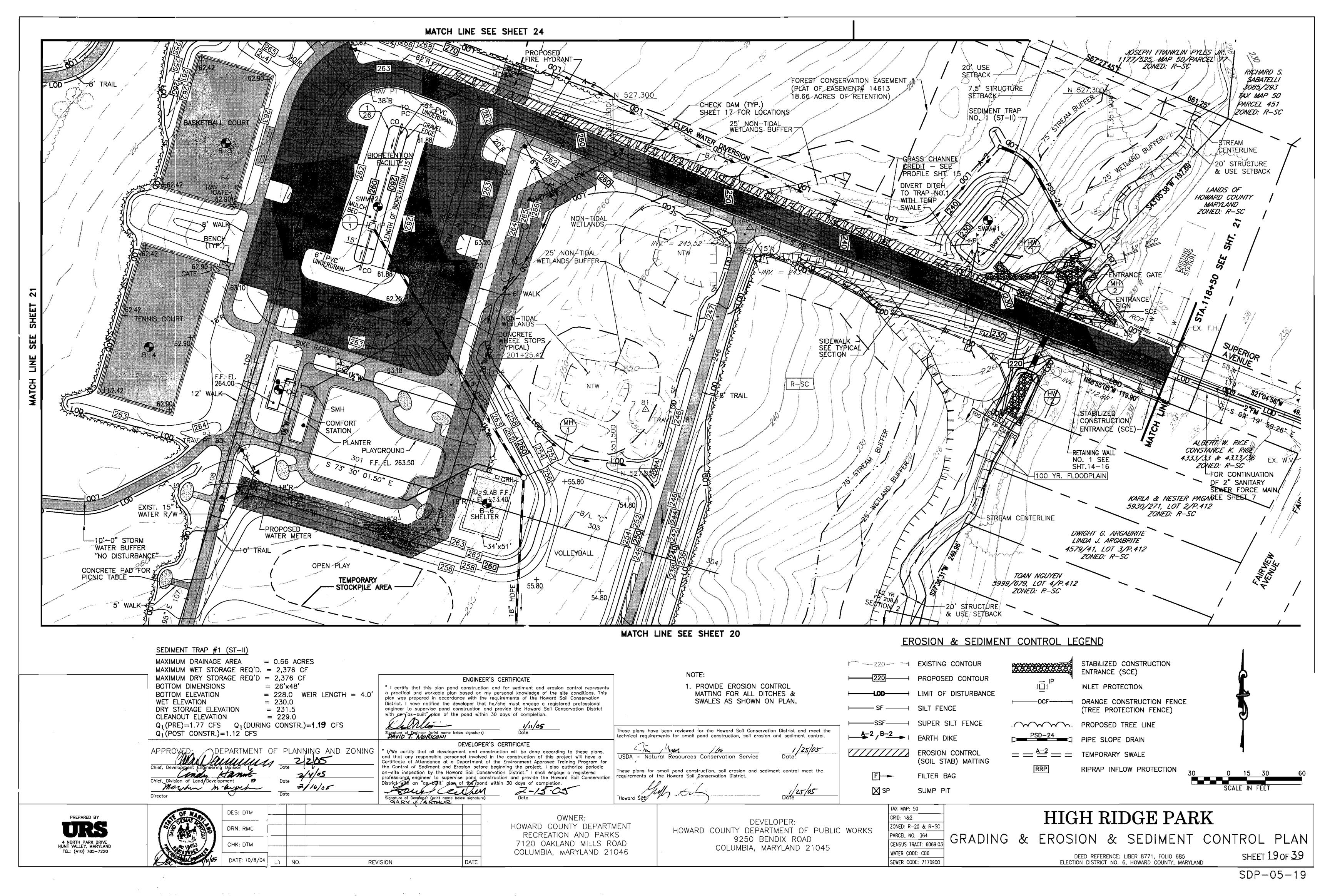
TAX MAP: 50
GRID: 1&2
ZONED: R-20 & R-SC
PARCEL NO.: 364
CENSUS TRACT: 6069.03
WATER CODE: CO6
SEWER CODE: 7170900

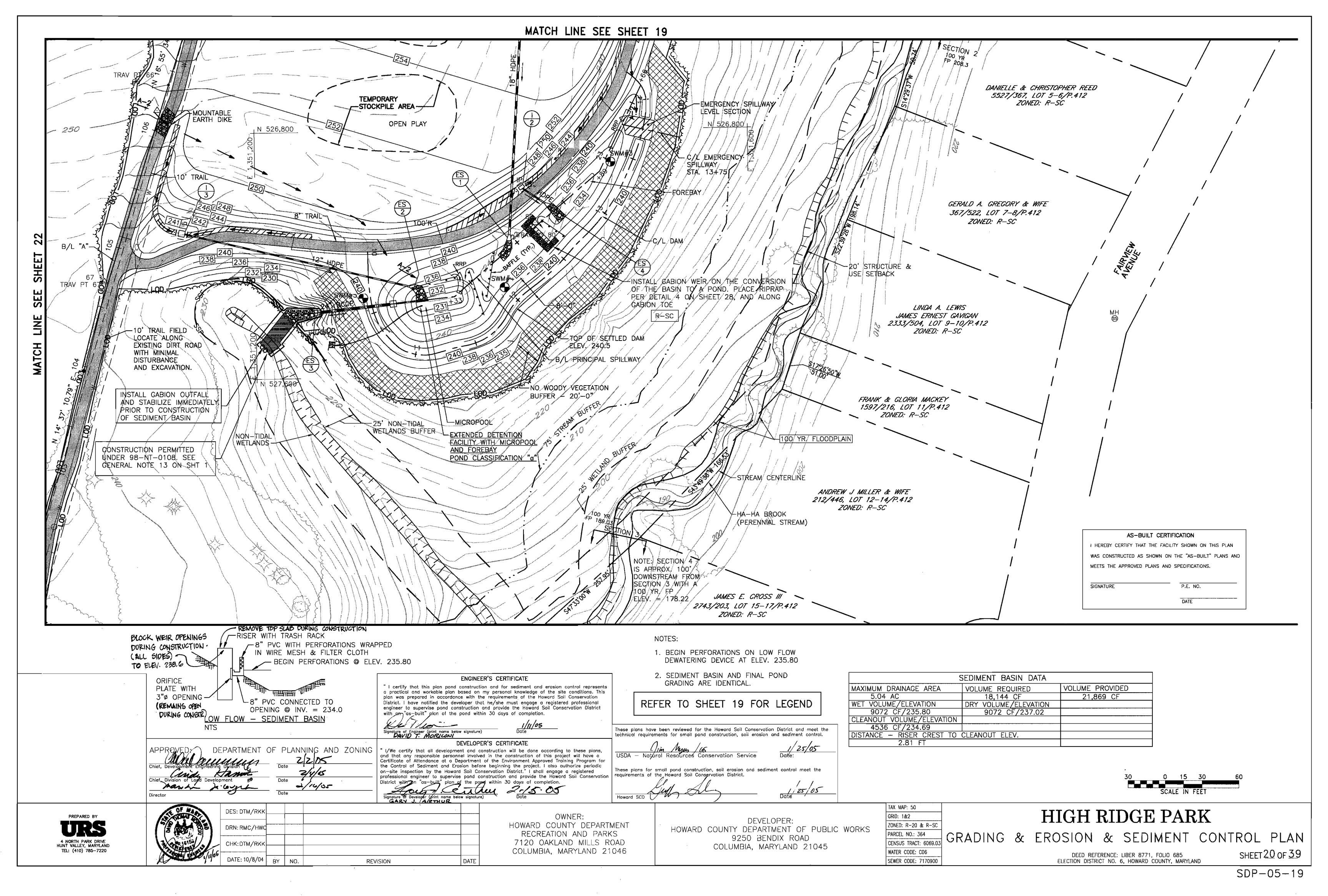
# HIGH RIDGE PARK

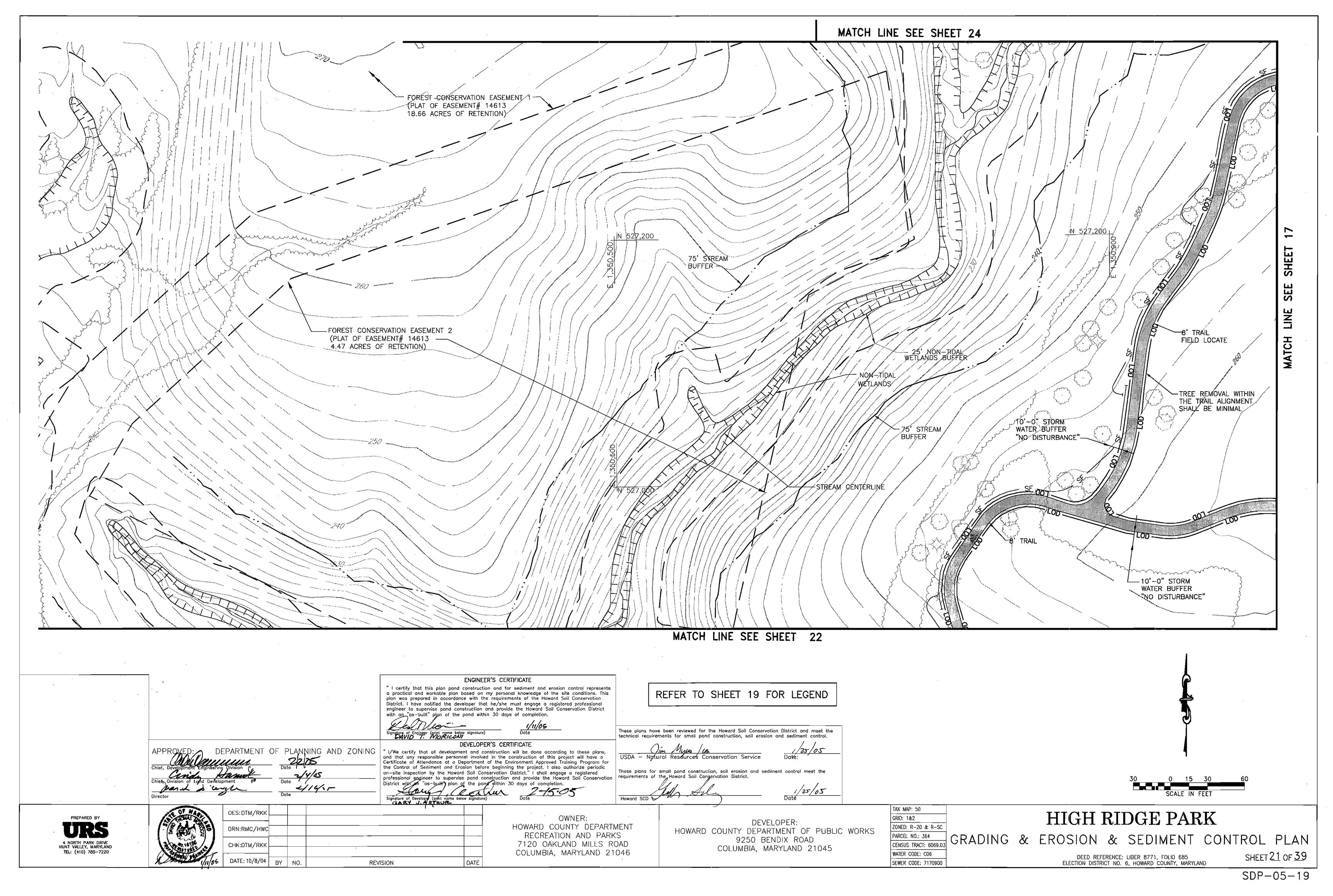
STORM DRAIN PROFILES, SCHEDULES AND DETAILS

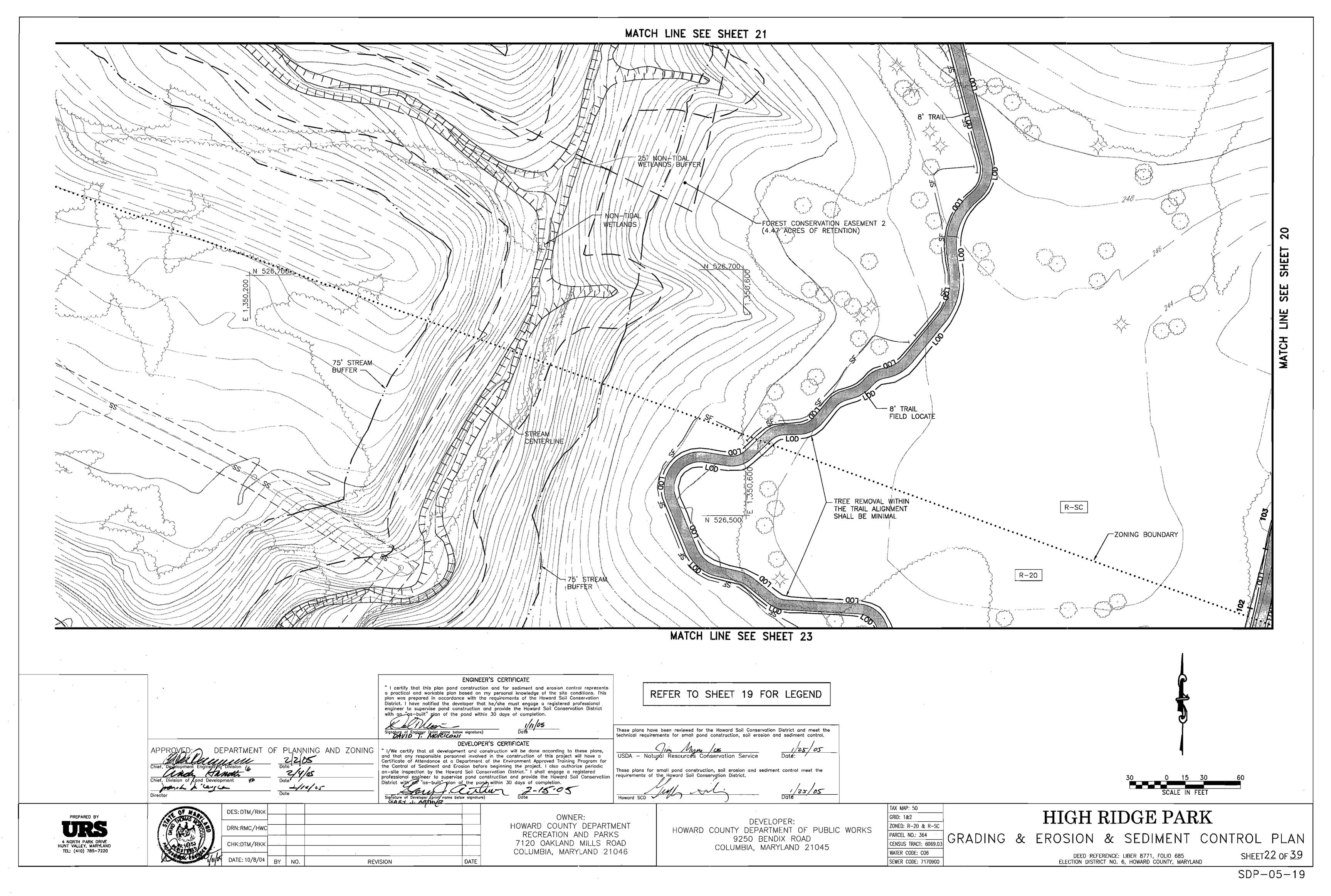
DEED REFERENCE: LIBER 8771, FOLIO 685 ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND

