

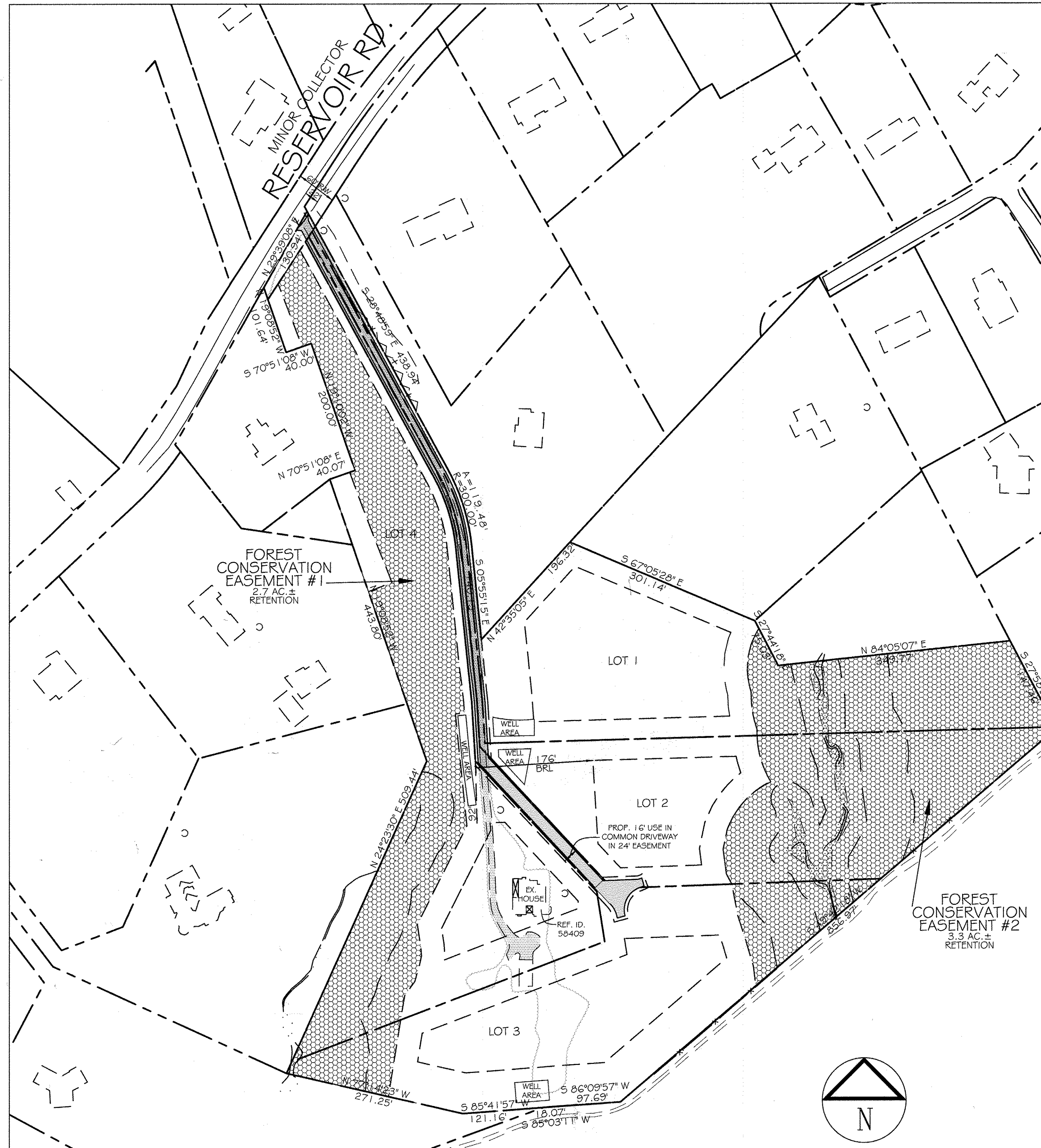
**GENERAL NOTES**

- All construction shall be in accordance with the latest standards and specifications of Howard County plus MSHA standards and specifications if applicable.
- The contractor shall notify the Department of Public Works/Bureau of Engineering/Construction Inspection Division at (410) 318-1880 at least five (5) working days prior to the start of work.
- The contractor shall notify "Miss Utility" at 1-800-251-TTTT at least 48 hours prior to any excavation work being done.
- Traffic control devices, markings and signing shall be in accordance with the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD). All street and regulatory signs shall be in place prior to the placement of any asphalt.
- The existing topography and boundary is taken from field run survey with maximum two foot contour intervals prepared by Shanaberger & Lane June, 2012.
- The coordinates shown hereon are based upon the Howard County Geodetic Control which is based upon the Maryland State Plane Coordinate System. Howard County Monument Nos. 401A and 0079 were used for this project.
- Site is located outside the metropolitan district.
- Stormwater Management for this site is provided by environmental site design to the maximum extent practical consisting of rooftop and non-rooftop disconnection, rainwater harvesting, pervious paving, grass swales, and micro bio-retention, all facilities privately owned and maintained. These practices are subject to a declaration of covenants.
- Existing utilities are based on plans of record, field run topography.
- No regulated floodplains exist onsite.
- Wetland and Forest Stand Delineation and report prepared by Eco Science Professionals Dated 1/4/13.
- Forest Conservation Requirements will be met by retention of onsite forest on the lots as permitted by NP 13-116 in the amount of 6.0 Ac +/- No survey is required.
- The contractor shall test pit existing utilities at least five (5) days before starting work shown on these drawings to verify their location and elevation. The contractor shall notify the engineer immediately if location of utilities is other than shown.
- Any damage caused by the Contractor to existing public right-of-way, existing paving, existing curb, and gutter, existing utilities, etc. shall be repaired at the Contractor's expense.
- All hydraulic data is for the 10-year storm unless otherwise noted.
- All fill areas shall be compacted to a minimum of 95% of the maximum dry density as determined and verified in accordance with AASHTO T-150.
- All plan dimensions are to edge of paving unless otherwise noted. Numerically written dimensions take precedence over scaled dimensions.
- There are no known cemeteries or burial grounds on this site.
- No grading, removal of vegetative cover or trees, paving and new structures shall be permitted within the wetlands, streams and associated buffers.
- All sign posts used for traffic control signs installed in the County right-of-way shall be mounted on a 2" galvanized steel, perforated, square tube post (1/4 gauge) inserted into a 2-1/2" galvanized steel perforated, square tube sleeve (1/2 gauge) - 3' long. A galvanized steel pole cap shall be mounted on top of each post.
- The landscape plan has been prepared in accordance with Section 16.124 of the Howard County Code and the Howard County Landscape Manual. Landscaping for lots 1 thru 4 is provided in accordance with a certified landscape plan as part of the supplemental drawings in accordance with section 16.124 of the Howard County Code and the landscape manual. Landscape surety in the amount of \$1800 (6 shade trees for replacement of removed specimen trees) will be posted with the grading permit.
- Signage at the street identifying the address is required.
- See previous DPZ Files ECP 14-006, NP 13-116.
- The property is zoned RR-DEO per the 10/06/13 comprehensive zoning plan.
- On July 3, 2013 the planning director approved NP-13-116 which allowed waivers of the following sections of the subdivision and land use regulations: section 16.117(b), section 16.120(a)(1)(i), section 16.120(a)(4)(ii), section 16.120(b)(4)(iii), section 16.120(b)(6)(i), section 16.120(b)(6)(vii), and section 16.120(a)(7), subject to the following conditions:
  - Considering alternatives such as a forest conservation bank.
  - Submission of a final plat and compliance with SRG requirements.
  - Furnishing a letter from MDE stating no threatened or endangered species have been identified in the area, and providing and update FSD that includes surveys for habitat identified species on the site.
  - Directing the timing and practices to be used during construction to comply with guidelines for limiting impacts to forest interior dwelling species habitats.
  - Use of fencing and signage as additional reminders to discourage encroachment into the easement areas.
  - No grading, removal of vegetative cover and trees, paving, and new structures are permitted within the stream, wetlands, forest conservation easements, and required buffers.
- Providing proof that education material was provided to each lot purchase explaining the restriction on encroachment into the forest conservation easement, stream, wetlands, and their buffers as part of the forest conservation easement inspection process.
- striving to maintain a 100-foot separation between any proposed house and the forest conservation easement when applying for building permits.
- planting of 2 new native shade trees as mitigation for removal of one specimen tulip poplar tree, and providing surety for the 2 new trees as part of the landscape surety. (See General Note #37)
- Final driveway location, construction, configuration, and perimeter landscaping along the driveway shall be reviewed and approved with the final plan.
- notation of the waiver petition number, sections granted, date, and conditions of approval on the final plat.
- A request for reconsideration for NP-13-116 was filed August 27, 2014 to remove 2 additional specimen trees located in septic reserve areas.
- For flag or pipestem lots, refuse collection, recycling, snow removal, and road maintenance are provided to the junction of the flag or pipestem and road right-of-way line and not onto the pipestem lot driveway.
- The Submission Community Meeting was held 12/20/13.
- This area designates a private sewage easement of at least 10,000 square feet as required by the Maryland Department of Environment for individual sewage disposal. Improvements of any nature in this area are restricted. This easement shall become null and void upon connection to a public sewerage system. The county health officer shall have the authority to grant adjustments to the private sewage easement. Recordation of a revised sewage easement shall not be necessary.
- Percolation Certification Plan prepared by Shanaberger & Lane approved 3/1/12.
- Sight Distance Analysis prepared by Shanaberger & Lane dated 3/12/14.
- Driveway(s) shall be provided prior to issuance of a use and occupancy permit to ensure safe access for fire and emergency vehicles per the following:
  - Width - 12 feet (16 feet if serving more than 1 residence)
  - Surface - six (6) inches of compacted "crusher run" base with tar and chip coating (1-1/2" min.)
  - Geometry - max. 15% grade, max 10% grade change and minimum 45' turning radius
  - Structures (culverts/bridges) - capable of supporting 25 gross tons (H25 loading)
  - Drainage elements - capable of safely passing 100-year flood with no more than 1-foot depth over driveway surface.
  - Maintenance - sufficient to ensure all weather use.
- The existing house is listed as an historic structure. Ref. ID. 59404. It was determined that Historic District Commission Advisory Comments for this subdivision are not required per October 23, 2013 decision of the Historic District Commission.
- Standard plan shall be used to provide sediment & erosion control for driveway construction only. No construction and grading for houses and / or associated stormwater management shall be done with this plan.
- Driveway construction will be done by the owner/developer to the limits shown on plan.
- When not constrained by building restriction lines, septic easements and well box locations, homes shall be sited 100 feet from forest retention easements.
- The builder shall make every attempt to locate houses 100' from the edge of the forest conservation easement whenever possible.
- Standard Set Plan may not be used for house construction

**SUMMARY OF ESDS**

LOT 1	DRYWELL	M-5
	NON ROOFTOP DISCONNECTION	N-2
LOT 2	MICRO BIO RETENTION	M-6
	RAIN WATER HARVESTING	M-1
LOT 3	PERVIOUS PAVEMENT	A-2
	MICRO BIO RETENTION	M-6
LOT 4	NON ROOFTOP DISCONNECTION	N-2
	GRASSED SWALE	M-8

APPROVED: DEPARTMENT OF Planning & Zoning  
 [Signature] Date 4-10-14  
 Chief, Division of Land Development  
 [Signature] Date 10-31-14  
 Chief, Development Engineering Division



Scale: 1"=100'

# Cover Sheet

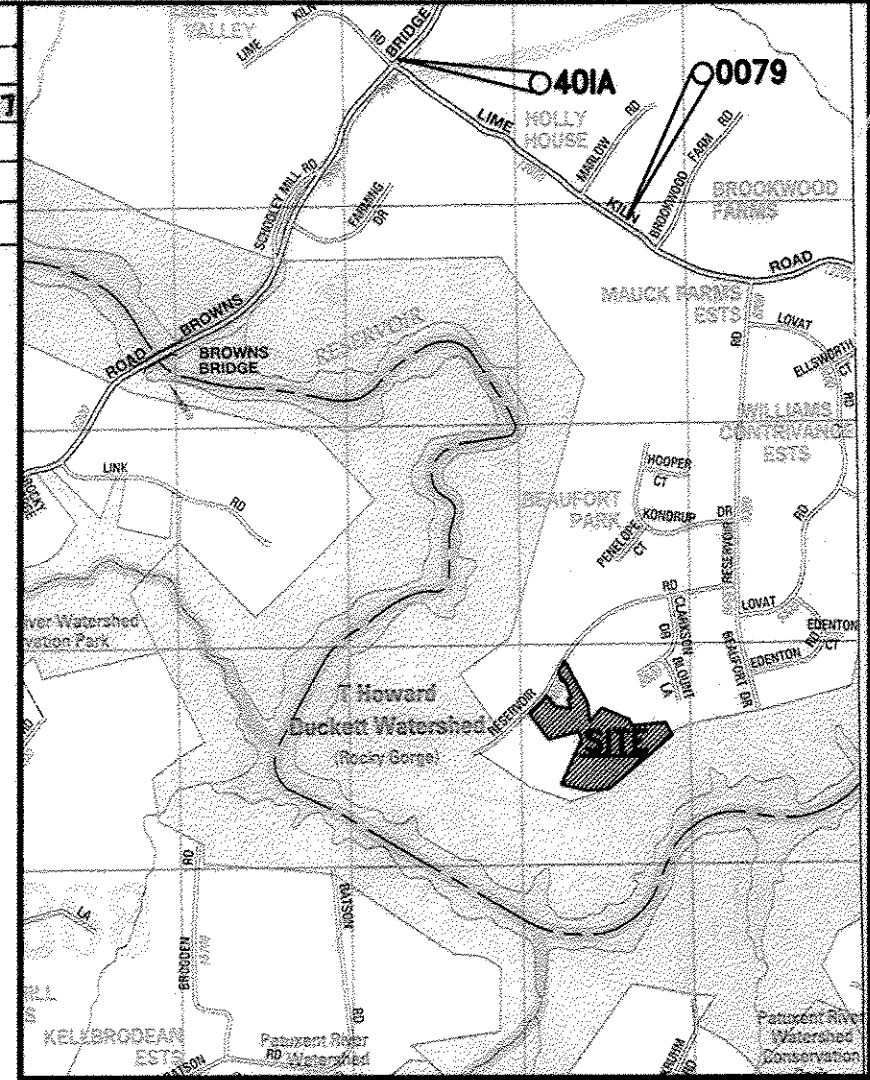
for

# Munro Property

Howard County, Maryland

LOTS 1 - 4

NO.	REVISIONS	DATE
1	REVISE SUMMARY LOT 1	7-21-17



Vicinity Map - Scale: 1" = 2000'

ADC The Map People - Permitted Use # 20612205  
 MAP 5051 J9  
 BENCHMARK DESCRIPTIONS

The courses and coordinates shown hereon are based on the following Howard County monuments:

Point	Northing	Easting	Elevation
401A	N 541725.7952	E 1325316.8410	Elev. 359.470
0079	N 540070.9966	E 1327702.7611	Elev. 426.227

37. Reconsideration of waiver approval for NP-13-116.  
 On October 1, 2014, the Planning Director approved your request to reconsider the waiver to waive Section 16.120(a)(7) to include two additional specimen trees permitted for removal to the one previously approved (a total of 3 specimen trees to be removed).

- Approval is subject to the following conditions:
- The approval for specimen tree removal is amended to include ONLY Specimen Trees #10 and #19 (as identified on the Forest Stand Delineation and ECP-14-006) in addition to Specimen Tree #15 previously approved for removal.
  - Any specimen tree approved for removal must be replaced at a 2:1 ratio (6 replacement trees total), preferably of the same species if suitable for the developed site. The developer shall identify these replacement trees on the Final Plan and surety of these shade trees shall be incorporated into the landscape surety with as part of the Final Plan. It is recommended these trees are placed along the future driveway and outside any BRL.
  - Once the replacement trees are identified on the plan, planted and bonded, removal of specimen trees #10 and #19 may occur despite any time lapse between approval of this waiver and the construction permitted on Lots 1 or 3.
  - A note regarding this waiver should be referenced on the grading permits for Lots 1 and 3 in order to avoid any delays in permitted due to specimen tree removal.
  - All other waivers and conditions for the initial NP-13-116 for all other sections approved on July 3, 2014 remain valid and in effect. They are not eliminated or superseded by the approval of this reconsideration, with the exception of condition #9 which is updated with the approval of this consideration.
  - Please add a note regarding this waiver petition reconsideration (file number, date, purpose, decision and conditions) to the Final Plat and Final Plan.

**SHEET INDEX**

SHEET	DESCRIPTION
1	Cover Sheet
2	Driveway Plan
3	Landscape Plan
4	SWM Drainage Area Map
5	SWM Plans & Specifications
6	SWM Profiles & Details
7	SWM Notes & Details
8	SWM Landscape Plan
9	Forest Conservation Plan

**Tesseract**  
 TESSERACT SITES, INC.  
 401 Washington Ave, Suite 303  
 Towson, Maryland, 21284  
 P. 410.321.7600  
 F. 410.321.7601

**Cover Sheet**  
**Munro Property**  
 Howard County, Maryland

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

LOT/PARCEL:	LIBRARY/FILED:	PLAT:
9 & 50	3704/323	3835/76
ORIG:	DATE/ZONE MAP:	ELECTRICTY CONTRACT:
12	RR-DEO	45
		5TH

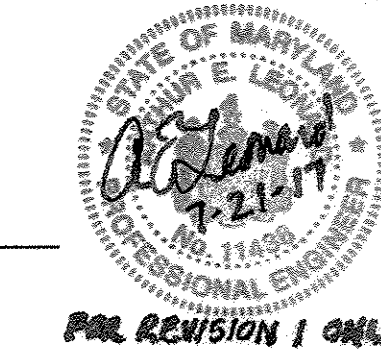
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 Proj. #: 12013  
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**1 of 9**

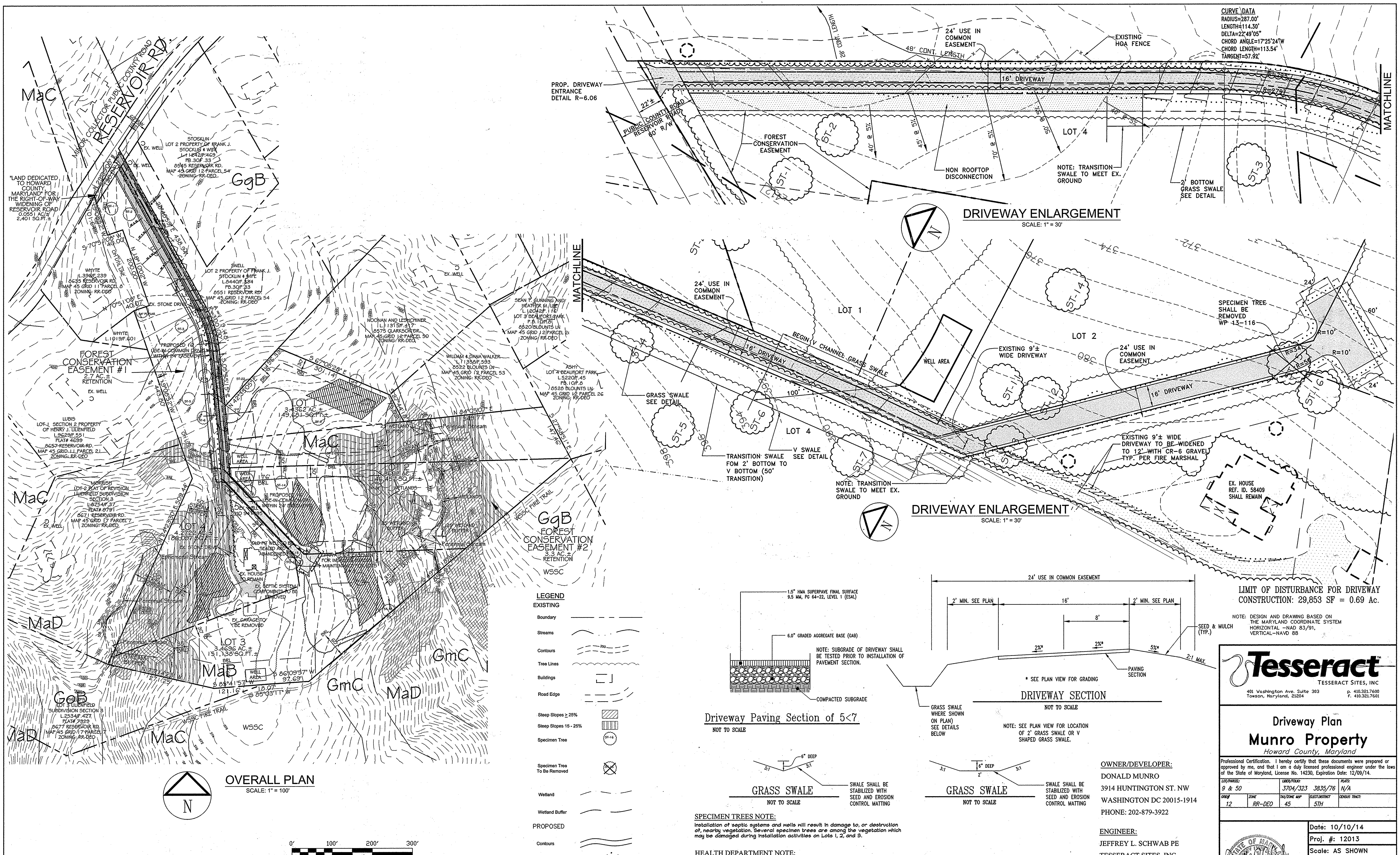
DESIGN: DRAWN: MAS CHECKED: XXX

**OWNER/DEVELOPER:**  
 DONALD MUNRO  
 3914 HUNTINGTON ST. NW  
 WASHINGTON DC 20015-1914  
 PHONE: 202-879-3922

**ENGINEER:**  
 JEFFREY L. SCHWAB PE  
 TESSERACT SITES, INC.  
 401 WASHINGTON AVE, SUITE 303  
 TOWSON, MD 21204  
 PHONE: 410-321-7600







**CURVE DATA**  
 RADIUS=287.00'  
 LENGTH=114.30'  
 DELTA=22°49'05"  
 CHORD ANGLE=17°25'24"W  
 CHORD LENGTH=113.54'  
 TANGENT=57.92'

PROP. DRIVEWAY ENTRANCE  
 DETAIL R-6.06

**DRIVEWAY ENLARGEMENT**  
 SCALE: 1" = 30'

**DRIVEWAY ENLARGEMENT**  
 SCALE: 1" = 30'

**LIMIT OF DISTURBANCE FOR DRIVEWAY CONSTRUCTION: 29,853 SF = 0.69 AC.**

NOTE: DESIGN AND DRAWING BASED ON THE MARYLAND COORDINATE SYSTEM HORIZONTAL - NAD 83/91, VERTICAL - NAVD 88

**Tesseract**  
 TESSERACT SITES, INC.  
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 Towson, Maryland, 21284  
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 F. 410-321-7601

