



Bureau of Environmental Health
 8930 Stanford Boulevard, Columbia, MD 21045
 Main: 410-313-2640 | Fax: 410-313-2648
 TDD 410-313-2323 | Toll Free 1-866-313-6300
www.hchealth.org
 Facebook: www.facebook.com/hocohealth

Maura J. Rossman, M.D., Health Officer

RECEIPT DATE: 6/10/16 **ONSITE SEWAGE DISPOSAL SYSTEM** P 558752
 APPROVAL DATE: 10/26/16 (RR) **PERMIT: CONSTRUCTION** A _____
 PROPERTY ADDRESS: 11590 Chapel Rise
 SUBDIVISION: Chapel Rise LOT: 8 TAX ID: 05-594207
 CONTRACTOR: Fern & Home Excavating EMAIL: _____
 CONTRACTOR ADDRESS: _____ PHONE: _____

CONTRACTOR CERTIFIED FOR BAT INSTALLATION: MDE MANUFACTURER:

PROPERTY OWNER: Chuck and Sophie Cullen EMAIL: cscullen@gmail.com
 OWNER ADDRESS: 6624 Towering Oak Path, Columbia, MD 21044 PHONE: 443-838-8322

BAT UNIT MODEL: Hoot H-600 BNR PUMP SIZE: EP0511 PUMP TANK CAPACITY: 750 GPD

OPERATION & MAINTENANCE AGREEMENT DATE SIGNED: _____ DATE RECORDED: _____

DISTRIBUTION SYSTEM: GRAVITY PRESSURE DOSED BEDROOMS: 5 APPLICATION RATE: _____

TRENCHES:	LINEAR FEET REQUIRED: <u>132</u>	INLET DEPTH: <u>2</u>
	TRENCH WIDTH: <u>3</u>	MAXIMUM BOTTOM DEPTH: <u>4</u>
	MINIMUM SPACE BETWEEN TRENCHES: <u>10</u>	EFFECTIVE AREA BEGINNING DEPTH: <u>2</u>

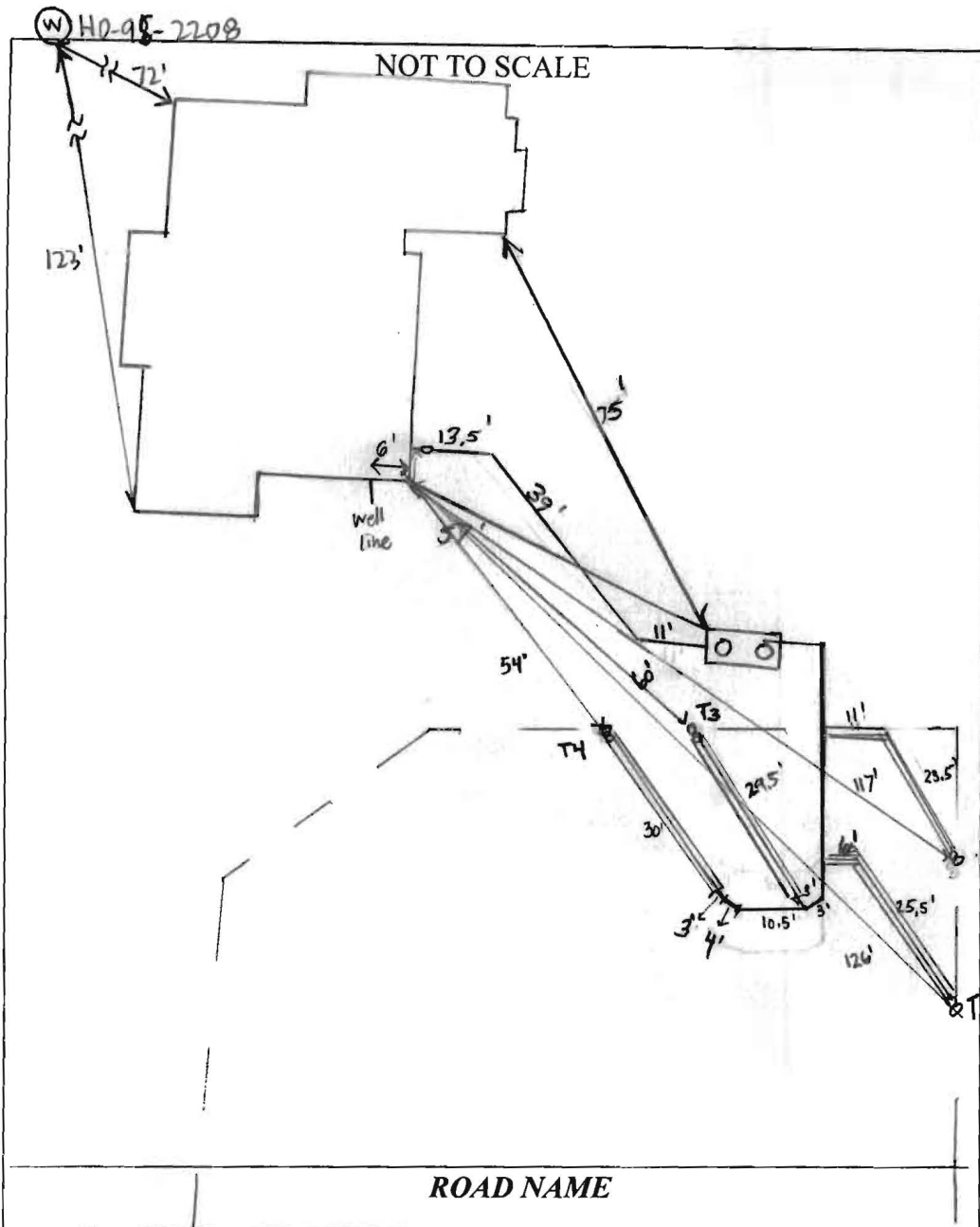
LOCATION: **PER APPROVED SITE PLAN. SEWAGE DISPOSAL AREA AND BAT UNIT LOCATION MUST BE STAKED BY LICENSED SURVEYOR PRIOR TO PRE-CONSTRUCTION INSPECTION.**

NOTES: See BAT plan for LPD details

ISSUED BY: Robert Bricker ISSUE DATE: 6/10/16 EXPIRATION DATE: 6/10/17

- NOTE: CONTRACTOR MUST SCHEDULE A PRE-CONSTRUCTION INSPECTION PRIOR TO BEGINNING ANY INSTALLATION
- NOTE: CONTRACTOR MUST SCHEDULE AN INSPECTION AND GAIN APPROVAL OF ALL COMPONENTS PRIOR TO COVERING
- NOTE: STONE MUST BE APPROVED BY HEALTH DEPARTMENT AND GRAVEL TICKET MUST BE AVAILABLE FOR REVIEW.
- NOTE: WATERTIGHT SEPTIC TANKS REQUIRED
- NOTE: ALL PARTS OF SEPTIC SYSTEM SHALL BE AT LEAST 100 FEET DOWNGRAIENT FROM ANY WATER WELL
- NOTE: MANHOLE RISERS REQUIRED ON ALL SEPTIC TANKS AND PUMP CHAMBERS
- NOTE: AN ELECTRICAL PERMIT IS REQUIRED FOR INSTALLATION OF ANY ELECTRICAL COMPONENTS OF THE SYSTEM
 ELECTRICAL PERMIT ISSUED E 16002598
- NOTE: AN INDIVIDUAL CERTIFIED BY MDE AND THE MANUFACTURER FOR BAT INSTALLATION MUST BE PRESENT AT ALL TIMES DURING BAT INSTALLATION.
- NOTE: MDE RECOMMENDS SEPTIC TANKS, BAT, AND OTHER PRETREATMENT UNITS BE PUMPED AT A FREQUENCY ADEQUATE TO ENSURE THAT SOLIDS ARE NOT DISCHARGED TO THE DISPOSAL AREA

**NEITHER THE HOWARD COUNTY COUNCIL NOR THE HEALTH DEPARTMENT IS RESPONSIBLE FOR THE SUCCESSFUL OPERATION OF ANY SYSTEM.
 PERMITTEE RESPONSIBLE FOR OBTAINING FINAL APPROVAL ON THIS PERMIT.
 CALL 410-313-1771 TO SCHEDULE INSPECTIONS.**



TRENCH/DRAINFIELD DATA		
WIDTH	INLET	BOTTOM
3	2	4
NUMBER OF TRENCHES		4
TOTAL LENGTH		129'
ABSORPTION AREA		774' + sidewall
DISTRIBUTION BOX LEVEL		-
DISTRIBUTION BOX BAFFLE		-
DISTRIBUTION BOX PORT		-

SEPTIC TANK DATA	
SEPTIC TANK I LEVEL	Yes
MANUFACTURER	Mayer Bros
CAPACITY	Host 600 GAL
SEAM LOC	Top
TANK LID DEPTH	3'
BAFFLES	Yes
BAFFLE FILTER	no
MANHOLE LOC	Front/Rear
6" PORT LOC	none
WATERTIGHT TEST	-
SLOTTED	Yes
DATE ON LID	N/A
PUMP/SEPTIC TANK LEVEL	
MANUFACTURER	
CAPACITY	
SEAM LOC	
TANK LID DEPTH	
BAFFLES	
BAFFLE FILTER	
MANHOLE LOC	
6" PORT LOC	
WATERTIGHT TEST	
SLOTTED	
DATE ON LID	

PRE-CONSTRUCTION: 7/29/16 Met Bill Ingram on site for layout. Tanks, SDA, and trenches all staked. Checked elevations - stakes at start + end of T1, T3, + T4 all within a few inches. Start + end of T2 ~ 8" different. Moved end of T2 closer to T1, still in SDA. Okay to set tank using centerline at tank edge. House connection made + covered b/c deck built over pipe leaving house. (S)

INSTALLATION: 8/5/16 SHC made. Host tank set per plan. Moved slightly away from SRA. (KW) 10/14/16 - Site inspection contractor on site, force main, trenches & laterals complete. Stone looks good. Trenches open for pump/alarm test, water observed coming out of 7 perforations in T1, 6 perforations in T2, 6 perforations in T3 and 5 perforations in T4. Head measured between 2'-3' on each lateral turn up. All trenches have 4" observation pipes at the end, 1/20 flow through laterals good. BAT startup certification needed for final. (PR) 10/26/16 - site visit contractors and homeowner on site. BAT startup complete timer adjusted to accommodate proper dosing; contractor will email the BAT cert. - (PR) 11/1/16 BAT startup certification received. (S)

FINAL INSPECTOR Ryan Rappaport DATE OF APPROVAL 10/26/16



Bureau of Environmental Health

8930 Stanford Boulevard, Columbia, MD 21045

Main: 410-313-2640 | Fax: 410-313-2648

TDD 410-313-2323 | Toll Free 1-866-313-6300

www.hchealth.org

Facebook: www.facebook.com/hocohealth

Twitter: HowardCoHealthDep

Maura J. Rossman, M.D., Health Officer

**OPERATION AND MAINTENANCE AGREEMENT
FOR AN ON-SITE SEWAGE DISPOSAL SYSTEM
HAVING AN ADVANCED PRE-TREATMENT SYSTEM**

THIS AGREEMENT is made this 1st day of February, ²⁰¹⁷ among Sophie Gorski-Cullen
and Charles Cullen, hereinafter collectively referred to as
"Owner", and the Howard County Health Department hereinafter referred to as the "County".

WHEREAS, Owner is the owner or contract owner of a parcel of land located at
11590 Chapel Rise, Clarksville, MD 2029, in the 5 Election District of Howard
County, Maryland, and the deed and subdivision plat of the property is recorded among the Land
Records of Howard County, Maryland, Tax Map # 29, Block # ---, Parcel # 26, Deed
Reference # 145570006 and Tax Account # 594207 ("the Property").

WHEREAS, The Property is suitable for the installation of a conventional on-site sewage
disposal system with an advanced pre-treatment system, utilizing best available technology to
perform nitrogen reduction, in accordance with the Code of Maryland Regulations 26.04.02.07,
effective January 1, 2013. The pre-treatment device being installed is
Hoot 600.

NOW, THEREFORE, the parties hereto agree as follows:

A. Owner hereby grants to the County the right to enter upon the Property at any reasonable time
with prior notice for access to the system to make periodic inspections and the Owner agrees to
provide any information and data in Owner's possession reasonably requested and needed by the
County.

B. Owner acknowledges and agrees that neither the County nor any of its agents or employees,
either officially or individually, underwrites the operation of any system approved by them.

C. The Owner will devote reasonable care and effort to the operation and maintenance of the
system in perpetuity or until a public sewer connection is made so that a system malfunction is
not the result of poor maintenance, faulty operation, or neglect.

D. The Owner agrees to enter into a contract reasonably acceptable to the Owner and the County
with a private entity to operate and maintain on a regularly scheduled basis an approved
advanced pre-treatment system. The owner shall supply a copy of the contract to the County
when it is renewed or altered.

E. This agreement shall run with the land and upon Owner's taking title to the Property shall bind the Owner, their heirs, successors, and assigns to the provisions of the agreement as long as the property is in existence and after installation of the system. Owner further agrees that they shall inform in writing any subsequent purchaser or lessee of the Property that the system shall require maintenance or other attention. Upon taking title to the Property, the Owner agrees to cause this agreement to be recorded in the Land Records of Howard County and assure that it becomes part of the Deed for the subject property in order that prospective buyers may be aware of the special conditions affecting this property.

F. This agreement shall not be construed to limit any authority of the County to protect the public health, safety or comfort or to issue any other orders to take any other action which is now or may hereafter be within its authority.

G. This agreement may be voided at any time at the discretion of the County.

H. This agreement contains the entire agreement and understanding between the County and the Owner. There are no additional terms other than as contained in this agreement. This agreement may not be modified, except in writing signed by each of the parties or by their authorized representatives.

I. The laws of the State of Maryland govern the provisions of all transactions pursuant to this agreement.

J. Owner acknowledges and agrees that interior renovations to increase the number of bedrooms or an increase in living space shall not be permitted without approval from the County.

IN WITNESS WHEREOF, the parties have signed and sealed this agreement on the date indicated above.

Bert Nyren 2/6/2017

Howard County Health Department

Charles P. Cullen 2/1/17

Owner #1 Signature Date

Charles P. Cullen
Owner #1 Print Name

Sophie Garsley-Cullen 2/1/17

Owner#2 Signature Date

Sophie Garsley-Cullen
Owner #2 Print Name

Buyer #1 Signature Date

Buyer #1 Print Name

Buyer #2 Signature Date

Buyer #2 Print Name



Bureau of Environmental Health

8930 Stanford Boulevard, Columbia, MD 21045

Main: 410-313-2640 | Fax: 410-313-2648

TDD 410-313-2323 | Toll Free 1-866-313-6300

www.hchealth.org

Facebook: www.facebook.com/hocohealth

Twitter: HowardCoHealthDep

Maura J. Rossman, M.D., Health Officer

AGREEMENT FOR APPROVAL OF AN INDIVIDUAL DRINKING WELL WITH AN ON-SITE TREATMENT SYSTEM

This agreement is entered into by and between the Howard County Health Department ("the Health Department") and Sophie Gorski-Cullen and Charles Cullen ("the Owner").

WHEREAS, the Owner owns a tract of land at street address 11590 Chapel Rise, Clarksville, MD 21029 and the deed and subdivision plat of the property is recorded among the Land Records of Howard County, Maryland, Tax Map # 29, Block # 26567, Parcel # 05594207, Deed Reference # 1455710406 and Tax Account # 594207 ("the Property").

WHEREAS, the Property lacks an available public drinking water source and is required to have and individual well as the source of drinking water for the residence of the property.

WHEREAS, the Owner has installed a residential drinking well under well permit H0-95-2208 that has been tested by the Health Department (or a private laboratory certified to perform testing) for radionuclide particles. The results of the tests have shown that the gross alpha particle content and/or the gross beta particle content and/or the combined radium 226/228 levels exceeds the standards of 15 picocuries per liter (pCi/L), 4 millirems per year (mrem/yr) and/or 5pCi/L respectively.

WHEREAS, The Maryland Department of the Environment (MDE) has promulgated rules and regulations under which a Certificate of Potability may be issued and has delegated the authority to issue such Certificate to the Health Department.

WHEREAS, MDE regulations permit the Health Department to issue as a special condition, a permanent deviation to the Certificate of Potability for individual wells where treatment has been installed to meet the maximum contaminate levels (MCL's) for radionuclides.

WHEREAS, MDE has determined that radium can be effectively removed from the drinking water by the use of treatment devices (e.g., ion exchange or reverse osmosis).

WHEREAS, the Owner is requesting that the Health Department issue a Certificate of Potability contingent upon installation and maintenance of a water treatment device to reduce radionuclides.

WHEREAS, neither the Owner nor the Health Department has knowledge of an alternative safe source of water for the Property.

NOW THEREFORE, the parties have agreed to the following terms and conditions:

1. The Owner will record this Agreement among the Land Records of Howard County, Maryland and provide confirmation to the Health Dept.
2. The Owner agrees to install and maintain a water treatment device, which effectively reduces the gross alpha, gross beta and radium levels to below their respective MCL. The Health Department

HO-95-2208

csqcullen@gmail.com



MAYER BROS., INC.
Precast Concrete Products
6264 Race Rd. Elkridge, MD 21075

Letter of Satisfaction Hoot System Installation

Address of Property: 11590 Chapel Rise Ct.
Clarksville, MD 21029

Date of Final Inspection: 10/26/16

Installer: Farm + Home Excavating Inc.

Hoot Technician/Inspector: Mike Sample

I hereby certify that the Hoot system installed at the property listed above has been installed according to proper Hoot installation practices. I have also verified the startup of the system and it is in proper working order.

Sincerely,

W. Michael Dorn
Name of Inspector
Mayer Bros., Inc.

PH: 410-796-1434
FX: 410-796-1438

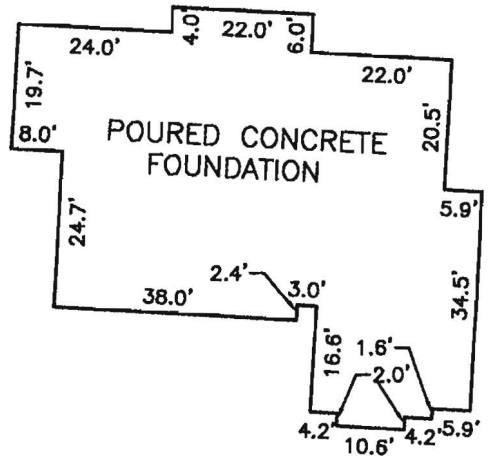
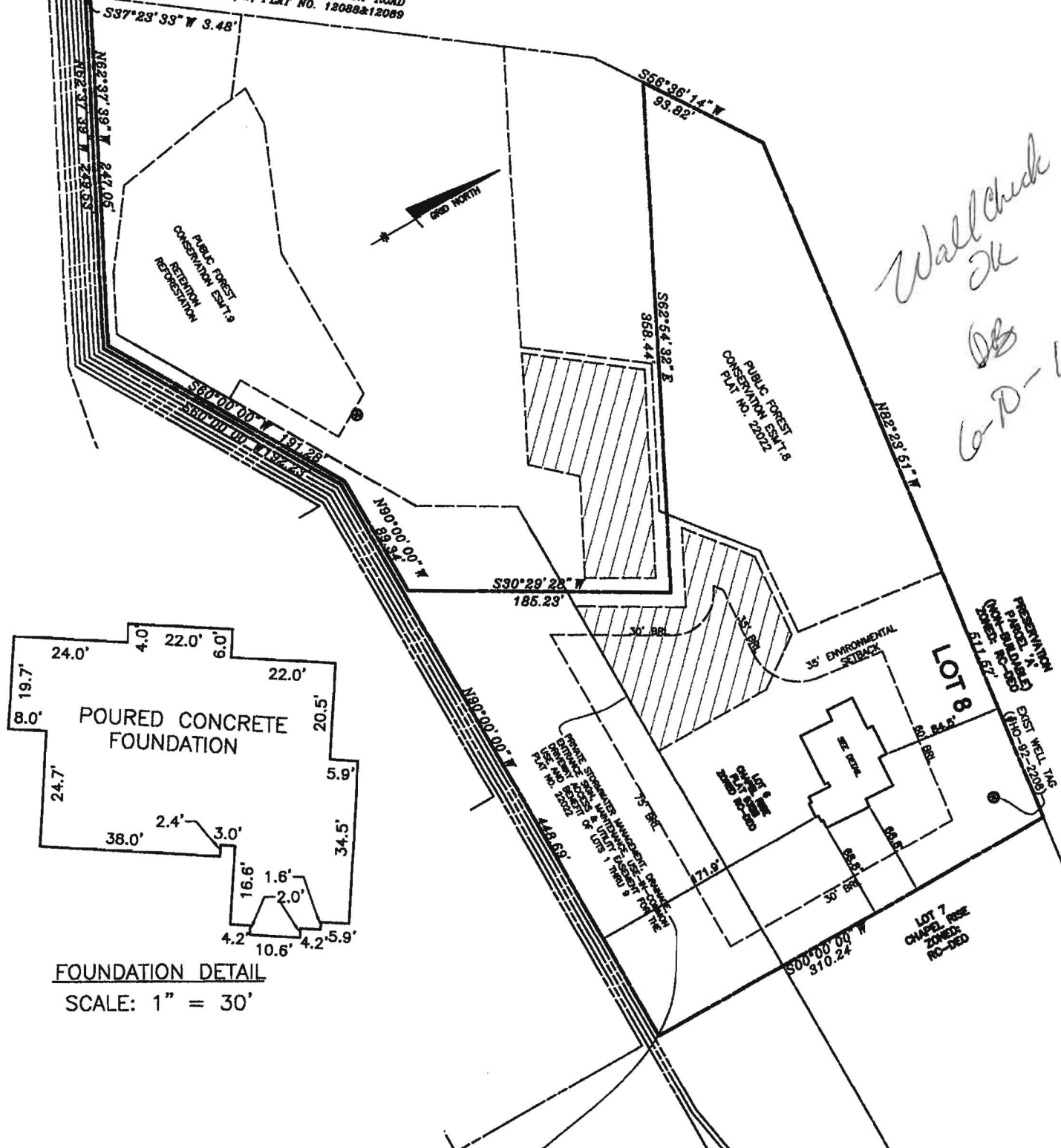
WBE

info@mayerprecast.com
www.mayerprecast.com

Grease Interceptors, HOOT Aerobic Treatment Units, Septic Tanks, Holding Tanks, Bench Barrier, Water Meter Vaults,
Sectional Valve Units, Top Slabs, Curb Heads, Curb Bumpers, Custom Precast Products

CHAPEL ESTATES DRIVE
 EXISTING PUBLIC COUNTRY ROAD
 60' R/W, PLAT NO. 13088&12089

Wall Check OK
DB
6-10-16



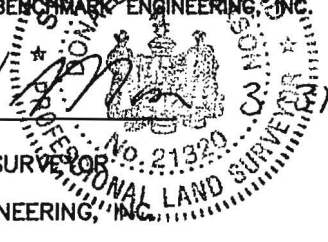
FOUNDATION DETAIL
 SCALE: 1" = 30'

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THESE DOCUMENTS, WERE PREPARED BY ME OR UNDER MY RESPONSIBLE CHARGE, AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 21320, EXPIRATION DATE 1-7-2017 AND TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF THAT THE DIMENSIONS OF THE BUILDING WALLS SHOWN HEREON ARE CORRECT; THAT THEY ARE BASED ON A FIELD RUN SURVEY PERFORMED BY BENCHMARK ENGINEERING, INC. ON 03/30/2016.

