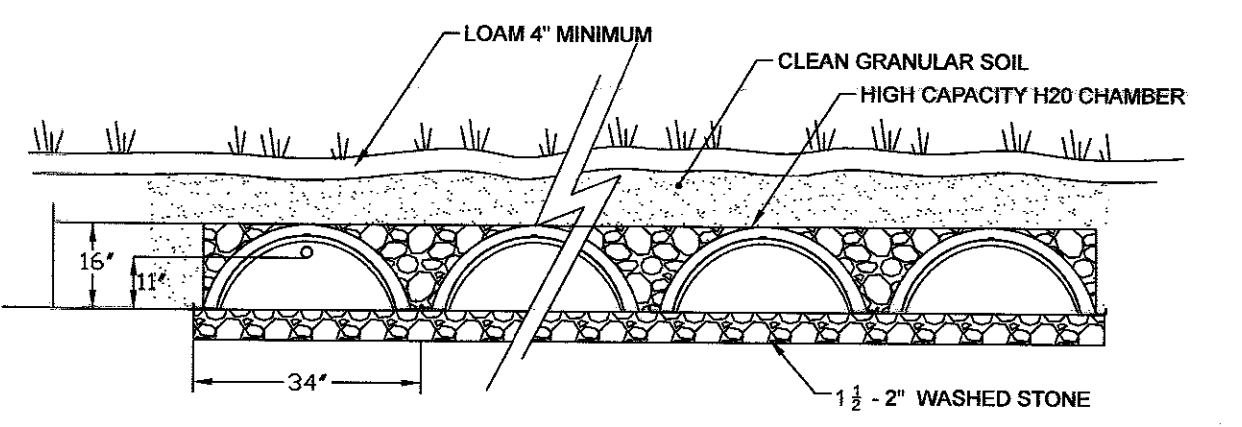
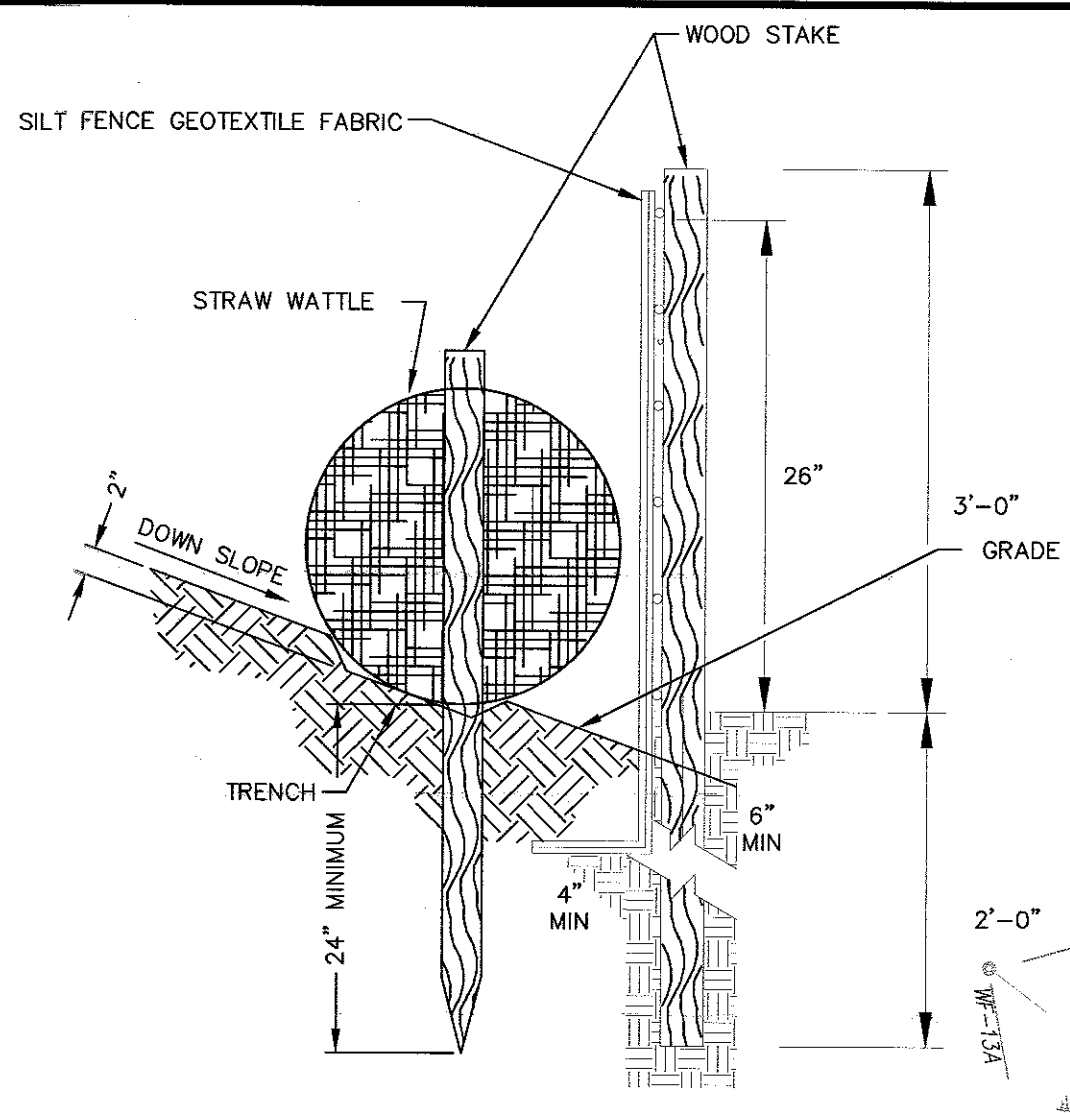