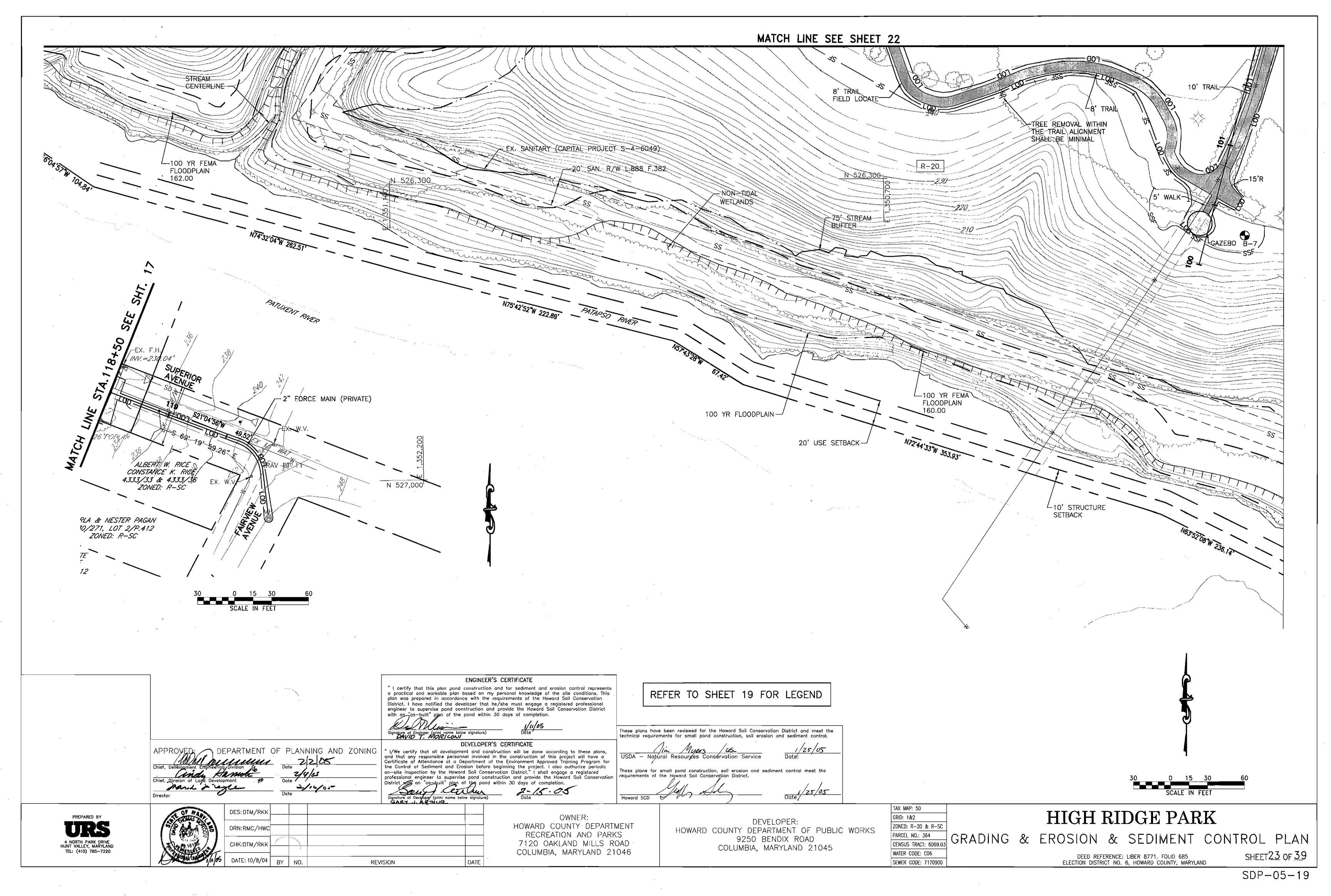
SHEET 18 OF 39

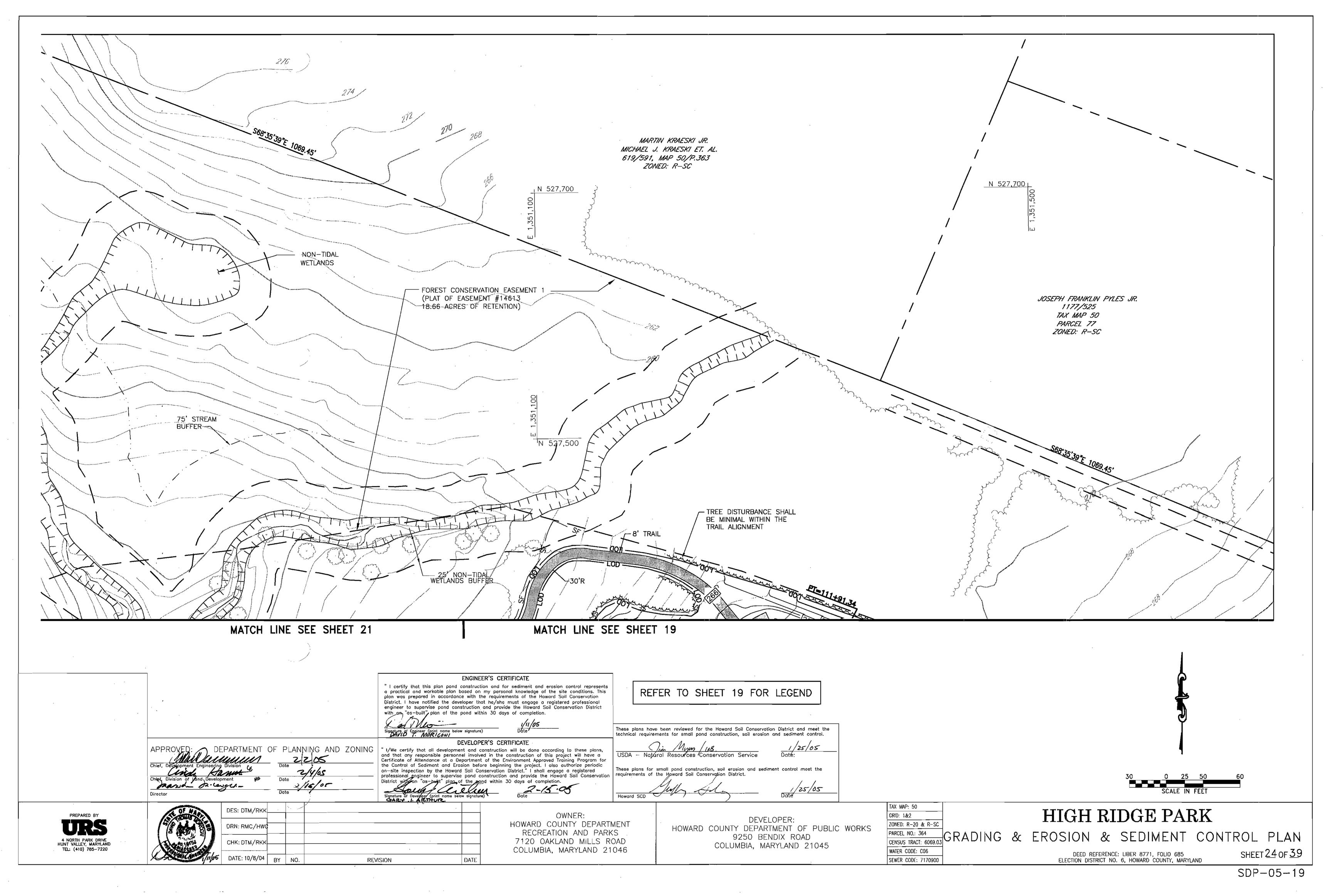












#### HOWARD SOIL CONSERVATION DISTRICT STANDARD SEDIMENT CONTROL NOTES

- A MINIMUM OF 48 HOURS NOTICE MUST BE GIVEN TO THE HOWARD COUNTY DEPARTMENT OF INSPECTIONS, LICENSES AND PERMITS, SEDIMENT CONTROL DIVISION, PRIOR TO THE START OF ANY CONSTRUCTION.
- ALL VEGETATIVE AND STRUCTURAL PRACTICES ARE TO BE INSTALLED ACCORDING TO THE PROVISIONS OF THIS PLAN AND ARE TO BE IN CONFORMANCE WITH THE "1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL", AND

REVISIONS THERETO.

- 3. FOLLOWING INITIAL SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN: A) 7 CALENDAR DAYS FOR ALL PERIMETER SEDIMENT CONTROL STRUCTURES DIKES. PERIMETER SLOPES AND ALL SLOPES STEEPER THAN 3:1, B) 14 DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT
- ALL SEDIMENTS TRAPS/BASINS SHOWN MUST BE FENCED AND WARNING SIGNS POSTED AROUND THEIR PERIMETER IN ACCORDANCE WITH VOL 1, CHAPTER 7 OF "HOWARD COUNTY DESIGN MANUAL", STORM DRINAGE.
- ALL DISTURBED AREAS MUST BE STABILIZED WITHIN THE TIME PERIOD SPECIFIED ABOVE IN ACCORDANCE WITH THE "1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL" FOR PERMANENT SEEDING, SOD, TEMPORARY SEEDING, AND MULCHING (SEC G.) TEMPORARY STABILIZATION WITH MULCH ALONE SHALL ONLY BE DONE WHEN RECOMMENDED SEEDING DATES DO NOT ALLOW FOR PROPER GERMINATION AND ESTABLISHMENT OF GRASSES.
- 6. ALL SEDIMENT CONTROL STURCTURES ARE TO REMAIN IN PLACE AND ARE TO BE MAINTAINED IN OPERATIVE CONDITION UNTIL PERMISSION FOR THEIR REMOVAL HAS BEEN OBTAINED FROM THE HOWARD COUNTY SEDIMENT
- 7. SITE ANALYSIS: ACRES ± = '88.4 TOTAL AREA OF SITE 7,4 ACRES ± AREA DISTURBED 3.07 ACRES ± = AREA TO BE ROOFED OR PAVED 4.33 ACRES ± AREA TO BE VEGATATIVELY STABILIZED = = 24,494 CUBIC YARDS TOTAL CUT = 23,040 CUBIC YARDS TOTAL FILL OFFSITE WASTE/BORROW LOCATION = N/A TO BE DETERMINED
- 8. ANY SEDIMENT CONTROL PRACTIVE WHICH IS DISTURBED BY GRADING ACTIVITY FOR PLACEMENT OF UTILITIES MUST BE REPAIRED ON THE SAME DAY OF DISTURBANCE.
- 9. ADDITIONAL SEDIMENT CONTROL MUST BE PROVIDED, IF DEEMED NECESSARY BY THE HOWARD COUNTY SEDIMENT CONTROL INSPECTOR.
- 10. ON ALL SITES WITH DISTURBED AREAS IN EXCESS OF 2 ACRES, APPROVAL OF THE INSPECTION AGENCY SHALL BE REQUESTED UPON COMPLETION OF INSTALLATION OF PERIMETER EROSION AND SEDIMENT CONTROLS, BUT BEFORE PROCEEDING WITH ANY OTHER EARTH DISTURBANCE OR GRADING. OTHER BUILDING OR GRADING INSPECTION APPROVALS MAY NOT BE AUTHORIZED UNTIL THIS INITIAL APPROVAL BY THE INSPECTION AGENCY IS MADE.
- 11. TRENCHES FOR THE CONSTRUCTION OF UTILITIES IS LIMITED TO THREE PIPE LENGTHS OR THAT WHICH SHALL BE BACK-FILLED AND STABILIZED BY THE END OF EACH WORK DAY, WHICHEVER IS SHORTER.

#### TEMPORARY SEEDING NOTES

APPLY TO GRADED OR CLEARED AREAS LIKELY TO BE REDISTURBED WHERE A SHORT-TERM VEGETATIVE COVER IS NEEDED.

SEEDBED PREPARATION: LOOSEN UPPER 3 INCHES OF SOIL BY RAKING, DISCING OR OTHER ACCEPTABLE MEANS BEFORE SEEDING (UNLESS PREVIOUSLY LOOSENED). SOILS AMENDMENTS: APPLY 600 LBS. PER ACRE 10-10-10 FERTILIZER

(14 LBS./1000 SQ.FT.)

THE FOLLOWING SCHEDULES:

SEEDING: FOR PERIODS MARCH 1 THROUGH OUT APRIL 30 AND FROM AUGUST 15 THROUGH NOVEMBER 15, SEED WITH 2 1/2 BU. PER ACRE OF ANNUAL RYE (3.2 LBS./1000 SQ.FT.). FOR THE PERIOD MAY 1 THROUGH AUGUST 14. SEED WITH 3 LBS. PER ACRE OF WEEPING LOVEGRASS (.07 LBS/1000 SO.FT.). FOR THE PERIOD OF NOVEMBER 16 THROUGH FEBRUARY 28. PROTECT SITE BY APPLYING 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING OR USE SOD.

SEEDING: FOR THE PERIODS MARCH 1 THROUGH APRIL 30, AND AUGUST 1 THROUGH OCTOBER 15; SEED WITH 60 LBS. PER ACRE (1.4 LBS./1000 SQ.FT.) OF KENTUCKY 31 TALL FESCUE. FOR THE PERIOD MAY 1 THROUGH JULY 31, SEED WITH 60 LBS. KENTUCKY 31 TALL FESCUE PER ACRE AND 2 LBS. PER ACRE (.05 LBS./1000 SQ.FT.) OF WEEPING LOVEGRASS. DURING THE PERIOD OF OCTOBER 16 THROUGH FEBRUARY 28, PROTECT SITE BY: OPTION (1) 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING. OPTION (2) USE SOD. OPTION (3) SEED WITH 60 LBS/ACRE KENTUCKY 31 TALL FESCUE AND MULCH WITH 2 TONS/ACRE WELL ANCHORED STRAW.

MULCHING: APPLY 1 1/2 TO 2 TONS PER ACRE (70 TO 90 LBS,/1000 SQ.FT.) OF UNROTTED SMALL GRAIN STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMEDIATELY AFTER APPLICATION USING MULCH ANCHORING TOOL OR 218 GALLONS PER ACRE ( 5 GALS./1000 SQ.FT.) OF EMULSIFIED ASPHALT ON FLAT AREA. ON SLOPES 8 FEET OR HIGHER, USE 348 CALLONS PER ACRE (8 GALS./1000 SQ.FT.) FOR ANCHORING.

MAINTENANCE: INSPECT ALL SEEDED AREAS AND MAKE NEEDED REPAIRS, REPLACEMENTS AND RESEEDINGS.

#### PERMANENT SEEDING NOTES

APPLY TO GRADED OR CLEARED AREA NOT SUBJECT TO IMMEDIATE FURTHER DISTURBANCE WHERE A PERMANENT LONG-LIVED VEGETATIVE COVER IS NEEDED

SEEDBED PREPARATION: LOOSEN UPPER 3 INCHES OF SOIL BY RAKING, DISCING OR OTHER ACCEPTABLE MEANS BEFORE SEEDING (IF NOT PREVIOUSLY LOOSENED).

SOIL AMENDMENTS: IN LIEU OF SOIL TEST RECOMMENDATIONS, USE ONE OF

#### 1. PREFERRED - APPLY 2 TONS PER ACRE DOLOMITIC LIMESTONE (92 LBS./1000 SQ.FT.) AND 600 LBS. PER ACRE 10-10-10 FERTILIZER (14 LBS./1000 SQ.FT.) BEFORE SEEDING. HARROW OR DISC INTO UPPER THREE INCHES OF SOIL. AT TIME OF SEEDING, APPLY 400 LBS. PER ACRE 30-0-0 UREAFORM FERTILIZER (9 LBS/1000 SQ.FT.)

2. ACCEPTABLE - APPLY 2 TONS PER ACRE DOLOMITIC LIMESTONE (92 L8S./1000 SQ. FT.) AND 1000 LBS. PER ACRE 10-10-10 FERTILIZER (23 LBS./1000 SQ.FT.) BEFORE SEEDING. HARROW OR DISC INTO UPPER THREE INCHES OF SOILS.

SEEDING - FOR THE PERIODS MARCH 1 - APRIL 30, AND AUGUST 1 - OCTOBER 15, SEED WITH 60 LBS/ACRE (1.4 LBS/1000 SQ. FT.) OF KENTUCKY 31 TALL FESCUE. FOR THE PERIOD MAY 1 - JULY 31, SEED WITH 60 LBS KENTUCKY 31 TALL FESCUE PER ACRE AND 2 LBS/ACRE (.05 LBS/1000 SQ. FT.) OF WEEPING LOVEGRASS. DURING THE PERIOD

OF OCTOBER 16 - FEBRUARY 28, PROTECT SITE BY: OPTION 1 - TWO TONS PER ACRE OF WELL ACHORED STRAW MULCH AND SEED

OPTION 2 - USE SOD. OPTION 3 - SEER: WITH 60 LBS/ACRE KENTUCKY 30 TALL FESCUE AND MULCH WITH 2 TONS/ACRE WELL ANCHORED STRAW.

AS SOON AS POSSIBLE IN THE SPRING.

MULCHING - APPLY 1-1/2 TO 2 TONS PER ACRE (70 TO 90 LBS/1000 SQ. FT.) OF ÜNROTTED SMALL GRAIN STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMÉDIATELY AFTER APPLICATION USING MULCH ANCHORING TOOL OR 218 GALLONS PER ACRE (5 GAL/1000 SQ. FT.) OF EMULSIFIED ASPHALT ON FLAT AREAS. ON SLOPE B FEET OR HIGHER, USE 348 GALLONS PER ACRE (8 GAL/1000 SQ. FT.) FOR ANCHORING.

MAINTENANCE — INSPECT ALL SEEDING AREAS AND MAKE NEEDED REPAIRS, REPLACEMENTS

#### TOPSOIL CONSTRUCTION AND MATERIAL SPECIFICATIONS

- TOPSOIL SALVAGED FROM THE EXISTING SITE MAY BE USED PROVIDED THAT IT MEETS THE STANDARDS AS SET FORTH IN THESE SPECIFICATIONS. TYPICALLY, THE DEPTH OF TOPSOIL TO BE SALVAGED FOR A GIVEN SOIL TYPE CAN BE FOUND IN THE REPRESENTATIVE SOIL PROFILE SECTION IN THE SOIL SURVEY PUBLISHED BY USDA-SCS IN COOPERATION WITH MARYLAND AGRICULTURAL EXPERIMENTAL STATION.
- II. TOPSOIL SPECIFICATIONS SOIL TO BE USED AS TOPSOIL MUST MEET
- 1. TOPSOIL SHALL BE A LOAM, SANDY LOAM, CLAY LOAM, SILT LOAM, SANDY CLAY LOAM, LOAMY SAND. OTHER SOILS MAY BE USED IF RECOMMENDED BY AN AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY. TEXTURED SUBSOILS AND SHALL CONTAIN LESS THAN 5% BY VOLUME OF CINDERS, STONES, SLAG, COARSE FRAGMENTS, GRAVEL, STICKS, ROOTS, TRASH, OR OTHER MATERIALS LARGER THAN 1 1/2 " IN DIAMETER.
- TOPSOIL MUST BE FREE OF PLANTS OR PLANT PARTS SUCH AS BERMUDA GRASS, QUACKGRASS, JOHNSONGRASS, NUTSEDGE, POISON IVY. THISTLE, OR OTHERS AS SPECIFIED.
- iii, WHERE THE SUBSOIL IS EITHER HIGHLY ACIDIC OR COMPOSED OF HEAVY CLAYS, GROUND LIMESTONE SHALL BE SPREAD AT THE RATE OF 4-8 TONS/ACRE (200-400 POUNDS PER 1,000 SQUARE FEET) PRIOR TO THE PLACEMENT OF TOPSOIL. LIME SHALL BE DISTRIBUTED UNIFORMLY OVER DESIGNATED AREAS AND WORKED INTO THE SOIL IN CONJUNCTION WITH TILLAGE OPERATIONS AS DESCRIBED IN THE FOLLOWING PROCEDURES.
- III. FOR SITES HAVING DISTURBED AREAS UNDER 5 ACRES:
- PLACE TOPSOIL (IF REQUIRED) AND APPLY SOIL AMENDMENTS AS SPECIFIED IN 20.0 VEGETATIVE STABILIZATION - SECTION I -VEGETATIVE STABILIZATION METHODS AND MATERIALS.
- IV. TOPSOIL APPLICATION
- WHEN TOPSOILING, MAINTAIN NEEDED EROSION AND SEDIMENT CONTROL PRACTICES SUCH AS DIVERSIONS, GRADE STABILIZATION STRUCTURES, EARTH DIKES, SLOPE SILT FENCE AND SEDIMENT TRAPS AND BASINS,
- GRADES ON THE AREAS TO BE TOPSOILED, WHICH HAVE BEEN PREVIOUSLY ESTABLISHED, SHALL BE MAINTAINED, ALBEIT 4" --8" HIGHER IN ELEVATION.
- III. TOPSOIL SHALL BE UNIFORMLY DISTRIBUTED IN A 4" 8" LAYER AND LIGHTLY COMPACTED TO A MINIMUM THICKNESS OF 4". SPREADING SHALL BE PERFORMED IN SUCH A MANNER THAT SODDING OR SEEDING CAN PROCEED WITH A MINIMUM OF ADDITIONAL SOIL PREPARATION AND TILLAGE. ANY IRREGULARITIES IN THE SURFACE RESULTING FROM TOPSOILING OR OTHER OPERATIONS SHALL BE CORRECTED IN ORDER TO PREVENT THE FORMATION OF DEPRESSIONS OR WATER POCKETS
- IV. TOPSOIL SHALL NOT BE PLACED WHILE THE TOPSOIL OR SUBSOIL IS IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBSOIL IS EXCESSIVELY WET OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING AND SEEDBED PREPARATION.
- V. THESE TOPSOIL SPECIFICATIONS HAVE BEEN EDITED FROM THE 1994 EROSION AND SEDIMENT CONTROL STANDARDS TO FIT THIS PROJECT. IT IS STILL THE INTENTION TO FOLLOW THE REFERENCED 1994 EROSION AND SEDIMENT CONTROLS STANDARDS IN THEIR ENTIRETY.