TOP OF FOUNDATION WALL ELEVATION = 417.3'
 OFFSET DIMENSIONS TO PROPERTY LINES ARE ± 0.1'

Donald A. Mason
 DONALD A. MASON
 PROFESSIONAL LAND SURVEYOR
 MD REG. No. 21320
 FOR BENCHMARK ENGINEERING, INC.
 MD REG. No. 351
 FEMA FIRM No. 24027C0125D
 ZONE: X
 DATED: 11/06/2013



WALL CHECK
CHAPEL RISE
LOTS 1 THRU 9
PLAT No. 22022
LOT No. 8

BENCHMARK
 ENGINEERS & LAND SURVEYORS & PLANNERS
ENGINEERING, INC.
 8480 BALTIMORE NATIONAL PIKE & SUITE 315
 ELLICOTT CITY, MARYLAND 21043
 phone: 410-465-6105 & fax: 410-465-6844
 www.bei-civilengineering.com

11590 CHAPEL ESTATES DRIVE
 5TH ELECTION DISTRICT
 HOWARD COUNTY, MARYLAND
 DRAWN BY EWF SCALE: 1" = 100' DATE: 03/30/2016

Clerk of the Circuit Court for
Howard County
Land Records/Licensing

The Thomas Dorsey Building
9250 Bendix Road
Columbia, MD 21045
410-313-5850

LR - Agreement Recording Fee
1x 20.00 20.00

Name: Gorski Cullen
Ref: 77

LR - Agreement Surcharge
1x 40.00 40.00

LR - Agreement Recording Fee
1x 20.00 20.00

Name: Gorski cullen
Ref: 78

LR - Agreement Surcharge
1x 40.00 40.00

SubTotal: 120.00
Total: 120.00

CRD-Credit 120.00
Credit Card Confirmation : ~~XXXXXXXXXX~~

02/06/2017 11:35 CC13-SB

#~~XXXXXXXXXX~~
***** DUPLICATE #002 *****

02/06/2017 11:36 CC13-SB
Thank you for visiting us today

Clerk of the Circuit Court for
Howard County
Land Records/Licensing

The Thomas Dorsey Building
9250 Bendix Road
Columbia, MD 21045
410-313-5850

LR - Agreement Recording Fee
1x 20.00 20.00

Name: Gorski Cullen
Ref: 77

LR - Agreement Surcharge
1x 40.00 40.00

LR - Agreement Recording Fee
1x 20.00 20.00

Name: Gorski cullen
Ref: 78

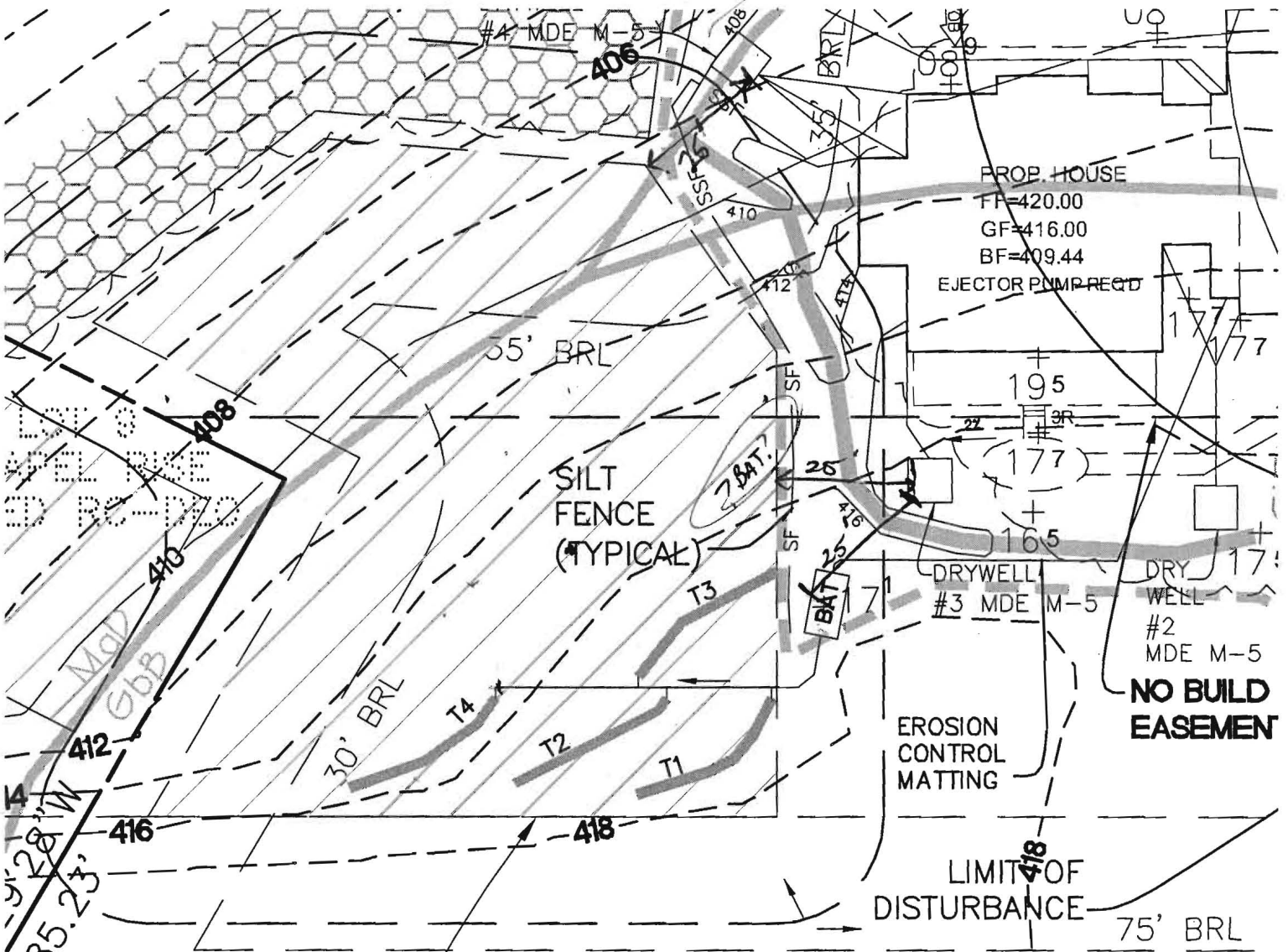
LR - Agreement Surcharge
1x 40.00 40.00

SubTotal: 120.00
Total: 120.00

CRD-Credit 120.00
Credit Card Confirmation : ~~XXXXXXXXXX~~

02/06/2017 11:35 CC13-SB

#~~XXXXXXXXXX~~
Thank you for visiting us today~



PROP. HOUSE
 FF=420.00
 GF=416.00
 BF=409.44
 EJECTOR PUMP REQ'D

SILT FENCE (TYPICAL)

DRYWELL #3 MDE M-5

DRYWELL #2 MDE M-5

NO BUILD EASEMENT

EROSION CONTROL MATTING

LIMIT OF DISTURBANCE

**LOT 8
 3.07 ACRES**

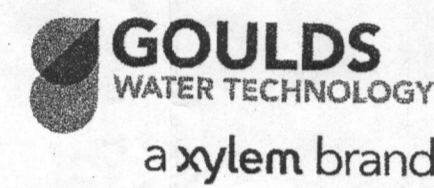
INV. AT HOUSE -
 GRD. AT INV. AT HOUSE -
 BRL IN TANK/DAT

TECHNICAL BROCHURE
B3871 R1



EP04 & EP05 Series
Model 3871

SUBMERSIBLE EFFLUENT PUMPS



*USE BLASTER PUMP EP0511

Wastewater

Goolds Water Technology

FEATURES

- EP04 Impeller: Thermoplastic semi-open design with pump out vanes for mechanical seal protection.
- EP05 Impeller: Thermoplastic enclosed design for improved performance.
- Casing and Base: Rugged thermoplastic design provides superior strength and corrosion resistance.
- Motor Housing: Cast iron for efficient heat transfer, strength, and durability.

APPLICATIONS

- Specifically designed for the following uses:
 - Effluent systems
 - Homes
 - Farms
 - Heavy duty sump
 - Water transfer
 - Dewatering

SPECIFICATIONS

- Solids handling capability: 3/4" maximum.
- Capacities: up to 60 GPM.
- Total heads: up to 31 feet.
- Discharge size: 1 1/2" NPT.
- Mechanical seal: carbon-rotary/ceramic-stationary, BUNA-N elastomers.
- Temperature:
 - 104° F (40° C) continuous
 - 140° F (60° C) intermittent.
- Class B Insulation
- Fasteners: 300 series stainless steel.
- Capable of running dry without damage to components.

- Motor Cover: Thermoplastic cover with integral handle and float switch attachment points.
- Power Cable: Severe duty rated oil and water resistant.
- Bearings: Upper and lower heavy duty ball bearing construction.

AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38849

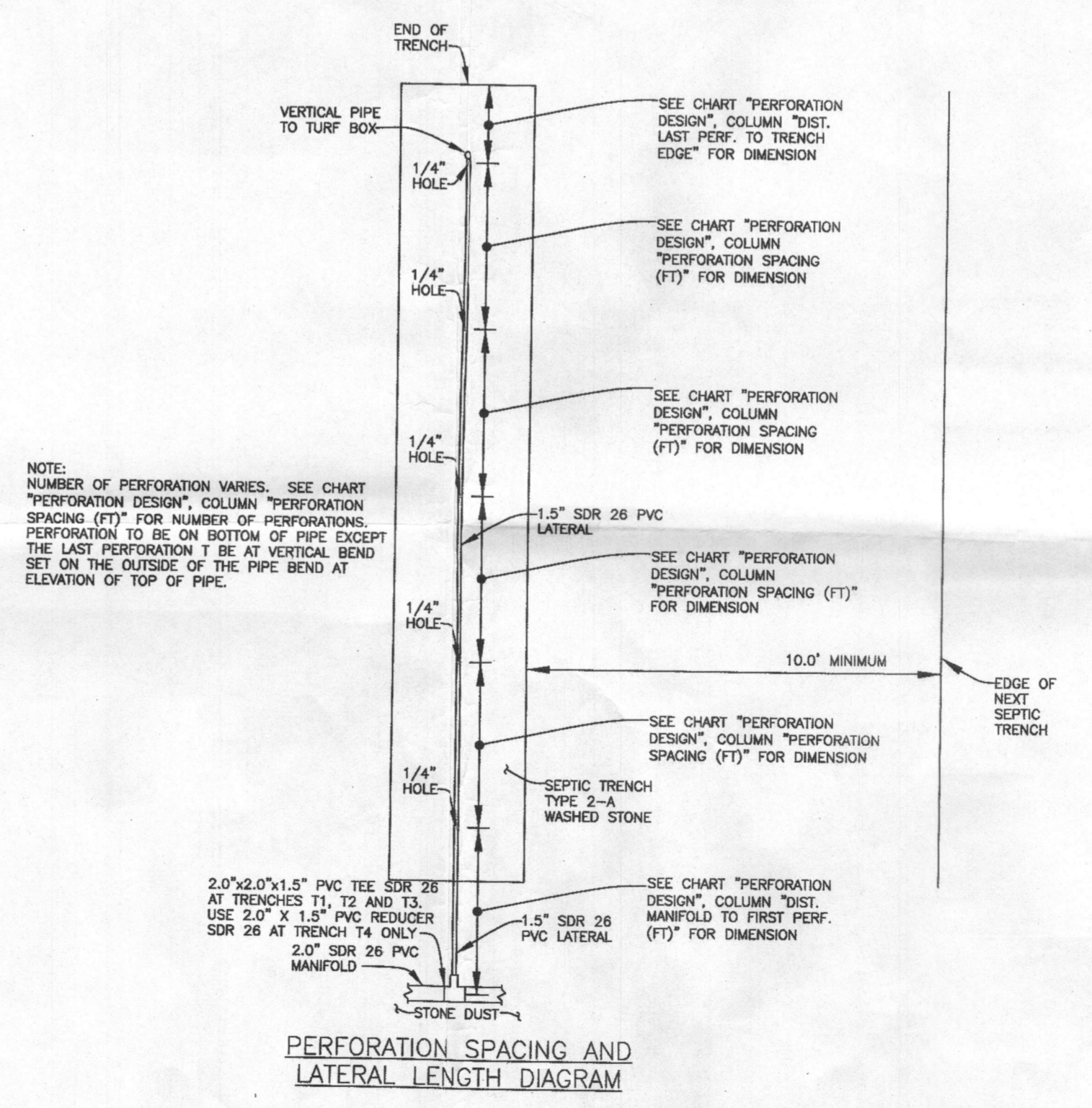
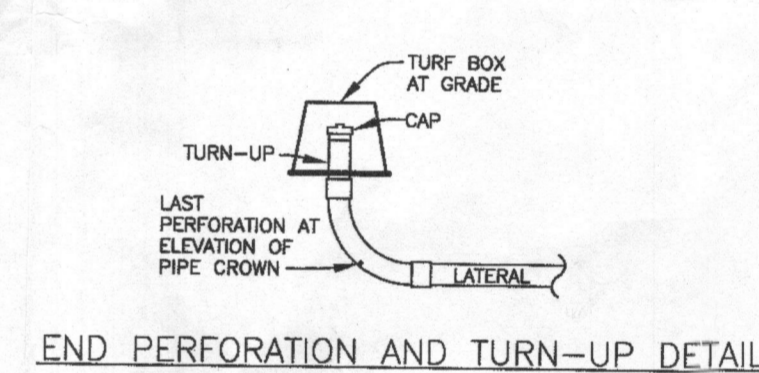
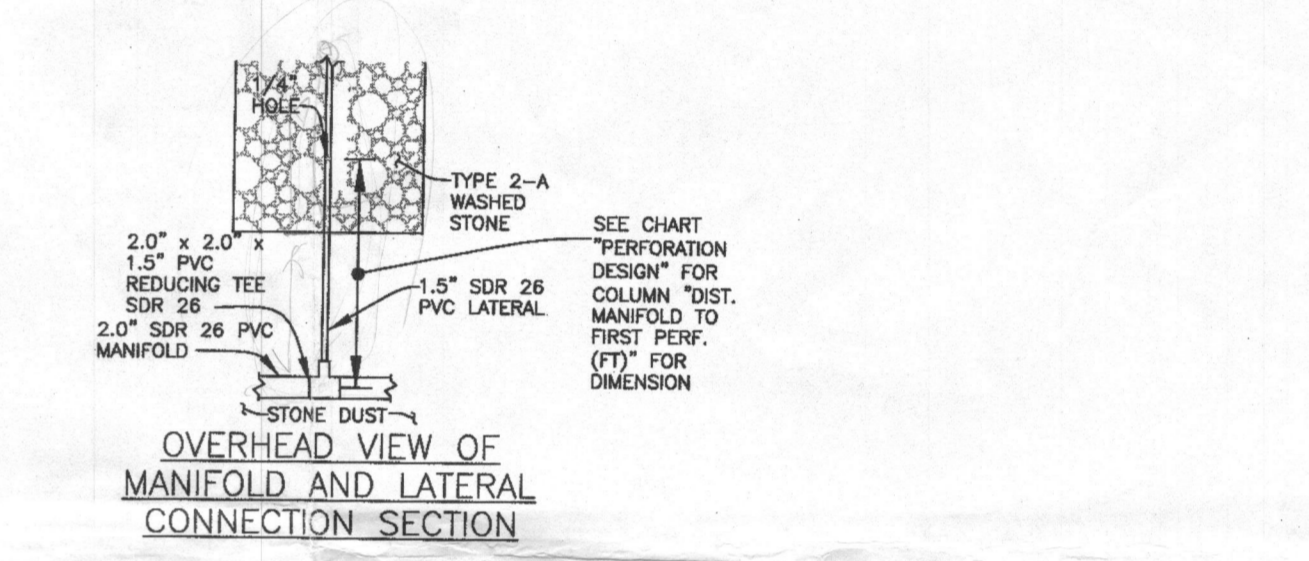
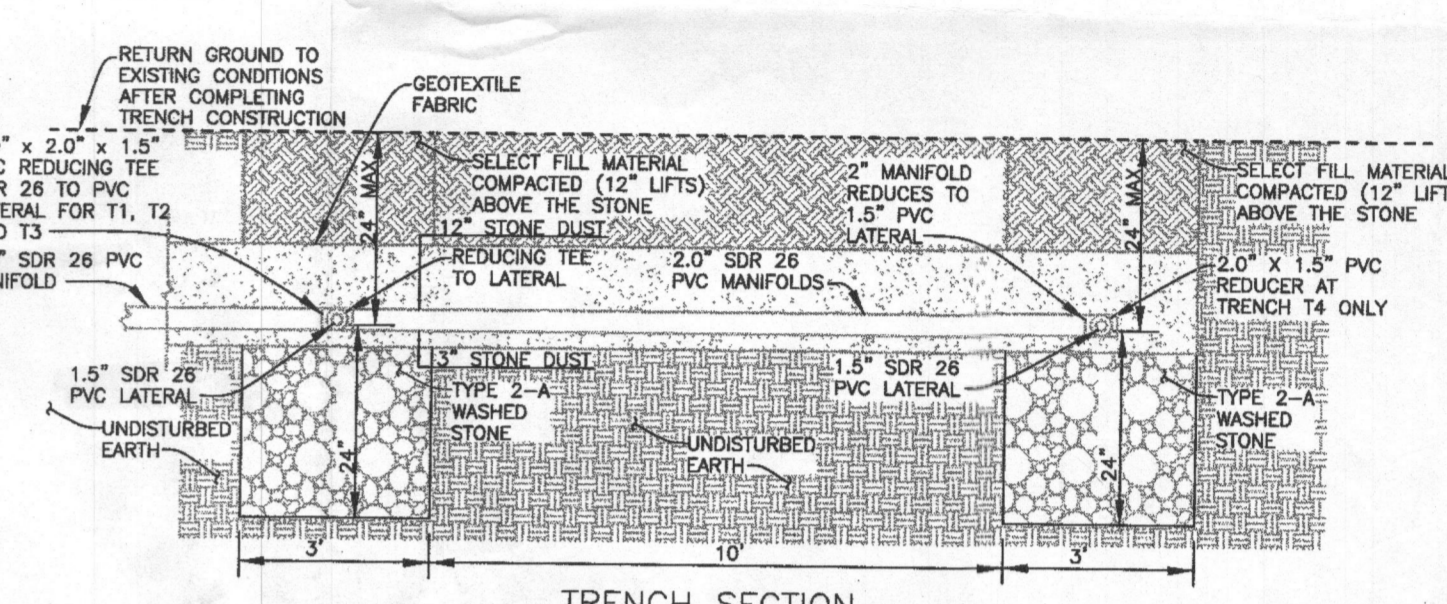
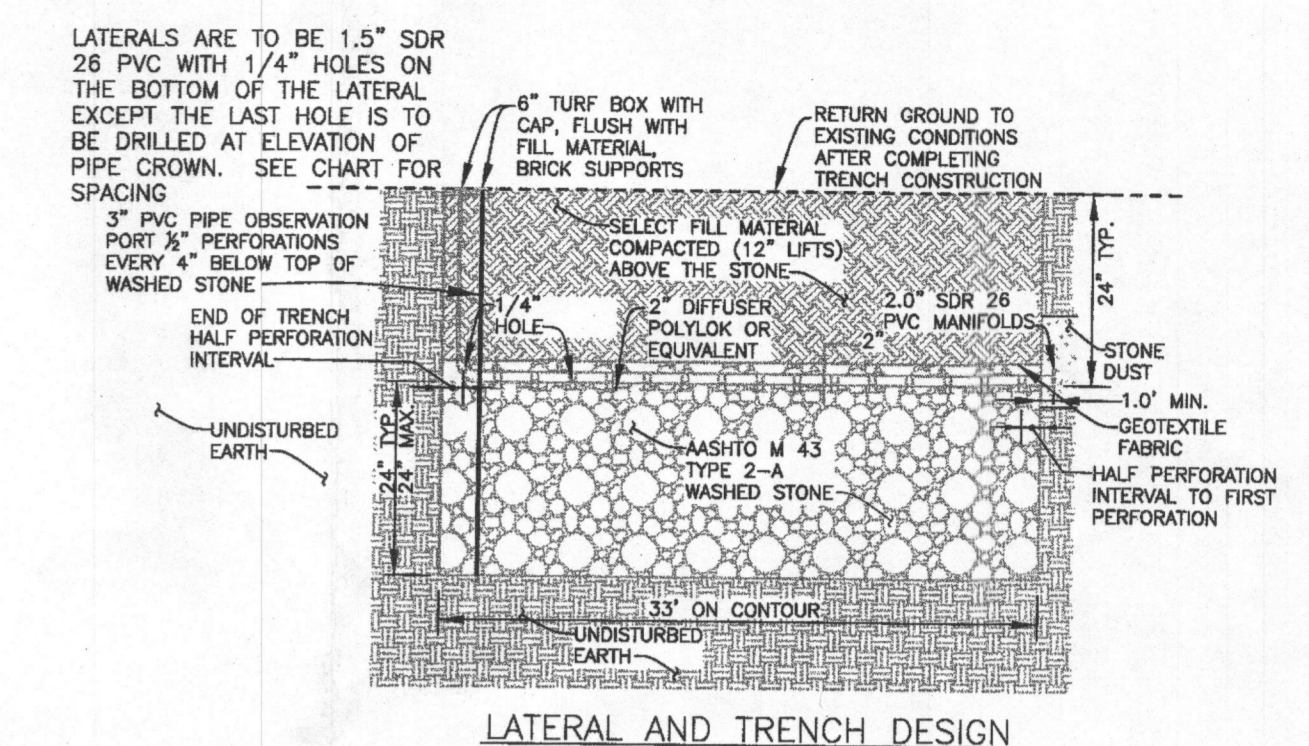
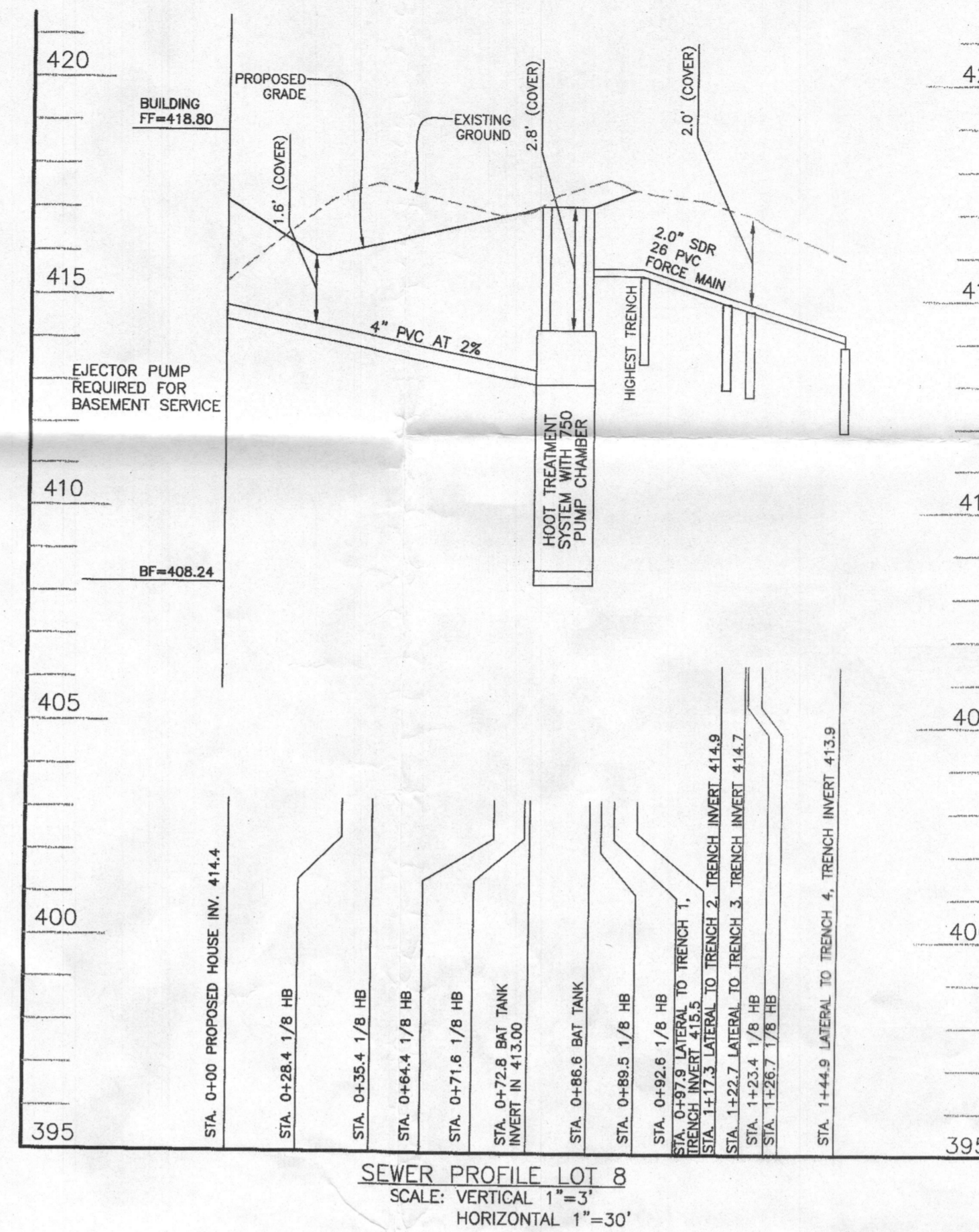
Motor:

- EP04 Single phase: 0.4 HP, 115 or 230 V, 60 Hz, 1550 RPM, built in overload with automatic reset.
- EP05 Single phase: 0.5 HP, 115 V or 230V, 60 Hz, 1550 RPM, built in overload with automatic reset.
- Power cord: 10 foot standard length, 16/3 SJTW with three prong grounding plug. Optional 20 foot length, 16/3 SJTW with three prong grounding plug (standard on EP05).
- Fully submerged in high grade turbine oil for lubrication and efficient heat transfer.

Available for automatic and manual operation.
Automatic models include Mechanical Float Switch assembled and preset at the factory.

PERFORMANCE RATINGS

Total Head (ft. of water)	Gallons Per Minute	
	EP04	EP05
5	53	-
10	46	62
15	36	55
20	21	46
25	0	33
30	-	11



BENCHMARK ENGINEERING, INC.

ENGINEERS • LAND SURVEYORS • PLANNERS

8480 BALTIMORE NATIONAL PIKE & SUITE 315
ELICOTT CITY, MARYLAND 21043
PHONE: 410-465-6105 • FAX: 410-465-6644
BE@BE-CMENGINEERING.COM

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. 45371. Date: 06-08-2016.

[Signature]
11/9/05

OWNER: CHARLES PATRICK CULLEN
SOPHIE LOUIS GORSKI-CULLEN
6624 TOWERING OAK PATH
COLUMBIA, MD 21044

BUILDER: TBD

DESIGN: BFC DRAFT: BFC

PROJECT: LOT 8- 11590 CHAPEL RISE
CLARKSVILLE, MARYLAND 21029

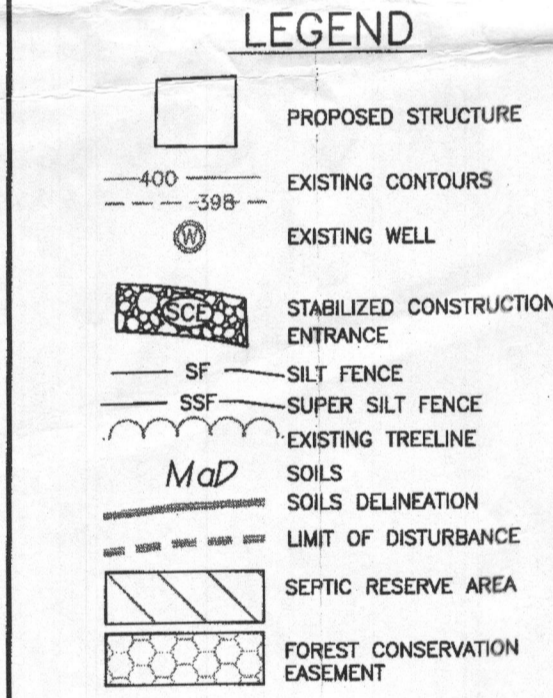
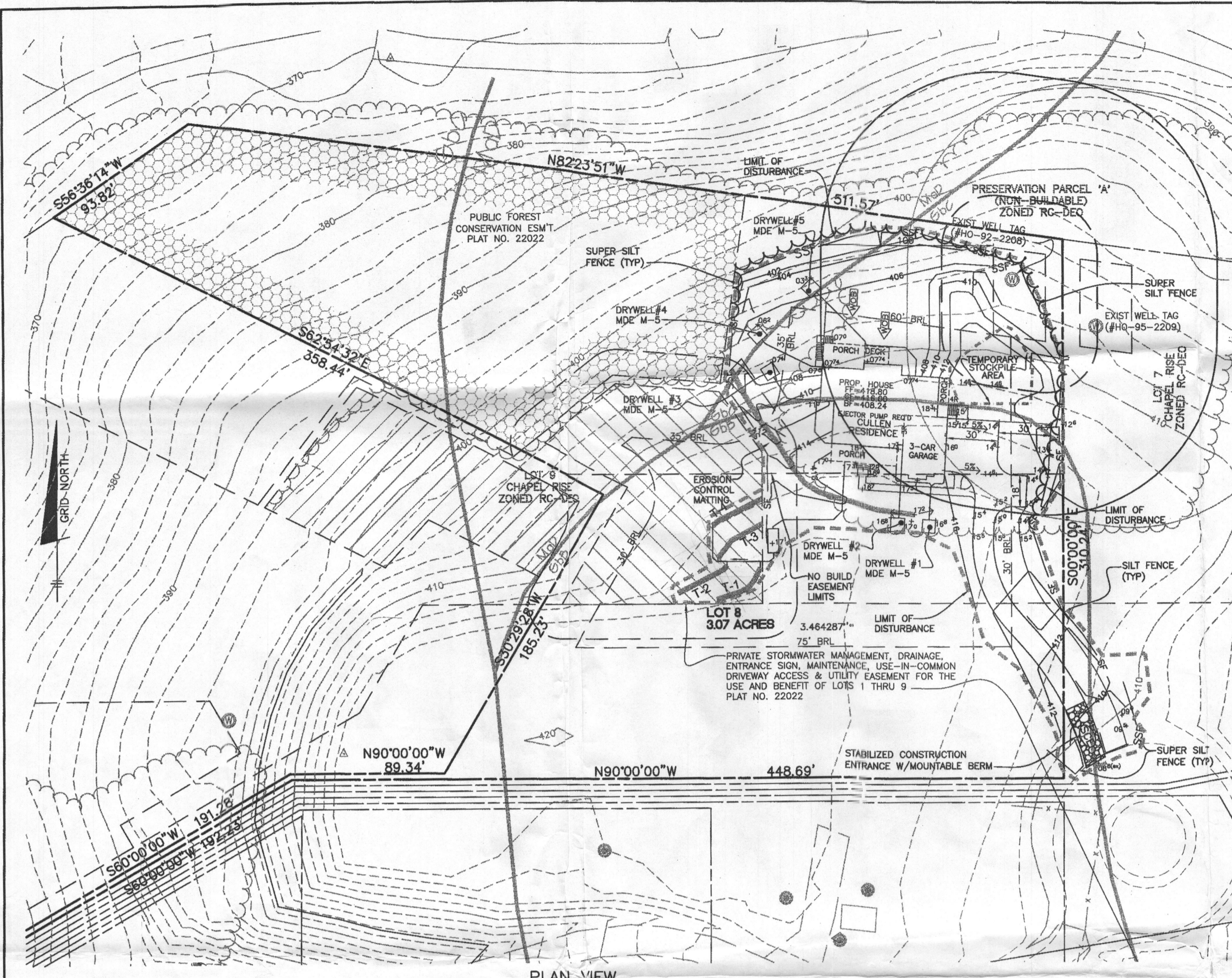
LOCATION: TAX MAP: 29, GRID: 13
PARCEL: 282 & 253
ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

TITLE: BAT SITE PLAN

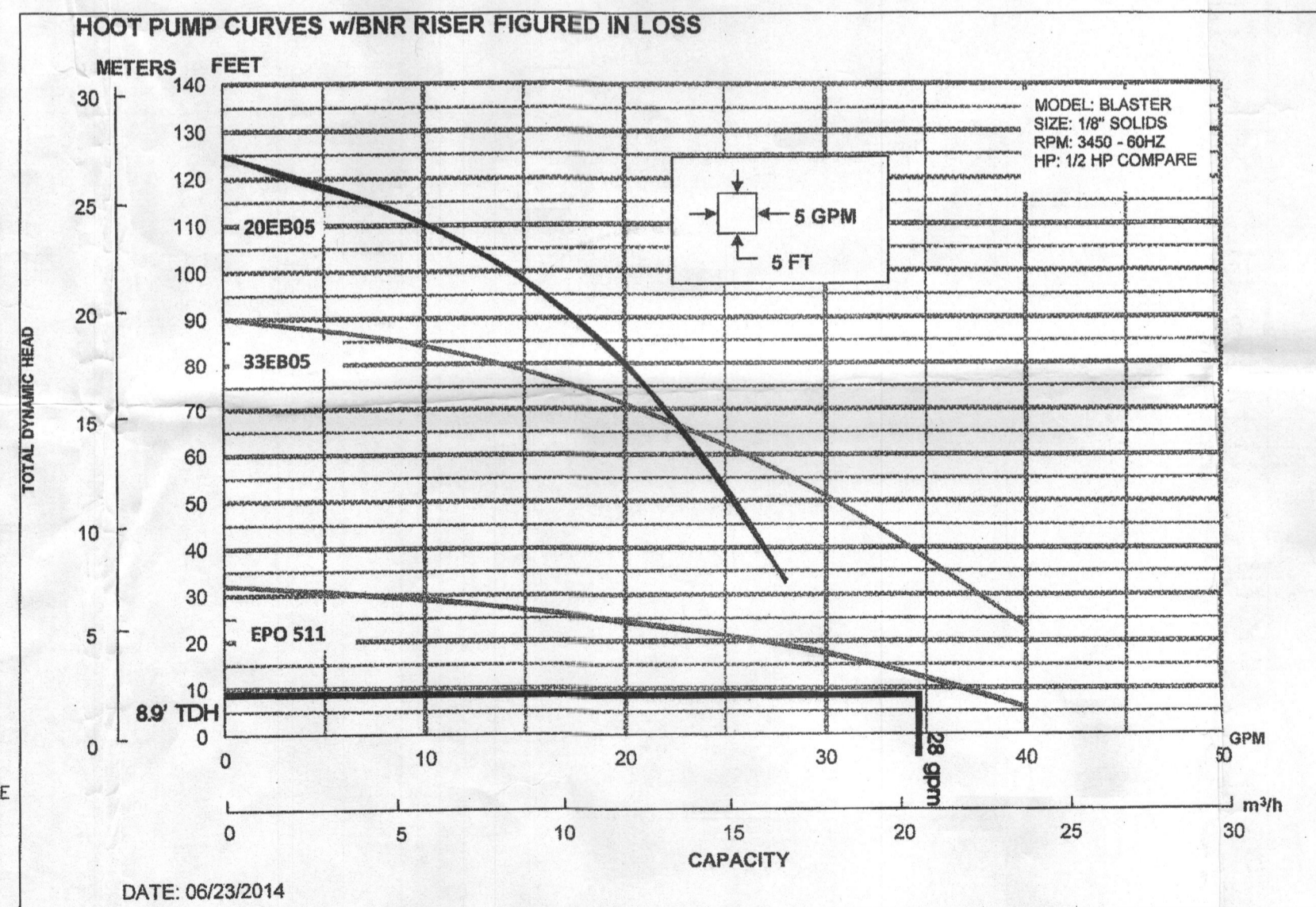
HOUSE TYPE: THE CULLEN RESIDENCE

DATE: OCTOBER, 2015 PROJECT NO. 2582

SCALE: 1" = 50' DRAWING 2 OF 2



- NOTES:**
1. THE LOT SHOWN HEREON COMPLIES WITH THE MINIMUM OWNERSHIP WIDTH AND LOT AREA AS REQUIRED BY THE MARYLAND STATE DEPARTMENT OF THE ENVIRONMENT.
 2. THIS AREA DESIGNATES A PRIVATE SEWERAGE EASEMENT OF 10,000 SQUARE FEET AS REQUIRED BY THE STATE DEPARTMENT OF THE ENVIRONMENT FOR INDIVIDUAL SEWERAGE DISPOSAL. IMPROVEMENTS OF ANY NATURE IN THIS AREA IS RESTRICTED UNTIL PUBLIC SEWER IS AVAILABLE. 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 SEWERAGE EASEMENT. ANY CHANGES TO A PRIVATE SEWERAGE EASEMENT SHALL REQUIRE A REVISED PERCOLATION CERTIFICATION PLAN. RECORDATION OF A REVISED SEWERAGE EASEMENT SHALL NOT BE NECESSARY.
 3. THE SEDIMENT AND EROSION CONTROLS, APPROVED BY HOWARD COUNTY DEPARTMENT OF THE ENVIRONMENT, SHALL BE USED FOR THE BUILDING PERMIT PLAN. DISTRICT BY GRADING PLAN: GP-15-07. SHALL BE USED FOR THE BUILDING PERMIT PLAN. HAS BEEN FIELD VERIFIED BY BENCHMARK ENGINEERING, INC., ON OR ABOUT NOVEMBER, 2013. EXACT LENGTHS OF SEPTIC TRENCHES ARE TO BE DETERMINED BY THE HEALTH DEPARTMENT AT THE TIME OF TRENCH LAYOUT AND INSPECTION.
 4. SPILL FROM THE TRENCHING OF THE SEPTIC AREA IS TO BE PLACED ON THE UPHILL SIDE OF THE EXCAVATION FOR EACH INDIVIDUAL LOT.
 5. ALL SEDIMENT AND EROSION CONTROL FEATURES USED ON THIS SITE SHALL COMPLY WITH 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.
 6. ALL DRAINAGE AND STORMWATER MANAGEMENT FEATURES USED ON THIS SITE MUST COMPLY WITH THE APPROVED ROAD CONSTRUCTION PLANS OR ENVIRONMENTAL CONCEPT PLAN.
 7. SEPTIC TANK FOR THIS LOT TO BE 2,000 GALLONS.
 8. THE EXISTING WELL SHOWN ON THIS PLAN, HO-95-2208, HAS BEEN FIELD LOCATED BY BENCHMARK ENGINEERING, INC. AND IS ACCURATELY SHOWN.
 9. THERE ARE NO EXISTING WELLS OR SEPTIC SYSTEMS WITHIN 100' OF THIS PROJECT'S BOUNDARY EXCEPT AS NOTED.
 10. ANY CHANGES TO A PRIVATE SEWERAGE EASEMENT SHALL REQUIRE A REVISED PERCOLATION CERTIFICATION PLAN.
 11. STORMWATER MANAGEMENT FOR THE DRIVEWAY IS PROVIDED BY NON-ROOFTOP DISCONNECTION (MDE DESIGNATION N-2). STORMWATER MANAGEMENT FOR THE ROOFTOP IS PROVIDED BY DRYWELLS (MDE DESIGNATION M-5).
 12. THE DESIGN OF THIS SEPTIC AREA REQUIRES THE USE OF A DEEP TRENCH SYSTEM. CALCULATIONS ARE BASED ON 5 BEDROOMS, 1.2 GPD/SF APPLICATION RATE AND 24" EFFECTIVE DEPTH. THE SEPTIC DISPOSAL SYSTEM FOR THIS LOT REQUIRES ADVANCED PRE-TREATMENT IN ACCORDANCE WITH MDE REGULATIONS.



Design Calculations

Design Input: Capacity requirements: 1 number of lots, 5 bedrooms per lot, 150 gpd use rate per bedroom.

Drainfield Requirements: Application Rate 1.2 gpd/sf, Trench width 2 ft, trench gravel depth 2 ft, number of trenches 10, min. trench spacing 6 ft.

Tanks and Capacities: BAT tank 1,500 gallons, 2nd settling tank NA, Equalization tank NA, pump tank size 2,000 gallons.

Distribution system: number of cells 1, trenches first system 4, lateral length per pump 132 ft, ID 1.5" SDR 26 PVC 1,754 inches, Max. Manifold length 58 ft, ID 2.0" SDR 26 PVC 2,173 inches.

Static Hydraulic Profile: Ground Elev. At BAT tank 417.10 ft, Tank #1 Inlet in Cover 413.00 ft, Tank #1 Top 414.27 ft, Fall in tank 0.13 ft.

Perforation Design: Size of Perforation 1/4 inches, Design Separation 5.00 ft, Use Perforations 7, Perforations per field 28.

Dosing volume, low rates and Pressures: Perforation flow rate 28.24 gpm, Friction (C) for PVC 180, Miscellaneous Losses 0 ft, Minimum Run Time 3.00 Min, Cells in simultaneous use 1, Pump tank Volume 47.21 Gal/in, Minimum Dose Vol. 84.72 gal.

Tank and Float Design: Ground over Tank = 417.10 ft, Top of Tank = 414.27 ft, Inset of Tank = 408.83 ft, Support and Pump = 0.79 ft, low probe = 1.25 ft, per Mayer Brothers Precast.