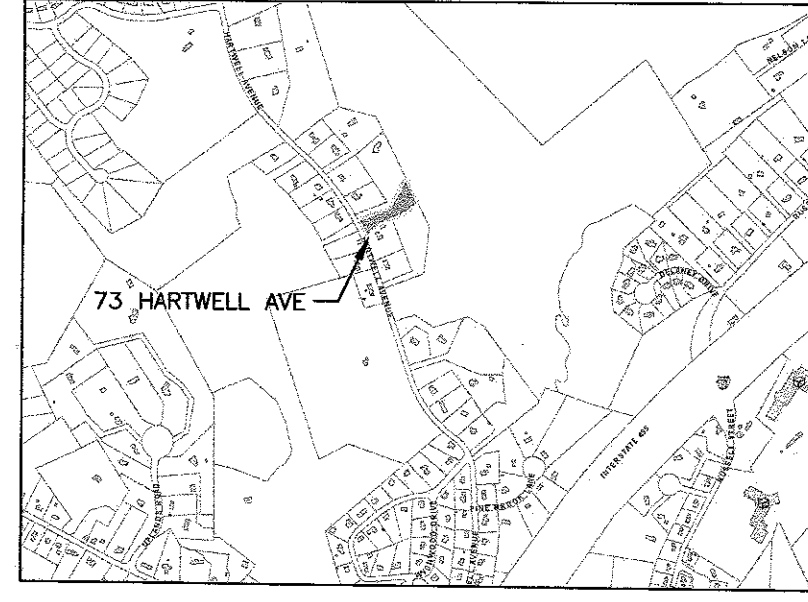
Property Information
 Owner of Record: Black Maple Development, LLC
 2 School Street
 Acton, Massachusetts 01720
 Litterton Assessors: Map R17, Lot 5 7
 Lot Area: 63,591 +/- sf
 Zoning District: Residence
 This property is NOT located within a Zone II
 This property is NOT located within a 100-year flood plain
 This property is located within a NHESP Priority Habitat
 This property is partially located within the Litterton Aquifer District
 This property is located within the Litterton Water Resource District