#### SEQUENCE OF CONSTRUCTION

1. OBTAIN HOWARD COUNTY GRADING PERMIT, (1 DAY)

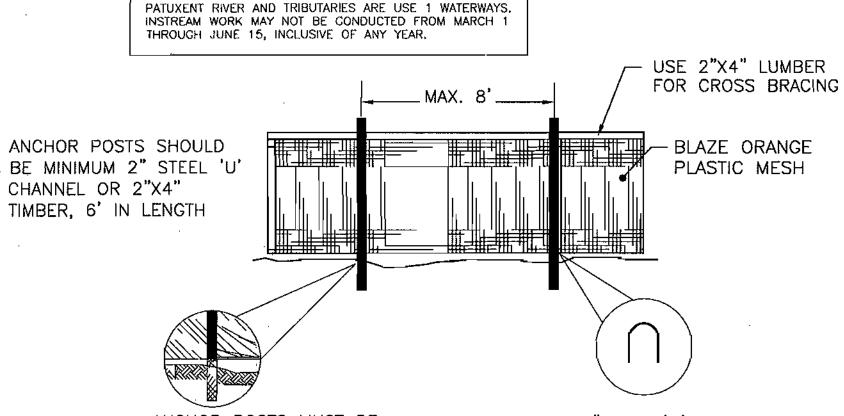
(410) 313-4730.

- 2. NOTIFY HOWARD COUNTY AT LEAST 48 HOURS PRIOR TO START OF CONSTRUCTION. PHONE (410) 313-1880 (1 DAY) AND MARK RAAB
- 3. INSTALL STABILIZED CONSTRUCTION ENTRANCE WITH MOUNTABLE BERM AND INSTALL ORANGE CONSTRUCTION FENCE (TREE PROTECTION FENCE). SILT FENCE AND SUPER SILT FENCE WITH APPROVAL FROM MARK RAAB AND SEDIMENT CONTROL INSPECTOR. (10 DAYS)
- -INSTALL PUMP AROUND PRACTICE AND DIVERSION PIPE, REMOVE EXIST. 36" PIPE AND REPLACE WITH 42" RCCP CL. 5, HEADWALLS, RIPRAP CHANNEL PROTECTION, ROADWAY EMBANKMENT BETWEEN 116+75 AND 117+95, RIPRAP DITCHES BETWEEN 116+75 TO 117+95 LT & MH-1 TO HW-1 PIPE. REMOVE PUMP AROUND PRACTICE AND DIVERSION PIPE WITH PERMISSION FROM INSPECTOR BEFORE PROCEEDING WITH REST OF THE SITES.
- -BEGIN INSTALLATION OF MODULAR BLOCK RETAINING WALL SYSTEM.
- -INSTALL EARTH DIKE NO. 1 (CLEAR WATER DIVERSION) & SLOPE DRAIN. 4. CONSTRUCT SEDIMENT BASIN AS SHOWN ON THE STORMWATER MANAGEMENT PLANS WITH THE FOLLOWING MODIFICATIONS: (3 WEEKS)
  - EXCAVATE POND TO THE BOTTOM ELEV. 231.0 INSTALL EMBANKMENT, RISER WITH TRASH RACKS, PRINCIPAL SPILLWAY - INSTALL 3" ORIFICE PLATE AT ELEV. 234.0 - INSTALL LOW FLOW DEVICE
- INSTALL PERIMETER CONTROLS: SILT FENCE, SUPER SILT FENCE, PIPE SLOPE DRAIN, EARTH DIKES AND SED. TRAP AS SHOWN ON THE PLAN. INSTALL ORANGE CONSTRUCTION FENCE AT THE LIMITS OF DISTURBANCE NOT SERVED BY SILT OR SUPER SILT FENCE, THE SILT FENCE, SUPER SILT FENCE AND ORANGE SAFETY FENCE SHALL BE INSTALLED UNDER THE SUPERVISION OF HOWARD COUNTY DEPARTMENT OF RECREATION & PARKS.
- 5. WITH THE APPROVAL OF THE SEDIMENT CONTROL INSPECTOR, CLEAR AND GRUB SITE WITHIN THE LIMITS OF DISTURBANCE. (2 WEEKS)
- STRIP AND STOCKPILE TOPSOIL. (1 WEEK)
- 7. WITH THE APPROVAL OF THE SEDIMENT CONTROL INSPECTOR, CONSTRUCT THE FOLLOWING: (15 WEEKS)
  - CONSTRUCT SANITARY SEWER, WATER LINE RELOCATION, AND STORM DRAIN AS INDICATED ON THE APPROVED PLANS.
  - GRADE SITE TO THE PROPOSED ELEVATIONS AS INDICATED ON THE SITE PLAN, INSTALL RETAINING WALLS. GRADE AND PERMANENTLY STABILIZE PATHWAY IN INCREMENTS,
- NOT TO EXCEED 200' IN LENGTH. - CONSTRUCT CURB, GUTTER AND INSTALL PAVEMENT ON THE ROADS AND PARKING LOTS - CONSTRUCT BIORETENTION AREA, INSTALL SILT FENCE AROUND THE BIORETENTION AREAS TO PROTECT AGAINST CONTAMINATION.
- 8. FINE GRADE AND STABILIZE SITE, (1 WEEK)
- 9. AFTER SITE IS PERMANENTLY STABILIZED, OBTAIN PERMISSION FROM HOWARD COUNTY SEDIMENT CONTROL INSPECTOR AND REMOVE SEDIMENT ONTROL MEASURES, CONVERT SEDIMENT BASIN INTO PERMANENT STORMWATER MANAGEMENT POND AS FOLLOWS: (2 WEEKS)

EXCAVATE POND TO THE BOTTOM ELEVATION INDICATED ON THE STORMWATER MANAGEMENT PLAN. - REMOVE DRAW-DOWN DEVICE. INSTALL 4" UNDERDRAIN PVC PIPE.

10. REMOVE ALL SEDIMENT CONTROL MEASURES AFTER RECEIVING PERMISSION FROM THE SEDIMENT CONTROL INSPECTOR. (1 WEEK)

THIS SEQUENCE MAY BE MODIFIED AFTER RECEIVING PERMISSION FROM THE SEDIMENT CONTROL INSPECTOR AS LONG AS THE INTENTION AND INTEGRITY OF THIS PLAN IS NOT COMPROMISED.



ANCHOR POSTS MUST BE INSTALLED TO A DEPTH OF NO LESS THAN 1/3 OF THE TOTAL HEIGHT OF POST

USE 8" WIRE 'U' TO SECURE FENCE BOTTOM

- TREE PROTECTION DEVICE ONLY.
- 2. TREE PROTECTION AREA WILL BE SET AS PART OF THE REVIEW PROCESS.
- 3. BOUNDARIES OF TREE PROTECTION AREA SHOULD BE STAKED AND FLAGGED PRIOR TO INSTALLING DEVICE.
- 4. ROOT DAMAGE SHOULD BE AVOIDED
- 5. PROTECTIVE SIGNAGE MAY ALSO BE USED, AND SHOULD BE ATTACHED DIRECTLY TO POSTS OR CROSS BRACING
- 6. DEVICE SHOULD BE MAINTAINED THROUGHOUT CONSTRUCTION.

# TREE PROTECTION FENCE

I certify that this plan pand construction and for sediment and erosion control represents a practical and workable plan based on my personal knowledge of the site conditions. This plan was prepared in accordance with the requirements of the Howard Soil Conservation District, I have notified the developer that he/she must engage a registered professional engineer to supervise pond construction and provide the Howard Soil Conservation District with an "as-built" plan of the pand within 30 days of completion. Recolusi-

ENGINEER'S CERTIFICATE

Signature of Engineer (print name below signature)

T. MORICONI DEVELOPER'S CERTIFICATE

DATE

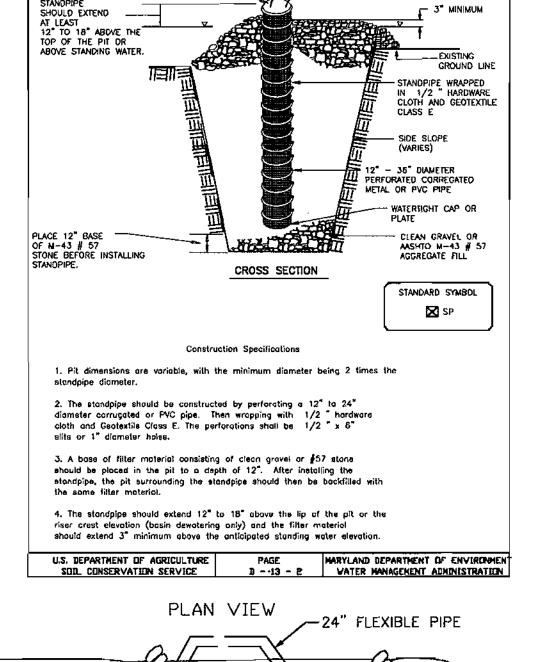
" I/We certify that all development and construction will be done according to these plans, and that any responsible personnel involved in the construction of this project will have a Certificate of Attendance at a Department of the Environment Approved Training Program for the Control of Sediment and Erosian before beginning the project. I also authorize periodic on-site inspection by the Howard Soil Conservation District." I shall engage a registered professional engineer to supervise pand construction and provide the Howard Soil Conservation District with an "as-built" plan of the pond within 30 days of completic Signature of Developer (print name below signature)

1/25/05 USDA - Natural Resources Conservation Service These plans for small pond construction, soil erosion and sediment control meet the requirements of the Howard Soil Conservation District.

These plans have been reviewed for the Howard Soil Conservation District and meet the

technical requirements for small pand construction, soil erosion and sediment control.

**DEVELOPER:** HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045



STABILIZED CONSTRUCTION ENTRANCE

MINIMUM 6" OF 2"-3" AGGREGATE

Construction Specification

2. Width - 10° minimum, should be flared at the existing road to provide a turning

3. Geotextile fabric (filter cloth) shall be placed over the existing ground prior

to placing stare. \*The plan approval authority may not require single family

4. Stone - crushed aggregate (2" to 3") or reclaimed or recycled concrete

equivalent shall be placed at least 6" deep over the length and width of the

5. Surface Water - all surface water flowing to or diverted toward construction

installed through the stabilized construction entrance shall be protected with a

6. Location - A stabilized construction entrance shall be located at every point

where construction troffic enters or leaves a construction site. Vehicles leaving

the site must travel over the entire length of the stabilized construction entrance

entronces shall be piped through the entronce, maintaining positive drainage. Pipe

mountable berm with 5:1 slopes and a minimum of 6" of stone over the pine. Pine has

to be sized according to the drainage. When the SCE is located at a high spot and has no drainage to convey a pipe will not be necessary. Pipe should be sized

according to the amount of runoff to be conveyed. A 6" minimum will be required.

OVER LENGTH AND WIDTH OF STRUCTURE

PROFILE

PLAN VIEW

1. Length - minimum of 50" (\*30" for single residence lot).

ISTING PAVEMENT

EXISTING PAVEMENT

EARTH FILL

DETAIL 33 - SUPER SILT FENCE

10' MAXIMUM

WITH 1 LAYER OF

Construction Specifications

1. Fencing shall be 42" in height and constructed in accordance with the

for a 6° fence shall be used, substituting 42" fabric and 6' length

4. Filter cloth shall be embedded a minimum of 8" into the around.

develop in the silt fence, or when silt reaches 50% of fence height

latest Maryland State Highway Details for Chain Link Fencing. The specification

2. Chain link fence shall be fastened securely to the fence posts with wire ties.

The lower tension wire, brace and truss rods, drive anchors and post caps are not

3. Filter cloth shall be fastened securely to the chain link fence with ties spaced

5. When two sections of filter cloth adjoin each other, they shall be overlapped

7. Filter cloth shall be fastened securely to each fence post with wire ties of

staples at too and mid section and shall meet the following requirements for

6. Maintenance shall be performed as needed and silt buildups removed when "bulges"

50 (be/in (min.)

20 lbs/in (min.)

4" MINIMUM

36" MINIMUM

FLOW

STANDARD SYMBOL

Test: MSMT 509

Test: MSMT 322

0.3 gat/ft /mirute (max.) Test: MSMT 322

Test: MSMT 509

THE TOP OF THE

. GEOTEXTILE CLASS 'C'

STANDARD SYMBO

SES SCE

DETAIL 20B - SUMP PIT

OR BETTER

EXISTING GROUND

NOTE: FENCE POST SPACING SHALL NOT EXCEED 10'

CENTER TO CENTER

GROUND 1

SURFACE

CHAIN LINK FENCING

EMBED FILTER CLOTH 8"

MINIMUM INTO GROUND

IF MULTIPLE LAYERS AR

by 6" ond folded.

Geotextile Closs F:

FILTER CLOTH

required except on the ends of the fence.

every 24" at the top and mid section

Tensile Strength

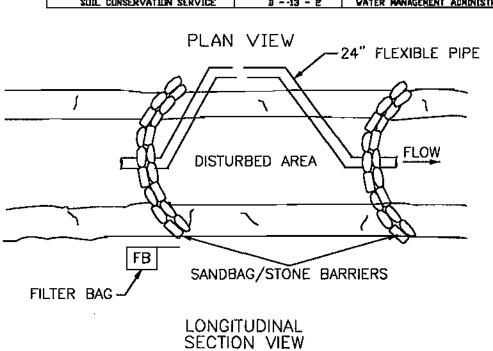
Tensile Modulus

Filtering Efficiency 75% (min.)

Flow Rate

2 1/2 \* DIAMETER

OR ALUMINUM



BARRIER HEIGHT IS AS DEFINED IN THE SANDBAG/STONE DIVERSION SECTIÓN IMPERVIOUS SHEETING TOP OF STREAM BANK DESIGN FLOW 

INSTALL AT THE END OF WORK DAY THROUGH EXISTING PIPE, WITHIN DISTURBED

1- 1 SLOPE OR FLATTER 2:1 SLOPE OR FLATTER CUT OR FILL 18" positive drainage Sufficient to drain **b-DIKE WIDTH** C-FLOW WIDTH d-FLOW DEPTH CUT OR FILL SLOPE PLAN VIEW STANDARD SYMBOL A-2 B-3 <del>---</del> --/---FLOW CHANNEL STABILIZATION . Seed and cover with straw mulch. 2. Seed and cover with Erosion Control Matting or line with sod. 3. 4" - 7" atoms or recycled concrete equivolent pressed into

DETAIL 1 - EARTH DIKE

Construction Specifications All temporary earth dikes shall have uninterrupted positive grade to an outlet. Spot elevations may be necessary for grades less than 1%.

2. Runoff diverted from a disturbed area shall be conveyed to a sediment

Runoff diverted from an undisturbed area shall outlet directly into an undisturbed, stabilized area at a non-erosive velocity.

4. All trees, brush, stumps, obstructions, and other objectional material shall be removed and disposed of so as not to interfere with the proper functioning of the dike.

5. The dike shell be excepted or should to line, grade and cross section as required to meet the criterio specified herein and be free of bank projection or other irregularities which will impede normal flaw. 6. Fill shall be compacted by earth moving equipment.

All earth removed and not needed for construction shall be placed so that it will not interfere with the functioning of the dike.

Inspection and maintanance must be provided periodically and offer each rain event.

DETAIL 2 - TEMPORARY SWALE 2:1 OR FLATTER SLOPES C MINIMUM DEPTH SUCTION LINE TO PUMP -----D MINIMUM WIDTH

C 1' MIN. D 4' MIN. 6' MIN. CROSS SECTION OUTLET AS REQUIRED \_ 0.5% SLOPE MINIMUM - FLOW -PLAN VIEW DRAINAGE AREA = 10 cc (MAX) SLOPE = 10% (MAX) STANDARD SYMBOL A - 2/B - 3

SWALE A SWALE B

I' MIN

Construction Specifications

2. Seed and cover with Erosian Control Molting or line with sod.

3. 4"-7" stone or recycled concrete equivolent pressed into soil

1. All temporary swales shall have uninterrupted positive grade to an outlet. Spot elevations may be necessary for grades less than 1%.

1. Seed and cover with straw mulch.

2. Runoff diverted from a disturbed area shall be conveyed to a 3. Runoff diverted from an undisturbed area shall outlet directly into an

4. All trees, brush, stumps, abstructions, and other objectional material shall be removed and disposed of so as not to interfere with the

5. The awale shall be excovated or change to line, grade and crosssection us required to meet the criteria specified herein and be free of bank projections or other irregularities which will impede normal flow.

6. Fill, if necessary, shall be compacted by earth moving equipment

7. All earth removed and not needed for construction shall be glaced so that it will not interfere with the functioning of the swale.

8. Inspection and maintenance must be provided periodically and offer MARYLAND DEPARTMENT OF ENVIRONMENT VATER MANAGEMENT ADMINISTRATION U.S. DEPARTMENT OF AGRICULTURE

CUT OPEN CORNER D BAG AND CLAMP ON DEWATERING HOSE — ISOMETRIC VIEW - Construction Fence For Restraint and Aid In Lifting USED BAG FB SECTION

 FILTER BAG SHALL SE PLACED ON A SLOPING OR LEVEL, WELL GRADED VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM DEVICE AND ANY WORK AREAS. 2. WIDTH AND LENGTH SHALL BE AS SHOWN.

3. THE FILTER BAG MUST BE STAKED IN PLACE AND SECURED TO THE PUMP DISCHARGE LINE. 4. FILTER BAG SHALL NOT BE USED FOR DISCHARGE FLOWS GREATER THAN 300 GPM. DEVICE SHALL BE REMOVED AND DISPOSED OF AFTER BAG IS FILLED WITH SEDIMENT. SEDIMENT. FROM BAG SHALL BE SPREAD IN AN UPLAND AREA.

6. FILTER FABRIC SHALL MEET THE FOLLOWING REQUIREMENTS FOR GEOTEXTILE CLASS F Tensile Strength 50 b / in (nin) 20 to / In (min) 0.3 gd ft / minute (mor.) Test : MSMT 322

FILTER BAG

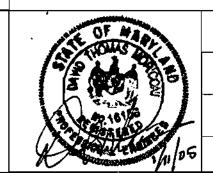
(TEMPORARY EROSION CONTROL MEASURE) FB.

HIGH RIDGE PARK

SHEET 25 OF 39

SDP-05-19





DES: DTM/RKK

DRN: RMC/HWC CHK:DTM/RKK

DATE: 10/8/04 | BY | NO.