Friction Head

Friction Head = Head loss due to pipe friction

2.0" pipe = 58 feet

45° bends: 4 loss for manifold bend, 16.0 feet per table 4.3

Str. Coupling: 3 loss for straight tee, 6.0 feet per table 4.3

90 deg. Side tee: 1 loss for tee bend, 10.0 feet per table 4.3 for smaller pipe

Sudden reduction: 1 loss for reduction, 1.0 feet per Crane Co. technical paper

45° bends: 1 loss for lateral bend, 1.5 feet per table 4.3

Ball Valve: 1 loss for valve, 1.3 feet per table 4.3

Equivalent Manifold Length = 81.3 ft Total Friction loss = 1.19 feet

Size Pump Chamber

Pump chamber must be able to hold one dose and one day design flow

One day Capacity = 750 gallons

Dose = 125.00 gallons

Totals = 875 gallons

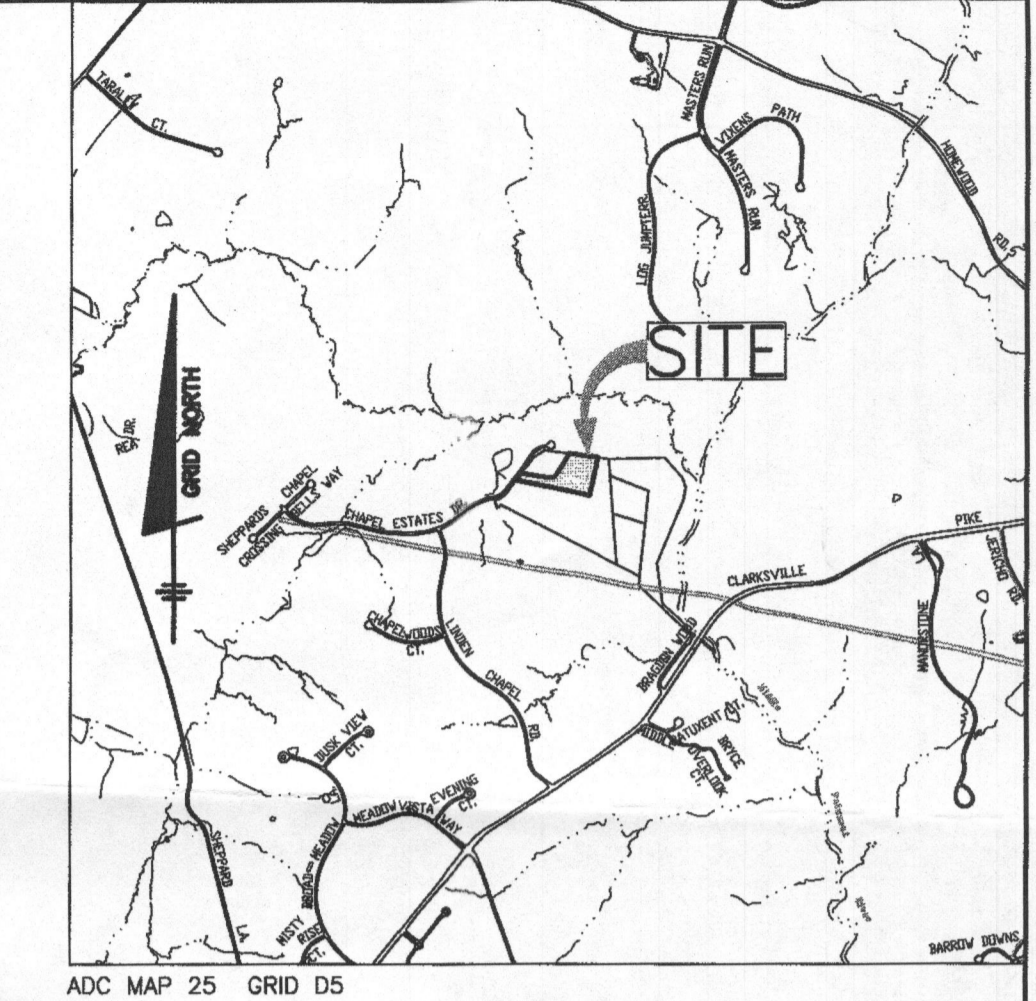
Use H-600 BNR with 750 gallon pump chamber (Tanks size per Health Department Septic Specifications Worksheet was 1,500 gallons)

Tank Dimensions: Exterior Length 13.75 feet, Interior Length 13.08 feet, Walls 0.33 feet, Width 6.46 feet, Interior Width 5.79 feet, Bottom 0.33 feet, Height 6.02 feet, Top 5.35 feet, Inset to inlet 4.42 feet, Area 75.73 sf, Inset to inlet 4.42 feet, Length Discharge Chamber: 23.40 sf, Area Discharge Chamber: 7.48, Tank Gallons per cubic foot: 47.21, Invert to Outlet 4.29 feet, Invert to high water probe = 4.25 feet, Vol. H.W. probe to Water level = 180.00 gallons, or 24.06417 cf, water level to bottom of top = 1.06, Vol. Water level to bottom of top = 80.15 cf, Total volume for Emergency = 590.53 gallons, or 104.22 cf, or 779.53 gallons

Lateral Pressure Calculations

Cell	Trench	Pipe	Beginning Manifold Loss	Ball Valve	Manifold Bends 45D	Manifold Length	Manifold velocity	Manifold Thru Tees	Delta Loss	Total Manifold Loss	Lateral 90 degree side tee loss	Sudden Reduction Loss	Lateral Bends 45 deg. Loss	Lateral Length to first perf. Loss	Lateral Loss Summation	Total Loss to First Perf.	Total Design Head (ft)	Flow per Lateral (gpm)
1	1	415.5	0.00	1	2	11.4	28.2	0	0.22	0.22	0.01	0.02	0.01	0.01	0.04	0.26	7.93	7.29
2	414.8	0.22	19.3	1	0.14	0.36	0.02	0.002	0.01	0.04	0.40	7.37	28.00	6	1.18	7.07	3.0%	
3	414.7	0.36	5.4	14.1	1	0.04	0.40	0.02	0.002	0.01	0.01	0.04	0.44	7.31	7.16	1.9%		
4	413.9	0.40	2	21.9	7.1	1	0.12	0.52	0.00	0.02	0.01	0.01	0.02	0.53	6.60	6.72	7.9%	

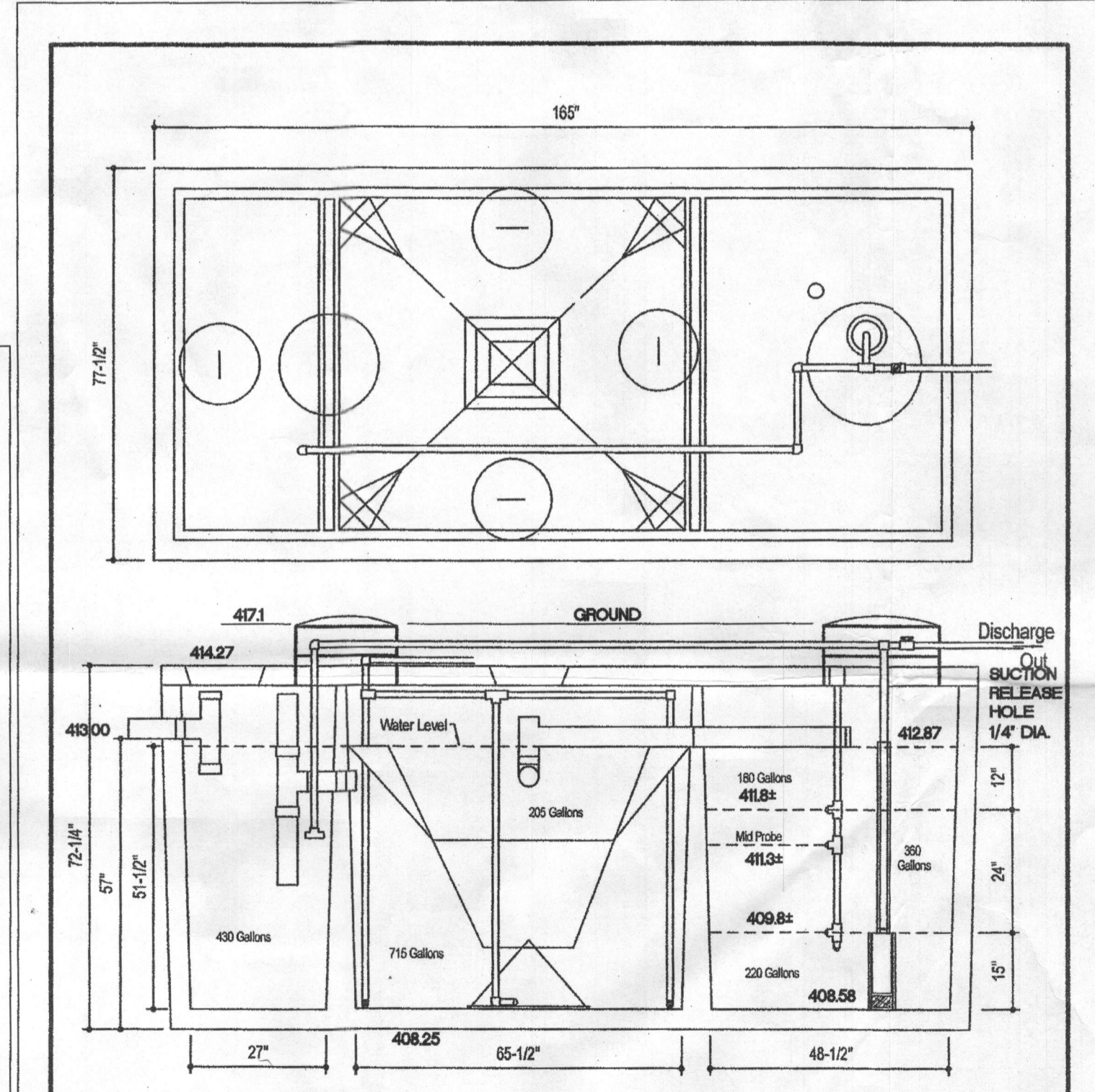
Perforation Diameter = 1/4" Distal Head 2 feet C = 150



Pump Requirements:

Performance = 28.24 gpm, Head of Water = 8.85 feet of head

Pump Selection: EPO5 Series effluent pump - EPO511, 1/2 horse power, See Manufacturer's specifications



DESIGN DATA & GENERAL NOTES

- 1) Concrete strength Fc=4,000 p.s.i. @ 28 days. Density = 149 pcf.
- 2) Concrete - Perforation Type 18 per ASTM C-150-02.
- 3) Admixtures & plasticizers per ASTM C 200-06 & C 404-02.
- 4) Reinforcing per ASTM A198, Min. 1/4" cover.

Mayer Brothers, Inc.
6264 Reister Road, Ellicott City, Maryland 21045, Tel. 410.795.1434, Fax. 410.795.1435, www.mayerbrothers.com

600 GPD BNR SYSTEM
H-600 BNR
with 750 GALLON PUMP CHAMBER

Dwg. No. Hoot Form #1 No Scale March 19, 2009

Trench and Lateral Design

Cell	Trench	Pipe Inv. Elev.	Trench Bottom Elev.	Highest Ground Over	Lowest Ground Over	Total Design Head (ft)	Approx. Lateral Length (ft)	Number of Perforations	Flow per Perforation (gpm)	Flow per Lateral (gpm)	Flow Differential
1	1	415.5	413.6	417.6	417.5	7.93	28.00	7	1.04	7.29	0.0%
2	2	414.8	413.0	417.0	416.8	7.37	28.00	6	1.18	7.07	3.0%
3	3	414.7	412.6	416.6	416.7	7.3	28.00	6	1.19	7.16	1.9%
4	4	413.9	411.9	415.9	415.9	6.6	28.00	5	1.34	6.72	7.9%

Perforation Diameter = 1/4 inches Target Flow = 7.29 gpm Cell 1 Flow Rate 28.24

Design Head = 2 feet

Depth to Effective Sidewall = Deep Trench Depth

Cell 1 2 ft 2 ft

Perforation Design

Cell	Trench	Number of Perforations	Manifold to Trench (ft)	Trench Length (ft)	Perforation Spacing (ft)	Dist. Manifold to First Perf. (ft)	Dist. Last Perf. to Trench Edge (ft)	Lateral Length (ft)
1	1	7	3.6	33	4.71	5.96	2.36	34.24
2	2	6	2.0	33	5.50	4.75	2.75	32.25
3	3	6	2.0	33	5.50	4.75	2.75	32.25
4	4	5	0.0	33	6.60	3.30	3.30	29.70

Deep Trench Calculations, per system

Application Rate: 750 GPD

Septic Flow: 1.2 GPD/sf

Trench Design Flow: 625 GPD

Deep Trenches:

- Trench Width: 36" or 3.0 ft
- Effective Depth: 24" or 2.0 ft
- Percent of Std. Trench: 62.50%

Trench Length:

- Length of Std. Trench: 208 ft
- Length of Deep Trench: 130 ft

Depth of Trench:

- Inlet depth: 2.0 ft
- Bottom Depth: 4.0 ft

Trench Separation:

- Separation Distance: 10 ft
- Distance Center to Cant: 13 ft

SEPTIC TRENCH DESIGN

SYSTEM	TRENCH DESIGNATION	LENGTH FEET	TOTAL LENGTH FEET
1	T1	33	33
	T2	33	66
	T3	33	99
REQ:	T4	33	132

BENCHMARK ENGINEERING, INC.
ENGINEERS & LAND SURVEYORS & PLANNERS

8490 BALTIMORE NATIONAL PIKE & SUITE 315
ELLCOTT CITY, MARYLAND 21043
PHONE: 410-465-6105 FAX: 410-465-6644
BEN@BEC-CIVILENGINEERING.COM

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. 45377, Expiration Date: 06-08-2016.

Signature: [Signature] Date: 10/2/15

OWNER: CHARLES PATRICK CULLEN, SOPHIE LOUISE GORSKI-CULLEN, 6624 TOWERING OAK PATH, COLUMBIA, MD 21044

BUILDER: TBD

PROJECT: LOT 8- 11590 CHAPEL RISE, CLARKSVILLE, MARYLAND 21029

LOCATION: TAX MAP: 29, GRID: 13, PARCEL: 282 & 353, ELECTION DISTRICT NO. 5, HOWARD COUNTY, MARYLAND

TITLE: BAT SITE PLAN

HOUSE TYPE: THE CULLEN RESIDENCE

DATE: OCTOBER, 2015 PROJECT NO. 2582

SCALE: 1" = 50' DRAWING 1 OF 2

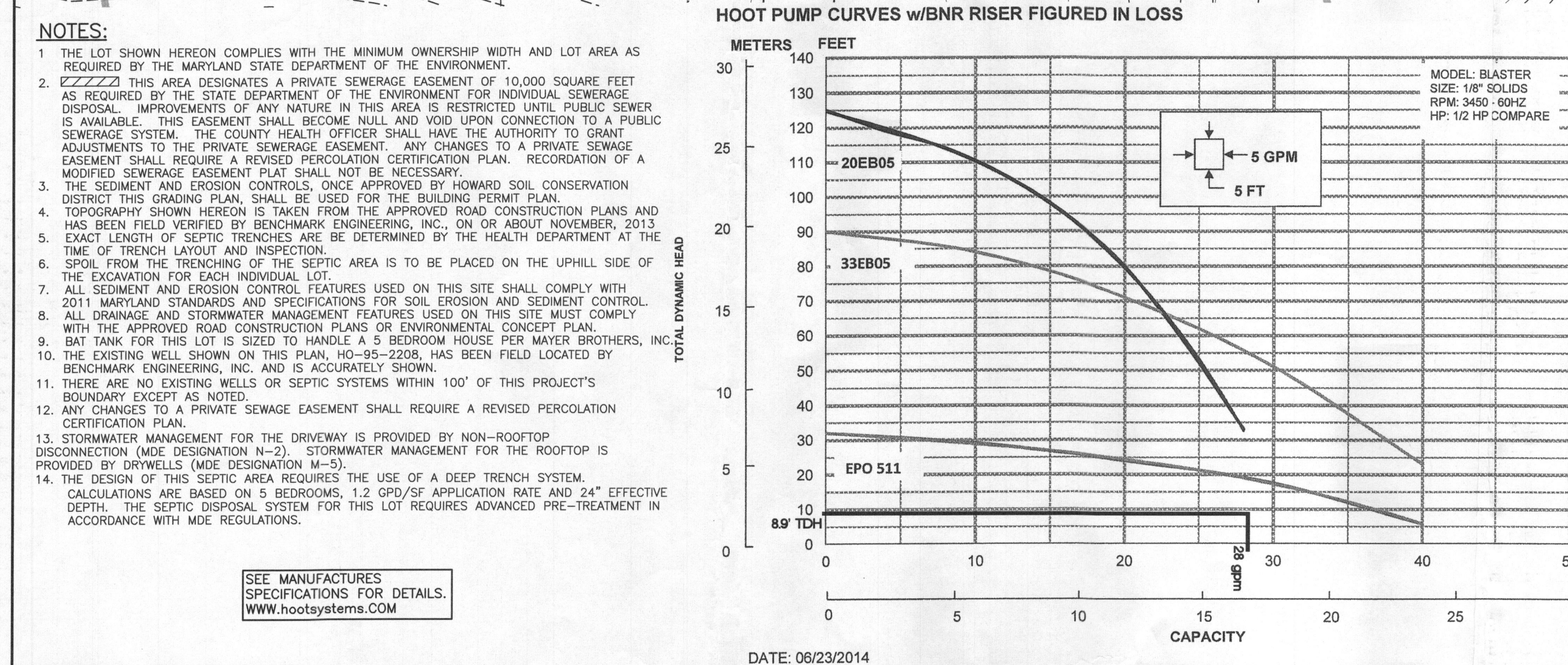
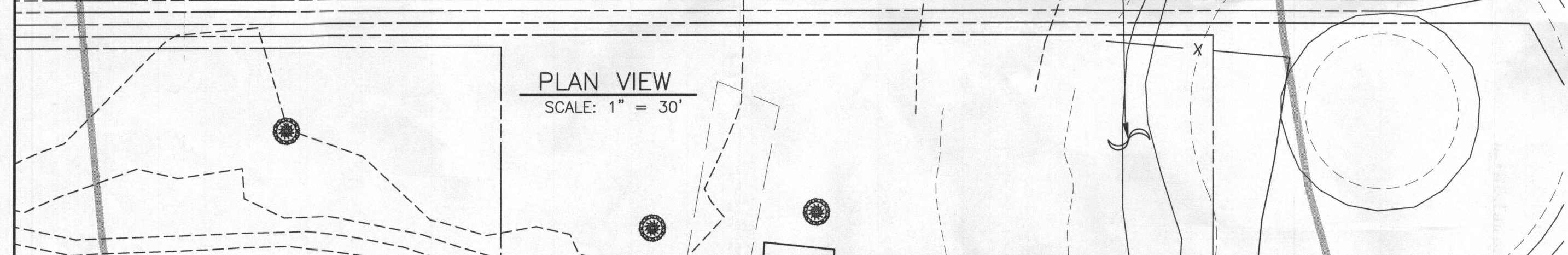
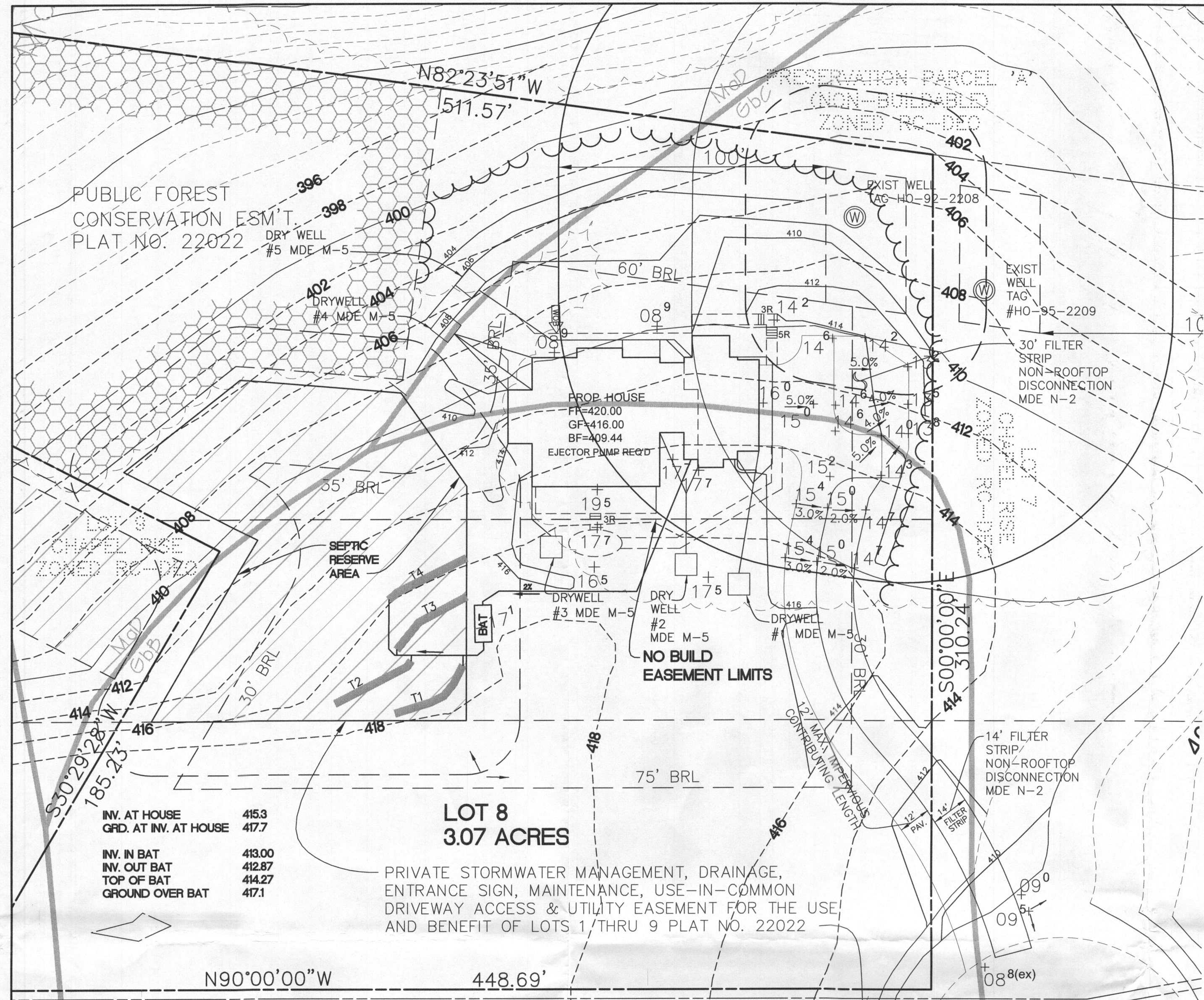
DESIGN: BFC **DRAFT:** BFC

SOILS CHART - SOIL SURVEY HOWARD COUNTY, MARYLAND PAGE 17

SYMBOL	HYDRC	HYDROLOGIC GROUP	ALTERNATE GROUP	NAME
B	B	B		GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GBC	B	B		GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
MdD	B	B		MANOR LOAM, 15 TO 25 PERCENT SLOPES

SEE MANUFACTURER'S SPECIFICATIONS FOR DETAILS. WWW.hootsystems.COM

BAT TECHNOLOGY SHALL BE IN COMPLIANCE WITH THE CURRENT LIST APPROVED BY MDE ON THE FOLLOWING WEB SITE: http://www.mde.state.md.us/programs/Water/BoyRestorationFund/OnsiteDisposalSystems/Pages/water/cbwr/cbwr_bat_process.aspx



DATE: 08/23/2014

SEE MANUFACTURER SPECIFICATIONS FOR DETAILS. WWW.hootsystems.com

BAT TECHNOLOGY SHALL BE IN COMPLIANCE WITH THE CURRENT LIST APPROVED BY MDE ON THE FOLLOWING WEB SITE: http://www.mde.state.md.us/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/water/cbwrf/cwds/bat_process.aspx

SYMBOL	HYDRIC	HYDROLOGIC GROUP	ALTERNATE GROUP	NAME
GCB	B			GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GBC	B			GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
MaD	B			MANOR LOAM, 15 TO 25 PERCENT SLOPES

Design Calculations

Design Input

Capacity requirements	1	Max. Daily Flow	750 gpd
bedrooms per lot	5	Average Daily Flow	375 gpd
use rate per bedroom	150 gpd	Maximum Daily Flow	0.52 gpm
		Average Daily Flow	0.26 gpm