STORMWATER INFILTRATION CROSS SECTION



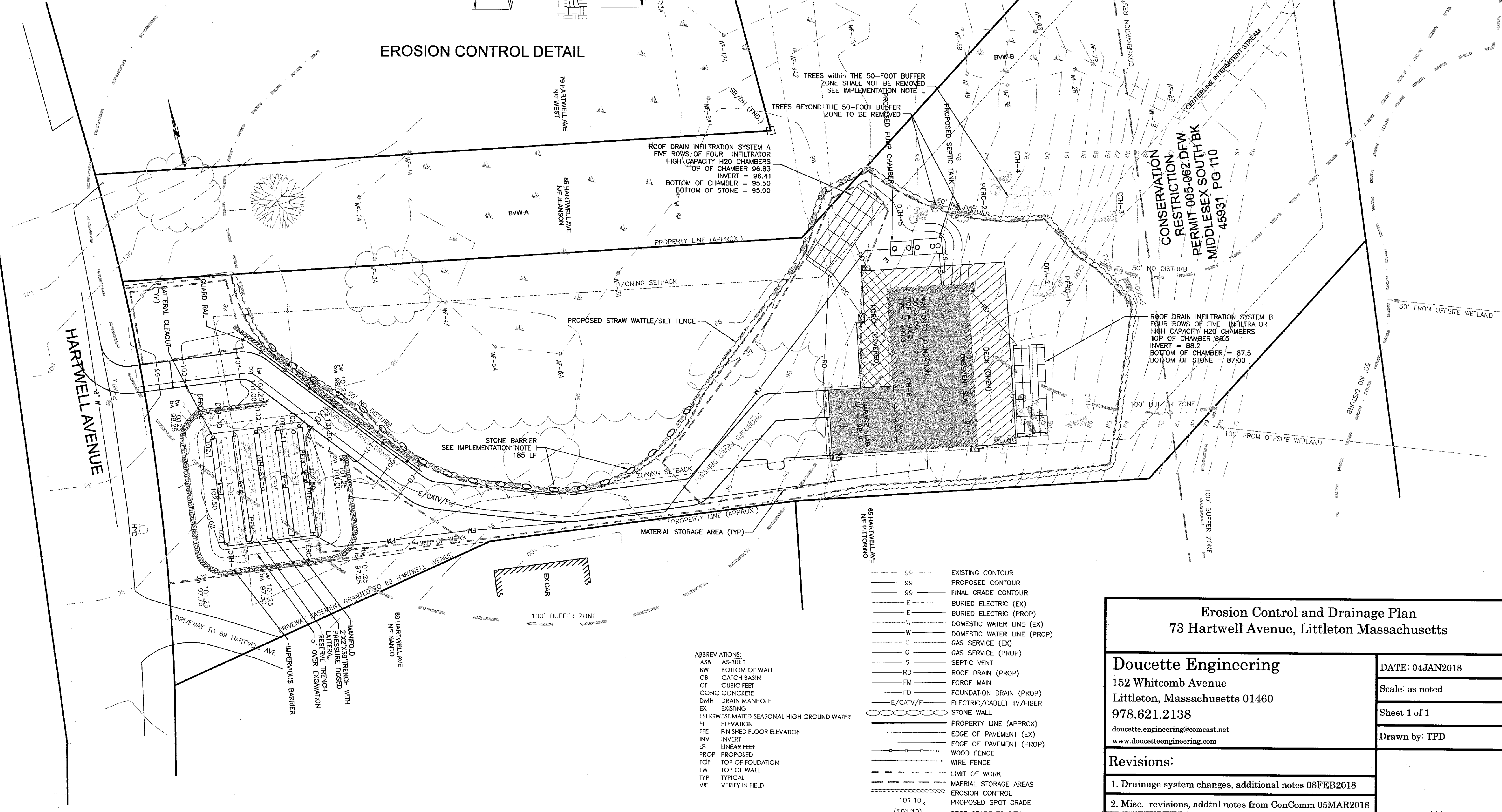
EROSION CONTROL DETAIL



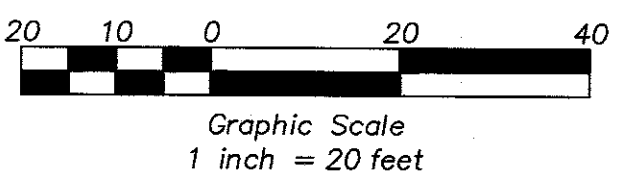
LOCUS
 NTS
 SOURCE: LITTLETON PUBLIC MAPS ONLINE

GENERAL NOTES
 WETLAND AREAS BVW-A AND BVW-B DELINEATED BY LEAH BASBANES, OF BASBANES WETLAND CONSULTING, ON JUNE 5, 2007
 OTHER BUFFER ZONES BEYOND 100' FROM THE PROPERTY TAKEN FROM PREVIOUS ELECTRONIC SURVEY DATA ELEVATIONS BASED ON ASSUMED DATUM

IMPLEMENTATION NOTES
 A. ALL WORK SHALL BE CONDUCTED IN ACCORDANCE WITH THE ORDER OF CONDITIONS ISSUED BY THE LITTLETON CONSERVATION COMMISSION.
 B. ALL WORK SHALL BE CONDUCTED IN ACCORDANCE AND COORDINATED WITH THE SEPTIC DESIGN PLAN.
 C. THE CONSTRUCTION SEQUENCE SHALL BE AS FOLLOWS
 1. LITTLETON CONSERVATION COMMISSION OR ITS AGENT SHALL BE NOTIFIED BEFORE ANY OTHER WORK BEGINS IN ORDER TO INSPECT. AT LEAST THREE WORKING DAYS SHALL BE PROVIDED PRIOR TO INSPECTION.
 A. STAKED EROSION CONTROL LINE
 B. FLAGGING OF TREES GREATER THAN 4-IN DIAMETER TO BE REMOVED
 C. STAKING OF THE JAPANESE KNOWTWEED TO BE REMOVED
 2. INSTALL SEDIMENTATION BARRIER, STRAW WATTLES PRIOR TO STARTING ANY OTHER WORK
 3. REMOVE JAPANESE KNOWTWEED AS PER IMPLEMENTATION NOTE K
 4. CLEAR AND GRUB
 5. GENERAL GRADING
 6. FOUNDATION EXCAVATION AND CONSTRUCTION
 7. INSTALL SEPTIC TANK, PUMP CHAMBER AND FORCE MAIN
 8. DRIVEWAY GRADING, SUBGRADE AND BINDER COURSE, SLOPE STABILIZATION
 9. HOUSE CONSTRUCTION
 10. SOIL ABSORPTION SYSTEM CONSTRUCTION
 11. FINAL GRADING
 12. FINAL SEEDING AND STABILIZATION
 13. DRIVEWAY TOP COURSE
 D. DURING CONSTRUCTION THE CONTRACTOR SHALL INSPECT THE SILTATION BARRIERS ON A REGULAR BASIS, ANY BARRIER SHALL BE REPLACED IF DEEMED TO BE INSUFFICIENT BY THE ENGINEER, CONSERVATION COMMISSION OR ITS AGENT.
 E. SILTATION SHALL BE REMOVED FROM THE BARRIER ONCE IT HAS REACH A DEPTH OF 50% OF THE BARRIER HEIGHT
 F. SLOPES SHALL BE STABILIZED IF THE AREA IS GOING TO BE UNDISTURBED FOR MORE THAN 7 DAYS.
 G. THERE SHALL BE NO BURIAL OR DISPOSAL OF CONSTRUCTION DEBRIS WITHIN THE 100-FOOT BUFFER ZONE.
 H. THERE SHALL BE NO ACTIVITY IN THE 50-FOOT NO-DISTURB ZONE. THIS SHALL INCLUDE NO STORAGE OF MATERIALS (INCLUDING SOIL), CUTTING OF TREES OR CLEARING OF BRUSH.
 I. FOLLOWING REMOVAL OF THE EROSION CONTROL BARRIER THERE SHALL BE A STONE BARRIER SET AT THE 50-FOOT WETLAND OFFSET. THIS SHALL CONSIST OF STONES NO SMALLER THAN 3 FEET, SPACED NO LESS THAN 6 FEET BETWEEN STONES
 J. ELECTRICAL WATER AND OTHER UTILITIES ARE SHOWN FOR COORDINATION, UTILITY PROVIDER WILL DETERMINE THE FINAL LOCATION
 K. JAPANESE KNOWTWEED THAT IS FOUND WITHIN THE LIMIT OF WORK SHALL BE REMOVED AND DISPOSED OF PROPERLY AS TO ELIMINATE THE SPREAD OF THIS INVASIVE SPECIES. SIX INCHES OF SOIL SHALL ALSO BE REMOVED WHERE THE JAPANESE KNOWTWEED IS REMOVED.
 L. SOIL SHALL BE RELOCATED OR DISPOSED OF PROPERLY ON THIS SITE. NO WASTE, TRASH OR DELTERIOUS MATERIAL SHALL BE BURIED ON SITE. SOIL SHALL BE APPROPRIATELY STABILIZED AFTER PLACEMENT. NO INVASIVE SPECIES MAY BE BURIED ON SITE.
 M. FOR ADDITIONAL SEPTIC SYSTEM DETAILS REFER TO NEW CONSTRUCTION CONVENTIONAL SOIL ABSORPTION SYSTEM DESIGN FOR 73 HARTWELL AVENUE, LITTLETON, MASSACHUSETTS BY DOUCETTE ENGINEERING, DATED 27JUL2018, REVISED 14AUG2018.