**Driveway Plan**  
**Munro Property**  
 Howard County, Maryland

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

DATE: 9 & 50	DATE: 3704/323	DATE: 3835/76	DATE: N/A
DATE: 12	DATE: RR-DEO	DATE: 45	DATE: 5TH

**OWNER/DEVELOPER:**  
 DONALD MUNRO  
 3914 HUNTINGTON ST. NW  
 WASHINGTON DC 20015-1914  
 PHONE: 202-879-3922

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 TESSERACT SITES, INC.  
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Date: 10/10/14  
 Proj. #: 12013  
 Scale: AS SHOWN  
**2 of 9**  
 DESIGN: DRAWN: MMS: CHECKED: XXX

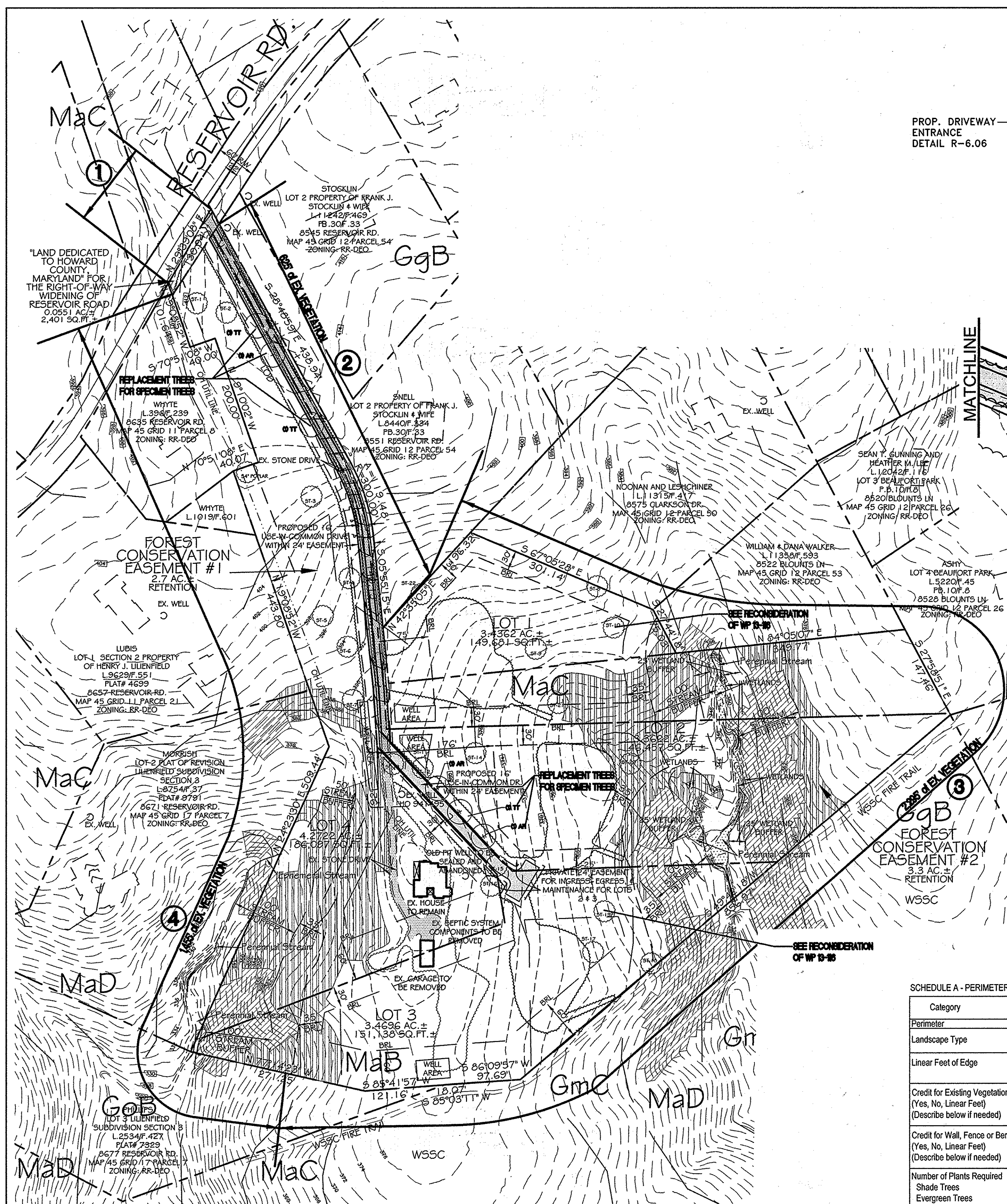
APPROVED: DEPARTMENT OF Planning & Zoning  
 Chief, Division of Land Development  
 Chief, Development Engineering Division  
 Date: 11-10-14  
 Date: 11-10-14

**SPECIMEN TREES NOTE:**  
 Installation of septic systems and wells will result in damage to, or destruction of, nearby vegetation. Several specimen trees are among the vegetation which may be damaged during installation activities on Lots 1, 2, and 3.

**HEALTH DEPARTMENT NOTE:**  
 This area designates a private sewage easement of at least 10,000 square feet as required by the Maryland Department of Environment for individual sewage disposal. Improvements of any nature in this area are restricted. This easement shall become null and void upon connection to a public sewerage system. The county health officer shall have the authority to grant adjustments to the private sewage easement. Recordation of a revised sewage easement shall not be necessary.







**OVERALL PLAN**  
SCALE: 1" = 100'

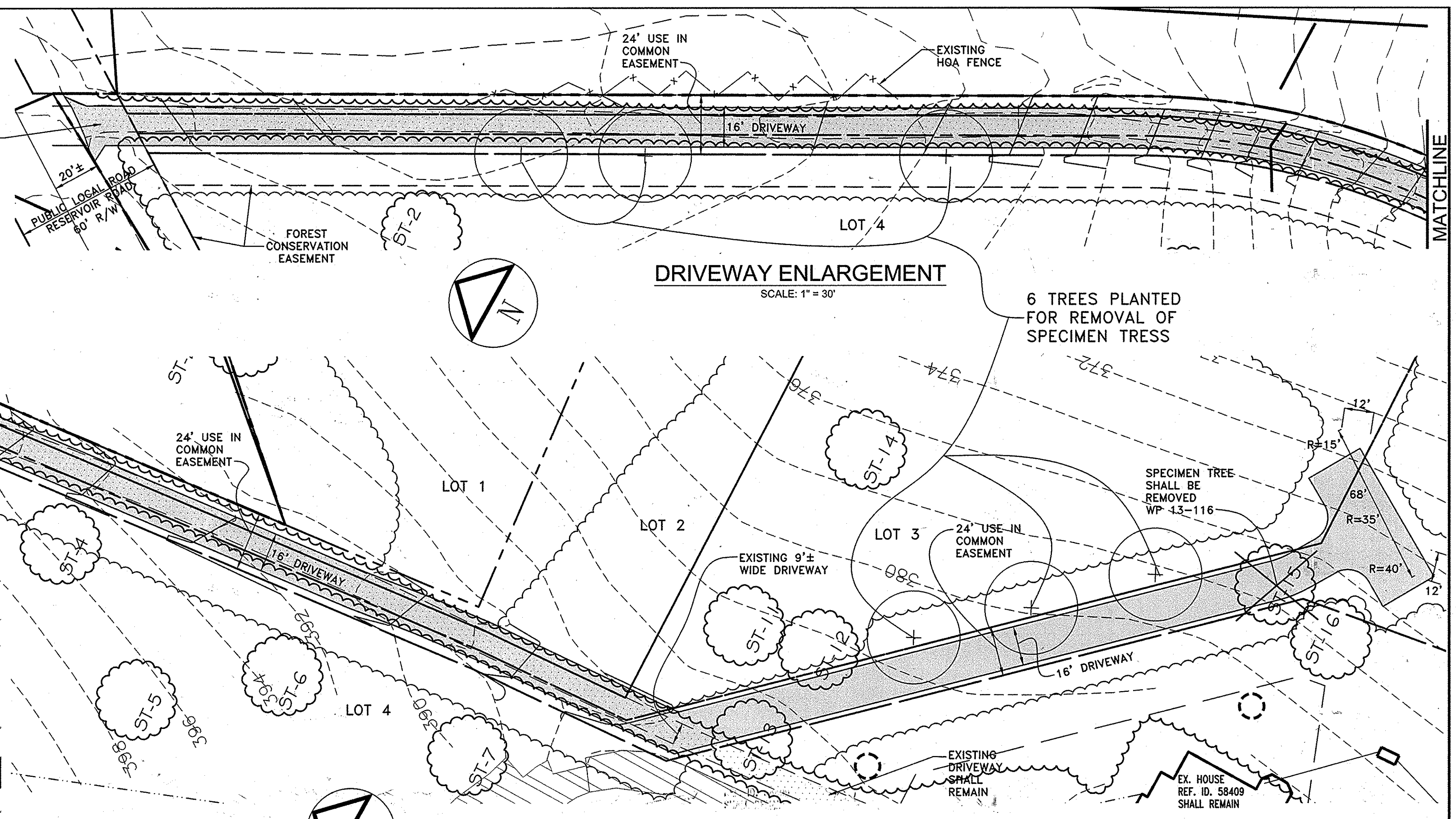
**DEVELOPER'S / BUILDER'S CERTIFICATE**

I/ we certify that the landscaping shown on this plan will be done according to the plan, Section 16.124 of the Howard County Subdivision and Land Development Regulations and the Landscape Manual. I/ we further certify that up completion, a Letter of Landscape Installation accompanied by an executed one year guarantee of plant materials will be submitted to the Department of Planning and Zoning.

APPROVED: DEPARTMENT OF Planning & Zoning  
 Chief, Division of Land Development  
 Chief, Development Engineering Division

Date: 11-10-14

Name: [Signature] Date: 10/16/14



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**SCHEDULE A - PERIMETER LANDSCAPING**

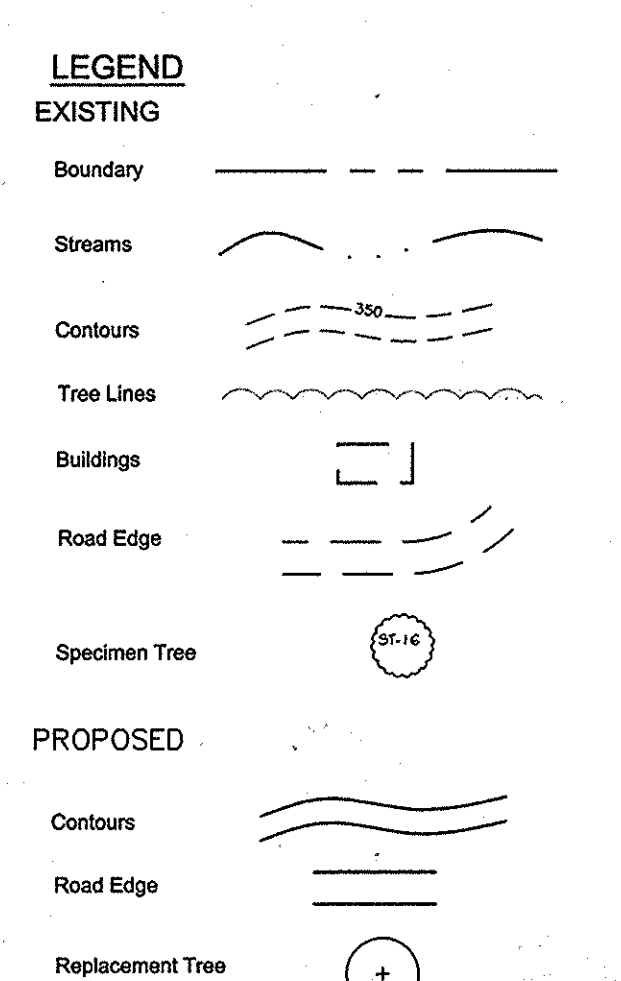
Category	Adjacent to Roadways				Adjacent to Perimeter Properties			
	1	# 2	3	4	1	2	3	4
Perimeter								
Landscape Type	N/A*	A	A	A				
Linear Feet of Edge	N/A	625'	2,295'	1,455'				
Credit for Existing Vegetation (Yes, No, Linear Feet) (Describe below if needed)	N/A	YES 625'	YES 2,295'	YES 1,455'				
Credit for Wall, Fence or Berm (Yes, No, Linear Feet) (Describe below if needed)	N/A	NO	NO	NO				
Number of Plants Required	N/A	0	0	0				
Shade Trees								
Evergreen Trees								
Shrubs								
Number of Plants Provided	N/A	0	0	0				
Shade Trees								
Evergreen Trees								
Other Trees (2:1 substitution)								
Shrubs (10:1 substitution)								
(Describe plant substitution credits below if needed)								

**SPECIMEN TREES TO REMAIN**

NUMBER	TYPE	CONDITION
ST-1	30" WHITE OAK	GOOD
ST-2	33" YELLOW POPLAR	FAIR
ST-3	36" YELLOW POPLAR	GOOD
ST-4	31" YELLOW POPLAR	GOOD
ST-5	35" YELLOW POPLAR	GOOD
ST-6	37" YELLOW POPLAR	GOOD
ST-7	33" YELLOW POPLAR	GOOD
ST-8	38" YELLOW POPLAR	GOOD
ST-9	33" YELLOW POPLAR	GOOD
ST-10	30" YELLOW POPLAR	GOOD
ST-11	35" YELLOW POPLAR	GOOD
ST-12	34" YELLOW POPLAR	FAIR
ST-13	35" YELLOW POPLAR	GOOD
ST-14	39" YELLOW POPLAR	FAIR
ST-16	32" AMERICAN SYCAMORE	FAIR
ST-17	36" YELLOW POPLAR	GOOD
ST-18	34" YELLOW POPLAR	GOOD
ST-19	30" YELLOW POPLAR	FAIR
ST-20	30" YELLOW POPLAR	GOOD
ST-21	27/30" TWIN YELLOW POPLAR	FAIR
ST-22	31" YELLOW POPLAR	GOOD

**SPECIMEN TREES TO BE REMOVED**

NUMBER	TYPE	CONDITION
ST-15	32" YELLOW POPLAR	GOOD



\*THERE IS NO LANDSCAPE REQUIREMENT FOR FRONT OF SINGLE FAMILY DETACHED TO ROADWAY

# THE DEPARTMENT OF PLANNING AND ZONING DETERMINED A LANDSCAPE BUFFER WAS NOT REQUIRED ADJACENT TO THE EXPANSION / PAVING OF THE DRIVEWAY SINCE THE DRIVEWAY IS EXISTING AND AT THE EDGE OF THE PROPERTY THERE ARE EXISTING TREES ON THE PROPERTY LINE, WITH THE DRIVEWAY FOR THE ADJACENT FLAG LOT PARALLEL TO THIS DRIVEWAY.

0' 30' 60' 90'

Landscape Surely in the amount of \$1800 (6 shade trees for replacement of specimen trees) shall be posted with the grading permit. See reconsideration of WP 13-116 approved 10/1/14, Note ST Sheet 1.

**PLANT SCHEDULE** (for mitigation planting required by removal of specimen trees)

KEY	BOTANICAL NAME	COMMON NAME	SIZE	QUANTITY	COMMENTS
AR	ACER RUBRUM 'RED SUNSET'	RED SUNSET RED MAPLE	2 1/2" CAL	3	B4B
TT	TILIA TOMENTOSA	SILVER LINDEN	2 1/2" CAL	3	B4B

NOTE: DESIGN AND DRAWING BASED ON THE MARYLAND COORDINATE SYSTEM HORIZONTAL - NAD 83/91, VERTICAL - NAVD 88

**Tesseract**  
Tesseract Sites, Inc.  
401 Washington Ave, Suite 303  
Towson, Maryland, 21284  
p. 410-321-7600  
f. 410-321-7601

**Landscape Plan**  
**Munro Property**  
Howard County, Maryland

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

DATE: 9 & 50  
SCALE: 12  
JOB: RR-DEO  
LABORER: 3704/323  
DEVELOPER: 3835/76  
DATE: N/A  
SHEET: 5TH  
SHEET COUNT: 3 OF 3

**OWNER/DEVELOPER:**  
DONALD MUNRO  
3914 HUNTINGTON ST. NW  
WASHINGTON DC 20015-1914  
PHONE: 202-879-3922

**ENGINEER:**  
JEFFREY L. SCHWAB PE  
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PHONE: 410-321-7600

Date: 10/10/14  
Proj. #: 12013  
Scale: AS SHOWN

**3 of 9**

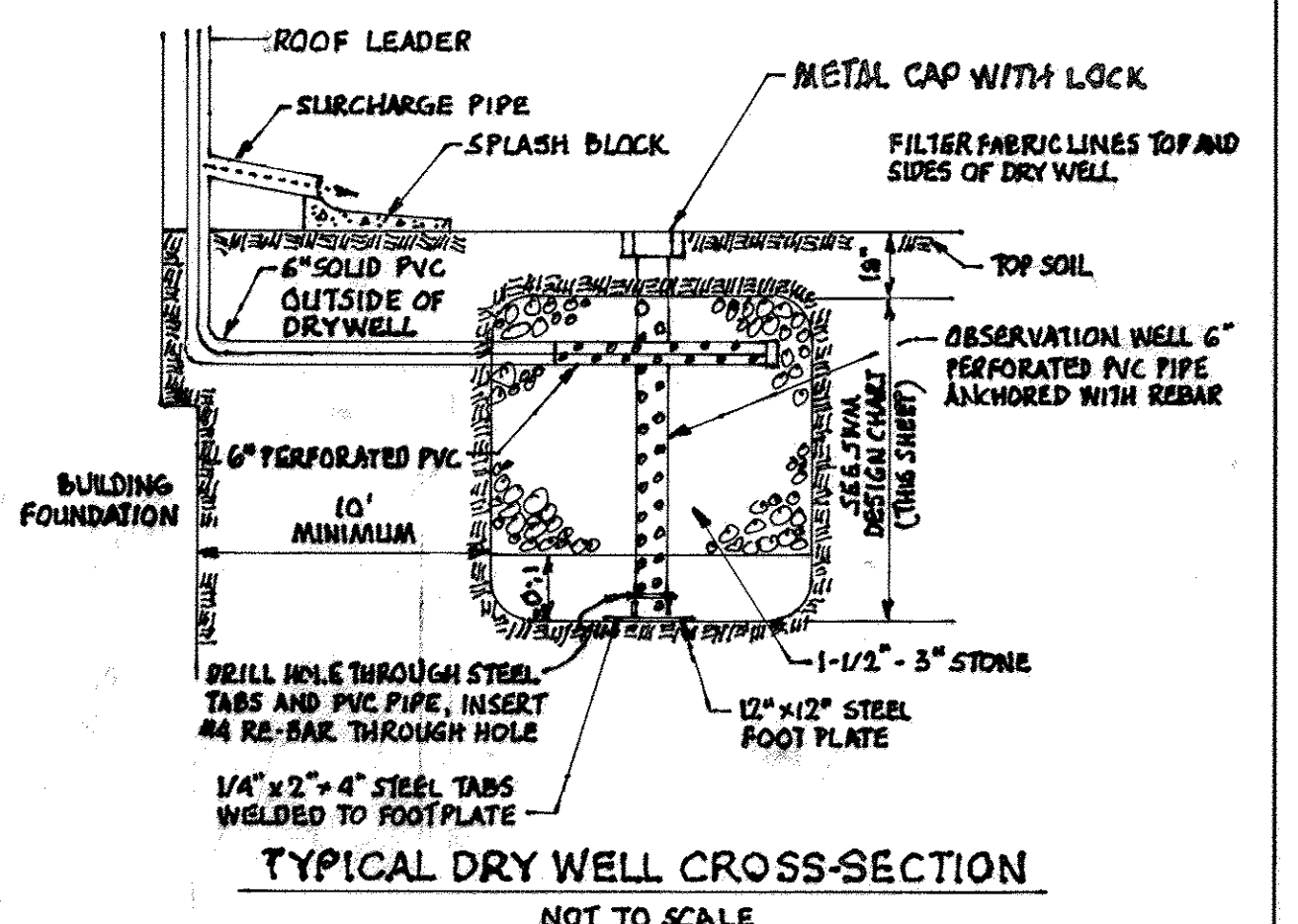
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**LEGEND**

- EXISTING**
- Boundary
  - Streams
  - Contours
  - Tree Lines
  - Buildings
  - Road Edge
  - Steep Slopes ≥ 25%
  - Steep Slopes 15 - 25%
  - Specimen Tree
  - Specimen Tree To Be Removed
  - Wetland
  - Wetland Buffer
- PROPOSED**
- Contours
  - House
  - Road Edge
  - Sepic Reserve Area
  - Limit of Disturbance
  - Storm drain
  - Pervious Concrete
  - Spot Elevation
  - Super Silt Fence
  - Super Fence Diversion
  - Stabilized Construction Entrance w/ Mountable Berm
  - Super Silt Fence Inlet Protection
  - DRYWELL (M-5)**



**SWM DESIGN CHART**

NO.	VOLUME REQ'D	VOLUME PROVIDED	SIZE OF DRY WELL
DW 1	55.5 CF	105 CF	7.5' x 7.0' x 5.0' DP
DW 2	55.5 CF	105 CF	7.5' x 7.0' x 5.0' DP
DW 3	55.5 CF	105 CF	7.5' x 7.0' x 5.0' DP
DW 4	55.5 CF	105 CF	7.5' x 7.0' x 5.0' DP

NOTE: PRACTICE M-5 DRY WELL

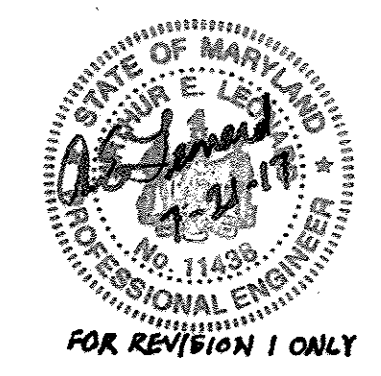
**STORMWATER DESIGN SUMMARY**

ESDv Required	2505cf
ESDv Provided	3237cf
Recharge Required	7862 cf
Recharge Provided*	7661 cf
N-2 Non Rooftop Disconnections	487 cf
A-2 Pervious Concrete Paving	347 cf
M-1 Rainwater Harvesting	51 cf
M-6 Micro Bio Retention	2352 cf
Total	3237cf
LOD	1.97 acres
Proposed Impervious Area	0.65 acres
Pe	1.0"
Soils	Type B

**FACILITY SUMMARY**

Facility	TC	DA	ESDv req	Pe req	AI Req	AI Prov	Max Storage Allowed	Temp Storage req	Temp Storage Prov
Mic Bio Ret #1	0.1	0.23ac	344cf	1.0"	300	480	280 CF	356 CF	244 CF
Mic Bio Ret #2	0.1	0.75ac	819cf	1.0"	654	686	2126 CF	614 CF	993 CF
Mic Bio Ret #3	0.1	0.77ac	457 CF	1.0"	675	678	1381 CF	398 CF	428 CF
Pervio us Conc.	0.1	0.06ac	134 CF	1.0"	n/a	n/a	347 CF	347 CF	347 CF

\* recharge for site provided by disconnecting 6321 sf of paving and by providing 1340 sf of pervious concrete paving which infiltrates into the ground  
 # pervious paving designed with a 12" storage subbase meets the target rca in accordance with Table 5.7 in Supplement #1 of the MDE Manual. Provide additional storage for run on in 3" of additional stone to the maximum allowed.