Drainfield Requirements

Application Rate	1.2 gpd/sf	Standard Trench Length	208.33 ft
Trench width	3 ft	Deep Trench Conversion Factor	62.50 %
Trench gravel depth	2 ft	Deep Trench Length for MDE	130.21 ft
number of trenches	4	total trench length for 100% capacity	130.21 ft
min. trench spacing c-c	10 ft	individual trench length	33 ft
		Approx. Lateral Length	28.00 ft

Tanks and Capacities

BAT tank	1,500 gallons	minimum req. area	1662.5 sq ft
2nd settling tank	NA	req. capacity (1125+0.75MDF)	1667.5 gal
Equalization Tank	NA	design settling capacity	NA
pump tank size	2,000 gallons	min. pump tank capacity (ADF)	470 gal

Distribution system

number of cells	1	Total Number of Pumps	1
trenches first system	4	laterals served by pump	12.8 ft
lateral length per pump	132 ft	Vol./100 ft 1" SDR 26	16.6 gal
Ø 1.5" SDR 26 PVC	1.754 inches	Vol. of laterals served	19.6 gal
Max. Manifold length	58 ft	Vol./100 ft 2" SDR 26	19.6 gal
Ø 2" SDR 26 PVC	2.173 inches	Max. Manifold volume	11.4 gal

Static Hydraulic Profile

Ground Elev. At BAT tank	417.18 ft	Tank #1 outlet elev.	412.87 ft
Tank #1 inlet in	413.00 ft		
Cover	2.85 ft		
Tank #1 top	414.27 ft	Pump Tank outlet elev.	0.00 ft
Fall in tank	0.13 ft	Invert of pump tank	408.58 ft
		Pump Elevation	408.58 ft
		pump intake elev.	409.37 ft
		Cell 1	

Perforation Design

Size of Perforation	1/4 inch	Distal Pressure =	2.0 ft
Design Separation	5.00 ft (see figure 4)	Flow	1.04 gpm
Use Perforations	7	Perforations per Lateral	6.90
Perforations per foot	28	Perforation Actual Spacing	4.71 ft
		Design Flow rate	29.18 gpm

Dosing volume, flow rates and Pressures

Perforation flow rate	29.18 gpm	Static Head (low probe to highest lat.)	5.67 ft Cell 1
Friction (C) for PVC	150	Friction Head	1.19 ft Cell 1
Miscellaneous Losses	0 ft	Distal Head	2 ft
Minimum Run Time	3.00 Min.	Max. Total Dynamic Head	8.86 ft
Cells in simultaneous use	1	Estimated Dose (Lateral+1xMain) Vol.	94.53 gal
Pump tank Volume	47.21 Gal	Estimated Runtime	4.28 min.
Minimum Dose Vol.	84.72 gal	Design Dose	125 gal
		Average Doses	3.00 per day

Tank and Float Design

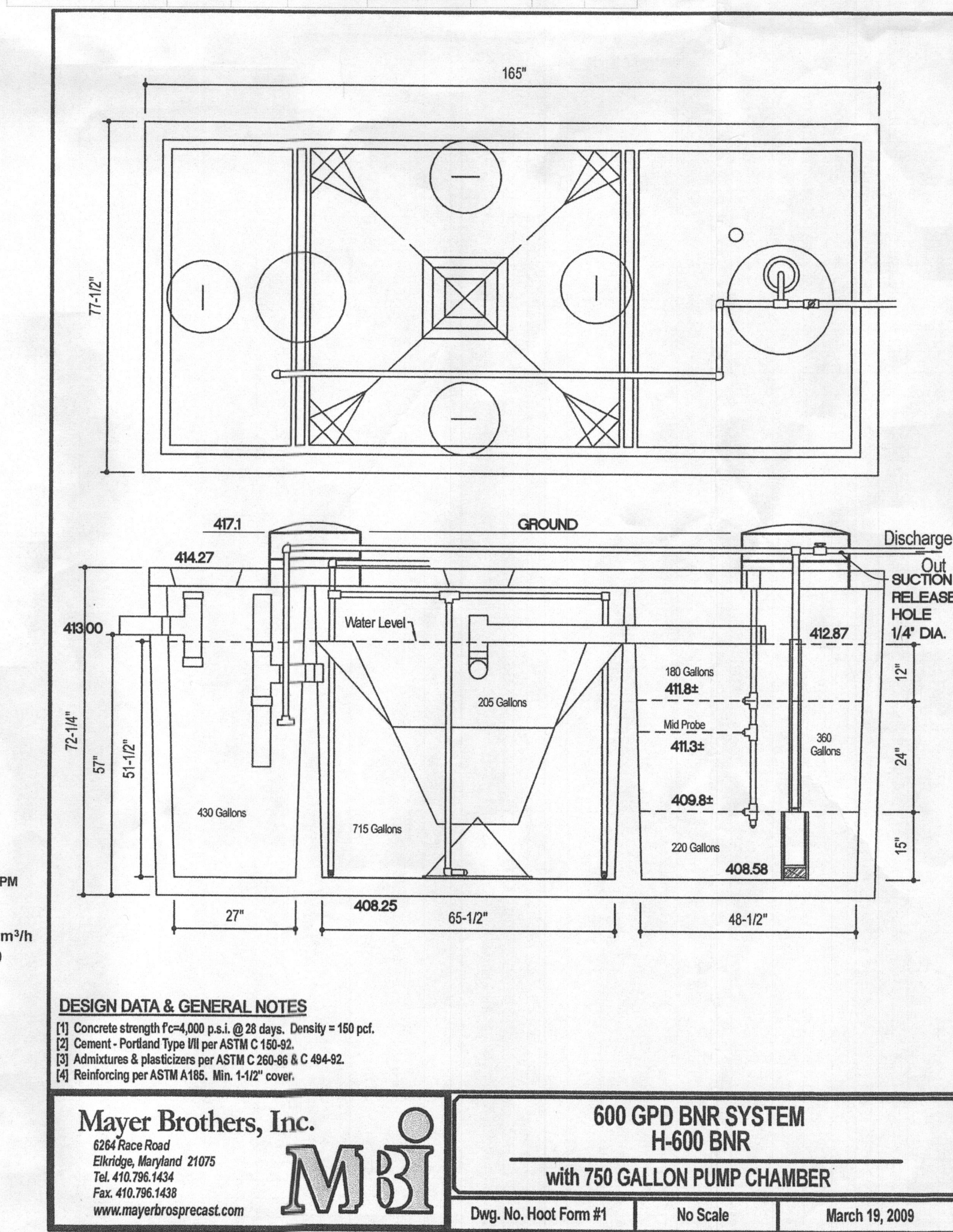
Ground over Tank =	417.10 ft	Inside Tank Dimensions	
Top of Tank =	414.27 ft	Height =	5.35 ft
Invert of Tank =	408.58 ft	Width =	5.79 ft
Support and Pump =	0.79 ft	Length =	13.08 ft
low probe =	1.25 ft	Number of Tanks =	1
per Mayer Brothers Precast			
Minimum Pump off =	409.83 ft		
Low Probe Elev =	409.83 ft		
		1.25 ft. above bottom	
Dose =	16.71 ft		
Area of Pit =	75.73 sq ft	(Use H-600 BNR with 750 gallon pump chamber	
		Distance invert to low probe	1.25 feet
Min. Pump on dist. =	0.22 ft	Distance low probe to mid probe	1.5 feet
Min. Pump on Elev. =	410.05 ft	Distance mid probe to Alarm	0.5 feet
Mid Probe Elev =	411.33 ft	Okay	
Distance between Pump on and Highwater Alarm =	0.5 ft		
Highwater Alarm Elevation =	411.83 ft		
Alarm Probe Elevation =	411.83 ft	Okay	
Vol. Above Alarm to water elev. =	24.06 cf or	180.00 gallons	
Vol. water elev. to bottom of top =	80.15 cf or	599.53 gallons	
Volume available for emergency =	104.22 cf or	779.53 gallons	
One Day Flow =	750.00 gallons	Okay	

Pump Requirements

Performance =	28.24 gpm
Head of Water =	8.86 feet of head

Pump Selection:

EP05 Series effluent pump - EP0511
1/2 horse power See Manufacturer's specifications



Friction Head

main

Friction Head = Head loss due to pipe friction
2.0" pipe = 58 feet

45° bends	4 loss for manifold bend	16.0 feet	per table 4.3
Str. Coupling	3 loss for straight tee	6.0 feet	per table 4.3
90 deg. Side tee	1 loss for side bend	1.0 feet	per table 4.3 for smaller pipe
Sudden reduction	1 loss for reduction	1.0 feet	per Crane Co. technical paper
45° bends	1 loss for lateral bend	1.8 feet	per table 4.3
Ball Valve	1 loss for valve	1.3 feet	per table 4.3

Equivalent Manifold Length = 81.3 ft Total Friction loss = 1.19 feet

Size Pump Chamber

Pump chamber must be able to hold one dose and one day design flow

One day Capacity = 750 gallons
Dose = 125.00 gallons
Totals = 875 gallons

Use H-600 BNR with 750 gallon pump chamber (Tank size per Health Department Septic Specifications Worksheet was 1,500 gallons)

Exterior Length:	13.75 feet	Interior Length:	13.08 feet	Walls:	0.33 feet
Width:	6.46 feet	Width:	5.79 feet	Bottom:	0.33 feet
Height:	6.02 feet	Height:	5.35 feet	Top:	0.33 feet
		Area:	75.73 sf	Invert to	
		Length Discharge Chamber:	4.04 feet	Inlet:	4.42 feet
		Area Discharge Chamber:	23.40 sf		
		Gallons per cubic foot:	7.48		
		Tank Gallons per inch per tank:	47.21		
		Invert to			
		Outlet	4.29 feet		
		Invert to high water probe =	4.25 feet		
		Vol. H.V. probe to Water level =	180.00 gallons		
		or	24.0641 cf		
		water level to bottom of top =	1.06		
		Vol. Water level to bottom of top =	80.15 cf		
		or	599.53 gallons		
		Total volume for Emergency =	104.22 cf		
		or	779.53 gallons		

Lateral Pressure Calculations

Cell	Trench	Pipe Inv.	Beginning Manifold Loss	Ball Valve	Manifold Bends 45D	Manifold Length	Manifold velocity	Manifold Thru Tees	Delta Loss	Total Manifold Loss	Lateral 90 degree	Sudden Reduction	Lateral Loss	Lateral Bends 45 deg. Loss	Lateral Length to first perf. Loss	Lateral Loss Summation	Total Loss to First Perf.	Total Design Head (ft)	Flow per Lateral (gpm)
1	1	415.5	0.00	1	2	11.4	28.2	0	0.22	0.22	0.02	0.002	0.02	0.01	0.01	0.04	0.40	7.37	7.07
2	2	414.8	0.22			19.3	21.2	1	0.14	0.36	0.02	0.002	0.01	0.01	0.04	0.40	7.37	7.07	7.29
3	3	414.7	0.36			5.4	14.1	1	0.04	0.40	0.02	0.002	0.01	0.01	0.04	0.44	7.31	7.16	7.16
4	4	413.9	0.40	2	2	21.9	7.1	1	0.12	0.52	0.00	0.002	0.01	0.01	0.02	0.53	6.80	6.72	6.72

Perforation Diameter = 1/4" Distal Head = 2 feet
C = 150

Required BAT Site Plan Notes

- Any change to the locations or depths to any components must be approved by the engineer and the Howard County Health Department prior to installation. A revised site plan may be required.
- The maximum depth of the BAT shall be per the manufacturer's specification, 3'0".
- The blower may not be located further from the tank than the manufacturer's specifications, 50' for a probe and 75' for a float tank.
- The BAT system shall be maintained and operated for the life of the system.
- The BAT shall be operated by and maintained by a certified service provider.
- Within one month of installation, a person installing the BAT system shall report to the Maryland Department of the Environment (MDE) in a manner acceptable to MDE, the address and date of completion of the BAT installation and the type of BAT installed.
- Electrical work for the BAT installation must be performed by a licensed electrician.
- An agreement and Easement must be completed and signed by all applicable parties, and recorded in Land Records of Howard County.
- The Health Department requires documentation for the start-up certification from the manufacturer prior to final approval of the installation.

Approved Septic System Plan
Howard County Health Department
HOOT 600 GPD BNR, H-600 BNR
to LPD system, see design details
Signature: [Signature] Date: 08/23/2014

Trench and Lateral Design

Cell	Trench	Pipe Inv. Elev.	Trench Bottom Elev.	Highest Ground Over	Lowest Ground Over	Total Design Head (ft)	Approx. Lateral Length (ft)	Number of Perforations	Flow per Perforation (gpm)	Flow per Lateral (gpm)	Flow Differential
1	1	415.5	413.6	417.6	417.5	7.93	28.00	7	1.04	7.29	0.0%
2	2	414.8	413.0	416.8	416.8	7.37	28.00	6	1.18	7.07	3.0%
3	3	414.7	412.6	416.6	416.7	7.3	28.00	6	1.19	7.16	1.9%
4	4	413.9	411.9	415.9	415.9	6.6	28.00	5	1.34	6.72	7.9%

Perforation Diameter = 1/4 inches Target Flow = 7.29 gpm Cell 1 Flow Rate 28.24 gpm
Design Head = 2 feet
Depth to Effective Sidewall = 2 feet Deep Trench Depth = 2 feet
Depth to Inlet = 2 feet

Perforation Design

Cell	Trench	Number of Perforations	Manifold to Trench (ft)	Trench Length (ft)	Perforation Spacing (ft)	Dist. Manifold to First Perf. (ft)	Dist. Last Perf. to Trench Edge (ft)	Lateral Length (ft)
1	1	7	3.6	33	4.71	5.95	2.36	34.24
2	2	6	2.0	33	5.50	4.75	2.75	32.25
3	3	6	2.0	33	5.50	4.75	2.75	32.25
4	4	5	0.0	33	6.60	3.30	3.30	29.70

see detail

BENCHMARK ENGINEERS & LAND SURVEYORS & PLANNERS
8480 BALTIMORE NATIONAL PIKE & SUITE 315
ELLICOTT CITY, MARYLAND 21043
PHONE: 410-465-6105 FAX: 410-465-6644
BEO@B-CVLENGINEERING.COM

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. 45577, Expiration Date: 06-08-2016.

OWNER: CHARLES PATRICK CULLEN
SOPHIE LOUISE GORSKI-CULLEN
6624 TOWERING OAK PATH
COLUMBIA, MD 21044

PROJECT: CHAPEL RISE - LOT 8
11590 CHAPEL RISE
CLARKSVILLE, MARYLAND 21029

LOCATION: TAX MAP 28, GRID: 13
PARCEL 289 & 353
ELECTION DISTRICT NO. 5
CLARKSVILLE, MD 21029
HOWARD COUNTY, MARYLAND

BUILDER: TBD

TITLE: BAT SITE PLAN AND LOW PRESSURE DOSE DESIGN
HOUSE TYPE: THE CULLEN RESIDENCE

DATE: OCTOBER, 2014 PROJECT NO. 2582
SCALE: 1" = 30' DRAWING 1 OF 2

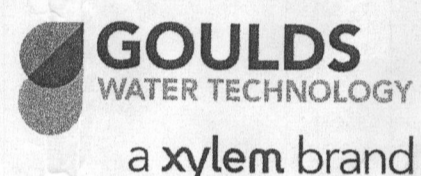
DESIGN: JMC DRAFT: JMC

Mayer Brothers, Inc. 600 GPD BNR SYSTEM H-600 BNR with 750 GALLON PUMP CHAMBER
Dwg. No. Hoot Form #1 No scale March 19, 2009



EP04 & EP05 Series Model 3871

SUBMERSIBLE EFFLUENT PUMPS



USE BLASTER PUMP EP0511

Wastewater

FEATURES

- EP04 Impeller: Thermoplastic semi-open design with pump out vanes for mechanical seal protection.
- EP05 Impeller: Thermoplastic enclosed design for improved performance.
- Casing and Base: Rugged thermoplastic design provides superior strength and corrosion resistance.
- Motor Housing: Cast iron for efficient heat transfer, strength, and durability.

APPLICATIONS

- Specifically designed for the following uses:
 - Effluent systems
 - Homes
 - Farms
 - Heavy duty sump
 - Water transfer
 - Dewatering

SPECIFICATIONS

- Solids handling capability: 3/4" maximum.
- Capacities: up to 60 GPM.
- Total heads: up to 31 feet.
- Discharge size: 1 1/2" NPT.
- Mechanical seal: carbon-rotary/ceramic-stationary, BUNA-N elastomers.
- Temperature:
 - 104° F (40° C) continuous
 - 140° F (60° C) intermittent.
- Class B Insulation
- Fasteners: 300 series stainless steel.
- Capable of running dry without damage to components.

- Motor Cover: Thermoplastic cover with integral handle and float switch attachment points.
- Power Cable: Severe duty rated oil and water resistant.
- Bearings: Upper and lower heavy duty ball bearing construction.

AGENCY LISTINGS
Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549

Motor:

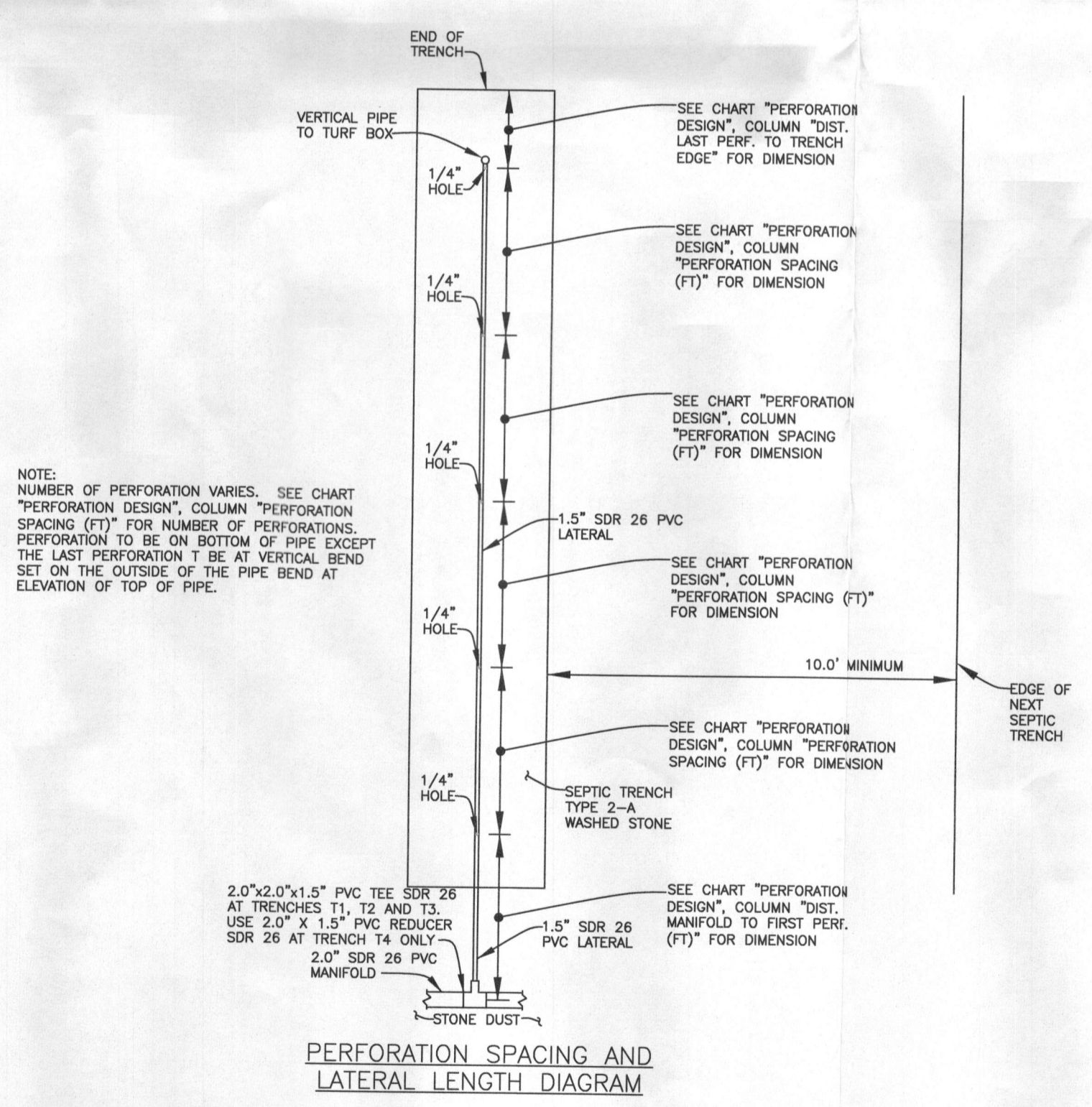
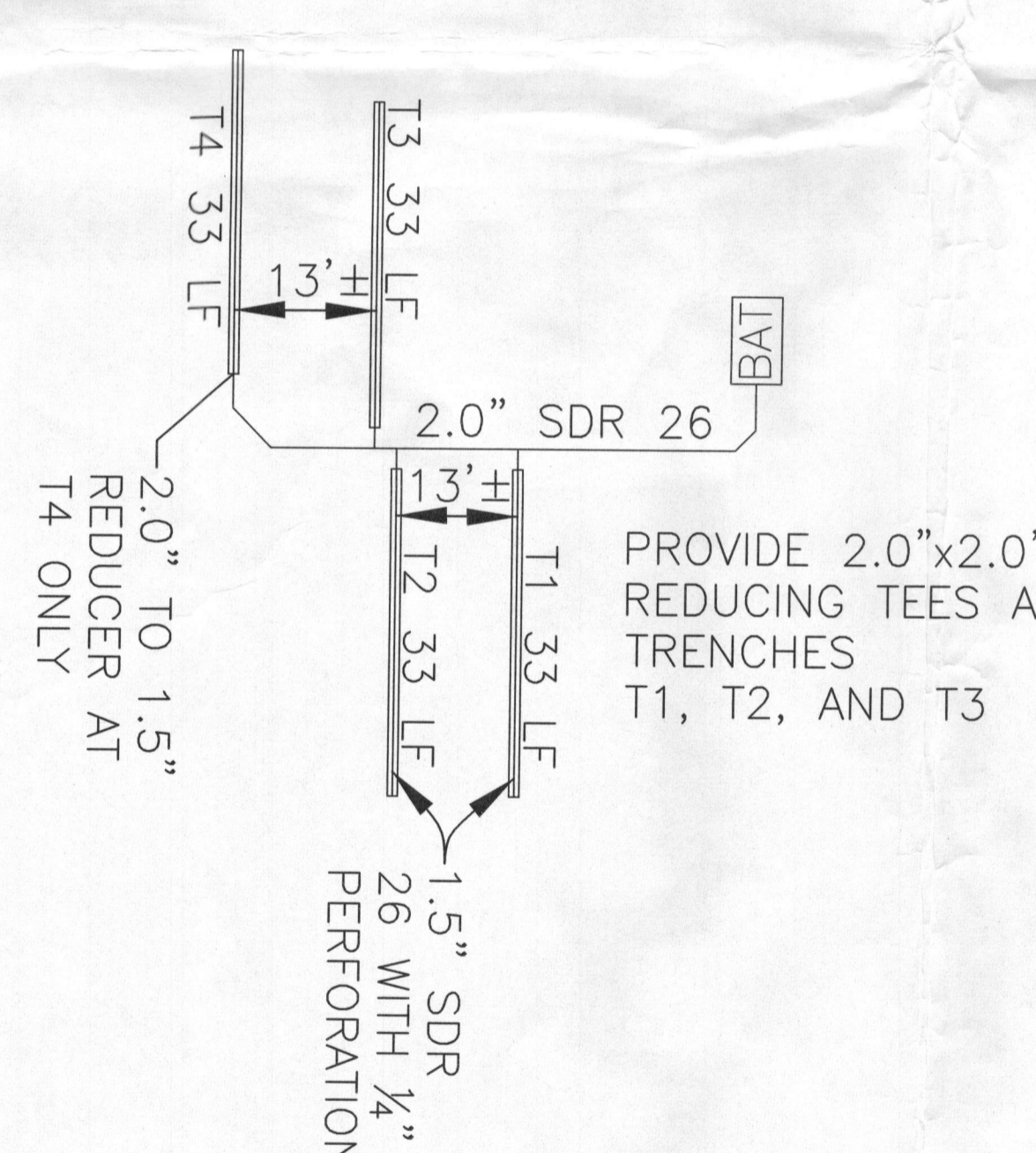
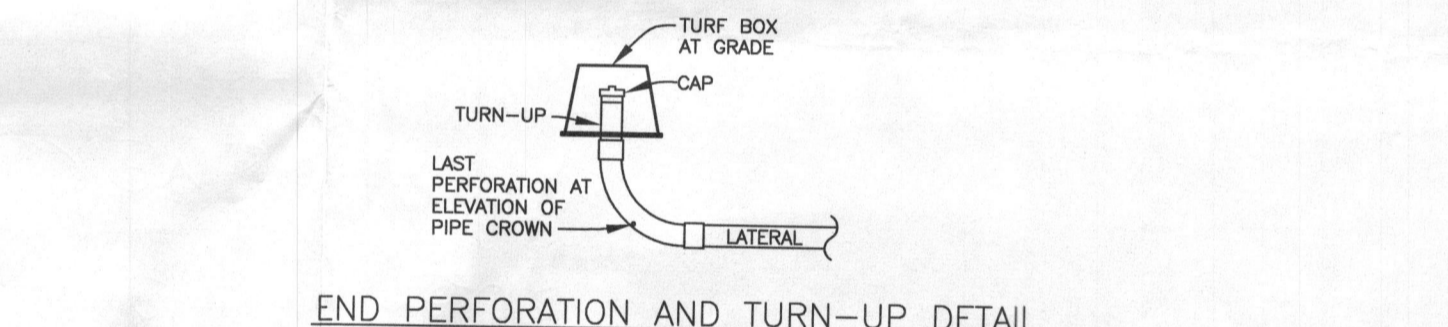
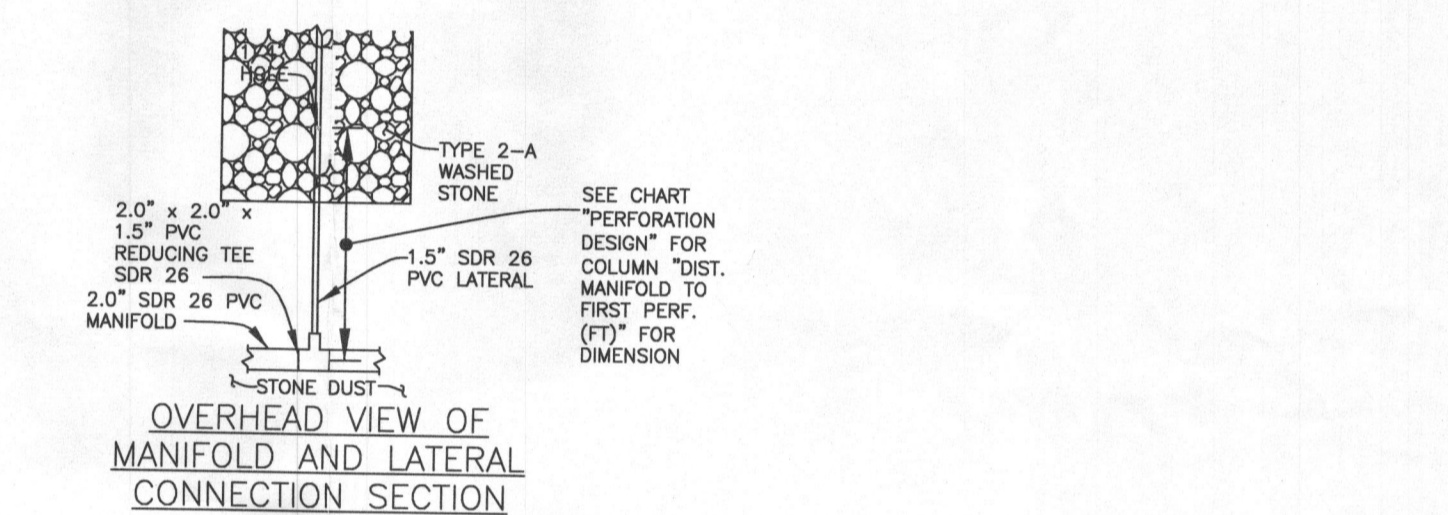
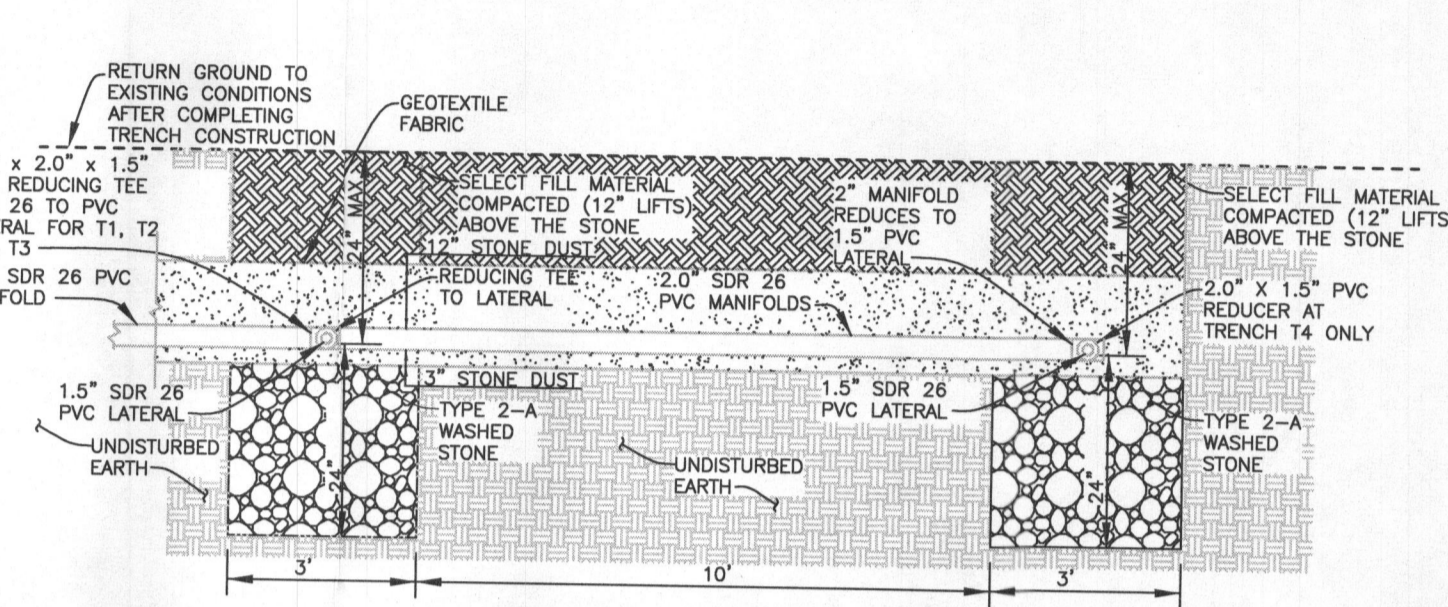
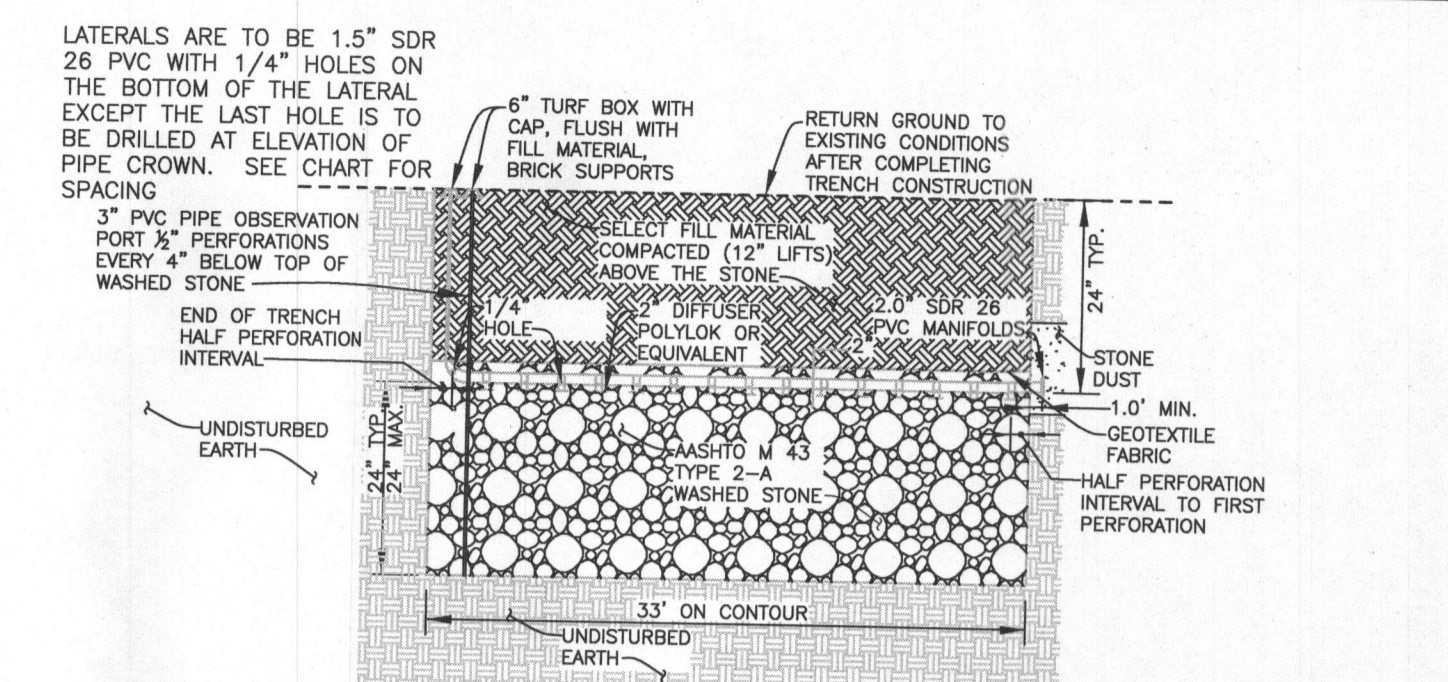
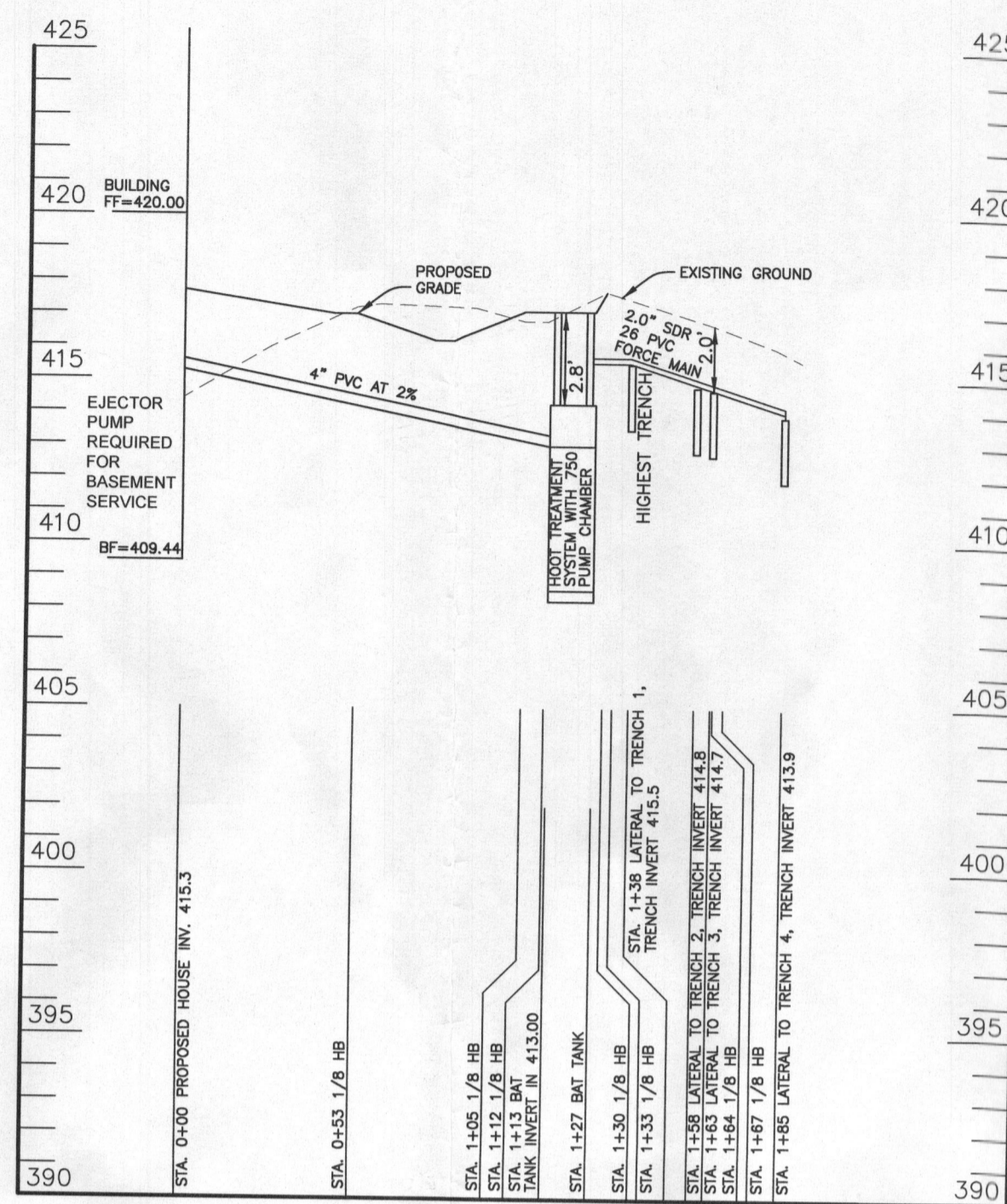
- EP04 Single phase: 0.4 HP, 115 or 230 V, 60 Hz, 1550 RPM, built in overload with automatic reset.
- EP05 Single phase: 0.5 HP, 115 V or 230V, 60 Hz, 1550 RPM, built in overload with automatic reset.
- Power cord: 10 foot standard length, 16/3 SJTW with three prong grounding plug. Optional 20 foot length, 16/3 SJTW with three prong grounding plug (standard on EP05).
- Fully submerged in high grade turbine oil for lubrication and efficient heat transfer.

Available for automatic and manual operation.
Automatic models include Mechanical Float Switch assembled and preset at the factory.

PERFORMANCE RATINGS

Total head (ft. of water)	Gallons Per Minute	
	EP04	EP05
1	53	-
10	46	62
15	36	55
20	21	46
25	0	33
30	-	11

Goulds Water Technology



Approved
BAT Plan
10/31/2014
RFB

BENCHMARK ENGINEERING, INC.

ENGINEERS • LAND SURVEYORS • PLANNERS

8480 BALTIMORE NATIONAL PIKE SUITE 315
ELLICOTT CITY, MARYLAND 21043
PHONE: 410-465-6105 FAX: 410-465-6644
BEI@BEI-CVLENGINEERING.COM

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer in the State of Maryland, License No. 14377, Expiration Date: 06-08-2016.

[Signature]
PROFESSIONAL ENGINEER

OWNER: CHARLES PATRICK CULLEN
SOPHIE LOUISE GORSKI-CULLEN
6624 TOWERING OAK PATH
COLUMBIA, MD 21044

PROJECT: CHAPEL RISE - LOT 8
11590 CHAPEL RISE
CLARKSVILLE, MARYLAND 21029

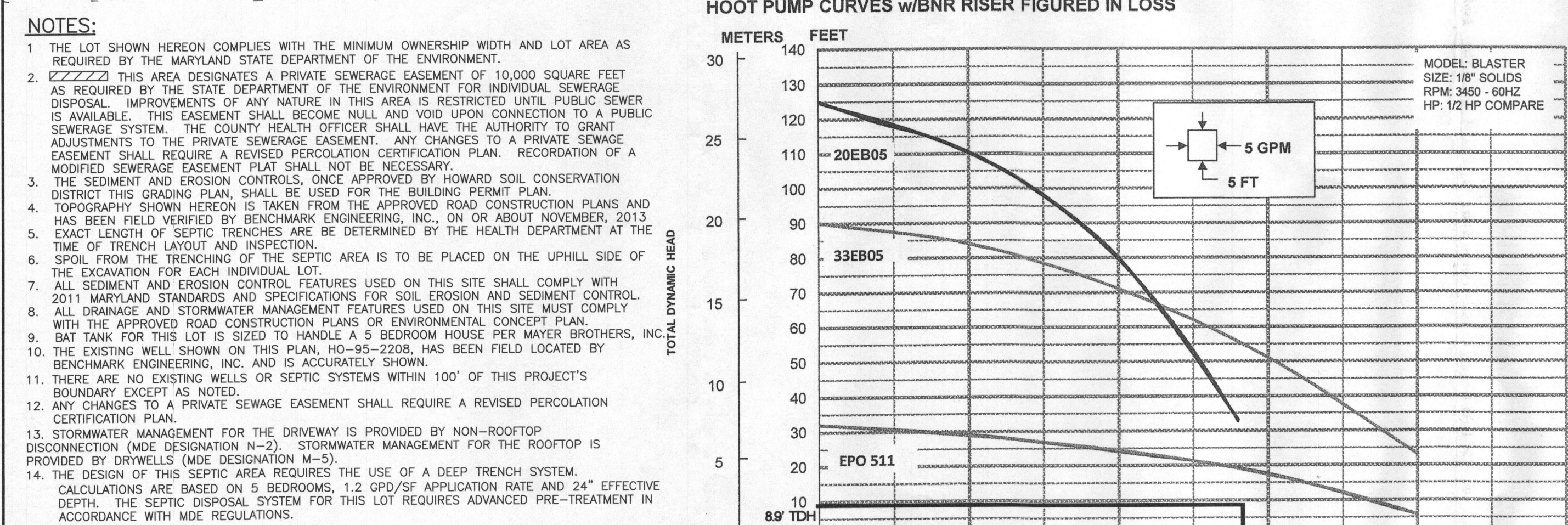
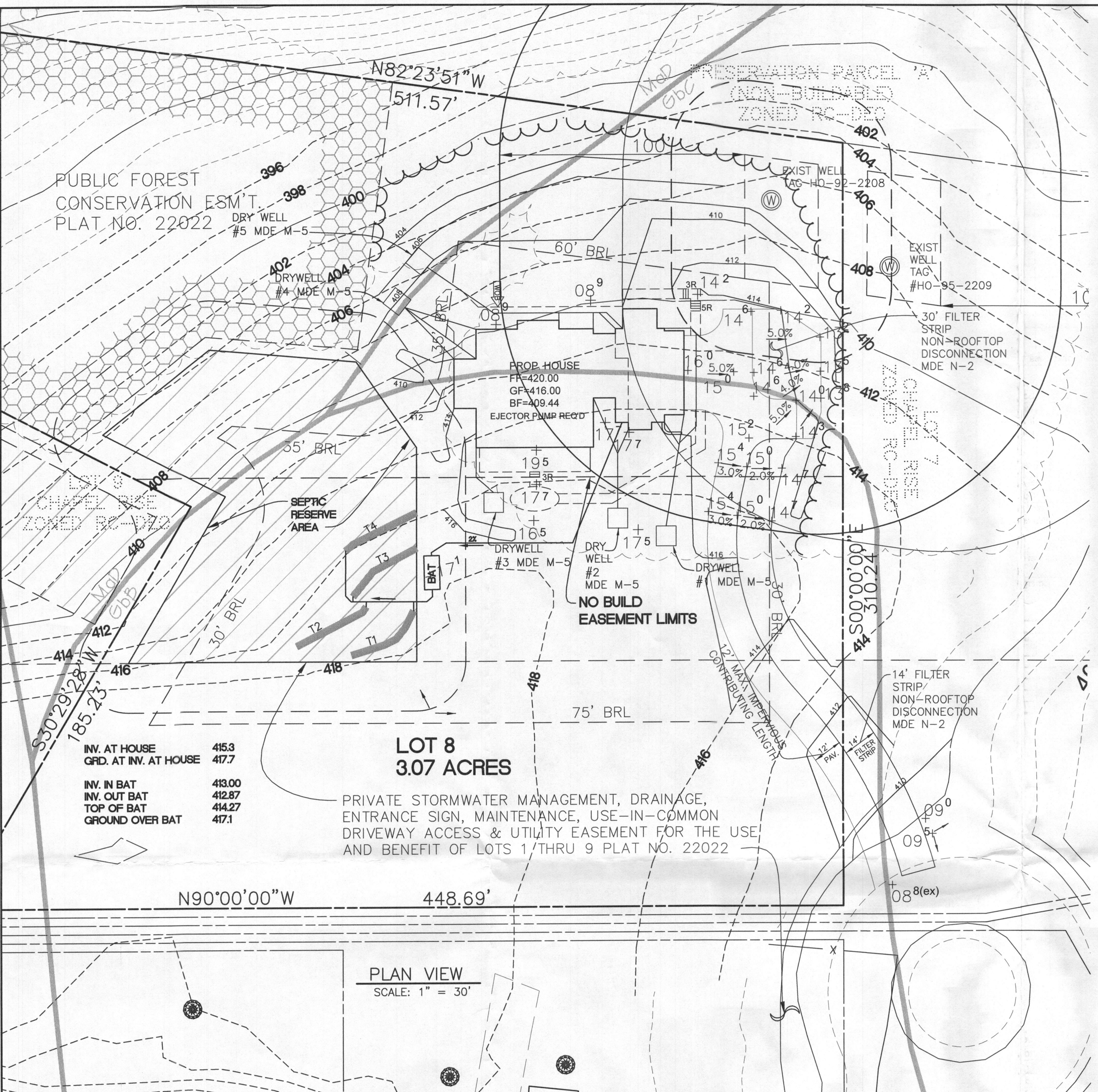
LOCATION: TAX MAP: 29, GRID: 13
PARCEL: 582 & 303
ELECTION DISTRICT NO. 5
11590 CHAPEL RISE
CLARKSVILLE, MD 21029
HOWARD COUNTY, MARYLAND