EROSION CONTROL AND DRAINAGE LAYOUT



ABBREVIATIONS:
 ASB AS-BUILT
 BW BOTTOM OF WALL
 CB CURB BASIN
 CF CURB FEET
 CONC CONCRETE
 DMH DRAIN MANHOLE
 EK EXISTING
 ESHG ESTIMATED SEASONAL HIGH GROUND WATER
 EL ELEVATION
 FFE FINISHED FLOOR ELEVATION
 INV INVERT
 LF LINEAR FEET
 PROP PROPOSED
 TOF TOP OF FOUNDATION
 TW TOP OF WALL
 TYP TYPICAL
 VIF VERIFY IN FIELD

LEGEND
 --- EXISTING CONTOUR
 --- PROPOSED CONTOUR
 --- FINAL GRADE CONTOUR
 --- BURIED ELECTRIC (EX)
 --- BURIED ELECTRIC (PROP)
 --- DOMESTIC WATER LINE (EX)
 --- DOMESTIC WATER LINE (PROP)
 --- GAS SERVICE (EX)
 --- GAS SERVICE (PROP)
 --- SEPTIC VENT
 --- ROOF DRAIN (PROP)
 --- FORCE MAIN
 --- FOUNDATION DRAIN (PROP)
 --- ELECTRIC/CABLE TV/FIBER
 --- STONE WALL
 --- PROPERTY LINE (APPROX)
 --- EDGE OF PAVEMENT (EX)
 --- EDGE OF PAVEMENT (PROP)
 --- WOOD FENCE
 --- WIRE FENCE
 --- LIMIT OF WORK
 --- MATERIAL STORAGE AREAS
 --- EROSION CONTROL
 --- PROPOSED SPOT GRADE
 --- SPOT GRADE TO REMAIN
 --- AS BUILT SPOT GRADE
 --- DEEP TEST HOLE
 --- PERCOLATION TEST
 --- TEMPORARY BENCH MARK
 --- GUTTER DOWNSPOUT

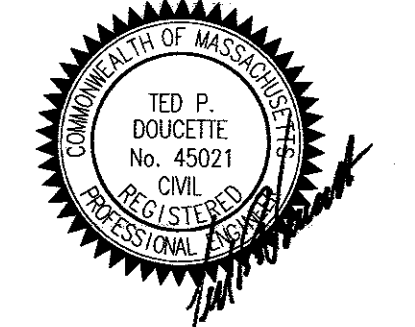
Erosion Control and Drainage Plan
 73 Hartwell Avenue, Littleton Massachusetts