NO.	REVISIONS DESCRIPTION	DATE
1	REVISE SWM LOT 1 AND DETAIL	7-21-17

**Tesseract**  
 TESSERACT SITES, INC  
 Jeffrey Schwab  
 401 Washington Ave. Suite 303  
 Towson, Maryland, 21284  
 P. 410.321.7600  
 F. 410.321.7601

**Stormwater Management Drainage Area Map Munro Property**  
 Howard County, Maryland

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

LOT/PARCEL	AREA	PERCENT	PERCENT	PERCENT
9 & 50	3704/323	3835/76	N/A	
12	RR-DEO	45	5TH	

Date: 10/10/14  
 Proj. #: 10020  
 Scale: 1" = 100'  
**4 of 9**  
 DESIGN: DRAWN: MAS CHKD: XXX

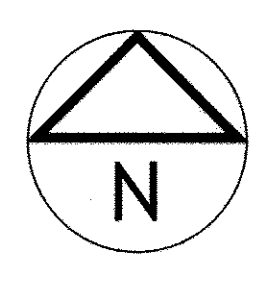
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING  
 Chief, Development Engineering Division  
 Chief, Division of Land Development  
 11-10-14  
 11-10-14

**SPECIMEN TREES NOTE:**  
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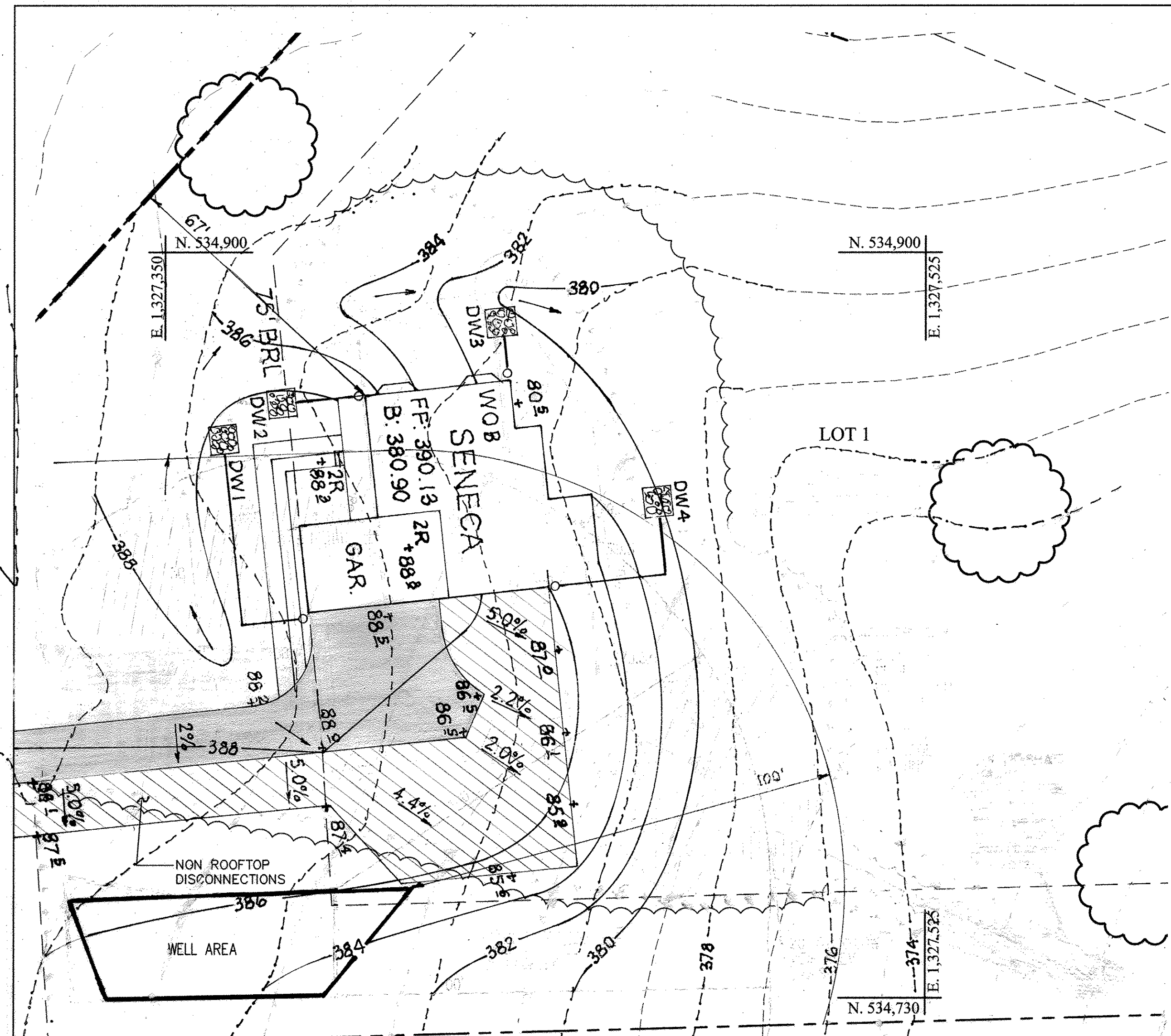
**OWNER/DEVELOPER:**  
 DONALD MUNRO  
 3914 HUNTINGTON ST. NW  
 WASHINGTON DC 20015-1914  
 PHONE: 202-879-3922

**ENGINEER:**  
 JEFFREY L. SCHWAB PE  
 TESSERACT SITES, INC.  
 401 WASHINGTON AVE, SUITE 303  
 TOWSON, MD 21204  
 PHONE: 410-321-7600



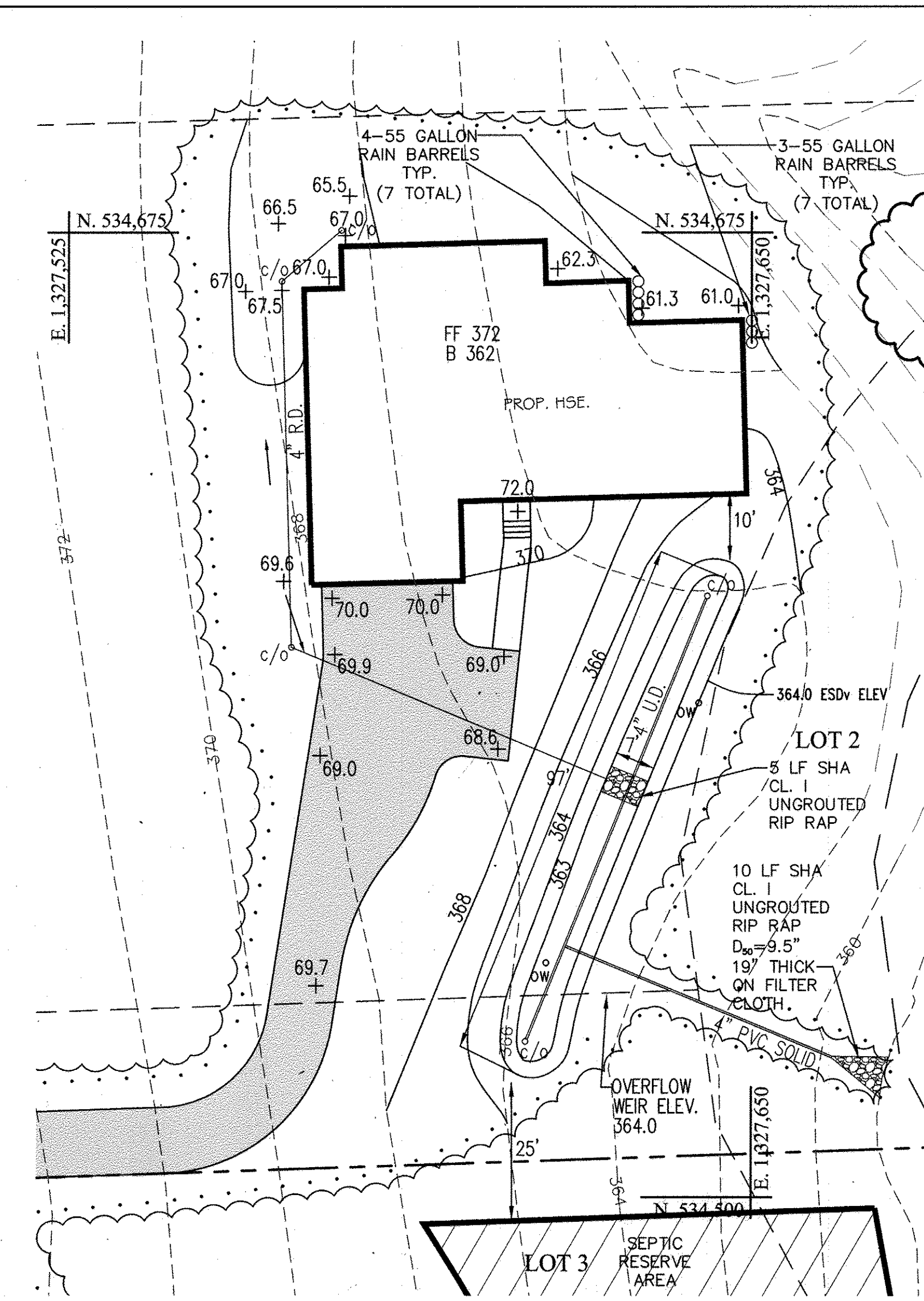
Rocky Gorge Reservoir





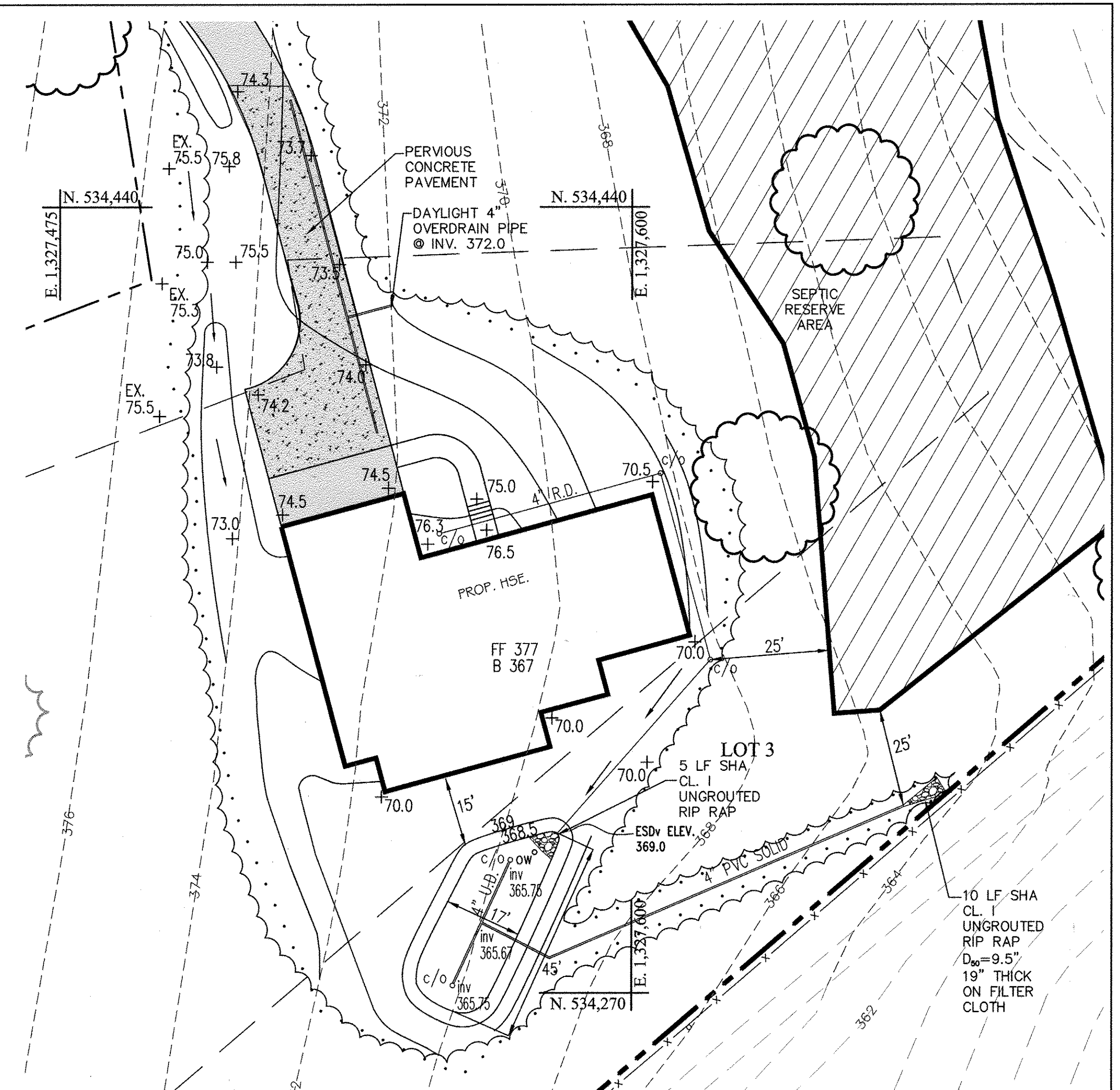
**LOT 1 DRYWELL & NON-ROOFTOP DISCONNECT DETAIL**

SCALE: 1"=20' NOTE: FOR DRYWELL DETAIL, SEE SHEET 4 OF 9



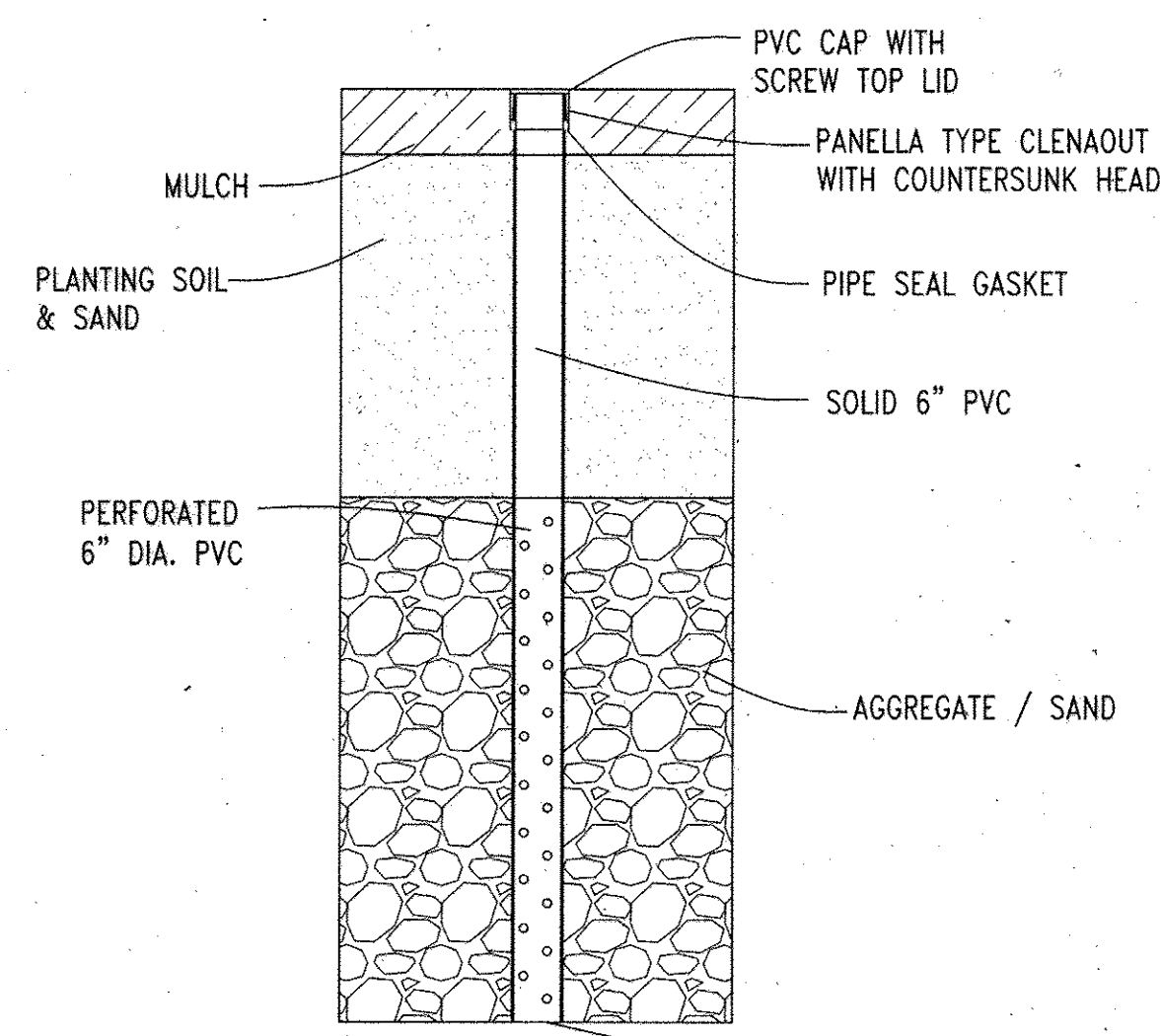
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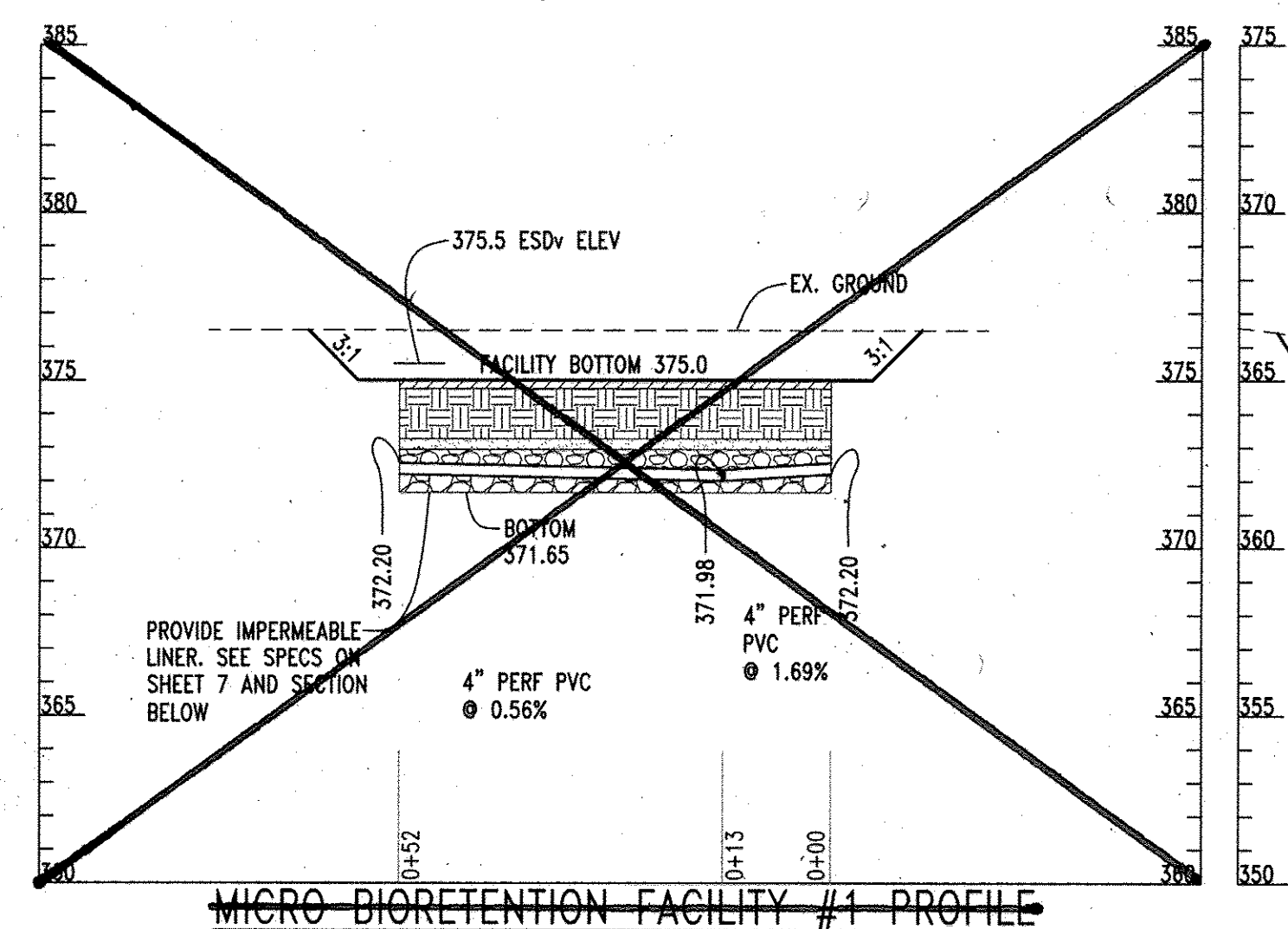