DEPARTMENT OF PLANNING AND ZONING

**REVISION** 

HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

OWNER:

DETAIL 1.4 - DIVERSION PIPE TAX MAP: 50

AREA, OR THROUGH NEW PIPE TO MAINTAIN FLOW DURING NON-WORK HOURS. GRID: 1&2

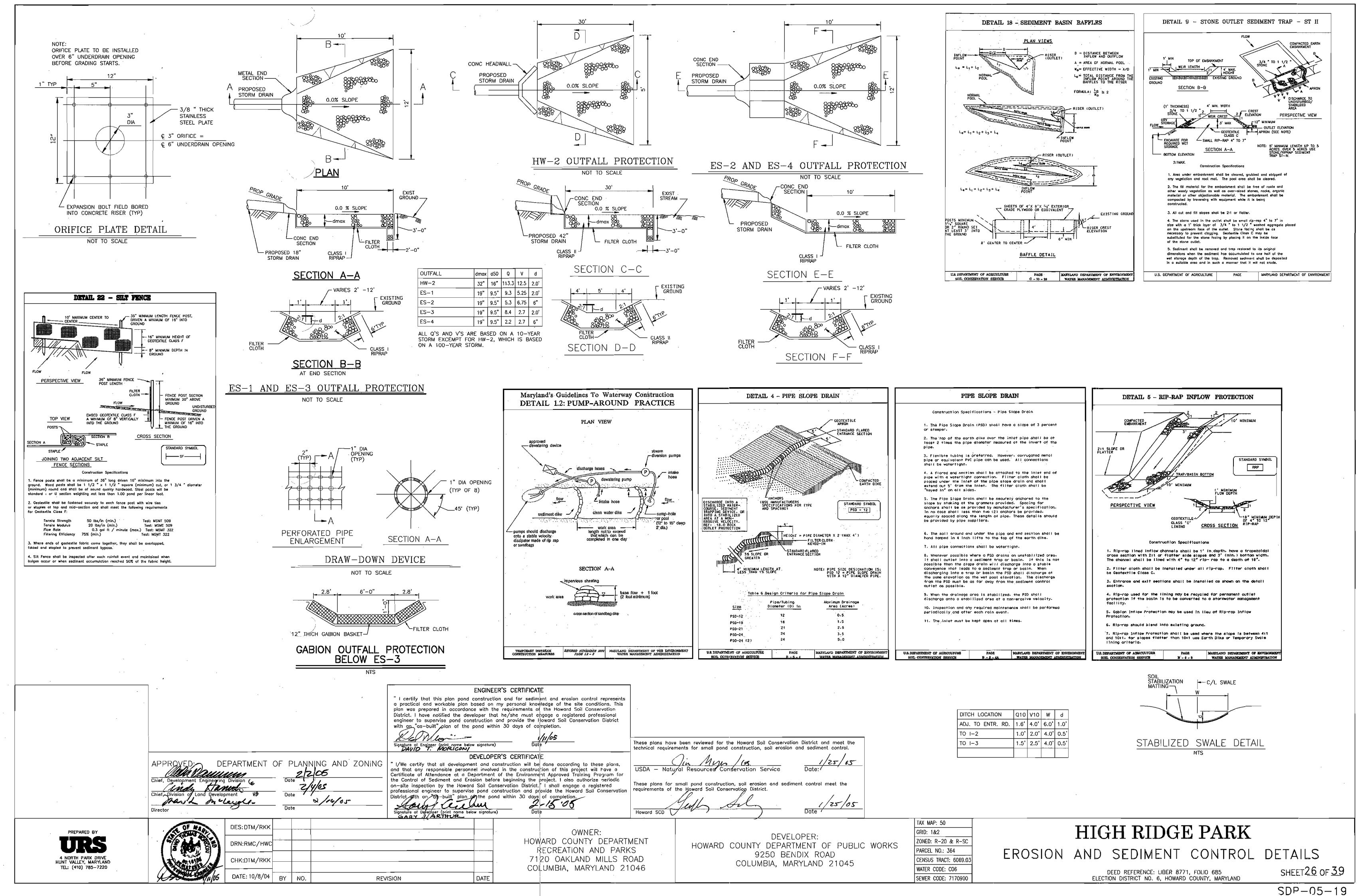
ZONED: R-20 & R-SC PARCEL NO.: 364 CENSUS TRACT: 6069.0

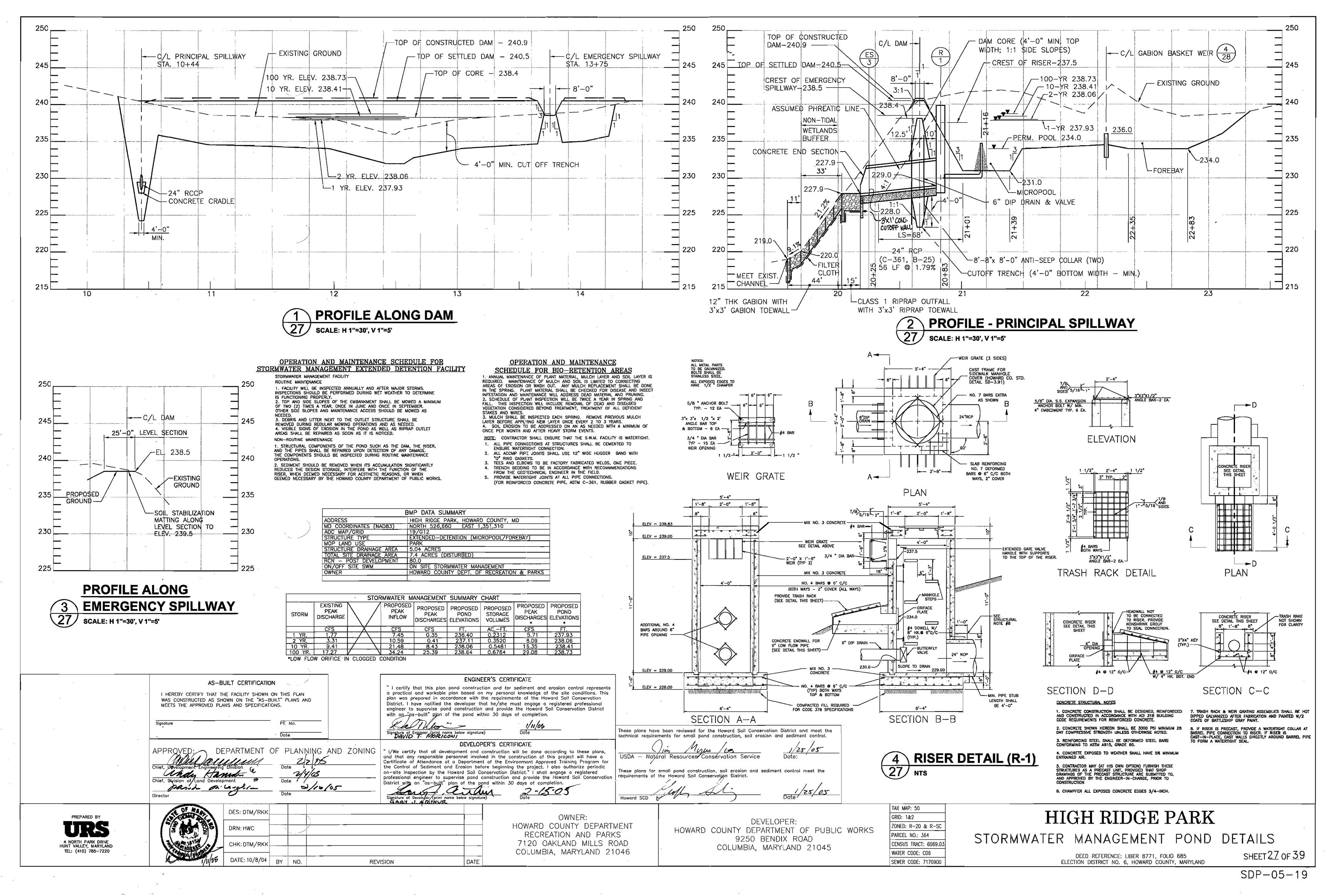
WATER CODE: CO6

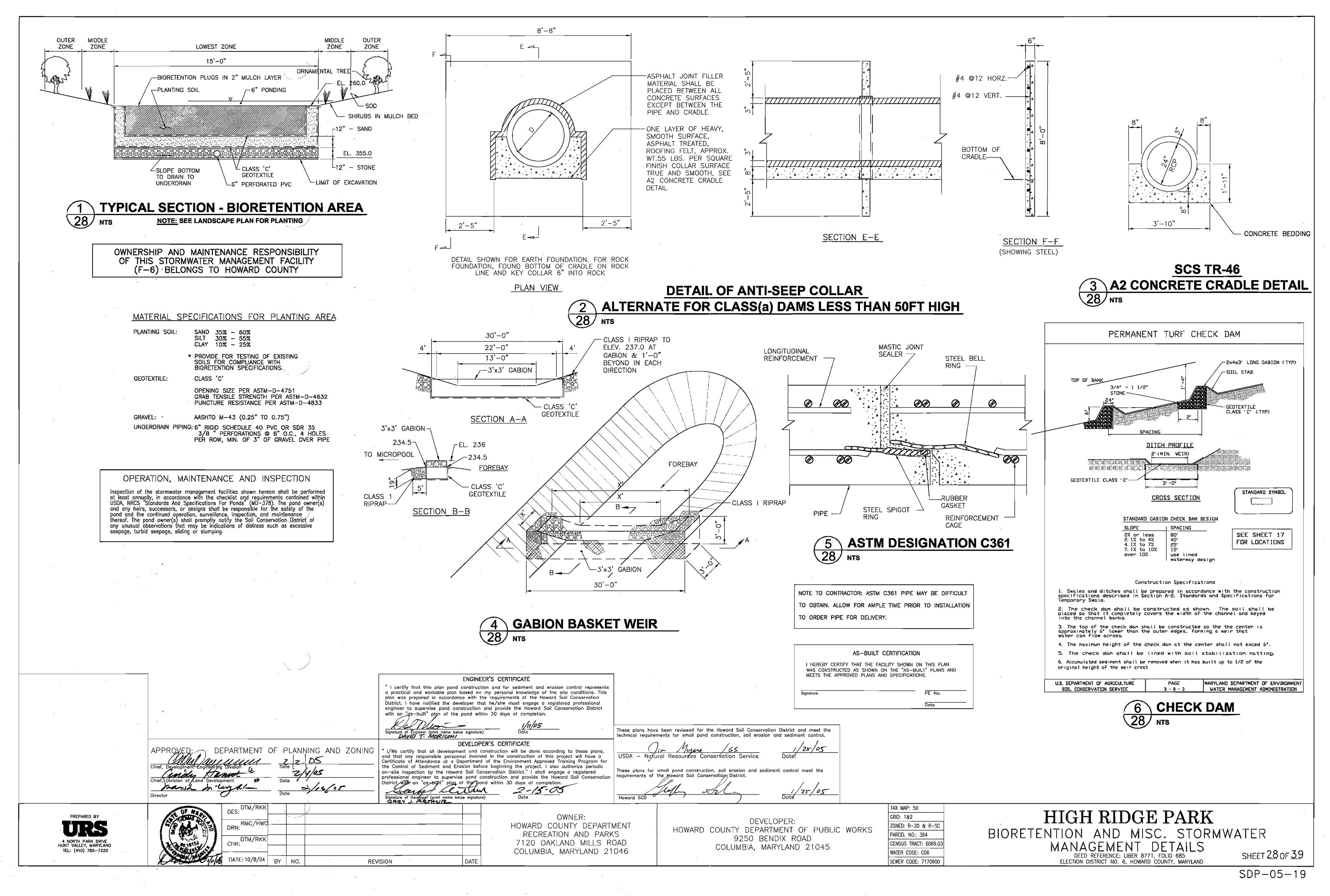
SEWER CODE: 7170900

EROSION & SEDIMENT CONTROL NOTES & DETAILS

DEED REFERENCE: LIBER 8771, FOLIO 685 ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND







#### SWM POND CONSTRUCTION SPECIFICATIONS

These specifications are appropriate to all ponds within the scope of the Standard for practice MD-378. All references to ASTM and AASHTO Specifications apply to the most recent version.

#### Site Preparation

Areas designated for borrow areas, embankment, and structural works shall be cleared, grubbed and stripped of topsoil. All trees, vegetation, roots and other objectionable material shall be removed. Channel banks and sharp breaks shall be sloped to no steeper than 1:1. All trees shall be cleared and grubbed within 15 feet of the toe of the embankment.

Areas to be covered by the reservoir will be cleared of all trees, brush, logs, fences, rubbish and other objectionable material unless otherwise designated on the plans. Trees, brush and stumps shall be cut approximately level with the ground surface. For dry stormwater management ponds, a minimum of a 25 foot radius around the inlet structure shall be cleared.

All cleared and grubbed material shall be disposed of outside and below the limits of the dam and reservoir as directed by the owner or his representative. When specified, a sufficient auantity of topsoil will be stockpiled in a suitable location for use on the embankment and other designated areas.

#### Earth Fill

Material-The fill material shall be taken from approved designated borrow greas. It shall be free of roots, stumps. wood, rubbish, stones greater than 6", frozen or other objectionable materials. Fill material for the center of the embankment and cut off trench shall conform to Unified Soil Classification GC, SC, CH, or CL and must have at least 30% passing the #200 sieve. Consideration may be given to the use of other materials in the embankment if designed by a geotechnical engineer. Such special designs must have construction supervised be a geotechnical engineer. Materials used in the outer shell of the embankment must have the capability to support vegetation of the quality required to prevent erosion of the embankment.

<u>Placement</u>-Areas on which fill is to be placed shall be scarified prior to placement of fill. Fill materials shall be placed in maximum 8 inch thick (before compaction) layers, which are to be continuous over the entire length of the fill. The most permeable borrow material shall be placed in the downstream portions of the embankment. The principal spillway must be installed concurrently with fill placement and not excavated into the embankment.

Compaction—The movement of the hauling and spreading equipment over the fill shall be controlled so that the entire surface of each lift shall be traversed by not less than one tread track of heavy equipment or compaction shall be achieved by a minimum of four complete passes of a sheepsfoot, rubber tired or vibratory roller. Fill material shall contain sufficient moisture to yield the required degree of compaction with the equipment used. The fill material shall contain sufficient moisture so that if formed into a ball it would not crumble, yet not be so wet that water can be squeezed out. When required by the reviewing agency the minimum required density shall not be less than 95% of maximum dry density with a moisture content within 2% of the optimum. Each layer of fill shall be compacted as necessary to obtain that density, and is to be certified by the Engineer at the time of construction. All compaction is to be determined by AASHTO Method T-99 (Standard Proctor).

Cut Off Trench — The cutoff trench shall be excavated into impervious material along or parallel to the centerline of the embankment as shown on the plans. The bottom width of the trench shall be governed by the equipment used for excavation. with the minimum width being four feet. The depth shall be at least four feet below existing grade or as shown on the plans. The side slopes of the trench shall be 1 to 1 or flatter. The backfill shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability.

Embankment Core - The core shall be parallel to the centerline of the embankment as shown on the plans. The top width of the core shall be a minimum of four feet. The height shall extend up to at least the 10-year water elevation or as shown or the plans. The side slopes shall be 1:1 or flatter. The core shall be compacted with construction equipment, rollers, or hand tampers

DRN: RMC/HWC

CHK:DTM/RKK

DATE: 10/8/04

BY NO.

URS

4 NORTH PARK DRIVE HUNT VALLEY, MARYLAND

TEL: (410) 785-7220

to assure maximum density and minimum permeability. In addition, the core shall be placed concurrently with the outer shell of the embankment.

#### Structure Backfill

Backfill adjacent to pipes or structures shall be of the type and quality conforming to that specified for the adjoining fill material. The fill shall be placed in horizontal layers not to other manually directed compaction equipment. The material needs to fill completely all spaces under and adjacent to the pipe. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a concrete structure or pipe, unless there is a compacted fill of 24" or greater over the structure or pipe. Structure backfill may be flowable fill meeting the requirements of the Maryland Department of Transportation, State Highway Administration Standard Specifications for construction and Materials. Section 313 as modified. The mixture shall have a √100-200 psi; 28 day unconfined compressive strength. The flowable fill shall have a minimum pH of 4.0 and a minimum resistivity of 2,000 ohm—cm. Material shall be placed such that a minimum of 6"(measured perpendicular to the outside of the pipe) of flowable fill shall be under (bedding), over and, on the sides of the pipe. It only needs to extend up to the spring line for rigid conduits. Average slump of the fill shall be 7" to assure flowability of the material. Adequate measures shall be taken (sand bags, etc.) to prevent floating the pipe. When using the flowable fill, all metal pipe shall be bituminous coated. Any adjoining soil fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material shall completely fill all voids adjacent to the flowable fill zone. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a structure or pipe unless there is a compacted fill of 24" or greater over the structure or pipe. Backfill material outside the structural backfill (flowable fill) zone shall be of a type and quality conforming to that specified for the core of the embankment or other embankment materials.

#### Pipe Conduits

All pipes shall be circular in cross section.

Corrugated Metal Pipe - All of the following criteria shall apply for corrugate metal pipe:

1. Materials — (Polymer Coated Steel Pipe) — Steel pipes with polymeric coatings shall have a minimum coating thickness of 0.01 inch (10 mil) on both sides of the pipe. This pipe and its appurtenances shall conform to the requirements of AASHTO Specifications M-245 & M-246 with watertight coupling bands or flanges.

Materials - (Aluminum Coated Steel Pipe) - This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M-274 with watertight coupling bands or flanges. Aluminum Coated Steel Pipe, when used with flowable fill or when soil and/or water conditions warrant the need for increased durability, shall be fully bituminous coated per requirements of AASHTO M-190 Type A. Any aluminum coating damaged or otherwise removed shall be replaced with cold applied bituminous coating compound. Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt.

Materials — (Alumium Pipe) — This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M-196 or M-211 with watertight coupling bands or flanges. Aluminum Pipe, when used with flowable fill or when soil and/or soil conditions warrant for increased durability, shall be fully bituminous coated per requirements of AASHTO Specification M-190 Type A. Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt. Hot dip galvanized bolts may be used for connections. The pH of the surrounding soils shall be between 4 and 9.

2. Coupling bands, anti-seep collars, end sections, etc., must be composed of the same material and coatings as the pipe. Metals must be insulated from dissimilar materials with use of rubber or plastic insulating materials at least 24 mils in thickness.