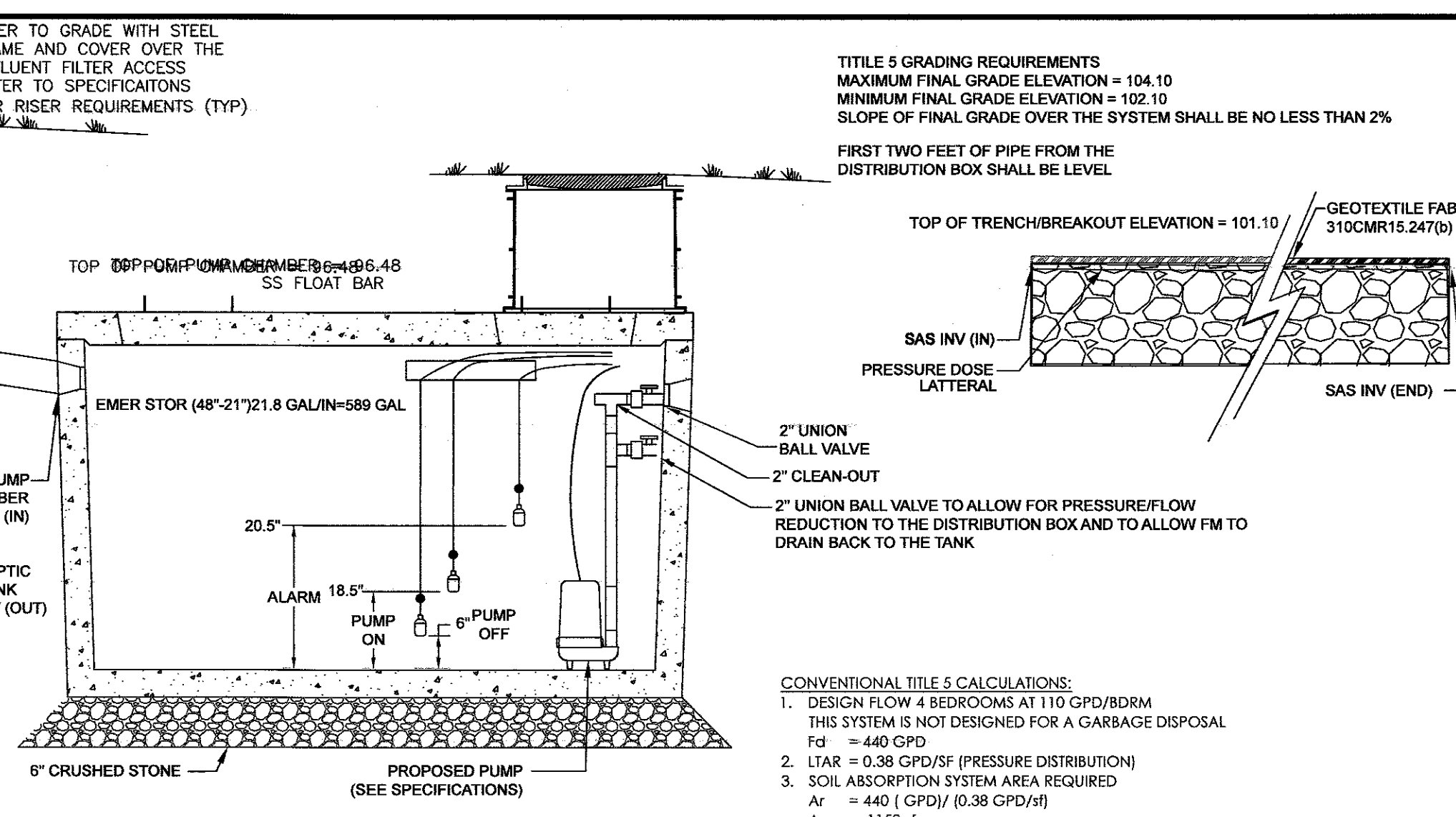
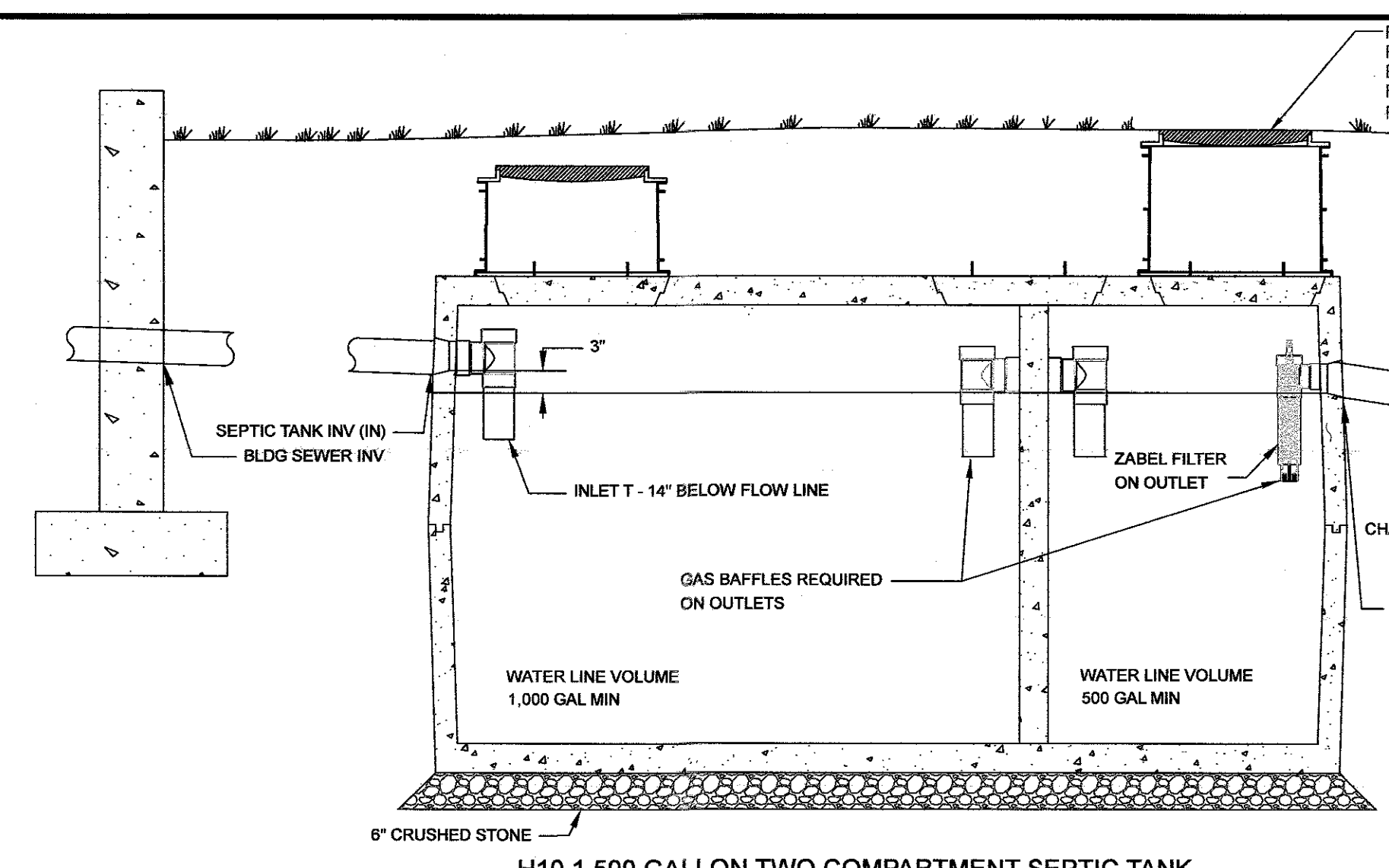
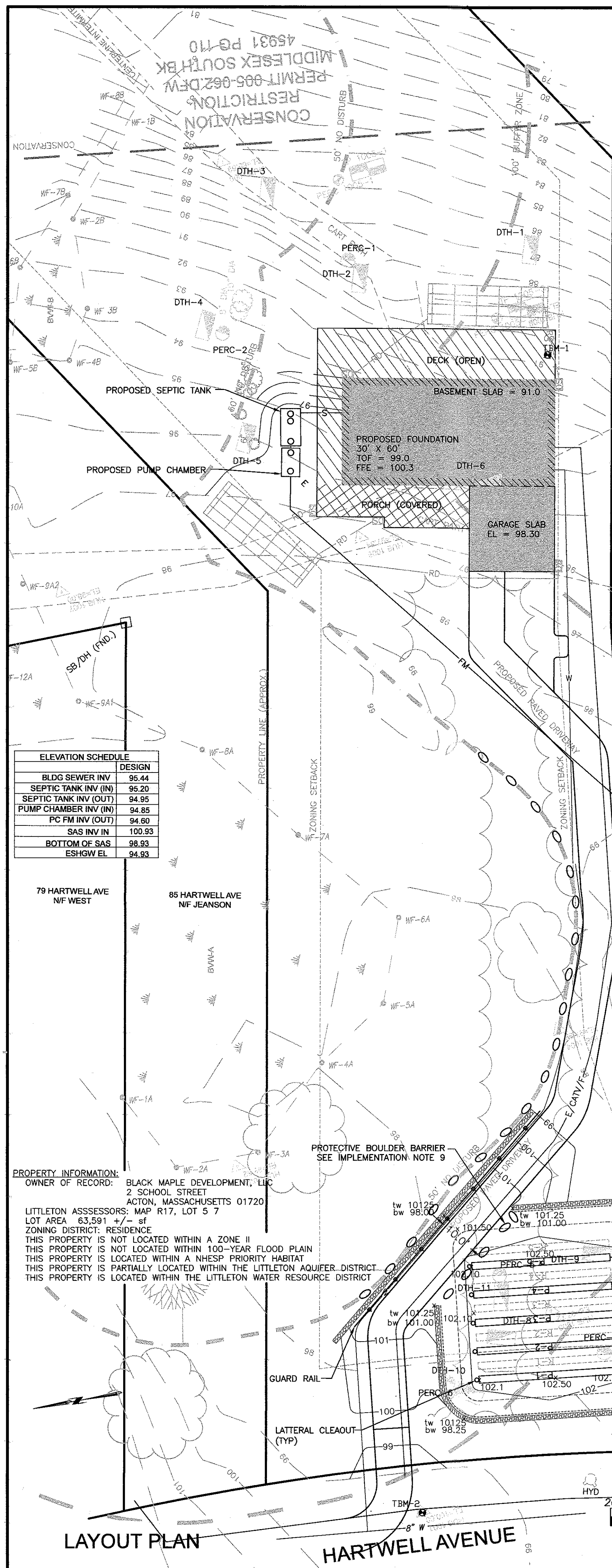
Doucette Engineering
 152 Whitcomb Avenue
 Littleton, Massachusetts 01460
 978.621.2138
 doucette.engineering@comcast.net
 www.doucetteengineering.com