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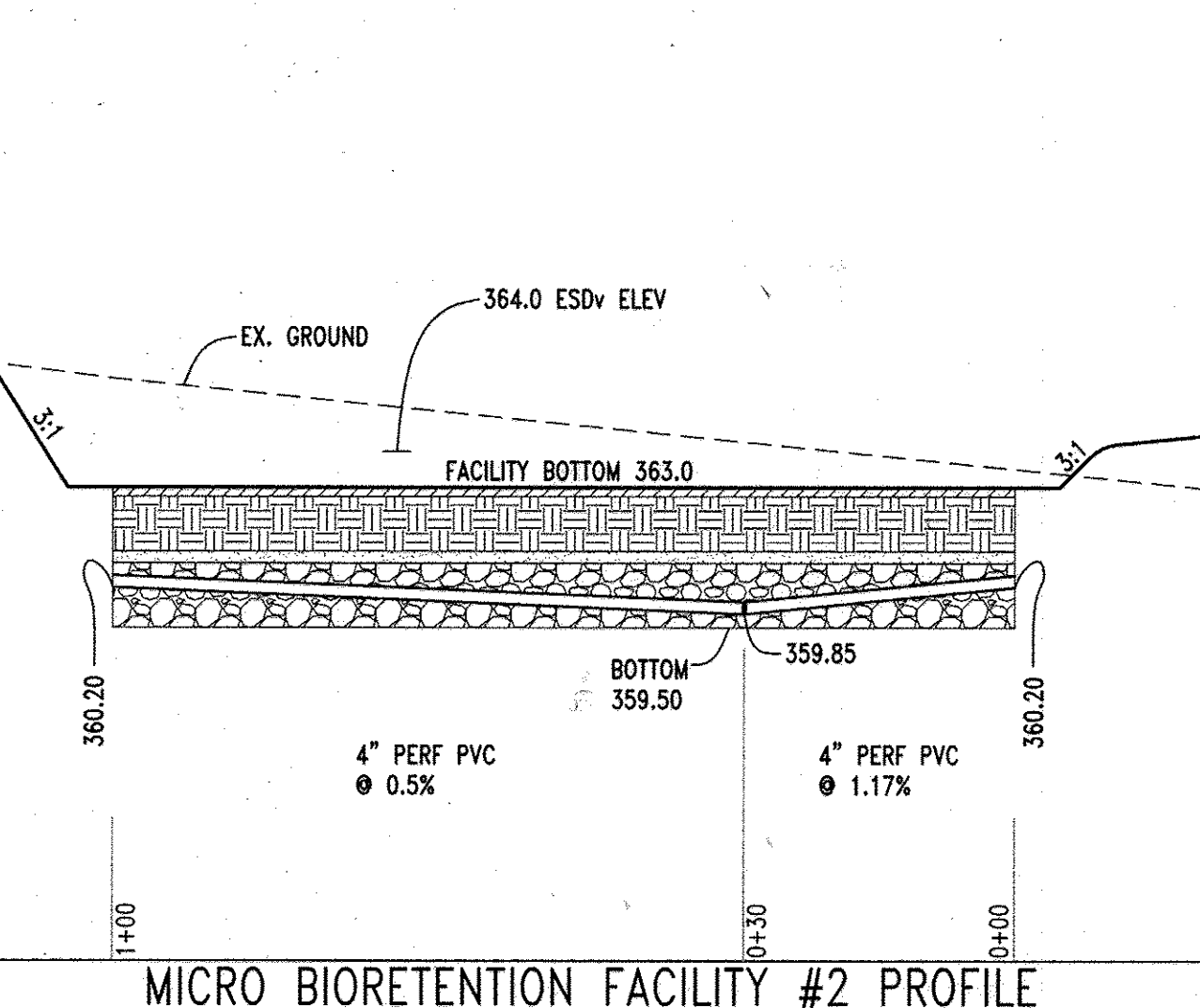
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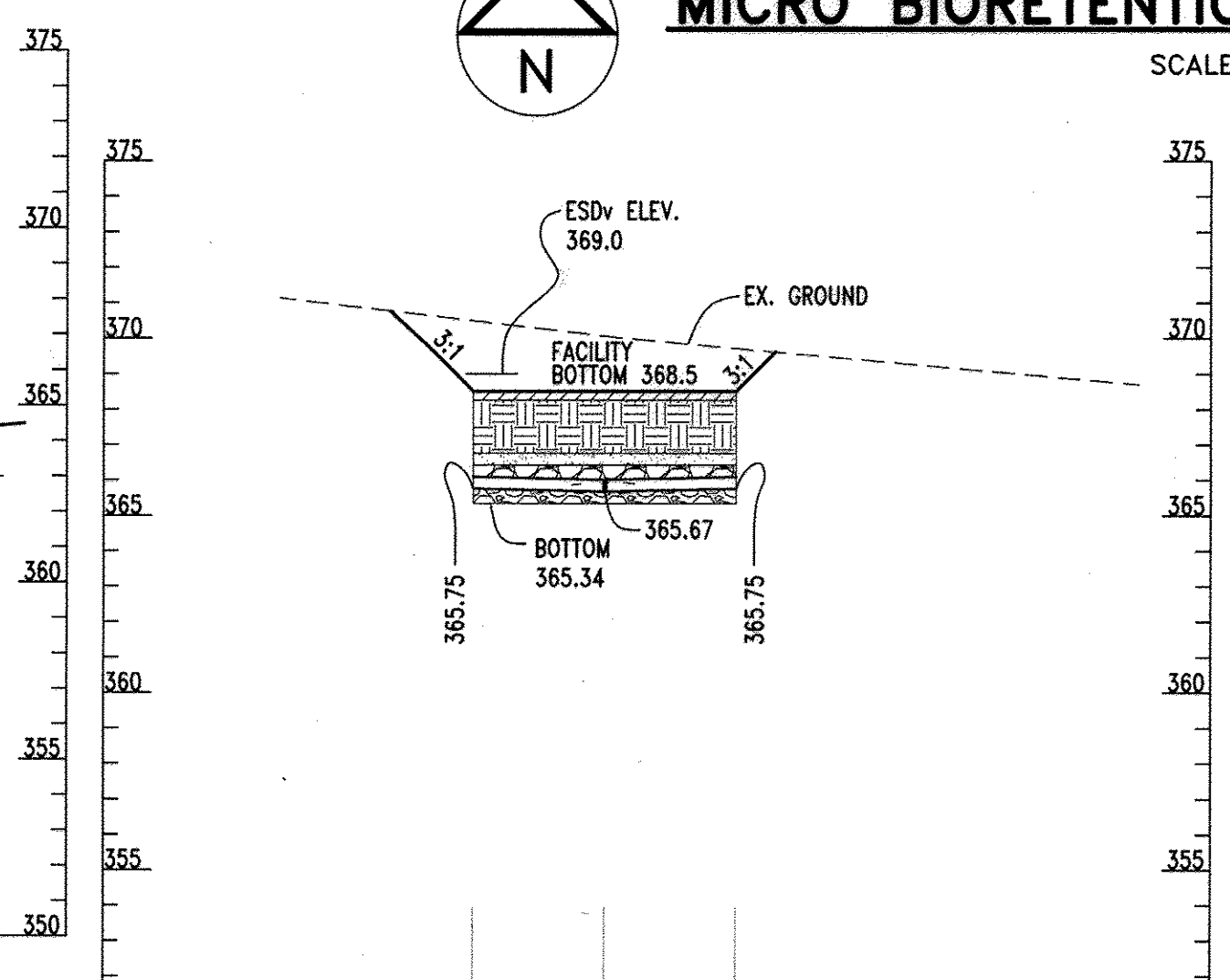
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NOT TO SCALE



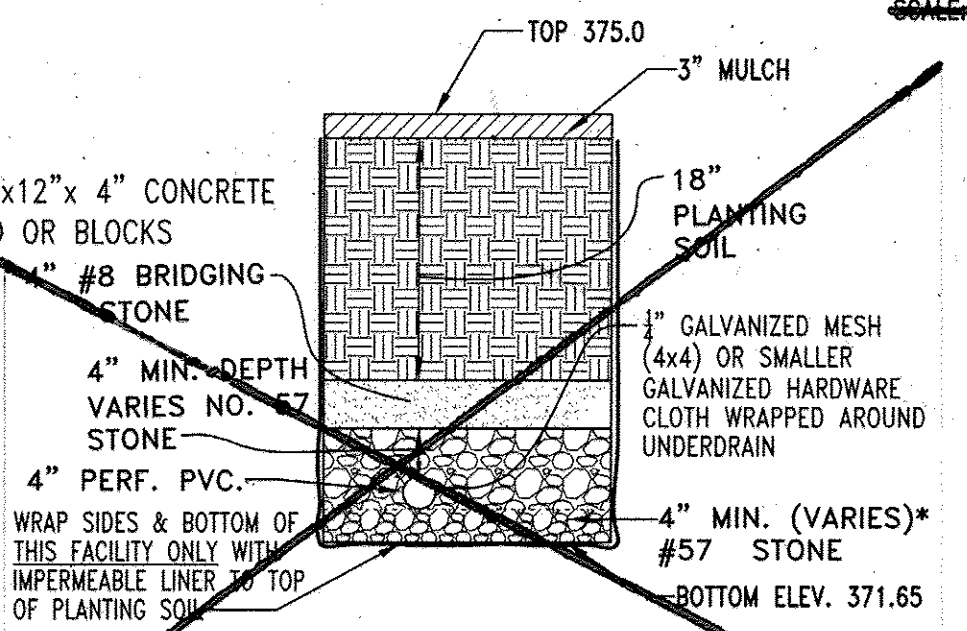
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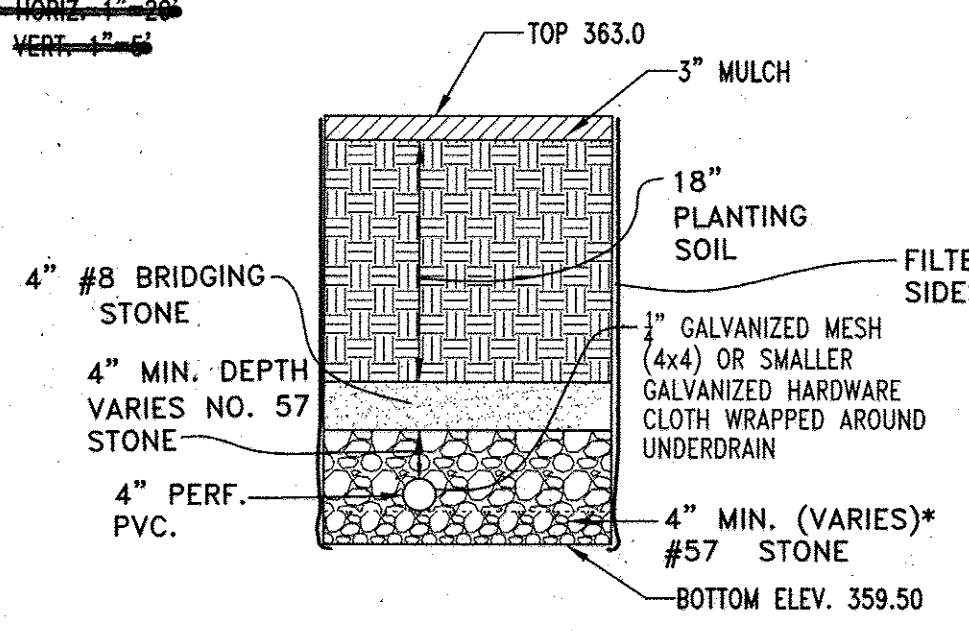
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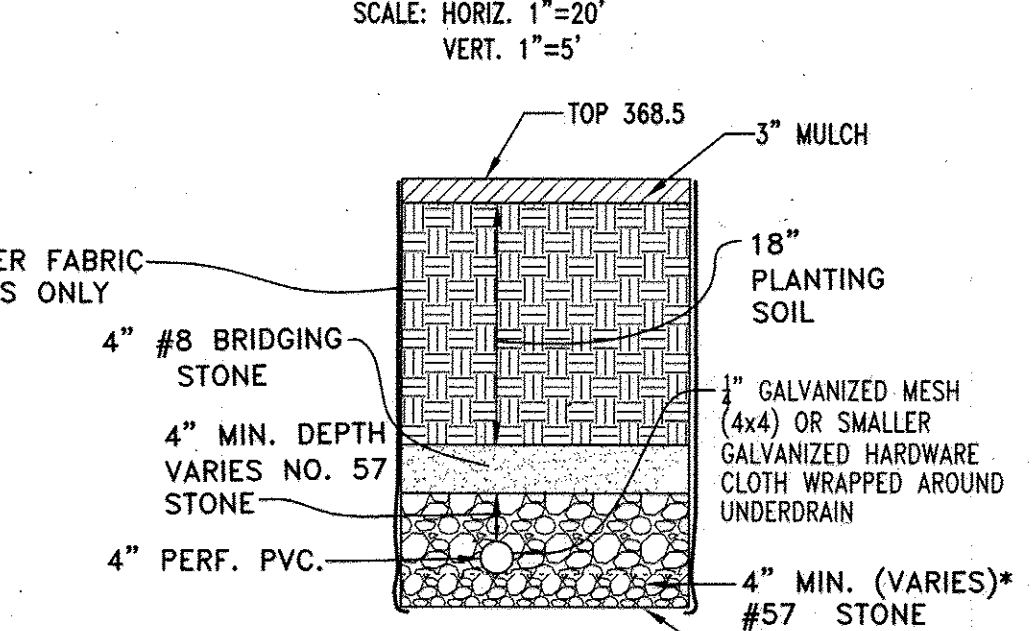
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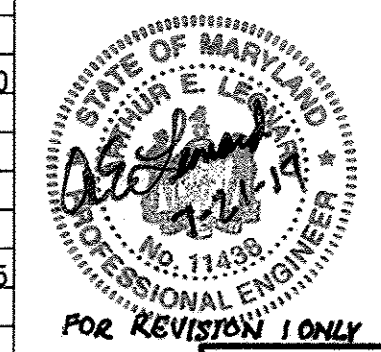
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SCALE: 1" = 2' \* HOLD BOTTOM LEVEL STONE ABOVE & BELOW PIPE VARIES



**TYPICAL SECTION MICRO BIORETENTION #2**  
SCALE: 1" = 2' \* HOLD BOTTOM LEVEL STONE ABOVE & BELOW PIPE VARIES



**TYPICAL SECTION MICRO BIORETENTION #3**  
SCALE: 1" = 2' \* HOLD BOTTOM LEVEL STONE ABOVE & BELOW PIPE VARIES



NO.	REVISIONS	DATE
1	REMOVE MICROBIORETENTION #1 & ADD LOT 1 DRYWELL & NON-ROOFTOP DISCONNECT DETAIL	7-21-17

**Tesseract**  
 Jeffrey Schwab  
 401 Washington Ave, Suite 303  
 Towson, Maryland, 21204  
 P. 410.321.7600  
 F. 410.321.7601

**Stormwater Management Plan & Specifications**  
**Munro Property**  
 Howard County, Maryland

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

LOT/ROW	LINE/POLE	PLAT
9 & 50	3704/323	3835/76
12	RR-DEO	45

Professional Engineer seal for Jeffrey L. Schwab, State of Maryland, License No. 11439.

**OWNER/DEVELOPER:**  
 DONALD MUNRO  
 3914 HUNTINGTON ST. NW  
 WASHINGTON DC 20015-1914  
 PHONE: 202-879-3922

**ENGINEER:**  
 JEFFREY L. SCHWAB PE  
 TESSERACT SITES, INC.  
 401 WASHINGTON AVE, SUITE 303  
 TOWSON, MD 21204  
 PHONE: 410-321-7600

Date: 10/10/14  
 Proj. #: 10020  
 Scale: 1" = 20'

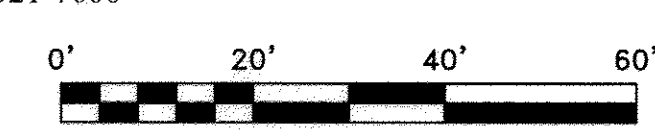
**5 of 9**

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING  
 Chief, Development Engineering Division  
 DATE: 11-10-14