3. Connections - All connections with pipes must be completely watertight. The drain pipe or barrel connection to the riser shall be

REVISION

welded all around when the pipe and riser are metal. Anti-seep collars shall be connected to the pipe in such a manner as to be completely watertight. Dimple bands are not considered to be watertight. All connections shall use a rubber or neoprene agaket when joining pipe sections. The end of each pipe shall be re-rolled an adequate number of corrugations to accommodate the bandwidth. The following type connections are acceptable for pipe less than 24 inches in diameter: flanges on both ends of the pipe with a circular 3/8 inch closed cell neoprene gasket, pre-punched to the flange bolt circle, sandwiched between adjacent flanges; a 12-inch wide standard lap type band with 12-inch wide by 3/8-inch thick closed cell circular neoprene gasket; and a 12-inch wide hugger type band with o-ring gaskets having a minimum diameter of 1/2 -inch greater than the corrugation depth. Pipes 24 inches in diameter and larger shall be connected by a 24-inch long annular corrugated band using a minimum of 4 (four) rods and lugs. 2 one each connecting pipe end. A 24-inch wide by 3/8-inch closed cell circular neoprene gasket will be installed with 12 inches on the end of each pipe. Flanged joint is with 3/8 inch closed cell aaskets the full width of the flange is also acceptable. Helically corrugated pipe shall have either continuously welded seams or have lock seams with internal caulking or a neoprene bead.

- 4. Bedding The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil in encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.
- Backfilling shall conform to "Structure Backfill".
- 6. Other details (Anti-seep collars, valves, etc.) shall be as shown on the drawings.

Reinforced Concrete Pipe — All of the following criteria shall apply for reinforced concrete pipe:

- 1. Materials—Reinforced concrete pipe shall have bell and spigot joints with rubber gaskets and shall equal or exceed ASTM C-361.
- 2. Bedding Reinforced concrete pipe conduits shall be laid in concrete bedding cradle for their entire length. This bedding cradle shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 50% of its outside diameter with a minimum thickness of 6 inches. Where a concrete cradie in not needed for structural reasons, flowable fill may be used as described in the "Structure Backfill" section of this standard. Gravel bedding is not permitted.
- 3. Laying pipe Bell and spigot pipe shall be placed with the bell and end upstream. Joints shall be made in accordance with recommendations of the manufacturer of the material. After the joints are sealed for the entire line, the bedding shall the joints are sealed for the entire line, the bedding shall be placed so that all spaces under the pipe are filled. Care shall be exercised to prevent any deviation from the Care shall be exercised to prevent any deviation from the original line and grade of the pipe. The first joint must be located within 2 feet from the riser. be located within 4 feet from the riser.
- 4. Backfilling shall conform to "Structure Backfill."
- Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

Plastic Pipe — All of the following criteria shall apply for plastic pipe:

- 1. Materials PVC pipe shall be PVC-1120 or PVC-1220 conforming to ASTM D-1785 or ASTM D-2241. Corrugated High Density Polyethylene (HDPE) pipe, couplings and fittings, shall conform to the following: 4" - 10" pipe shall meet the requirements of AASHTO M-252 Type S, and 12" through 24" shall meet the requirements of AASHTO M-294 Type S.
- 2. Joints and connections to anti-seep collars shall be completely watertight.
- 3. Bedding The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.
- 4. Backfilling shall conform to "Structure Backfill".
- 5. Other details (Anti-seep collars, valves, etc.) shall be as shown on the drawinas. Drainage Diaphraams - When a drainage diaphraam is used, registered professional engineer will supervise the design and construction inspection.

SEQUENCE OF CONSTRUCTION AND INSPECTOR'S CHECK-OFF LIST FOR SWM FACILITIES

STAGE	DEVELOPER'	S/ENGINEER ROVAL		ECTOR'S ROVAL
	INITIALS	DATE	INITIALS	DATE
1. PRE-CONSTRUCTION MEETING. *				
2. SCE, TREE PROTECTION, AND POND EXCAVATION TO THE BOTTOM ELEVATION 231.00				
3. INSTALLATION OF STRUCTURES AND ASSOCIATED STORM DRAINAGE: * A.FOOTING SUBGRADE PRIOR TO POURING. *				
B.FOOTING FORMED AND STEEL SET PRIOR TO POURING. *				
C.STRUCTURE SIDES FORMED AND STEEL SET PRIOR TO POURING. *				
D.PRIOR TO TOP SLAB AND MANHOLES BEING SET ON, INSPECTOR MUST INSPECT ALL CAST—IN—PLACE AND PRE—CAST STRUCTURES FOR PROPER ASSEMBLY. *				
4. SEDIMENT BASIN CONSTRUCTION:* A.INSTALLATION OF ORIFICE PLATE				
B.INSTALLATION OF DRAW-DOWN DEVICE				
5. SITE IS PERMANENTLY STABILIZED, ALL SEDIMENT AND DEBRIS REMOVED FROM THE STRUCTURE AND SEDIMENT BASIN CONVERTED INTO STORMWATER MANAGEMENT POND:*  A. POND EXCAVATED TO THE BOTTOM ELEVATIONS INDICATED ON THE PLAN SHEET.				
B. ORIFICE PLATE IS REMOVED				
C. DRAW-DOWN DEVICE IS REMOVED AND UNDERDRAIN PIPE INSTALLED.				
6. FINAL INSPECTION. *				
NOTE: SEE CONSTRUCTION SPECIFICATIONS FOR DETAILE	D REQUIREMENTS			
* MANDATORY NOTIFICATION/APPROVAL OF INSPECTOR PR			STAGE.	

4035M-4 (REV 4-89) Concrete

Concrete shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 414, Mix No. 3.

Rock Riprap

Rock riprap shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials. Section 311. Geotextile shall be placed under all riprap and shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 921.09, Class C.

#### Care of Water During Construction

TAX MAP: 50

ZONED: R-20 & R-SC

CENSUS TRACT: 6069.03

PARCEL NO.: 364

WATER CODE: CO6

SEWER CODE: 7170900

GRID: 1&2

All work on permanent structures shall be carried out in areas free from water. The Contractor shall construct and maintain all temporary dikes, levees, cofferdams, drainage channels, and stream diversions necessary to protect the areas to be occupied by the permanent works. The contractor shall also furnish, install, operate, and maintain all necessary pumping and other equipment required for removal of water from the various parts of the work and for maintaining the excavations, foundation, and other parts of the work free from water as required or directed by the engineer for constructing. An operation and maintenance plan in each part of the work. After having served their purpose, all temporary protective works shall be removed or leveled and graded to the extent required or prevent obstruction in any degree whatsoever of the flow of water the dam inspection checklist located in to the spillway or outlet works and so as not to interfere in any way with the operation or maintenance of the structure. Stream diversions shall be maintained until the full flow can be passed through the permanent works. The removal of water from the required excavation and the foundation shall be accomplished in a manner and to the extent that will maintain stability of retained in a file. The issuance of a the excavated slopes and bottom of required excavations and will allow satisfactory performance of all construction operations. During the placing and compacting of material in required excavations, the water level at the locations being refilled shall be maintained below the bottom of the excavation at such locations which may require draining the water to sumps from which the water shall be pumped.

#### Stabilization

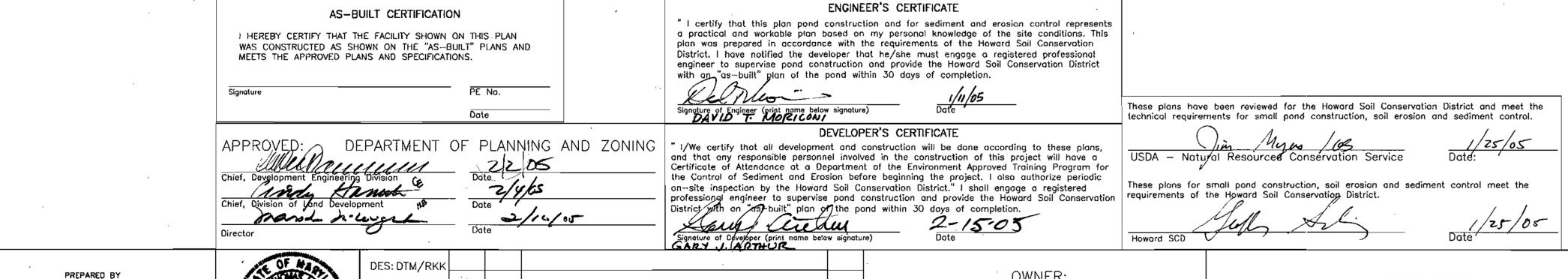
All borrow areas shall be graded to provide proper drainage and left in a sightly condition. All exposed surfaces of the embankment, spillway, spoil and borrow areas, and berms shall be stabilized by seeding, liming, fertilizing and mulching in accordance with the Natural Resources Conservation Service Standards and Specifications for Critical Area Planting (MD-342) or as shown on the accompanying drawings.

#### Erosion and Sediment Control

Construction operations will be carried out in such a manner that erosion will be controlled and water and air pollution minimized. State and local laws concerning pollution abatement will be followed. Construction plans shall detail erosion and sediment control measures.

#### OPERATION AND MAINTENANCE

accordance with Local or State Regulations will be prepared for all ponds. As a minimum, Appendix A shall be included as part of the operation and maintenance plan and performed at least annually. Written records of maintenance and major repairs needs to be Maintenance and Repair Permit for any repairs or maintenance that involves the modification of the dam or spillway from its original design and specifications is required. A permit is also required for any repairs or reconstruction that involve a substantial portion of the structure. All indicated repairs are to be made as soon as practical.



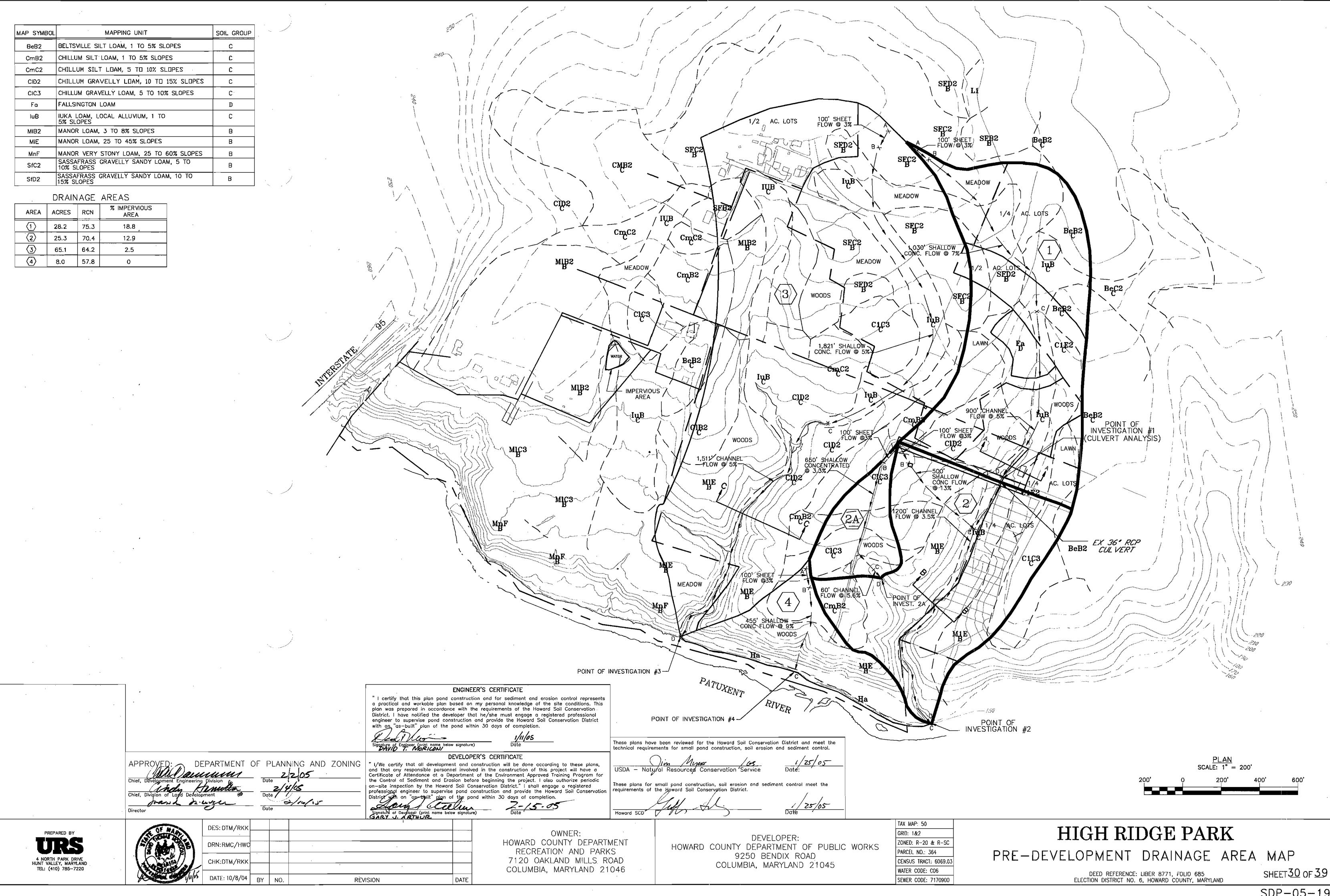
OWNER: HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

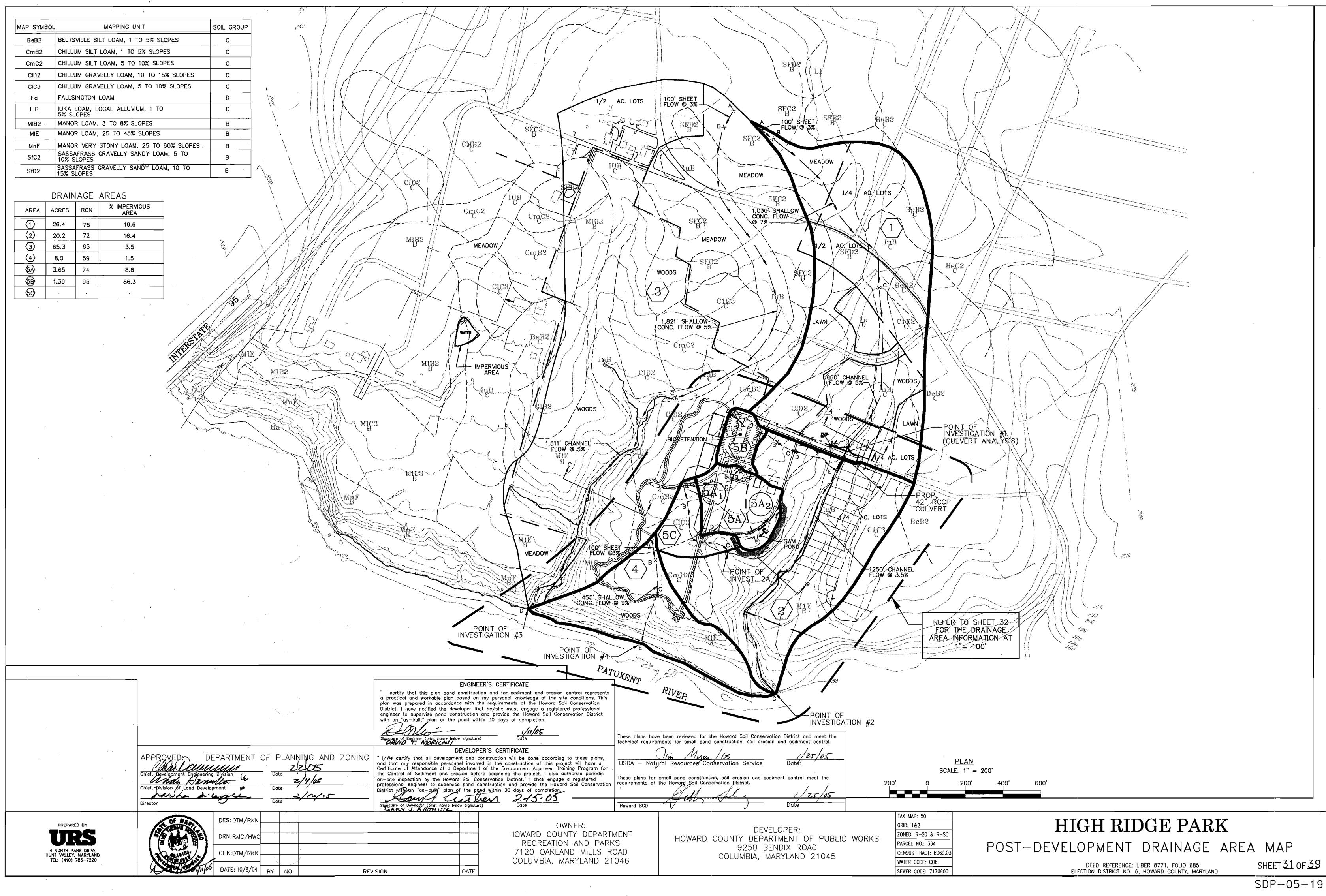
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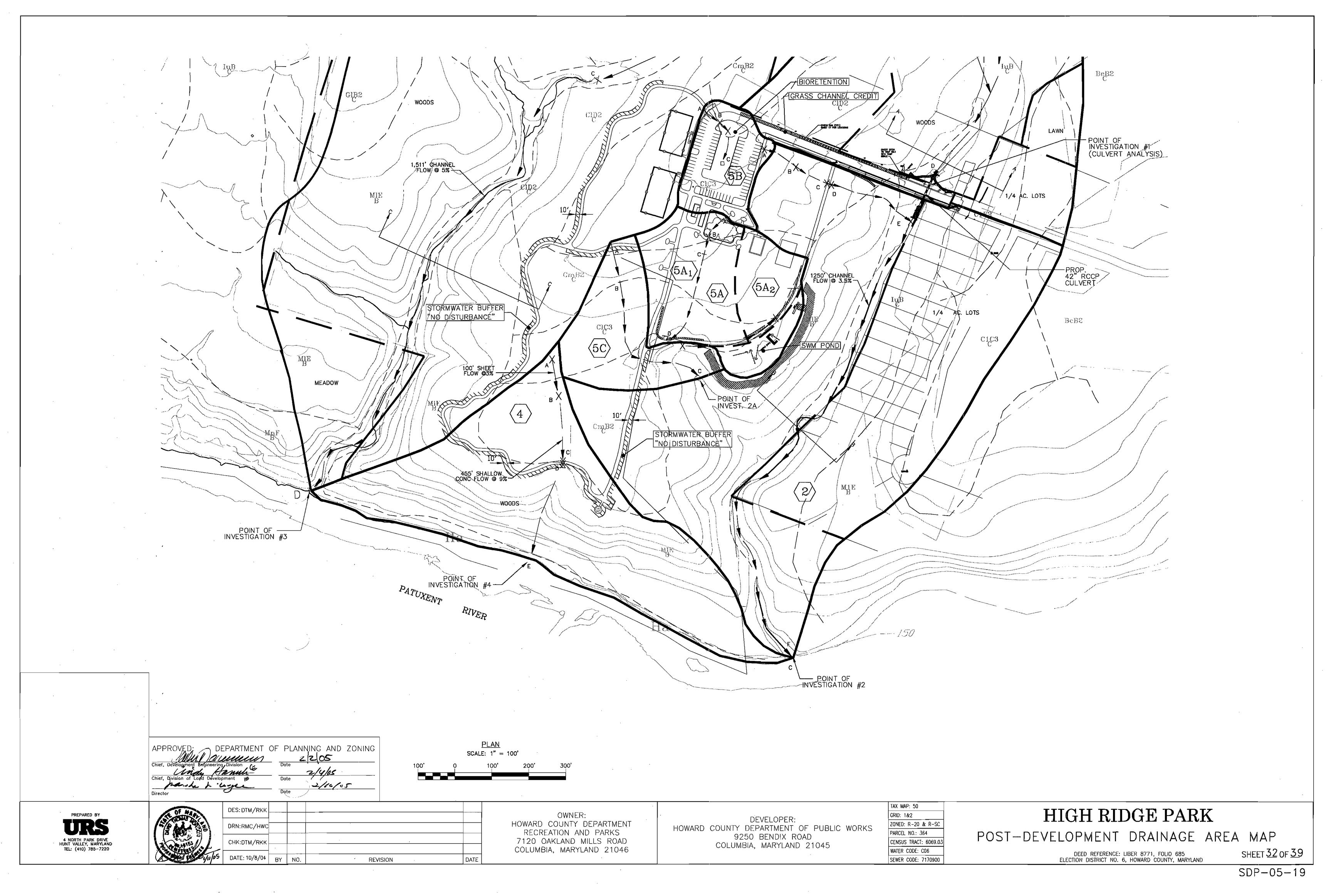
DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA. MARYLAND 21045