DATE: 04JAN2018
 Scale: as noted
 Sheet 1 of 1
 Drawn by: TPD

Revisions:

1. Drainage system changes, additional notes 08FEB2018
2. Misc. revisions, addtl notes from ConComm 05MAR2018
3. Relocated septic, new foundation 19MAR2018
4. Relocated septic 13APR2018
5. Relocated septic tank/pc, misc edits 24APR2018
6. Revised soil absorption sys to Perc-rite design 05JUN2018
7. Conventional setpic design 23AUG2018





SOIL EVALUATION:
THE SOIL EVALUATION WAS CONDUCTED ON JULY 5, AUGUST 8, NOVEMBER 27, 2017, APRIL 13, 2018, AND JULY 16, 2018 BY TED P. DOUCETTE, WITNESSED BY JAMES GARREFFI, LITTLETON HEALTH AGENT, BOARDS OF HEALTH

DEEP TEST HOLE LOGS:

DTH 1 (EL = 86.85)
0'-8" A LOAM VERY (FRIABLE)
8'-22" B SANDY LOAM (FRIABLE)
22'-116" C SANDY LOAM (FIRM)
REDOXIMORPHIC FEATURES INDICATING GROUNDWATER WERE FOUND AT A DEPTH OF 34" NO SEEPING/STANDING WATER

CONVENTIONAL TITLE 5 CALCULATIONS:

- DESIGN FLOW 4 BEDROOMS AT 110 GPD/BDRM. THIS SYSTEM IS NOT DESIGNED FOR A GARBAGE DISPOSAL
Fd = 440 GPD
- LTAR = 0.38 GPD/SF (PRESSURE DISTRIBUTION)
SOIL ABSORPTION SYSTEM AREA REQUIRED
Ar = 1158 sf
- CONVENTIONAL SYSTEMS LAYOUT (REQUIRED TO BE SHOWN)
TRENCH DESIGN
DIMENSIONS W = 2' DEPTH 2'
EFFECTIVE WIDTH = 2'
INFLTRATIVE AREA IS 6 SF / LF
LENGTH OF TRENCH REQUIRED
Lr = (1158 SF) / (6 SF/LF) = 193 LF
- SOIL ABSORPTION SYSTEM AREA LAYOUT
3 TRENCHES AT 39 FT
- SOIL ABSORPTION SYSTEM CAPACITY PROVIDED
Cp = (5 FT)(39 FT)(6 SF/FT)(0.38 GPD/SF)
Cp = 445 GPD
- CONVENTIONAL LAYOUT
PRIMARY/RESERVE 5 TRENCHES 4' APART
RESERVE AREA PROVIDED BETWEEN TRENCHES AS ALLOWED BY 310CMR15.251(4) WHEN THE SPACING BETWEEN THE PRIMARY TRENCHES IS 3 TIMES THE EFFECTIVE WIDTH OR DEPTH, WHICHEVER IS GREATER

TRENCH CROSS SECTION

NTS: FIVE TRENCHES REQUIRED
TOTAL DEPTH OF COVER OVER THE TRENCHES SHALL BE 12"

DEEPTEST HOLE LOGS:

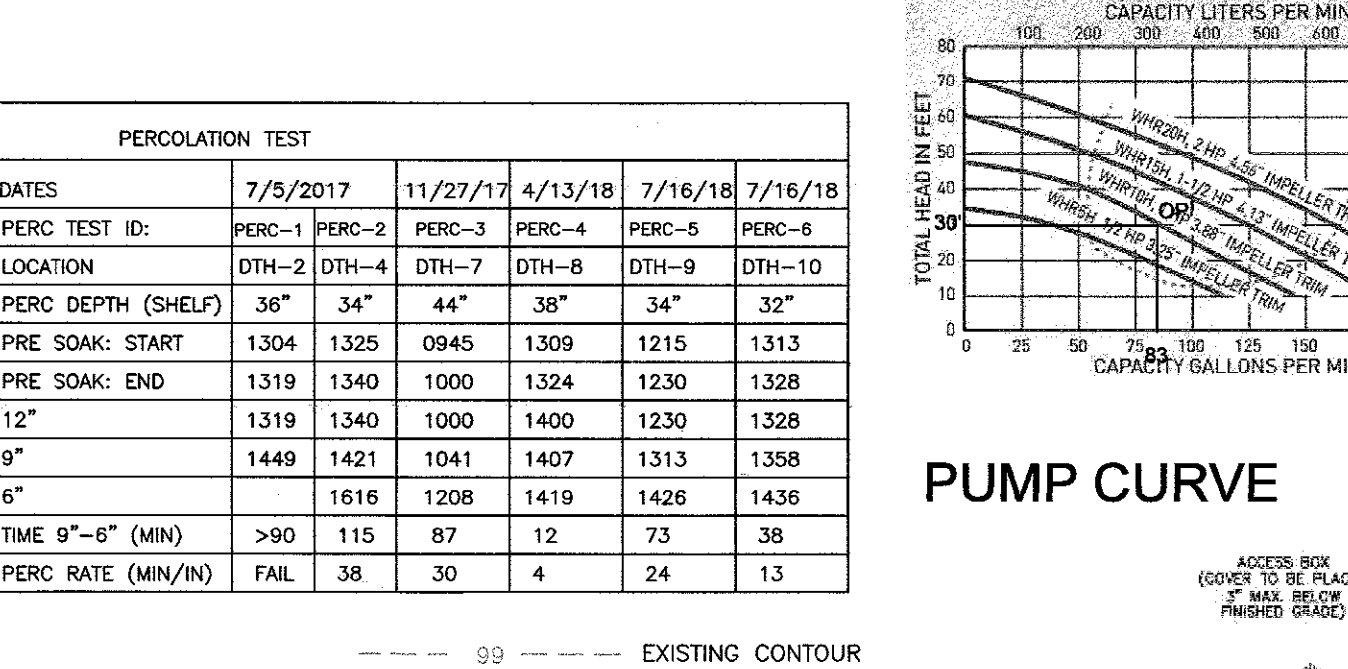
DTH 2 (EL = 88.21)
0'-8" A LOAM VERY (FRIABLE)
8'-24" B SANDY LOAM (FRIABLE)
24'-84" C SANDY LOAM (FIRM)
REDOXIMORPHIC FEATURES INDICATING GROUNDWATER WERE FOUND AT A DEPTH OF 34" NO SEEPING/STANDING WATER

PUMP CHAMBER BUOYANCY CALCULATIONS:

- GIVEN
FINAL GRADE AT PC= 97.3
TOP OF PC EL = 95.93
STATIC HEAD = 10.33
PC EXT BOTTOM EL = 90.26
WEIGHT OF TANK = 87.65 lb
AREA OF PC = 41.4 ft²
- ASSUMPTIONS
DENSITY OF SOIL = 100 lb/ft³
ESHOW EL = 93.50
DENSITY OF WATER = 62.4 lb/ft³
3. BUOYANT FORCE (Fb)
Fb = 93.50 - 90.26(41.4 ft²)(62.4 lb/ft³)
Fb = 8.370 lb
- WEIGHT (Fw) WEIGHT TANK AND WEIGHT OF SOIL OVER THE PUMP CHAMBER
Fw = Wt + Ws
Fw = 87.65 lb + (97.3 - 95.93)(41.4 ft²)(100 lb/ft³)
Fw = 14,561 lb
- CONCLUSION
Fw > Fb

PERCOLATION TEST

DATES	7/5/2017	11/27/17	4/13/18	7/16/18	7/16/18
PERC TEST ID:	PERC-1	PERC-2	PERC-3	PERC-4	PERC-5
LOCATION:	DTH-2	DTH-4	DTH-7	DTH-8	DTH-10
PERC DEPTH (SHELF)	36"	34"	44"	38"	32"
PRE SOAK: START	1304	1325	0945	1309	1215
PRE SOAK: END	1319	1340	1000	1324	1230
12"	1319	1340	1000	1400	1230
9"	1449	1421	1041	1407	1313
6"	1616	1208	1419	1426	1436
TIME 9"-6" (MIN)	>90	115	87	12	73
PERC RATE (MIN/IN)	FAIL	38	30	4	24



DEEPTEST HOLE LOGS:

DTH 3 (EL = 86.07)
0'-10" A LOAM VERY (FRIABLE)
10'-26" B SANDY LOAM (FRIABLE)
26'-38" C1 SANDY LOAM (LOOSE)
38'-96" C2 SANDY LOAM (FIRM)
REDOXIMORPHIC FEATURES INDICATING GROUNDWATER WERE FOUND AT A DEPTH OF 34" NO SEEPING/STANDING WATER

LATERAL CLEAN OUT DETAIL

ACCESS BOX TO BE PLACED AT MAX. BEING FINISHED GRADE

3" MIN. 1/4" TO 1/2" DOUBLE WASHED STONE

3/4" TO 1 1/2" DOUBLE WASHED STONE

6" OF 3/4" TO 1 1/2" DOUBLE WASHED STONE TO VENT HOLE AND BENEATH ACCESS BOX

DEEPTEST HOLE LOGS:

DTH 4 (EL = 86.85)
0'-14" A LOAM VERY (FRIABLE)
14'-30" B SANDY LOAM (FRIABLE)
30'-96" C2 SANDY LOAM (FIRM)
REDOXIMORPHIC FEATURES INDICATING GROUNDWATER WERE FOUND AT A DEPTH OF 30" NO SEEPING/STANDING WATER