Chief, Division of Land Development  
 DATE: 11-10-14

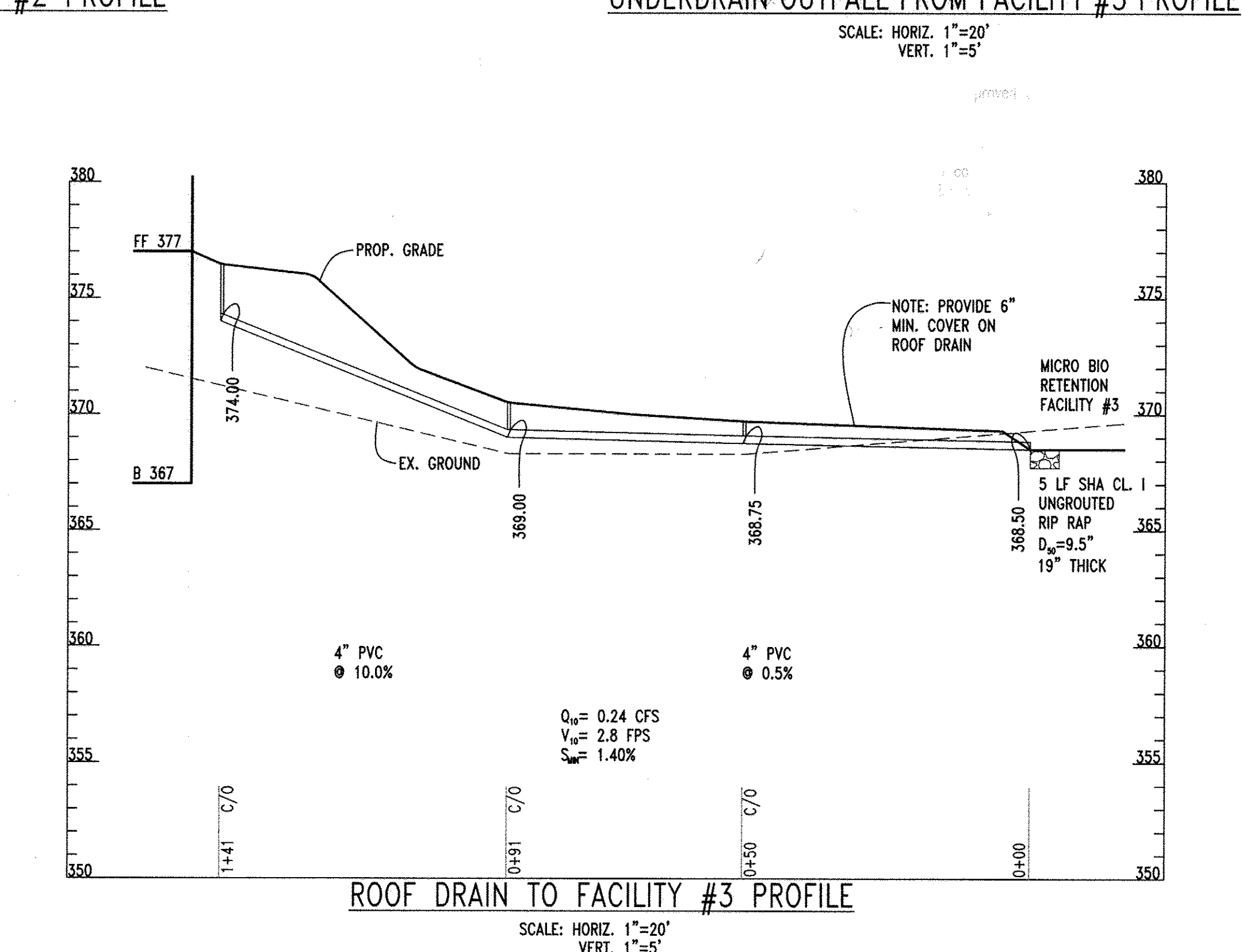
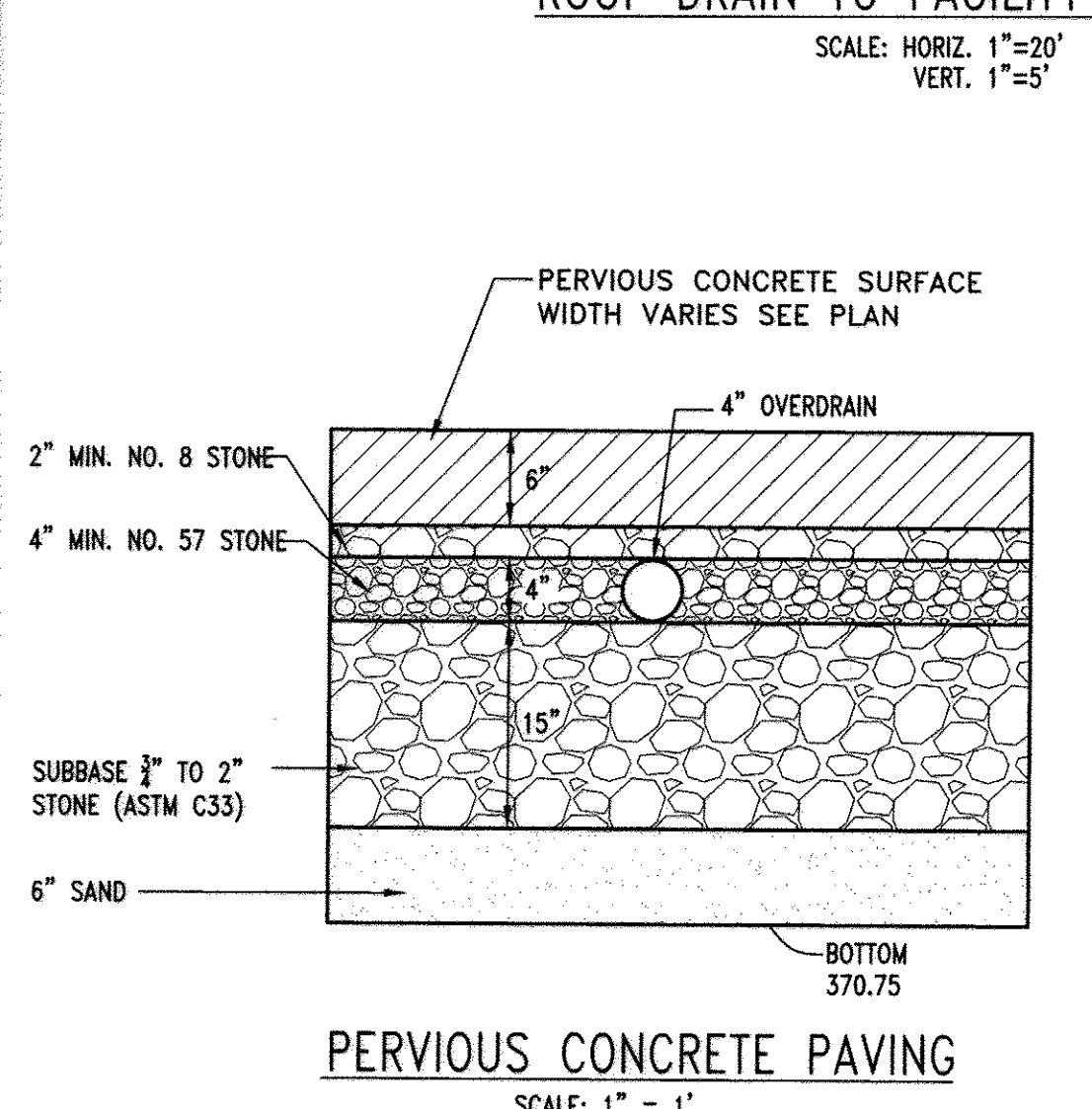
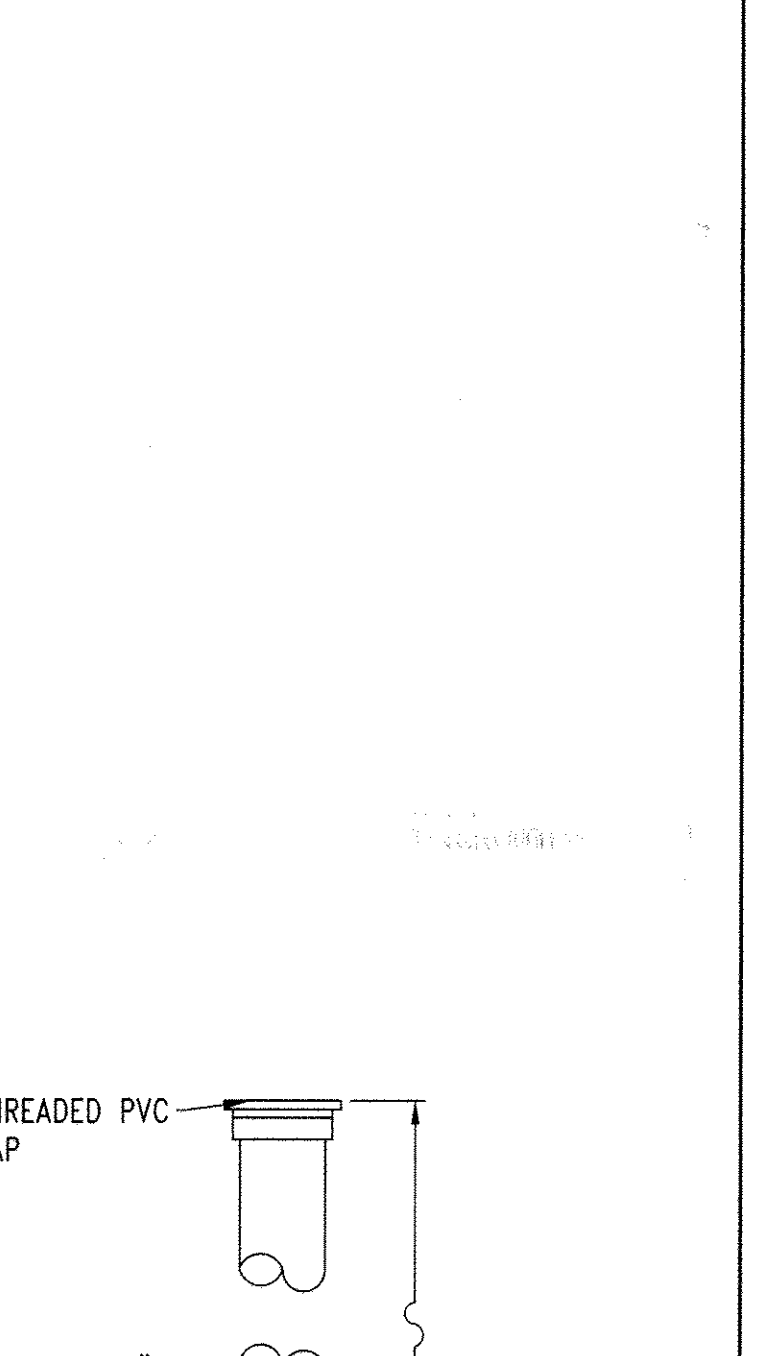
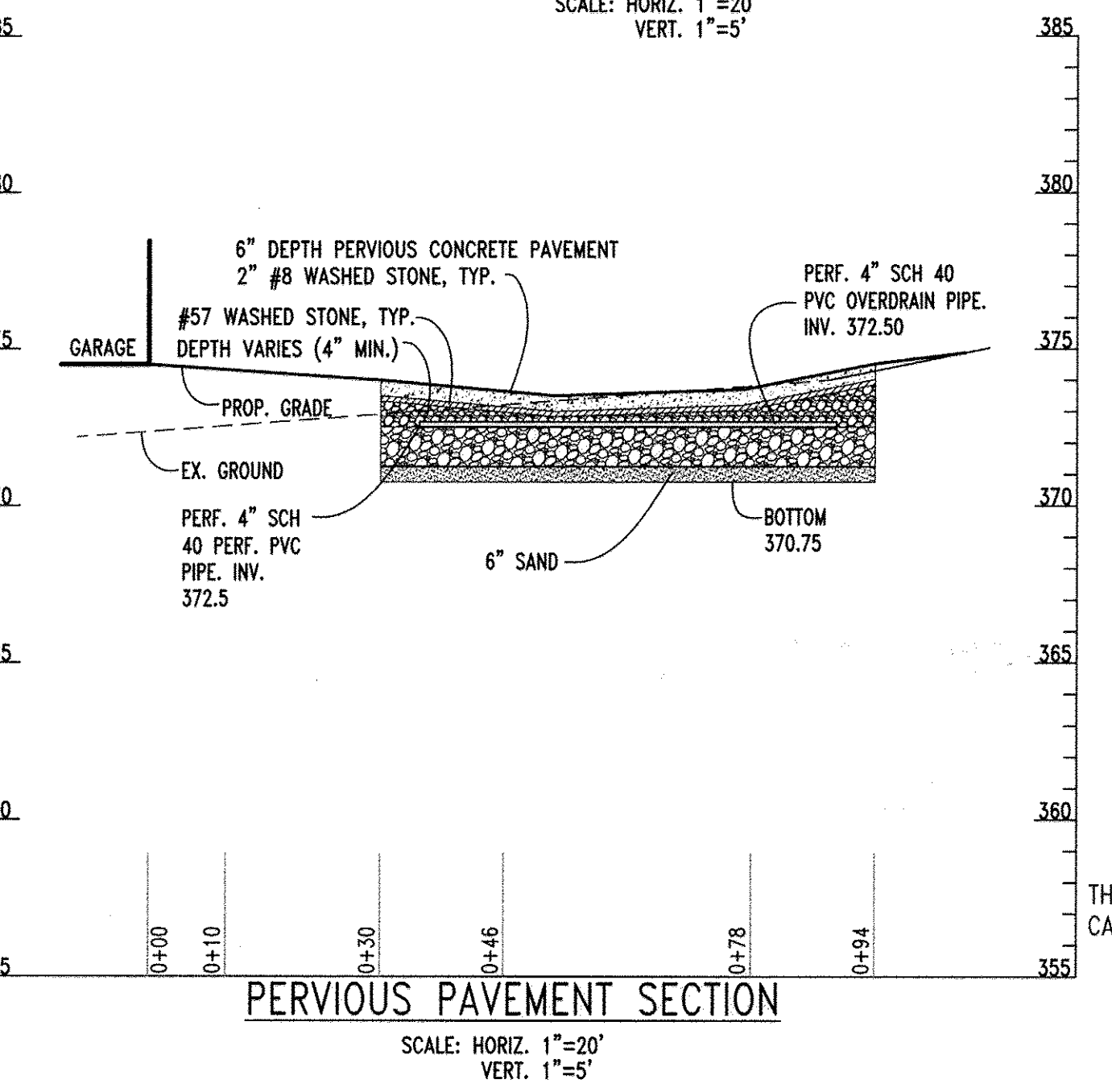
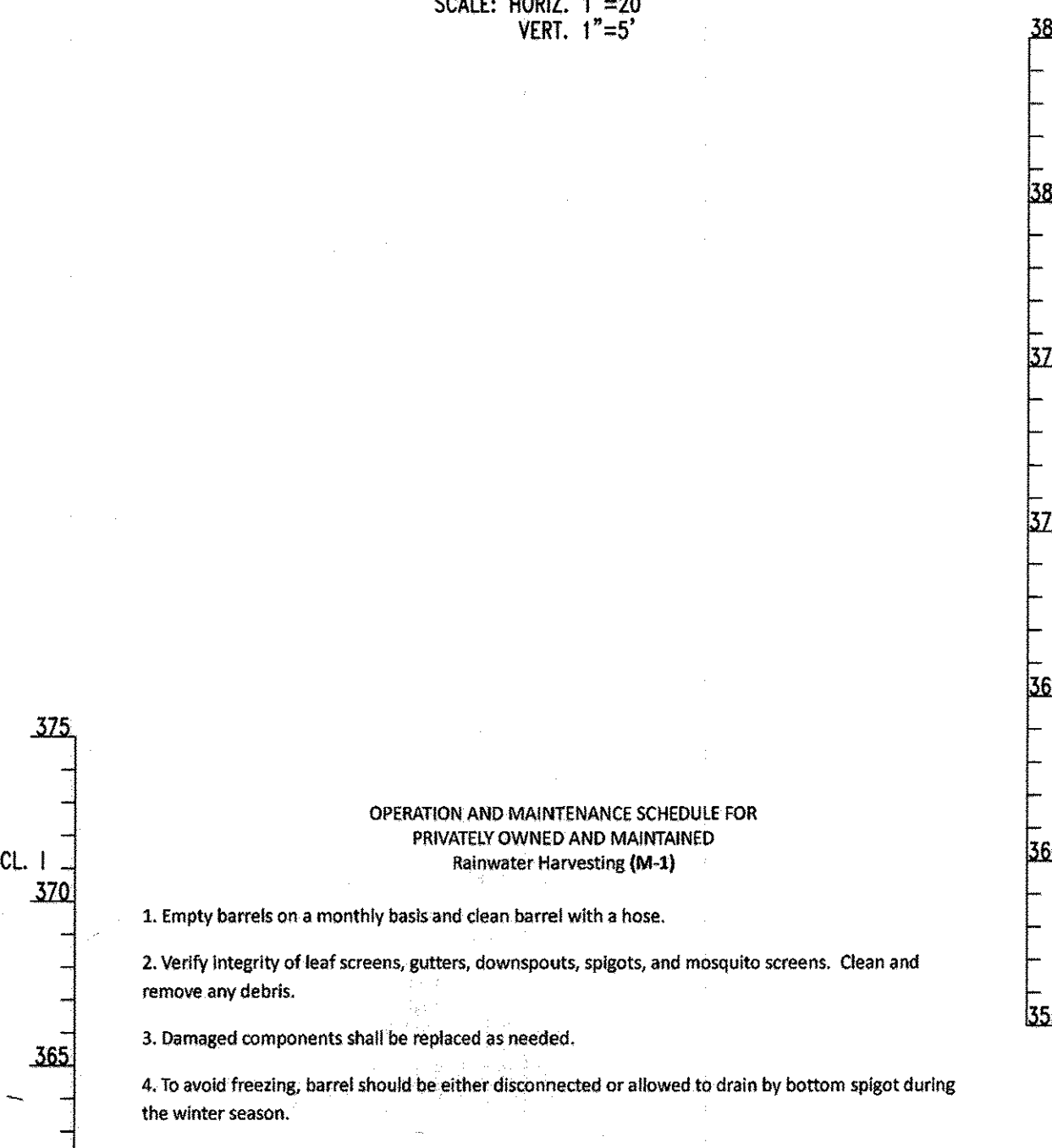
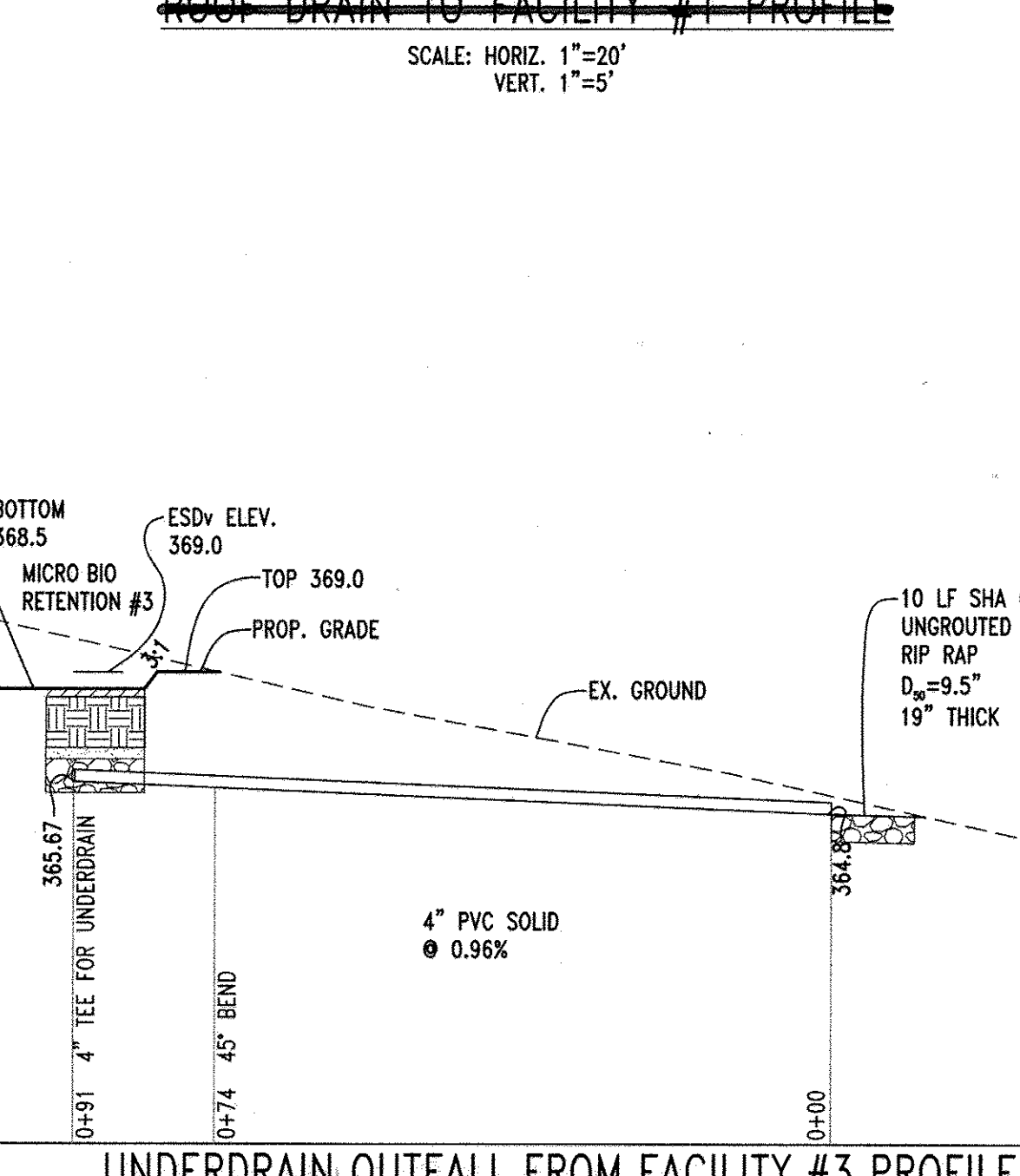
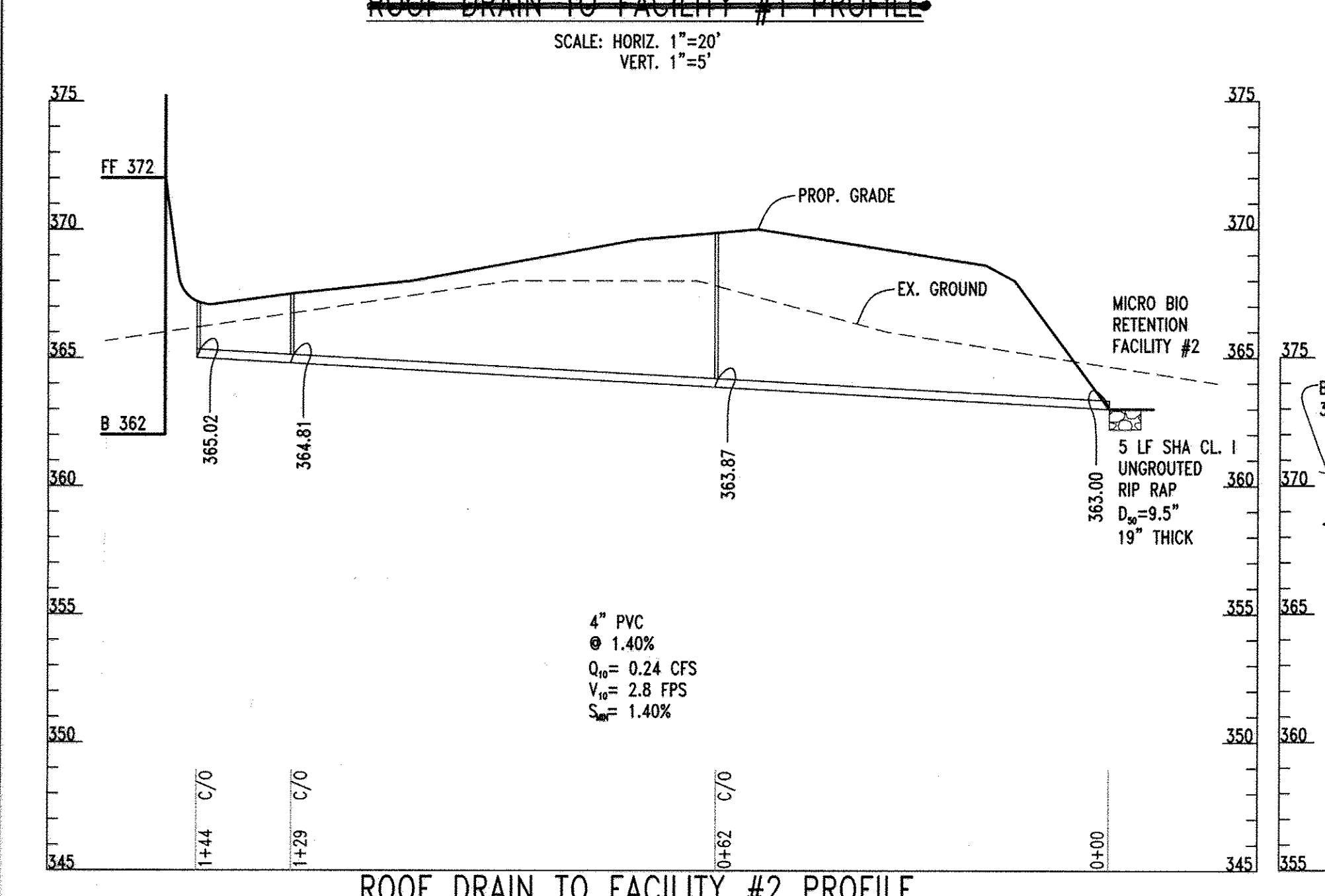
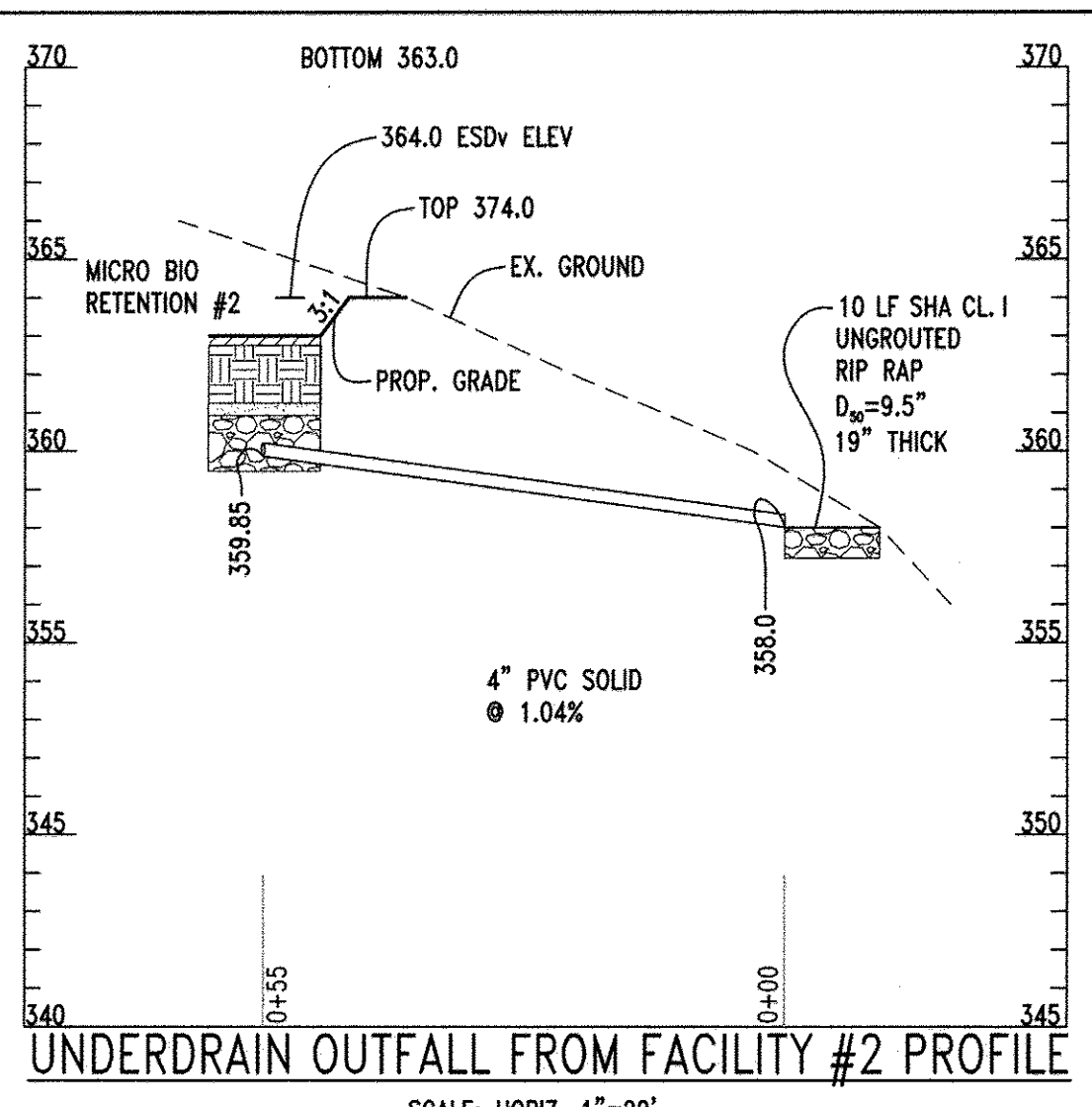
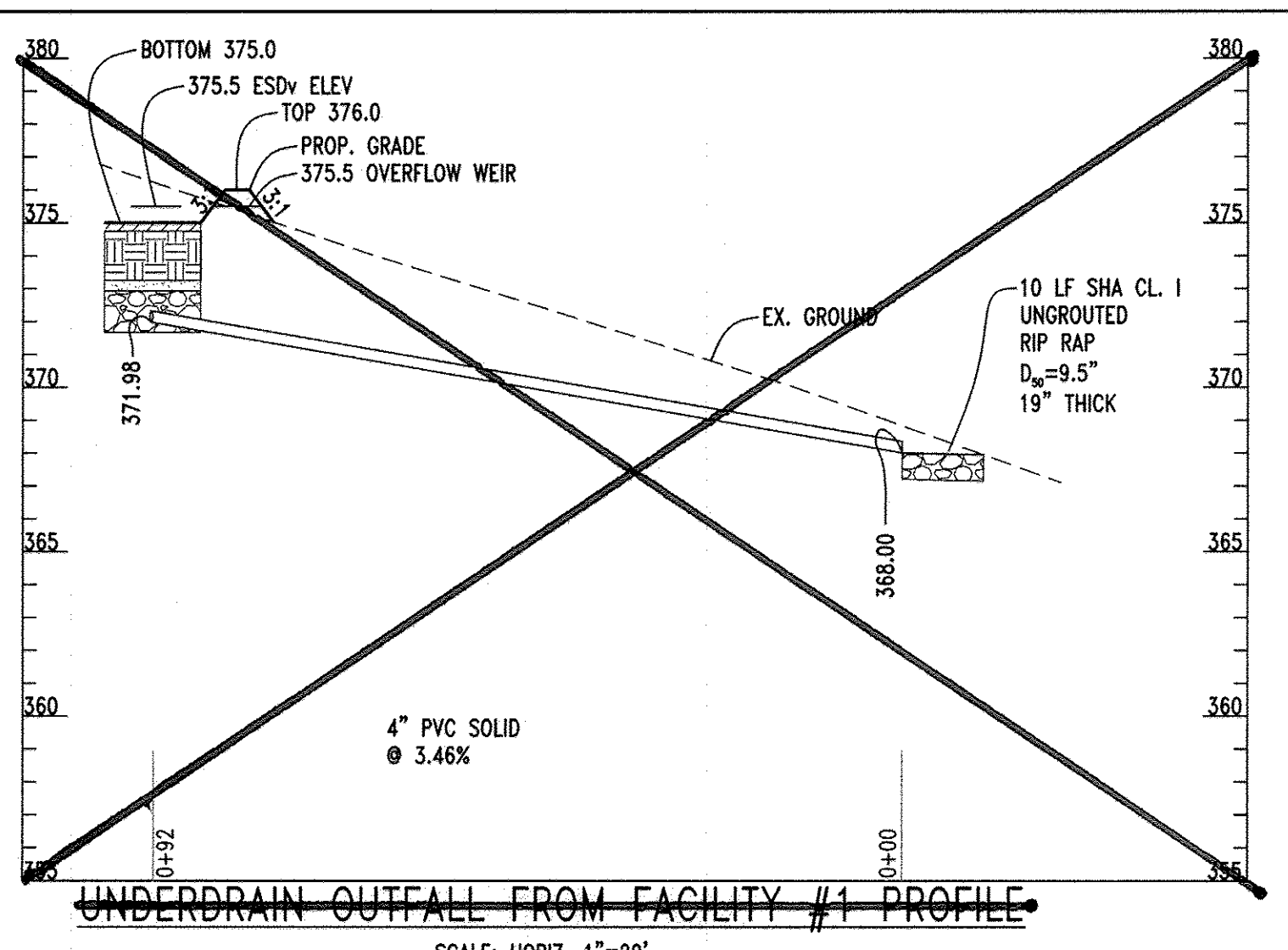
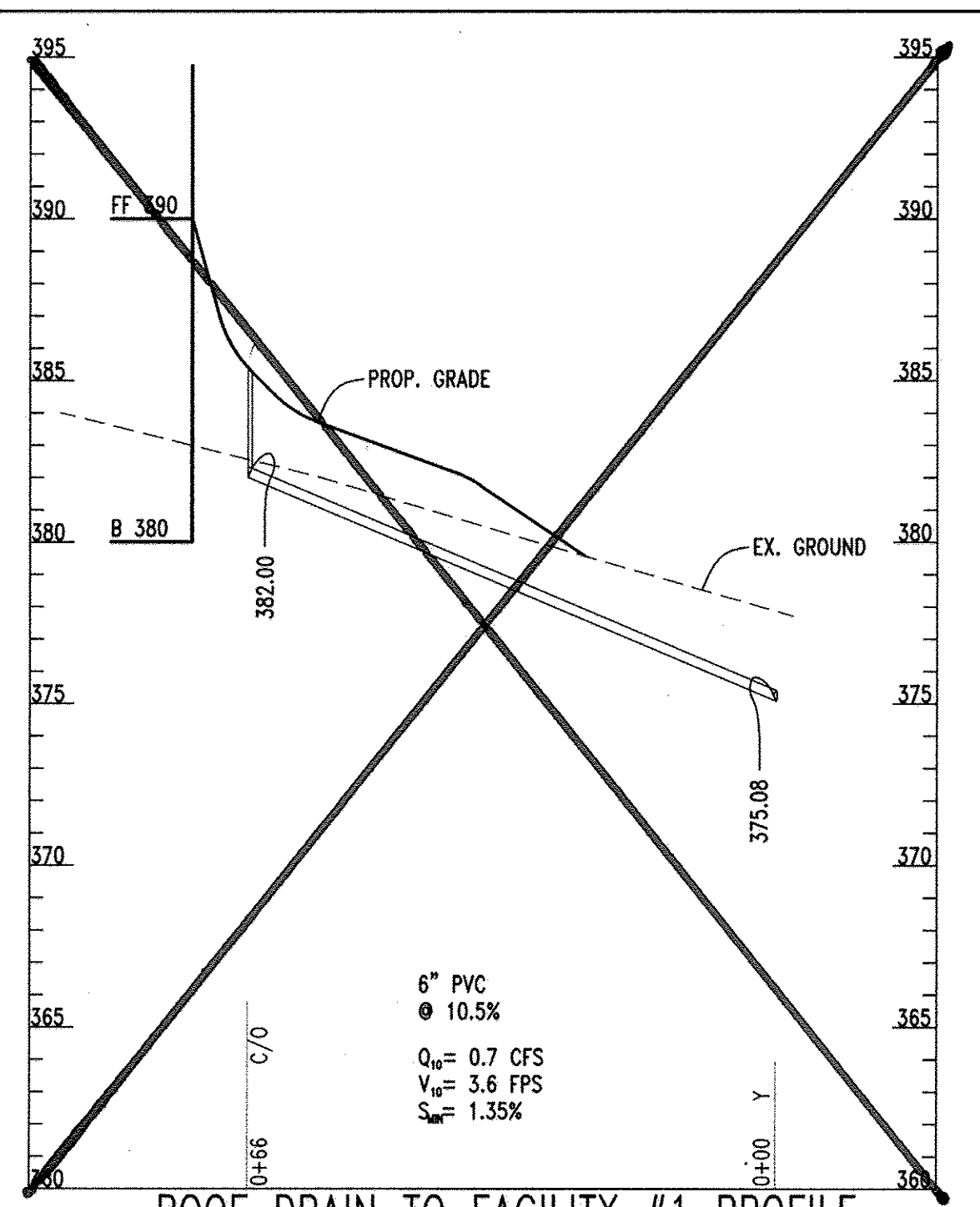
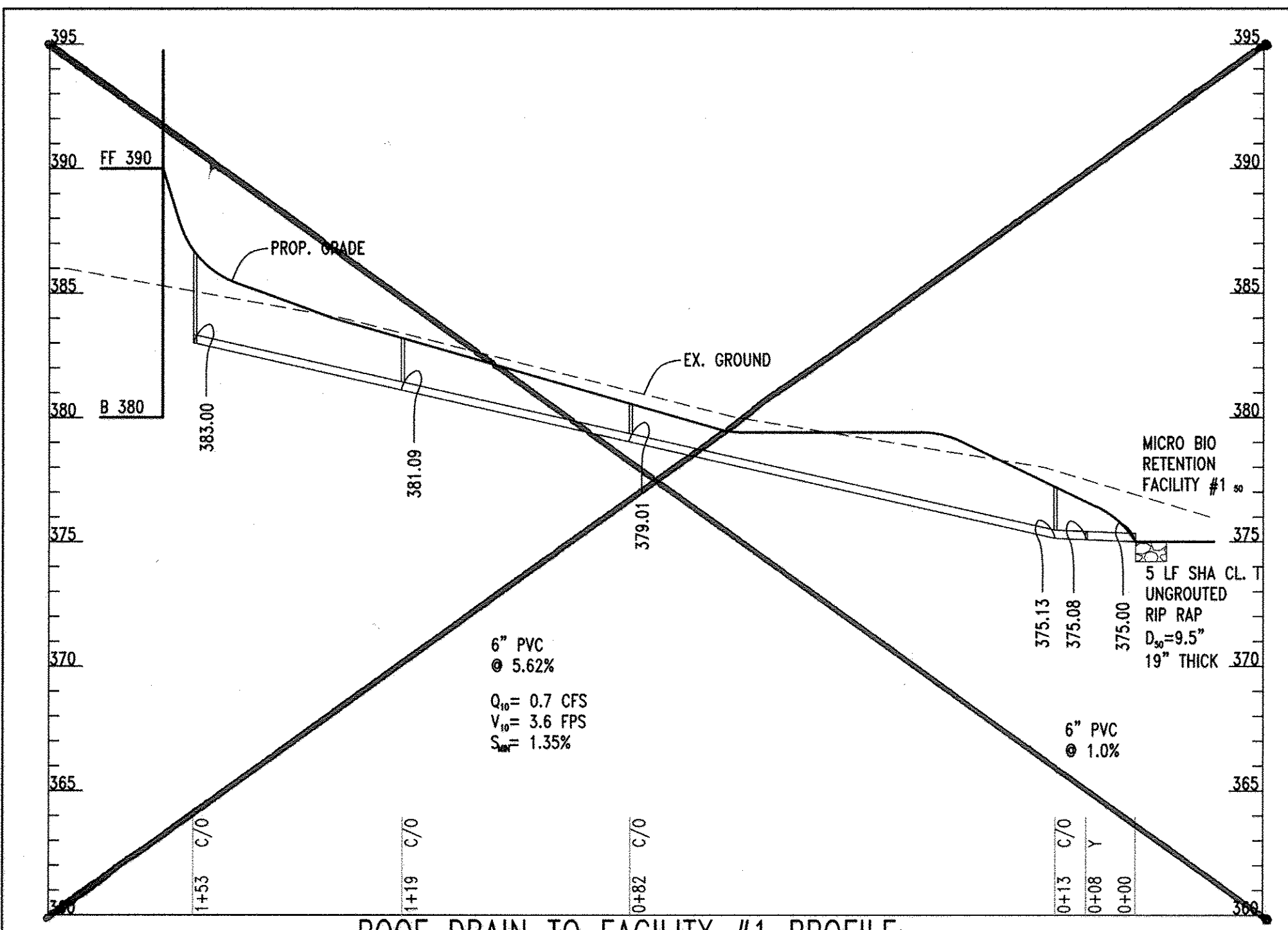
OWNER/DEVELOPER:  
 DONALD MUNRO  
 3914 HUNTINGTON ST. NW  
 WASHINGTON DC 20015-1914  
 PHONE: 202-879-3922