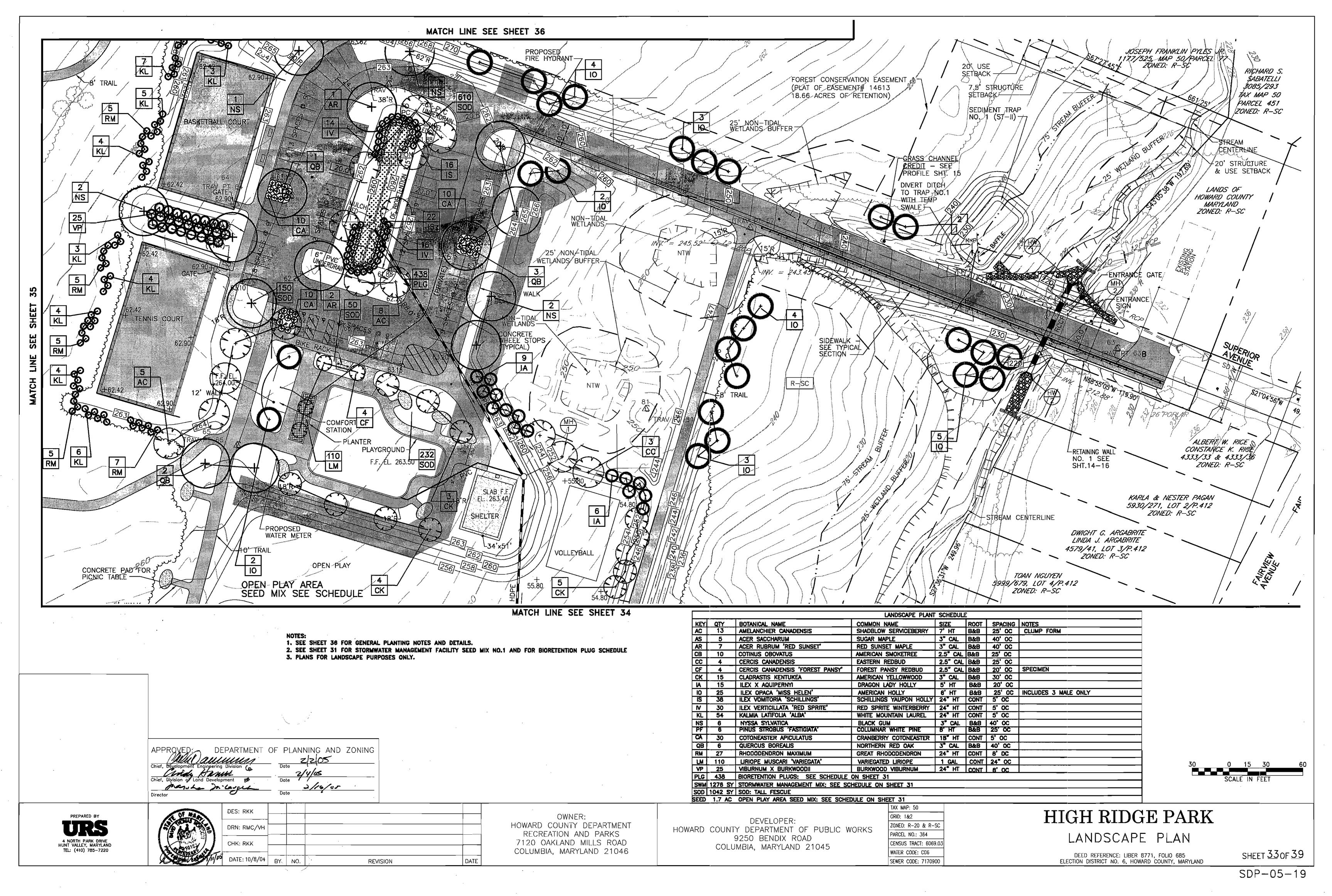
# HIGH RIDGE PARK STORMWATER MANAGEMENT NOTES

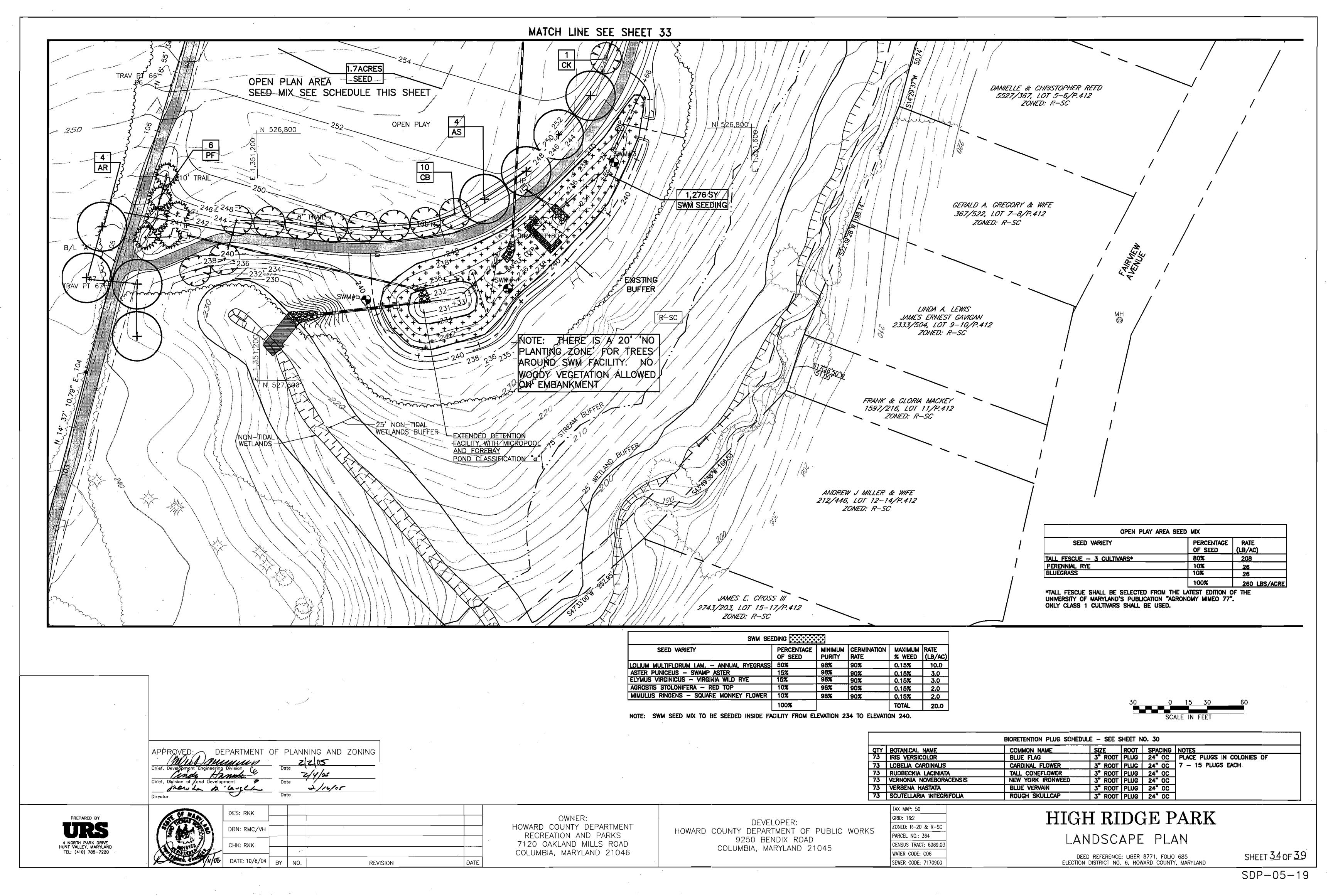
DEED REFERENCE: LIBER 8771, FOLIO 685 ELECTION DISTRICT NO. 6. HOWARD COUNTY, MARYLAND SHEET 29 OF 39