LEGEND

- 99 --- EXISTING CONTOUR
- 99 --- PROPOSED CONTOUR
- 99 --- FINAL GRADE CONTOUR
- BURIED ELECTRIC (EX)
- BURIED ELECTRIC (PROP)
- DOMESTIC WATER LINE (EX)
- DOMESTIC WATER LINE (PROP)
- GAS SERVICE (EX)
- GAS SERVICE (PROP)
- SEPTIC VENT
- ROOF DRAIN (PROP)
- FM FORCE MAIN
- FD FOUNDATION DRAIN (PROP)
- E/CATV/F ELECTRIC/CABLE TV/FIBER
- STONE WALL
- PROPERTY LINE (APPROX)
- EDGE OF PAVEMENT (EX)
- EDGE OF PAVEMENT (PROP)
- WOOD FENCE
- WIRE FENCE
- LIMIT OF WORK
- MATERIAL STORAGE AREAS
- EROSION CONTROL
- PROPOSED SPOT GRADE
- SPOT GRADE TO REMAIN AS BUILT SPOT GRADE
- DEEP TEST HOLE
- PERCOLATION TEST
- TEMPORARY BENCH MARK
- GUTTER DOWNSPOUT

CONVENTIONAL TITLE 5 CALCULATIONS:

- DESIGN FLOW 4 BEDROOMS AT 110 GPD/BDRM. THIS SYSTEM IS NOT DESIGNED FOR A GARBAGE DISPOSAL
Fd = 440 GPD
- LTAR = 0.38 GPD/SF (PRESSURE DISTRIBUTION)
SOIL ABSORPTION SYSTEM AREA REQUIRED
Ar = 1158 sf
- CONVENTIONAL SYSTEMS LAYOUT (REQUIRED TO BE SHOWN)
TRENCH DESIGN
DIMENSIONS W = 2' DEPTH 2'
EFFECTIVE WIDTH = 2'
INFLTRATIVE AREA IS 6 SF / LF
LENGTH OF TRENCH REQUIRED
Lr = (1158 SF) / (6 SF/LF) = 193 LF
- SOIL ABSORPTION SYSTEM AREA LAYOUT
3 TRENCHES AT 39 FT
- SOIL ABSORPTION SYSTEM CAPACITY PROVIDED
Cp = (5 FT)(39 FT)(6 SF/FT)(0.38 GPD/SF)
Cp = 445 GPD
- CONVENTIONAL LAYOUT
PRIMARY/RESERVE 5 TRENCHES 4' APART
RESERVE AREA PROVIDED BETWEEN TRENCHES AS ALLOWED BY 310CMR15.251(4) WHEN THE SPACING BETWEEN THE PRIMARY TRENCHES IS 3 TIMES THE EFFECTIVE WIDTH OR DEPTH, WHICHEVER IS GREATER

IMPLEMENTATION NOTES:

- CONTRACTOR SHALL CONTACT DIGSAFE AT 811 OR WWW.DIGSAFE.COM, NO LESS THAN 72 HOURS PRIOR TO STARTING THEIR WORK.
- SUBSURFACE CONDITIONS ARE NOT GUARANTEED. THE LOCATION AND PRESENCE OF SUBSURFACE UTILITIES ARE NOT WARRANTED TO BE COMPLETE. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO THE COMMENCEMENT OF WORK.
- CONTRACTOR SHALL COORDINATE THE INSPECTIONS WITH THE BOARD OF HEALTH AND THE ENGINEER. PROVIDE 24-HOURS NOTICE. MINIMUM INSPECTIONS SHALL INCLUDE:
- AFTER EXCAVATION - BOTTOM OF HOLE
- AFTER CONSTRUCTION IS COMPLETE, PRIOR TO BACKFILLING
- PUMP TEST, IF NECESSARY SHALL BE WITNESSED BY THE BOARD OF HEALTH
- FINAL GRADES SHALL MEET EXISTING GRADES OR AS SHOWN ON THE PLAN.
- THE GRADING PLAN REQUIRES AT LEAST THREE INCHES OF SCREENED LOAM OVER THE ENTIRE DISTURBED AREA AND SPREADING SUITABLE SOIL FOR THIS PROPERTY.
- FINAL GRADES WILL BE SURVEYED FOR COMPLIANCE WITH THE DESIGN GRADES AND TITLE 5 REQUIREMENTS
- ALL WORK SHALL BE CONDUCTED IN ACCORDANCE WITH THE ORDER OF CONDITIONS ISSUED BY THE LITTLETON CONSERVATION COMMISSION AND RELATED PLANS
- PROTECTIVE BOULDER BARRIER AS REQUIRED BY THE BOARD OF HEALTH, THE BARRIER SHALL CONSIST OF BOULDERS NO SMALLER THAN 3 FEET AND SPACED NO MORE THAN SIX FEET APART.

LOCUS

NTS
SOURCE: LITTLETON PUBLIC MAPS ONLINE

I CERTIFY THAT ON 13NOV2003 I HAVE PASSED THE SOIL EVALUATOR EXAMINATION APPROVED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND THAT THE ABOVE ANALYSIS WAS PERFORMED BY ME CONSISTENT WITH THE REQUIRED TRAINING, EXPERTISE DESCRIBED IN 310 CMR 15.017

ISIGNATURE: [Signature] DATE 21DED2017

New Construction Conventional Subsurface Sewage Disposal System Design for
73 Hartwell Avenue, Littleton Massachusetts

DOUCETTE ENGINEERING
152 Whitcomb Avenue, Littleton, Massachusetts 01460
978.621.2138 • doucette.engineering@comcast.net
www.doucetteengineering.com

DATE: 27JUL2018
Scale: as noted
Sheet 1 of 1
Drawn by: TPD
Drawing number: 2018 - 109

Revisions:
1. BoH review, relocate water line, edits and clarifications 14AUG2018
2. BoH required protective stone barrier 22AUG2019

TEDE P. DOUCETTE
No. 45021
CIVIL ENGINEER
REGISTERED PROFESSIONAL