ENGINEER:  
 JEFFREY L. SCHWAB PE  
 TESSERACT SITES, INC.  
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 TOWSON, MD 21204  
 PHONE: 410-321-7600





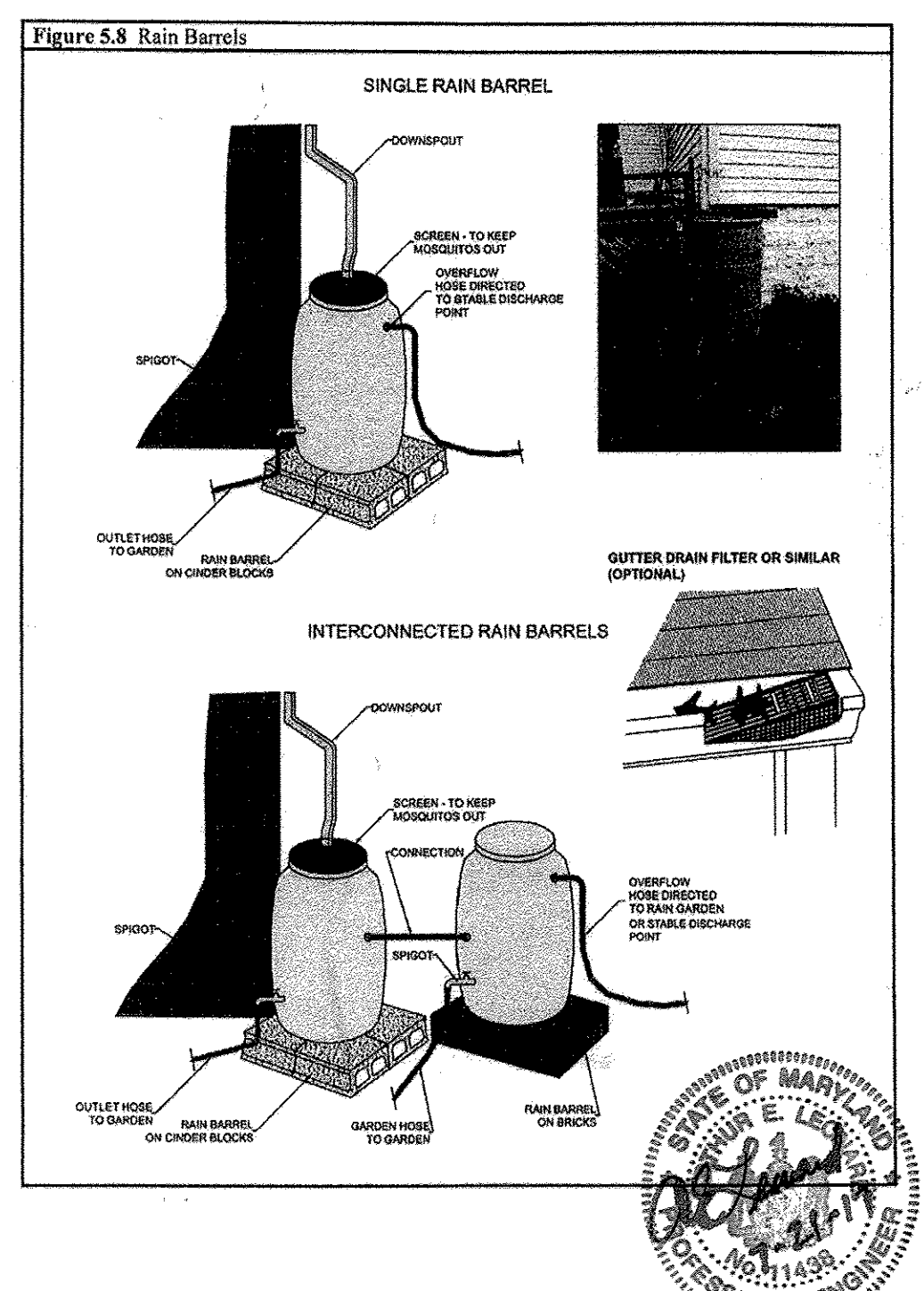
REVISIONS		
NO.	DESCRIPTION	DATE
1	REMOVE MICROBIORETENTION #1	7-21-17



- OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED Rainwater Harvesting (M-1)
1. Empty barrels on a monthly basis and clean barrel with a hose.
  2. Verify integrity of leaf screens, gutters, downspouts, spigots, and mosquito screens. Clean and remove any debris.
  3. Damaged components shall be replaced as needed.
  4. To avoid freezing, barrel should be either disconnected or allowed to drain by bottom spigot during the winter season.

- OPERATION AND MAINTENANCE SCHEDULE FOR LANDSCAPE INFILTRATION (M-3) MICRO-BIORETENTION (M-6), RAIN GARDENS (M-7), BIORETENTION SWALE (M-8), ENHANCED FILTERS (M-9)
1. Annual maintenance of plant material, mulch layer and soil layer is required. Maintenance of mulch and soil is limited to correcting areas of erosion or wash out. Any mulch replacement shall be done in the spring. Plant material shall be checked for disease and insect infestation and maintenance will address dead material and pruning. Acceptable replacement plant material is limited to the following: 2000 Maryland Stormwater Design Manual Volume II, Table A.4.1 and 2.
  2. Schedule of plant inspection will be twice a year in spring and fall. This inspection will include removal of dead and diseased vegetation considered beyond treatment, treatment of all diseased trees and shrubs and replacement of all deficient stakes and wires.
  3. Mulch shall be inspected each spring. Remove previous mulch layer before applying new layer once every 2 to 3 years.
  4. Soil erosion to be addressed on an as needed basis, with a minimum of once per month and after heavy storm events.

- OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED PERMEABLE PAVEMENT (A-2)
1. Pavement surfaces should be swept and vacuumed (if porous concrete) to reduce sediment accumulation and ensure continued surface porosity. Sweeping should be performed at least twice annually with a commercial cleaning unit. Washing or compressed air units should not be used to perform surface cleaning.
  2. Drainage pipes, inlets, stone edge drains and other structures within or draining to the subsurface should be cleaned out at regular intervals.
  3. Deicers should be used in moderation. Deicers should be non-toxic and be applied either as calcium magnesium acetate or as pretreated salt. Snow plowing should be done carefully with blades set one-inch above the surface. Plowed snow piles and snowmelt should not be directed to permeable pavement.
- a. Maintenance of areas receiving disconnected runoff is generally no different than that required for other lawn or landscaped areas. The Owner shall ensure the areas receiving runoff are protected from future compaction or development of impervious area. In commercial areas, foot traffic should be discouraged as well.



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APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING  
11-10-14  
CHIEF, DEVELOPMENT ENGINEERING DIVISION  
11/10/14  
CHIEF, DIVISION OF LAND DEVELOPMENT

**Tesseract**  
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**Stormwater Management Profiles & Details Munro Property**  
Howard County, Maryland

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

DATE: 12	ZONE: RR-DEO	MAX. ZONE MAP: 45	ELECTRODISTRICT: 5TH	CONTRIB. TRACT: N/A
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DATE: 10/10/14  
Proj. #: 10020  
Scale: N/A

**6 of 9**

DESIGN: DRAWN: MAS CHKD: XXX



# CONSTRUCTION SPECIFICATIONS

1. SCOPE: This specification describes the requirements for construction of pervious concrete pavement. All requirements of the Howard County Design Manual Volume IV Standard Specifications for Construction and Materials (HoCo) and the Maryland State Highway Administration Standard Specifications for Construction and Materials (MSHA), latest edition, shall apply as modified herein. See Project Specifications for additional information.

2. SUBMITTALS
- A. As required by HoCo and MSHA and noted herein.
  - B. Contractor Qualifications, related to construction of pervious concrete pavement.
  - C. Concrete Manufacturer's qualifications, related to manufacture of pervious concrete product.
  - D. Design Mixture (proportions and density), for pervious concrete pavement.
  - E. Operation and Maintenance Data: For pervious concrete pavement.
  - F. Materials certificates: For cementitious materials and Admixtures.
  - G. Materials test reports:
    - 1) Provide separate reports for coarse and fine aggregates indicating type, source, grading, dry-rodged unit weight, and void content.
    - 2) Pervious concrete product, to verify compliance with specified performance criteria
  - H. Test panel results.
  - I. Joint plan; distinguish between different joints by color or labeling.
  - J. Field Quality Control Reports.

3. QUALITY ASSURANCE
- A. Pervious Concrete Contractor:
- 1) The installation crew shall have a minimum of two years of documented successful experience installing pervious concrete pavement for vehicular use, and
  - 2) The pervious concrete contractor shall submit evidence of a minimum of 2 successful pervious concrete projects for vehicular use, each greater than 1,000 sf. Submit project name, address, owner name and address and contact information.
  - 3) The installation crew shall have no less than one National Ready Mixed Concrete Association (NRMA) certified Pervious Concrete Craftsman, who shall be on site, supervising all concrete placement and finishing, or
  - 4) The crew shall have no less than three NRMA certified Pervious Concrete Installers, or
  - 5) The crew shall have no less than one NRMA certified Installer and three NRMA certified Pervious Concrete Technicians.
- B. Concrete Manufacturer: A firm experienced in successfully manufacturing ready-mix pervious concrete products. Manufacturer shall be certified according to NRMA's "Certification of Ready Mix Concrete Production Facilities," with a minimum of two years documented experience in providing pervious concrete products.
- C. Testing Agency: Personnel conducting field tests for pervious concrete shall be qualified, at a minimum, as NRMA certified Pervious Concrete Technician, or equivalent.
- D. Test Panel: Provide minimum 10' x 20' test panel, full depth including concrete, stone base, and required subgrade condition, using the mixture proportions, materials, and equipment proposed for the project. Panel shall demonstrate typical joints, finish, color, curing, and standard of workmanship. Test panel for quality requirements.
- 1) Test Fresh Density in accordance with ASTM 1888. Sample per ASTM 172.
    - a. Fresh density shall be ±5 lb/cu ft. of specified fresh density.
    - 2) Test Hardened Density in accordance with ASTM C140, paragraph 9.3. Core per ASTM C42.
    - 3) Test Thickness in accordance with ASTM C174, using the average from three cores.
      - a. Average compacted thickness shall not be more than 1/4 inch less than specified thickness, with no single core exceeding 1/2 inch less than specified thickness.
      - b. Average compacted thickness shall not be more than 1 1/2 greater than specified thickness.
- E. Preinstallation Conference: Conduct conference at project site a minimum of 2 weeks in advance of commencing pervious concrete installation and discuss issues relating to construction of pervious concrete, including but not limited to, materials, transport, placement, curing, and testing. At a minimum, the meeting shall include the design engineer, general contractor, the pervious concrete subcontractor, the pervious concrete foreman, the testing agency representative, the owner's representative.

4. PRODUCTS
- A. Subbase Materials: uniformly graded, ASTM #57, rounded or crushed, 3/4" to 2" Stone ASTM C-33, Sand ASTM C-33 or AASHTO M-6.
- B. Concrete Materials:
- 1) Aggregate:
    - a. ASTM D448 and ASTM C33, uniformly graded. Provide aggregate from a single source.
    - b. Single size coarse aggregate ASTM #8 or #67, rounded or crushed. There shall be little or no fine aggregate.
  - 2) Portland Cement: ASTM C 150, gray portland cement Type I or Type II. Cement may be supplemented with Fly Ash (per ASTM C 618), Ground Granulated Blast-Furnace Slag (per ASTM C989, Grade 100 or 120), or Silica Fume (per ASTM C1240).
  - 3) Admixtures: shall be in accordance with ASTM C494. Admixtures may be used to facilitate production and placement of pervious concrete upon approval of the Engineer.
  - 4) Water: Potable.
- C. Steel Reinforcement: shall not be used with pervious concrete.
- D. Joint Material: Isolation joint material shall comply with ASTM D994, D1751, or D1752. Expansion joint material shall comply with specifications for standard concrete materials.
- E. Curing Materials: Moisture retaining cover shall be clear or white opaque polyethylene film, 6 mil, ASTM C 171.
- F. Concrete Mixture: Select design mix in accordance with ACI 211.3 "Guide for Selecting Proportions for No-Slump Concrete." Mix shall meet the following criteria:
- 1) Density/Unit Weight (in place) 100-120 lb/cu ft.
  - 2) Portland Cement Content 600 lb/cu yd.
  - 3) Water/Cement Ratio 0.24-0.34 (by mass)
  - 4) Fine/Coarse Aggregate Ratio There shall be little to no fine aggregate.
  - 5) Void Ratio 15-35%
  - 6) Air entrainment shall be used to improve resistance to freeze/thaw.
  - 7) Hydration stabilizers are recommended.
- G. Concrete Mixing: Mixing and delivery time are very critical for pervious concrete materials. Begin mixing immediately after addition of cement to aggregate.

5. EXECUTION
- H. SUBGRADE: Examine the subgrade and verify its acceptability prior to proceeding with installation of subbase and pervious concrete pavement.
- 1) Subgrade shall comply with requirements for dimensional, grading, and elevation tolerances.
  - 2) Subgrade shall be compacted to MAXIMUM 95% Standard Proctor (90-92% Modified Proctor).
  - 3) Test subgrade permeability in accordance with ASTM D3385 prior to placing concrete. Subgrade shall meet minimum percolation rate of 1/2 inch per hour.
  - 4) Subgrade shall not be muddy, saturated, or frozen.
- B. SUBBASE
- 1) Install aggregate in maximum 6 inch lifts. Place stone in a manner that does not disturb or compact the soil bed. Material shall be deposited within thirty feet of its final placement location. Movement (pushing) of material more than thirty feet from the location where it is deposited will not be permitted. Lightly compact with equipment, minimizing equipment movement over aggregate. Install to grades indicated.
  - 2) Keep clean from soil and other contaminants.
- C. SETTING FORMWORK
- 1) Formwork for pervious concrete may vary from formwork for conventional concrete.
  - 2) Set, align, and brace forms so that the hardened concrete meets the tolerances specified. Install forms to allow continuous progress of work so forms can remain in place at least 24 hours after concrete placement.
  - 3) Concrete placement width shall not exceed 20 feet unless otherwise specified.