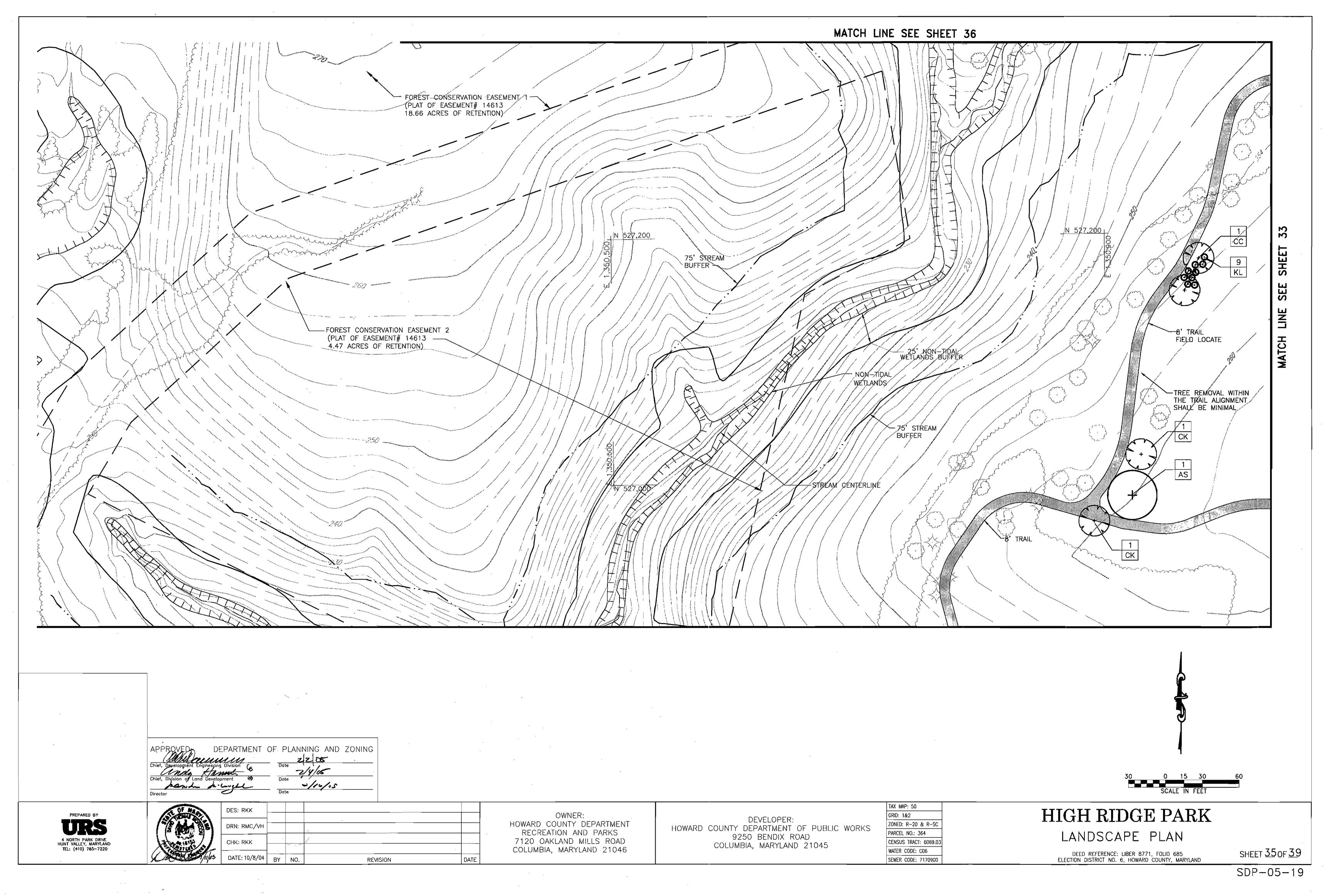


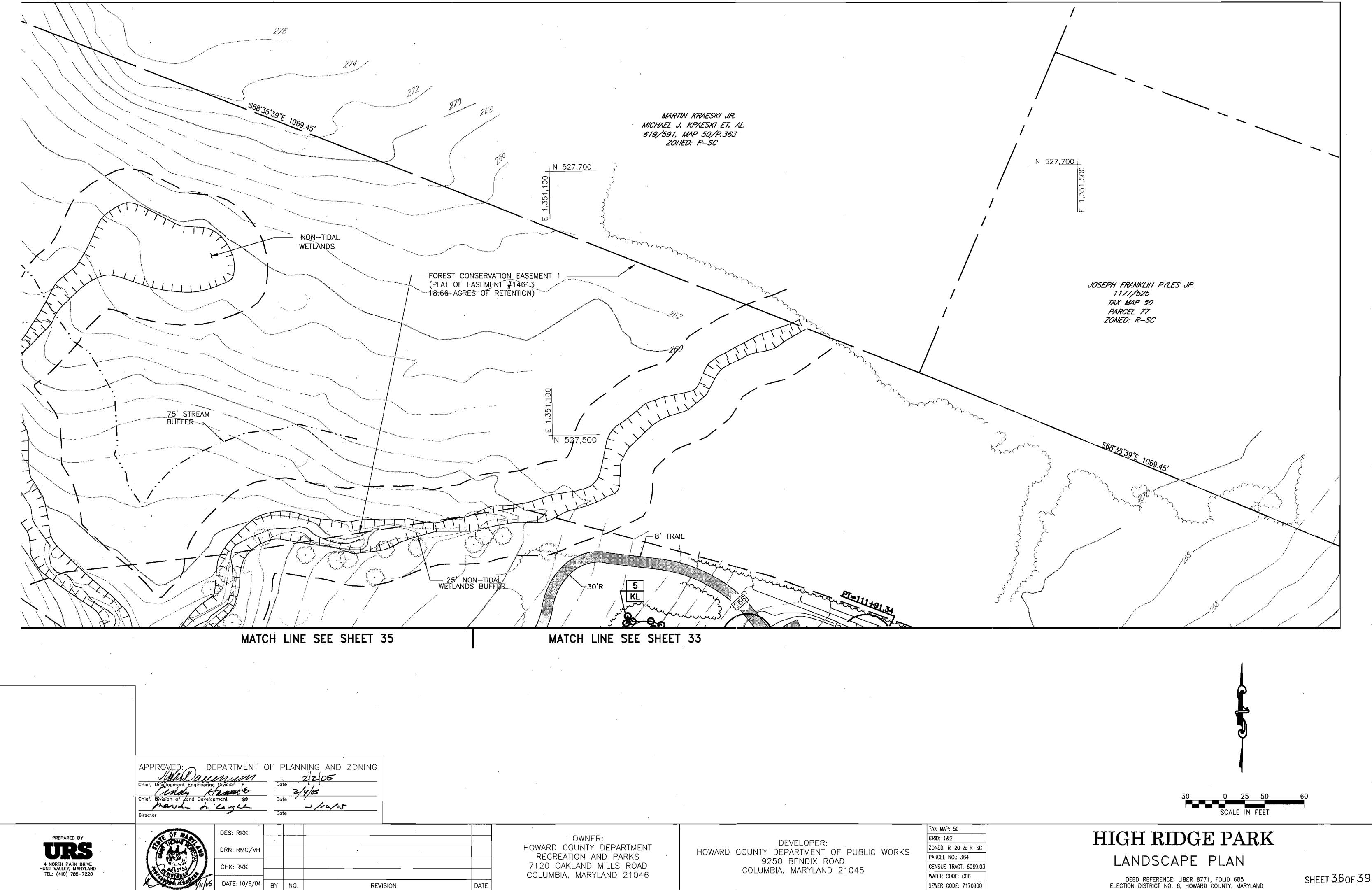


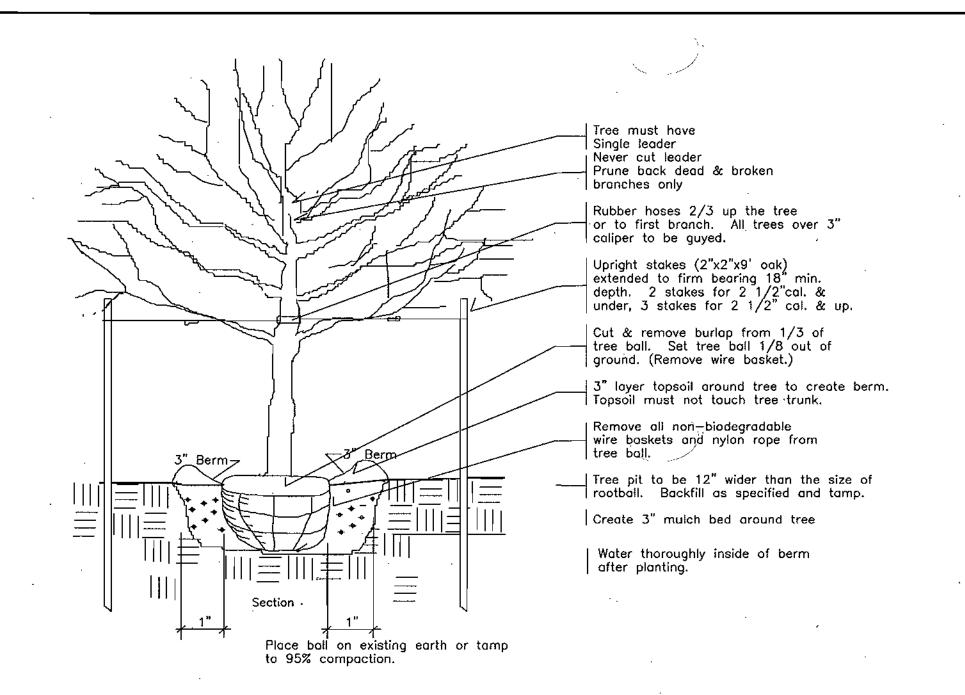






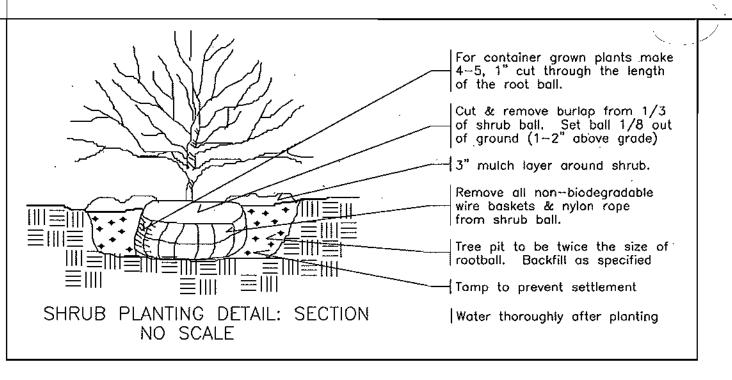


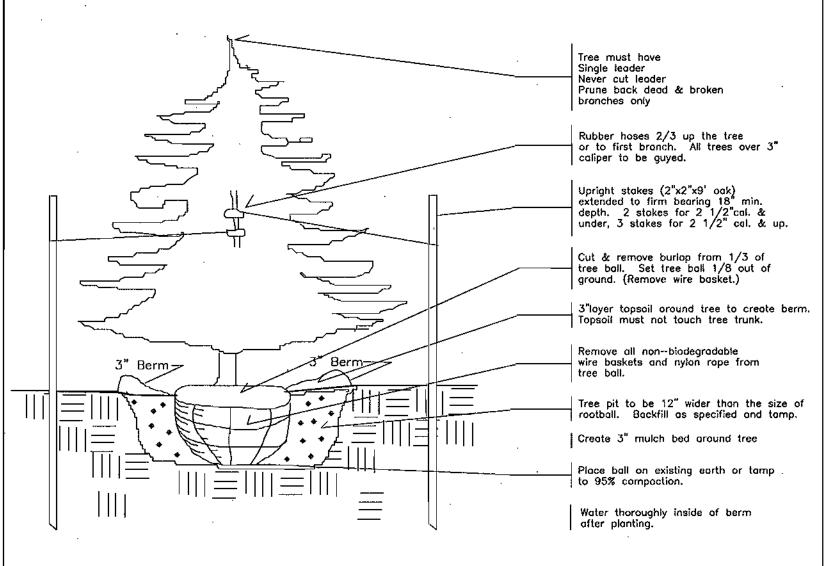




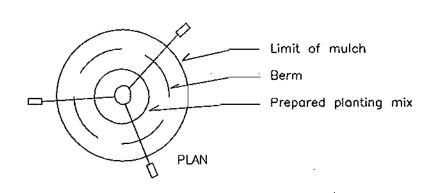
DECIDUOUS TREE PLANTING DETAIL: SECTION

NO SCALE





EVERGREEN TREE PLANTING DETAIL: SECTION NO SCALE



DECIDUOUS AND EVERGREEN TREE PLANTING DETAIL: PLAN VIEW

NO SCALE

#### SCHEDULE A

PERIMETER	LANDSCAPE EDGE	
CATEGORY	ADJACENT TO ROADWAYS	ADJACENT TO PERIMETER PROPERTIES
LANDSCAPE BUFFER TYPE	NONE	TYPE A
LINEAR FEET OF ROADWAY FRONTAGE/PERIMETER	NONE - ENTRANCE ROAD TO PARK IS 20' WIDE	1,219 LINEAR FEET
CREDIT FOR EXISTING VEGETATION (YES, NO, LINEAR FEET) (DESCRIBE IF NEEDED)	NO	*1,219 LF ALONG ADJACENT PROPERTIES TO REMAIN
NUMBER OF PLANTS REQUIRED SHADE TREES EVERGREEN TREES OTHER TREES(2:1 SUBSTITUTION) SHRUBS (10:1 SUBSTITUTION)		0
NUMBER OF PLANTS PROVIDED SHADE TREES EVERGREEN TREES OTHER TREES(2:1 SUBSTITUTION) SHRUBS (10:1 SUBSTITUTION) (DESCRIBE PLANT SUBSTITUTION CREDITS BELOW IF NEEDED)	NONE	14

\*THE EXISTING STREAM AND FOREST BUFFER EXCEEDING MINIMUM REQUIREMENTS IS PROVIDED.

SCHEDULE B PARKING LOT INTERNAL LANDSCAPING

LUMBING FOR INTERMED PUNDSON MA				
	LOT 1			
NUMBER OF PARKING SPACES	67			
NUMBER OF PARKING ISLANDS REQUIRED	4			
NUMBER OF PARKING ISLANDS PROVIDED	8			
NUMBER OF TREES REQUIRED	4			
NUMBER OF TREES PROVIDED SHADE TREES	6			
EVERGREEN TREES OTHER TREES (2:1 SUBSTITUTION)	* <del>4</del>			
*8 ORNAMENTAL TREES PROVIDED, 4 CREDITED AT 2:1 RATIO				

SCHEDULE D

STORMWATER MANAGEMENT AREA LANDSCAPING

LINEAR FEET OF PERIMETER	1036'
NUMBER OF TREES REQUIRED SHADE TREES EVERGREEN TREES	20 26
CREDIT FOR EXISTING VEGETATION (YES, NO & %)	*YES 100 % EXISTING FOREST TO BE RETAINED
CREDIT FOR OTHER LANDSCAPING (YES, NO & %)	NO
NUMBER OF TREES PROVIDED SHADE TREES EVERGREEN TREES OTHER TREES (2:1 SUBSTITUTION)	NONE , SEE NOTE BELOW
THE SWM FACILITY IS OVER 250' FROM THE	NEAREST OWELLING AND INCLUDING

\*THE SWM FACILITY IS OVER 250' FROM THE NEAREST DWELLING AND INCLUDING EXISTING FOREST AND STREAM BUFFER.

NOTE: NO LANDSCAPE SURETY IS REQUIRED SINCE THIS IS A HOWARD COUNTY CAPITAL PROJECT.

#### GENERAL NOTES FOR PLANTING

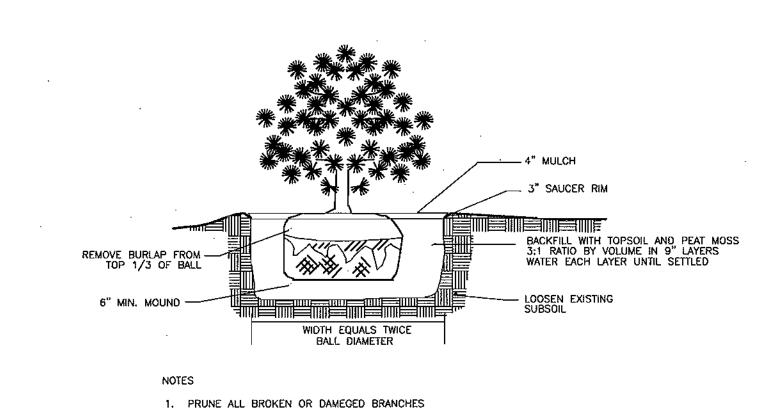
- 1. Plants shall conform to current "American Standards for Nursery Stock" by American Association of Nurseryman (ANN), particularly with regards to size, growth, size of ball, and density of branch sturcture.
- All plants (B&B or container) shall be properly identified by weather proof lobels securely attached thereto before delivery to project site. Labels shall not be removed until the final inspection by the Landscape Architect.
- Any material and/or work may be rejected by the Landscape Architect if it does not meet the requirements of the specifications. All rejected materials shall be removed
- from the site by the contractor. 4. The contractor shall furnish all plants in quantities and sizes to complete the work as specified in the plant schedule.
- 5. Substitutions in plant species or size shall not be permitted except with the written approval by the landscape architect.
- Plants shall be installed as shown on the drawings and by scaling or as designated in the field by the landscape architect. All locations are to be approved by the landscape
- 7. Contractor shall contact Miss Utility prior to excavaton.

pedestrian and vehicular traffic.

drawings, the greater number shall apply.

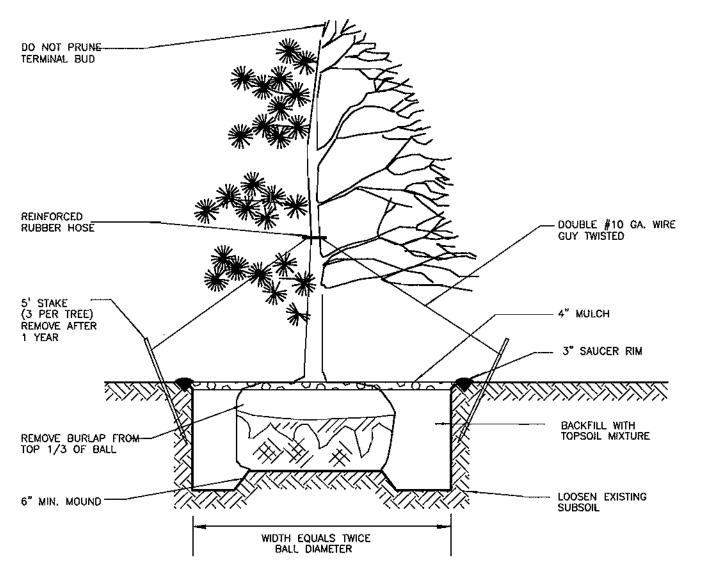
- 8. If Utility lines are encountered in excavation of tree pits, other locations for trees shall be selected by the landscape architect. Such changes shall be made by the contractor without additional compensation. No changes shall take place prior to location and digging the pits for the trees.
- Contractor shall first locate and mark the underground utilities and delineate the utility easement areas where no planting shall take place prior to location and digging
- 10. All equipment and tools shall be placed so as not to interfere or hinder the
- 11. During planting operation, excess and waste materials shall be promptly and
- 12. The landscape contractor shall be responsible to verify all plant quantities prior to commencment of work. Quantities in the schedule are intended to be only a guide. In the event of a discrepancy between the number of plants in the schedule and on the
- 13. All disturbed areas of the site not planted with shurbs, groundcover or sod shall be
- 14. Diameters of plant materials as drawn are representative of plants at or near maturity rather than at inital planting.
- 15. All shurbs or trees occuring in a continuous R.O.W. or formal arrangement shall have uniform height, spread, and habit of growth.
- 16. A minimum of 12" depth of new topsoil shall be placed in all bed areas by landscape contractor prior to plant installation. Backfill all shrubs and trees with backfill mix of one part peat to three parts topsoil. Backfill all holly, boxwood, perennials, and groundcover with backfill mix of one part peat to one part topsoil.
- 17. Mulch perennial and groundcover beds with min. 2" of shredded hardwood mulch.

  Mulch shrubs and trees with min. 3" of shredded hardwood mulch. Mulch shall extend in a continuous layer within plantings beds from face to face of site structures -walks, building, or other plant bed limits.
- 18. All bed edges shall be spade—cut and closely align as possible with edges as shown on drawing.



- 3. MATERIALS WITH A FALL PLANTING HAZARD SHALL BE HANDLED
- ALL PLANT MATERIAL SHALL CONFORM TO THE AMER. ASSOC. OF NURSERYMEN'S STANDARDS.

SHRUB PLANTING DETAIL NOT TO SCALE

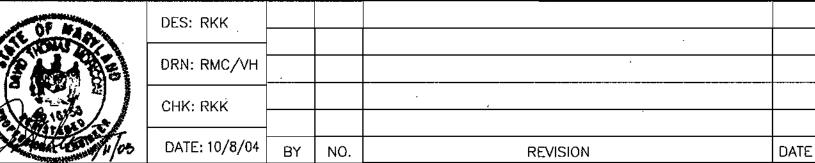


- 1. STAKES TO BE DRIVEN INTO UNDISTURBED SOIL

EVERGREEN TREE PLANTING DETAIL

DEPARTMENT OF PLANNING AND ZONING





HOWARD COUNTY DEPARTMENT RECREATION AND PARKS 7120 OAKLAND MILLS ROAD COLUMBIA, MARYLAND 21046

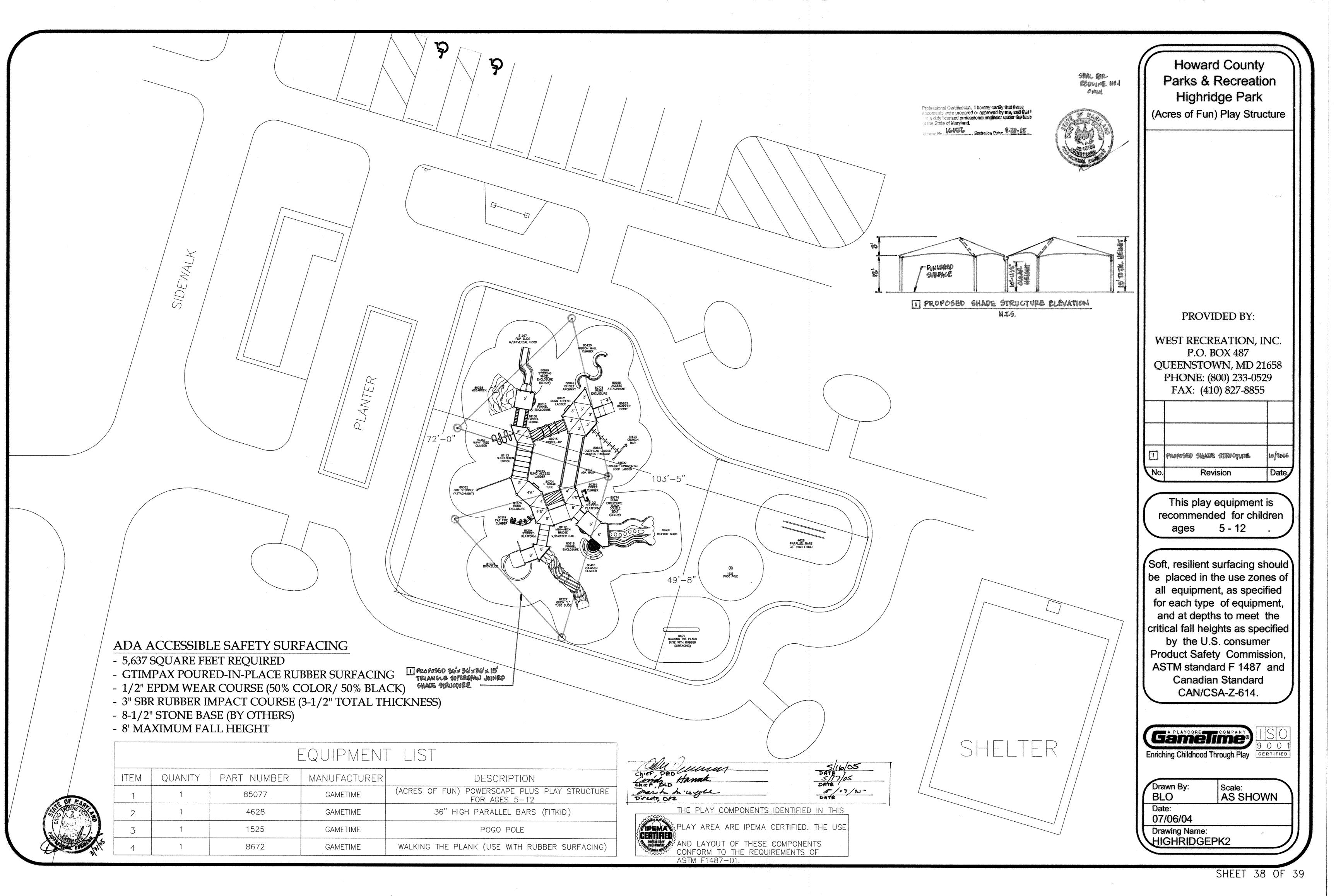
DEVELOPER: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS 9250 BENDIX ROAD COLUMBIA, MARYLAND 21045

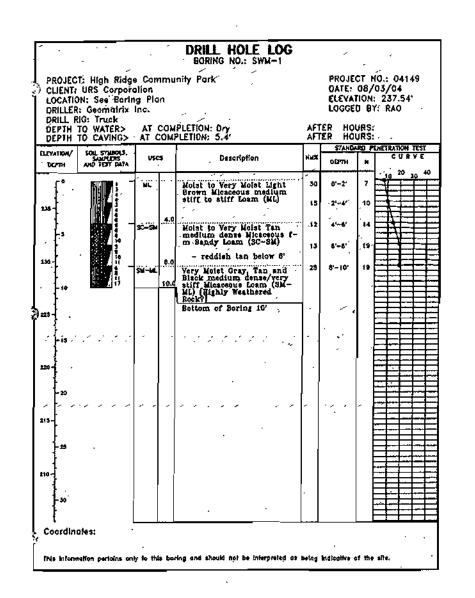
TAX MAP: 50 GRID: 1&2 ZONED: R-20 & R-SC PARCEL NO.: 364 CENSUS TRACT: 6069.03 WATER CODE: CO6 SEWER CODE: 7170900

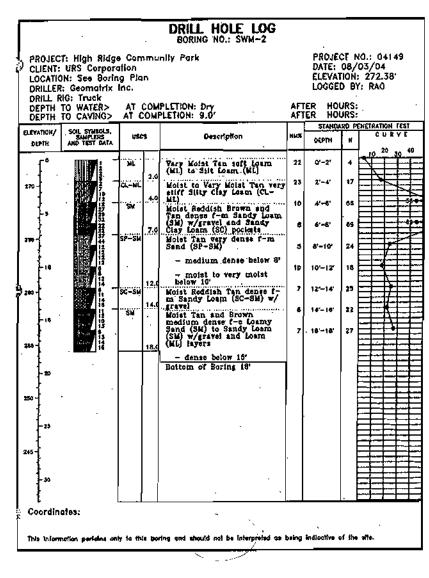
# HIGH RIDGE PARK

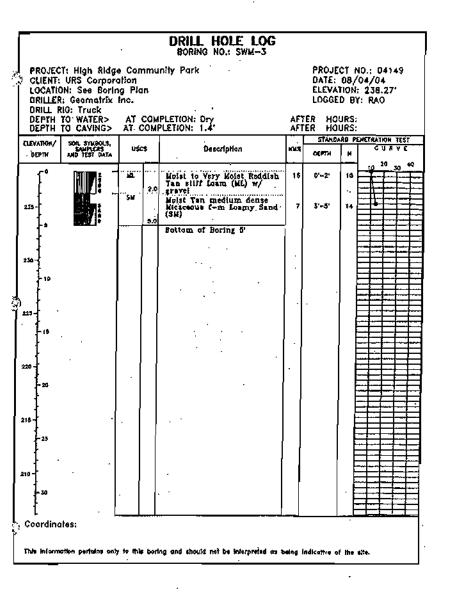
LANDSCAPE DETAILS

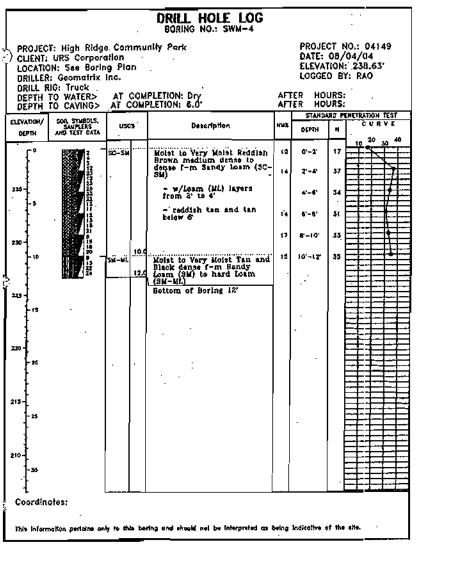
SHEET <u>37</u> of <u>39</u> DEED REFERENCE: LIBER 8771, FOLIO 685 ELECTION DISTRICT NO. 6, HOWARD COUNTY, MARYLAND