BUILDER: TBD

TITLE: BAT SITE PLAN AND LOW PRESSURE DOSE DETAILS
HOUSE TYPE: THE CULLEN RESIDENCE

DATE: OCTOBER, 2014 PROJECT NO. 2582

DESIGN: JMC DRAFT: JMC SCALE: 1" = 30' DRAWING 2 OF 2



DATE: 06/23/2014

SEE MANUFACTURER SPECIFICATIONS FOR DETAILS. WWW.HOOTSYSTEMS.COM

BAT TECHNOLOGY SHALL BE IN COMPLIANCE WITH THE CURRENT LIST APPROVED BY MDE ON THE FOLLOWING WEB SITE: http://www.mde.state.md.us/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/water/cbrwt/ocsd/brf_bat_process.aspx

SYMBOL	HYDRIC	HYDROLOGIC GROUP	ALTERNATE GROUP	NAME
GbB	B			GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B			GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
MaD	B			MANOR LOAM, 15 TO 25 PERCENT SLOPES

Design Input	Calculations
Capacity requirements	Maximum Daily Flow 750 gpd Average Daily Flow 375 gpd Minimum Daily Flow 0.52 gpm Average Daily Flow 0.26 gpm
Drainfield Requirements	Application Rate 1.2 gpd/sq ft Standard Trench Length 206.33 ft Trench width 2 ft Deep Trench Conversion Factor 62.50 % Deep Trench Length for MDF 130.21 ft number of trenches 4 total trench length for 100% capacity 130.21 ft min. trench spacing cc 10 ft individual trench length 33 ft Approx. Lateral Length 28.00 ft
Tanks and Capacities	minimum req. area 1562.5 sq ft BAT tank 1,500 gallons req. capacity (1125+(0.75*MDF)) 1687.5 gal 2nd setting tank NA gallons design setting capacity NA Equalization Tank NA gallons pump tank size 2,000 gallons min. pump tank capacity (ADF) 470 gal
Distribution system	number of cells 1 Total Number of Pumps 1 laterals served by pump 4 lateral length per pump 132 ft Vol 1100 ft 1.5" SDR 26 12.6 gal ID 1.5" SDR 26 PVC 1.754 inches Vol of lateral served 19.6 gal Max. Manifold length 58 ft Vol 1100 ft 2" SDR 26 19.6 gal ID 2" SDR 26 PVC 2.173 inches Max. Main volume 11.4 gal
Static Hydraulic Profile	Ground Elev. At BAT tank 419.30 ft Tank #1 effluent elev 412.87 ft Tank #1 invert in 413.00 ft Cover 2.83 ft Tank #1 top 414.27 ft Fall in tank 0.13 ft Pump Tank effluent elev 0.00 ft Invert of pump tank 408.58 ft Pump Elevation 408.58 ft Pump Intake elev 409.37 ft
Perforation Design	Distal Pressure = 2.0 ft Size of Perforation 1/4 inches Flow 1.04 gpm Design Separation 5.00 ft (see figure 4.4) Perforations per Lateral 6.90 Use Perforations 7 Perforation Actual Spacing 4.71 ft Perforations per field 28 Design Flow rate 29.18 gpm
Dosing volume, flow rates and Pressures	Perforation flow rate 29.26 gpm Static Head (low probe to highest lat.) 5.67 ft Cell 1 Friction (C) for PVC 150 Friction Head 1.19 ft Cell 1 Miscellaneous Losses 0 ft Distal Head 2 ft Minimum Run Time 3.00 Min. Max. Total Dynamic Head 8.86 ft Cells in simultaneous use 1 Estimated Dose (x(Lateral+VolMain)) Vol. 94.53 gal Pump tank Volume 47.21 Gal/In. Estimated Runtime 4.28 min. Minimum Dose Vol. 84.72 gal. Design Dose 125 gal Average Doses 3.00 per day
Tank and Float Design	Ground over Tank = 417.10 ft Inside Tank Dimensions Top of Tank = 414.27 ft Height = 5.35 ft Invert of Tank = 408.58 ft Width = 5.79 ft Support and Pump = 0.79 ft Length = 13.08 ft Low Probe = 1.25 ft Number of Tanks = 1 per Mayer Brothers Precast minimum Pump off = 409.83 ft Low Probe Elev. = 409.83 ft 1.25 ft. above bottom Dose = 16.71 ft Use H-600 BNR with 750 gallon pump chamber Area of Pk 75.73 sq ft Distance Invert to low probe 1.25 feet Min. Pump on dist. = 0.22 ft Distance low probe to mid probe 1.5 feet Min. Pump on Elev. = 410.05 ft Distance mid probe to Alarm 0.5 feet Mid Probe Elev. = 411.33 Okay Distance between Pump on and Highwater Alarm = 0.5 ft Highwater Alarm Elevation = 411.83 ft Alarm Probe Elevation = 411.83 Okay Vol. Above Alarm to water elev. = 24.06 of or 190.00 gallons Vol. water elev. to bottom of top = 80.15 of or 599.53 gallons Volume available for emergency = 104.22 of or 779.53 gallons One Day Flow = 750.00 gallons Okay
Pump Requirements	Performance = 28.24 gpm Head of Water = 8.86 feet of head
Pump Selection	EPO5 Series effluent pump - EPO511 1/2 horse power See Manufacturer's specifications

Friction Head	main
Friction Head = Head loss due to pipe friction	2.0" pipe = 58 feet
45° bends	4 loss for manifold bend 16.0 feet per table 4.3
Str. Coupling	3 loss for straight tee 8.0 feet per table 4.3
90 deg. Side tee	10.0 feet per table 4.3 for smaller pipe
Sudden reduction	1 loss for reduction 1.0 feet per Crane Co. technical paper
45° bends	1 loss for lateral bend 1.0 feet per table 4.3
Ball Valve	1 loss for valve 1.3 feet per table 4.3
Equivalent Manifold Length =	81.3 ft
Total Friction loss =	1.19 feet

Size Pump Chamber

Pump chamber must be able to hold one dose and one day design flow

One day Capacity = 750 gallons
Dose = 125.00 gallons
Totals = 875 gallons

Use H-600 BNR with 750 gallon pump chamber (Tanks size per Health Department Septic Specifications Worksheet was 1500 gallons)

Tank Dimensions:
Exterior Length: 13.75 feet Interior Length: 13.08 feet Walls: 0.33 feet
Exterior Width: 6.46 feet Interior Width: 5.79 feet Bottom: 0.33 feet
Exterior Height: 6.02 feet Interior Height: 5.35 feet Top: 0.33 feet
Area: 75.73 sf Invert to: 4.42 feet
Length Discharge Chamber: 4.04 feet Inlet: 4.42 feet
Area Discharge Chamber: 23.40 sf
Gallons per cubic foot: 7.48
Tank Gallons per inch per tank: 47.21
Invert to Outlet: 4.29 feet
Invert to high water probe = 4.25 feet
Vol. H.W. probe to Water level = 180.00 gallons
water level to bottom of top = 24.06417 cf
Vol. Water level to bottom of top = 80.15 cf
or 599.53 gallons
Total volume for Emergency = 104.22 cf
or 779.53 gallons

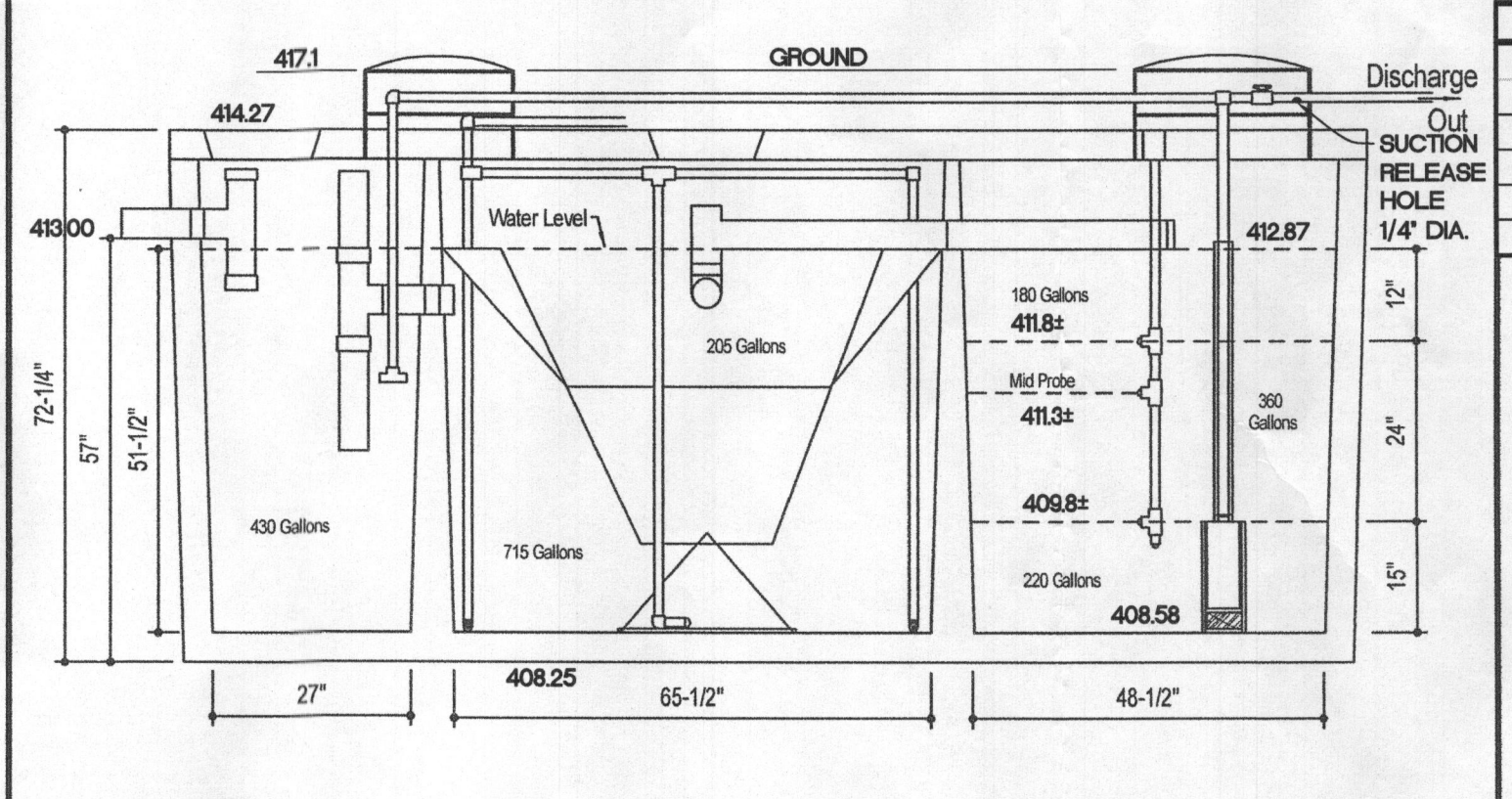
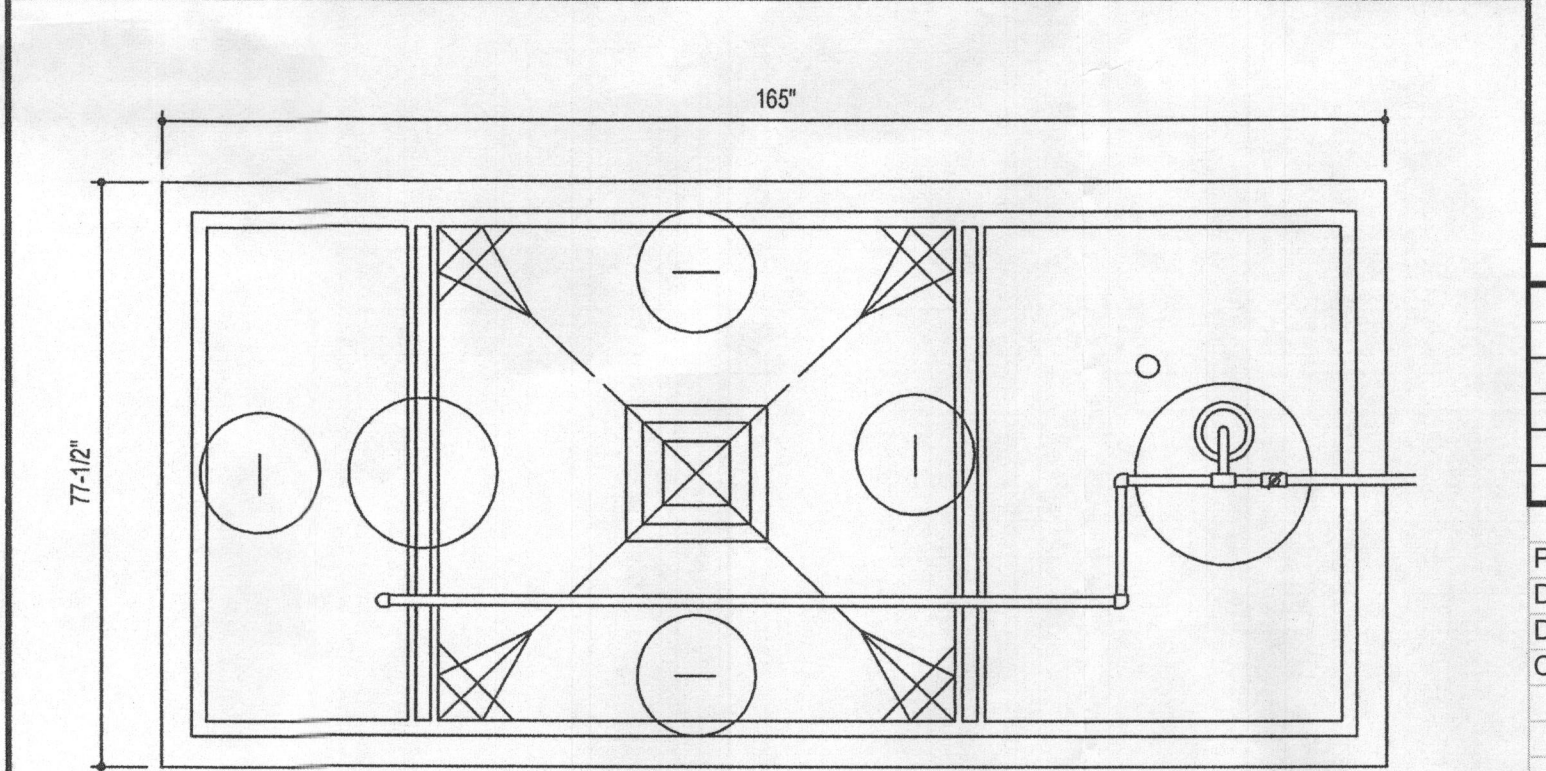
Cell	Trench	Pipe Elev.	Beginning Manifold Loss	Ball Valve	Manifold Bends 45D	Manifold Length	Manifold velocity	Manifold Thru Tees	Delta Loss Manifold	Total Manifold Loss	Lateral 90 degree side tee loss	Sudden Reduction Loss	Lateral Bends 45 deg. Loss	Lateral Length to first perf. Loss	Lateral Loss Summation	Total Loss to First Perf.	Total Design Head (ft)	Flow per Lateral (gpm)
1	1	415.5	0.00	1	2	11.4	28.2	0	0.22	0.22	0.02	0.002	0.01	0.01	0.04	0.26	7.93	7.93
2	2	414.8	0.22			19.3	21.2	1	0.14	0.36	0.02	0.002	0.01	0.01	0.04	0.40	7.37	7.07
3	3	414.7	0.36			5.4	14.1	1	0.04	0.40	0.02	0.002	0.01	0.01	0.04	0.44	7.31	7.16
4	4	413.9	0.40		2	21.9	7.1	1	0.12	0.52	0.00	0.002	0.01	0.01	0.02	0.53	6.60	6.72

Cell	Trench	Pipe Inv. Elev.	Bottom Elev.	Highest Ground Over	Lowest Ground Over	Total Design Head (ft)	Approx. Lateral Length (ft)	Number of Perforations	Flow per Perforation (gpm)	Flow per Lateral (gpm)	Flow Diff. (gpm)
1	1	415.5	413.6	417.5	417.5	7.93	28.00	7	1.04	7.29	0.09
2	2	414.8	413.0	417.0	416.8	7.37	28.00	6	1.18	7.07	3.09
3	3	414.7	412.6	416.6	416.7	7.3	28.00	6	1.19	7.16	1.99
4	4	413.9	411.9	415.9	415.9	6.6	28.00	5	1.34	6.72	7.99

Approved Septic System Plan
Howard County Health Department
HOOT 600 GPD BNR; H-600 BNR
discharge to LPD system; see details
Signature: [Signature] 10/31/2014
Date

Required BAT Site Plan Notes

- Any change to the locations or depths to any components must be approved by the engineer and the Howard County Health Department prior to installation. A revised site plan may be required.
- The maximum depth of the BAT shall be per the manufacturer's specification, 3.0'.
- The blower may not be located further from the tank than the manufacturer's specifications, 50' for a probe and 75' for a float tree.
- The BAT system shall be maintained and operated for the life of the system.
- The BAT shall be operated by and maintained by a certified service provider.
- Within one month of installation, a person installing the BAT system shall report to the Maryland Department of the Environment (MDE) in a manner acceptable to MDE, the address and date of completion of the BAT installation and the type of BAT installed.
- Electrical work for the BAT installation must be performed by a licensed electrician.
- An agreement and Easement must be completed and signed by all applicable parties, and recorded in Land Records of Howard County.
- The Health Department requires documentation for the start-up certification from the manufacturer prior to final approval of the installation.



DESIGN DATA & GENERAL NOTES

- Concrete strength $f'c=4,000$ p.s.i. @ 28 days. Density = 150 pcf.
- Cement - Portland Type III per ASTM C-150-92.
- Admixtures & plasticizers per ASTM C-260-96 & C-484-92.
- Reinforcing per ASTM A-108. Min. 1/2" cover.

Mayer Brothers, Inc.
624 Ross Road
Elkridge, Maryland 21075
Tel. 410.796.1434
Fax. 410.796.1438
www.mayerbrothersprecast.com

**600 GPD BNR SYSTEM
H-600 BNR
with 750 GALLON PUMP CHAMBER**

Dwg. No. Hoot Form #1 No Scale March 19, 2009

Cell	Trench	Pipe Inv. Elev.	Bottom Elev.	Highest Ground Over	Lowest Ground Over	Total Design Head (ft)	Approx. Lateral Length (ft)	Number of Perforations	Flow per Perforation (gpm)	Flow per Lateral (gpm)	Flow Diff. (gpm)
1	1	415.5	413.6	417.5	417.5	7.93	28.00	7	1.04	7.29	0.09
2	2	414.8	413.0	417.0	416.8	7.37	28.00	6	1.18	7.07	3.09
3	3	414.7	412.6	416.6	416.7	7.3	28.00	6	1.19	7.16	1.99
4	4	413.9	411.9	415.9	415.9	6.6	28.00	5	1.34	6.72	7.99

BENCHMARK ENGINEERING, INC.
ENGINEERS • LAND SURVEYORS • PLANNERS
8480 BALTIMORE NATIONAL PIKE # SUITE 315
ELLCOTT CITY, MARYLAND 21043
PHONE: 410-465-6105 FAX: 410-465-6644
BEN@B-CIVLENGINEERING.COM

OWNER: CHARLES PATRICK CULLEN
SOPHIE LOUISE GORSKI-CULLEN
6624 TOWERING OAK PATH
COLUMBIA, MD 21044

BUILDER: TBD

PROJECT: CHAPEL RISE - LOT 8
11590 CHAPEL RISE
CLARKSVILLE, MARYLAND 21029

LOCATION: TAX MAP: 28, GRID: 13
PARCEL: 282 & 303
ELECTION DISTRICT: 10, 5
11590 CHAPEL RISE
CLARKSVILLE, MD 21029
HOWARD COUNTY, MARYLAND

TITLE: BAT SITE PLAN AND LOW PRESSURE DOSE DESIGN
HOUSE TYPE: THE CULLEN RESIDENCE

DATE: OCTOBER, 2014 PROJECT NO. 258
SCALE: 1" = 30' DRAWING 1 OF 1



EP04 & EP05 Series Model 3871

SUBMERSIBLE EFFLUENT PUMPS



USE BLASTER PUMP EP0511

Wastewater

Goulds Water Technology

FEATURES

- EP04 Impeller: Thermoplastic semi-open design with pump out vanes for mechanical seal protection.
- EP05 Impeller: Thermoplastic enclosed design for improved performance.
- Casing and Base: Rugged thermoplastic design provides superior strength and corrosion resistance.
- Motor Housing: Cast iron for efficient heat transfer, strength, and durability.

APPLICATIONS

Specifically designed for the following uses:

- Effluent systems
- Homes
- Farms
- Heavy duty sump
- Water transfer
- Dewatering

SPECIFICATIONS

- Solids handling capability: 3/4" maximum.
- Capacities: up to 60 GPM.
- Total heads: up to 31 feet.
- Discharge size: 1 1/2" NPT.
- Mechanical seal: carbon-rotary/ceramic-stationary, BUNA-N elastomers.
- Temperature: 104° F (40° C) continuous, 140° F (60° C) intermittent.
- Class B Insulation
- Fasteners: 300 series stainless steel.
- Capable of running dry without damage to components.