- 4) Riser strips are often used on formwork for initial strike-off and removed to facilitate compaction.
- D. BATCHING, MIXING, AND DELIVERY
- 1) Place mixture in accordance with NRMA Pervious Concrete Contractor Certification guidelines. Mixture proportioning shall be tightly controlled to meet specified criteria. Aggregate water content during mixing must be monitored carefully.
  - 2) Addition of water at the discharge point is permitted to bring workability up to a level that is acceptable to the contractor without causing paste drain.
  - 3) Mixture typically should be completely discharged within one hour of mixing. This timeframe may be increased slightly upon addition of hydration stabilizing admixtures. Placement shall be continuous. Pervious pavement mixtures typically cannot be pumped. Discharge is slowed due to its low slump and several mixers may be necessary working simultaneously.
- E. CONCRETE PLACEMENT
- 1) Before placing concrete, inspect formwork installation and items to be embedded or cast-in.
  - 2) Remove snow, ice, or frost from subbase surface. Do not place concrete on frozen surfaces.
  - 3) Moisture subbase to provide a uniform dampened condition at the time concrete is placed.
    - a. Moistness is more critical for pervious concrete than with conventional concrete construction. Failure to provide a moist subbase will result in a reduction in strength of the pavement. Subbase shall be in a wet condition immediately prior to placing concrete.
  - 4) Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
    - a. Refer to NRMA publications for recommended methods of spreading pervious concrete material. Deposit concrete as close to its final location as practical. Limit pulling and shoveling of concrete that may reduce voids.
    - b. Do not allow foot traffic on the fresh concrete. Do not contaminate mix.
  - 6) Strike off must be performed quickly. Strike off between forms using a form-riding paving machine or vibrating screed. Other strike-off devices may be used upon prior approval of the engineer.
  - 7) Compact using a weighted steel pipe roller or motorized or hydraulically actuated rotating tube screed that spans the full width of the section placed and exerts a vertical pressure of 10 psi on the concrete. Do not use internal vibration. Compact along slab edges with hand tools.
    - a. Finish Pavement shall comply with the following tolerances:
      - Elevation: +3/4 in., -0 in.
      - Thickness: + 1 1/2 in., - 1/4 in.
      - Contraction Joint Depth: +1/4 in., -0 in.

- F. FINISHING
- 1) Finish pavement to the elevations and thicknesses specified.
  - a. Do not use steel trowels or power finishing equipment.
  - 2) Edge top surface to a radius of not less than 1/4 inch.

- G. JOINTING
- 1) Construct joints as indicated in the Construction Documents.
    - a. Spacing between Contraction joints shall not exceed 20 feet. Depth shall be 1/4 to 1/3 of pavement thickness.
    - b. Contraction joints may be saw cut or tooled.
  - 2) Use Isolation joints where pavement abuts fixed objects and adjacent to standard concrete products. Extend through the full depth of the pavement. Fill entire Isolation joint with joint material.
  - 3) Align joints of adjacent pavement panels. Align joints of curb within 1/4 inch of adjacent joints in pavement panel.
  - 4) Joints shall be perpendicular with edges of pavement panels, unless otherwise indicated.

- H. CURING
- 1) Begin curing within 20 minutes of concrete placement.
  - 2) Completely cover pavement surface with a 6 mil thick polyethylene sheet. Cut sheeting to extend approximately three feet beyond edges of pavement.
  - 3) Provide evaporation retarders, misting or other protection as needed during adverse weather conditions.
  - 4) Secure curing cover. If surface has lost its sheen, lightly mist prior to placing cover. Do not use dirt to secure sheeting on top of pavement.
  - 5) Cure pavement for a minimum of seven uninterrupted days.
  - 6) No traffic, material storage, or other use of fresh concrete surfaces shall be permitted during curing.

- I. FIELD QUALITY CONTROL AND ACCEPTANCE
- 4) Tests of samples of concrete shall be performed according to the following requirements:
    - a. Fresh Density: ASTM C1688
    - Obtain 1 cu ft. composite samples for testing in accordance with ASTM C172
    - Measure a minimum of one fresh density test during each day's placement.
    - b. Hardened Density: ASTM C140, para. 9.3
    - Measure as an average from three cores from each lot of 5000 sf ft of pavement, obtained not less than seven days after placement of concrete. Remove cores in accordance with ASTM C42. Select core locations in accordance with ASTM D3665.
    - c. Thickness: Use cores obtained for Hardened Density tests. Thickness shall be an average of the thickness of the 3 cores.
    - d. Void: ASTM C 172.
      - Test per each 100 cy of material.
  - 2) Pervious concrete finished product shall be in accordance with approved test panel results, within the following tolerances:
    - a. Fresh Concrete Density ±5 lb/cu ft. of specified fresh density
    - b. Hardened Concrete Density within 5% of approved hardened density of test panel
    - c. Fresh Void Ratio ±2% of submitted fresh void content
    - d. Hardened Void Ratio maximum 2% less than design void content
    - e. Hardened concrete compacted thickness: no more than 1/4 inch less or 1 1/2 inch more than specified thickness
  - 3) Concrete paving shall be considered defective if it does not pass tests and inspections.
  - 4) Cores holes shall be filled with concrete or preblended grout.

## Protection of Work

Completed pervious concrete work shall be protected from construction and other activities. No storage of materials, vehicular traffic or other use shall be permitted on the pervious concrete surface prior to Final Acceptance.

Material	Specification	Size	Notes
Planting soil	see Appendix A, Table A.4	n/a	planting area site-specific
Planting soil (2' to 4' deep)	loamy sand (60-65%) & compost (35-40%) or sandy loam (30%) coarse sand (30%) & compost (40%)	n/a	USDA soil types loamy sand or sandy loam; clay content < 5%
Organic content	Min. 10% by dry weight (ASTM D 3978)		
Mulch	shredded hardwood		aged 6 months, minimum; no pine or wood chips
Pea gravel diaphragm	pea gravel: ASTM-D-448	NO. 6 OR NO. 9 (1/8" TO 3/8")	
Curtain drain	enamel stone: washed cobble	stone: 2" to 5"	
Geotextile	n/a		PE Type 1 nonwoven
Gravel (underdrains and infiltration basins)	AASHTO M-43	NO. 57 OR NO. 6 AGGREGATE (3/8" to 3/4")	
Underdrain piping	F 758, Type FS 28 or AASHTO M-278	4" to 6" rigid schedule 40 PVC or SDR35	Slotted or perforated pipe; 1/8" perf. @ 6" on center. 4 holes per 6" min. minimum of 3" of gravel over pipe; no necessary underdrain pipes. Perforated pipe shall be wrapped with 1/2-inch polyethylene hardware cloth.
Paired in place concrete (if required)	MSHA Mix No. 3; F <sub>c</sub> = 3500 psi (6 28 days, normal weight, air-entrained; conforming to meet ASTM-611-60	n/a	on-site testing of paired-in-place concrete required: 28 day strength and slump test; all concrete design (cast-in-place or pre-cast) not using previously approved state or local standards requires design drawings sealed and approved by a professional structural engineer licensed in the State of Maryland - design to include meeting ACI Code 508.8.8; vertical loading (H-10 or H-20); allowable horizontal loading (based on soil strength); and analysis of potential cracks.
Sand	AASHTO M-6 or ASTM C-31	0.02" to 0.04"	Sand substitutions such as Dolomite and Gypstone (AASHTO #10) are not acceptable. No calcium carbonate or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.

### B.3.B Specifications for Micro Bioretention

1. Material Specifications  
The allowable materials to be used in bioretention area detailed in Table B.3.2.

2. Planting Soil  
The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of Bermuda grass, Quackgrass, Johnson grass, or other noxious weeds as specified under COMAR 15.08.01.05.  
The planting soil shall be tested and shall meet the following criteria:

pH range	5.2 - 7.0
organic matter	1.5 - 4% (by weight)
magnesium	35lb./ac
phosphorus (phosphate - P2O5)	75 lb./ac
potassium (potash - K2O)	85 lb./ac
soluble salts	not to exceed 500 ppm

All bioretention areas shall have a minimum of one test. Each test shall consist of both the standard soil test for pH, phosphorus, and potassium and additional tests of organic matter, and soluble salts. A seasonal analysis is required from the site stockpiled topsoil. If topsoil is imported, then a texture analysis shall be performed for each location where the top soil was excavated.

Since different labs calibrate their testing equipment differently, all testing results shall come from the same testing facility.  
Should the pH fall out of the acceptable range, it may be modified (higher) with lime or (lower) with iron sulfate plus sulfur.

3. Compaction  
It is very important to minimize compaction of both the base of the bioretention area and the required backfill. When possible, use excavation hoses to remove original soil. If bioretention rubber tires with large treads or high pressure tires will cause excessive compaction resulting in reduced infiltration rates and is not acceptable. Compaction will significantly contribute to design failure.

Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are to retille the soil profile through the 12 inch compaction zone. Substitute methods must be approved by the engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.

Rototill 2 to 3 inches of sand into the base of the bioretention facility backfilling the optional sand layer. Pump any ponded water before preparing (rototilling) base.

When backfilling the bioretention facility, place soil in lifts 12" to 18". Do not use heavy equipment within the bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Grade bioretention materials with light equipment such as a compact loader or a dozer/loadeer with marsh tracks.

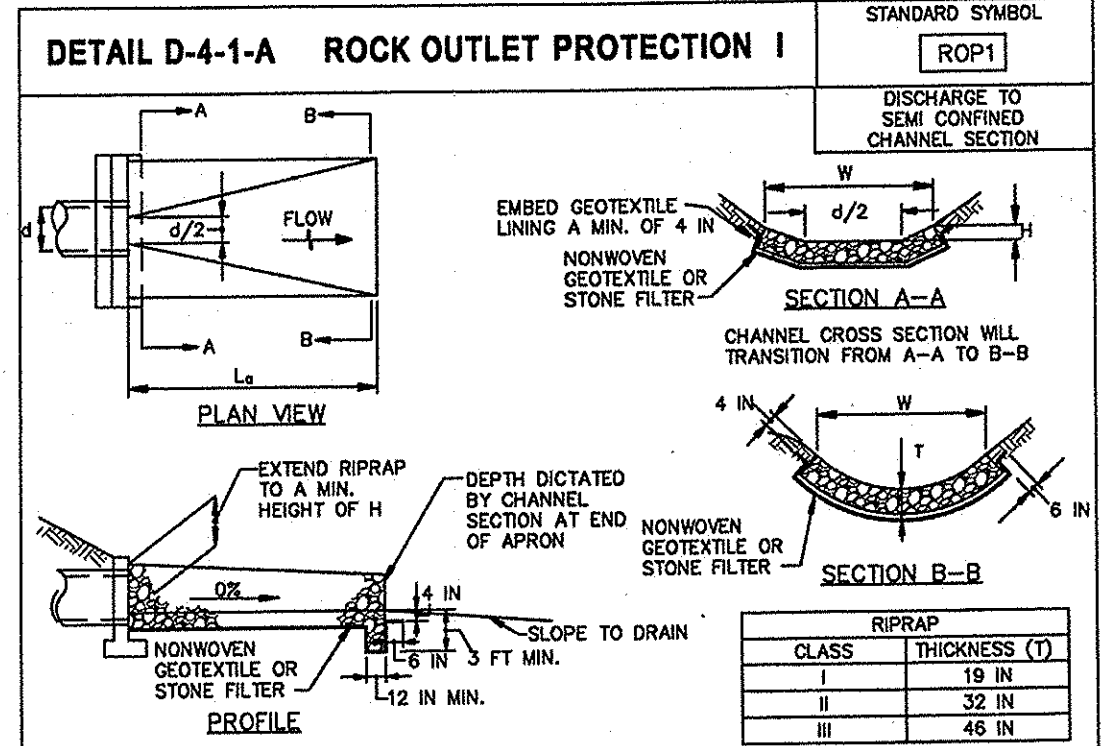
4. Plant Material  
Plant material shall be as indicated on the plans.  
5. Plant Installation  
Mulch should be placed to a uniform thickness of 2" to 3". Shredded hardwood mulch is the only accepted mulch. Pine mulch and wood chips will float and move to the perimeter of the bioretention areas during a storm event and are not acceptable. Shredded mulch must be well aged (6 to 12 months) for acceptance.

Root stock of the plant material shall be kept moist during transport and on-site storage. The plant root ball should be planted so 1/8th of the ball is above final grading surface. The diameter of the planting pit shall be at least six inches larger than the diameter of the planting ball. Set and maintain the plant straight during the entire planting process. Thoroughly water ground bed cover after installation.

Trees shall be braced using 2" by 2" stakes only as necessary and for the first growing season only. Stakes are to be easily spaced on the outside of the tree ball.  
Grasses and legume seed should be drilled into the soil to a depth of at least one inch. Grass and legume plugs shall be planted following the non-grass ground cover planting specifications.

The topsoil specifications provide enough organic material to adequately supply nutrients from natural cycling. The primary function of the bioretention structure is to improve water quality. Adding fertilizers, deicers, or at a minimum, impedes this goal. Only acid fertilizer if wood chips or mulch are used to amend soil. Rototill urea fertilizer at a rate of 2 pounds per 100 square feet.

6. Underdrains  
Underdrains are to be placed on a 3'-0" wide section of filter cloth. Pipe is placed next, followed by the gravel bedding. The ends of underdrain pipes are not terminating in an observation well shall be capped.  
The main collector pipe for underdrain systems shall be constructed at a minimum slope of 0.5%.  
7. Miscellaneous  
The bioretention facility may not be constructed until all contributing drainage area has been stabilized.



### CONSTRUCTION SPECIFICATIONS

1. RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
3. PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (1/4 TO 1/2 INCH STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF THE RIPRAP.
5. CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENEOUS WITH THE SMALLER STONES, AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE STONE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
7. CONSTRUCT APRON WITH OR SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
8. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND DISLOGGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL	
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION
2011	
D.20	

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING  
  
 CHIEF, DEVELOPMENT ENGINEERING DIVISION  
 DATE: 11/10/14

CHIEF, DIVISION OF LAND DEVELOPMENT  
 DATE: 11/10/14

OWNER/DEVELOPER:  
DONALD MUNRO  
3914 HUNTINGTON ST. NW  
WASHINGTON DC 20015-1914  
PHONE: 202-879-3922

ENGINEER:  
JEFFREY L. SCHWAB PE  
TESSERACT SITES, INC.  
401 WASHINGTON AVE, SUITE 303  
TOWSON, MD 21204  
PHONE: 410-321-7600

**Tesseract**  
 TESSERACT SITES, INC.  
 401 Washington Ave, Suite 303  
 Towson, Maryland, 21204  
 p. 410.321.7600  
 f. 410.321.7601

**Stormwater Management Notes & Details**  
**Munro Property**  
 Howard County, Maryland

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

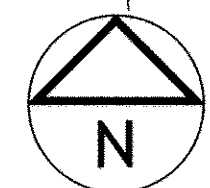
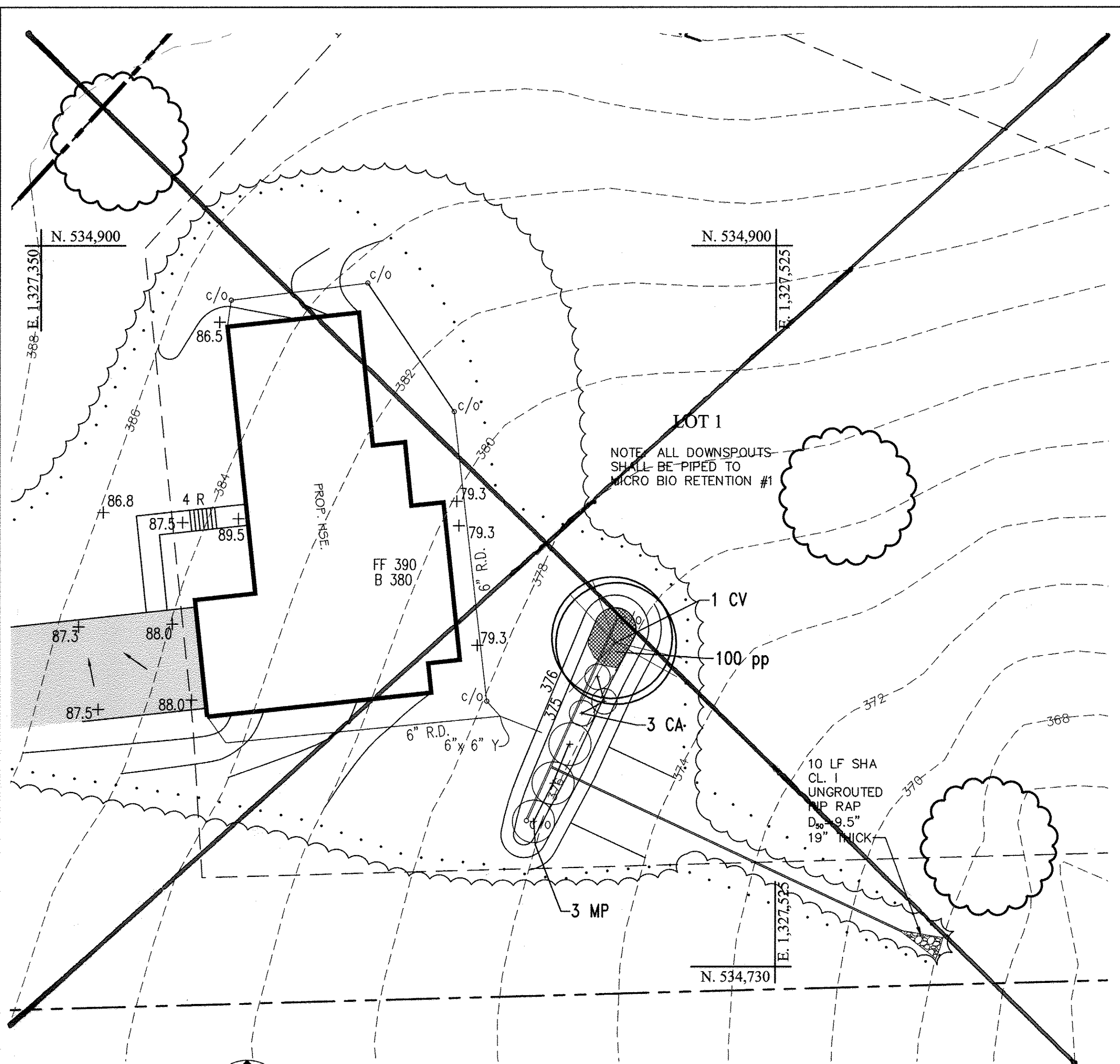
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DATE: 12	DATE: RR-DEO	DATE: 45	DATE: 5TH