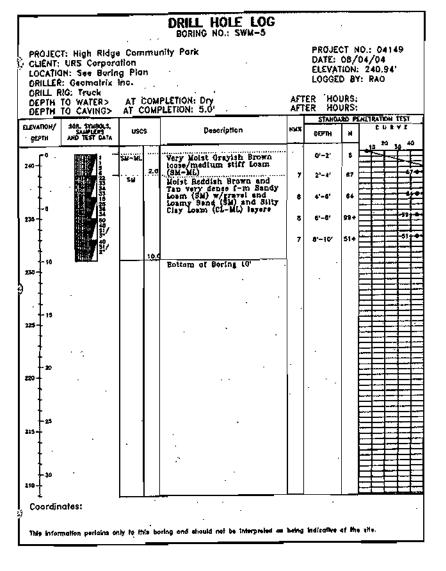


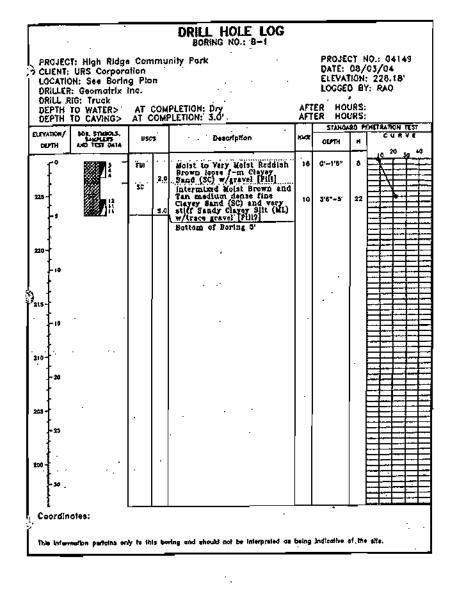


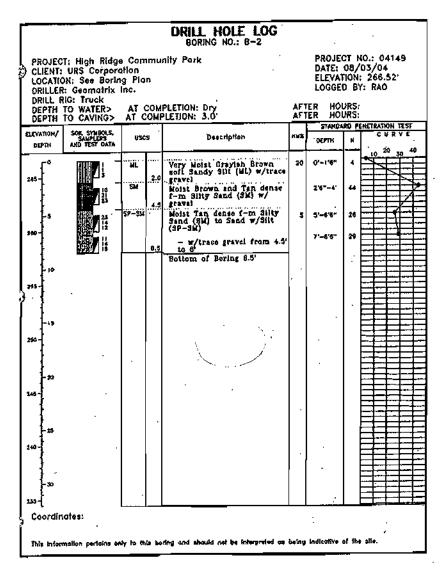


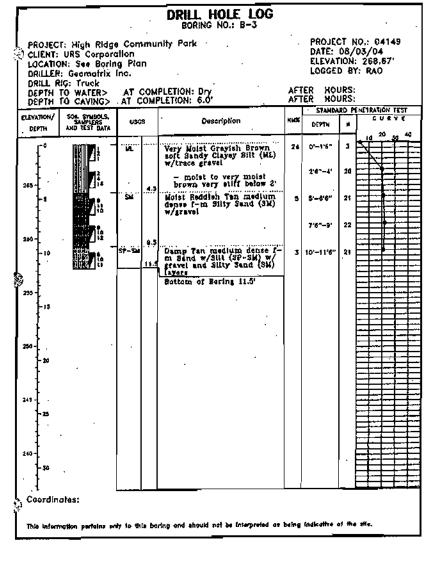


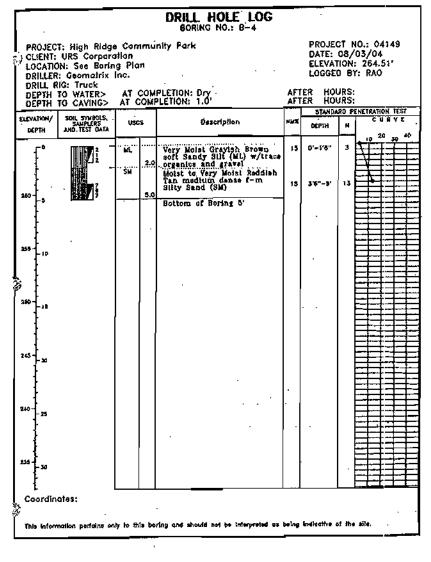


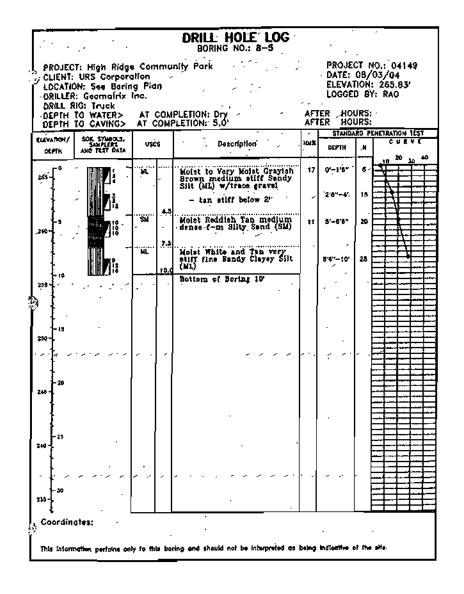


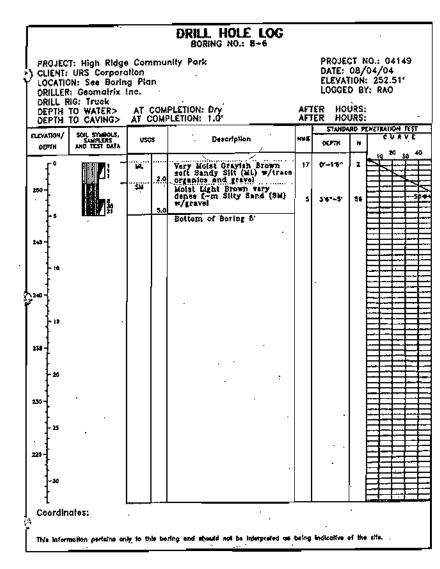


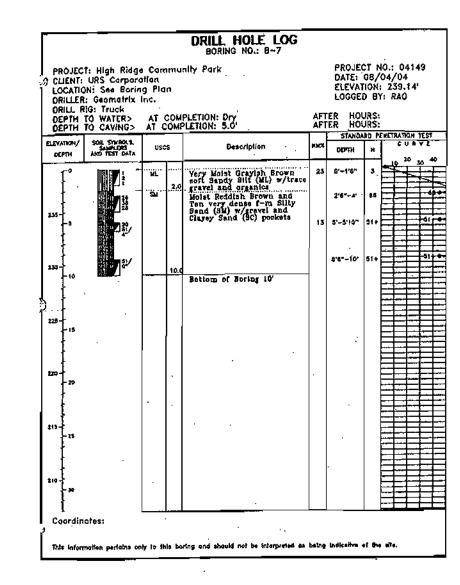


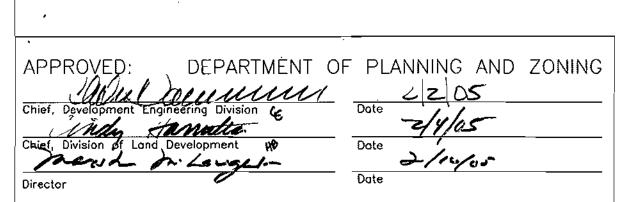




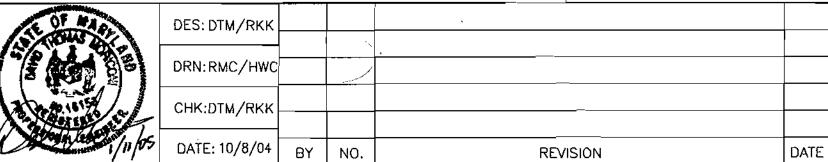












OWNER:
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DEVELOPER:
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9250 BENDIX ROAD
COLUMBIA, MARYLAND 21045

TAX MAP: 50
GRID: 1&2
ZONED: R-20 & R-SC
PARCEL NO.: 364
CENSUS TRACT: 6069.03
WATER CODE: CO6

SEWER CODE: 7170900

#### CONCLUSIONS AND RECOMMENDATIONS

It is concluded from this investigation that conventional spread footings and floor slabs can be used to support the proposed buildings and other ground-supported structures. Solid bedrock and groundwater were not encountered at any boring location and should not, therefore, impact grading operations provided excavations do not extend much below the boring depths. We note that some of the shallow soils are fine-grained ML materials and that they may become unstable from construction activity disturbance if their moisture contents are too high which may be the case during wet seasons. In the area of the basketball and tennis courts, SM Sands should be exposed at subgrade level based on Borings B-3 and B-4. These soils should be relatively easy to grade. Concerning pavements, reference is made to a following section of this report concerning recommendations. The classification of the soils at the SWM pand and bioretention areas range from acceptable to unacceptable relative to the use of infiltration dealign; groundwater does not appear to be a limitation. Given below are geotechnical-related comments and recommendations to guide design and construction of the building foundations, peved areas, and SWM febilities.

#### Site Preparation

All topsoil, vegetation, and any other unsultable condition – such as unacceptable existing fill – that may be found to exist over the surface of the various sites should be stripped and removed from the construction areas. In building and pavement areas where the surface is at design grade after these operations or where fill is required, the exposed subgrade should then be proof-rolled with a fully loaded tandem-axis dump truck or equivalent to check for soft, loose, or otherwise unsultable conditions. Any such area should be undercut as required to expose firm, stable conditions or if conditions permit, densified in place by vibratory rollers.

Proof-rolling operations should be inspected by a Geotechnical Engineer or his/her representative to determine if the subgrade is in suitable condition to support the proposed construction. Hand suger borings and Dynamic Cone Penetrometer (DCP) tests may be required as part of that inspection.

#### Grading

All structural fill meterials should be approved by a Geotechnical Engineer prior to placement. All of the soils excavated from cut areas on-site that classify as SC and SM Sands should be acceptable for use as general fill, including under foundations and paved areas. Any structural fill required under slabs and pavements should be placed in loose lifts not to exceed 12 inches and each lift should be compacted to a density of at least 95 percent maximum density as determined by the Modified Proctor test (AASHTO T-180). The subgrade in all fill areas should also be compacted to a firm, stable condition prior to placement of the fill. We recommend that fill placement below slabs and pavements extend a minimum of 5 feet horizontally beyond the edge of each structure. Compacted fill under foundations should extend beyond foundation edges at a ratio of 1.3 vertical to 1 horizontal.

Moisture contents of structural fills should ideally be maintained within -/+2 percentage points of optimum, thus adjustments to the natural moisture contents of the soils may be required in order to obtain specified compaction levels. We note here that the natural moisture content of the shallow on-site soils will depend on seasonal conditions.

All subgrade preparation, fill placement, and compaction operations in critical areas, i.e., structural and slab areas, should be monitored by a qualified Soils Inspector under the supervision of a Geotechnical Engineer, on a full-time basis to ensure that fill materials are being placed and compacted in compliance with the project specifications. A sufficient number of in-place density tests should be performed to verify that the proper degree of compaction is being obtained. Should any compaction problems develop during grading operations, the Geotechnical Engineer should be consulted for an evaluation of the problem.

#### Foundatio

It is recommended that all foundations exposed to outside temperatures be located at least 2.5 feet below final exterior grade for frost protection. Foundations not exposed to outside temperatures can be located as shallow as 1 foot below final grade. Foundations located at these depths and bearing either on approved natural soils or compacted fill can be designed for an allowable net bearing capacity of 3000 part. In using net bearing capacity, it is not necessary to include the weight of the footing or backfill over the foundation in sizing the footing. All footings should also contain reinforcing afeet as designated by a structural engineer.

All footing excavations and/or foundation areas where structural fill is required should be inspected by a Geotechnical Engineer prior to the placement of concrete or the structural fill. This inspection may include thand auger bortags and Dynamic Cone Penetrometer (DCP) testing to determine conditions within the depth influence of the foundation. The purpose of the inspection would be to ensure that the exposed materials will be capable of supporting the design footing pressure. If soft or loose pockets are encountered in the footing excavations, the unsuitable materials should be removed and the footings should be located at a lower elevation. Alternatively, the unsuitable materials could be undercut and replaced with new fill placed and compacted in accordance with the recommendations of the Grading Section.

#### Floor Slabs

Floor slabs should be supported on approved firm natural soils or on newly compacted fill over natural soils. It is recommended that, unless dictated by structural requirements, slabs be directly supported on a minimum 4-inch layer of clean granular materials (washed gravel). These materials may require acquisition from off-site sources. A polyethylene vapor-moisture barrier should be provided above these granular materials. These precautions will provide a moisture break that will prevent dampness of the floor slab.

#### Groundwater and Drainage

The groundwater table appears to be below expected excavation depths. However, during wet seasons rainwater could collect in open excavations. We recommend that adequate precautions be undertaken to minimize the possibility of water collecting in the structural areas. Adequate drainage should be provided at the site to minimize this possibility of any increase in moisture content of the foundation soils. Slab subgrade areas should be sealed each night with a smooth drum roller or covered.

A locally high groundwater condition can develop immediately adjacent to the building if surface drainage is not properly controlled. The site grading plan should include a grade of at least 5 percent perpendicular to the walls for the first 10 feet away from the walls to facilitate rapid runoff of surface water. Roof downspouts or other water collection systems should be discharged well away from the beckfill so that surface water does not have an opportunity to pond adjacent to the foundation walls and cause seepage into the backfill and foundation bearing soils. In addition, we recommend that the foundation walls which will be below grade be demo-proofed.

#### Stormwater Management and Biometention

Boring	Denth	<u>Description</u>	Infiltration Potential*
SWM-1	0'-4'	Loam (ML)	Poor
011	4' - 8"**	Sandy Loam (SC-SM)	Slow
,	8' - 10'	Loam (SM-ML) [Weathered Rock?]	Poor
SWM-2	·0'-2'	Silt Loam (ML)	Poor
O11111-2	2' 4'	Silty Clay Loam (CL-ML)	Poor
	4' - 7'	Sandy Loam (SM) w/Sandy Clay Loam Pockets	Slow/Poor***
	7'-12'	Sand (SP-SM)	Good
	12' - 14"**		Slow
-	14' – 18'		Good/Slow***
SWM-3	0' - 2'	Loam (ML)	Poor
	2'-5'**	Loamy Sand (SM)	Good
Boring	Depth	Description	Infiltration Potential :
SWM-4	0' - 10"**	Sandy Loam (SC-SM)	Slow
***************************************	10' – 12'	Sandy Loam (SM) to Loam (SM-ML)	Slow/Poor***
mini t	n or	( oam/\$\4.\f) \	Proc

- Relative Permeability Ratings by Marshall Engineering, Inc.;
   Poor = Not considered suitable for Infiltration (can be due to thin layers)
- Good = probably suitable (Prof. 1 = 2.5 In./i
- Set pipe in this stratum and performed infiltration test.
   Where a dual infiltration potential is provided, the slower infiltration rate should be used for

The permeability classification and preliminary infittration rates "i" given above are arbitrary and solely estimates by Marshall Engineering, Inc. based on previous experience.

Sandy Loam (SM) & Loamy Sand (SM)

results and/or other data.

Concerning actual measured infiltration rates, reference is made to the Infiltration Test Summary In Appendix C. The following table summarizes the findings of our infiltration.

They are for preliminary design purposes only, and are subject to change based on field test

Based on the above, it appears that infiltration conditions vary from unsuitable to suitable depending on location and depth. We typically recommend a conservative design infiltration rate of about one-half the measured rate to account for the presence of the seams and layers of soils with slower rates. We also recommend that the bottom of any infiltration system be at least 2 feet above a layer with a slower or unsuitable rate. Based on the above, tabulated below are our recommendations.

Boring	Recommended [refiltration Rate (in Ar.)	Depth
SWM-1	1	4' ~ 6'
SWM-2	1	14'-10
SWM-3	•	2'-3'
SWM-4	7	8' 10
SWM-5	•	2' - 8'

Slowest tested rate less than 1 in Jhr.

#### Раучи

It is assumed that construction of the peved areas will be a staged operation of first grading the site to include compaction of the subgrade, proof-rolling to locate soft areas and repair of those areas, placement and compaction of a stone base and finally placement of the asphalt surface. Variation in the timing of the various stages may be appropriate, depending on economics and other considerations. For example, it may be desirable to prepare the subgrade and only place the stone, delaying placement of the asphalt until after building construction is completed so as to minimize repair costs due to asphalt pavement failures under the heavy construction traffic.

The key to good pavement support is proper compaction of an acceptable subgrade material and protection of the subgrade from intrusion of water which softens the subgrade soils, thereby weakening them. The on-site SP-SM, SM and SM-SC Sends exhibit good subgrade characteristics for support of assumed moderate traffic loading conditions. Based on their classification, a CBR value of at least 5 should be available at all locations where these soils exist in a compacted condition to at least 2 feet below subgrade level. This can be accomplished by undercutting any pavement area where these soils are not present and replacing the undercut with these soils as obtained from other on-site locations. Based on this subgrade preparation, standard Howard County pavement sections should be suitable for the expected traffic and loading conditions.

GEOTECHNICAL DATA

DEED REFERENCE: LIBER 8771, FOLIO 685

ELECTION DISTRICT NO. 6. HOWARD COUNTY, MARYLAND

SHEET 39 OF 39