- Motor Cover: Thermoplastic cover with integral handle and float switch attachment points.
- Power Cable: Severe duty rated oil and water resistant.
- Bearings: Upper and lower heavy duty ball bearing construction.

AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549

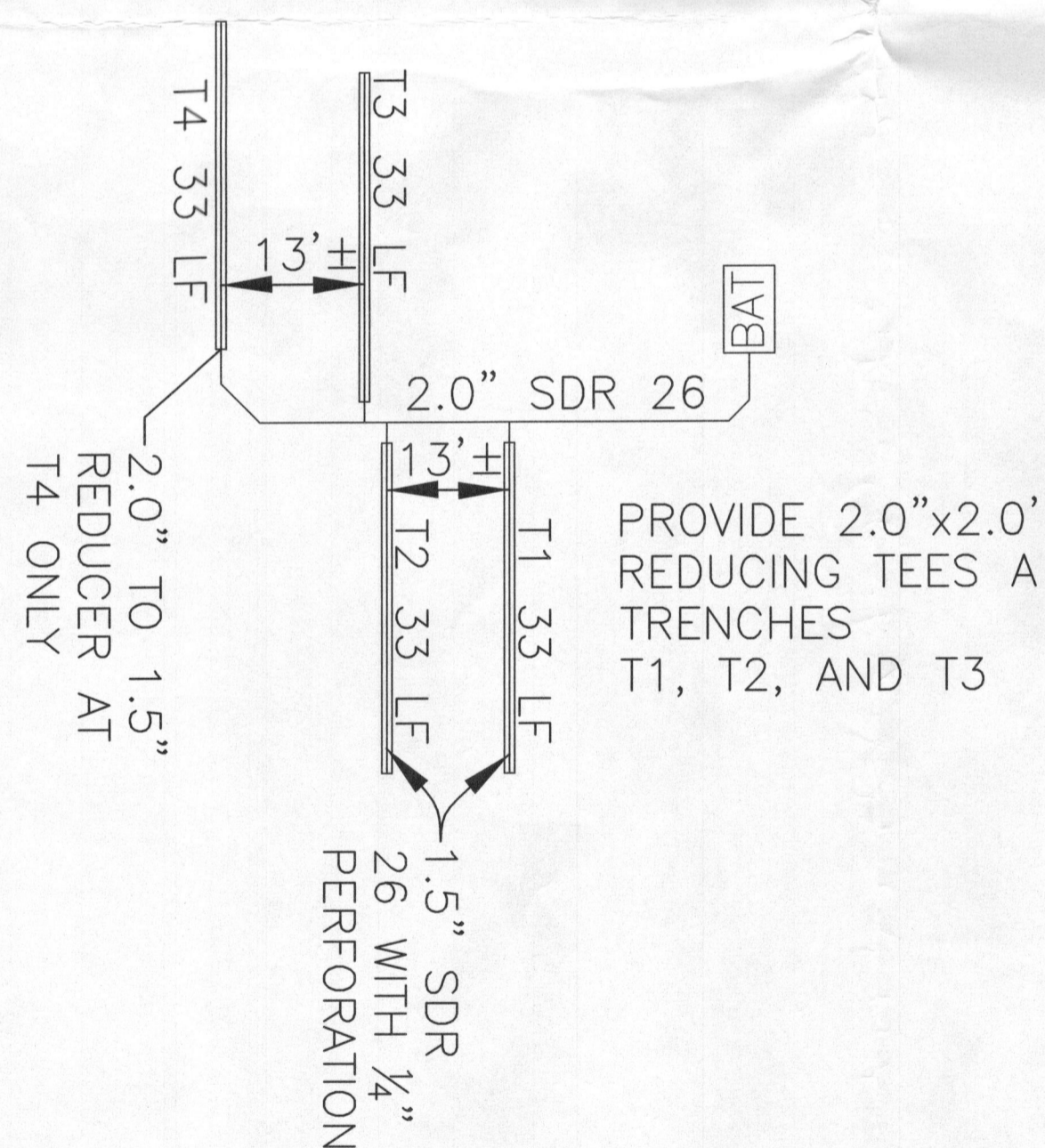
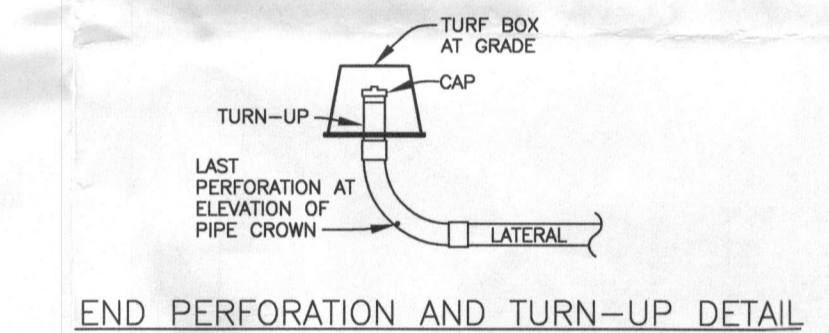
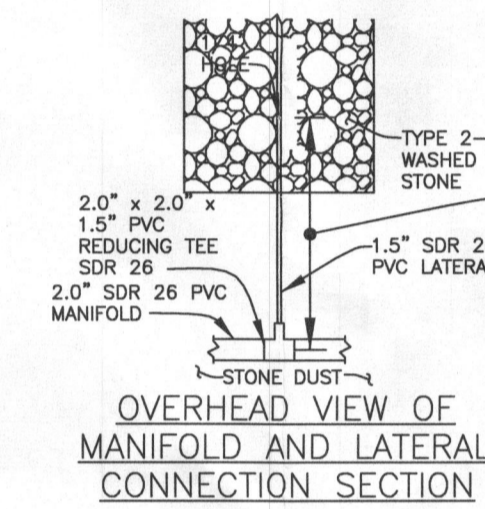
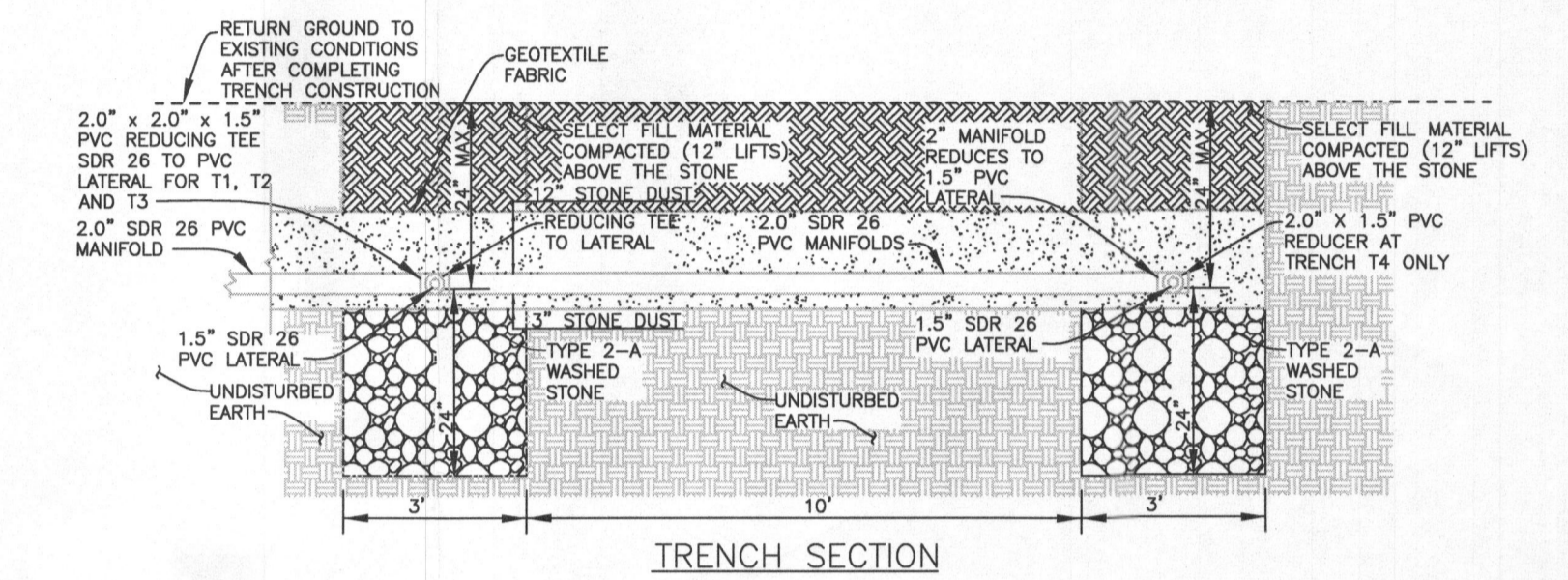
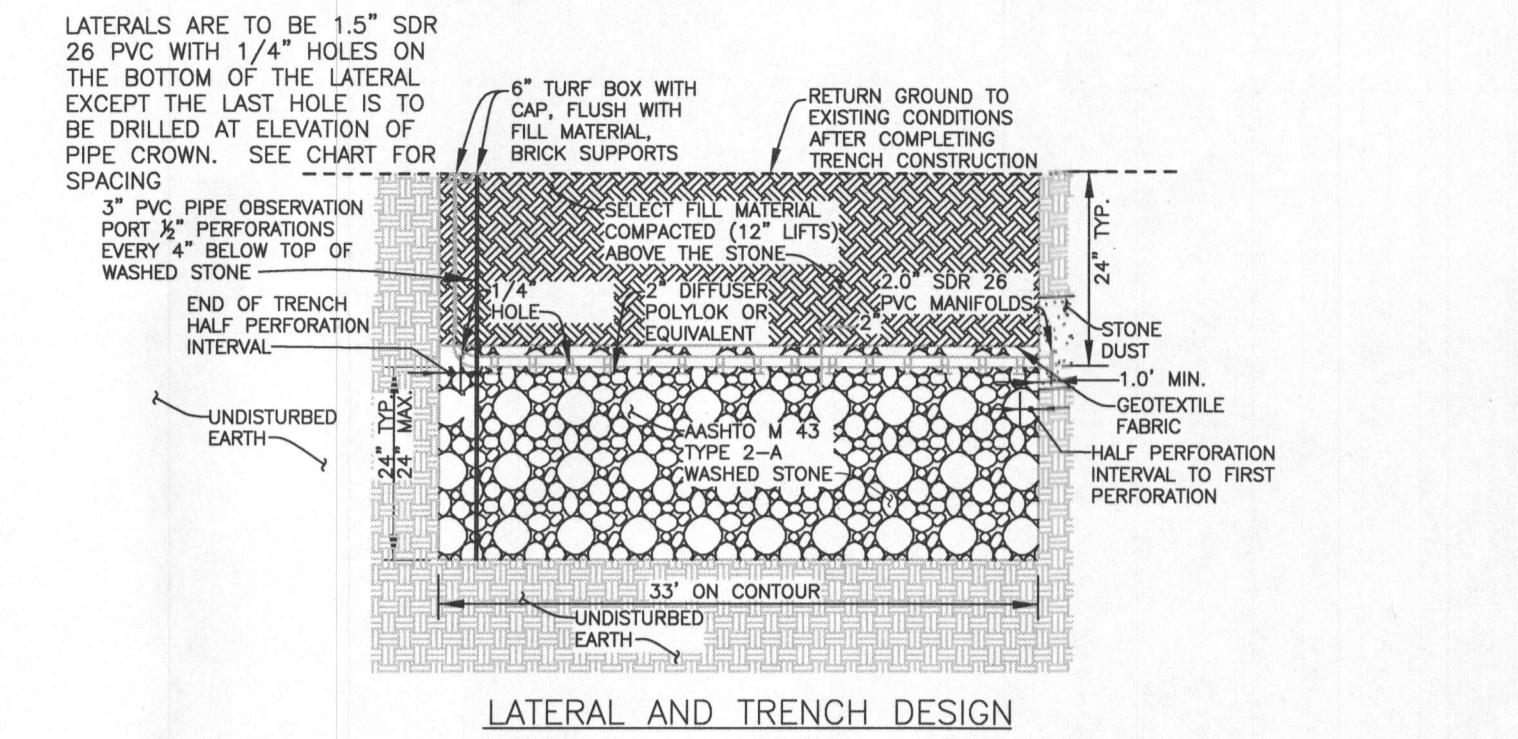
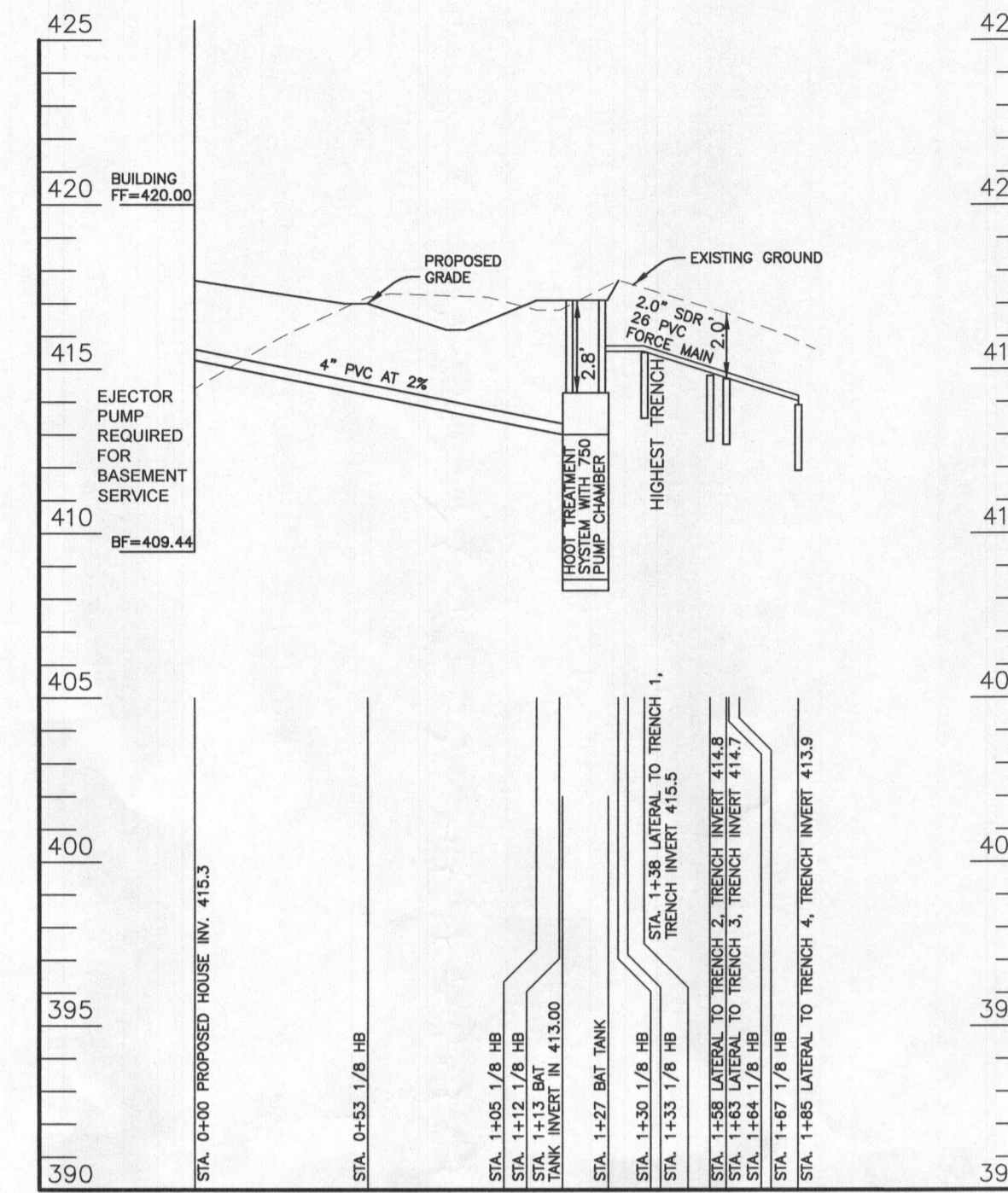
Motor:

- EP04 Single phase: 0.4 HP, 115 or 230 V, 60 Hz, 1550 RPM, built in overload with automatic reset.
- EP05 Single phase: 0.5 HP, 115 V or 230V, 60 Hz, 1550 RPM, built in overload with automatic reset.
- Power cord: 10 foot standard length, 16/3 SJTW with three prong grounding plug. Optional 20 foot length, 16/3 SJTW with three prong grounding plug (standard on EP05).
- Fully submerged in high grade turbine oil for lubrication and efficient heat transfer.

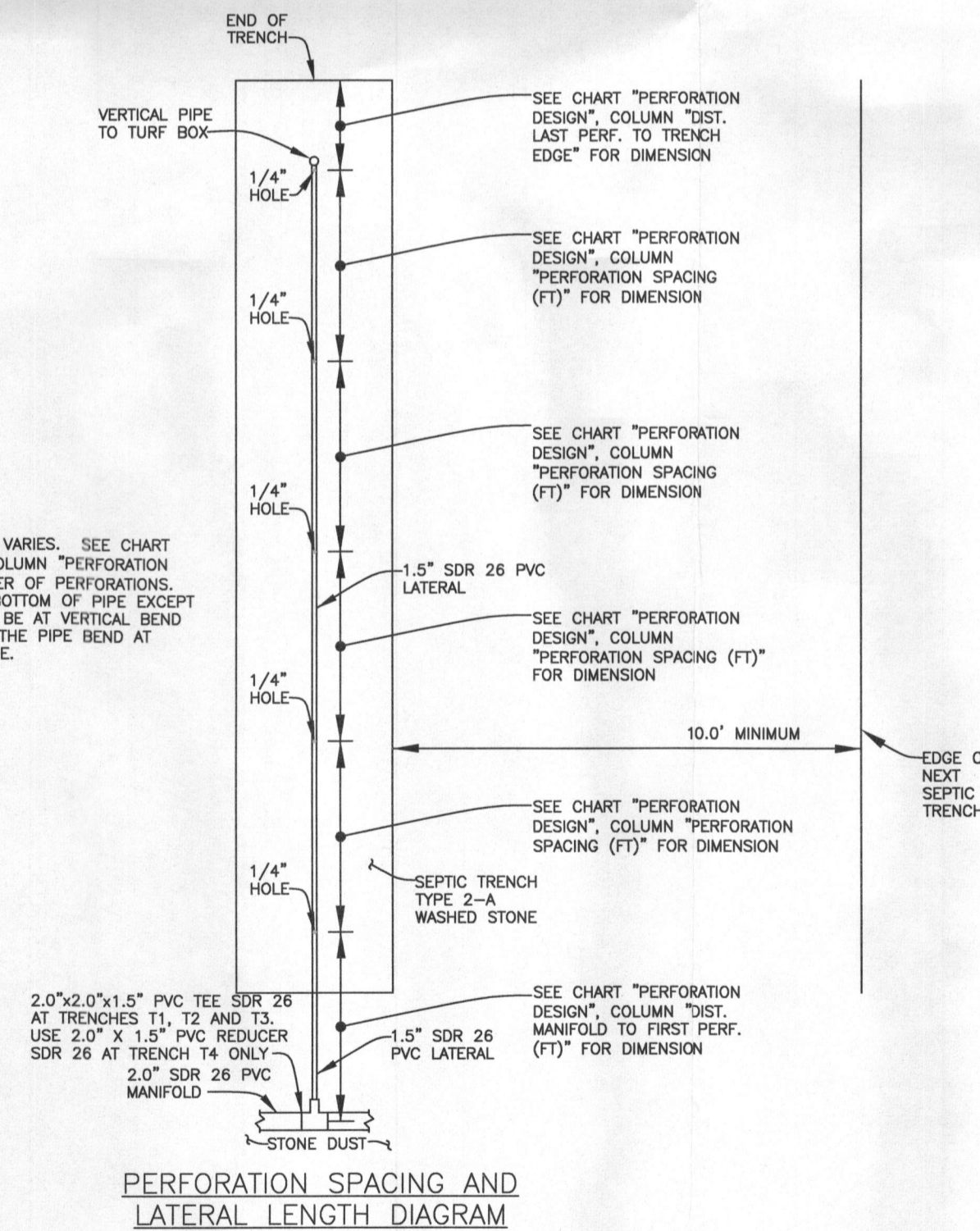
Available for automatic and manual operation.
Automatic models include Mechanical Float Switch assembled and preset at the factory.

PERFORMANCE RATINGS

Total Head (ft. of water)	Gallons Per Minute	
	EP04	EP05
5	53	-
10	46	42
15	36	55
20	21	46
25	0	33
30	-	11



NOTE: NUMBER OF PERFORATION VARIES. SEE CHART "PERFORATION DESIGN", COLUMN "PERFORATION SPACING (FT)" FOR NUMBER OF PERFORATIONS. PERFORATION TO BE ON BOTTOM OF PIPE EXCEPT THE LAST PERFORATION T BE AT VERTICAL BEND SET ON THE OUTSIDE OF THE PIPE BEND AT ELEVATION OF TOP OF PIPE.



Approved BAT Plan
10/31/2014

BENCHMARK
ENGINEERS & LAND SURVEYORS & PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE & SUITE 315
ELLICOTT CITY, MARYLAND 21043
PHONE 410-465-6105 FAX: 410-465-6644
BEI@BEI-CIVILENGINEERING.COM

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. 45577, Expiration Date: 06-08-2016.

OWNER: CHARLES PATRICK CULLEN
SOPHIE LOUISE GORSKI-CULLEN
6624 TOWERING OAK PATH
COLUMBIA, MD 21044

BUILDER: TBD

PROJECT: CHAPEL RISE - LOT 8
11590 CHAPEL RISE
CLARKSVILLE, MARYLAND 21029

LOCATION: TAX MAP: 28, GRID: 13
PARCELS: 282 & 303
ELECTION DISTRICT NO: 5
CLARKSVILLE, MD 21029
HOWARD COUNTY, MARYLAND

TITLE: BAT SITE PLAN AND LOW PRESSURE DOSE DETAILS
HOUSE TYPE: THE CULLEN RESIDENCE

DATE: OCTOBER, 2014 PROJECT NO. 2582

DESIGN: JMC DRAFT: JMC SCALE: 1" = 30' DRAWING 2 OF 2