Date: 10/10/14  
 Proj. #: 10020  
 Scale: N/A

**7 of 9**

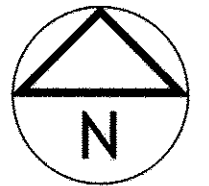
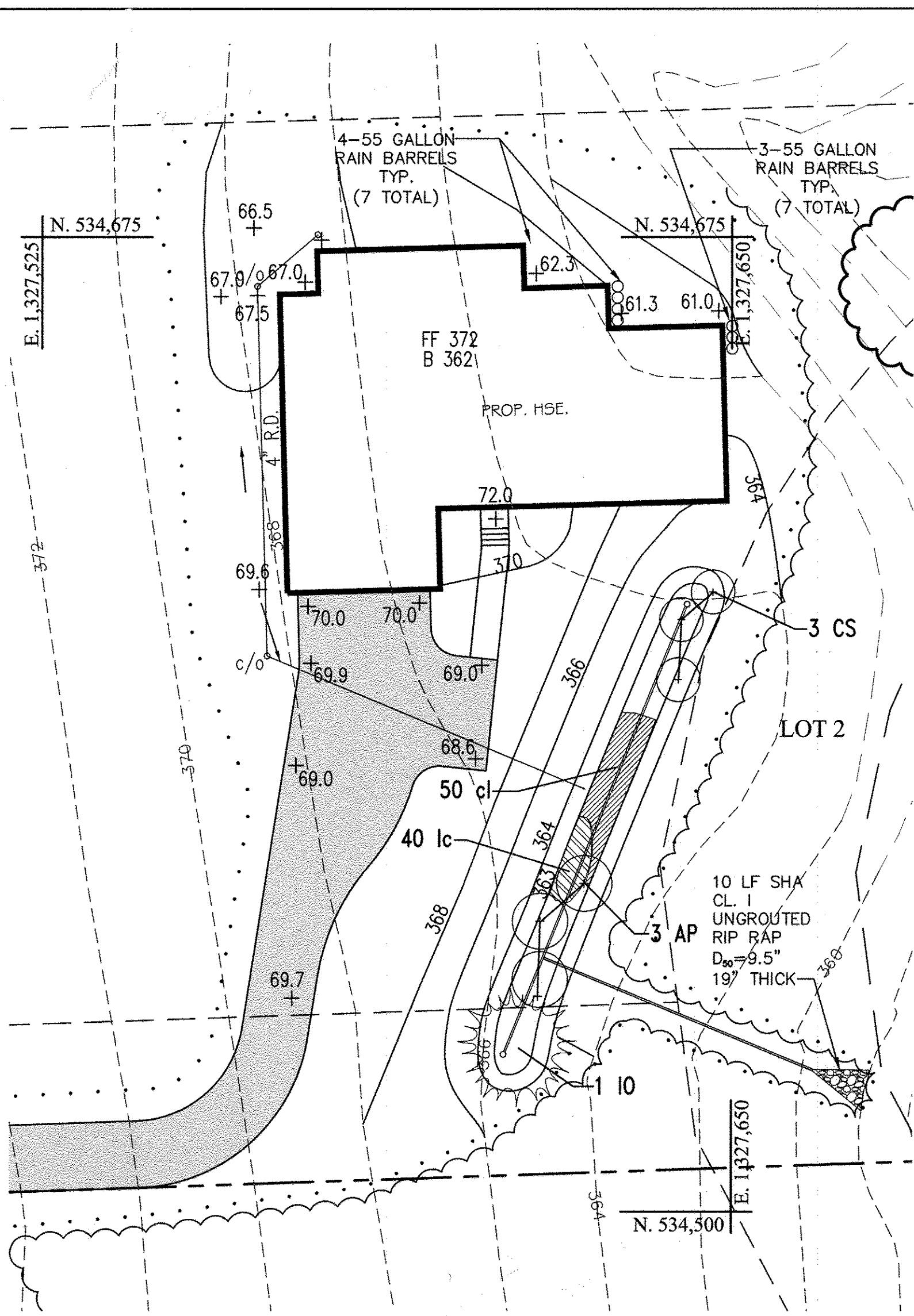
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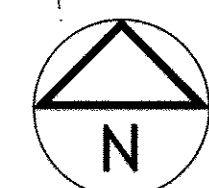
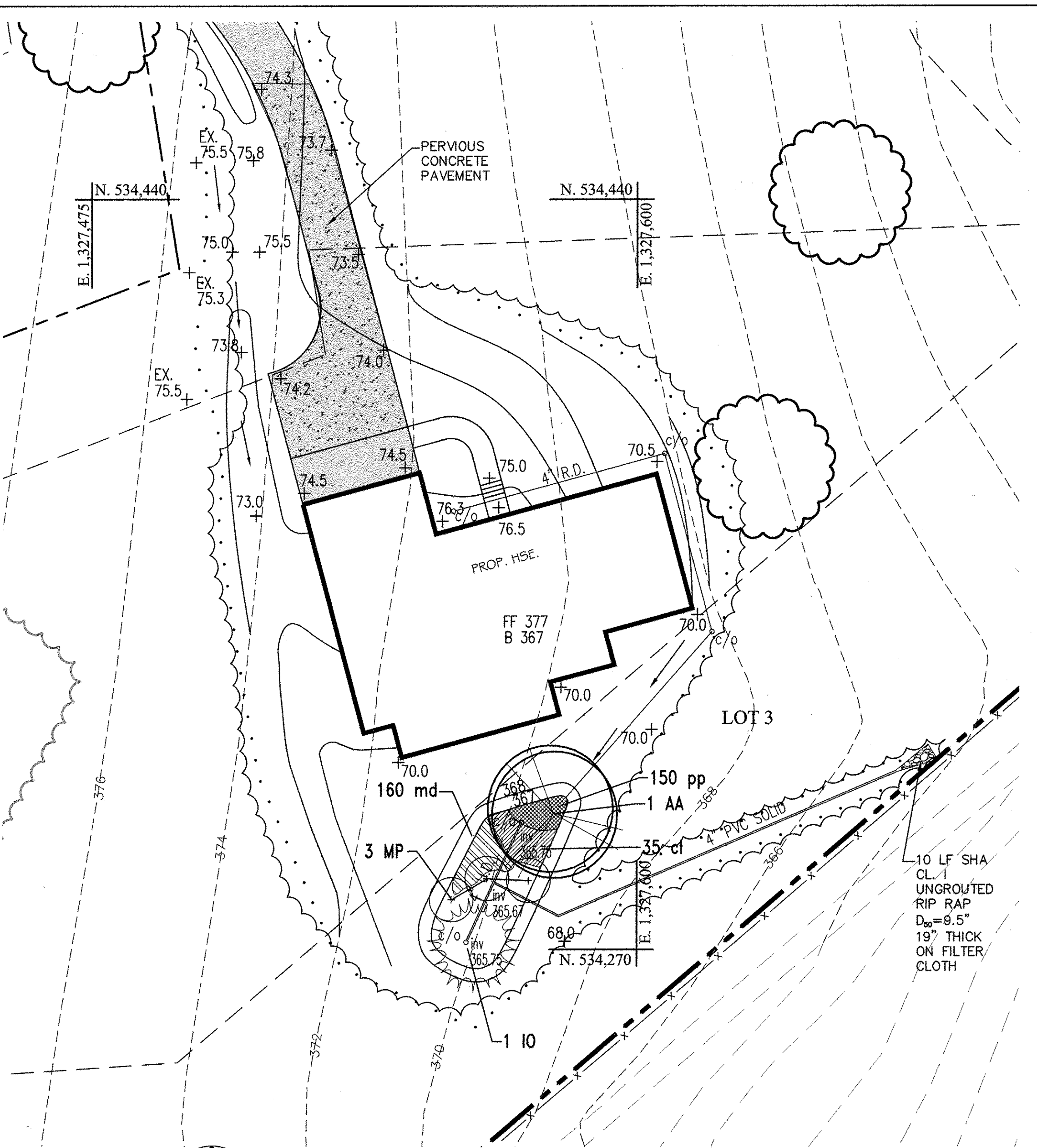
**MICRO BIORETENTION FACILITY #1**

SCALE: 1"=20'



**MICRO BIORETENTION FACILITY #2**

SCALE: 1"=20'



**MICRO BIORETENTION FACILITY #3**

SCALE: 1"=20'

**PLANT SCHEDULE**

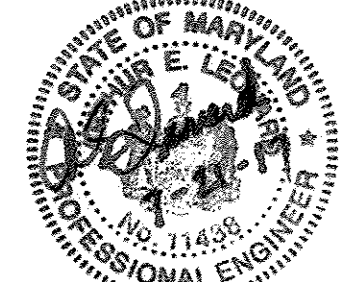
KEY	BOTANICAL NAME	COMMON NAME	SIZE	QUANTITY	SPACING	ROOT & COMMENT
<b>TREES</b>						
AA	AMELANCHIER CANDADENSIS	AUTUMN BRILLIANCE SERVICEBERRY	8-10' Ht	1	-	B&B MULTI-STEMMED
<del>CH</del>	<del>CHIONANTHUS VIRGINICUS</del>	<del>FRINGE TREE</del>	<del>3-10' GAL</del>	<del>1</del>		<del>B&amp;B</del>
IO	ILEX OPACA	AMERICAN HOLLY	6' HT	2		B&B
<b>SHRUBS</b>						
AP	AESCLLIUS PARVIFLORA	BOTTLEBRUSH BUCKEYE	3'-4' HT.	3	10'	B&B OR CONTAINER
<del>CS</del>	<del>CORNUS AMOMIA</del>	<del>SPICEBUSH</del>	<del>3'-4' HT.</del>	<del>2</del>	<del>6'</del>	<del>B&amp;B OR CONTAINER</del>
CS	CORNUS SERICEA	REDBOSIER DOGWOOD	3'-4' HT.	3	8'	B&B OR CONTAINER
MP	MYRTICA PENNSYLVANICA	NORTHERN BAYBERRY	24" HT.	3	10'	B&B OR CONTAINER
<b>HERBACEOUS</b>						
cl	CHASMANTHILUM LATIFOLIUM	NORTHERN SEA OATS	QUART	50	18" O.C.	
lc	LOBELIA CARDINALIS	CARDINAL FLOWER	QUART	40	12" O.C.	
md	MORNING GLORY	BEE BALM	QUART	160	12" O.C.	
pp	PACHYSANDRA PROCUMBENS	ALLEGHENY SPURGE	EACH	150	6" O.C.	

**General Landscape Notes:**  
 1. All nursery stock shall be in accordance with the American Standard for Nursery Stock, latest edition.  
 2. Planting bed mulch and soil shall be in accordance with the approved stormwater management plans.

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING  
*[Signature]* 11/10/14  
 CHIEF, DEVELOPMENT ENGINEERING DIVISION, DATE  
*[Signature]* 11/12/14  
 CHIEF, DIVISION OF LAND DEVELOPMENT, DATE

**OWNER/DEVELOPER:**  
 DONALD MUNRO  
 3914 HUNTINGTON ST. NW  
 WASHINGTON DC 20015-1914  
 PHONE: 202-879-3922

**ENGINEER:**  
 JEFFREY L. SCHWAB PE  
 TESSERACT SITES, INC.  
 401 WASHINGTON AVE. SUITE 303  
 TOWSON, MD 21204  
 PHONE: 410-321-7600



FOR REVISION 1 ONLY

REVISIONS		
NO.	DESCRIPTION	DATE
1	REMOVE MICROBIORETENTION #1	7-21-17

**Tesseract**  
 Jeffrey Schwab  
 401 Washington Ave. Suite 303  
 Towson, Maryland, 21204  
 P. 410.321.7600  
 F. 410.321.7601

**Stormwater Management Landscape Plan**  
**Munro Property**  
 Howard County, Maryland

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14230, Expiration Date: 12/09/14.

LOT/PAGE:	LIBBY/PLR:	PLAT:
9 & 50	3704/323 3835/76	N/A

DATE:	SCALE:
12	45

Date: 9/3/14  
 Proj. #: 10020  
 Scale: 1" = 20'  
**8 of 9**  
 DESIGN: DRAWN: MAS CHECKED: JXX





**CONSTRUCTION PERIOD PROTECTION PROGRAM**

- A. Forest Protection Techniques**
- Soil Protection Area (Critical Root Zone)**  
The soil protection area, or critical root zone, of a tree is that portion of the soil column where most of its roots may be found. The majority of roots responsible for water and nutrient uptake are located just below the soil surface. Temporary fencing shall be placed around the critical root zone of the forest in areas where the forest limits occur within 25 feet of the limit of disturbance.
  - Fencing and Signage**  
Existing forest limits occurring within 25 feet of the limits of disturbance shall be protected using temporary protective fencing. Permanent signage shall be placed around the afforestation area prior to plant installation, as shown on the plan.
  - Pre-Construction Meeting**  
Upon staking of limits of disturbance a pre-construction meeting will be held between the developer, contractor and appropriate County inspector. The purpose of the meeting will be to verify that all sediment control is in order, and to notify the contractor of possible penalties for non-compliance with the FCP.
  - Storage Facilities/Equipment Cleaning**  
All equipment storage, parking, sanitary facilities, material stockpiling, etc. associated with construction of the project will be restricted to those areas outside of the proposed Forest Conservation Easement. Cleaning of equipment will be limited to area within the LOD of the proposed homesteads. Wastewater resulting from equipment cleaning will be controlled to prevent runoff into environmentally sensitive areas.
  - Sequence of Construction**  
The following timetable represents the proposed timetable for development of the subject property. The items outlined in the Forest Conservation Plan will be completed within two (2) years of subdivision approval.
- Below find a proposed sequence of construction.
- Install all signage and sediment control devices.
  - Hold pre-construction meeting between developer, contractor and County inspector.
  - Build access roads, install water and sewer, and construct houses. Stabilize all disturbed areas accordingly.
  - Remove sediment control.
  - Hold post-construction meeting with County inspectors to assure compliance with FCP. Submit Certification of Retention.

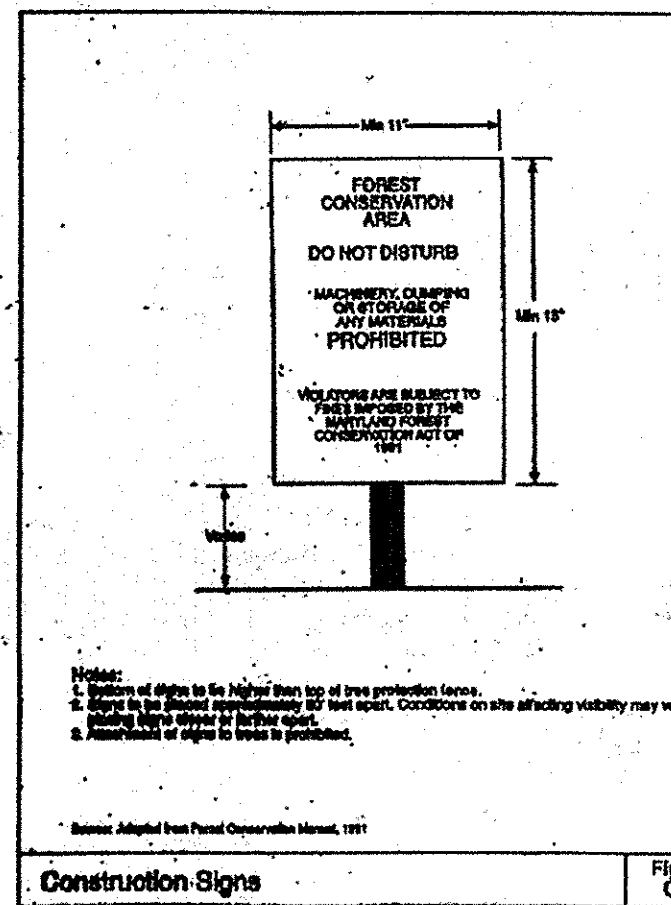
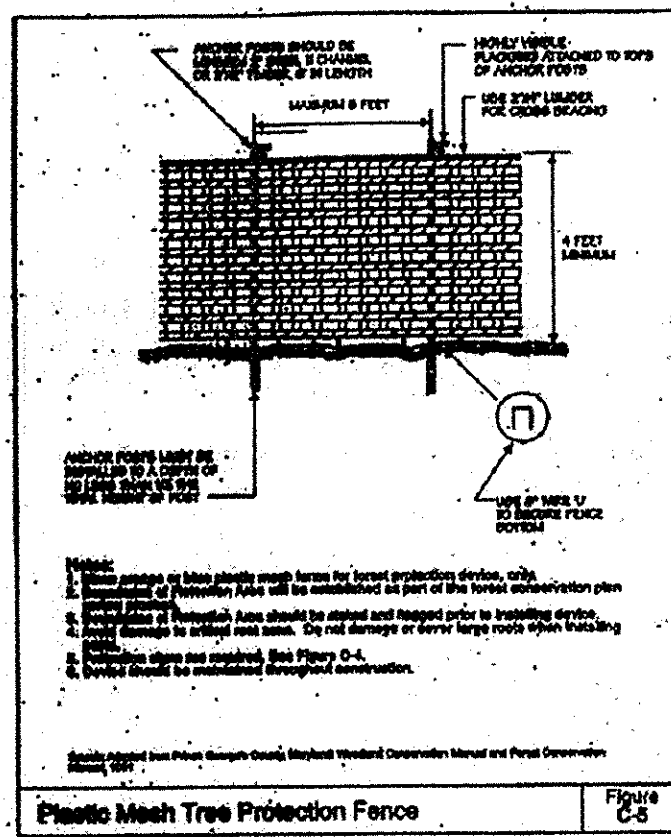
- E. Construction Monitoring**
- Eco-Science Professionals, or another qualified professional designated by the developer, will monitor construction of the project to ensure that all activities are in compliance with the Forest Conservation Plan.
- F. Post-Construction Meeting**
- Upon completion of construction, Eco-Science Professionals, or another qualified professional designated by the developer, will notify the County that construction has been completed and arrange for a post-construction meeting to review the project site. The meeting will allow the County inspector to verify that forest retention requirements have been met.

**POST-CONSTRUCTION MANAGEMENT PLAN**

- Howard County requires a two year post-construction management plan be prepared as part of the Forest Conservation Plan. The plan goes into effect upon acceptance of the construction certification of completion by the County. Eco-Science Professionals, or another qualified professional designated by the developer, will be responsible for implementation of the post-construction management plan.
- The following items will be incorporated into the plan for the subject property.
- Fencing and Signage**  
Permanent signage indicating the limits of the retention/planting area shall be maintained.
  - General Site Inspections**  
Site inspections will be performed to insure that retention of the forest is met in accordance with this plan and that the forest edge remains healthy and stable.
  - Education**  
The developer will provide appropriate materials to property owners informing them of the location and purpose of the forest conservation easement. Materials may include site plans and information explaining the intent of the forest conservation law.
  - Final Inspection**  
At the end of the two year post-construction management period, Eco-Science Professionals, or another qualified professional, will submit to the administrator of the Howard County Forest Conservation Program certification that all retention/afforestation requirements have been met. Upon acceptance of this certification, the County will release the developer from all future obligations and release the developer's bond.

**FOREST CONSERVATION EASEMENTS**

Easements are a legal means of providing permanent protection of forests, farmland and open space. In accordance with the criteria outlined in the Howard County Forest Conservation Manual, a forest conservation easement will be recorded for the retention areas the subject property. Submission of the easements for recordation will occur prior to commencement of construction activities.



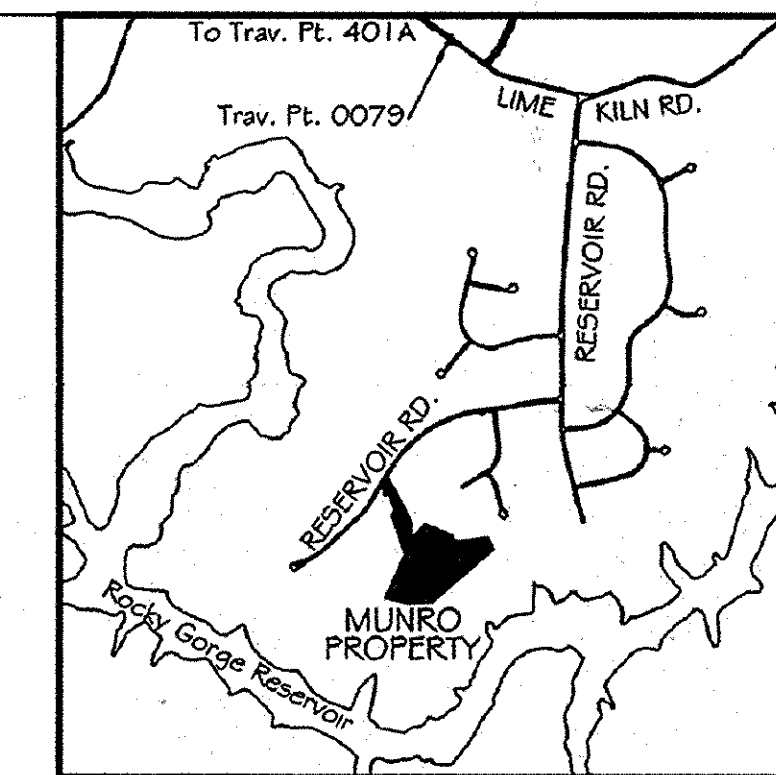
"LAND DEDICATED TO HOWARD COUNTY, MARYLAND" FOR THE RIGHT-OF-WAY WIDENING OF RESERVOIR ROAD  
0.0551 AC. ±  
2,401 SQ. FT. ±

**Forest Stand Data**

Key	Community Type	Acreage (NTA)	Dominant Vegetation	General Condition	Retention Priority
F1	Poplar	13.5	Liriodendron tulipifera, Pinus strobus, Acer rubrum, Picea serotina, Juglans nigra	Good	Moderate - High

See accompanying report for complete stand descriptions

- NOTES:**
- No rare, threatened, or endangered species were observed on the property.
  - Surrounding land use is medium density residential and watershed property.
  - Wetland delineation and specimen tree survey provided by Exploration Research, Inc. and certified by Eco-Science Professionals, Inc.



VICINITY MAP  
SCALE: 1" = 2000'

**SPECIMEN TREES TO REMAIN**

NUMBER	TYPE	CONDITION
ST-1	30" WHITE OAK	GOOD
ST-2	33" YELLOW POPLAR	FAIR
ST-3	36" YELLOW POPLAR	GOOD
ST-4	31" YELLOW POPLAR	GOOD
ST-5	35" YELLOW POPLAR	GOOD
ST-6	37" YELLOW POPLAR	GOOD
ST-7	33" YELLOW POPLAR	GOOD
ST-8	36" YELLOW POPLAR	GOOD
ST-9	33" YELLOW POPLAR	GOOD
* ST-10	30" YELLOW POPLAR	GOOD
ST-11	35" YELLOW POPLAR	GOOD
ST-12	34" YELLOW POPLAR	FAIR
ST-13	35" YELLOW POPLAR	GOOD
ST-14	35" YELLOW POPLAR	FAIR
ST-15	32" AMERICAN SYCAMORE	FAIR
ST-16	32" YELLOW POPLAR	GOOD
ST-17	34" YELLOW POPLAR	GOOD
* ST-18	30" YELLOW POPLAR	FAIR
ST-20	30" YELLOW POPLAR	GOOD
ST-21	27/30" TWIN YELLOW POPLAR	FAIR
ST-22	31" YELLOW POPLAR	GOOD

**SPECIMEN TREES TO BE REMOVED**

NUMBER	TYPE	CONDITION
ST-15	32" YELLOW POPLAR	GOOD

\* MAYBE REMOVED FOR INSTALLATION OF SEPTIC SYSTEM.  
SEE RECONSIDERATION OF WP 13-116 APPROVED 10/1/14,  
NOTE 37 SHEET 1.

**FOREST CONSERVATION WORKSHEET**  
Version 1.0

Project: Munro Property  
Date: February 21, 2014

NET TRACT AREA	Acres
A. Total tract area	14.5
B. Area within 100 Year Floodplain	0
C. Area to remain in agricultural production	0
D. Net Tract Area	14.5

LAND USE CATEGORY: (from table 3.2.1, page 40, Manual)

AREA	MDR	IDA	HDR	MPD	GA
X					
E. Afforestation Threshold (percentage)	0.20	2.9			
F. Conservation Threshold (percentage)	0.25	-3.6			

EXISTING FOREST COVER:

Category	Acres
G. Existing Forest Cover (excluding floodplain)	13.5
H. Area of forest above afforestation threshold	10.6
I. Area of forest above conservation threshold	9.9

BREAK EVEN POINT:

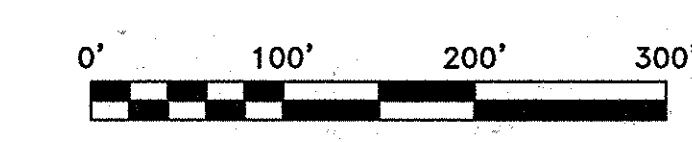
Category	Break-Even Point
J. Forest retention above threshold with no mitigation	2.0
K. Clearing permitted without mitigation	7.9

PROPOSED FOREST CLEARING

Category	Acres
L. Total area of forest to be Cleared or Retained Outside FCE	7.5
M. Total area of forest to be Retained in FCE	6.0

PLANTING REQUIREMENTS

Category	Acres
N. Reforestation for clearing above Conservation Threshold	1.9
P. Reforestation for clearing below Conservation Threshold	0
Q. Credit for retention above conservation threshold	2.4
R. Total reforestation required	0
S. Total afforestation required	0
T. Total reforestation and afforestation required	0



**FOREST STAND DELINEATION AND FOREST CONSERVATION PLAN  
MUNRO PROPERTY, LOTS 1-4**

PREVIOUS COUNTY FILES: WP-13-116, ECP-14-006  
5TH ELECTION DISTRICT, HOWARD COUNTY, MD  
TAX MAP 45 BLOCK 12 PARCEL 9 & P/O PARCEL 50  
ZONING: RR-DEO  
SCALE: 1" = 100' DATE: 10/10/14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING  
*[Signature]* 11-10-14  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE  
*[Signature]* 11/10/14  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

**SHANABERGER & LANE**  
8726 TOWN & COUNTRY BLVD.  
SUITE 201  
ELLCOTT CITY, MD 21043  
(410) 461-9563  
(410) 461-9693 fax  
home@shaname.com

Eco-Science Professionals, Inc.  
Conserving Ecologists  
P.O. Box 8882 Ches. Ann, Maryland 21887  
Tel: (410) 525-2499 Fax: (410) 525-2498

MD DNR Qualified Professional  
USA COB Wetland Delineator  
Certification # WDP/13MD061004132  
*[Signature]* 10/21/14  
John P. Chasler

**SPECIMEN TREES NOTE:**  
Installation of septic systems and wells will result in damage to, or destruction of, nearby vegetation. Several specimen trees are among the vegetation which may be damaged during installation activities on Lots 1, 2, and 3.

